Subjective Wellbeing, Use of Payments and Financial Capability:

an Empirical Analysis of Mexico

By: Georgette A. Fernandez Laris

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Department of Economics
Faculty of Social Sciences
University of Sheffield

Abstract

This thesis revisits the role that people's engagement with their personal finances (and with tools generated to enhance such involvement) has on their financial behaviours and SWB. Specifically, the thesis aims to contribute to the SWB literature and to research about the psychology of payments in developing countries, such as Mexico, where financial inclusion is low, financial markets are less evolved, and the related literature is scarce. Adopting a microeconomics perspective grounded in behavioural economics (BE) insights, the thesis consists of three empirical chapters that evaluate distinct but related queries.

The first empirical chapter innovates by using Mexican Family Life Survey (MxFLS) panel data to develop measures of financial capability (FC)— that gauge attitudes, emotional reactions and cognitive-behavioural predispositions that guide people's financial habits—and by evaluating whether the latter influence the extent of depression and anxiety among Mexicans. The chapter's results showed that people with low FC (reflected through credit mismanagement and debt procrastination) experienced more symptoms of depression and anxiety than those with high FC (expressed in terms of better money monitoring habits). Results also revealed that, in our sample, the preferences of respondents' *future* short-run *selves* were outweighed by their short-run *present selves'* inclinations. Hence, the instantaneous pleasures forgone when undertaking patient (financial) choices loomed larger than the psychological gains from self-regulation, causing them to experience (on net) more depression symptoms.

The second empirical chapter investigates whether household financial balances, such as savings and debt levels—when considered as self-standing constructs (rather than resulting from FC attributes)—as well as debt to income (DTI) and debt to savings (DTS) ratios have any influence on people's experience of depression. Also based on longitudinal MxFLS data, this chapter innovates by controlling for the impact of risk aversion (RA) and time-value (TV) preferences to explore whether such behavioural traits exert any influence over how debts and savings affect people's SWB. Cross-sectional results evidenced a positive statistically significant relationship between depression and anxiety and respondents' total debts overdue, debt to income (DTI) and debt to savings (DTS) ratios. The effects of total savings were less conclusive. Panel FE results revealed causal significant positive effects of debts and DTI ratios on depression and anxiety once time-invariant heterogeneity across respondents was controlled for. While cross-sectional results across both waves suggested a positive relationship between TV preferences and depression and anxiety, RA was only significant in the later period (2009) wave. None of the behavioural covariates revealed significant causal impacts on depression and anxiety

once time-invariant unobservables such as engrained cultural values or the biological components of temperament were controlled away in FE panel estimations.

The third (and final) empirical chapter expands the literature on the behavioural effects of payments using the most recent wave (2021) of Mexico's financial inclusion survey, to date the only existing survey in Mexico combining household-level sociodemographic indicators with payments use data allowing for micro-level analyses. Through multinomial logit regressions it evaluates the determinants of the use of different payment forms according to diverse transactions. The results revealed negative associations between cash usage and education, standard of living, financial knowledge, and residing in an urban area. Perceptions of subjective financial wellbeing (SFWB) and financial attitudes were positively related to using non-cash payments and age was inversely related with the use of digital payments. The last empirical chapter also analyses whether distinct non-cash payment methods, diversified by extent of physicality, influence financial management behaviours through interplay with people's cognitive biases and mental accounting processes. We correct endogeneity from omitted variable bias through a novel technique that uses information about selection on observables to retrieve information about selection along unobservables. Bias-adjusted results showed that all psychological effects were stronger for digital payment forms and supported our conjecture that the more virtual the payment form, the more it can bypass cognitive functions that naturally rein in spending, thus potentially leading to compromised financial behaviours.

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Declaration:

I hereby declare that this thesis is my own original work. It has not been submitted, in whole or in part, for any other degree or qualification at this or any other university. Additionally, I have acknowledged and fully referenced the work of others when consulting and describing it.

No conflicts of interest emerged with respect to the research, authorship, and/or completion of this PhD thesis. None of the analyses, findings and interpretations herein presented reflect the views of CONACYT, my sponsor, nor those of any other institution, or group of researchers.

On the condition for the possibility of (any type of) freedom:

"Freedom is the disciplining of desire so as to make the achievement of the good first possible and then effortless."

(B. R. Baron, 2023)

To Joaquin Claudio Fernandez Laris:

For while we all still trade in the currency of time,
you reached the greatest value and prime,
sooner than our effort would align,
and are rewarded by lasting joy we could not define.

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List of Abbreviations

AET .... (Scholars) Altonji, Elder, and Taber (2005a)
AME .... Average Marginal Effect(s)
ATM .... Automated Teller Machine(s)
BANSEFI .... Banco del Ahorro Nacional y Servicios Financieros
(Mexico's National Savings and Financial Services Bank)
BANXICO .... Banco de México
(Central Bank of Mexico)
BE .... Behavioural Economics
BHPS .... British Household Panel Survey
CC .... Credit Card
CDS .... Calderón Depression Score
CE .... Certainty Equivalent
CFPB .... (U.S.) Consumer Financial Protection Bureau
CHFS .... (China) Household Finance Survey
CIDE .... (Mexican) Centre for Economic Research and Teaching
CIP .... Choice Indifference Points
CNVB .... Comisión Nacional Bancaria y de Valores
(Mexican National Banking and Stock Exchange Commission)
CoDi .... Cobro Digital
(Mexican Fast-Retail Electronic Payment Technology)
CONAIF .... Consejo Nacional de Inclusión Financiera
(Mexican National Council of Financial Inclusion)
CONDUSEF .... Comisión Nacional para la Defensa de Usuarios de las Instituciones Financieras
(Mexico's National Committee for the Defence of Users of Financial Institutions)
DC .... Debit Card
DFS .... Digital Financial Services
DID .... Difference in Differences
DTI .... Debt-to-income Ratio
DTS .... Debt-to-savings Ratio
EC .... European Commission
EF .... Executive (Brain) Functions
ENIF .... Encuesta Nacional de Inclusion Financiera
(Mexican Financial Inclusion Survey)

EV ... Expected Value

FA ... Factor Analysis

FB ... Financial Behaviour(s)

FBI ... Financial Behaviour(s) Index

FC ... Financial Capability

FCA ... (U.K.) Financial Conduct Authority

EV ... Expected Value

FA ... Factor Analysis

FB ... Financial Behaviour(s)

FBI ... Financial Behaviour(s) Index

FC ... Financial Capability

FCA ... (U.K.) Financial Conduct Authority

FDI ... Foreign Direct Investment

FE ... Fixed Effects

FI ... Financial Institution(s)

FINRA ... (U.S.) Financial Industry Regulatory Authority

FL ... Financial Literacy

FSA ... (U.K.) Financial Service Authority

FWB ... Financial Wellbeing

GET ... General Evaluability Theory

GFC ... (2008) Global Financial Crisis

GHQ ... (U.K.) General Health Questionnaire

GNI ... Gross National Income

GPFI ... Global Partnership for Financial Inclusion

HIC ... (High Income Country(/ies)

HILDA ... (Australia) Household, Income & Labour Dynamics Survey

Hhd ... Household

IBERO ... Iberoamerican University

INEGI ... Instituto Nacional de Estadística y Geografía (Mexico's National Institute of Statistics and Geography)

INFE ... International Network on Financial Education

IQ ... Intelligence Quotient

IS-LM ... Investment Savings-Liquidity Money Model

LMIC ... Low and Middle Income Country(/ies)

MIC ... Middle Income Country(/ies)

MB .... Mobile Banking
MST .... Magnetic Secure Transmissions
MxFLS .... Mexican Family Life Survey
MxFLS-II Second Wave (2005-2006)
MxFLS-III Third Wave (2009-2012)
MXN .... Mexican Peso
NFC .... Near-field Communication
NFI .... Non-financial Institution
NLPCA .... Nonlinear Principal Component Analysis
OECD .... Organisation for Economic Co-operation and Development
OSPI .... Overall Store Price Image
OV .... Omitted Variable(s)
OVB .... Omitted Variable Bias
PC .... Principal Component
PCA .... Principal Component Analysis
PFRC .... (University of Bristol) Personal Finance Research Centre
PIN .... Personal Identification Number
PNIF .... Política Nacional de Inclusión Financiera
(Mexican Nacional Financial Inclusion Policy)
POS .... Point of Sale
PWB .... Psychological Wellbeing
QR .... Quick Response (Code)
RA .... Risk Aversion
RE .... Random Effects
RF .... Radio Frequency
ROSCA .... Rotating Savings and Credit Associations
RP .... Risk Premia
RPM .... Raven Progressive Matrices (Test)
SEC .... (U.S.) Securities and Exchange Commission
SFWB .... Subjective Financial Wellbeing
SPEI .... Sistema de Pagos Electronicos Interbancarios
(Mexico's Interbank Electronic Payment System)
STTW .... Spendthrift-Tightwad (Scale)
SWB .... Subjective Wellbeing

2SLS .... Two-stage Least-squares Regression
TP .... Time Premia
TV .... Time-value
UCLA .... University of California, Los Angeles
UFA .... Universal Financial Access
UNODC .... United Nations Office on Drugs and Crime
U.S. .... United States of America
USD .... United States Dollars
U.K. .... United Kingdom of Great Britain
VAT .... Value Added Tax
WB .... Word Bank
WTP .... Willingness-to-pay

Chapter 1

Introduction

"The problem confronting social analysts is not to find the social in the money grid, which is already social, but to understand the wellbeing implications of people's dynamics in such grid."

(Excerpt adaptation: "Finance and Society", Perry Mehrling, 2017)

1.1 MOTIVATION AND AIMS

Finance, understood as an efficient use of money and of its infrastructure, is not something separate from society but part of its fabric. To this effect, economists as far back as Adam Smith recognised that its object of analysis—money— "determines the prudence or imprudence of all purchases and sales, and hereby regulates almost the whole business of common life" (Smith, 1776, p. 37). Similarly, Simmel (1907) argued that the "money economy makes possible a specific kind of mutual dependence which, at the same time, affords room for maximum liberty" since exchange using money presupposes "objective appraisal, consideration, mutual acknowledgment and restraint" that, through collaborative action, makes it advantageous for both parties and increases their mutual satisfaction (p.290-295).
The resonance of these propositions endures, not only intuitively but empirically. Over the past 50 years, and especially since the first decade of the 2000s, interest in how people's personal finances relate to their SWB and in the (positive or negative) contribution of financial markets to pre-existing social conditions (including inequality) has been renewed; partly in response to financial crises and partly to understand financial services' potential to foster inclusion and prosperity. A cursory review of research and policy initiatives taking precedence after the 2008 global financial crisis (GFC) and prior to the Covid-19 pandemic, reveals that, aside from economic recovery programmes and proposals to regulate financial markets, two interrelated aims have been central for international organisations, local governments and academic research centres alike: augmenting SWB and financial inclusion.

Indeed, following Stiglitz, Sen, and Fitoussi's (2010) denunciation of the familiar but until then, largely disregarded limitations of using gross-domestic product (GDP) as a yardstick of economic progress, in July 2011 the United Nations General Assembly adopted resolution 65/309: "Happiness: towards a holistic approach to development" which encouraged governments to direct attention to happiness and wellbeing as new normative benchmarks for policymaking. Similarly, in 2011 the Organisation for Economic Co-operation and Development (OECD) launched the "Better Life Initiative" and since has promoted guidelines to build SWB into measures of societal progress.

From these and related initiatives, research on the importance of money (measured through income) as a determinant of happiness burgeoned alongside the specific preoccupations of the time. For example, evaluating the effects of the Covid-19 pandemic, Helliwell et al. (2022) found that countries that dealt better with the pandemic and also maintained their pre-pandemic happiness ranking were those with high levels of social and institutional trust. Helliwell et al. (2022) also attributed the falling happiness observed in countries such as Argentina, Brazil, Colombia and Mexico to the pervasive lack of trust in Latin America (itself ranking as one of regions of the world with least trust). The results coincided with their earlier research exploring the effects of the GFC on happiness where Helliwell et al. (2013) observed a smaller impact in countries with high levels of mutual trust.[1]

Concurrent with the flourishing of SWB research within the "beyond GDP" zeitgeist of the early 2000s, financial inclusion research also blossomed. The latter had been an explicit social policy[2] since the 1990s but was initially bound up within criticisms of financialization.[3] Nonetheless, institutions such as the World Bank (WB) have consistently advanced financial inclusion as a paragon, market-based antidote for poverty, through complementary strategies. Following the GFC, FC emerged as a new strategy to complement pre-existing financial inclusion initiatives. Instead of concentrating on expanding access (like microcredit and reverse redlining programs) FC focuses on improving financial decision-making (of all groups) and on mitigating exclusion arising from scarce or lacking understanding about how best to utilize financial resources. Additionally, since the GFC several agreements and international consortiums have been established to position financial consumer protection, financial education (of which FC is part) and financial inclusion as basic building blocks of consumers' empowerment (OECD, 2017). Moreover, since 2013 the WB set up the parallel goal of universal financial access (UFA) whose advancement has relied on the swift technological change in digital financial services (DFS), thus also enshrining financial digitalisation as an implicit policy goal of the financial inclusion paradigm.

Despite the simultaneous, yet independent, commitments to enhance SWB and financial inclusion as international policy agendas, much research is still needed to understand how they relate and, most importantly, to evaluate what influence do specific tools within the financial inclusion policy-set (such as financial capability or the adoption of new forms of payments) have on people's financial health and SWB. Such an enquiry is even more essential for developing countries where people tend to face low financial and social inclusion as well as stagnating or decreasing SWB.

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[1] Both WHR findings coincide with a broader literature documenting that groups with high levels of trust are generally much more resilient when facing a variety of crises (health, financial or otherwise).

[2] Both at the local, country-level and internationally.

[3] Following Epstein (2005) we use the term broadly to refer to the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of the domestic and international economies.

For example, Helliwell et al. (2022) found that since 2012, the trend growth in worry and sadness has been greatest in Latin America, MENA, South Asia, and Sub-Saharan African countries. Additionally, comparing answers to the Cantril ladder life-evaluation question across 140 countries, Helliwell et al. (2022) found that average life satisfaction scores between the 2008-2012 and the 2019-2021 period dropped the most for: Lebanon, Venezuela, Mexico, Afghanistan, Lesotho, Zimbabwe, Jordan, Zambia, India, and Botswana. At the same time, based on 2017-2021 Global Financial Inclusion (Global Findex) Database country rankings, Mexico has one of the lowest levels of financial inclusion of the above group of countries with declining SWB (being second to last [after Afghanistan] by share of population [older than 15 years] with an account). Nonetheless, according to WB databank time-series statistics, Mexico's per capita GDP has been, consistently, at least double than that of most aforementioned countries (WB National Accounts Data, 2011-2022).

Since most scholars acknowledge that the evolution of money and adoption of new financial instruments has been, historically, inseparable from technological change and that the latter responds directly in proportion to the accumulation of capital and wealth in a country, the level of financial inclusion in Mexico is somewhat puzzling.

The case of Mexico is even more intriguing given that since 2012/2013 financial inclusion has prefigured as one of the main axes of the national development plan (PND[4]) just as in India, one of the countries with the most improvements in this policy area over the past decade. In fact, Mexico's ENIF emerged in 2012 in response to the growing promotion of financial inclusion as 'a pillar of development' and 'tool' to weaken poverty cycles, diminish inequalities, and provide social mobility opportunities (Global Partnership for Financial Inclusion [GPFI] n.d.). Similarly, in 2013 India's Finance Minister launched an index to measure the status of financial inclusion in India (CRISIL Inclusix). However, despite similar monitoring initiatives, much less improvements have been observed in Mexico than in India in terms of financial inclusion. Nonetheless, Mexico's average life evaluation score was 1.6 times higher than India's (Helliwell et al., 2022).

More recently, the 2019-2024 iteration of Mexico's PND included a national digital strategy positioning financial digitalisation as a bottom-up pathway to improve social inclusion and wellbeing amongst the population. Nonetheless, neither the PND nor the related 2020-2024 National Financial Inclusion Policy specify empirically (and at the level of the individual) how greater engagement with financial services would improve Mexicans' experienced SWB.

Granted, most official government publications and statutory proposals do enumerate the usual benefits of financial inclusion, namely: incorporating more citizens to the productive economic spheres of the country, raising their ability to smooth consumption and potential for savings, reducing transaction costs and the informal sector. However, such inventories of benefits maintain an aggregative character,

[4] PND – from its Spanish name "Plan Nacional de Desarrollo."

mostly relate to material wellbeing (rather than to other dimensions of SWB) and they still seem detached from individuals' specific relation to financial resources, preferences and understanding of how best to use the increasing availability of financial services to further meaningful personal goals.

In contrast, others have heralded Kenya's mobile money payment network system—M-Pesa—as the greatest financial inclusion success story of the twenty-first century, emphasising that, beyond the focus upon scale, speed and volume characterizing most evaluations of financial inclusion, success depends on understanding how new technologies and access can achieve broader changes in how people use and relate to money (see Kirwan, 2021).
With less than half the proportion of account holders (as a share of working age population) than Kenya, Mexico's GDP per capita is five times as large and its happiness (life satisfaction) score is 1.4 times higher than in Kenya. Nonetheless, 'wealthier' and 'seemingly happier' Mexicans can still learn from the technological ingenuity of other LMICs to improve the financial behaviours and SWB of the population.

In light of the above stylized facts, including Helliwell et al. (2022) observation of increasing long run negative affective states in Latin America, the research presented in this thesis aims to analyse how Mexican's levels of anxiety and depression have been influenced by their actual debts and savings balances; by their use of different payment forms; and by capabilities that help people control the influence of behavioural biases and enhance one's autonomy with respect to financial affairs.

Hence, broadly speaking, this thesis intends to provide objective empirical evidence about how Mexicans' actual engagement with their finances (as reflected by elements of their financial competence [i.e. FC] , the levels of debts and savings they maintain, or how they interact with different payment forms) affects their SWB to help inform policymakers seeking to ensure the financial inclusion agenda delivers on its promises so that it becomes, beyond the "access at all costs" narrative, a route to enhance the (material and psychological) wellbeing of new financial technologies' adopters.

1.2 RESEARCH APPROACH

While development economics' ontological shift to look "beyond GDP" to assess economic progress and the promotion of financial inclusion to enhance living standards are relatively recent, the overarching relationship analysed throughout this thesis—namely how the financial domain of people's lives interrelates with SWB—has preoccupied the humanities and social sciences for centuries. Recognising that the nature of the investigation, and the results it may obtain, depend, at least partially, on the standpoint undertaken, this section details the epistemological approach adopted in this thesis.

Following neoclassical economics empirical reorientation since the late 1950's, this thesis adopts a positivist research philosophy. Using an inductive empirical approach its chapters contextualise, describe and test specific hypotheses seeking to explain associations between financial understandings, financial behaviours and SWB patterns observed from official, (secondary) quantitative Mexican household survey data.

Polysemy surrounding both money (the object of finance) and SWB has ignited theorising regarding their nature, purpose and measurement across a wide array of disciplines, certainly including, but not limited to, economics. Thus, we first clarify the specific meaning of these variables in the context of the research hereby presented.

Money, as a concept and tool, has existed since antiquity. Deriving from the Latin ‘Moneta’, the term relates to the name of the goddess of memory, indirectly alluding to the instrument’s store of value and standard of deferred payments uses which, along with its recognition as a unit of account and medium of exchange (both related to its use as payment), constitute the main functional interpretations of money given by economics and thus followed in this thesis. Historically, classical economic science was relatively silent about money. Following the marginal revolution, and prior to the emergence of macroeconomics (1930s) and to the growth of financial economics (since the 1950s), some of the few economists who discussed money were mostly concerned with its relational value (to other goods) and identification with price[5] and not with wellbeing per se.

Nonetheless, this thesis follows modern microeconomics’ use of income—i.e., a monetary sum available for consumption or investment—as a proxy for utility, itself defined by Bentham (1789) as a “*property in any object* whereby it tends to produce benefit, advantage, pleasure, good, or happiness”. Indeed, prior to Easterlin’s (1974) rebuttal of the belief that income growth had long lasting effects on happiness, SWB was viewed as a simple function of income (expressed in monetary terms). Thus, except for the debt and wellbeing literature, the majority of research relating SWB with money or personal finances has focused on the effects of income (growth, accumulation and inequality).

Since the late 20th century growth in the economics of wellbeing, personal financial resources have been conceived as one *among many* determinants of SWB. Such interpretations partly align with eudaemonic accounts of wellbeing, which while more recent than hedonic (Benthamite) SWB, are grounded in Aristotelian Ethics and correspondingly understand money and other resources as subordinate goals—sought after to facilitate eudaimonia (i.e., “living well” or “engaging in rational virtuous activity”) and not for constituting wellbeing in themselves (Kraut, 2022).

Within the above framework, the current thesis presents several distinctive characteristics. Firstly, each chapter analyses how SWB is impacted by financial engagement through channels different from the usual interpretation of financial resources as constraints or vehicles of preference satisfaction. Also,

[5] Such was the case of Carl Menger, Stanley Jevons, nominalists and other’s embracing a psychological conception of the economy (some from the Austrian school of economics).

rather than employing evaluative or eudemonic measures, in line with behavioural finance research documenting emotional reactions to money, Chapters 2 and 3 use an affect-based experiential measure of SWB approved by the Mexican Institute of Psychiatry as a valid scale of depression and anxiety for the Mexican population. By solely measuring negative affective states, the SWB measure employed in this thesis evades criticism given to experiential measures that combine positive and negative scales because positive and negative affect are considered somewhat independent.[6] Chapter 2 evaluates the affective impacts of capabilities that enhance understanding of financial instruments and how to command them (which helps foster a sense of autonomy, internal locus of control, goal achievement, self-discipline and reliability). As such, Chapter 2 presumes that financial capabilities relate to SWB also through feelings of purpose and not only through purely hedonic calculus. An important ontological consideration of Chapter 2 is that it differentiates FC from financial literacy (FL) and does not equalize FL to financial knowledge. Furthermore, we posit that treating these terms interchangeably is highly misleading because it disregards pedagogical and neuroscience studies proving there are different types of learning and of knowledge (beyond those stemming solely from literacy, properly understood[7]). Polysemy surrounding these terms trivialises them, causing them to lose specificity and with this their ability to clarify what findings really mean. Chapter 2 tries to avoid this by a greater delineation of the concepts.

Chapter 3 analyses how individuals' financial health, as measured through their financial balances' (debts and savings) status, affects their emotional wellbeing largely through the psychological effects of the former on the latter. Finally, concentrating on the instrumental use of money as a payment technology, Chapter 4 investigates whether diverse payment forms might elicit different financial behaviours through interplay with our psychology and cognition.

In summary, in line with BE and social studies of finance this thesis broadly understands money as an evolving technology which (as explained in Chapter 4) conditions our attention, perception, and recall-memory and through it, helps shape financial behaviours. Chapters 2 and 3 analyse how the latter and their corresponding financial outcomes have psychological implications on SWB. Together, the three empirical chapters presume that people's relation to their personal finances encompasses a type of 'sentimental hedonism' involving feelings of both pleasure, pain and purpose.[8]

1.3 STRUCTURE AND CONTENT OF THE THESIS

Chapters 2, 3 and 4 present the three related but independent empirical analyses conducted in this thesis. Each of them stands as a self-contained study and a brief summary of their respective content is given below. The thesis conclusions are presented in Chapter 5.

[6] See: Diener and Emmons (1984) and Huppert and Whittington (2003).
[7] That is understanding literacy (of any subject) in its original sense—as the ability to read and write about a particular topic.
[8] Term coined and discussed in further detail by Dolan (2014).

1.3.1 Chapter 2

The first empirical chapter, Chapter 2, analyses the effects on SWB of FC, an emergent conceptualisation of financial education seeking to improve individuals' financial behaviours. As a multidimensional construct, FC encompasses both financial literacy (FL) and financial efficacy attributes. In addition to comprising familiarity with financial terms (as FL does), FC has an affective dimension which addresses subjective, emotional and visceral reactions to money and to debt experiences. FC also covers the range of motivations, preferences, biases and psychological traits that spur people's understanding, confidence and ability to take good financial decisions. Hence, FC differentiates itself from similar frameworks by stressing that financial inclusion and well-being does not only entail wider access to financial services nor a crystallised knowledgebase, but primarily builds on the acquisition of personal finance habits leading to the most effective use of financial instruments. As such, FC can be used as a tool to enhance the financial wellbeing (FWB) of people who are highly financially included as well as that of those excluded from formal financial services. Given the latter, its relevance for improving FWB, and through it, SWB in Mexico cannot be overstated, especially in light of the country's slow progress in terms of financial inclusion.

To date Mexico has neither developed a FC survey nor has it brought the behavioural and attitudinal aspects of FC to the forefront of the policy dialogue. Additionally, to our knowledge, studies about SWB in Mexico have not yet evaluated its relationship with Mexicans' FC and personal finances. Responding to such gaps this chapter analyses how FC—an antecedent factor to debt and savings accumulation—can influence Mexicans' SWB. More specifically, aligning with the domain-satisfaction interpretation of SWB, the chapter is concerned with how affective states (associated with depression and anxiety) are instigated by Mexicans' positive engagement (or lack thereof) with their personal finances due to their high (or low) FC. The chapter's theoretical framework builds on the BE, SWB and economic development literatures while the hypothesised impact of FC on SWB is based on mechanisms that capability theory, locus of control (agency) theory and mental models in finance postulate as emerging from people's involvement with the financial domain of their life.

Employing data from the second (2005-2006) and third (2009-2012) waves of the MxFLS, a multi-thematic longitudinal (panel) survey, we derived our dependent variable, the Calderón Depression Score (CDS), as the sum of answer values given in the MxFLS emotional wellbeing module, itself consisting of a questionnaire about affective states that the psychiatry literature associates with depression and anxiety. We used principal component analysis (PCA), a data reduction technique commonly used in financial economics and in the FC literature, over sets of questions from the MxFLS TV preferences, savings and credit utilisation modules to derive indices representing the main FC dimensions identified by the literature, namely: (1) an instrumental money management dimension and (2) a behavioural-attitudinal dimension.

Using cross-sectional and panel fixed effects (FE) specifications of standard SWB regressions enriched by our key explanatory variables—the FC indices—a cognitive ability indicator, and other correlates of SWB (e.g., community cohesion, crime and a standard of living index), we tested the following hypotheses. Firstly, that a positive relationship existed between people's experience of depressive symptoms and weak FC, itself expressed through problematic debt and credit mismanagement practices[9]. The existence of a negative relationship between depression and attributes causing people to save, plan for the future, and to exercise patience over spending and consumption, all aspects of strong FC, was also tested.

Cross-sectional results from both waves as well as the results from panel estimations significantly supported the hypothesised positive relationship between weak FC and SWB in Mexico (measured through the CDS). The 2009 wave cross-sectional results supported, yet without statistical significance, the hypothesised inverse relation of the savings orientation index and depression while in 2005 the effect of the savings index was also insignificant and contrary to our hypothesis, indicating a positive effect on depression. The behavioural-attitudinal 'patience' FC index only showed a statistically significant relationship with SWB in the 2009 cross-sectional regressions but in opposite direction to our hypothesis. Panel FE estimations also revealed a positive effect, though not significant, of the patience FC index on SWB over the two-waves period.

The findings were reconciled through dual-self theory (Thaler and Shefrin, 1981; Fudenberg and Levine, 2006) which suggests that despite the positive feelings fostered through an internal locus of control resulting from patience, the higher relative importance of the short-term over the long term for MxFLS respondents implied that losses from postponement of spending and consumption accompanying patient (financial) choices loomed larger than any psychological gains from self-regulation, thus (on net) resulting in higher symptoms of depression. We further stipulate that the affective loss or subjective costs of delayed rewards (resulting from patience and savings) were stronger for respondents in 2009-2012 than in the prior period (2005-2006) because a series of exogenous events—such as the US subprime crisis and the 2008 GFL[10] as well as the escalating violence seen in Mexico between the two MxFLS waves[11]—heightened levels of uncertainty in Mexico, therefore raising the saliency of the present and the subjective costs of forgoing current consumption for the future (or of delaying receipts

[9] Reflected through the FC problematic credit management index of the instrumental money management dimension of FC (explained in the chapter).
[10] Both affecting the Mexican economy.
[11] Due to conflicts between drug-cartels and with the government.

of money) in 2009-2012 above the subjective costs (e.g. anxiety and depression) of delayed gratification experienced in 2005-2006.

Overall, in line with preliminary research about FC in Mexico, the results revealed that, in our sample, the average respondent exhibited present-bias and had a short-term horizon—assigning higher value to the preferences of their short-run *present selves* than to their *future* short-run *selves.* The results thus suggested that promoting planning ahead behaviours, increasing awareness of cognitive biases that trigger impulsive spending and encouraging patient consumption habits among the population posit pertinent routes for new financial education content grounded in strong FC. In turn, the latter could respond to public policy concerns related to improving the efficacy of financial education interventions and their relationship with financial inclusion and wellbeing.

1.3.2 Chapter 3

Seeking to better understand how people's financial health interacts with their emotional health and wellbeing, Chapter 3 evaluates how savings and debt levels (both important financial balances) and the ratios of debt to income and to savings (both gauging financial resilience) influence people's SWB, measured through an index of depression and anxiety, the CDS. The empirical analysis is based on both cross-sectional SWB regressions taking financial balances as key regressors (that derive information about sources of between variability) and on panel FE estimations (to assess within-respondent's variability and obtain cause-and-effect relationships). As in Chapter 2, we use data from MxFLS because, to date, it is the only existing panel survey allowing for the longitudinal exploration of household finances, mental health, biomarkers, and other pertinent sociodemographic characteristics of people in Mexico in order to facilitate identification of causal relationships between them.

Despite using the same source data, Chapter 3 differentiates from Chapter 2 in important ways. Firstly, it considers the direct effects of savings and of problematic debt construed as self-standing, independent predictors rather than resulting from or being mediated by acquired attributes such as FC. Hence, while maintaining CDS as dependent variable, Chapter 3 uses as main predictors total savings, total outstanding debts and the relative ratios of debt-to-income (DTI) and of debt-to-savings (DTS) instead of the FC indices assessed in Chapter 2. In addition to the usual set of sociodemographic controls, Chapter 3 includes risk aversion (RA) and time-value (TV) preference indicators to explore the influence that heterogeneity in terms of behavioural traits such as tolerance to uncertainty (indirectly measured by RA) and extent of present bias or of patience (measured through temporal preferences) have over how debts, savings, DTI and DTS ratios contribute to people's SWB. Including RA in the specification is relevant because behavioural finance research has shown that RA can influence people's SWB and use of financial instruments. Likewise, TV preferences are of interest because their fluctuation can diminish the expected utility of future consequences and thus influence financial behaviours and

SWB (Frederick, Loewenstein and O'Donohue, 2002). While Chapter 2 also assessed the effects of temporal orientation, it did so through indices that summarized questions related to patience and impulsivity. However, Chapter 3 includes an ordinal TV preferences indicator (with categories representing levels of preferences decreasing in present bias while increasing in patience) as an independent single covariate helping to control for the influence of TV preferences on SWB and on the impact of the four financial balances considered on SWB in Mexico.

While there were variations in the wording of RA and TV modules between the two data waves used in this study (MxFLS-II and MxFLS-III), none of them implied a substantive change in the construct or attribute the two modules aimed to measure in each wave. Thus, both modules, regardless of the wave period, measured the extent of respondents' tolerance or aversion to risk and respondents' extent patience. Moreover, both modules allowed us to classify respondents' answers to risk-gambles questions and to TV lottery sequences in each wave along comparable levels of risk preferences and of patience levels to derive equivalent ordinal RA and TV preferences indicators. Since the levels in the latter indicators maintained the same hierarchical relationship and proportionality order in each of the waves, this facilitated their comparison in cross-sectional analysis and allowed us to include RA and TV preference controls in the longitudinal analysis.

The results largely supported the chapter's hypotheses. In both waves, cross-sectional results showed that, as hypothesised, total debts overdue, respondents' DTI ratios and their DTS ratios bore a positive and generally statistically significant relationship with depression and anxiety. Aligning with the literature, cross-sectional results regarding the influence of savings on SWB were ambiguous, suggesting savings were associated with higher depression and anxiety in 2005 while 2009 results suggested savings were associated with lower incidence of depression and anxiety. The relative abundance of savings with respect to balances such as debts is offered as a potential explanation since savings were less abundant (relative to debts) in 2009 than in 2005 which increased their perceived importance as a 'safety net' provision of liquidity thus raising the subjective benefits of savings (sense of self reliance and autonomy) over their subjective costs (forgone gratification from immediate consumption) and therefore on net contributing positively to SWB in 2009 but not so much so in 2005.

Once time-invariant unobservable traits were accounted for through panel FE, the results also corroborated our hypotheses as they provided evidence in favour of a causal effect between increasing unpaid debts (whether measured as a total sum or as DTI ratios) and higher depression and anxiety symptoms. However, neither savings nor DTS ratios were significant in panel FE estimations therefore we were not able to argue for a causal effect (over time) in any direction regarding these two balances.

The behavioural covariates (RA and TV preferences) also demonstrated interesting patterns, although, following the literature, their impact was hypothesised as ambiguous. RA was only significant in MxFLS (2009-2012) cross-sectional regressions, and it suggested that, on average, respondents with more risk tolerance experienced less depression and anxiety. Cross-sectional results in both waves also suggested that TV preferences were statistically significant with their influence implying that respondents with more patience (less impulsivity) had, on average, a higher CDS (lower SWB). We alluded to dual-self theory which recognises that the net utility from choices depends on their impact on both our short-term and long-term-self perspectives to explain the suggested direction of TV preferences on depression and anxiety. The relative dominance (culturally) of a shorter-term orientation in Mexico (documented by the literature) implies that the interests of the short-term self (running contrary to the benefits of patience) outweigh those of the long-term self are more prevalent in any decision. Nonetheless, neither RA nor TV preferences were statistically significant in panel FE estimation, which precluded us from affirming their influence was causal.
Finally, ‘having been victim of assault, property theft or any other harm’ and ‘having experienced personal and household economics shocks’ consistently showed—across all cross-sectional and panel (both FE and RE) estimations—the largest (effect size) and most significant positive impacts on the incidence of depression and anxiety symptoms in Mexico. As such, they provided further evidence of the importance of restoring safety and the rule of law in Mexico to also improve residents’ SWB.

1.3.3 Chapter 4

Chapter 4 responds to the realisation that while the evolution of money has followed a trajectory of increased dematerialization or decreased physicality, less is known about the effects of more virtual (less material) payment forms on our uses of money, financial management behaviours and financial wellbeing (FWB). Adopting a behavioural economics (BE) theoretical framework—suitable to capture the multidimensional nature of payments—Chapter 4 expands the literature on the behavioural effects of payment methods in middle income countries (MICs) such as Mexico where financial inclusion is low, cash remains king and the (non-macro) payments literature is scant. Using the most recent wave (2021) of Mexico’s Financial Inclusion Survey (in Spanish ‘Encuesta Nacional de Inclusion Financiera’ [ENIF]), Chapter 4 specifically explores: (1) how do structural, socio-demographic and personal characteristics affect the forms of payment Mexicans use to conduct distinct transaction-types and (2) how different methods of payment, diversified by their extent of physicality, impact Mexican households’ financial management behaviours through their interplay with cognitive biases and mental accounting processes.

To address these inquiries, the chapter is divided in two parts. The first research question is mainly evaluated through a multinomial logit model that regresses a categorical variable indicating the payment method most frequently used (either: cash, card [credit or debit] payments, and (virtual) electronic or digital transfers [through smartphones or apps]) across different types of transactions on a diverse set of independent controls. Beyond the common set of socio-demographic indicators the latter included structural (geographic) variables (to account for the urban-rural divide regarding levels of financial access and inclusion) and personal characteristics such as trust in financial institutions (FIs), financial knowledge, financial attitudes, subjective financial well-being (SFWB), fraud experiences, use of banking correspondents and of informal finance. Robustness check estimations are also conducted through logit regressions over alternative sets of transaction outcome variables which consolidate payment method options into cash versus non-cash payment forms so as to: (1) verify the reliability of the multinomial logic results, (2) assess the value of the knowledge gained by differentiating card payments from digital payments (including virtual transfers), and to (2) evaluate whether additional knowledge is in fact gained from studying the determinants of the use of different payment forms, separately, over diverse transaction-types distinguished by either purpose, place of acquisition, motive, or outlay value.

The second research question is assessed through multiple regression models whose outcome variable is a financial behaviours index (FBI) computed as the sum of answers to ENIF 2021 questions measuring resilient money management behaviours (such that a higher score signals better management of one's finances). Three non-cash payment forms differentiated by their degree of physicality (e.g., credit card [CC], debit card [DC], mobile banking [MB]) act as key predictors along with part of the controls used in the (above described) multinomial models. We exclude informal finance, financial attitudes and SFWB indicators from the second part of the empirical analysis to avoid simultaneity between them and our FBI dependent variable.
We address endogenous selection by calculating bias-adjusted estimates of the three non-cash payment forms (used as treatment variables in the second part of the chapter's analysis) based on a recent technique proposed by Oster (2019) that uses information on selection on observables (overt bias) to retrieve information about selection along unobservables (hidden bias).

The bias-adjustment mechanism proposed by Oster (2019) was not applicable to the multinomial logit model used in the first part of the chapter's empirical analysis because it presupposed the use of a linear model. Hence, the average marginal effects obtained from the multinomial regressions evaluating the determinants of payment methods' use retained a descriptive character. Nonetheless, the results were corroborated through the logit estimations and revealed interesting patterns aligning with our hypotheses such as: an inverse relationship between age and the use of digital payments, a positive relationship between residing in a urban locality and using non-cash payment forms, a steep (general) education gradient revealing that higher levels of education are consistently associated with lower probabilities of cash usage as well as a negative relationship between financial knowledge and the probability of using cash over other payment methods. As expected, higher standard of living was negatively associated with cash use and positively with cards and digital payments while trust in FIs had the converse effects, favoring cash. The SFWB index (measuring financial autonomy, self-control and contentment with own financial status) revealed a positive association with non-cash payments whereas financial attitudes (reflecting future orientation [lower present bias and less impulsivity])[12] bore a negative relationship with cash and a positive relationship with non-cash payment forms (as expected by BE theories related to pain of paying and coupling). Despite their limitation to prove causality, such results act as a first approximation of the relationship between payment forms and their use in Mexico, which, to our knowledge, had not been previously studied (nor in other LMICs). All the estimations in the first part of Chapter 4 revealed that the main determinants of payment forms' use in Mexico are: standard of living, living in an urban location, education (schooling level), financial knowledge, financial attitudes, SFWB and mistrust towards FIs. Such findings have important implications for they suggest that policies geared towards increasing trust in FIs, improving educational attainment, fostering financial capability, strengthening future oriented financial attitudes as well as developing autonomy and decision making over one's finances could influence the prevalence of cash use in Mexico as well as the adoption and use rate of alternative digital payment technologies.

Turning to our second research question, we first run preliminary (unadjusted) regressions assessing the effects of payment forms with different extents of digitalization (physicality) on an index of positive and resilient financial behaviours (FBs). The raw results aligned with our expectation that the effects of MB on FBs would be larger than those of card payments but none of the observed raw results corroborated our initial conjectures regarding the direction of effects (i.e., that payment forms less physical than cash would negatively affect the FBI). Acknowledging that absent support regarding the direction of effects could be a by-product of selection bias, we apply Oster (2019) bias-correction mechanism to minimize omitted variable bias (OVB) endogeneity through Oster's user-generated Stata command $psacalc$. The latter corrects biased treatment effects using Oster's estimator and recommended bounds for the method's key parameters: the maximum amount of variation explained by the model, inclusive of all confounders (R_{max}) and a coefficient of proportionality between unobservables and observables (δ) reflecting their relative extent of selection.

Following Oster (2019) we approximate a 'realistic bound' for R_{max} through the product of the bias (Π) likely induced by the set of unobservable confounders in our specification and the value of the coefficient of determination ($\tilde{R}$) of regressions of the FBI on each non-cash payment form and pertinent

[12] Indeed, as is evident from the appendix of Chapter 4 a higher financial attitude score implied that the respondent had low-present bias, low impulsivity, and high future orientation for he/she preferred saving than spending, constantly thought about the future especially when taking financial and purchasing decisions and saw money as something more than simply a medium of immediate exchange.

observable controls. Based on preexisting literature regarding the influence of our set of unobservables, we conclude that the bias arising from OVs in the model is $\Pi = 2$ and set $R_{max} = \Pi\tilde{R} = 2\tilde{R}$. In other words, based on the literature, we expect that including unobservable controls would double the explained variance of FBs and argue that selection on unobservables is about half that of observables, or at most equal to it in our model. Coinciding with the bounds determined by Oster's observational data validating exercises, our bounds also aligned with those employed by recent survey-based empirical studies using Oster's technique (see Bryan et al., 2022).

Our bias-adjusted results supported the hypothesised negative effect of increasingly dematerialised payments on resilient FBs due to more digital forms' tendency to ensue impulse spending, low expenditure recall, inattention and low levels of pain from paying. Additionally, the bias-adjusted results showed that all psychological effects were stronger for MB than for credit and debit card payments, therefore supporting our conjecture that the more virtual the payment form, the more it can bypass cognitive functions that naturally rein in our spending, thus potentially leading to compromised FBs.

Oster's method assumed orthogonality between observed controls and unobservable factors. Recognising recent methodological critiques arguing that such assumption is implausible and non-refutable based on data alone, we relax the orthogonality restriction following Diegert et al. (2022) who, building on Oster, develop an alternative technique to assess and correct for OVB while allowing for endogenous controls. Results based on Diegert et al. (2022) adjustment coincided with our Oster-based findings and showed that the hypothesised negative effect of less physical forms of payment on FBs was attained at an upper bound level of endogeneity closer to zero (i.e., to exogeneity) than to one (i.e., to capricious endogeneity). Thus, the results suggested that endogeneity of controls was only minor and partial in our analysis rather than arbitrary and, in the presence of endogenous controls, the results supported our hypothesised negative effects of dematerialised payments under less selection of unobservables to observables.

As digital payments continue to normalise, we hope these findings can help raise awareness about the common mechanisms through which less material (more digital) forms of payment circumvent our rationality (broadly construed) when taking financial decisions.

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Chapter 2

Financial Capability and Subjective Wellbeing in Mexico

"Money is a great servant but a bad master."
(Lord Francis Bacon)

2.1 INTRODUCTION

De-regulation, increased competition in the financial sector, disintermediation, digitalisation, and the marketisation of social protections (including those of users of financial products), entail that individuals have to learn how to operate in increasingly complex financial marketplaces in order to achieve their economic goals and desired wellbeing (Kempson et al., 2017). Scholars and policy makers have long raised concerns regarding the extent to which people are really equipped to do so. From this it follows that financial literacy (FL) has been promoted as an important tool for international development that educates consumers on the use of financial services. Yet, critics acknowledge that, while necessary, FL is insufficient to fully enable people to benefit from the increased provision of financial services as 'individuals can have financial knowledge but still make irrational financial decisions' (World Bank 2013: 23).

In line with the behavioural and cognitive turn in finance,[13] financial capability (FC) emerged in the early 2000s as a holistic element of the financial inclusion agenda. While still concerned about people's basic financial and numeracy skills, FC is also involved with guiding the range of motivations, preferences, biases and psychological traits that shape people's financial habits beyond the explicit, declarative knowledge[14] they have regarding certain financial principles.

FC recognises that propositional financial knowledge in isolation does not always change behaviours nor does it necessarily support people in making important financial decisions autonomously and confidently. Even if people know and understand the facts, they may still take poor decisions due to weak self-control, cognitive biases, temperament differences and other specific personality characteristics. Likewise, in situations of partial misinformation individuals and households might resort to ingrained methods of processing information or 'heuristics' that lead to systematic bias, aspects that FC seeks to rectify.

[13] Strengthening since the 1980s and late 1990s.
[14] Also called 'definitional' or 'propositional' knowledge.

While the empirical literature analysing the types of cognitive biases affecting financial decisions is still developing, a relatively newer literature has evaluated how financial participation and financial behaviours affect people's psychology and wellbeing. However, the bulk of this literature has analysed the effect of financial distress (i.e., the non-ability to meet expenses due to overspending, over-indebtedness and scarce savings) on psychological wellbeing and has not yet turned to the question of how antecedent factors to debt and savings accumulation, such as a person's FC, influence people's financial health perception and their resulting subjective wellbeing (SWB). It is through this latter channel that the current chapter seeks to contribute to the literature.

As with any other inquiry, scepticism exists regarding the extent to which FC provides more meaningful information regarding people's engagement with their finances. Some question whether the concept adds any substantive value beyond what FL research or studies about debt and SWB have been able to reveal. This chapter also responds to some of these concerns.

Given the relative recency of the concept, academic and policy research on FC is far from mature. Most of the existing work on the topic has focused on developed countries which have mirrored the UK's pioneering FC Strategy. Launched in 2015 to help reduce over-indebtedness in the UK, the strategy defined FC as a combination of money management skills and of money attitudes that help people attain financial resiliency and wellbeing. In 2020 the UK's FC Strategy transitioned into a ten-year "Strategy for Financial Wellbeing" highlighting, through the reframing, the inherent role FC plays in enhancing the financial domain of people's wellbeing.

In emerging markets and in low-and middle-income countries (LMICs) such as Mexico,[15] preliminary research by Kempson et al. (2013a, 2013b) and World Bank (WB) scholars was conducted after the 2008 Global Financial Crisis (GFC). Nonetheless, Mexico has not yet considered FC as a separate construct within its financial education policy tools, nor has it conducted any further systematic studies about it.[16] Additionally, to our knowledge, none of the relatively few studies about SWB in Mexico[17] have sought to evaluate its relationship with financial participation and Mexican households' finances.

In response to the above restraints, using Mexico as a case study, this chapter asks whether a significant causal relationship between FC and SWB, measured through affective-state balance, exists. Since

[15] The World Bank classifies world economies into four income groups based on their Atlas Gross National Income (GNI) per capita (pc.) level (expressed in US dollars [USD]). As of the year 2022-2023, the thresholds were: low income (Atlas GNI pc. ≤ 1,085), lower-middle income (1,086 ≤ Atlas GNI pc. ≤ 4,255), upper-middle income (4,256 ≤ Atlas GNI pc. ≤ 13,205), and high income (Atlas GNI pc. > 13,205). While, Mexico is considered an upper-middle income country, we use the terminology employed in Kempson et al (2013a, 2013b), namely LMICs, which only distinguished low-income countries from middle income ones and did not further gradate income levels amongst countries classified under the wider middle-income umbrella.

[16] The ambiguous demarcation between FC and FL in several LMICs is partially influenced by how the concepts are treated in international institutions known to provide policy guidelines and conditional aid to developing countries like Mexico. For example, institutions such as the WB recognise FC as related, yet separate from FL, whereas the Organisation for Economic Co-operation and Development (OECD) does not (see further explanation in main text ahead).

[17] See: Fernández-Domínguez and Gómez-Hernández (2019); Heald and Treviño-Aguilar (2021); Lara (2019); Reyes-Martínez et al. (2021); Romo-Anaya (n.d.); Tejeda-Parra and Burgos-Flores (2020): Temkin (2016).

Mexico lacks a FC survey, we base our study on data from the multi-purpose Mexican Family Life Survey (MxFLS) and use cross-sectional and fixed effects (FE) panel methods to exploit the between and within variability in the data and analyse whether causality between FC and SWB can be observed. More specifically, our analysis consists of SWB regressions that use an index of affective-states (related to depression and anxiety) as dependent variable and take distinct FC measures derived through principal component analysis (PCA) as core explanatory variables. In particular, guided by the FC literature and following the growing use of PCA in financial economics research,[18] we employ PCA to summarize groups of MxFLS variables—chosen, as per the literature, to represent constitutive characteristics of FC dimensions—into separate FC indices[19] or components that capture the maximum possible information (variation) of the original MxFLS variables and use them as key regressors.

The study therefore presents a first attempt at disentangling the relationship between affective states of wellbeing associated with depression and FC. Likewise, it hopes to provide evidence to help elucidate the debate on whether FC and FL can be treated as separate, yet complementary, financial education tools.

The chapter is structured as follows. Section 2.2 defines FC, explains its conceptual relationship with similar metrics, how it has been operationalised and reviews the literature highlighting the mechanisms through which FC is presumed to impact SWB. Based on the gaps in the literature, Section 2.3 stipulates our research question. Section 2.4 presents the data used and defines the key explanatory variables for which Section 2.5 provides descriptive statistics. Section 2.6 explains the methodology behind the construction of our FC indices and gives descriptive statistics of the latter. Section 2.7 specifies the chapter's main hypotheses and identifies the empirical models used. Section 2.8 presents the results of cross-sectional estimations (subsection 2.8.1) and of panel FE estimations (subsection 2.8.2). Section 2.9 concludes.

2.2 LITERATURE REVIEW

2.2.1 Contextualizing FC

As the embeddedness of the logic of finance[20] continues to expand over more and more areas of social life; a wide body of research relating the financial domain to people's wellbeing has been spurred. Within such research agenda a myriad of concepts has surfaced in close relation to one another. FC, FL, and financial resilience have received attention from policy officials and scholars who sometimes treat them interchangeably.[21] Conceptual interlinkages have nonetheless confused understanding of their

[18] See subsection 6.1.
[19] The indices are indeed the principal components extracted through PCA from the group of variables taken to constitute each financial capability dimension (see section 6 for more details). They are thus summarizing indicators.
[20] Process known in the literature as 'financialisaton'.
[21] Such concepts also relate to the more profuse literature on SWB and debt.

specific bearing on people's wellbeing. Thus, to clarify and contextualise our research contribution, we begin by establishing the relationship between SWB and FC.

SWB has been treated as a general area of scientific interest rather than as a single, specific construct. Diener et al. (1999) define SWB as a broad category of phenomena including people's emotional responses, fulfilment from diverse life dimensions, and global judgments of life satisfaction. SWB is also understood, from the domain-satisfaction standpoint, as the sum of affect-based evaluations over different life-domains. Aligning with the latter interpretation, the current chapter focuses on the affective states[22] (associated with depression and anxiety) instigated by people's engagement (or lack thereof) with their personal finances.[23] Therefore, the chapter is specifically concerned with subjective *financial* wellbeing (SFWB). Following Kempson et al. (2017), we treat the latter as a continuum (ranging from severe financial distress to high satisfaction with one's financial situation) rather than as a single state. We further argue that SFWB—one of the satisfaction domains of individuals' SWB—can be understood as an outcome of individuals' FC.[24]

2.2.2 Definition and conceptual interlinkages

Against this backdrop, FC can be interpreted as the set of beliefs, attitudes, competences and behaviours, that help people enhance their objective financial status, which in turn influences their SFWB. Conceptually, FC is considered broader than FL, indeed encompassing it. Lusardi and Mitchell (2014) define FL as people's ability to process economic information, undertake complex economic calculations and have expertise in dealing with financial markets. They pair FL with financial knowledge about inflation, simple and compound interest and risk diversification. However, as pointed by Kempson et al. (2017), FC goes beyond knowing some financial concepts and focuses on how individuals actually engage with their personal finances—it comprises understanding the motivations, heuristics and biases leading people to take certain financial decisions (over others) and to develop particular financial habits. The interiorised and performative knowledge fostered through FC helps spur financial efficacy—ability to reach desired (financial) goals—and financial resilience—people's ability to 'weather life's storms' without falling into damaging debt—thanks to pro-active measures like building a savings buffer, taking up insurance protection, setting up a will and making voluntary

[22] Because the terms: 'affects, emotions and feelings' refer to similar constructs, they are usually used interchangeably. Yet, they are conceptually distinct. From the Latin 'affectus' (to afflict, shake or touch) *affects* refer to the manifestations (reactions) we have in response to different stimuli (in this case of financial or pecuniary order). Emotions (from Latin 'emovere': moving, displacing) are ephemeral episodes emerging as reactions to affective conditions that, due to their intensity, move us to some kind of action. Emotions can thus be understood as sudden disruptions of affective balance or as intense mobilizing affects which can provoke concomitant or subsequent partial or total blocking of logical reasoning and behavioural loss of control. In contrast, feelings are considered lower intensity (or modular) prolonged states of affection with lesser interference on reasoning and behaviour and with fewer disruptive repercussions on organic functions than emotions.

[23] That is, the chapter focuses on the affective states that emerge from involvement with the financial domain of one's life. Other domains considered by the domain-satisfaction definition of SWB include occupation, family ties, group inclusion, leisure and health.

[24] We therefore posit that FC can exert an impact on SWB precisely through its effects on people's S***F***WB.

contributions to one's retirement fund (New Zealand Commission for FC). Financial resiliency and efficacy are therefore considered outcomes characteristic of financially capable people who plan for the future and are thus assumed to positively influence people's SFWB.

FC and FL also differ by the research methods used in their measurement. As Holzmann et al. (2013) argue, while FL surveys share content normatively—i.e. by reference to a theoretical consensus over the knowledge necessary to take rational economic decisions—the measurement of FC has been highly empirical. Measurement discrepancies are also reflected in the particularly nuanced distinction between FC and FL seen in policy circles.

Based on empirical studies (Kempson et al, 2013a) showing that the correlation between people's scores on differentiated FC questions and on purely FL questions is not always positive (therefore giving evidence supporting their distinctiveness), the WB differentiates the two terms as do several industry watchdogs in high income countries (HICs) such as the UK and the US. For example, the U.S. Financial Industry Regulatory Authority (FINRA)[25] defines FC as a 'multi-dimensional concept that encompasses a combination of knowledge, resources, perceptions, attitudes, experiences, behaviours and habits that spur our understanding, confidence and motivation to make good financial decisions'.

Analogously, the multidimensionality of FC is precisely demarcated in the UK's Strategy for Financial Wellbeing[26] where FC is defined in terms of: 1) a set of money management skills and 2) a set of money attitudes and behavioural biases. The money management dimension of FC includes the ability to: 1.1) administer money well – both day-to-day and throughout significant life events, and to 1.2) handle times when life is financially difficult through personal budgeting and saving to prepare for the future or unexpected events. These abilities also underlie financial efficacy and resilience and help govern the instrumental aspects of money (i.e. they oversee money's specific economic functions and constitution as a: medium of exchange, means of payment, unit of account, standard of deferred payment, and store of value). Conversely, the behavioural and attitudinal dimension of FC relates to its symbolic and idiosyncratic meaning and includes disciplining any tendencies, predispositions and habits surrounding money that surpass 'living for today' constraints.

In contrast, the Organisation for Economic Co-operation and Development (OECD) does not distinguish FC from FL and defines the latter as "the combination of financial awareness, knowledge, skills, attitudes and behaviours necessary to make sound financial decisions and ultimately achieve individual financial wellbeing [FWB]" (OECD/INFE, 2022).[27] Therefore, some scholars (see Kempson

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[25] A private, self-regulated entity ultimately overseen by the U.S. Securities and Exchange Commission (SEC).

[26] Formerly called Financial Capability Strategy (see introduction for more details).

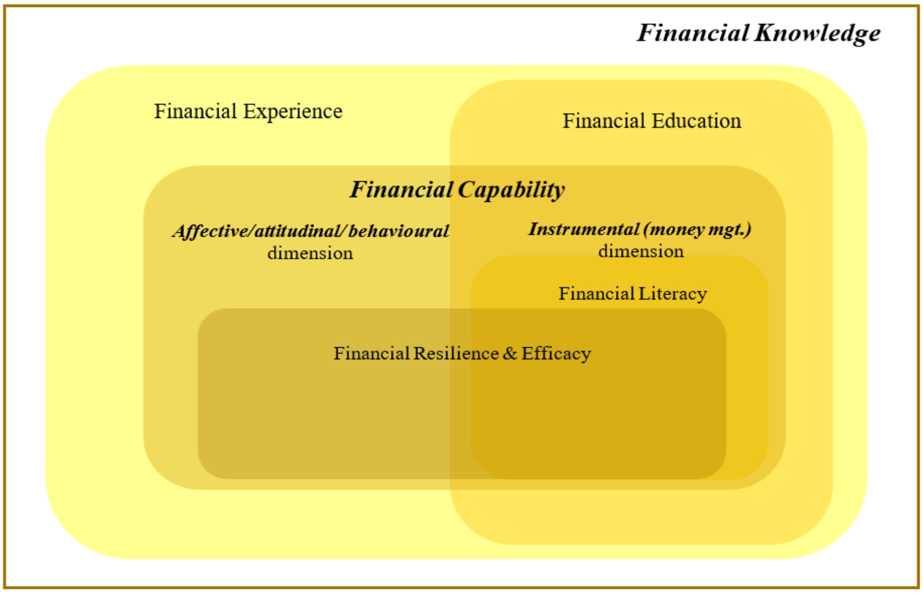
[27] Since 2010 the OECD Expert Subgroup on the Measurement of FL argued that the terms 'FL' and 'financial capability' "could be used interchangeably as they were reflecting similar perceptions of the reality they aim to cover" (OECD, 2010).

et al., 2017) argue that the OECD's 'Financial Literacy and Inclusion Survey' is a hybrid between FL and FC measurements. This has contributed to the scarce differentiation of the two concepts in several LMICs (including Mexico) who have followed OECD guidelines to develop their own financial inclusion surveys (Kempson et al, 2017).

Cognitive and developmental psychology research[28] has nonetheless long stressed the particularities of different kinds of knowledge. Some of the most well-known types include explicit, implicit and procedural knowledge. Explicit or declarative knowledge refers to structured information that is easy to document systematically, e.g., definitions and facts about a concept such as inflation. Implicit knowledge is gained through experience from applying explicit knowledge and acts as an informal, internal (tacit) pool of best practice insights, learned overtime, that are subjective and social (since implicit understandings are often personally and culturally determined). Procedural knowledge emerges from implicit knowledge, is concerned with 'how' things operate, and is demonstrated through one's ability to do something. Examples of implicit and procedural financial knowledge include individuals' ability to: prioritize expenses, ballpark price changes based on personal shopping experiences, forecast appreciation of assets intuitively, leverage financial resources, and schedule savings and investments without full and proper information. Given the greater alignment of FC with implicit and procedural knowledge and of FL with explicit and declarative knowledge, this chapter differentiates between the two concepts to attempt to unravel the type of financial knowledge base contributing the most to people's financial wellbeing, and thus to their broader SWB.

To summarize, Figure 2.1 schematises the conceptual interlinkages of FC with related concepts to emphasise its commonalities with them (through darker, overlapping hues) and distinctiveness.

Figure 2.1



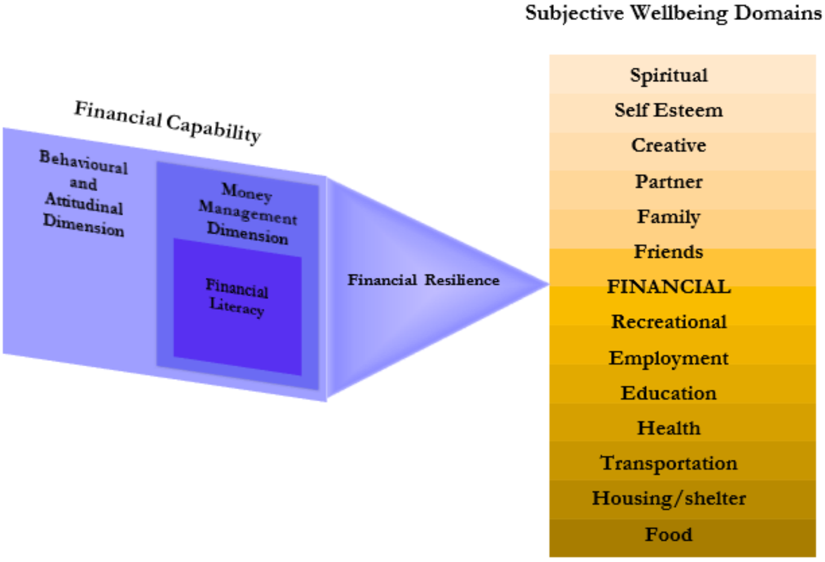
Source: Self-generated based on literature review.

[28] See: Brosowsky et al., 2021; de Jong and Ferguson-Hessler, 1996; Magendans et al., 2017; Rabbani et al, 2022; Schoenfeld, 1979; Ulrike and Harris, 2014; Wagner, 1991; Weinberger and Green, 2022.

It displays how FC helps to build people's financial knowledge by playing a role in both people's financial education and financial experience. Furthermore, Figure 2.1 shows how FC's contribution to financial education is achieved through its instrumental money management dimension which encompasses FL. However, Figure 2.1 also highlights that the contribution of FC to people's financial experience exceeds the confines of the explicit or structured declarative knowledge characteristic of FL (and of financial education stemming from standard schooling curricula) by incorporating a behavioural dimension. Together both FC dimensions are understood to foster financial resilience and efficacy.

Similarly, Figure 2.2 illustrates the holistic and antecedent nature of FC. On the one hand it encompasses FL within its instrumental money management dimension since the declarative financial knowledge traditionally promoted through FL is tailored to endow people with the conceptual framework needed to manage their personal and household finances favourably.

Figure 2.2



Source: Self-generated based on literature review.

On the other hand, through its behavioural and attitudinal dimension, FC targets people's psychological and emotional biases (attachments), preferences, and dispositions towards their finances—including inertia, status quo bias, limited patience, impulsivity (or weakened self-control) and hyperbolic discounting— which can either strengthen or weaken the knowledge gained through explicit financial education.

The latent features composing the behavioural and attitudinal dimension of FC act as a priori enablers (or inhibitors) of the formalised knowledge that motivate financial habits associated with the money management dimension of FC which, in turn, determines financial resilience and FWB outcomes. It follows that FC's behavioural and attitudinal dimension can be understood as preceding its money management dimension in so far as it serves to mediate the latter's impact on FWB.

2.2.3 Operationalising FC in Mexico & other low and middle-income countries.

Much of the measurement of FC worldwide has been influenced by the development of the UK's FC survey and policy strategy[29] soon replicated by other HICs including Ireland, Canada, the U.S and New Zealand. Based on the relative success of these, and following a similar methodology, in the aftermath of the 2008 GFC, the WB spearheaded an effort to advance the study of FC in LMICs including Mexico.

2.2.3.1 FC measurement

The higher poverty levels, greater share of rural communities, higher levels of informality, lower levels of schooling, lower levels of financial inclusion and the fewer options to manage and mitigate risk found in LMICs undermine the validity of using FC measures developed for HICs to study FC in LMICs such as Mexico because the aforementioned conditions entail that FC manifests differently in the economically active populations of each country-type.

To counter this, Kempson et al. (2013a; 2013b) derived an operational definition of FC from the results of cognitive qualitative and quantitative research performed on focus groups across seven LMICs, including: Armenia, Colombia, Lebanon, Mexico, Nigeria, Turkey and Uruguay. Their approach rested on several premises. Firstly, Kempson et al. (2013a; 2013b) recognised that FC is a broad and abstract concept that cannot be measured *directly* but is instead measured through its various *manifestations* including knowledge as well as skills, attitudes, and behaviours.[30] Secondly, that FC is not limited to one specific financial behaviour or area of financial knowledge but spans different financial matters or domains.[31] Thirdly, Kempson et al. (2013a; 2013b) made no a priori assumptions on whether FC domains standing out in the UK (and in other HICs) would also be relevant for LMICs nor about whether there was a set of domains that would apply exclusively across all LMICs.

Following Atkinson et al. (2006), Kempson et al. (2013a; 2013b) used PCA to evaluate the extent to which different sets of survey questions captured a latent component of FC.[32] Kempson et al. (2013a; 2013b) results bore strong resemblance with those obtained by analyses about FC in the UK. However, Kempson et al. (2013a) found that the role of psychological factors was more important in LMICs than in HICs. More specifically, Kempson et al. (2013a, 2013b) findings suggested that time-orientation,

[29] In the UK, the FC survey was initially developed by the UK's Financial Service Authority in collaboration with the UK 's Basic Skills Agency (BSA) and the University of Bristol's Personal Finance Research Centre (PFRC). Since 2020, the UK Money and Pensions Service (MaPS) has reshaped the UK's FC Strategy into the UK's Strategy for Financial Wellbeing and used findings from the FC survey (among other surveys) to inform the new strategy.

[30] Yet, World Bank researchers did not make assumptions about the causal relationships between them.

[31] Since FC is a multidimensional concept, commonly understood to be composed of different dimensions (at least a money management [instrumental] dimension and a behavioural and attitudinal dimension) researchers (including Kempson et al. [2013a; 2013b] and Atkinson et al. [2006], among others) usually use PCA over groups of related questions judged to represent each FC dimension in order to summarise their variance into a single indicator that signifies the given FC dimension (and which is then treated as underlying component of total FC).

[32] For example, if the variance from answers of a group of questions (variables) asking about planning expenses loaded on the same latent constituent factor, the resulting component would be used as a summary measure for "budgeting." Components in turn were considered as the empirical counterparts of manifestations of the FC recorded in focus groups interviews (Kempson et al, 2013a).

impulsivity and achievement-orientation were the key psychological factors underpinning many behaviours associated with FC in LMICs like Mexico.

2.2.3.2 FC in Mexico

To our knowledge, the comparative analysis of FC in LMICs (including Mexico) by Kempson et al. (2013a, 2013b)[33] is the only existing study regarding FC in Mexico. In such study, the Mexican sample was segmented into five ascending income clusters (just as were the respective samples of Colombia and Uruguay, the other two Latin American countries considered).[34]

Relative to the results observed in other LMICs, the Mexican sample showed that regardless of income cluster, Mexicans were good at managing their money day-to-day, had short-term horizons, and were much less likely to plan how to spend their money (budgeting). People in Mexico had low levels of financial inclusion and poor monitoring of expenses just as Colombians but compared to Mexicans, Colombians of all income segments were better at planning their expenditures. Mexicans were more inclined to save than respondents from Colombia and Uruguay but scored quite low at shopping around for financial products (like Uruguayans). While Mexicans lower tendency (on average) to consider different options of financial instruments could be related to the lower level of financial inclusion observed in Mexico, Kempson et al. (2013a) did not evaluate causal paths and their research remained descriptive. Neither Mexicans, nor Colombians or Uruguayans were good at making provisions to cover unexpected expenses. However, unlike Mexicans and Colombians, Uruguayans evidenced high average FL scores and had higher levels of financial inclusion. All five income clusters in Uruguay showed low levels of overspending. In contrast, middle-class Mexicans (i.e., from the third income level cluster) were particularly vulnerable to changes in their circumstances despite having one of the highest incidences of formal employment and with incomes slightly higher than the average in Mexico. Kempson et al (2013a) attributed the vulnerability of middle-income Mexicans to their tendency to overspend and to rely heavily on credit to make ends meet (sometimes falling into arrears).

Importantly, Kempson et al (2013a) found that none of the financial knowledge (literacy) assessments of the three countries was unambiguously related with their FC scores. For example, the results showed that some financially *illiterate* Mexicans evidenced high money management skills. At the same time, some Mexicans from higher income groups had scarce restraint or patience when spending (were biased towards impulsivity) and were prone to over-indebtedness even though their responses also revealed they had greater familiarity with standard FL concepts such as interest compounding, diversification and inflation.

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[33] Itself commissioned by the WB.

[34] The first income cluster grouped Mexicans with the lowest income and the fifth cluster those with the highest. Therefore, those classified in the third income cluster were considered as part of the middle class.

In contrast, using the UK's FC survey[35] Atkinson et al. (2006; 2007) identified: (1) making ends meet, (2) managing money, (3) planning ahead, (4) choosing products and (5) staying informed as the five domains most associated with (average) robust FC scores in the UK. The comparison of both types of FC research (in LMICs vs HICs) thus seems to suggest that in HICs—with broader financial inclusion (such as the UK)—wider access to different financial products helps to raise the importance of habits associated with the money management FC dimension.
Atkinson et al. (2006; 2007) also noted that higher income individuals, older people, and couples with no dependent children had the greatest FC scores while younger people, couples with dependent children, single people, and those with lower income had the least.

2.2.4 FC: state of the literature

Given its recency and relatedness to other financial education policy tools, the FC literature is still scarce.[36] Most of it discusses either theoretical or methodological issues concerning FC and their relationship to objective FWB, but not to SWB. Moreover, some studies, including metanalyses of the impact of financial education interventions on financial inclusion and objective wellbeing (see Fernandes et al., 2014 and Miller et al., 2015) do not differentiate between FL and FC. Except for Kempson et al. (2013a, 2013b), no other study has exclusively evaluated FC in LMICs such as Mexico. Yet, the latter study remained descriptive and did not analyse what people's FC entails for their SWB, the specific inquiry that the current chapter tackles.

The causal directionality explored in this chapter—from FC to SWB—more closely aligns with that of a couple of studies conducted in HICs. For example, Melhuish et al. (2008) analysed FC among low-income mothers in England and found that greater FC was associated with higher psychological wellbeing.

Taylor et al. (2011) assessed the independent impact of FC on psychological health (measured through the UK 12-item General Health Questionnaire [GHQ]) contained in the British Household Panel Survey [BHPS]). They derived their main explanatory variable, the FC indicator, through a two-stage procedure involving factor analysis (FA). Firstly, Taylor et al. (2011) selected a range of objective indicators about people's financial situation (taken to reflect people's FC outcomes) from the British Household Panel Survey (BHPS) and using FA (regression scoring) extracted the commonly shared (latent) characteristic

[35] Survey commissioned by the Financial Service Authority (FSA), the pre-cursor of UK's current-day Financial Conduct Authority (FCA).
[36] A lot of the research explicitly and unambiguously concerning FC has been conducted by public policy institutions as diverse as the UK Financial Conduct Authority (formerly Financial Service Authority) [in collaboration with the University of Bristol Personal Finance Research Centre (PFRC)], the WB, the U.S. Consumer Financial Protection Bureau (CFPB), and Consumption Research Norway.

or principal underlying component reflected by the selected variables.[37] Subsequently, Taylor et al. (2011) regressed their derived principal component (PC) on income and business cycle indicators using normal OLS and used the residual as their FC measure arguing that it captured the portion of people's financial situation that could not be explained by their income or the general economic climate. Finally, they regressed their psychological health dependent variable (the GHQ scores) on the derived (residualized) FC measure using within-group fixed effects (FE) and a set of demographic and macroeconomic controls.

Taylor et al. (2011) showed that FC had significant and substantial effects on psychological health over and above those associated with income and material wellbeing. Furthermore, Taylor et al. (2011) found that having low FC exacerbated the psychological costs associated with unemployment and divorce, both life events reportedly identified as deterrents of happiness and wellbeing.
While the FC definition in Taylor et al. (2011) stressed far less the attitudinal and psychological dimensions of FC emphasised by the behavioural economics (BE) literature, and covered in this chapter, along with Kempson et al. (2013a, 2013b) research about FC in LMICs, Taylor et al. (2011) analysis provided a useful benchmark to inform our empirical specification (after adapting the design to the constraints of the data used in this chapter).

2.2.5 FC, psychology and SWB

FC is conceptually and empirically related to BE research and with public policy studies evaluating the efficacy of financial education interventions. The growing body of research in these areas argues that FC may have an impact on psychological wellbeing through different processes or mechanisms which Taylor et al. (2011) summarise as: (1) indirect effects through FC's role as enabler of SWB domains including but not limited to FWB (process 1), and (2) direct effects through the behaviours and traits embodied by financially capable people (process 2).[38]

2.2.5.1 Process 1

Process 1 argues that more financially capable people manage their incomes more efficiently and, all else equal, have higher levels of disposable income (or lower levels of unmanageable debt) than those less financially capable with otherwise similar characteristics. Process 1 mechanisms form the basis

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[37] The set of survey questions they use for the factor analysis include: current financial situation; financial situation worsened since last year; respondent saves; has housing payment problems; debt or income problems required borrowing; debt or income problems required cutbacks; and been at least 2 months in arrears during last 12 months.

[38] The two processes or mechanisms herein proposed are not to be confounded with those posited by Kahneman's dual-system theory, popularised in his book "Thinking, fast and slow" (2011). In the latter, Kahneman argued that at any one time we recur to either one of two different decision-making processes. A fast one that is emotional and acts without thinking whilst relying on heuristics and past knowledge and or experiences (system 1, commonly associated with the type of thinking most prevalently observed in the right brain hemisphere) and a slower, more cognitive or deliberate, thinking process which takes a wider range of data than just our personal experience (system 2, most commonly associated with the thinking functions of the left bran hemisphere).

that explains FC money management dimension's effects on the affective-state balance linked to depression and anxiety used as the SWB measure in this chapter.

Capability Theory

Scholars have associated capability theory to process 1 mechanisms because higher capabilities are thought to help people reach their aims in diverse SWB domains (including the financial one) more effectively. Capability theory[39] suggests that the enhancement of the stock of knowledge, skills, and behavioural predispositions that FC helps to facilitate allows people wider access to institutions, its members, and to the latter's network and external environment. Through social capital and peer effects these would contribute to the development of other abilities that best lead people to attain their desired lifestyle and financial goals (Johnson and Sherraden 2007; Nussbaum 2002; Robeyns 2005; Sen 1993). Under the capabilities approach, higher FC is thought to expand individuals' freedoms to reach the standards of living or of doing of their choice which, in turn, result in greater personal satisfaction. Thus, the capabilities approach suggests that the 'freedom-enhancing' role of FC relates to both objective and subjective measures of wellbeing.

2.2.5.2 Process 2

Process 2 posits that through locus of control (agency) and mental models, FC impacts psychological wellbeing independently from its correlation with the attainment of a certain level of income and of material or socioeconomic wellbeing (Taylor et al. 2011). As such, process 2 mechanisms form the basis of the behavioural-attitudinal dimension of FC we develop in this study.

Locus of control theory

A large literature acknowledges the importance of feelings of control and agency in fostering wellbeing. The locus of control theory differentiates between people with an internal locus of control (i.e., those that feel responsible for their outcomes) and people with an external locus of control (i.e. who consider that their outcomes depend on others or are the result of luck). According to this theory, low FC is associated with feelings of external locus of control over financial matters whereas high FC with an internal locus of control. Locus of control theory further argues that individuals with an internal locus of control enjoy a greater sense of autonomy and responsibility over their lives, in turn attaining higher levels of psychological wellbeing than individuals with an external locus of control, regardless of income variability (DeNeve and Cooper 1999; Peacock and Wong 1996; Peterson 1999).

While scholarship recognises that individuals' locus of control is highly influenced by personality, biological and cultural factors, research also suggests that acquiring habits and beliefs associated with high FC could help people nurture an internal sense of control over their finances which would in turn

[39] As applied to the realm of FWB.

improve their SWB. Under this view, in so far as FC enables internal locus of control, FC helps nurture elements of positive affective wellbeing such as autonomy, accountability, self-control, patience, confidence, and satisfaction with one's condition. Due to simultaneity between a persons' locus of control and FC, it is still unclear whether high FC is a cause or a consequence of an internal locus of control. More research is needed to unequivocally affirm causality from FC to SWB under this theory.

Mental models in finance

Other scholars argue that cognitive resources such as sophisticated mental models of finance and heuristics adopted from social learning interactions and peer effects are also part of the processing capacities people use during financial decision making.

In institutional economics, mental-models refer to value-laden[40] internal representations of complex environments forged in social contexts, and which underpin all the institutions (rules and norms) through which we collaborate in society (Denzau and North 1994). Extensive use of mental models and heuristics results from bounded rationality because we resort to the former techniques when confronted with complex financial decisions involving uncertainty and risk (and for which we lack time, information, or mental capacity to conduct an exhaustive analysis).

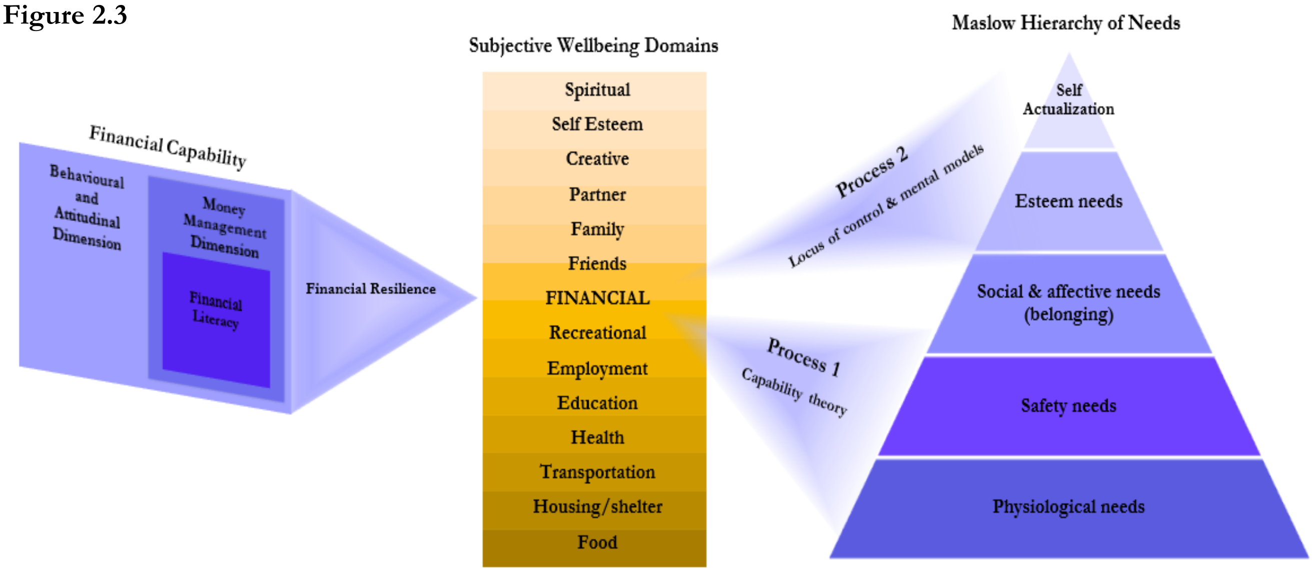
Few studies have specifically related mental models with FC, and none have yet established causality. Related studies on SWB and debt—the management of which constitutes a component of FC—have analysed whether social norms and peer effects impact people's financial mental models or bias their personal-finance decisions. Others merely touch on how FC interacts with cognitive biases to confirm or challenge mental models used for financial decisions. For example, it is possible to hypothesise that framing can nudge people towards austerity mental models and to exercise frugal FC habits—such as monitoring expenses and budgeting—which, under certain circumstances, could improve FWB and through the latter lead to a subjective appreciation of the mental model. On the other hand, it is also possible to presume that bad FWB outcomes resulting from low FC could reinforce inadequate mental models of finance, heighten an external locus of control, or extrapolate biases leading to mistrust and financial mismanagement in a self-fulfilling fashion.

Moreover, scholarship on the two theories associated with process 2 has recognised that their underlying mechanisms reinforce each other. For example, an internal locus of control aligns better with thrift-based mental models than an external locus of control since the former two are grounded on the basis of autonomous agency which can help regulate impulsivity biases and foster patience with respect to consumption and spending, therefore preventing current account overdrafts or problematic over-indebtedness. People's locus of control and mental models also have concurrent influence on how people cope with uncertainty and on which risk attitudes are nurtured (both of which are components of FC). However, more research is still needed to test and better understand the above causal chains.

[40] That is, representations that presuppose the acceptance of or adherence to a particular set of values.

To motivate the chapter's specific research question, Figure 2.3 summarizes the mechanisms underlying our study (and described in this section). We relate both processes to Maslow's hierarchy of needs because according to the latter's theory of behaviour and motivation[41], people's level of affective wellbeing correlates with the type of needs being satisfied. Given the above mechanisms, FC has the potential to impact people's self-actualisation and esteem needs (through process 2 mechanisms) and people's physiological, safety and social belonging needs (through process 1 mechanisms).

Figure 2.3



Source: Self-generated based on literature review.

2.2.6 *Limitations of pre-existing research*

The recency of FC as a field of inquiry has left several methodological and research questions open. As previously noted, to our knowledge, except for Kempson et al. (2013a, 2013b), no other evaluation of FC in Mexico exists. Despite the useful insights provided by such research, it is but a starting point of further needed rigorous inquiry.

While, just as this study, Kempson et al. (2013a, 2013b) research emerged from the observed insufficiency of standard FL research, it did not fully address our chapter's research question. For one, Kempson et al. (2013a, 2013b) studies arose from the hypothesis that higher FC could be related—either by correlation or by causality—with higher levels of welfare, which, as pointed by the wellbeing literature, is a construct different from (affective) SWB, the focal dependent variable of our study. Kempson et al. (2013a, 2013b) assumed that individuals with greater FC would be better equipped to smooth consumption and to protect themselves from exogenous shocks. Maintaining such presupposition, the current chapter extends the analysis by incorporating BE insights positing that FC

[41] See Gorman (2010).

can improve people's SWB beyond any factual and perceived material wellbeing effects (especially through process 2 mechanisms associated with FC's behavioural and attitudinal dimension).

Finally, while some studies evaluating FC in HICs align more closely to the line of causality explored in this chapter, the external validity of their results for Mexico and other LMICs is partially attenuated by social norms and structural differences in living conditions and the stage of development of financial markets between the different types of countries. Considering the above, the current chapter attempts to assess how FC manifests in Mexico and what this entails for Mexicans SWB.

2.3 RESEARCH AIM AND RESEARCH QUESTION

The current chapter seeks to provide informed insights to improve SWB through tools, such as FC, that can help people build up their FWB. We focus the analysis on Mexico to generate evidence that is more generalisable to LMICs which have thinner financial markets, lower financial inclusion and where less research has been devoted to study SWB and FC than in HICs.

The chapter hence responds to the question:

- *Are there any causal effects between FC and the SWB of Mexicans?*

Given FC's theoretical dimensions, our primary research question also indirectly helped us assess whether the instrumental money management dimension of FC influences SWB in Mexico differently than the behavioural and attitudinal dimension of FC.

Relevance

The contribution of this chapter is manifold. Firstly, the chapter responds to the scarce systematic evidence on the causal impact of FC on the financial dimension of SWB, thus helping to fill a gap in the literature.

Secondly, the study aims to contribute to the nascent FC literature by providing some evidence of FC's concurrent relevance especially vis a vis related (more established) literatures seeking to improve people's FWB, such as the FL and the debt and SWB literatures.

Thirdly, using Mexico as a case study, the chapter contributes to the financial inclusion debate regarding policies aimed at ensuring financial citizenship by differentiating the effects of the instrumental money management dimension of FC (itself directly tied to FL) from the cognitive-behavioural, psychological and attitudinal elements of FC on SWB.

The importance of studying FC in Mexico in turn rests on several factors. Even though Mexico was one of the early adopters of the post-2008 GFC financial inclusion paradigm, which stressed the importance of financial education, improvements in the latter have only been gradual. With the 2012 launch of the Mexican Financial Inclusion Survey (ENIF)[42], developed using OECD guidelines, Mexico began

[42] Acronym of its name in Spanish: 'Encuesta Nacional de Inclusion Financiera'.

embracing a ‘financial-inclusion through financial-literacy’ agenda. However, the ENIF is a hybrid survey that contains both financial knowledge questions of concepts typically assessed through FL (such as inflation, simple and compound interest) as well as questions on perceptions and attitudes towards money, that is, about factors more specifically associated with FC than to FL. To date, Mexico has neither adopted a separate FC survey nor has it brought the behavioural and attitudinal aspects associated with FC to the forefront of the policy dialogue. Consequently, to our knowledge, no studies have attempted to measure the potential effects of a capabilities-enhancing engagement with personal finance instruments on the SWB of Mexican people, a gap we attempt to tackle. At the same time, Mexico remains one of the countries (globally) with least financial inclusion despite some improvements in amount of access points from the supply side. This motivates asking whether evaluating FC would help to best understand channels and processes of inclusion related to the financial domain and how these affect the SWB of Mexicans.

2.4 DATA

We use data from the Mexican Family Life Survey (MxFLS),[43] a longitudinal (panel), multi-thematic survey which has been used previously to analyse different dimensions of wellbeing in Mexico, including: emotional, cognitive and physical health as well as factors influencing their changes over time. While the MxFLS consists of three waves, we restrict the analyses to data from the second (MxFLS-II) and third waves (MxFLS-III), together covering the time period between 2005-2012[44] because the set of variables we use as proxies of latent factors associated to the behavioural dimension of FC (i.e., modules on time-value [TV] preferences and trust gambles) were introduced until the second MxFLS wave. In what follows we describe the main variables and their conceptual specifications (see appendix Table 2.A.1 for more details regarding the raw survey-questions [variable items] used to derive several of our controls).

2.4.1 SWB

We use the emotional wellbeing module of the second and third waves of the MxFLS to derive the dependent variable of the analysis. The module is based on a diagnostic questionnaire about a set of affective states of wellbeing associated in the literature with depressive symptoms commonly known as the Calderón Depression Score (CDS) after its creator, Professor of Psychiatry and Member of the

[43] The MxFLS emerged as a multi-institutional research project designed, developed and managed by researchers from the Mexican Center for Economic Research and Teaching (CIDE), the Mexican National Institute of Statistics and Geography (INEGI), and the Iberoamerican University (IBERO) in collaboration with scholars from Universities in the United States including Northwestern University, Duke University, and University of California Los Angeles (UCLA).

[44] The first wave of the survey (MxFLS-I) took place in 2002 while the second round (MxFLS-II) pertained to the period 2005-2006 because its data collection period began in mid-2005 and ended in 2006. However, the data collection period of the third round (MxFLS-III) lasted longer, beginning in 2009 and finishing until 2012, thus encompassing the 2009-2012 period. Both the MxFLS-II and MxFLS-III waves succeeded at relocating and re-interviewing about 90 percent of the original households sampled in 2002.

General Academy of Medicine in Mexico, Dr Guillermo Calderon Narvaez,[45] Since its creation in 1997, researchers at the Mexican Institute of Psychiatry have tested its reliability[46] through Cronbach Alpha (α) evaluations. The CDS has consistently obtained a Cronbach Alpha[47] of 0.86 therefore indicating high internal consistency among the 20 questionnaire items[48] conforming it and suggesting it is a sufficiently reliable measure of depression symptoms amongst the Mexican population (Cazzuffi and López, 2016; Calderón, 1997).

Just as the UK's General Health Questionnaire (GHQ-12 score) —widely used in the literature regarding the psychological costs of financial vulnerability and debt in the UK (e.g. Brown et al., 2005)— the CDS is considered a valid measure[49] of self-reported psychological wellbeing even if it does not consist of the conventional life satisfaction survey questions frequently used by research on SWB. Each of the 20 questions in the CDS module asks respondents to self-report whether, over the past four weeks, they experienced symptoms of depression according to the rating: 1 – *not at all/no*, 2 – *yes, sometimes*, 3 – *yes, many times*, 4 – *yes, all the time*. The symptoms covered by the CDS questionnaire include affections related to: sadness, lack of energy, difficulty concentrating, loneliness, insecurity, sleeplessness, fear, anxiety, discouragement, scarce motivation, loss of appetite, regret, and diminished job performance.

Following the literature using the CDS module of MxFLS data, we added the values of answers to all the module's questions to compute a final score per observation. According to clinical evidence supporting the CDS, the scores were interpreted as follows: (1) non-depressed, normal person (score

[45] The module was part of the MxFLS project throughout the three waves and experienced no changes in terms of the questions' content, order and scaling. Therefore, exactly the same question-set was administered in each wave.

[46] Reliability of any given indicator refers to the extent to which it is a consistent measure of the concept being studied: depression, in this case. Since its creation, the CDS has evidenced a high degree of reliability in clinic and epidemiological studies in Mexico.

[47] Cronbach alpha is a measure used to assess the reliability, or internal consistency (and strength) of a set of survey (scale) items. It is a function of the number of items in a test (here survey questions), the average covariance between pairs of these questions, and the variance of the total questionnaire score. It is normally computed by correlating the score for each scale item (survey question) with the total score for each observation (i.e., of interviewees or survey respondents) and then comparing that to the variance for all individual question scores.

The higher the α coefficient, the higher the amount of shared covariance between the items in a given set of questions, therefore allowing the latter to be understood as measuring the same underlying concept.

Most methodologists recommend a minimum α coefficient between 0.65 and 0.8. A high α is both a function of the covariances among the specific affect based SWB questions and the number of questions in the MxFLS emotional well-being module. Often, the α coefficient can be increased simply by increasing the number of survey questions in the set. However, with highly correlated question items, as the number of questions in the set increase, the risks of question redundancy also increase.

In and of itself, a high α coefficient is not enough to conclude a set of survey items best captures the concept being measured. Tests of construct validity and dimensionality are usually also recommended. We report results of the latter two in the main text.

[48] The CDS module in the MxFLS consists of 21 survey question items. However, to compute the SWB score for this chapter (as well as for Chapter 3), we excluded the question-item asking about sexual interest because the Mexican Institute of Psychiatry has argued that, in Mexico, the wording of the question is often interpreted in terms of coital relationships while the sought after construct should refer to interest in male and female relationships *in general*, without necessarily alluding to sexual intercourse. Hence, the SWB score used in the chapter's analysis relies on 20 out of the original 21 questionnaire items.

[49] Validity refers to the extent to which a measure evaluates the true concept one is trying to analyse (in this case the affective-psychological state of respondents) without capturing too many additional unintended characteristics.

between 20-35), (2) person with some anxiety (score in 36-45 range), (3) person evidencing signs of average depression (score between 46-65), (4) severely depressed person (score > 65 points).
Following such scaling, our SWB dependent variable consisted of a qualitative ordinal variable treated continuously as a total sum of affective states and whose values ranged from 20 (least experience of depressive affective states) to 80 (greater frequency and strength of depressive states). Therefore, the higher the value reflected by our dependent variable (i.e., the higher final score), the larger number and greater intensity of depressive symptoms experienced by the given sample respondent.

2.4.2 Cognitive ability score

In addition to the standard socio-demographic controls employed in the wellbeing and happiness literatures, this chapter also includes as covariate a measure of abstract reasoning obtained from the MxFLS cognitive ability module.[50] Its inclusion was motivated by the growing literature investigating how cognitive ability affects people's financial decisions[51] and outcomes (Benjamin et al., 2013; Bogan and Fertig, 2013; Christelis et al., 2010). Likewise, mental-state theories of SWB such as Hsee and Zhang (2010) general evaluability theory (GET)[52] emphasise the role that cognitive, attentional and memory interpretation processes (related to abstract reasoning) have in shaping people's perceptions, happiness and SWB, thus also prompting the use of a cognitive ability indicator in our analysis.

The cognitive ability module included in all three MxFLS waves[53] corresponds to the shortened version of the Raven Progressive Matrices (RPM) test.[54] Usually administered to 13-65-year-old individuals, the RPM test consists of twelve questions measuring fluid cognition, each presenting a matrix diagram displaying a graphic pattern with a missing part that respondents are asked to complete by choosing from a set of eight different options printed underneath it (see appendix Figure 2.A.1 for an example extracted from MxFLS questionnaires).

To our knowledge, the RPM test has not been previously analysed in relation to SWB. With the exception of Hansen and Villa (2014), it has also not been used in the literature studying the

[50] The majority of articles based on MxFLS data that have used the survey's cognitive ability module have studied individual, local and macroeconomic wellbeing determinants of cognitive skills in Mexico, their transition, and geography (Ruvalcaba and Teruel, 2004; Mayer and Servan, 2008; Mayer-Foulkes, 2008; Altamirano et al., 2009). The analysis by Hansen and Villa (2014) is an exception for they instead use the MxFLS cognitive ability and RA modules along with a financial participation index (also derived from MxFLS data) to test whether the relationship between cognitive skills and financial participation could be attributed to RA mediated transmission effects.
[51] Such literature has found a statistically significant relation between cognitive ability and individuals' holding of financial assets as well as a positive relation between cognitive faculties and risk biases (Dohmen et al., 2010). The understanding of human capital as the convergence of cognitive and non-cognitive skills (which in turn influences SWB) by the economic development literature also justifies adding our cognitive ability control.
[52] GET explains individuals' sensitivity (i.e., subjective reaction or change in affective state) to levels of cared-about attributes (e.g., amount of income and other status markers).
[53] Exactly the same version of the RPM test appears in the three MxFLS waves with no changes in the content (patterns presented), order or presentation of the 12 questions (neither on its answers).
[54] Also called 'Raven test'. Hence, we use both names interchangeably.

relationships between cognitive ability and participation in financial markets. Moreover, the latter literature has mostly used overall measures of intelligence quotient (IQ) tests or specific measures of crystallized intelligence such as numeracy and FL variables neither of which are dimensions measured by the RPM test.

The latter is not a measure of overall intelligence. Rather, the RPM test was designed by English psychologist John C. Raven[55] to measure the *eductive* and *reproductive ability* components of general cognitive ability initially identified by Spearman in 1923. Eductive ability[56] refers to the ability to generate and use high-level (usually nonverbal) schemata to handle complexity. Reproductive ability in turn refers to the capacity to absorb, recall, and reproduce information that has been made explicit and communicated. Both are constituent parts of abstract reasoning, itself considered a nonverbal estimate of *fluid intelligence*[57], that is, of a person's ability to draw inferences about the best solution to a novel problem.

The Raven test is considered a reliable measure of cognitive ability that allows for comparability across groups of people because it was designed to measure skills that build relationships by analogy, regardless of language and education. It therefore provides insights on the level of fluid intelligence of respondents without requiring them to know how to read or write. RPM test scores are thus assumed to be less biased by socioeconomic status than other measures of intelligence, making them particularly useful to gauge the effects of cognitive ability when using survey data from countries punctuated by socio-economic inequality across respondents—as is the case in Mexico.

Following the literature on RPM assessments and using the RPM test answer keys (publicly available through the respective MxFLS waves documentation) we construct our cognitive ability score indicator as the total sum of correct answers given by respondents. Therefore, its values fall along a 0-12 score-range. Because both MxFLS-II and MxFLS-III contain the same version of the RPM test, with exactly the same set of diagrams and answer options (see appendix Figure 2.A.1), our derived measure of fluid cognitive ability allows for comparability throughout time, just as the dependent variable of the analysis (i.e., the CDS).

2.4.3 Behavioural and attitudinal FC aspects

We employ the TV preferences module questions in MxFLS-II and MxFLS-III as constituent factors that proxy for levels of patience (or conversely of impulsivity) in the derived index representing the

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[55] Originally written as his thesis in 1938.
[56] From the Latin *educere*, meaning ''to draw out'', this ability is also associated with creating meaning out of confusion.
[57] Fluid intelligence is related to the executive functions that the pre-frontal cortex (PFC) of the brain specialises in (decision-making processes, problem solving, the pursuit of value-congruent action, directing and maintaining attention to a task) and differs from crystallized intelligence which is associated to the accumulation of knowledge and skills (McArdle et al., 2009; Nisbett et al., 2012).

behavioural and attitudinal dimension of FC used as one of the key explanatory variables in the empirical analysis.

Following a revealed-preferences measurement approach, the TV MxFLS modules present sequences of hypothetical gamble questions that seek to elicit respondents' choices over the time-of-payment of lottery ticket rewards hypothetically won (see appendix Diagrams 2.A.1 and 2.A.2). In both waves, TV questions guide respondents through different payment-period and payment-amount combinations up to different terminal points. Respondents were then classified into five thresholds according to such terminal points with each threshold representing each of the categories of our ordinal TV preference indicators and, correspondingly, reflecting the different additional payoffs respondents were willing to accept to wait for payment (delayed reward) instead of receiving the amount immediately (in the present).

As such, our categorical TV preference indicators can also be understood as reflecting respondents' different delay-discounting (or time-discounting) preferences. The latter concept acknowledges that in intertemporal choices the consequences (rewards) of some options are delayed (happen in the future) and thus, when deciding over them, their utility must be discounted (i.e. reweighted to take into account the delay). Delay or time discounting further posits that the value of a reward decreases as the delay increases and therefore is a function of the temporal proximity of the reward due to "implicit risk" that makes the receipt of the reward less certain as more time passes before it can be retrieved (Green et al., 1994).

Hence, we argue that each of the categories within our TV preferences indicator represent how much of a premium do respondents need in order to be willing to accept a delay in the receipt of the reward or to prefer the future payment over the immediate one. In our study, respondents requiring the least extra payment or premium to be willing to wait to receive the payment in the future were classified as having the lowest present bias and the most patience (corresponding to TV category 5) while those requiring the highest minimum premium to forego immediate payment for the future payment were categorised as having the highest-present bias and least patience (corresponding to TV category 1). The reference or base TV level corresponded to that of respondents choosing irrationally (such as opting for a smaller payment in the future).

As seen in appendix Diagrams 2.A.1 and 2.A.2 (and described through appendix Table 2.A.1), while the questions in both waves were designed to measure the same underlying concept—namely, the required extra payment (premium) needed to be willing to wait to receive the payment in the future—the wording of the questions changed between the two waves. The monetary value of the hypothetical lottery ticket won changed from: \$10,000 $_{\text{MXN}}$ in MxFLS-II (2005) to only \$1,000 $_{\text{MXN}}$ in MxFLS-III (2009). The hypothetical waiting period was also modified. In MxFLS-III (2009) respondents were asked to decide between getting a \$ 1,000 $_{\text{MXN}}$ lottery ticket paid ‘today’ (the day when interviewed) versus receiving a larger amount a year from ‘today’ (i.e. a year from the day of the survey interview). However, the TV trade-off presented in the earlier MxFLS-II (2005) wave implied both a lengthier waiting period (3 years) and, as noted above, a more generous reward (since it asked respondents to evaluate being paid \$10, 000 $_{\text{MXN}}$ ‘today’ (as opposed to a higher amount in three years).

Despite the above modifications, both waves were consistent in terms of the underlying TV thresholds they tested respondents’ preferences for. Regardless of the payment amount, both waves asked respondents whether they preferred receiving the base payment immediately as opposed to a future payment being either more than double, double, 50% or 20% higher than the initially offered (base) payment. Therefore, we were able to classify respondents along the same TV categories[58] in both periods and to use the categorical TV indicator as a factor component of the index representing the behavioural and attitudinal FC dimension of our cross-sectional SWB regressions.

As will be further detailed in subsection 2.6, the role of our categorical TV indicator in this chapter is to act as one of the constituent indicators of the index standing for the attributes associated by the literature with the behavioural and attitudinal dimension of FC—such as the extent of patience or impulsivity, which, as most psychological factors tends to be a latent factor. The categorical TV indicator plays such a role because, as per the FC and the BE literatures, TV preferences are correlated (with some error) with latent traits such as patience that are conceptually represented by the behavioural and attitudinal dimension of FC. As such, the particular questions used in each MxFLS wave to elicit TV preferences from respondents are but one way to measure their correlation with the latent patience factor. Even as the wording regarding the value of the payments offered and the waiting period changed from MxFLS-II to MxFLS-III, the type of lottery was not modified (each set of questions still gauged TV preferences and did so along similar proportional relationships regarding the required premium to wait for payment). Hence, despite the wording changes on the TV modules between the waves, the derived TV categorical indicators in each wave could still act as a measure reflecting their correlation with the latent patience factor and from which patterns regarding its variation over time could be identified. This allowed us to still use the behavioural and attitudinal FC index—itself partially based on TV preferences—in the panel analysis.

In addition to TV lottery categories, the behavioural and attitudinal FC index included two other components. A binary indicator that reported whether individuals took the future into consideration when making spending and saving decisions was included as additional evidence of stated temporal-preferences.

[58] Determined according to the extra payoff threshold proportion respondents reported to need to wait for future payments.

The other indicator (also binary) reflected whether respondents likely saved the whole or at least more than half of a random monetary gift received from their family as opposed to spending it entirely (or most of it). We consider the latter indicator as a constituent factor of our behavioural and attitudinal FC index because it is suggestive of the positive relationship that the self-controlled stance of high FC bares with patience[59] as respondents choosing to spend all or more than half of the gift reflect less patience (more impulsivity) or a sense of entitlement and of self-gratification which could lead them to less healthy personal finance positions. As noted in appendix Table 2.A.1 the wording (in terms of the monetary gift amount received) of the raw MxFLS survey questions underlying the latter indicator also changed between the two waves. However, as in the case of TV preference modules, the difference in wording (primarily of the gift amount) did not entail a change in the latent construct with which the variables underlying our indicator correlated and helped to capture. Hence, we were also able to employ our indicator of the likelihood to save half or more than half of a monetary gift received to derive the behavioural and attitudinal FC index used in panel regressions.

Using the aforementioned variables, the actual behavioural and attitudinal FC index is extracted through PCA computations explained in section 2.6.

2.4.4 Debt and instrumental money management FC aspects

Following Kempson et al. (2013a, 2013b) we use the individual and household level credit modules of MxFLS-II and MxFLS-III to derive the components of the indices representing the instrumental money management dimension of FC which are used as the other two core explanatory variables in SWB regressions. The credit modules in both waves contain information on debt and savings variables and about their management. Since the content of the modules remained the same in both waves, the set of component indicators derived from them were used in both cross-sectional and panel analyses.

While the majority of the constituent indicators used to calculate the instrumental money management FC index were individual level indicators, two constituent factors were derived from household level data. The latter two were constructed to capture whether respondent was part of (1) a household that did not pay any debts outstanding and/or (2) whether respondent was part of a household with unpaid debts outstanding totalling > $1,000 $_{\text{MXN.}}$ Their inclusion was considered appropriate because the debt situation of a household affects the resources available to *all* members and influences the general morale within the household. Both can, in turn, affect process 1 and process 2 mechanisms at the individual level, namely: they can bias the financial behaviours of individual family members, their sense of locus of control and mental models of finance. The high interrelation between such controls based on household-data with the individual level derived variables further reflecting financial behaviours

[59] Conversely it reflects the opposite relationship that the self-controlled stance of high FC bares with impulsivity.

pertaining to credit management (per respondent) granted their concurrent use as constituents of the instrumental money management FC indexes used in Chapter 2.

2.5 *DESCRIPTIVE STATISTICS*

Table 2.1 and 2.2 below present simple descriptive statistics of the sample of each (cross-sectional) wave period used in the study. Descriptive statistics of the corresponding panel sample are presented in appendix Table 2.A.10.

Table 2.1

Descriptive Statistics: MxFLS-III (2009-2012)

Individual Level	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Dependent Variable:					
Calderon Depression Score (CDS)	13395	25.650	7.238	20	80
Demographic Controls:					
Age	13395	32.906	14.086	15	69
Male	13395	.418	.493	0	1
Marital Status (1: married/domestic partnership)	13395	.623	.485	0	1
Income earnt last 12 months (amount)	13395	19174.425	79268.561	0	5000000
Education Level 1 - No Schooling & Preschool/ Kinder	13395	.059	.235	0	1
Education Level 2 - Elementary School (1st - 6th grade)	13395	.3	.458	0	1
Education Level 3 - Jr. High School (7th -9th grade)	13395	.337	.473	0	1
Education Level 4 - High School (10th -12th)	13395	.194	.396	0	1
Education Level 5 - Higher Education: Univ. & Col. Grad	13395	.11	.313	0	1
Cognitive Ability Score (2009), No. of correct answers: 0 – 12	13395	5.77	2.836	0	12
Urban Locality (people ≥ 15,000)	13395	.452	.498	0	1
Sum of loan debt still outstanding (amount)	13395	1001.306	10306.645	0	625000
Sum of savings (amount)	13249	1772.361	17631.813	0	1000000
Household Level					
Other correlates of wellbeing & wealth:					
Experienced robbery or assault to person or to property	13395	.341	.474	0	1
Cohesive, inclusive & trustworthy community	13395	.867	.34	0	1
Household experienced damages due to shocks, prior 5 years	13395	.211	.408	0	1

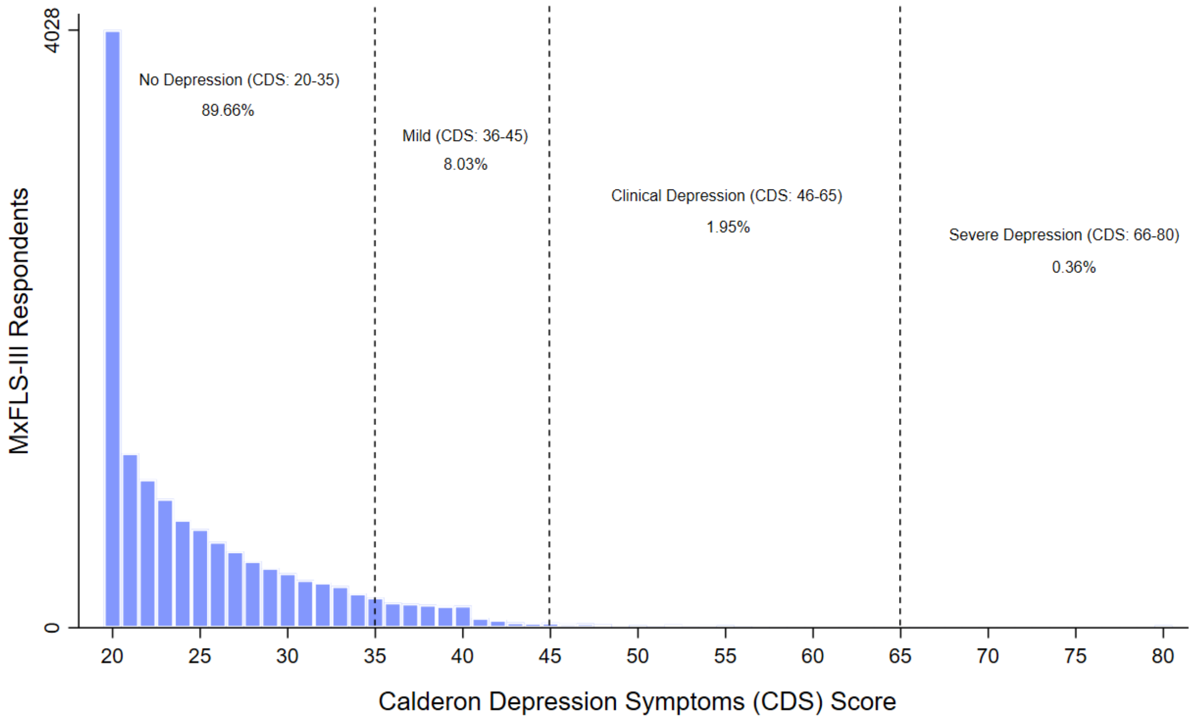
All quantities calculated over estimation sample (restricted to those between 15 & 75 years) and to observations for which both prior and current cognitive ability data was available.
Monetary amounts expressed in Mexican pesos (MXN) corresponding to an average exchange rate of: $29. MXN per £ 1 (.034 £ per MXN).

On average, the sample of Mexicans surveyed throughout the period 2009-2012 did not show signs of clinical depression since, as can be seen from Table 2.1, the average CDS score of MxFLS-III respondents was 25.7 which, according to the existent clinical evidence on the CDS, falls within Mexicans' *normal range* of affective-state balance (i.e., non-indicative of depression).

Figure 2.4 shows that close to 90% of MxFLS-III respondents scored between 20-35 points in the CDS, hence falling within the non-depressive range. A score of 20 was obtained when respondents reported not experiencing any of the feelings and conditions associated with depression and anxiety (as per the

CDS questionnaire). The large initial spike in the number of respondents scoring 20 could be attributed to self-assured respondents rushing through this section of the survey by providing the same answer to all 20 questions whenever they believed that, broadly speaking, they did not tend to experience depression symptoms.[60]

Figure 2.4



Source: Self-generated over estimation sample based on MxFLS-III questionnaire (emotional wellbeing module).

The remaining 10% of the MxFLS-III sample showed signs of depression. Among the latter, 77.7% presented only mild symptoms of clinical depression, 18.8% showed standard depression symptoms and 3.5% fell within the severe depression range. Similarly, appendix Figure 2.A.2 shows that 90 % of MxFLS-II (2005) respondents stood within the non-depressive CDS range. The distribution of the CDS amongst the remaining 10% of respondents in 2005 showed that about 80.7% of them had mild depression symptoms, 16.4% experienced symptoms associated to standard depression and 2.9% showed severe depression symptoms. While the CDS score patterns were very similar in both waves and even though 90% of respondents in each of them were classified as not depressed, we were still able to model variations in their SWB.

Given that lower CDS values signal better mental health, Table 2.2 shows that with a mean affective wellbeing score of 25.2, MxFLS-II sampled Mexicans reported, on average, a slightly higher (by 0.46

[60] The four categories of depression symptoms (CDS ranges) presented in Figure 2.4 are based on the scale stipulated by Dr. Guillermo Calderon in the 1997 article where he explained the new questionnaire he had developed to diagnose clinical depression. Such questionnaire was used as the set of 20 questions constituting the MxFLS emotional wellbeing module from which we calculated the CDS. See Calderón-Narvaez (1997) for more methodological details.
While the distribution of respondents' CDS across the four ranges of depressive symptoms is clearly uneven, our analysis uses the CDS as a continuous variable (not as discrete ranges) thus incorporating all of the variation within each range.

percentage points) level of SWB in 2005-2006 than in the 2009-2012 period. In both wave periods sampled respondents were young adults, on average, in their early 30s. The average Mexican sampled in MxFLS-III was about 33 years old and, as seen from Table 2.2, the average MxFLS-II respondent was two years younger (31 years old).

Table 2.2

Descriptive Statistics : MxFLS-II (2005-2006)

Individual Level	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Dependent Variable:					
Calderon Depression Score (CDS)	11293	25.194	7.098	20	80
Demographic Controls:					
Age	11293	30.816	13.690	15	69
Male	11293	.419	.493	0	1
Marital Status (1: married/domestic partnership)	11293	.534	.499	0	1
Income earnt last 12 months (amount)	11293	15926.610	41423.546	0	2000000
Education Level 1 - No Schooling & Preschool/ Kinder	11293	.056	.231	0	1
Education Level 2 - Elementary School (1st - 6th grade)	11293	.321	.467	0	1
Education Level 3 - Jr. High School (7th -9th grade)	11293	.329	.470	0	1
Education Level 4 - High School (10th -12th)	11293	.186	.389	0	1
Education Level 5 - Higher Education: Univ. & Col. Grad	11293	.108	.310	0	1
Cognitive Ability Score (2009), No. of correct answers: 0 – 12	11293	6.746	2.834	0	12
Urban Locality (people ≥ 15,000)	11293	.472	.499	0	1
Sum of loan debt still outstanding (amount)	11293	431.813	5074.180	0	625000
Sum of savings (amount)	11138	1634.658	24283.507	0	1000000
Household Level					
Other correlates of wellbeing & wealth:					
Experienced robbery or assault to person or to property	11293	.236	.424	0	1
Cohesive, inclusive & trustworthy community	11293	.857	.35	0	1
Household experienced damages due to shocks, prior 5 years	11293	.155	.362	0	1

All quantities calculated over estimation sample (restricted to those between 15 & 75 years) and to observations for which both prior and current cognitive ability data was available.
Monetary amounts expressed in Mexican pesos (MXN) corresponding to an average exchange rate of: $29. MXN per £ 1 (.034 £ per MXN).

Slightly more than two-thirds of informal finance (e.g., loans via friends, relatives or acquaintances) users in MxFLS-III lived in rural areas. The same patterns were observed in MxFLS-II data. Hence, taking the use of informal financial instruments as indicative of the extent of exclusion from formal financial markets, we can unsurprisingly conclude that financial exclusion was more prevalent in rural areas in both waves.

The majority of respondents sampled in MxFLS-III had low levels of educational attainment. Only about 11% of 2009-2012 wave respondents pursued further studies after high school (i.e., university or graduate school education) while 5.9% had no schooling or had at most completed pre-school. About a third of sampled individuals (30%) only completed elementary school, 33.7% had at most completed junior high school, and 19.4% also completed the last three years of high school. The low level of education amongst MxFLS-III respondents can be explained by respondents coming mainly from non-urban localities, as 54.8% of 2009-2012 sampled respondents lived in localities with *less than* 15,000 inhabitants (the threshold used in Mexico to classify a community as urban), 11.1% resided in localities with populations between 15,000 - 99,999 inhabitants and 34.1% lived in cities with at least 100,000 people. In Mexico educational attainment is known to be lower in rural and semi-rural areas than on large cities. MxFLS-III descriptive statistics provide evidence of this since the percentage of urban survey respondents achieving a postgraduate degree after high-school doubled the proportion of rural MxFLS respondents continuing in education after high school. Moreover, the proportion of respondents whose last level of education was elementary school in rural areas (35.7%) was about 13 percentage points higher than the proportion of respondents not pursuing further education after elementary school in cities (23.2%) understood as localities with *at least* 15,000 inhabitants. Given these statistics and that financial education tends not to be part of the curricula until high school, it is plausible to assume that our wave 3 sample had low levels of FL.

As expected, Table 2.2 showed that educational attainment amongst MxFLS-II sampled individuals (2005-2006 period) was even lower than that of individuals in the MxFLS-III sample (2009-2012 period) thus evidencing that Mexico continued achieving minor and paced gains throughout time in terms of raising education levels. To illustrate, in our MxFLS-II (2005) sample only 10.8% of respondents achieved university level education after high school while 5.6% had no schooling or at most completed pre-school. MxFLS-II sample statistics revealed the same pattern of educational attainment as in wave 3 for the remaining schooling levels as: 32.1% of respondents completed elementary school, 32.9% also coursed the subsequent three years of Jr. high school, but only roughly 18.6% attended high school entirely.

The discrepancy in the level of educational attainment between rural and urban communities in Mexico was more pronounced in 2005 than in 2009-2012. For example, the proportion of MxFLS-II Mexicans from rural communities attending university level education (4.7%) was just over a a third of the percentage of urban MxFLS-III Mexican respondents completing university, college or graduate school (14.3%). Given these figures, the level of FL of the 2005 sample was likely even lower than that of MxFLS-III. Just as in 2009-2012, the majority of sampled individuals from MxFLS-II came from non-urban localities as 52.8% of respondents recorded being part of a locality with less than 15,000 inhabitants and the rest lived in either localities with populations between 15,000-99,999 inhabitants (9.9%) or in cities with at least 100,000 people (37.3%). As in MxFLS-III, the distribution of 2005-2006 respondents per locality-type shed some light on potential reasons behind the low educational attainment of the MxFLS-II sample.

Together, information on educational attainment and on the distribution of households between rural and urban localities in both waves suggest a slight bias in MxFLS data towards farming and non-urban subpopulations.

In terms of abstract reasoning aptitudes, 45.4% of working age Mexicans in 2009-2012 had between 5 to 8 (inclusive) correct answers in the RPM test, therefore evidencing an intermediate (average) level of fluid intelligence. About 19.2% of MxFLS-III respondents scored in the upper range (i.e., with 9 or more correct answers, inclusive of the 1.1% working age respondents who achieved a perfect score of 12 correct answers). Yet, more than a third (35.3%) of working age individuals in MxFLS-III obtained a lower range (with 4 or less correct answers) abstract cognitive ability score.

About the same proportion (45.8%) of MxFLS-II working age respondents as in the posterior wave (MxFLS-III) obtained an intermediate (normal) RPM test score (i.e., had between 5-8 correct answers, inclusive). Yet, RPM cognitive ability cores amongst the remaining proportion of MxFLS-II respondents appeared higher than those of respondents in wave 3. Standing at 30.3%, the share of MxFLS-II respondents scoring in the upper range of 9 or more correct answers (inclusive of those with a perfect score) was 11.9 percentage points higher than in 2009 and the amount of 2005 respondents achieving a perfect score of 12 correct answers (3%) tripled that of respondents in 2009. Additionally, 23.9% of the sampled working age individuals in 2005 had 4 or less correct answers, implying that the proportion of MxFLS-II respondents in the lower range of cognitive ability was 11.4 percentage points lower than in MxFLS-III. Coupled with MxFLS-II schooling attainment data, the observed pattern of cognitive ability scores amongst the 2005 sample helps to validate claims that the RPM test is impartial to socio-economic status and to formal education levels since despite the slightly lower levels of educational attainment of the 2005-2006 period, respondents performed better in the RPM test in the former period than in 2009-2012.

The average value of financial balances such as the total labour income earnt over the 12 months preceding the survey, the total amount of debts outstanding and total amount of savings of respondents were higher for the MxFLS-III (2009-2012) sample than in the MxFLS-II sample (2005-2006). Total labour income earnt over the year prior to each survey saw a 20% increase from being, on average, $\$15,926.6_{MXN}$ in 2005-2006 to an average of $\$19,174.4_{MXN}$ in 2009-2012. Similarly average total savings grew by 8% from $\$1,634.7_{MXN}$ in 2005-2006 to $\$1,772.4_{MXN}$ in 2009-2012. Total outstanding debts increased the most as their average MxFLS-III value of $\$1,001.3_{MXN}$ more than doubled the average sum of outstanding loan debt value in 2005 which stood at $\$431.8_{MXN}$. The latter implied that despite the higher income and savings balances of the 2009-2012 period, as per the summary statistics of Tables 2.1 and 2.2, the financial position of respondents in MxFLS-III was slightly less robust than in MxFLS-II since both the average debt-to-income and debt-to-savings ratios were higher in 2009-2012 than in 2005-2006.

Finally, while, on average, MxFLS-III respondents experienced a slightly higher sense of belonging to a cohesive, inclusive and trustworthy community than in 2005, the other two correlates of SWB (namely the amount of crime and negative shock experiences) were on average higher in 2009-2012 than for respondents in 2005.

2.6 FINANCIAL CAPABILITY INDICES

As key explanatory variables in our study, the derivation of the FC indices used in the chapter was an important preliminary step of the empirical assessment. We thus devote this section to explain such process separately.

2.6.1 Methodology

2.6.1.1 Rationale

Following Kempson et al. (2013a, 2013b) we employ PCA over groups of MxFLS questions containing information on factors related to the two dimensions of FC identified by the literature, namely: (1) the instrumental money management dimension and (2) a behavioural-attitudinal dimension.

When using large multidimensional surveys such a MxFLS, one risks confusing the strength of complex inter-relations between variables or double-counting latent information contained in related variables (questions) specific to certain survey modules (like the MxFLS time preferences and credit modules).

In light of these challenges, data reduction techniques such as PCA help to simplify the data and to parse out the most relevant information for the analysis by distinguishing between the individual information content of each variable (question) and the amount of shared information across collections of questions.

PCA assumes that a certain group of variables (or questions) are correlated and that their variability can be summarized through a reduced set of *uncorrelated* linear combinations (components) of the original variables.[61] As any other data reduction method, PCA entails some unavoidable information loss. However, the latter can be minimised by the method's parameters in order to obtain the most meaningful summary of the initial variables at the lowest cost. Despite its caveats, PCA has been amply used in empirical research within economics.

[61] Factor analysis (FA) is another commonly used dimensionality reduction technique. While both share the presumption that the given original group of variables one seeks to summarize are highly correlated, PCA is preferred to FA because the latter poses several factor solutions, choses a priori the number of factors in which to summarise the data and estimates (common) factor scores that are still correlated. In other words, FA assumes there exist few common factors driving the variation in the original variable-set. All of this can cause multicollinearity issues in regression estimations. In contrast, PCA does not assume a few common factors drive the variability. Instead, PCA determines the number of components ex post (guided by the amount of variability of the original set they explain), sorts the component according to the amount of variability explained (to facilitate selection) and computes common component scores that are unique and uncorrelated.

To illustrate, Table 2.3 lists the number of articles that use PCA in some capacity and have been published by top economics journals[62] (identified through their respective H-index ranking)[63].

Table 2.3
Published Articles Using PCA (Top 55 Journals)

Journal	H-Index	Articles
The Quarterly Journal of Economics	2	**2**
Journal of Finance	3	**3**
Econometrica	4	**1**
Journal of Financial Economics	6	**7**
Review of Economic Studies	7	**1**
Journal of Econometrics	10	**31**
The Review of Economics and Statistics	11	**6**
Review of Financial Studies	12	**4**
Journal of Development Economics	17	**1**
Management Science	18	**5**
European Economic Review	19	**1**
Journal of Banking & Finance	20	**11**
Research Policy	23	**2**
Journal of Business & Economic Statistics	25	**13**
Energy Policy	28	**19**
Energy Economics	31	**17**
Journal of Applied Econometrics	34	**6**
Journal of Financial and Quantitative Analysis	35	**5**
Journal of International Money and Finance	44	**8**
Economics Letters	45	**10**
Journal of Economic Behavior & Organization	48	**5**
Journal of Economic Dynamics and Control	53	**3**
European Journal of Operational Research	54	**24**

As is seen from Table 2.3, PCA is more common in subfields related to financial economics since the technique is particularly useful for abridging information regarding valuation (of assets, goods and services [including energy]), as well as for mapping perceptions (including of uncertainty), attitudes and habits related to personal finance.

Given the above, PCA was particularly suited to our analysis, as it helped capturing the latent factors constituting the two dimensionalities of FC described in the literature.

2.6.1.2 Procedure

Based on the theoretical delimitations of FC dimensions (see section 2.2) we first grouped questions of similar substantive content from MxFLS modules on credit and TV preferences. As a dimensionality reduction technique, PCA permitted us to assume that for each collection of MxFLS variables—which we suspected to reveal a similar pattern of responses—there existed an underlying latent construct that could explain their interrelationships and indeed cause them. Thence, we extracted summary measures

[62] Table 2.3 is based on data from the RePEc (Research Papers in Economics) aggregate rankings of journals. Using the RePEc service IDEAS, we restricted the search to the top 55 journals ranked according to their H-index (as computed by RePEc) and employed the search terms "principal component analysis" and "PCA" to retrieve the number of published articles per journal. Reflecting the rising recent popularity of PCA, close to 75% of the articles were published between 2018 and 2023, a fifth between 2000 and 2017 and ~ 5% between 1969-2000.

[63] As noted by Zimmerman (2013), in RePEc aggregate rankings a journal with an H-index of h has h articles with at least h citations. Per definition, the metric favours older journals or series that have good quality and numerous articles that attract citations (perhaps due to thematic interests, methods preference or even author affiliations). Nonetheless, journals age could be reflective of quality (resilience) Additionally, in bibliometrics, H-index is preferred to one-dimensional metrics (such as impact factors) because it combines measures of quantity and impact in a single indicator. Overall, the H-index is also more efficient than other criteria to evaluate a researcher's scientific input (number of citations, impact factor, number of highly cited papers).

from each collection of questions gauging the same underlying concept and named the resulting condensed indicators (components) according to the latent attribute reflected by the MxFLS responses being summarised. Using such procedure, we constructed three FC indices: two pertaining to the instrumental money management dimension of FC and one corresponding to its behavioural and attitudinal dimension. All three were later used as main predictors of the effect of FC on SWB (see section 2.8).

The two (sub)indices associated with the instrumental money management dimension of FC represent two separate features associated with the given FC dimension. Implied by its name, the 'problematic credit management' (or 'not keeping track') index was the synopsis of information in five MxFLS credit questions reflecting poor credit management and neglect towards keeping track of personal finances. Such a question-set included queries about: falling into debt arrears, not having paid for any debts incurred, or having large balances of unpaid debts in need of servicing.

The other money management FC dimension (sub)index, namely the 'savings orientation and resilience index' summarised the information of three questions gauging whether respondents planned for unexpected shocks through savings and prepared for the viability of their living standard into the future by considering their retirement when making financial decisions. Whereas the savings orientation index characterised attributes of good FC and judicious money administration, in contrast, the problematic credit management index epitomised traits that could lead respondents to bad financial outcomes. Consequently, while our problematic credit management index is expected to bear a positive relationship with depression and anxiety, our savings orientation index is expected to bear a negative (opposite direction) relationship with our SWB dependent variable, the CDS. Thus, even though both are part of the instrumental money management dimension of FC, in the empirical analysis we treat them as independent indicators.

The single index representing the behavioural and attitudinal dimension of FC was obtained as the summary PC encapsulating the shared common variance of three MxFLS questions pertaining to time-biased spending preferences. More specifically (as explained in subsection 2.4.4) constituent factors of the behavioural-attitudinal FC index gauged the saliency of the future in respondents' present spending and saving decisions, the extra-payoff MxFLS respondents needed to be willing to wait for payment of a lottery ticket won across different time-thresholds as well as responses reflecting willingness to save a larger share of a monetary gift received than the share spent of it. Therefore, our behavioural-attitudinal FC index signals 'patience' with respect to consumption and spending decisions (or conversely, the extent of respondents' 'impulsivity' when dealing with financial choices). Correspondingly, we called it 'patience index'.

While the savings orientation index is related to the patience index, we differentiate the two by treating the former as part of the instrumental money management FC dimension and the latter as standing for the behavioural and attitudinal dimension of FC, because, as explained in section 2.2 and as detailed in subsections 2.6.1 and 2.6.2 the constituent factors summarized by the patience index (i.e., preferences and cognitive predispositions) are considered antecedent susceptibilities that help individuals to achieve outcomes such as those constituting the components of the savings orientation instrumental money management (sub)index (e.g. having savings and a retirement account with voluntary contributions).

2.6.2 Indices specification and descriptive statistics

Table 2.4 provides descriptive statistics for the variable-sets used to derive the FC indices of the 2009-2012 period. Analogous descriptive statistics for the constituent factors of wave two FC indices are found in appendix Table 2.A.3.

Table 2.4

Descriptive Statistics FC Indices Constituent Factors : MxFLS-III (2009-2012)

Individual Level	N	Mean	Std. Dev.	Min	Max
FC– Cognitive/Behavioural Dimension:					
Patience index factors					
Time-value preferences (categorical indicator)	13395	1.433	1.066	0	5
Considers the future in spending & saving decisions	13395	.582	.493	0	1
Spent nothing or less than half of $20,000 MXN monetary gift*	13395	.650	.477	0	1
FC– Instrumental Money Management Dimension:					
Problematic credit management index factors					
Has loan debt amounts in need to be paid back (binary 1 – in arrears)	13395	.095	.293	0	1
Has total debt outstanding > $1,000 MXN	13395	.287	.453	0	1
Made credit card withdrawals not paid-off by due date (last 12 months)	13395	.010	.098	0	1
Has outstanding credit card balance	13395	.020	.141	0	1
Did not pay any of the debts incurred (over last 12 months)	13395	.067	.251	0	1
Savings orientation & resilience index factors					
Has savings	13395	.135	.341	0	1
Has a retirement savings account (AFORE)	13395	.170	.376	0	1
Made voluntary contributions to retirement savings account (AFORE)	13395	.004	.062	0	1

All quantities calculated over estimation sample (restricted to those between 15 & 75 years).

The pre-selection of the sets of MxFLS questions comprising the constituent factors of our study's FC indices was informed by our review of the literature, tetrachoric and polychoric correlation matrices.[64] Tetrachoric correlations were preferred to the traditional Pearson correlations commonly used in PCA to derive the instrumental money management FC dimension indices of our study because tetrachoric correlations are best suited to capture associations of dichotomous variables just as those comprising

[64] Tetrachoric correlations are technically defined as estimates of the Pearson correlation coefficients one would get if: (1) the variables were measured on a continuous scale instead of as ordered-categorical variables, and (2) the two continuous variables followed a bivariate normal distribution. Polychoric correlation evaluates the correlation between two unobserved, continuous variables with a bivariate normal distribution. Information about each unobserved variable is assumed to be obtained through an observed ordinal variable that is supposed to derive from the unobserved variable by discretization—classifying its values into a finite set of discrete, ordered values (Olsson 1979; Drasgow 1986). Polychoric correlation between two observed binary variables is also known as tetrachoric correlation.

the constituent factors of our problematic credit management and savings orientation indices.[65] Polychoric correlations can be interpreted as a more general case of tetrachoric correlations that instead of applying to binary variables (as the tetrachoric) are used to measure associations involving ordinal variables just as our categorical TV indicators.[66] Hence, the estimations underlying the patience index representing the behavioural and attitudinal FC dimension and which incorporates TV preferences as constituent factor were based on polychoric correlations. Both tetrachoric and polychoric correlations helped assess the degree and direction of association of the variables constituting each FC index. We also used tetrachoric correlations to derive an index of household durable goods and dwelling characteristics to proxy for wealth and living-standard controls commonly used in the literature as important correlates of SWB. Coefficients from the different correlation matrices used in the PCA derivation of the three FC indices (in each wave) are given in appendix Tables 2.A.4.1 – 2.A.4.6. The latter tables show significant correlations (at the 0.05 level) across most of the factor variables used to construct each of the FC indices they loaded on. Similar patterns of correlations were observed in both periods and, as expected, the magnitude of each wave's pairwise tetrachoric and polychoric correlation coefficients were higher than those of their respective Pearson correlations.[67]

Following the literature (e.g., Taylor et al. 2011), Cronbach Alpha (α) tests were used to evaluate whether the sets of questions chosen to derive each index[68] were the most reliable (internally consistent) to capture the variables' shared latent FC attribute as well as to determine if a summary (index) measure could be constructed from them (Cronbach, 1951). As a per sample metric, the Cronbach Alpha can help measure whether the variables in question vary in the same direction and have a statistically meaningful level of correlation with each other. Table 2.5 compares Cronbach Alpha test scores of the variable-sets used to construct our FC indices across both waves. The two 'A' columns of Table 2.5 show the estimated correlation between the set of variables to be summarised by each FC index and any other alternative set with the same number of variables measuring the underlying latent attribute (i.e. the scale reliability coefficient). The two 'B' columns give the estimated correlation between the scale (i.e., the square root of the sum of the variable-sets chosen to be synthetized into each index) and the underlying latent attribute they attempt to measure. According to the literature, correlation scores with

[65] The consistency of estimates obtained from Pearson correlations depend on assuming the multivariate normality of the sample estimation, a condition that limits its applicability for samples mainly consisting of binary indicators, as is the case in this study (Kolenikov and Angeles, 2004). Similar to the traditional PCA assumption of latent constructs, Tetrachoric correlations assume a latent bivariate normal distribution for each pair of dichotomous and categorical variables as well as a threshold model for the observed variables in the matrix.

[66] More precisely, polychoric correlations assume that variables are ordered measurements or an underlying continuum (that cannot be adequately measured continuously). Furthermore, polychoric correlations acknowledge that an ordinal variable can result from the discretization (or binning) of an underlying unobserved (latent) continuous variable such as the extent of present bias, impulsivity, or patience. Based on this, polychoric correlation assumes that latent variables are bivariate normal and estimates the Pearson correlation between the continuous variables that underlie the ordinal variables (Wicklin, 2013).

[67] Pearson correlation tables are not reported but can be provided upon request.

[68] The problematic credit management index consisted of 5 variables; the savings orientation index consisted of 3 indicators and the patience (behavioural) index was constituted by 3 variables.

latent attributes greater than 0.40 are considered acceptable, yet they denote modest reliability. Scores greater than 0.60 are therefore preferred and those above 0.80 are considered high.[69]

Table 2.5

Reliability Alpha: FC Indices Constituent Factors

	MxFLS-II		MxFLS-III		
FC Constituent Factors	**Average Alpha** α^s		**Average Alpha** α^s		f
	A	**B**	**A**	**B**	
Problematic Credit Management Factors	0.4763	0.6901	0.4489	0.6700	5
Savings Orientation & Resilience Factors	0.3183	0.5642	0.2638	0.5136	3
Attitudinal & Behavioural (Patience) Factors	0.0798	0.2825	0.1064	0.3262	3
Hhd. Durable Assets & Dwell. Characs. Factors	0.7801	0.8832	0.7454	0.8634	15

Avg. α^s refer to the per-period Cronbach Alpha test scores of each index generated from its standardised constituent factors.
All Cronbach Alpha scores shown are based on the sum of standardized variables.
All quantities calculated over estimation sample (restricted to those between 15 & 75 years).
B columns represent $\sqrt{A}$
f column indicates the number of constituent factors used to derive the Cronbach Alpha score reflected by each index.

From Table 2.5 we see that, except for the set of factors used to derive the patience (behavioural) FC index, the Alpha test scores of the sets of variables used for MxFLS-II indices (period 2005-2006) were consistently higher than those of MxFLS-III (period 2009-2012). From Table 2.5 we also see that out of all the sets of constituent factors used to derive each of the FC indices, the five variables used to construct the problematic credit management index had the highest Alpha score, suggesting that such five-variables were the most reliable at measuring the underlying latent attribute they attempted to capture, namely: respondents' inability to keep track of their budget and personal finances.

Given that Alpha scores are both a function of the number of constituent variables summarised by each of the indices and of the correlations among them, the lower α coefficient of the three variables used in the derivation of the savings orientation index reflects both the higher sensitivity of the index to a smaller number of constituent factors as well as the three variables' weaker reliability at capturing MxFLS respondents' latent orientation towards building financial resilience through savings. Similarly, the small α coefficient resulting from the three variables used to derive the (behavioural) patience index can be both attributed to the scarce number of factors involved and to their feebler correlations. Despite the smaller α coefficients of the patience index, the results in Table 2.5 suggest that, while the sets of components of the behavioural-attitudinal FC index in each wave correlate with and measure the same underlying latent construct: patience—those from the MxFLS-III wave were more internally consistent (had higher α) than the most coherent group of (three) factors constituting the behavioural-attitudinal FC index in the earlier, 2005 wave.

[69] Methodologists recommend a minimum α coefficient between 0.60 and 0.8 (or higher in many cases); α coefficients that are less than 0.45 are usually considered very moderate to poor.

After analysing the structure and reliability of the correlations of the variable-sets constituting our indices, we used tetrachoric PCA estimations to predict the scores of the two instrumental money management FC indices and polychoric PCA estimations to calculate the score for the behavioural and attitudinal FC index of our study. Tetrachoric PCA estimations are a form of Nonlinear Principal Component Analysis (NLPCA)[70] that generalises the tenets of standard PCA[71] (based on Pearson correlations) for their application to binary data like the variables constituting the FC indices representing the instrumental money management FC dimension of our study. Polychoric PCA estimations are an extended case of NLPCA applicable when one or more of the constituent variables are ordinal (as was the case for our [patience] behavioural and attitudinal FC index). The maximum common variance from all the indicators constituting the variable-sets of any of the FC indices was extracted and condensed into a principal score through either tetrachoric or polychoric PCA estimations. Such procedure yielded two composite (tetrachoric) indices for the FC money management dimension and a single (polychoric) index representing the behavioural and attitudinal dimension of FC. Each index can be expressed as a linear combination of its respective group of constitutive (standardised) set of variables.[72]

More formally, each index score S[73] is specified as:

$$S^C = w_1^c \frac{V_1^c - \mu_1^c}{\sigma_1^c} + w_2^c \frac{V_2^c - \mu_2^c}{\sigma_2^c} + \ldots + w_5 \frac{V_5^c - \mu_5^c}{\sigma_5^c} \tag{2.1}$$

$$S^S = w_1^s \frac{V_1^s - \mu_1^s}{\sigma_1^s} + w_2^s \frac{V_2^s - \mu_2^s}{\sigma_2^s} + w_3^s \frac{V_3^s - \mu_3^s}{\sigma_3^s} \tag{2.2}$$

$$S^P = w_1^p \frac{V_1^p - \mu_1^p}{\sigma_1^p} + w_2^p \frac{V_2^p - \mu_2^p}{\sigma_2^p} + w_3 \frac{V_3^p - \mu_3^p}{\sigma_3^p} \tag{2.3}$$

Where S^C refers to the *Problematic Credit Management Index* and S^S to the *Savings Orientation & Resilience Index* of the first dimension of FC, the instrumental money management dimension. The second FC dimension in our study is captured through S^P, a *Patience Index* indirectly denoting the extent of impulsivity (low patience) of MxFLS respondents when budgeting and taking some personal financial decisions.

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70 The NLPCA methodology leads to the optimal synthesis of observed variables in a reduced space whilst preserving measurement levels of qualitative ordinal data without assuming an a priori difference between their categories.

71 The PCA technique can be interpreted as a regression model with a restricted number of unknown independent variables and homoskedastic residuals in which a few common factors linearly combine a set of original question-item variables.

72 As a form of multidimensional scaling PCA (and NLPCA) procedures use correlations between the constituent variables of each index to find new vectors of the former that explain the most variance. Thus, PCA (and NLPCA) procedures consist of linear transformations of the constituting factor variables underlying each FC index into a lower dimensional space thought to retain the maximal amount of information about the variables, which conceptually relate to the latent construct being represented (Breyal, 2010).

73 In the regression analyses we use the term index to refer to each of the pertinent principal scores (denoted as either S^C, S^S, or S^P).

The means of the variables in the grouped collection of factors comprising each index are given by μ^c, μ^s, μ^p and their respective standard deviations by σ^c, σ^s, σ^p. The weights w^c, w^s, w^p were a-priori unknown and calculated empirically based on the maximization of the variance of the first PC of the scores S^C, S^S, S^P.

For example, tetrachoric PCA estimations extracted the commonly shared variance of the five constituent factors of our problematic credit management FC index (i.e., of V_h^c with $h = 1, \dots, 5$). Then, subject to the maximisation of their variance,[74] weights w^c were assigned to each factor V_h^c to linearly transform the five credit questions (variable-set) and reduce it into one principal maximal variance component score represented through S^C. The other index scores (S^S and S^P) were constructed analogously.[75] In the literature the weights w^c, w^s, w^p are commonly referred to as component loadings, and they represent the importance or contribution of each constituent MxFLS question (factor) to the principal index score they help summarize. Intrinsically, component loadings help to gauge the strength of the relationship between the constituent factors of each of the index and the latent construct they signify.

Table 2.6 gives the eigenvectors of the component loadings conforming each of the FC indices across the two MxFLS wave periods. Starting with the problematic credit management index, we can see from Table 2.6 that all its constituent questions asked whether the respondent had unpaid debts in need of repayment. Since all had positive loadings, we concluded that, by construction, our problematic credit management index signals low (rather than good or strong) FC as it stands for latent attributes causing credit and debt mismanagement, mis-budgeting or failing to keep track of money. Moreover, given that in both waves the two largest factor loadings came from variables associated with unpaid credit card (CC) balances, it can be assumed that our index mostly measures latent attributes associated to problematic CC debt.

Table 2.6

FC Indices: Components

FC Dimension 1:	**Instrumental Money Management Dimension**	
Problematic Credit Management FC Index		
Constituent factor variable	**MxFLS-II**	**MxFLS-III**
	Factor weights*	

[74] The weights that solve each maximization problem are a function of the matrix of correlations amongst the constitutive factors of each index.

[75] Even though the S^P was calculated through a polychoric PCA procedure, the only practical difference between the latter one and the tetrachoric PCA procedure consisted in calculating a matrix of polychoric correlations rather than tetrachoric ones prior to predicting the PC scores corresponding to such correlations. However, the logic of both methods remained analogous since polychoric correlation is just a generalization of tetrachoric correlation to ordered categorical variables.

(1) Has unpaid loan & credit amounts	0.454	0.424
(2) Household unpaid debts > $ 1000	0.478	0.467
(3) Made cc withdrawal not fully paid	0.498	0.507
(4) Has outstanding cc balance to pay	0.479	0.500
(5) Hhd. did not pay any debts incurred	0.302	0.258

Savings Orientation FC Index

Constituent factor variable	**MxFLS-II**	**MxFLS-III**
	Factor weights*	
(1) Has savings	0.453	0.412
(2) Has retirement savings account	0.625	0.637
(3) Makes voluntary contributions to retirement account	0.635	0.652

FC Dimension 2: Behavioural-attitudinal Dimension

Patience FC Index

Constituent factor variable	**MxFLS-II**	**MxFLS-III**
	Factor weights*	
*(1) Time-value preferences (categorical indicator) **	0.186	0.515
(2) Considers the future in spending & saving decisions	0.710	0.741
*(3) Spent nothing or less than half of monetary gift received **	0.679	0.432

* Factor weights also receive the name of factor loadings.
Value of monetary gift received MxFLS-II (wave 2) was $1,000 MXN,
Value of monetary gift received in MxFLS-III (wave 3) was $ 20,000 MXN
Waiting period in MxFLS-II (wave 2) time-value lottery questions was 3 years
Waiting period in MxFLS-III (wave 3) time-value lottery questions was 1 year.
Value of presently biased amount if choosing today in MxFLS-II (wave 2) was $10,000 MXN.
Value of presently biased amount if choosing today in MxFLS-III (wave 3) was $ 1,000 MXN.
All quantities calculated over estimation sample (restricted to those between 15 & 75 years).

The second panel of Table 2.6 provides information on the relative importance of the factors constituting our savings orientation index. In both waves all the variables considered for its construction had positive loadings and those referring to making voluntary contributions to personal retirement savings account showed the highest statistical importance. Therefore, we concluded that our index reflects a latent *proactive* and *autonomous* concern about the future motivating people to prepare for it through willingness to save *voluntarily* for retirement (good FC).

Panel three of Table 2.6 shows that in both survey-wave periods the three constituent factors of the behavioural-attitudinal FC index loaded positively and the variable standing for respondents' consideration of the future in spending and saving financial decisions unequivocally revealed the greatest strength (magnitude). As explained in subsection 2.4.3, the categories in our ordinal TV preferences indicator are increasing in terms of patience so that each successive category reflects a lower payment premium required to relinquish immediate payment for a future payment (higher willingness to wait) and therefore a higher level of TV preference towards the future rather than the present. The higher factor weight obtained for the TV preferences categorical indicator in MxFLS-III relates to Table 2.5 results which reflected that, whilst the wording change in questions gauging for TV preferences between the two waves did not modify the latent construct both sets of TV questions helped to capture (extent of patience), MxFLS-III survey items revealed higher internal consistency and reliability (as reflected by their higher Cronbach Alpha in Table 2.5). Nonetheless, the reliability and correlational value of the TV preferences indicator in MxFLS-II was still significant. Indeed, Table 2.6 panel three results suggested that the TV preferences indicator, together with the other two constituent factors of the index derived to represent the behavioural-attitudinal dimension of FC, on net, reflected a low present bias and captured respondents' patience towards spending, therefore representing good FC.[76]

Following the literature (Taylor et al, 2011; Anderloni et al, 2012), to facilitate the comparison of the indices, Table 2.7 presents descriptive statistics of the standardised values (z-scores) of the three FC indices and the household living conditions proxy index in MxFLS-III. Appendix Table 2.A.5 provides analogous results for MxFLS-II. From Tables 2.7 and 2.A.5 we can see that, in both waves, among FC indices, the behavioural-attitudinal (patience) index had the largest average FC score, the biggest range of values and the widest dispersion whereas the savings orientation index had the lowest mean score value, the least range of values and of dispersion of the three FC indices. In both waves, the household dwelling characteristics index showed more dispersion than any of the FC indices, the largest range as well as the highest average score of the four indices.

Table 2.7

MxFLS-III Descriptive Statistics FC Indices

	Mean	Std. Dev.	Min	Max	Explained Variance	*f*
Problematic Credit Use Management FC Index	0.204	0.326	0	2.186	0.566	5
Savings Orientation & Resilience FC Index	0.162	0.299	0	1.700	0.750	3
Attitudinal & Behavioural (Patience) FC Index	1.418	0.705	0	3.746	0.368	3
Hhd. Durable Assets & Dwell. Characs. Index	3.038	0.628	0	3.810	0.493	15

* *f* column indicates the number of constituent factors used to derive each index
Scores for the first, second and fourth indices predicted from tetrachoric PCA over the constituent factors of each index.
Scores for the third index predicted from polychoric PCA over its constituent factor variables.
Quantities calculated over estimation sample (restricted to those between 15 & 75 years) & none of the scores are standardised.

The 'explained variance' column of Table 2.7 represents the share of the total variance from the collection of factors used to derive each index (given by f) that is accounted for by each index. Hence, in wave three the savings orientation index explained 75% of the shared variance of its constituent factors. This meant that it was the index that condensed (in itself) the most information from its constituent factors, leaving the least share of latent attributes related to saving unexplained by the model.

[76] The latter is also supported by the positive and significant loadings (in both waves) on the variable accounting for respondents' preference to spend little to none of a monetary gift received.

The problematic credit management index accounted for 56.6% of the shared variance of the five factors from which it was constructed whilst the behavioural-attitudinal (patience) FC index accounted for 36.8% of the shared variance of its three constitutive factors. Table 2.A.5 in the appendix shows that wave two indices followed a similar pattern with the savings orientation index in wave 2 accounting for 78.2% of its factors' shared variance, the problematic credit management index accounting for 62.8% of the variance of its constituent factors and the behavioural-attitudinal (patience) FC index accounting for 36.2% of its three factors' shared variance. Interestingly, despite the wording change in the underlying questions of the TV preferences indicator across the two waves, the explained variance of the patience FC index changed the least (marginally increased) between the two waves while the other two FC indices saw a slightly larger (while still small) change as their explained variance faintly decreased from wave 2 to wave 3.

To help identify target sociodemographic groups for FC enhancement and financial education strategies, Table 2.8 presents the MxFLS-III average FC indices' scores per sociodemographic characteristic while appendix Table 2.A.6 presents those of MxFLS-II. The last column shows how, regardless of sociodemographic profile, in both waves, the average CDS of respondents fell within the normal, non-depressive range (i.e., a score between 20-35). Within this normalcy, in both waves, average respondents with characteristics such as having no schooling (or at most elementary schooling), being female, or falling within the 60-78 age-group had larger-magnitude CDS, yet still below mild depression, therefore suggesting that people characterised by such traits had, on average, a larger tendency towards depression or anxiety than their counterparts. The last column of both Tables (2.8 and 2.A.6) also shows how the CDS score is decreasing in education as the most educated subgroups of respondents showed some of the lowest CDS (and therefore highest SWB) scores.

Table 2.8
Mean FC Index Scores per sociodemographic & affective wellbeing characteristics.

MxFLS-III	**Money management FC Dimension**		**Behav. attitudinal FC Dimension**	
	Problematic Credit Index [A] *(Keeping-track)*	***Saving Index*** [A] *(Resilience)*	***Patience Index*** [B] *(Low impulsivity)*	***SWB Score (CDS)***
Urban Locality (people ≥ 15,000)	.235	.230	1.432	25.895
Male	.214	.214	1.395	24.180
Female	.196	.122	1.436	26.767
Married (couple, partnership, etc.)	.220	.168	1.413	25.716
Not married (single, divorced, etc.)	.176	.151	1.428	25.479
Age Group: 15-30 years old	.200	.154	1.490	25.063
Age Group: 31-45 years old	.244	.219	1.415	25.620
Age Group: 46-60 years old	.203	.161	1.352	26.288
Age Group: 60-75 years old	.121	.057	1.247	26.833
No Schooling & Preschool/ Kinder	.120	.062	1.269	27.360
Elementary School (1st - 6th grade)	.182	.096	1.350	26.227

Jr. High School (7th -9th grade)	.215	.167	1.447	25.402
High School (10th -12th)	.225	.219	1.471	24.914
University/Graduate School	.268	.334	1.572	24.283
Cognitive Ability (average or higher)	.227	.213	1.498	25.133

*All index scores are reported as non-standardised average values.
Quantities calculated over estimation sample (restricted to those between 15 & 75 years).
[A] superscript: indices based on tetrachoric correlation matrices of constituent factors (i.e. on tetrachoric principal component)
[B] superscript: index based on polychoric correlation matrix of constituent factors (i.e. on polychoric principal component)

From both Table 2.8 and 2.A.6 it is clearly seen that while the patience index scores were the highest of all three FC indices (regardless of sociodemographic factor), they seemed to be increasing in education which is plausible given that staying in school indirectly denotes willingness to forego some present activities for prospective future earnings and education itself can help people acquire self-disciplining habits compatible with self-denial and patience. However, both tables also showed that the patience index score seemed to decrease with age. Such a result might appear counterintuitive if age is assumed to proxy for maturity and thus for the related ability to regulate oneself towards less impulsivity and more patience. However, it is also plausible for some people to adopt more self-indulgent attitudes with age, essentially decreasing their postponement of gratification precisely due to their perceived shorter remaining lifespan. Table 2.8 further showed that MxFLS-III respondents' problematic credit management index scores were consistently higher than their saving orientation index scores except for respondents with some university and/or graduate schooling. Conversely Table 2.A.6 shows that in 2005, the saving index score was slightly higher than the problematic credit management score not only for those with university and/or graduate schooling but also among males and people living in urban localities.

Additionally, in both tables we see that the credit management of males and of married people was slightly more problematic than that of females and of unmarried respondents. Married people and males also had higher savings orientation scores, therefore denoting stronger FC attributes than their counterparts. Rather than suggesting target sociodemographic groups in need of improving their FC, together such results could indicate that, on average, males and married respondents might be more financially active—engaging more often with credit, its repayment and with saving instruments or strategies—than their female or unmarried counterparts.

People aged between 31-45 years showed, on average, higher problematic credit management and savings orientation index scores than people from any other age-group. This is unsurprising given that people within such age-group tend to be at their prime working age as well as in life-stages during which credit commitments tend to increase whilst a more mature regard for the future and on how to leverage for it through savings also takes a stronger hold.

As evidenced by Table 2.8 (and by Table 2.A.6) the problematic credit management index and the savings index also increased with years of schooling in both waves (just as the patience index).

Finally, both Table 2.8 and 2.A.6 showed that people with at least average abstract reasoning (or within the upper half of the abstract reasoning spectrum) had a high patience index score, and a higher problematic credit management score than their savings orientation score. These results corroborate with findings from the neuroeconomics literature documenting the correlation between fluid intelligence and patience as people with higher fluid intelligence tend to be patient because they embrace longer time horizons (Potrafke, 2019). The results also align with the literature proposing a link between abstract reasoning and people's confidence with taking more complex (riskier) and longer-term financial decisions and therefore with the extent of their participation in credit markets (i.e., engaging in credit acquisition and debt repayment).

2.7 EMPIRICAL SPECIFICATION

Our analysis consists of both cross-sectional and longitudinal evaluations of the impact of FC on Mexicans experience of affective states associated to depression. We use cross-sectional assessments to derive information regarding the sources of between variability in experienced depression amongst respondents given their particular levels (scores) on each FC index per period. The panel analysis, in turn, allows us to better understand whether respondents' affective state varied across time as the extent of FC changed (i.e., it helps us to comprehend within-respondent's variability).

Both specifications are based on the analysis of FC effects on psychological health by Taylor et al. (2011) and on Kempson et al. (2013a, 2013b, 2017) comparative analysis of FC in LMICs, including Mexico. As detailed in the prior section, following the literature's standard and our benchmark papers, our empirical design uses PCA (regression scoring) to derive the three FC measures (indices) used as core explanatory variables of our OLS (affective) SWB regressions. Our preliminary specification is given by:

$$CDS_{it} = \beta_1 S_{it}^C + \beta_2 S_{it}^S + \beta_3 S_{it}^P + \boldsymbol{X_{it}} \boldsymbol{\Gamma} + u_i + \varepsilon_{it} \tag{2.4}$$

where CDS_{it} is our (affect-based) SWB dependent variable—the CDS–of individual i at time t . S_{it}^C and S_{it}^S are (respectively) the problematic credit management index and the savings orientation index scores representing the money management dimension of FC of respondent i at time t. S_{it}^P stands for the patience index score representing the behavioural-attitudinal dimension of FC. Standard socioeconomic characteristics considered important correlates of people's affective states according to the SWB literature are included in the vector $\mathbf{X}_{it}$ [77] which also contains our abstract reasoning control (RPM score) and the derived households' durable assets and dwelling characteristics index proxying for respondents' standard of living. Unmeasured characteristics constant over time are represented by u_i while the error ε_{it} includes unmeasured time-varying characteristics inclusive of random shocks.

[77] The vector $\mathbf{X}_{it}$ includes standard sociodemographic controls such as: age, gender, marital status, highest schooling level, prior year income, victimization indicators (i.e. experience of crime or theft), sense of community belonging, type of location (urban vs rural), income shock experiences, cognitive ability, household asset ownership and living conditions indicator.

Given that we explicitly separate the error term in the notation of specification (2.4), the model alludes more explicitly to its panel format.[78] Nonetheless, the cross-sectional counterpart of our model follows the same notation along with the composite error term $\omega_{it} = u_i + \varepsilon_{it}$ (and no change in the time subscript t).

All the empirical estimations (including the derivation of FC indices described in section 2.6 and the cross-sectional and panel regressions presented in section) were constrained to exclusively consider working-age individuals defined as those within 15 and 75 years of age for the purposes of the current analysis. The latter age-range (15-75) was considered appropriate because it best proxies the effective (*de-facto*) working age of people in Mexico beyond different available legal (*de-jure*) working age definitions.

While the 1ower bound employed—15 years old—could raise concerns due to the potential biases that including people at an age in which University level education is unlikely to be completed could generate on important variables (including outstanding debts), we did not consider this a strong argument to raise the lower bound of the working age range employed to analyse data from Mexico because international development institutions such as the OECD use 15 years of age as the lower bound (age floor) of the working age population in Mexico and in other similar LMICs. Moreover, several of the individual level (adult) data modules of the MxFLS (in all waves) used 15 years old as the lower age threshold for respondents to be considered "adults" (see Rubalcava and Teruel, 2007; 2013).[79] Additionally, Mexico has a large informal economic sector with more than 45% of the population being employed in it. By its very nature, the informal economic sector has more flexible and wider working age limits and many informal workers misreport their age (either upwards or downwards) to maintain their employment.

The latter helps to justify the necessity of using a working age definition that includes both: people younger than the standard age needed to complete schooling up to university level as well as people beyond the standard retirement age (i.e. up until 75 years of age instead of 65). An important factor guiding the selection of 75 as a more plausible upper bound for the working age restriction used to define our sample of analysis was the distinction between the effective age of retirement—i.e. the *de-facto* average age at which Mexican workers decide to retire—and the official (*de-jure*) retirement age in Mexico (65 years old). According to a "Pensions at a Glance" 2011 OECD report, Mexico stands out for having the highest average effective retirement age for men of all OECD member-countries with Mexican men's effective retirement being 72.2 years. Relatedly, with an effective retirement age of 69.5 years for women, Mexico also has the second highest effective retirement age for women of all

[78] Our panel specification model also included a time fixed effect dummy variable used to control for the impact of the GFC. This additional control can be assumed to be included withing the vector of additional controls. However, such a controls was absent from the (per-wave) cross-sectional specifications.

[79] Furthermore, some MxFLS individual data modules such as the MxFLS cognitive ability *adult* data module used an even lower age-bound by recording answers of respondents as young as 13 years old as part of the *adult* module (whilst responses from those aged 5-12 being classified on a separate cognitive ability module for infants).

OECD countries. These, along with specific characteristics of the narrow and shallow pension system in Mexico[80] which motivate people to stay in employment (either formally or informally) for longer helped to substantiate our upper bound limit for the working age population in Mexico.

From our review of the relevant literature and given the particularities of our data, we use baseline specification (2.4) to test the following hypotheses:

Table 2.9

FC Index	***Hypotheses***	***Explaining Theory***
Problematic Credit Management Index Score S_{it}^{C}	1. $\beta_1 > 0$ Positive relationship between latent attributes causing credit mismanagement (weak FC) and CDS_{it}	***Process 1 (Capability Theory)*** • On average, arrears or unserviceable debt burdens deter the procurement of life satisfaction domains such as group inclusion, leisure and health which may induce depression symptoms (*process 1 inhibition of domains-satisfaction and of fulfillment of safety and belonging needs*). • Credit mismanagement can constrain one's access to desired levels of material wellbeing and undermine one's freedom to reach certain standards of living (*capability theory*).
Savings Orientation Index Score S_{it}^{S}	2. $\beta_2 < 0$ Negative relationship between attributes causing saving (responsibility, sense of autonomy, etc) & planning for the future (strong FC) & depression.	***Process 2 (Locus of Control & Mental Models)*** • Greater saving habits reveal a higher internal locus of control – a personality trait associated with positive affects provoked by having a sense of agency, self-autonomy, responsibility and self-determination. • Mental models and locus of control tend to reinforce each other. For example, those understanding money as something 'that exists to be spent' are less likely to save or withhold from spending and might ascribe their financial status outcomes to generalized external conditions such as inflation, welfare provisions or generosity of pensions rather than also to their own financial decisions and overspending.
Patience Index Score S_{it}^{P}	3. $\beta_3 < 0$ Negative relationship between latent psychological factors such as patience (low or controlled impulsivity) & restraint from spending (strong FC) and CDS_{it}	***Process 2 (Locus of Control & Mental Models)*** • Patience (or low impulsivity) is associated with positive affectivity because it serves people to refrain from temptations and impulses that derail them from their goals. It therefore supports individuals to achieve their aims and thus to better satisfy higher needs such as self-actualization and esteem needs associated with personal confidence and effectiveness. • Impulsivity is also related to hyperbolic discounting—a cognitive bias affecting TV choices under which

[80] Including that in Mexico public pension spending as a proportion of GDP is only 1.4% compared to the 7% OECD average (OECD, 2011, p.269-271). Furthermore, in Mexico it is possible to defer the pension after the official retirement age of 65 (OECD, 2011 p.269-271) as the social security system has no penalties for continued work after normal retirement age and benefits for dependants are given to the pensioner regardless of the working status of the spouse (Aguila and Zissimopoulos, 2013). There are low coverage rates of social security benefits in Mexico and the coverage of private, employer-provided pensions is also low which pushes some people to seek outside sources of income beyond pensions during old age (Aguila and Zissimopoulos, 2013). Finally, life expectancy (a determinant of work-time-allocation decisions) after the pensionable age (65) in Mexico was: 16.4 years (in 2002) and 17.2 years (in 2010) for men whilst being 18.2 years (in 2002) and 19.4 years (in 2010) for women (OECD, 2011, p.29-30).

		discounted pleasures from receiving an item in the future are outweighed by rewards from obtaining or consuming the item in the present, even if future amounts of the good far exceed present ones. • Individuals with mental models prioritizing thriftiness and a concern for the future might find being patient in terms of their purchases (rather than impulsive) less burdensome and with it gain a greater sense of accountability and agency regarding their finances.

2.8 EMPIRICAL ANALYSIS

2.8.1 FC cross-sectional study

Table 2.10 presents cross-sectional results of SWB regressions on FC using MxFLS-III data (period 2009-2012) while appendix Table 2.A.7 gives those of MxFLS-II data (period 2005-2006). Both tables contain the same four specifications. Column 1 gives the results of a standard SWB regression where our dependent variable (CDS) is solely determined by the set of demographic variables used as key correlates of people's affective states in the empirical literature. These are denoted by $\mathbf{X}_{it}$ in our model specifications and include: individual level personal indicators (age, gender, marital status, education, income, households' economic shocks experience); indicators of individuals' experiences tied to community characteristics (crime, victimisation and community cohesiveness); an urbanity indicator, and an index of households' durable assets and dwelling characteristics used as a proxy for households' wealth and living standard. We expand on the standard SWB framework by also including a control standing for individual fluid cognitive ability which has been used in the personal finance literature.[81] To address the chapter's research question, columns 2 to 4 include (some or all three) FC indices (in addition to the controls in $\mathbf{X}_{it}$) and compare how their inclusion changes the effect of the traditional sociodemographic regressors on our depression syndrome score. More specifically, column 2 presents results pertaining to the impact of the two instrumental money management FC indices in the absence of the patience index. Conversely, column 3 gives the effects of the behavioural-attitudinal FC index (patience index) while excluding both instrumental money management FC indices. Finally, column 4 presents results of the specification including the three FC indices concurrently.

Table 2.10

MxFLS-III (2009-2012) FC Cross-sectional Analysis Regression

SWB ***(Calderon Depression Score [CDS])***	(1) Baseline (no FC)	(2) Money management FC	(3) Behavioural FC	(4) Both: Money Mgt & Behavioural FC
Problematic Credit Management FC Index[A]		0.746***		0.742***
		(0.0643)		(0.0644)
Saving & Building Resilience FC Index[A]		-0.0858		-0.106

[81] While our (abstract) cognitive ability control has been mainly used in the personal finance literature, as noted in the data section of this chapter, studies based on mental-state theories of SWB are known to employ different measures of cognitive states and of cognitive processes to analyse their effects on SWB (see section 2.4 for details).

		(0.0660)		(0.0663)
Patience FC Index[B]			0.207***	0.195***
			(0.0627)	(0.0629)
Fluid Cognition (2009 Raven score)	-0.0662***	-0.0726***	-0.0685***	-0.0744***
	(0.0242)	(0.0241)	(0.0241)	(0.0241)
Age	0.0515*	0.0430	0.0535*	0.0460
	(0.0291)	(0.0293)	(0.0291)	(0.0293)
Age^2	-0.000404	-0.000272	-0.000414	-0.000295
	(0.000381)	(0.000382)	(0.000381)	(0.000382)
Male	-2.406***	-2.386***	-2.385***	-2.364***
	(0.137)	(0.137)	(0.138)	(0.137)
Married/domestic partnership	-0.381**	-0.478***	-0.398***	-0.493***
	(0.150)	(0.149)	(0.150)	(0.150)
Elementary School (1st - 6th)	-0.743**	-0.776**	-0.762**	-0.795***
	(0.304)	(0.302)	(0.304)	(0.302)
Jr. High School (7th -9th)	-1.303***	-1.355***	-1.327***	-1.374***
	(0.316)	(0.314)	(0.316)	(0.314)
High School (10th -12th)	-1.598***	-1.639***	-1.625***	-1.658***
	(0.334)	(0.333)	(0.334)	(0.333)
Higher Educ: Univ. & Col. Grad	-2.444***	-2.510***	-2.504***	-2.557***
	(0.359)	(0.357)	(0.361)	(0.358)
Income earnt last 12m (ln)	-0.00388	-0.0129	-0.00576	-0.0137
	(0.0148)	(0.0153)	(0.0148)	(0.0153)
Victim assault or prop theft	1.424***	1.204***	1.409***	1.193***
	(0.160)	(0.160)	(0.160)	(0.161)
Cohesive & inclusive community	-0.936***	-0.909***	-0.948***	-0.919***
	(0.196)	(0.194)	(0.196)	(0.194)
Urban (people ≥ 15,000)	0.616***	0.575***	0.622***	0.585***
	(0.137)	(0.137)	(0.137)	(0.137)
Personal & hhd econ shocks (5 yrs)	1.289***	1.072***	1.276***	1.061***
	(0.131)	(0.131)	(0.131)	(0.131)
Hhd Living Conditions & Assets Index[A]	-0.0371	-0.0960	-0.0488	-0.105
	(0.0782)	(0.0784)	(0.0781)	(0.0783)
Constant	27.15***	27.52***	27.15***	27.48***
	(0.596)	(0.608)	(0.596)	(0.607)
Observations	13,395	13,395	13,395	13,395
R-squared	0.059	0.069	0.060	0.070

All quantities calculated over the estimation sample (restricted to those between 15 & 75 years).
[A] superscript: indices based on tetrachoric correlation matrices of constituent factors (i.e. gives the tetrachoric PC)
[B] superscript: index based on polychoric correlation matrix of constituent factors (i.e. gives the polychoric PC)
*All index scores are reported as a standardized score (z-score)..
Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Negative sign estimates indicate an inverse relationship between the indicator in question and the experience of depressive symptoms (therefore suggesting an improved affective state) whereas positive results imply that the given variable increases people's experience of depressive symptoms (i.e., worsened affective state). In both tables[82] column 1 results were largely consistent with the SWB literature for they showed that sociodemographic characteristics such as being male, married (or having a couple), having higher levels of schooling, higher income, being part of a cohesive and inclusive community, and having a good standard of living (measured through household living conditions and

[82] Table 2.10 and appendix Table 2.A.7.

assets) were associated with experiencing less symptoms of depression. Unsurprisingly, column 1 results also showed how having experienced theft or assault, living in an urban locality and having experienced a personal shock (e.g., death of family member, disabling injury, health hazard or becoming unemployed) over the prior 5 years were associated with experiencing more depressive symptoms.

Cognitive ability (represented via the RPM score in this study) bore a negative relationship with our measure of affective-state balance (the CDS) in both waves, across all specifications and regardless of FC considerations since its effect maintained roughly the same negative magnitude and significance even after the inclusion of FC indices. As mentioned in section 2.4, our cognitive ability variable is not a standard intelligence indicator but a measure of fluid intelligence which relates to executive functions (EF) of the brain such as respondents' ability to engage with value-congruent decision-making, draw inferences to solve complex problems, display self-control (regulation), prioritizing, planning and staying focused (despite distractions).[83] Therefore, the negative relation between respondents' RPM score and their CDS score does not imply that less intelligent people tend to be depressed but rather reflects the natural inverse relationship observed between executive brain function activity (the locus of fluid intelligence)[84] and the dominance of emotional (limbic system) brain regions[85] amongst respondents experiencing stronger and more frequent symptoms of depression and anxiety.
We acknowledge the possibility of simultaneity since greater experiences of depressive symptoms can impair executive function and lead to lower performance on cognitive ability tests measuring fluid cognition (as ours). However, the constraints of our data limited our ability to adequately control for this through instrumentation. Hence, our results do not suggest causality from low cognitive ability (in this study referring to fluid cognition and EF) to depression. Rather, the results provide evidence of a negative relationship between high EF and depression. Alternatively, in line with cognitive psychology literature, the results reflect the correlation between: limbic system predominance over executive functioning, impaired fluid cognition, and the frequency and increased intensity of experienced depression symptoms.

Comparing column 1 results with the other columns we observe that once we introduced FC indices to the estimations, sociodemographic controls initially positive tended to become less positive (especially when only instrumental money management dimension FC indices were included) and those showing

[83] Cognitive psychologists (Miyake et al., 2000) define EF as the "set of skills or general-purpose control mechanisms that modulate the operation of various cognitive subprocesses and regulate the dynamics of human cognition."
[84] The cognitive and neuroimaging literatures (see: Nowrangi et al., 2014) have long associated executive functioning (anatomically) to the pre-frontal cortex area of the brain. Other neuroimaging correlates of EF are basal ganglia and thalamus.
[85] The literature on the neurological basis of depression (Royall, 1999; Pandya et al. 2012) has long identified subcortical limbic brain regions such as the amygdala, hippocampus, and the dorsomedial thalamus as the neuroimaging correlates of depression. The same literature has documented significant executive function deficits (e.g. decreased metabolism in the prefrontal cortex) and changes in executive cognitive ability (e.g. decreased volume of the orbitofrontal cortex) through the course of depression which entails impaired cognitive engagement in and completion of goal-directed tasks.

a negative relationship with CDS became more negative (less so when only the behavioural-attitudinal [patience] FC index was added), implying that the omitted (latent) factors summarized by FC indices bore, on net, a positive relationship with symptoms of depression and anxiety. In other words, the results suggest that, absent the FC indices from the specifications, the omitted (latent) factors summarized by the former created a positive bias that overestimated the true effect of most controls. However, the fact that the positive bias was less pronounced for the patience index aligns with our expectation as the positive attributes associated patience (itself understood as characteristic of high FC) are theoretically assumed to improve (rather than decrease) SWB.

Table 2.11 summarises our FC indices' results in light of our research hypotheses (specified on Table 2.9). From it we can see that during both wave-periods our regression results significantly supported the hypothesised positive relationship between the latent attributes indicative of weak FC (i.e., procrastination, status quos bias, peer effects, avoidance) captured by our problematic credit management index score and negative affectivity (captured by our dependent variable, the CDS). Moreover, the implied relationship remained relatively unaffected (maintained its significance and order of magnitude) when other dimensions of FC were considered.

Furthermore, from column 1 we observe that the omission of the problematic credit management index score attenuated the true effect of sociodemographic controls showing an inverse relationship with depression in the standard SWB specification.[86] For example, the results in columns $2-4$ show that the coefficients on our cognitive ability measure became more negative once the effects of the FC indices were taken into account, especially those pertaining to our problematic credit management index. The same was observed across our schooling-level attainment variables.

Table 2.11 explains how results of the problematic credit management index aligned with arguments from capability theory which contend that factors underlying problematic debt and credit mismanagement can encumber the extent of access to resources (material [money] or people)[87] used as facilitators of different domains of SWB therefore indirectly hampering the extent to which people are satisfied or derive positive affects from multiple areas of their lives.

The hypothesised negative effect of the savings orientation index was only supported by results from the 2009-2012 period, however the index's inverse relationship with depression was not significant. In 2005, the effect of our savings orientation index was not only not significant but also contrary to our expectation since the effect was positive.

[86] As controls in $\mathbf{X}_{it}$ with a negative relationship with CDS became more negative once we controlled for low FC through our problematic credit management index.

[87] Especially if individuals develop bad credit rating scores, are delinquent on loans, face bankruptcy or have their assets (e.g. housing or vehicle) repossessed.

Table 2.11

FC Index	*Hypotheses*	*Explaining Theory*	*Observed β* MxFLS-II	MxFLS-III
Problematic Credit Management Index Score S_{it}^{C}	1. $\beta_1{}^{C} > 0$ Positive relationship between latent attributes causing credit mismanagement (weak FC) & depression	***Capability Theory***	**Positive**. **Significant** (at 0.1% level). **Supports Hypothesis 1.**	**Positive**. **Significant** (at 0.1% level). **Supports Hypothesis 1.**
Savings Orientation Index Score S_{it}^{S}	2. $\beta_2{}^{S} < 0$ Negative relationship between attributes causing saving (responsibility, sense of autonomy, etc) & planning for the future (strong FC) & depression.	***Locus of Control Theory***	**Positive. Not Significant.** Does Not Support Hypothesis 2.	**Negative. Not significant.** Supports Hypothesis 2.
Patience Index Score S_{it}^{P}	3. $\beta_3{}^{P} < 0$ Negative relationship between latent psychological factors such as patience (low or controlled impulsivity) & restraint from spending (strong FC) and CDS_{it}.	***Locus of Control Theory***	**Negative. Not Significant.** Supports Hypothesis 3.	**Positive. Significant** (at 0.1% level). **Does Not Support** Hypothesis 3.

* Results supporting hypothesized effects in colored cells.

Significance Level: 0.1% 1% 5% 0 %

In terms of the behavioural-attitudinal FC index capturing respondents' patience, Table 2.11 shows that, as hypothesised, it bore a negative but not significant effect with depression symptoms during the 2005-2006 period. Conversely, as per MxFLS-III (2009-2012) results, the patience index evidenced a significant positive association with CDS thus in opposite direction to what we had hypothesised based on mental models and locus of control theories.

To shed light on possible explanations for the results of the savings and the patience indices, Figure 2.5 graphs the distribution of TV preferences by age group in both waves. As can be seen from the length of TV category 1 in both panes, all age groups appeared to be more patient—had smaller proportions of people preferring TV category 1 (the most present biased one)—in MxFLS-II (2005-2006) than in MxFLS-III (2009-2012).

Additionally, as noted in section 2.5, even though all financial balances (labour income, value of savings and value of total debts) increased from 2005-2006 to 2009-2012, both average DTI and DTS ratios were higher in the 2009-2012 period than in 2005-2006 implying a relative deterioration of household balance sheets between the two waves since debts grew faster than savings and income between the two periods. The observed increase in the DTS ratio between the two waves meant that the saliency of the present and the subjective costs of delaying lottery payments were higher for MxFLS-III respondents than in MxFLS-II as immediate receipts of the lottery payment could help leverage higher debts.

Furthermore, circumstantial external factors such as the lagged impact of the US subprime mortgage crisis and of the ensuing 2008 GFC on the Mexican economy, as well as the 180% increase in Mexico's homicide rate[88] between the two waves (UNODC, 2023), entailed that perceived uncertainty (implicit risk) regarding the future was likely higher for respondents in MxFLS-III than in MxFLS-II making it more subjectively costly to wait for receipt of payment as opposed to receiving the reward immediately.

The latter is evidenced in Figure 2.5 through the higher discount rates k underlying TV preferences in MxFLS-III than in MxFLS-II. Such discounts rates were obtained by solving for k—the parameter representing the extent of discounting—after applying a simplified version (without scaling for sensitivity to delay) of Green et al. (1994) expression for delay discounting[89] to the TV preference modules of each MxFLS wave.

Our expression for the rate of discounting was therefore: $k = \frac{A-\mathrm{V}}{VD}$ where (using Green et al., [1994] notation) A represented the future payment amount, V stood for the amount to be paid 'today' (which conceptually equalled the discounted value of the delayed amount needed for respondents to be indifferent between the two) and D gave the duration of delay. (See appendix Tables 2.A.8 and 2.A.9 for a detailed provision of each wave's TV lotteries along with their implicit discount rates [k]).
Together, the smaller proportions of respondents preferring the least patient lottery observed in 2005-2006, the increase in the DTS ratio and the external factors raising the subjective cost of delayed payments between the two waves help to explain the significant positive effect revealed by the behavioural-attitudinal (patience) FC index in 2009-2012 as well as its negative (though not significant) influence in 2005-2006.

The significant positive results observed for our behavioural-attitudinal FC index during the 2009-2012 period can also be explained through BE dual-self theory[90] developed by Fudenberg and Levine (2006).

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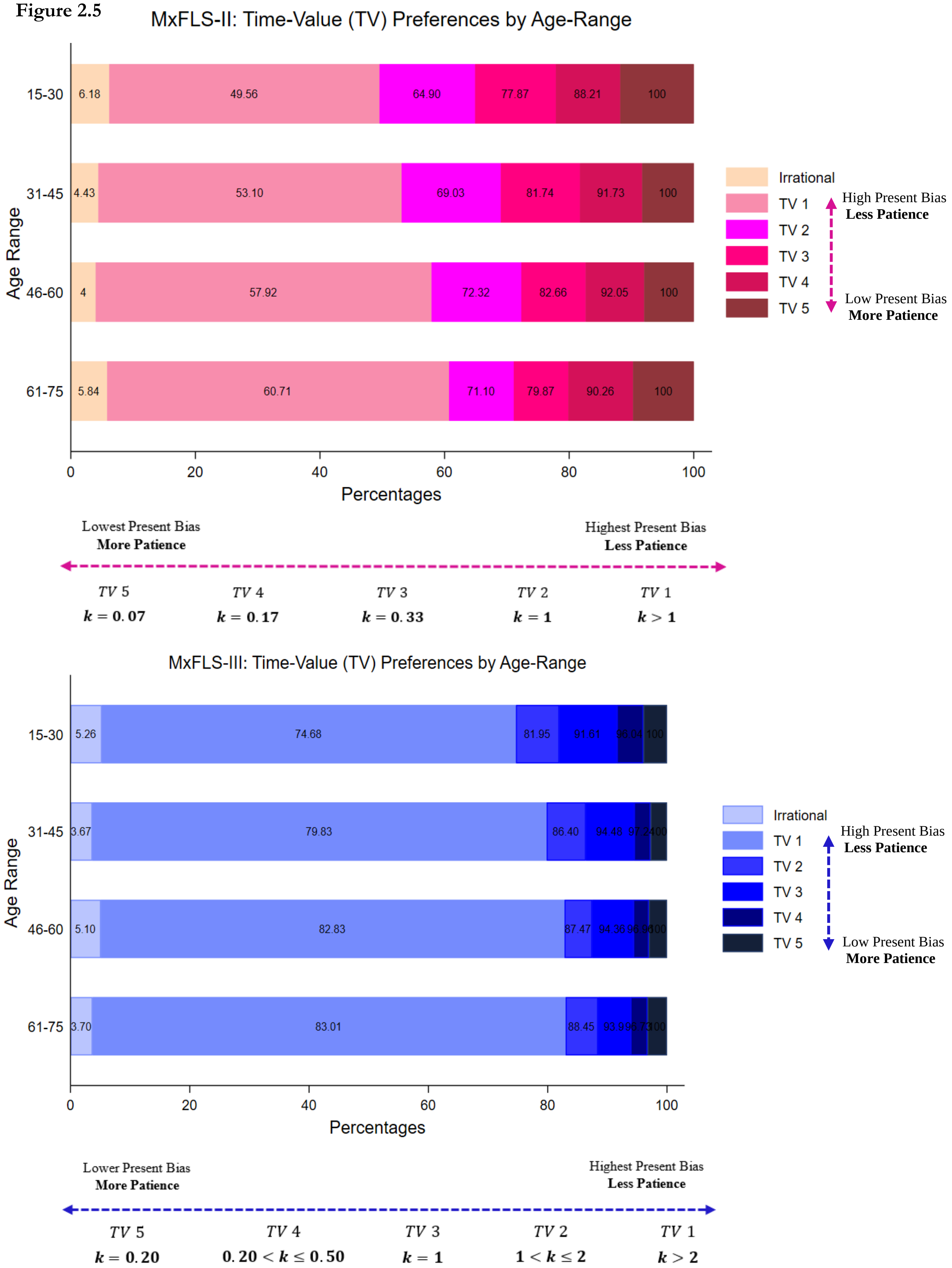
[88] Figure based on data from the Unites Nations Office on Drugs and Crime (UNODC) Crime Trends Survey (UN-CTS) and INEGI. The growth in the crime and homicide rate between 2005 and 2012 has been largely attributed to drug-cartels' disputes of the Mexican territory to secure greater shares of the drug distribution channels towards the US and to cartels' retaliation against Mexican government forces trying to combat narcotraffic during the presidency of Felipe Calderon.

[89] Green et al. (1994) expression corresponded to: $V = \frac{A}{(1+kD)^S}$ with A, V, k and D as described above and S represented a scaling factor used to account for sensitivity to delay (which Green et al. [1994] also recognised as trivial or unnecessary).

[90] The dual-self or 'multiple selves' model emerged as a more generalisable model than models of quasi-hyperbolic discounting and indeed is more appropriate than the former to our study because despite the differences in the temporal trade-offs presented by the time-preferences modules underlying our patience index in each wave (i.e. the 2009 wave entailing waiting one year for future payments whereas the 2005 wave presented respondents with a waiting time of 3 years), cross-sectional results did not reveal any preference reversal (the patience index showed a positive effect in both waves).

Figure 2.5



Source: Self-generated based on MxFLS-II & MxFLS-III (TV modules). Calculated over estimation sample (restricted to 15-75 years old).

The latter model builds upon Thaler and Shefrin (1981) who argued that at any point in time our long-run-self (farsighted planner) preferences conflict with our short-run-self (myopic doer) preferences and the difference between them determines the net effect of our decisions on our affectivity. Fudenberg and Levine (2006) generalised the model positing that any decision point can be understood as a game between a sequence of short-run impulsive selves and a long-run patient self, where the long-run self and the short run selves share the same preferences in the short-run (stage games) but the long-run self has the added capacity of choosing self-control actions influencing the utility function of both (decreasing it in the short-run) but overall not harming the *future* short-run self.

In contrast to quasi hyperbolic discounting models which emphasize the conflict between the two selves as if they were different people, Fudenberg and Levine (2006) stress that because the long-run self has both the preferences of the short-run (myopic) self[91] in short-horizon decisions as well as forward-looking 'planning' preferences, the long-run-self preferences do not conflict with the interests of *future* short-term selves and indeed serve them.

Whilst, according to INEGI data, on average, the age group to reach peak median income in Mexico is 45-64, in both panes of Figure 2.5 sample respondents older than 46 unequivocally show more impatience (higher proportion of people in older cohorts prefer TV category 1) than younger groups therefore suggesting that Mexican society is present-biased.[92] This has been reiterated by empirical results showing that the majority of Mexicans focus more on the present than on the future (see: Kempson et al., 2013a, 2013b, 2017). Based on such findings we can use the dual-self conceptualisation to interpret our MxFLS-III (2009-2012) patience index results. Given that Mexicans far-sighted system is less dominant than their short-term present-biased systems, the affective loss (reduction in immediate gratification) experienced from the patient postponement of today's consumption, spending or reward receipt is much larger at any decision point than the positive affects (i.e. confidence, sense of self-mastery and fulfilment) derived from having an internal locus of control therefore explaining the positive association between the patience index and depression.[93]

Aligning with prior research, our cross-sectional patience index results showed that enabling factors such as impulse control that would allow respondents to reach higher order objectives in the future de-facto exert a lower positive influence in the psychology of respondents because of the prevalence of short-term time horizons amongst Mexicans.

[91] The short-run self is deemed 'myopic' because of his/her disregard for the future.

[92] As a characteristic of present bias societies is to lose income and wealth after reaching peak mean income or wealth.

[93] Dual-self theory and the combination of the reasons outlines in the text can also help understand the non-significant results observed regarding the savings index.

2.8.2 Panel Analysis

The empirical analysis of the prior subsection investigated the extent to which variation in the instrumental and behavioural dimensions of FC across MxFLS respondents impacted their experience of depression symptoms in each survey period. As a snapshot in time, cross-sectional results from subsection 2.8.1 do not provide definite information about cause-and-effect relationships. Unobserved variable bias[94], endogeneity bias[95] and indeterminacy over the sequence of causal mechanisms[96] are some of the empirical challenges limiting the ability of cross-sectional methods to unequivocally address causality. Therefore, all we could infer from the cross-sectional results was that at a given time-period (either 2005 or 2009) individuals with a certain level of FC (in either dimension) tended to have a particular CDS score. Nonetheless, this told us nothing about intra-individual changes in the relationship between FC and depression which are important to affirm causality.

Since we are interested in how within-time FC attributes variation influence respondents' SWB outcomes, this section presents FE panel estimation results. As noted in subsection 2.4.3, despite the wording differences regarding the waiting-time and amount parameters framing the TV trade-offs constituting our patience indices, in both waves we were able to classify respondents in a set of 5 TV categories descending in level of present-bias and ascending in patience with similar proportional relationships between each other. Thus, despite the framing differences in the TV lotteries between MxFLS-II and MxFLS-III, each wave's ordinal TV indicator allowed us to measure the same latent factor –patience—in an equivalent order. Therefore, we used FE estimations over regressions using both the two indices representing the instrumental money management FC dimension and the single patience index standing for the behavioural-attitudinal FC dimension.

FE is considered a more powerful estimation method than the standard OLS approach employed in cross-sectional analysis because it 'fixes' or soaks-up biases induced by unobservables assumed to remain constant throughout time across individuals, thus helping to reduce omitted variable bias (OVB) more properly[97] and allowing us to focus more precisely on the impact of indicators that varied for each individual during the 2005-2012 period. In other words, our use of FE implies that the estimations presented in this section explore the within-time variation of the effects of the instrumental money management FC dimension indices over respondents' SWB once the effects of time-invariant

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[94] Refers to the bias introduced by omitted variables (varying or consistent in time) which, if included in the model, would render the relationship between main treatment or explanatory variable and the outcome conditional independent (see: Duncan 1972; Holland, 1986; Cerulli, 2015).

[95] Can occur when there is simultaneity (bidirectional causality) between outcome variable and main explanatory variable (see: Hausman 1978; Berry, 1984; Finkel, 1995; Cerulli, 2015 and Masten and Poirier, 2018).

[96] Refers to the impossibility of gauging which variable precedes another in order to help determine whether it causes it (since the 'causal' variable must predate the 'receiving' variable).

[97] Although the cross-sectional analysis in sections 8.1 exploited both the between and within variation dimensions of our data, it only did so inefficiently.

unobservable factors that might simultaneously affect individuals' emotional state, TV preferences, the extent of their debt servicing, and of their credit and savings accumulation capabilities are controlled for.

The very slow-moving factors (taken as time-invariant) we sought to control for in our FE estimations included: (1) value systems regarding debt, thriftiness, consumerism, autonomy and personal responsibility (2) self-accountancy, self-confidence, and self-reliance beliefs, (3) neurological or genetic differences among respondents that could make them more (or less) prone to develop depression and at the same time put them on a differential spectrum of numeracy and of impulsivity, (4) other biologically and culturally-determined aptitudes that influence financial management. According to locus of control theory, some elements from this list (sense of autonomy, self-confidence, self-reliance, accountability) coincide with part of the latent factors our patience index sought to summarize.
According to some neuroscience studies (Chuang and Schechter, 2015; Hertwig et al, 2019) such attributes change very slowly (especially over a relatively short period of time such as the time frame used in our analysis) once unforeseen exogenous events including personal-life shocks or economic shocks such as the GFC are accounted for. Nonetheless, we include the patience index in our FE estimations to test the validity of that assumption among Mexican respondents and to broaden the evidence regarding the stability of TV preferences throughout time.

Table 2.12 presents the panel analysis FE results (appendix Table 2.A.10 presents descriptive statistics of the panel sample). Column 1 gives estimates of our baseline SWB regression while columns 2 through 4 provide estimates including FC indices. All four specifications contain the same set of sociodemographic controls used in the cross-sectional regressions. We additionally include a time effect to control for the impact of the aftermath of the GFC on Mexican households which revealed non-significant—similar magnitude and positive—associations with depression symptoms across all specifications. Importantly, the latter control helped to account for any potential destabilising effects of the GFC on respondents' temporal preferences.

Table 2.12

Panel Analysis Regression

SWB (Calderon Depression Score [CDS])	(1) ***Fixed Effects*** Baseline (no FC)	(2) ***Fixed Effects*** Money Mgt. FC	(3) ***Fixed Effects*** Behavioural FC	(4) ***Fixed Effects*** Both: Money Mgt & Behavioural FC
Keeping Track Credit Management FC Index[A]		0.362***		0.361***
		(0.105)		(0.105)
Saving & Building Resilience FC Index[A]		0.177		0.172
		(0.122)		(0.122)
Patience FC Index[B]			0.0683	0.0533
			(0.110)	(0.110)

Fluid Cognition (Raven score)	-0.0404	-0.0348	-0.0405	-0.0349
	(0.0454)	(0.0453)	(0.0454)	(0.0453)
Age	0.185	0.158	0.181	0.156
	(0.154)	(0.155)	(0.154)	(0.155)
Age^2	-0.00182	-0.00168	-0.00178	-0.00165
	(0.00151)	(0.00151)	(0.00150)	(0.00151)
Married/domestic partnership	-0.513	-0.556	-0.521	-0.562
	(0.395)	(0.392)	(0.396)	(0.394)
Elementary School (1st - 6th)	0.954	0.958	0.974	0.973
	(0.863)	(0.867)	(0.864)	(0.867)
Jr. High School (7th -9th)	1.328	1.339	1.345	1.351
	(0.957)	(0.959)	(0.957)	(0.959)
High School (10th -12th)	1.430	1.421	1.439	1.428
	(0.996)	(0.998)	(0.996)	(0.998)
Higher Educ: Univ. & Col. Grad	1.575	1.564	1.576	1.564
	(1.042)	(1.043)	(1.043)	(1.044)
Income earnt last 12m (ln)	-0.00486	-0.0115	-0.00570	-0.0120
	(0.0304)	(0.0307)	(0.0304)	(0.0307)
Victim assault or prop theft	1.049***	0.926***	1.049***	0.927***
	(0.317)	(0.315)	(0.317)	(0.315)
Cohesive & inclusive community	-0.389	-0.397	-0.398	-0.404
	(0.356)	(0.356)	(0.357)	(0.357)
Urban (people >=15,000)	0.124	0.0825	0.118	0.0779
	(0.573)	(0.569)	(0.573)	(0.569)
Personal & hhd econ shocks (5 yrs)	0.533**	0.421*	0.528**	0.417
	(0.252)	(0.254)	(0.252)	(0.254)
Hhd Living Conditions & Assets Index[A]	-0.106	-0.141	-0.109	-0.143
	(0.207)	(0.206)	(0.206)	(0.205)
Post Global Financial Crisis	0.482	0.555	0.490	0.561
	(0.481)	(0.482)	(0.482)	(0.483)
Constant	20.74***	21.49***	20.84***	21.56***
	(3.776)	(3.801)	(3.787)	(3.809)
Observations	20,565	20,565	20,565	20,565
R-squared	0.017	0.020	0.017	0.020
Number of groups	16,815	16,815	16,815	16,815

All quantities calculated over the estimation sample.
[A] superscript: indices based on tetrachoric correlation matrices of constituent factors (i.e. on tetrachoric principal component)
[B] superscript: index based on polychoric correlation matrix of constituent factors (i.e. on polychoric principal component)
*All index scores are reported as a standardized score (z-score)..
Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

FE regression results support the hypothesised effects regarding our problematic credit management FC index as the latter's coefficient revealed a positive significant relationship between latent personal attributes causing credit mismanagement (impulsivity, procrastination, status quo bias, negative peer effects, etc) and increased depression symptoms over time. The results on the problematic credit management FC index were also consistent with cross-sectional findings in both waves.

Turning to the impact of the savings orientation index, our panel results did not support our theoretical hypothesis. The latter postulated a negative relationship between attributes causing saving and planning for the future and depression based on the assumption that a more pre-emptive planning disposition would entail lower incidence of depression symptoms due to the good feelings associated with one's proactiveness, financial prudence and perception of self-control. The sign of the (instrumental) savings orientation index FE regression results suggested instead a positive, yet insignificant, association between the latent factors summarized by the index (related to planning and building resilience) and respondents' depression symptoms throughout 2005–2012.

Similarly, panel results regarding the patience index also did not support the influence we hypothesised the behavioural-attitudinal FC dimension to have on respondents CDS as it bore a positive yet not significant association with the CDS.

The non-significant positive association observed for both the savings and patience indices can nonetheless be understood through the mechanisms alluded to in the cross-sectional analysis findings (subsection 2.8.1), including dual-self theory. Since Mexico is considered a present-biased society (as was verified through TV preferences in our sample [see Figure 2.5] and by prior research [see Kempson et al., 2013a, 2013b, 2017]), we argue that the far-sighted (planning) self is, on average, less dominant than the short-run self among Mexicans, therefore the net affective effect of financial decisions is primarily determined by their short-run selves perspective.

This said, from cross-sectional descriptive statistics we know that while in 2005 the average respondent's sum of outstanding loan debts was about 26% of his/her amount of total savings, in 2009 total debts of the average respondent where about 56% his/her total savings.[98] Together this meant that throughout the period of the panel, the DTS ratio slightly deteriorated[99]. The latter marginally increased respondents' subjective burden of debt (i.e debt-based triggers of anxiety and depression). Furthermore, contextual exogenous factors such as the 2008 GFC and the increase in crime and homicides observed between MxFLS-II and MxFLS-III in Mexico resulting from drug cartels' conflicts with one other and with the government increased uncertainty regarding the future in Mexico, raising the subjective costs of delayed payments as well as of delayed spending. Together these factors decreased people's internal locus of control and extrapolated the (negative) affectivity loss inherent to patience and savings causing it to trump any gains (sense of autonomy, self-efficacy, etc). The predominance of the short-term self in financial decision making and the reinforcing effect of the aforementioned external conditions on uncertainty, increased the saliency and extent of affective loss (subjective cost of delayed payments and consumption rewards) from patience and savings above any of their gains thus resulting in a positive effect on the CDS.

[98] In other words, respondents' total savings were, on average, 1.77 (almost double) the size of their average outstanding loan debts in MxFLS-III whereas in MxFLS-II average savings were 3.79 (almost 4 times) the average size outstanding loan debts of the sample.

[99] With the average amount of total outstanding debts almost equalling half the size (45%) of total savings.

Due to Random Effects (RE) importance as an alternative panel data estimation method, for comparability purposes, we include RE results in appendix Table 2.A.11. The latter shows that RE coefficients of the problematic credit management FC index had the same direction (sign) and significance as in FE estimations, thus supporting our hypothesis (although RE estimates were of larger magnitude). RE estimates regarding the influence of the patience index revealed the same direction of impact (positive) as in the FE regressions and remained not significant. However, RE coefficients for the savings orientation index were negative (supporting our hypothesis) though lacking statistical significance. We use the Hausman specification test to evaluate whether any systematic differences existed between FE and RE coefficients of each of our specifications. In light of Hausman test results (see appendix Table 2.A.12), we reject the hypothesis that unique errors were not correlated with the regressors (or that the difference in the coefficients between the FE and RE model is not systematic, core assumption of RE). We therefore reject the hypothesis that RE are preferred to FE and conclude that FE was the best model to use for our panel analysis.

For robustness we also conducted time-fixed effect tests (reported in appendix Table 2.A.13) and modified Wald-tests for groupwise heteroskedasticity (reported in appendix Table 2.A.14). According to appendix Table 2.A.13 results, no time-fixed effects were needed in the specifications as the test results did not provide sufficient evidence to reject the assumption that the coefficients for all wave years jointly equalled zero. Nonetheless, for substantive completeness, all our panel specifications included a time-fixed effect to control for the GFC because it was an important exogenous shock that theoretically could have affected both explanatory and outcome variables.

As per results from the modified Wald-test for groupwise heteroskedasticity (see Table 2.A.14), we rejected the null of constant variance (i.e. of homoskedasticity) and all reported cross-sectional and panel regression results employed robust standard errors (i.e. Huber/White standard errors).

Finally, to evaluate the presence of panel effects (through the null hypothesis of zero variance across entities) we ran Breusch-Pagan Lagrange Multiplier (BPLM) tests[100] and their results led us to reject the hypothesis of no significant difference across units, therefore providing support for the existence of significant heterogeneity across individuals in the sample and supporting the rejection of the assumption of no panel effects.

2.9 CONCLUSIONS

Keeping track of income and expenditures, budgeting, debt monitoring and planning for unforeseeable income shocks are prescribed as the minimum proactive measures for households to '*weather the storm*' and maintain their FWB. As explained throughout this paper, these financial habits are fostered through

[100] BPLM test results across all four panel specifications had *Prob > Chi2* smaller than 0.05 therefore supporting the rejection of the assumption of no panel effects Test results are available upon request.

FC—a tool conceptualised to help improve people's FWB and to advance their financial inclusion. As a concept, FC is more holistic and encompassing than the related notion of FL. Yet, as explained throughout the chapter, in practice, it has not been well-differentiated, neither in academic research nor in policy circles. As a result, the systematic measurement and study of FC has not yet been undertaken in places such as Mexico where FL has been the policy focus. In this chapter we attempt to fill such a research gap especially because FC goes beyond the propositional knowledge grounding FL to encompass the cognitive biases and attitudes people could tap into to enhance their financial resilience and satisfaction regarding the financial domain—and as a result of this improve their overall SWB. Using MxFLS waves comprising the 2005-2012 period, we undertook cross-sectional and panel analyses of the influence of FC's main dimensions on Mexicans SWB (as measured through the CDS).

Cross-sectional and panel results significantly supported the hypothesised positive relationship between the CDS and weak FC—as reflected by our problematic credit management index—a *keeping track* index. The 2009-2012 wave cross-sectional results insignificantly supported the hypothesised inverse relation of our savings and resilience index and depression (i.e., results supported the relation positing that latent factors leading people to have more savings also tend to foster positive affective states, which is equivalent to less depression). In 2005, the effect of our savings orientation index was contrary to our hypothesis, indicating a positive but not significant effect on depression.

The behavioural-attitudinal patience FC index only revealed a significant effect in MxFLS-III (2009-2012) cross-sectional analysis but in opposite direction to our hypothesis. Nonetheless, our patience index results can be reconciled through dual-self theory, the recognition that Mexican society is relatively present-biased (as documented by prior research and evidenced through our data), the increase in DTS ratios and the influence of a set of external conditions that heightened uncertainty regarding the future among the Mexican population such as the trickle-down economic effects of the subprime mortgage crisis in the US, the 2008 GFC and the increase in violence in Mexico from 2005 to 2009 due to drug-cartels' battles for distribution networks toward the US and against the Mexican government.

Dual-self theory argues that the satisfactions forgone by our *short-term present-selves* tend to outweigh the gains envisaged by our farsighted planner for our *future short-run selves*, all the more so for individuals with high present-orientation. Thus, despite the gains derived from an internal locus of control—itself associated with patience—the higher relative importance of the short-term over the long term for MxFLS respondents implied that the loss from postponement of spending and consumption accompanying patient (financial) choices was larger than any psychological gains from self-regulation, thus translating into higher reported experiences of depression symptoms. A present-bias orientation heightens the importance of the short-run self in decision making and this, united with the aforementioned external conditions that raised uncertainty levels in Mexico entailed that the affective loss or subjective costs of delayed rewards (resulting from patience and savings) were stronger for respondents in 2009-2012 than in the prior period.

Results from demographic covariates in both cross-sectional and panel analyses were closely aligned to theoretical expectations from the SWB literature. Having experienced crime (personal assault, kidnap or property theft), having experienced personal or household economy shocks (illness or death of household member, unemployment or incapacity) and residing in a locality with 15,000 or more inhabitants (considered urban) increased the depressive symptom scores reported by respondents. Conversely, and in line with findings of the correlates of SWB performed in HICs, living in a cohesive and inclusive community and being in a couple (being married or in a close partnership), bore an inverse relationship with our depression score, providing evidence of how these factors improve Mexicans' affective-states balance. However, only cross-sectional estimations and RE panel regressions revealed a positive association or impact of higher levels of educational attainment on SWB (i.e. negative relationship with CDS). The latter might suggest that time-invariant personal characteristics such as the genetic components of a person's temperament might exert a negative bias on the influence of higher levels of education (as declarative knowledge) on CDS (depression symptoms) when unaccounted for.[101]

Overall, our descriptive and causal (especially in terms of the positive impact of the problematic credit FC index and of the patience FC index) results provided evidence supporting earlier findings regarding FC in Mexico (see Kempson et al., 2013a, 2013b, 2017). The latter research concluded that Mexicans were good at day-to-day money management but not with intermediate and longer-term financial management (as the one tested through the problematic credit FC index), had short-term horizons, were not likely to plan how to spend their money (budgeting), and were particularly vulnerable to a change in their circumstances. Echoing such findings, our sample of MxFLS respondents revealed some present bias (thus, short time horizons). Our results also reiterated that time-orientation and impulsivity are among the core psychological factors underpinning several financial behaviours in middle-income countries (MIC) such as Mexico just as was concluded by Kempson et al.(2013a).

Despite our results' correspondence with the observations found previously by Kempson et al. (2013a, 2013b, 2017), it was not without caveats. Given the subjective nature of our dependent variable as well as that of part of our predictors, the empirical specifications faced endogeneity challenges through simultaneity. While not reported in the current analysis we attempted reducing the potential bias induced by bi- directionality between depression and covariates such as abstract cognitive ability using lagged variables. However, we recognise the limits of such an approach. While data availability constrained our scope for using instruments, we acknowledge that a more elaborate method to deal with

[101] As FE estimations are assumed to remove the effect of such time-invariant characteristics.

endogeneity (using other similar surveys) is an important area for future FC and SWB research contributions.

Finally, we acknowledge that prior research using measures similar to our dependent variable such as the UK's General Health Questionnaire (GHQ-12 score) has focused on its inverse-caseness version (construed as a sum of binary scores where higher numbers indicate increased psychological wellbeing). Others have treated it as an ordered dependent indicator apt for methodologies such as standard ordered probit regressions. Nonetheless, we chose not to reverse-code our SWB measure, the CDS, and to treat it as a continuous variable to follow the specific literature that has used MxFLS data.[102] Recognising the potential value[103] of complementary treatments of the same data, we leave alternative derivations and handling of our dependent variable as an area for future research.

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[102] Furthermore, we recognise that maintaining the CDS as is (i.e., not reverse-coding it) amounts to a framing decision through which we favoured aligning our study and chapter's narrative to the existing literature utilising the CDS as a measure of affective-states balance (linked to depression and anxiety) and thus of negative wellbeing.
[103] Mostly interpretative—as it could be intuitively easier to deal with positive wellbeing interpretations.

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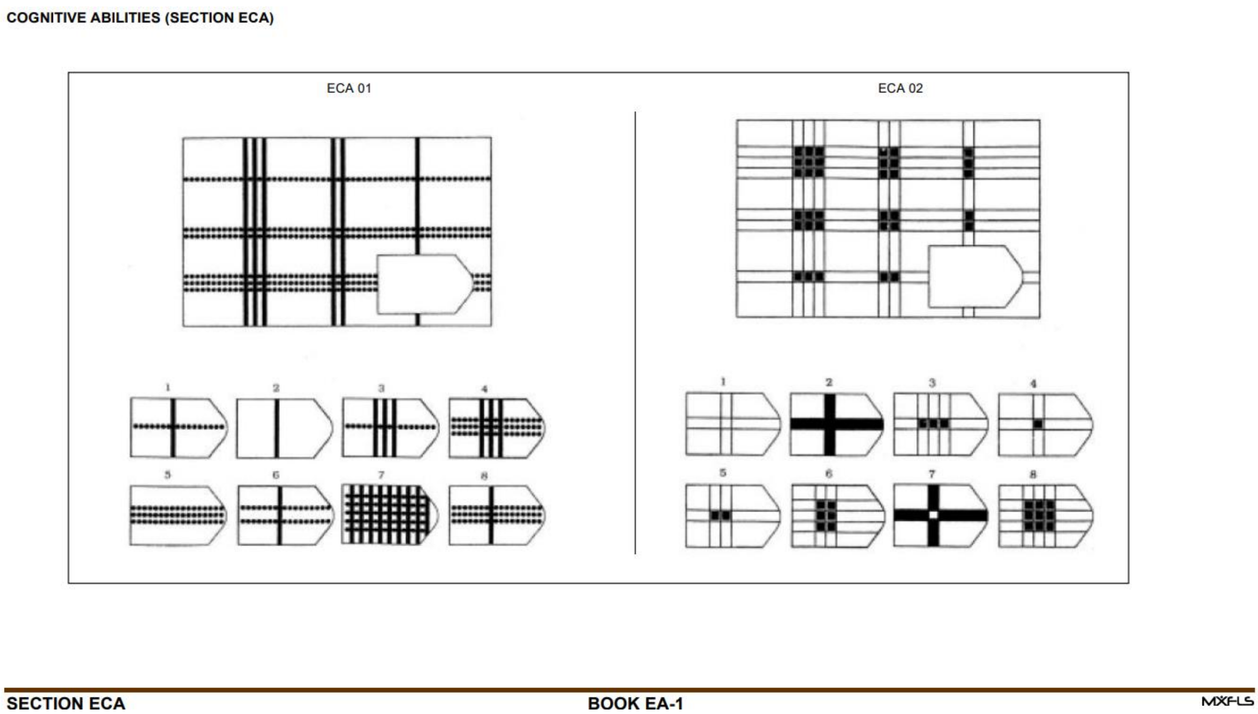
2.11 APPENDIX

Derived Variables Construction

Figure 2.A.1:

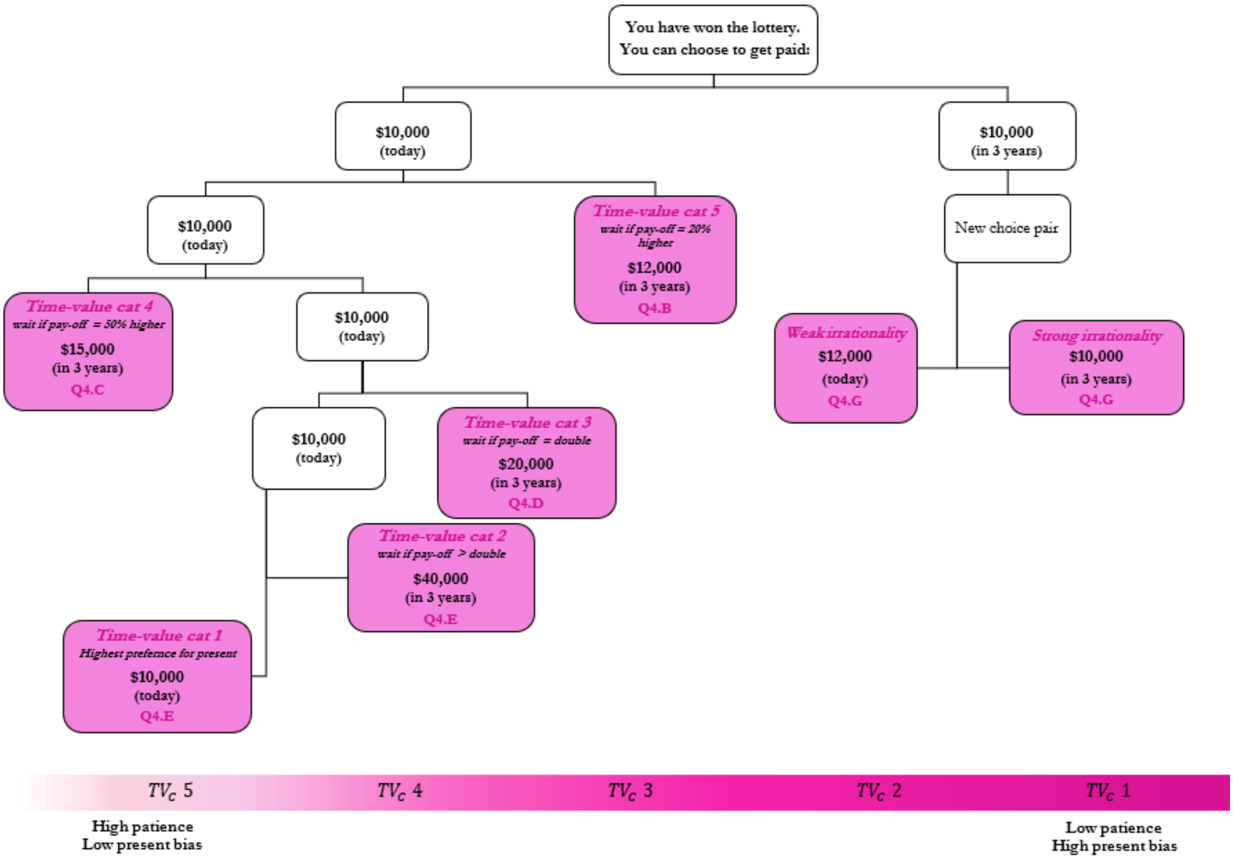
MxFLS Adult Cognitive Abilities Modules
(Raven Progressive Matrix Tests of Fluid Cognition, shortened versions)



Source: MxFLS-II and MxFLS-III survey questionnaires.

Diagram 2.A.1:

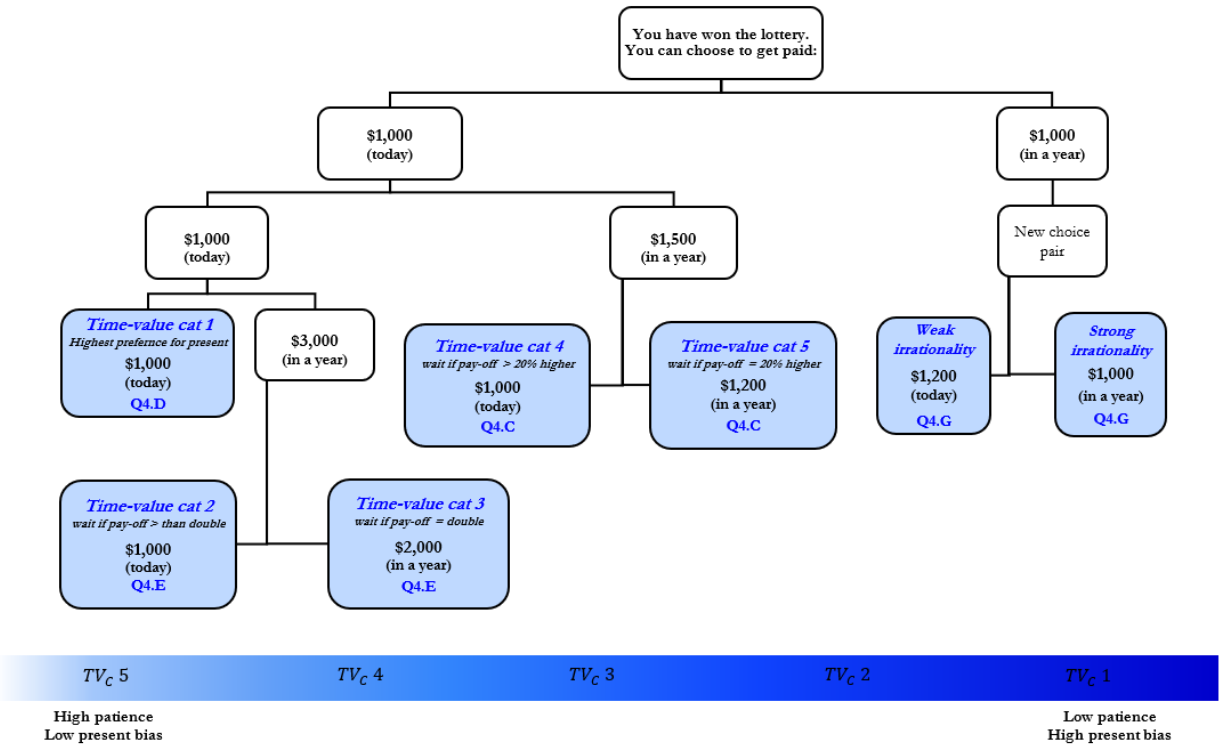
TV Preferences MxFLS-II (period 2005) –*Lottery payments today vs in 3 years.*



Source: Self-generated, based on MxFLS-II survey questionnaire.

Diagram 2.A.2:

TV Preferences MxFLS-III (period 2009-2012) –*Lottery payments today vs in a year.*



Source: Self-generated, based on MxFLS-III survey questionnaire.

Table 2.A.1 :

MxFLS-II & MxFLS-III VARIABLES DESCRIPTION

<table>
<tr><th>Derived variables</th><th>MxFLS
Raw survey questions & variables</th><th>Description of derived variable</th></tr>
<tr><td colspan="3">Chapter 2 and 3: Identifiers</td></tr>
<tr><td>Folio</td><td colspan="2">Folio
Household identifier</td></tr>
<tr><td>LS</td><td colspan="2">LS
Sequential individual household members identifying number. Corresponds to the sequential number of panel household members or of the household where individuals were first identified and registered.</td></tr>
<tr><td>Pid_link</td><td colspan="2">Pid_link
Unique identifying number of individuals in survey.
Contains the household identifying number (Folio) and the corresponding LS of the individual on the first time that the individual was registered in the MxFLS project.
Pid_link numbers stayed constant throughout MxFLS waves—they did not change when individuals changed residence or household between subsequent MxFLS waves.</td></tr>
<tr><td colspan="3">Chapter 2 and 3: Dependent Variable</td></tr>
<tr><td>Calderon Depression Score (CDS) – Subjective (affective) wellbeing score</td><td>Calderon Depression Score Question-set : sm01-sm07; sm09-sm21
Each of the 20 questions included in the question set asked respondents about the affective state of wellbeing they experienced a month (4 weeks) prior to the day in which they were interviewed for the given MxFLS survey wave.
Same set of questions were applied in all MxFLS waves.

While the CDS module in the MxFLS consists of 21 survey question items, the SWB score used in Chapter 2 analysis relies on 20 out of the original 21 questionnaire items. We excluded the item asking about sexual interest because the Mexican Institute of Psychiatry has argued that, in Mexico, the wording of the question is often interpreted in terms of coital relationships while the sought after construct should refer to interest in male and female relationships in general, without necessarily alluding to sexual intercourse.

The specific affective states measured responded to inquiry:
In the past 4 weeks did you:
sm01 – Feel sad?
sm02 – Cried?
sm03 – Slept badly?
sm04 – Awake without encouragement?
sm05 – Have difficulty concentrating?
sm06 – Feel less hungry?
sm07 – Feel obsessive?
sm09 – Feel poor performance?
sm10 – Feel pressure in chest?
sm11 – Feel nervous?
sm12 – Feel more tired?
sm13 – Feel pessimistic?
sm14 – Feel pain in back and/or neck?
sm15 – Feel more irritated?
sm16 – Feel insecure?</td><td>Since in the raw MxFLS data, answer categories for the (affective) subjective wellbeing variables conforming the CDS were ordered in a non-monotonic way, we first recode the categorical answers of each item in sm01-sm07 and in sm09-sm21 set to instead reflect the progressively ordered categories:
1 – No
2 – Sometimes
3 – Many times
4 – All the time

Consequently, the CDS was computed as the total sum obtained per respondent across the 20 affective wellbeing questions. Each question-item was given the same weight.

Minimum possible score : 20
Maximum possible score : 80

A higher score reflected a higher incidence (simultaneity) of experiences associated with depression and anxiety. Lower scores therefore signified higher subjective wellbeing.</td></tr>
</table>

	sm17 – Feel less useful to the family? *sm18* – Fear some things? *sm19* – Wish to die? *sm20* – Loose interest in things? *sm21* – Feel lonely? In raw data, all these questions had as answer options: 1 – Yes, sometimes. 2 – Yes, a lot of times. 3 – Yes, all the time. 4 – No	
Chapter 2 and/or Chapter 3: Socio-demographic Controls		
Age	*ls02_2* Continuous variable giving age of respondent.	Included without modification -used as reported. To capture non-linear effects of age, the square of *ls02_2* was also included to represent age squared.
Gender	*ls04* Biological gender: 1 –Masculine (male) 3 – Feminine (female)	Recoded variable as binary (dummy) indicator: 1 – Male 0 – Female
Married	*ls10* Are you in a domestic partnership / divorced / married or single? 1 – Living with your partner in free union (domestic partnership) 2 – Separated from your partner 3 – Divorced from your partner 4 – Widowed (your partner passed away) 5 – Married 6– Single	Used information from *ls10* to derive a binary variable indicating whether respondent had a significant other or was in a marital or domestic partnership relationship. 1 –If married or in partnership living together with couple but not married 0 – Otherwise
Education Level (categorical indicator)	*ls14* What was the last level of education you achieved? Answer options provided in raw data correspond to levels: 1 – No instruction 2 – Preschool / Kindergarten 3 – Elementary (Middle) School 4 – Junior High (Secondary School) 5 – Open Secondary School 6 – High School 7– Open High School 8 – Basic Normal 9 – Undergraduate Degree University, College, or Technical Bachelors' Degree (in apprentice studies) 10 – Graduate Level Studies (Master and Doctoral Studies) 98 – Don't know.	Created categorical variable *RlsHhd_EDlLachiev* based on the values of *ls14* but with fewer categories since *RlsHhd_EDlLachiev* assigned all pre-elementary schooling levels to a single level of education (the lowest one) and also combined all the categories within *ls14* (from elementary onwards) that corresponded to an equivalent or near equivalent level of education into a single category. The specific values of *RlsHhd_EDlLachiev* are: 1 – No instruction / Preschool / Kindergarten 2 – Elementary (Middle) School 3 – Junior High (Secondary School) & Open Secondary School 4 – High School & Open High School 5 – Basic Normal / Undergraduate Degree University, College, or Technical Bachelors' Degree (in apprentice studies) / Graduate Level Studies (Master and Doctoral Studies)
Education Level (binary-variables set)	*ls14* What was the last level of education you achieved?	Created 5 different dummy variables based on *ls14.* Each dummy indicates whether respondent's highest level of

	Answer options provided in raw data correspond to levels: 1 – No instruction 2 – Preschool / Kindergarten 3 – Elementary (Middle) School 4 – Junior High (Secondary School) 5 – Open Secondary School 6 – High School 7– Open High School 8 – Basic Normal 9 – Undergraduate Degree University, College, or Technical Bachelors' Degree (in apprentice studies) 10 – Graduate Level Studies (Master and Doctoral Studies) 98 – Don't know.	education/schooling completed corresponded to one of the following levels: *Hd_Edachv_L1* 1 – None / uncertain or (at most) Preschool/Kindergarten *Hd_Edachv_L2* 1 – Elementary/Middle School *Hd_Edachv_L3* 1 – Junior High (Secondary School) / Open Secondary School *Hd_Edachv_L4* 1 – High School / Open High School *Hd_Edachv_L5* 1 – Basic Normal / University (Bachelors, Masters or Doctorate) In all 5 dummies 0 codes for having "another level" (above or below) than the one indicated by category 1 of given level.
Urban **(People $\geq$ 15,000)**	Based on variable*: estrato* Categorical variable with information of stratification of localities by size according to geographical area used by INEGI, in all Censuses, the ENIF and in MxFLS. 1 – 100,000 and more residents (urban) 2 – 15,000 to 99,999 residents (semi-urban) 3 – 2,500 to 14,999 residents (semi- rural) 4 – less than 2,500 residents (rural)	Derived a single dummy variable based on the raw variable *estrato* to differentiate semi- urban & urban areas from non-urban areas: 1 – If respondent is from a locality with at least 15, 000 residents (and many more (millions of) residents) 0 –Includes both semi-rural localities (those with 2, 500 $\leq$ residents $\leq$ 14,999) & rural localities (those with less than 2, 500)
Income earnt last 12 months (nominal amount)	Questions *ls12, ls13_2* *ls12* During the last 12 months, did you work or carry out any activity to help with the household expenses? 1 – Yes 3 – No *ls13_2* In the last 12 months, approximately how much did you earn or receive from this job or activity? *Respondents were asked to provide the actual amount of earnings.* In raw data only respondents that answered they "did you work or carry out any activity to help with the household expenses" (*ls12==1*) would provide a numeric answer to *ls13_2.* Those answering they "did not work or engage in a paid activity to contribute with the household expenses" (*ls12==3*) had missing values in the raw data of variable *ls13_2.*	Derived variable based on information from *ls12, ls13_2* which: Equalled the amount provided by respondents to answer *ls13_2* 0 – Otherwise Note – only 31.55% of the total raw MxFLS-III sample said they had worked over the past 12 months and only 65.50% of them provided information regarding the amount earnt. Hence only 20.66% of respondents of the total raw MxFLS-III data actually provided the amount information regarding income earnt over prior 12 months. All others (80%) were assigned zero income. Final variable used in estimations corresponded to the natural logarithmic (*ln*) form of the derived labour income earn over past year variable.
Victimization (assault and / or property theft)	Questions: *vlh08a, vlh08b, vlh08c, vlh12a, vlh12b, vlh14, vlh16* *vlh08a* Do you know Fam/friend who has been robbed in house/ business in the last 5 years? *vlh08b*	Recoded each variable as binary (dummy) indicator: 1 – Yes 0 – Otherwise

	Do you know Fam/friend who has been assaulted in house/ business in the last 5 years? *vlh08c* Do you know Fam/friend who has been kidnapped in house/ business in the last 5 years? *vlh12a* & *vlh12b* Experienced somebody entering by force to rob household dwelling you currently live in or where you used to live since after 2005? *vlh14* Experienced somebody entering by force in business to rob since 2005? *vlh16* Experienced somebody entering by force in parcel to rob since 2005? In raw data, all these questions had as answer options: 1 – Yes 3 – No 9 – NA	Then consolidated all the dummies into a single aggregated binary indicator that coded: 1 – When any of the 6 individual crime and victimization indicators reflected having experienced or knowledge of an assault. 0 – Otherwise However, indicator was not sensitive to number of offenses experienced or being aware of as the aggregated indicator simply recorded 1 whenever a respondent had at least one experience or knowledge of an assault or crime.
Cohesive & inclusive locality/community	Questions: *vlh01k, vlh01l, vlh01m, vlh01n* *vlh01k* Are people in this locality/community close/amicable to one another? *vlh01l* Are people in this locality/community willing to help their neighbours? *vlh01m* Do people in this locality/community share the same values? *vlh01n* Are people in this locality/community trustworthy? In raw data, all these questions had as answer options: 1 – Completely Agree 2 – Agree 3 – Disagree 4 – Completely Disagree 8 – DK	Derived consolidated (binary) indicator that coded: 1 – Whenever the respondent completely agreed or simply agreed that his/her community or locality of residence exhibited any of the inclusiveness, trust, and cohesiveness characteristics described through the four underlying raw indicators. 0 – Otherwise. Therefore, indicator is insensitive to the strength of the belief (completely agree and agree were treated equally) as well as to the simultaneous occurrence of several cohesive and inclusive characteristics in the community/locality. The derived indicator equalled 1 just as likely when one characteristic of cohesiveness, trust and resilience was perceived as when all were.
Personal & household economic shocks (over prior 5 years)	Questions : *se01a, se01b, se01c, se01d, se01e, se01f* *se01a* Did any household member die in the last 5 years? *se01b* Did any household member have a disease, accident or was in hospital in the last 5 years? *se01c* Did any household member become unemployed or had their business fail or become bankrupt in the last 5 years? *se01d* Did you suffer any loss of property or negative consequence due to a natural disaster in the last 5 years? *se01e*	Created dummy variable consolidating the information of the six underlying variables that coded: 1 – Whenever respondent declared having experienced one or more of the shocks detailed by the six underlying variables. 0 – Otherwise. Derived indicator was insensitive to the number of shocks experienced during the past 5 years for it simply recorded 1 whenever respondent had at least experienced one of the shocks,

	Did you lose your crop or the products of your labour due to a natural disaster in the last 5 years? *se01f* Did you lose part of your property, livelihood, assets due to robbery or armed conflict over the last 5 years? In raw data, all these questions had as answer options: 1 – Yes 3 – No	
Cognitive ability: Raven Progressive Matrix Score (RPMS)	Question: *eca01, eca02, eca03, ..., eca11, eca12* Each question in set *eca01– eca12* consisted of a matrix diagram displaying a graphic pattern with a missing part that respondents had to complete by choosing one option (itself a graphical display or geometric pattern) from amongst a set of 8 different options printed underneath of the main question-problem. The diagram patterns and answer options varied for each question, but all respondents were administered the same RPM set of questions in both waves (MxFLS-II and MxFLS-III).	Using the RPM test answers provided as part of the publicly available documentation of the MxFLS project, dummy variables based were created based on respondents' answers to the question-set *eca01– eca12* where each dummy equalled 1 if question problem was answered correctly and 0 otherwise. Afterwards, the cognitive ability score (RPMS) was computed as the total sum of correct answers provided by respondent. Each question-item was given the same weight. Minimum possible score : 0 Maximum possible score : 12 Higher scores reflected higher level of fluid cognition.
Household living conditions and assets index	Questions: *cvo04, cv01_1, cv16, cv05, cv19, cv20, cvo02_1, cvo05_1, cvo06_1, cvo07_1, ah03a, ah03d, ah03e, ah03f, ah03g, ah03h* *cvo02_1* What type of dwelling do you reside/live in? Answer options for *cvo02_1:* 1 – Mobile dwelling 2 – Warehouse used as dwelling 3 – Room built on a rooftop 4 – Room or house in a tenement building 5 – Apartment/flat in a building 6 – Individual house sharing common walls 7 – Individual house not sharing common walls 8 – Other type of dwelling *cvo05_1* Which is the main flooring material in the dwelling? Answer options for *cvo05_1:* 1 – Wood/paving stone/carpet or other covers 2 – Cement 3 – Soil 4 – Other *cvo06_1* Which is the main material of the dwelling's external walls? Answer options for *cvo06_1:* 1 – Concrete/partition brick/ blocks 2 – Adobe 3 – Wood	Firstly, binary (dummy) variables were derived based on the information contained by raw data variables. Their corresponding coding is as follows: • *Proper type of dwelling (dummy)* 1 – If respondent answered they lived in a 'proper' type of dwelling where 'proper' was defined as being either: a room on rooftop, a room or house in tenement property building, an apartment or flat in a building, an individual house sharing or not common walls. Therefore, the binary indicator for having a proper dwelling was 1 whenever *cvo02_1*==3 or 4 or 5 or 6 or 7 0 – Otherwise • *Proper floor (dummy)* 1 – If floor of dwelling was either wood/paving stone/ carpet/ other coverings or cement [i.e. coded 1 if *cvo05_1* == 1 or 2] 0 – Otherwise • *Proper walls (dummy)* 1 – If external walls were of concrete /partition brick/ blocks; or adobe [i.e. coded 1 if *cvo06_1* == 1 or 2] 0 – Otherwise • *Proper roof (dummy)*

	4 – Asbestos /metal sheets/ fiberglass plastic-mica 5 – Sticks covered by mud 6 – Common reed-grass/bamboo/shingles 7 – Cardboard sheets 8 – Waste material 9 – Stone 10 – Other *cvo07_1* Which is the main material of the roof in the dwelling? Answer options for *cvo07_1:* 1 – Small beams and polyurethane 2 – Concrete/partition brick/ blocks 3 – Tiles 4 – Asbestos sheets 5 – Common reed-grass/bamboo/terrace 6 – Metal sheets/ fiberglass plastic-mica 7 – Palm leaves/shingles/wood 8 – Cardboard sheets 9 – Waste material 10 – Other In your dwelling, do you...: *cv01_1* – Have own telephone? *cvo04* – Have electricity? *cv05* – Have independent room for cooking? Answer options for *cv01_1, cvo04* & *cv05* : 1 – Yes / 3 – No *cv16* – Have sanitary service? Answer options for *cv16:* 1 – Toilet 2 – Latrine 3 – Cesspit/cesspool 4 – Does not have sanitary service *cv19* – Access to garbage disposal area/service? Answer options for *cv19:* 1 – Public collection service 2 – Public/communal dump 3 – No, garbage thrown to river 4 – No, garbage burnt inside dwelling 5 – No, garbage burnt outside of dwelling 6 – No, garbage buried inside dwelling 7 – No, garbage buried outside of dwelling 8 – No, other way of disposing off garbage *cv20* – Energy source for cooking and heating? Answer options for *cv20:* 1 – Firewood 2 – Coal 3 – Petroleum 4 – Gas 5 – No fuel 6 – Other source of energy/power 7– Electricity *Do you **own**:* *ah03d* – A motor vehicle? *ah03e* – Electronic device(s)? *ah03f* – Washing machine and stove? *ah03g* – Other household appliance(s)? *ah03h* – Financial assets/ AFORE(s)?	1 – If roof was of concrete /partition brick/ blocks; tiles or of small beams and polyurethane [i.e. coded 1 if *cvo07_1* == 1, 2 or 3] 0 – Otherwise • *Telephone (dummy)* 1 – If *cv01_1* ==1 (yes) / 0 – Otherwise • *Electricity (dummy)* 1 – If *cvo04* ==1 (yes) / 0 – Otherwise • *Independent room for cooking* 1 – If *cv05* ==1 (yes) / 0 – Otherwise • *Have toilet / sanitary services (dummy)* 1 – If respondent claimed dwelling had a toilet [i.e. coded 1 if *cv16* == 1] 0 – Otherwise • *Access to proper garbage disposal (dummy)* 1 – If respondent claimed garbage was disposed via the public (garbage) collection service [i.e. coded 1 if *cv19* == 1] 0 – Otherwise • *Gas (power) for cooking* 1 – If respondent claimed main source of energy for cooking and heating was gas [i.e. coded 1 if *cv20* == 1] 0 – Otherwise • *Has motor vehicle (dummy)* 1 – If *ah03d* ==1 (yes) / 0 – Otherwise • *Has electronic devices (dummy)* 1 – If *ah03e* ==1 (yes) / 0 – Otherwise • *Has washing machine (dummy)* 1 – If *ah03 f*==1 (yes) / 0 – Otherwise • *Has other household appliances (dummy)* 1 – If *ah03g* ==1 (yes) / 0 – Otherwise • *Has financial assets and/or AFOREs (dummy)* 1 – If *ah03h* ==1 (yes) / 0 – Otherwise Estimated tetrachoric correlations amongst the above set of 15 binary indicators and derived the main PC for households' dwelling characteristics and durable (appliances) ownership from tetrachoric correlation matrices or the aforementioned 15 survey question items.

	Answer options for *ah03d - ah03h* in raw data: 1 – Yes / 3 – No	
Chapter 2: Problematic Credit Management FC Index Constituent Factors		
CC withdrawals not fully paid (left outstanding)	*cr02* In the last 12 months, did you withdraw cash from your CC and did not pay it in full at the due date? Answer options for *cr02*: 1 – Yes 3 – No	Derived dummy indicator based on *cr02* that coded: 1 – When respondent had withdrawn cash from CC and not paid it fully by due-date (i.e. when *cr02==1*) 0 – Otherwise Derived variable was employed as one of the five constituent factors used to estimate the *problematic credit use FC index* of the instrumental money management dimension in FC and SWB regressions in Chapter 2.
Has outstanding debts unpaid.	Questions: *cr22_1, cr22_2* * See description of raw variables used for sum of unpaid loan debts below.	Derived dummy indicator based on modified version of *cr22_2mf* that accounted for inconsistencies of missing values in *cr22_2* (see description of derived variables used for sum of unpaid loan debts below). and which coded: 1 – When respondent had outstanding debts unpaid (i.e. when *cr22_2mf==1*) 0 – Otherwise Final derived variable was employed as one of the five constituent factors used to estimate the *problematic credit use FC index* of the instrumental money management dimension in FC and SWB regressions in Chapter 2.
Has outstanding CC balance.	*cr01* In the last 12 months, did you make any purchases with CC that you did not pay in full at the due date? Answer options for *cr01*: 1 – Yes, made purchases via CC but have not paid-up the full balance by due date. 2 – Yes, made purchases via CC and paid full balance by due date. 3 – No, did not make purchases with CC although you have one. 4 – No, you do not have a CC.	Derived dummy indicator based on *cr01* that coded: 1 – When respondent declared having made purchases using a CC but not having paid the full balance of their CC by its due date (i.e. when *cr01==1*) 0 – Otherwise Derived variable was employed as one of the five constituent factors used to estimate the *problematic credit use FC index* of the instrumental money management dimension in FC and SWB regressions in Chapter 2.
In household that did not pay any debts outstanding	Questions: *crh03_1, crh03_2, crh03a, crh03b, crh03c, crh03d* *crh03_1* Out of all the debts you have/had, how much money has the household paid in the last 12 months? Answer options for *crh03_1:* 1 – Opting to disclose/declare amount in MXN pesos. 2 – Has not paid/did not pay anything in the last 12 months 3 – Does not have any debts 8 – DK	Used the information provided by responses to survey questions *crh03_1, crh03_2, crh03a, crh03b, crh03c, crh03d* to derive a binary variable that could indicate whether the household had not paid any of its outstanding debts. First, an ordinal variable (*crh03_hdbtpaid*) was created to consolidate the information provided by the series *crh03a – crh03d* such that each category represented one of the threshold values of ***debt already paid***

	crh03_2 Contained respondent-provided monetary amount in MXN if and only if interviewed respondent opted to disclose amount in *crh03_1* (i.e. if and only if *crh03_1==1*). Variable set *crh03a – crh03d* had non-missing values (i.e. an actual numeric answer) whenever respondents declared they did not know the amount of debts they owed (i.e. when *crh03_1==8*). As such the variable set *crh03a – crh03d* provided a series of values amongst which respondents could choose from to approximate the value of the portion of their debt they had already paid or settled. *crh03a* Is the amount you have already paid to settle part of your debts likely more than \$500 MXN or less than \$500 MXN? 1 – Less than \$500 MXN 2 – More than \$500 MXN *crh03b* Is the amount you have already paid to settle part of your debts likely more than \$1,000 MXN or less than \$1,000 MXN? 1 – Less than \$1,000 MXN 2 – More than \$1,000 MXN *crh03c* Is the amount you have already paid to settle part of your debts likely more than \$5,000 MXN or less than \$5,000 MXN? 1 – Less than \$5,000 MXN 2 – More than \$5,000 MXN *crh03d* Is the amount you have already paid to settle part of your debts likely more than \$10,000 MXN or less than \$10,000 MXN? 1 – Less than \$10,000 MXN 2 – More than \$10,000 MXN	indicated by each variable in *crh03a – crh03d.* The categorical levels of the derived ordinal indicator *crh03_hdbtpaid* were: 0 – No debts outstanding 1 – Debt amount paid ≤ \$500 MXN 2 – \$500 MXN < debt amount paid ≤ \$1,000 MXN 3 – \$1,000 MXN < debt amount paid ≤ \$5,000 MXN 4 – \$5,000MXN < debt amount paid ≤ \$10,000 MXN 5 – Debt amount paid > \$10,000 MXN 6 – Did not pay for any of the debts outstanding over the past 12 months. Using the same threshold categories for the values of ***debt already paid*** implicit in the *crh03a – crh03d* variable-set the monetary amounts reported by respondents who answered *crh03_1==1* (and therefore *crh03_2!=.*) were categorised and incorporated to the information of the ordinal variable (*crh03_hdbtpaid*) previously derived. Lastly, a dummy variable was developed based on the information of the ordinal variable (*crh03_hdbtpaid*) that in turn consolidated the information provided by *crh03_1, crh03_2, crh03a – crh03d* as described above. Such as dummy coded: 1 – Whenever respondent declared his/her household had not paid/did not pay any of its outstanding debts during the last 12 months (i.e. whenever *crh03_hdbtpaid==6,* which corresponded to whenever *crh03_1==2*) 0 – Otherwise
In household with unpaid debts outstanding totalling > \$1,000 MXN	Questions: *crh04_1, crh04_2, crh04a, crh04b, crh04c, crh04d* *crh04_1* Considering all debts, how much does the household owe (including interests)? Answer options for *crh04_1:* 1 – Opting to disclose/declare amount in MXN pesos. 8 – DK *crh04_2* Contained respondent-provided monetary amount in MXN if and only if interviewed respondent opted to disclose amount in *crh04_1* (i.e. if and only if *crh04_1==1*). Variable set *crh04a – crh04d* had non-missing values (i.e. an actual numeric answer) whenever respondents declared they did not know the amount of debts they owed (i.e. when *crh04_1==8*). As such the variable set *crh04a – crh04d* provided a series of values amongst which respondents could choose from to approximate the value of their debts.	Used the information provided by responses to survey questions *crh04_1, crh04_2, crh04a, crh04b, crh04c, crh04d* to derive a binary variable that could indicate whether the household had unpaid debts greater than \$1,000 MXN. Firstly, an ordinal variable was created (*crh04_thdbtouts*) to consolidate the information provided by the series *crh04a – crh04d* such that each category represented one of the threshold values of ***debt still outstanding*** indicated by each variable in *crh04a – crh04d.* The categorical levels of the derived ordinal indicator *crh04_thdbtouts* were: 0 – No debts outstanding 1 – Total debts outstanding ≤ \$500 MXN 2 – \$500 MXN < total debts outstanding ≤ \$1,000 MXN 3 – \$1,000 MXN < total debts outstanding ≤ \$5,000 MXN 4 – \$5,000 MXN < total debts outstanding ≤ \$10,000 MXN

	crh04a Is the debt owed likely more than $500 MXN or less than $500 MXN? 1 – Less than $500 MXN 2 – More than $500 MXN *crh04b* Is the debt owed likely more than $1,000 MXN or less than $1,000 MXN? 1 – Less than $1,000 MXN 2 – More than $1,000 MXN *crh04c* Is the debt owed likely more than $5,000 MXN or less than $5,000 MXN? 1 – Less than $5,000 MXN 2 – More than $5,000 MXN *crh04d* Is the debt owed likely more than $10,000 MXN or less than $10,000 MXN? 1 – Less than $10,000 MXN 2 – More than $10,000 MXN	5 – Total debts outstanding > $10,000 MXN Using the same threshold categories for the value of ***debt outstanding*** implicit in the *crh04a – crh04d* variable-set the monetary amounts reported by respondents who answered *crh04_1==1* (and therefore *crh04_2!=.*) were categorised and incorporated to the information of the ordinal variable (*crh04_thdbtouts*) previously derived. Lastly, a dummy variable was developed based on the information of the ordinal variable (*crh04_thdbtouts*) that in turn consolidated the information provided by *crh04_1, crh04_2, crh04a – crh04d* as described above. Such as dummy coded: 1 – Whenever total amount of debt outstanding from all credit, loan, & other debt products and their interests was greater than $1,000 MXN (i.e. whenever *crh04_thdbtouts* ≥ *3*) 0 – Otherwise
Chapter 2: Savings Orientation FC Index Constituent Factors		
Has retirement savings account (in Spanish AFOREs)	*cr30* Do you have a retirement savings account (AFORE)? Answer options for *cr30*: 1 – Yes 3 – No 7 – No response	Derived dummy indicator based on *cr30* that coded: 1 – When respondent reported having an AFORE (i.e. when *cr30==1*) 0 – Otherwise Final derived variable was employed as one of the three constituent factors used to derive the *savings orientation (and resilience) FC index* of the instrumental money management dimension of FC and SWB regressions in Chapter 2.
Has made voluntary deposits or contributions to retirement savings account (AFORE)	*cr32* Have you made any voluntary contributions or deposits into your AFORE? Answer options for *cr32*: 1 – Yes 3 – No	Derived dummy indicator based on *cr32* that coded: 1 – When respondent reported having made voluntary contributions or deposits to their AFORE (i.e. when *cr32==1*) 0 – Otherwise Final derived variable was employed as one of the three constituent factors used to derive the *savings orientation (and resilience) FC index* of the instrumental money management dimension of FC and SWB regressions in Chapter 2.
Has savings	*cr27* Do you have savings? Answer options for *cr27*: 1 – Yes 3 – No	Derived dummy indicator based on *cr27* that coded: 1 – When respondent reported having savings (i.e. when *cr27==1*) 0 – Otherwise Final derived variable was employed as one of the three constituent factors used to derive the *savings orientation (and resilience) FC index* of the instrumental

		money management dimension of FC and SWB regressions in Chapter 2.
Chapter 2: Behavioural – Attitudinal (Patience) FC Index Constituent Factors		
Considers the future in spending & saving decisions	*pr01* Some people save because they expect their income to be less in the future. Others do not save because they expect their income to increase in the future. Do you think about the future when you make your decisions about spending and saving? Answer options for *pr01:* 1 – Yes 2 – No, I do not have enough money 3 – No, I do not think about the future	Derived dummy indicator based on *pr01* that coded: 1 – When respondent reported thinking about the future (i.e. when *pr01 ==1*) 0 – Otherwise Final derived variable was employed as one of the constituent factors used to derive the *patience FC index* of the behavioural and attitudinal dimension of FC and SWB regressions in Chapter 2.
Spent nothing or less than half of monetary gift received. **Value in MxFLS-II: $1, 000 MXN** **Value in MxFLS-III: $20, 000 MXN**	Questions: *co06, co07_1, co07_21, co07_22, co08_a, co08_b* *co06* Imagine that you have a rich relative who gives you $1,000 MXN today (MxFLS-II) $20,000 MXN today (MxFLS-III). In the next 30 days, would you spend it all, save it all, or spend one part and save the rest? Answer options for *co06*: 1 – Spend it all 3 – Save it all 5 – Spend one part and save the rest 8 – DK *co07_1* Approximately, how much would you spend? Respondents were asked to choose option format in which they wanted to express answer, with *co07_1* alternatives being: 1 – Report amount 2 – Report a percentage 8 – DK *co07_21* In raw data only respondents that in question *co07_1* answered they would like to declare or report how much they would spend of the gift through a stated amount of money (i.e. those that answered *co07_1==1)* subsequently answered question *co07_21* by specifying the pertinent monetary amount of the gift they would spend. Otherwise (i.e. if *co07_1==2* or *8*) then *co07_21* had missing values in raw data. *co07_22* In raw data only respondents that in question *co07_1* answered they would like to declare or report how much they would spend of the gift through a stated percentage of the monetary gift received (i.e. those that answered *co07_1==2)* subsequently answered question *co07_22* by specifying the pertinent percentage of the amount of the gift they would spend. Otherwise (i.e. if *co07_1==1* or *8*) then *co07_22* had missing values in raw data.	Given the different concepts tracked by the raw question items of the individual level preferences module of the MxFLS, the information contained in the raw data variable-set was consolidated to derive a binary variable indicating individual spent nothing or less than half of a monetary gift received. A couple of modifications were made to the underlying variables used to ensure consistency among the answers. The information contained in *co07_21* and in *co07_22* was combined into a new variable that equalled *co07_22* answers and incorporated data from *co07_21* after the data responses recorded in *co07_21* were converted to the terms of the responses reported in *co07_22*. The latter process helped to eliminate many missing values and ensured that both variables reflected identical information. Thereafter, information from *co08_a* & *co08_b* was also incorporated. Specifically, using MxFLS individual level Book IIIB questionnaires & codebooks the categories of values presented by *co08_a*and *co08_b* were converted into percentages aligned to the information comprised by the new indicator consolidating the information from *co07_21* and *co07_22* described above. Finally, a binary indicator was developed from the above derived variables that coded: 1 – When respondent reported either: • saving the entirety of the monetary gift amount received (i.e. *co06==3*) or • spending at most half of the monetary gift amount received (as per the derived proportions of the gifts that respondents reported they would be willing to spend [explained above])

	co08_a Is the amount you reported in *co07* and *co07_21?* Answer options for *co08_a*: ***Values in MxFLS-II:*** 1 – Greater than or equal to $500 MXN 2 – Less than $500 MXN 8 – DK ***Values in MxFLS-III:*** 1 – Greater than or equal to $10, 000 MXN 2 – Less than $10, 000 MXN 8 – DK *co08_b* If the amount you reported in *co08_a* was... Answer options for *co08_b*: ***Values in MxFLS-II:*** Greater than or equal to $500 MXN, answer options: 1 – Greater than or equal to $750 MXN 2 – Less than $750 MXN 8 – DK Less than $500 MXN, answer options: 1 – Greater than or equal to $250 MXN 2 – Less than $250 MXN 8 – DK ***Values in MxFLS-III:*** Greater than or equal to $10,000 MXN, answer options: 1 – Greater than or equal to $15,000 MXN 2 – Less than $15,000 MXN 8 – DK Less than $10,000 MXN, answer options: 1 – Greater than or equal to $5000 MXN 2 – Less than $5000 MXN 8 – DK	0 – Otherwise Final derived variable was employed as one of the constituent factors used to derive the *patience FC index* of the behavioural and attitudinal dimension of FC and SWB regressions in Chapter 2.
Time-value (TV) preferences (categorical indicator of levels of present-bias)	Question-set (both waves) : *pr04a, pr04b, pr04c, pr04d, pr04e, pr04g* Question-set *prompt (both waves)*: Imagine you have won the lottery. In each of the following questions choose how you prefer to be paid: **MxFLS-II** Question-set *options*: *pr04a* 1 –$10,000 MXN today 2 –$10,000 MXN in 3 years *pr04b* 1 –$10,000 MXN today 2 –$12,000 MXN in 3 years *pr04c* 1 –$10,000 MXN today 2 –$15,000 MXN in 3 years *pr04d* 1 –$10,000 MXN today 2 –$20,000 MXN in 3 years *pr04e* 1 –$10,000 MXN today 2 –$40,000 MXN in 3 years *pr04g*	I created a categorical variable for each wave condensing the information in the *pr04a - pr04g* raw variable sets of each wave into a single indicator of the TV (TV) preferences of respondents. These were: *w2pr04_tvYcatgr* (for MxFLS-II) and *w3pr04_tvYcatgr* (for MxFLS-III) To construct the (per wave) categorical TV control, dummy (binary) indicators were first developed per TV preference/ or extent of present bias for each wave. Such binary indicators coded 1 according to the final choice of payment selected by respondents at the end of a sequence of payment choice-pairs from which respondents had to choose to identify their TV path and ultimate TV preference level. As shown by Diagrams 2.A.1 and 2.A.2 each sequence of payment choice-pairs terminated in a particular option of payment with an associated minimum future payment necessary for respondents to wait for a future

	1 –$12,000 MXN today 2 –$10,000 MXN in 3 years **MxFLS-III** Question-set *options* : *pr04a* 1 –$1,000 MXN today 2 –$1,000 MXN in 1 year *pr04b* 1 –$1,000 MXN today 2 –$1,500 MXN in 1 year *pr04c* 1 –$1,000 MXN today 2 –$1,200 MXN in 1 year *pr04d* 1 –$1,000 MXN today 2 –$3,000 MXN in 1 year *pr04e* 1 –$1,000 MXN today 2 –$2,000 MXN in 1 year *pr04g* 1 –$1,200 MXN today 2 –$1,000 MXN in 1 year	payment rather than choosing the immediate payment option. Each TV preference level dummy would code 1 for all observations terminating their payment choice-sequence in a specific choice point representing their given TV level. Five levels of TV preferences were identified through such a process, each corresponding to a distinct payment choice-set terminal point (illustrated through the coloured cells in diagrams 2.A.1 and 2.A.2). After all the 5 levels of TV preferences were identified, their information was condensed again into a **single** categorical indicator with 6 different values representing declining levels of present bias (i.e. with level 1 reflecting highest present bias and level 5 representing the least present bias). Level 0 was the base or referent level and corresponded to exhibiting irrational choice in the payment choice-sets (i.e. choosing an irrational option such as selecting a much lower future payment than the immediate payment). Despite the wording differences between the waves, the same 5 levels of TV preference categories were employed in both TV categorical indicators as the content of the *pr04a* - *pr04g* question-sets was deemed comparable across both waves due to both of them measuring the same latent concept (extent of present bias). Hence, the categories for *w2pr04_tvYcatgr* (for MxFLS-II) and *w3pr04_tvYcatgr* (for MxFLS-III) were: 0 – irrational choice 1 – for highest present bias (to opt for future payment individual requires future payment to be more than 3 times as large as the immediate-present payment (in case of MxFLS-III) and more than 4 times as large (in MxFLS-II) 2 – substantial/large present bias (to opt for future payment individual requires future payment to be *at least more than* 2 times as large as the immediate-present payment (in case of MxFLS-III) and 4 times as high (in MxFLS-II) 3 – intermediate level of present bias (to opt for future payment individual requires future payment to be double the immediate-present payment) 4 – moderate present bias (to opt for future payment individual requires future payment to be *greater than* 20% higher than the immediate-present payment (in MxFLS-III) and *at least* 50% *higher than* the

		immediate-present payment (in MxFLS-II) 5 – smallest present bias (to opt for future payment individual requires future payment to be *only* 20% higher than the immediate-present payment (in MxFLS-III) or *at least* 20% *higher* (in MxFLS-II).
Chapter 3 (mostly) and part of Chapter 2: Financial Balances Variables & Risk Aversion		
Risk-aversion (RA) preferences (categorical indicator of levels of RA)	Question-set (both waves): *rg01, rg02, rg03, rg04, rg05, rg06, rg07* **MxFLS-II** *rg01*: Image a game of random chance in which there is a single bag that contains two balls, 1 blue and 1 yellow. Each ball has an amount written on it which represents the amount of money you get if you select that ball. You are asked to select only one ball by sticking your hand into the bag and grabbing a single ball. However, the bag is not see-through. Therefore, you cannot see neither the colour of balls nor the amounts printed on each of the 2 balls. All you know is that one ball if blue and one is yellow and if you grab the blue ball, you get the amount printed on it and if you grab the yellow ball you get the amount printed on the yellow ball. What coloured ball do you have the highest probability of getting? 1 – Blue 2 – Yellow 3 – Same probability 8 – DK Questions-set *rg02, rg03, rg04, rg05, rg06, rg07 prompt:* Now imagine you can choose between the two bags shown on the slide. In each of the following questions choose the answer of the bag you prefer (if you don't know [DK] choose 8). Questions-set *options*: *rg02* 1 – Bag 1: if you grab the blue chip or the yellow chip, you receive $1,000 MXN 2 – Bag 2: you receive $500 MXN if you grab blue ball or $2,000 MXN if you grab yellow ball 8 – DK *rg03* 1 – Bag 1: you receive $500 MXN if you grab blue ball or $2,000 MXN if you grab yellow ball 2 – Bag 2: you receive $300 MXN if you grab blue ball or $3,000 MXN if you grab yellow ball 8 – DK *rg04*	Categorical variable was created for each wave condensing the information in the *rg01-rg07* raw variable sets of each wave into a **single** indicator of the levels of RA of individual respondents. These were: *w2_rAvcategor* (for MxFLS-II) and *w3_rAvcategor* (for MxFLS-III) To construct the (per wave) categorical RA control, dummy (binary) indicators were first developed per level of RA/ or risk tolerance for each wave. Such binary indicators coded 1 according to the final bag chosen by respondents at the end of a sequence of gamble-pairs from which respondents had to choose to identify their RA path and ultimate RA level. As shown by diagrams 3.A.1 and 3.A.2 each sequence of gamble-pairs terminated in a particular final bag chosen with an associated ultimate minimum risk premium necessary for respondents to choose the risky option. The RA level dummies would code 1 for all observations terminating their gamble sequence in the specific choice representing their RA. Five levels of RA were identified through such a process, each corresponding to a distinct gamble-set terminal point (illustrated through the coloured cells in diagrams 3.A.1 and 3.A.2). After all the 5 levels of RA were identified, their information was condensed again into a **single** categorical indicator with 6 different values representing declining levels of RA (i.e. with level 1 reflecting highest RA and level 5 representing the least level of RA). Level 0 was the base or referent level and corresponded to exhibiting irrational choice in the gamble sets (i.e. choosing an irrational payoff as per the type of rationality implied by expected value theory). Despite the wording differences between the waves, the same 5 levels of RA categories were employed in both RA categorical indicators as the content of *the rg01-rg07* question-sets was deemed comparable across both waves

	1 – Bag 1: you receive \$100 MXN if you grab blue ball or \$4,000 MXN if you grab yellow ball 2 – Bag 2: you receive \$100 MXN if you grab blue ball or \$7,000 MXN if you grab yellow ball 8 – DK *rg05* 1 – Bag 1: you receive \$1,000 MXN if you grab blue ball or \$1,000 MXN if you grab yellow ball 2 – Bag 2: you receive \$800 MXN if you grab blue ball or \$2,000 MXN if you grab yellow ball 8 – DK *rg06* 1 – Bag 1: you receive \$1,000 MXN if you grab blue ball or \$1,000 MXN if you grab yellow ball 2 – Bag 2: you receive \$800 MXN if you grab blue ball or \$4,000 MXN if you grab yellow ball 8 – DK *rg07* 1 – Bag 1: you receive \$1,000 MXN if you grab blue ball or \$1,000 MXN if you grab yellow ball 2 – Bag 2: you receive \$800 MXN if you grab blue ball or \$8,000 MXN if you grab yellow ball 8 – DK **MxFLS-III** Questions-set *prompt*: Imagine you can choose between two bags. Once you have chosen a bag, you will put your hand inside the bag and without looking you will pick a ball which will show the amount of money you have won. In each of the following questions choose the answer of the bag you prefer (if you don't know [DK] choose 8). Questions-set *options*: *rg01* 1 – Bag 1: has 1 ball worth \$2,500 MXN . 2 – Bag 2: has 2 ball, one worth \$2,500 MXN (same value as in bag1) and the other ball is worth \$5,000 MXN 8 – DK *rg02* Are you sure? Remember, you can only pick a single ball from the bag you choose. Things would not change if we put another ball worth \$2,500 MXN into Bag 1. 1 – Bag 1: has 2 balls, both worth \$2,500MXN 2 – Bag 2: has 2 balls, one worth \$2,500 MXN (same value as in bag1) and the other ball is worth \$5,000 MXN 8 – DK *rg03* Choose between: 1 – Bag 1: guarantees you will win \$2,500MXN 2 – Bag 2: has 2 balls, one worth \$2,000 MXN and the other is worth \$5,000 MXN 8 – DK *rg04*	due to both of them measuring the same latent concept (extent of RA). Hence, the categories for w2_rAvcategor (for MxFLS-II) and w3_rAvcategor (for MxFLS-III) were: 0 – irrational choice 1 – for highest level of RA (highest risk premia required to choose risk or uncertainty). 2 – substantial/large RA (still large risk premia required, though not the largest one) 3 – intermediate level of RA (risk premia level required stood was almost the median of the risk premia required in the other levels of RA) 4 – moderate RA (low risk premia required to choose uncertainty and risk but not the lowest one) 5 – smallest RA level (smallest risk premia required to choose risk or uncertainty).

	Choose between: 1 – Bag 1: guarantees you will win $2,500 MXN 2 – Bag 2: has 2 balls, one worth $1,500 MXN and the other is worth $5,000 MXN 8 – DK *rg05* Choose between: 1 – Bag 1: guarantees you will win $2,500 MXN 2 – Bag 2: has 2 balls, one worth $1,000 MXN and the other is worth $5,000 MXN 8 – DK *rg06* Choose between: 1 – Bag 1: guarantees you will win $2,500 MXN 2 – Bag 2: has 2 balls, one worth $500 MXN and the other is worth $5,000 MXN 8 – DK *rg07* Choose between: 1 – Bag 1: guarantees you will win $2,000 MXN 2 – Bag 2: has 2 balls, one worth $5,000 MXN and the other is worth $2,500 MXN 8 – DK	
Sum of savings	*cr28* How much money do you have saved? Respondents were asked to report/declare the total amount (in monetary value) of their savings.	Since raw variable *cr28* had missing values whenever respondent had answered on the preceding survey question *cr27* that they had no savings (i.e. *cr27==3*), a modified version of *cr28* was created (*cr28mf*) that equalled the monetary amount provided in *cr28* by respondent whenever he/she declared having savings (i.e. when *cr27==1*) and equalled 0 whenever respondent declared not having any savings (i.e. when *cr27==3*). Final variable used in financial balances and SWB estimations corresponded to the natural logarithmic (*ln*) form of the total amount (in nominal terms) of savings. Since for some observations *cr28mf* equalled zero, the natural logarithmic (*ln*) form was derived through left censoring [i.e. through ln(*cr28mf* +1).
Sum of unpaid loan debts	Questions : *cr18_1, cr18_2, cr19_1, cr19_2, cr20_1, cr20_2, cr22_1, cr22_2* *cr18_1* In the last 12 months have you asked to borrow money or received any loans or credits? *cr19_1* In the last 12 months did the people or institution(s) from whom/which you asked to borrow money lent some money to you? Answer options for *cr18_1* and *cr19_1* in raw data: 1 – Yes / 3 – No / 8 – Do not know (DK) *cr18_2* How much money did you ask?	Given the different concepts tracked by the question items of the individual level credit module of the MxFLS (including: amounts of money asked to borrow, amounts received as loans or credits, amounts of loans paid, amounts of credits or loans left outstanding) the information contained in the raw data variable-set was consolidated to compute the total sum of unpaid loan debts per respondent. Since, by design, several of the raw credit variables contained a large amount of missing values (see cases explained in middle column description of raw data), a couple of modifications were made to the underlying variables

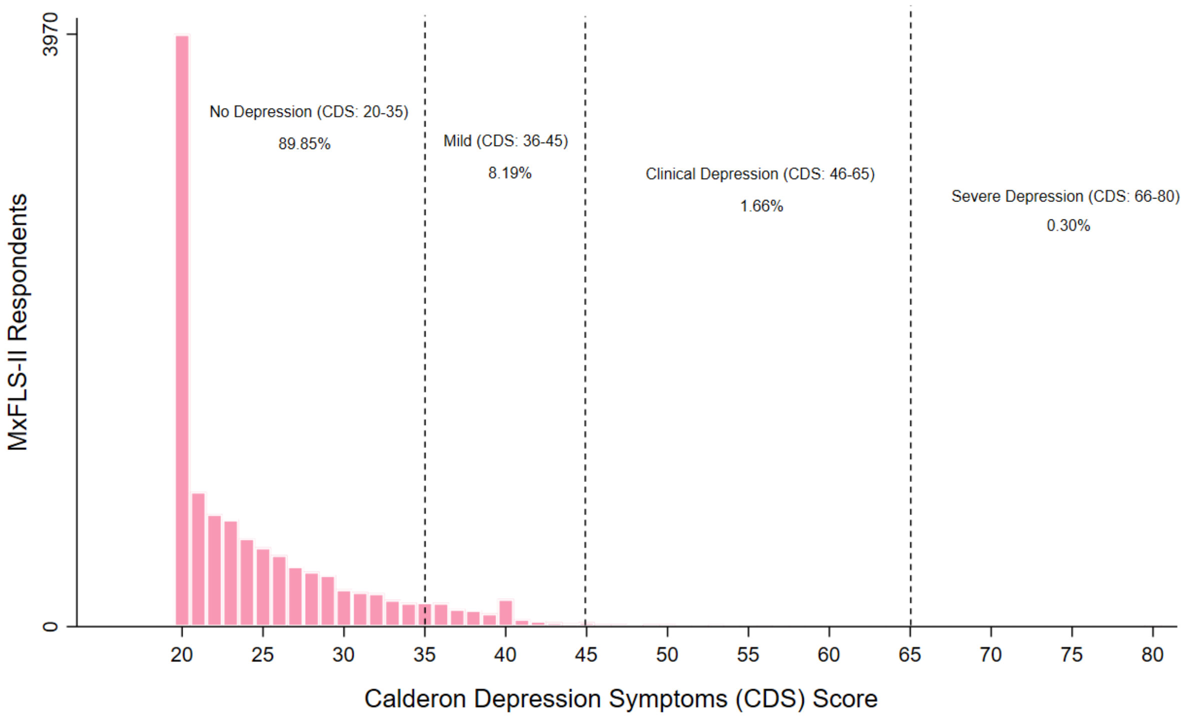
	cr19_2 In the last 12 months how much money was lent to you as a loan or credit? In raw data only respondents that answered they had either asked for a loan (i.e. *cr18_1==1* and/or received it *cr19_1==1* had to state/declare/report the pertinent monetary amount asked in questions *cr18_2* and *cr19_2*. Otherwise (i.e. if they had answered *cr18_1==3 or 8* and/or *cr19_1==3 or 8*) then variables *cr18_2* and *cr19_2* had missing values in raw data. *cr20_1* To date, have you paid back (either partly or wholly) the amount borrowed and its interests? Answer options for *cr20_1:* 1 – Paid back a partial amount 3 – Loan entirely liquidated (paid entire amount with interests) Note: neither in MxFLS-II nor in MxFLS-III were there answer options offered for: "*have not paid back any of the money owed*" nor for "*do not know*" cases. Hence, as per the MxFLS questionnaire design, the only two answer options available for survey item *cr20_1* were either *cr20_1==1* or *cr20_1==3.* *cr20_2* To date, how much have you paid back of the amount borrowed (including interests)? In raw data only respondents that answered they had paid a partial amount (*cr20_1==1*) would provide a numeric answer to *cr20_2* and in such a case they needed to state/declare/report the pertinent monetary amount paid back. Otherwise (i.e. when *cr20_1==3*), raw data had missing values for *cr20_2*. *cr22_1* To date, will you still have to pay some amount of money when the loan(s) you received expire(s)? Answer options for *cr22_1:* 1 – Still have to pay something 8 – Do not know (DK) Note: neither in MxFLS-II nor in MxFLS-III was there an answer option offered for "*have already paid for all loans*" case (as there existed for survey item *cr20_1*). Additionally, option "*have not yet paid any of the money owed*" is assumed to be implicit in answer option *cr22_1==1* (as there was no separate option answer available in *cr22_1* for the case of "*still having to pay the totality of amounts owed*"). Moreover, the two questions *cr20_1* and *cr22_1* are not serially linked according to each other's answers in the raw survey questionnaire. Hence, as per the MxFLS questionnaire design, the only two answer	used to compute the total sum of debts outstanding. Since raw variable recording the amount of loan-debt (received) already paid back by respondents (*cr20_2*) contained missing values (instead of the value of the complete amount already paid back) whenever respondent indicated he/she had already paid the entirely of the loan (i.e. when *cr20_1==3*) a new variable was generated (*cr20_2mf*) that equalled the value of loan amounts received (*cr19_2*) when respondent indicated they had fully liquidated their loans (i.e when *cr20_1==3*) and that equalled the reported value of the partial amount of loans paid back indicated in *cr20_2* when respondent indicated they had only paid a portion of their debts (i.e. when respondent had answered *cr20_1==1*). Such new variable (*cr20_2mf*) consolidated the amount of loans paid back per respondent. Raw variable recording the monetary amount of debt outstanding (left to pay) per respondent (i.e. *cr22_2*) also had some missing values that were inconsistent with the responses recorded on the other credit variables. Thus, the modified variable *cr22_2mf* was created and it equalled the amount reported in *cr22_2* whenever respondent adequately declared he/she still had outstanding debts (i.e. when *cr22_1==*1) but corrected for inconsistencies such as *cr22_2* having missing values whenever *cr22_1==1* or *8*. For example, when respondents indicated they still had outstanding debts or declared they did not know whether they had outstanding debts (i.e. *cr22_1==1* or *8* respectively) but *cr22_2* had missing values and at the same time the same respondents had received loans and yet had missing values in the variables that asked whether they had already paid part of their loans or reported a payment of zero on their loans → then new variable *cr22_2mf* equalled the amount of loan received to proxy the monetary value of debts left outstanding. Therefore, cr22_2mf attempted to account more correctly for real missing values and to differentiate them from real zero outstanding balances. By construction both derived indicators *cr20_2mf* and *cr22_2mf* assign zeros to missing values stemming from respondents not having obtained and/or requested a loan in the 12

	options available for survey item *cr22_1* were either *cr22_1==1* or *cr22_1==8.* *cr22_2* How much money will you have to pay when the loan(s) you received expire(s)? In raw data only respondents indicating they still would need to pay back some amount (*cr22_1==1*) would provide a numeric answer to *cr22_2* and in such a case they needed to state/declare/report the pertinent monetary amount they still had as outstanding debt in need to be paid back. Otherwise (i.e. when *cr22_1==8*), raw data had missing values for *cr22_2.*	months prior to the MxFLS data collection period. Such a decision seemed sensible as the outcome being measured—i.e. the value of debts outstanding is the same when someone has no loans as when the value of loan debts outstanding is zero. While a more in-depth exploration of behavioural finance patterns among respondents would differentiate among the two types of respondents, doing so would necessitate a much larger dataset as many observations are lost when the distinction is made. Since in the raw-data credit modules (prior to being merged with other datasets) there were individuals who had received multiple loans over the 12-month period preceding the survey, the monetary amounts of: loans asked for, received, paid back or left outstanding (to pay) were consolidated at the individual level through derived variables that estimated the total monetary value (sum) of loan amounts: (1) asked for, (2) received, (3) paid back or (4) left outstanding (to pay) through a sum by *folio ls pid_link.* Two main variables were derived from the final variable reflecting the sum of loan debt amounts still outstanding, owed or in need to be paid back by individuals: • *cr22_tldebtamtoutsdD* A binary (dummy variable) coding 1 if respondent had outstanding debts unpaid (0 otherwise) which was employed as one of the five component factors used to derive the *problematic credit use FC index* of the instrumental money management dimension of FC and SWB regressions in Chapter 2. • *lncr22_tldebtamtostd* Natural logarithmic (*ln*) form of the sum of loan debt amounts still outstanding which was used as the main explanatory variable indicating sum of debts outstanding in financial balance and SWB regressions as well as a component of the debt-to-savings and debt-to-labour income SWB regressions performed for Chapter 3. Since for some observations *cr22_tldebtamtoutsd* equalled zero, the natural logarithmic (*ln*) form was derived through left censoring [i.e. through ln(*cr22_tldebtamtoutsd*+1).
Debt to labour income ratio	As per its name, the derived indicator resulted from the ratio: ***Sum of unpaid loan debts*** *(numerator)*	

	Income earnt last 12 months *(denominator)* From the descriptions in this appendix both variables were construed and utilised in their natural logarithmic form (left censored) and both derived variables equalled zero for some observations. The latter informed the choice to construct the debt-to-labour income ratio as a *ln difference* of its previously derived constituent indicators.
Debt to savings ratio	As per its name, the derived indicator resulted from the ratio: ***Sum of unpaid loan debts*** *(numerator)* **Sum of savings** *(denominator)* From the descriptions in this appendix both variables were construed and utilised in their natural logarithmic form (left censored) and both derived variables equalled zero for some observations. The latter informed the choice to construct the debt-to-savings ratio as a *ln difference* of its previously derived constituent indicators.

MxFLS-II (2005-2006) – SWB Descriptive Statistics

Figure 2.A.2



Source: Self-generated over estimation sample based on MxFLS-II questionnaire (emotional wellbeing module).

Table 2.A.3

Descriptive Statistics FC Indices Constituent Factors : MxFLS-II (2005-2006)

Individual Level	N	Mean	Std. Dev.	Min	Max
<u>FC– Cognitive/Behavioural Dimension:</u>					
Patience index factors					
Time-value preferences (categorical indicator)	11293	2.062	1.463	0	5
Considers the future in spending & saving decisions	11293	.636	.481	0	1

Spent nothing or less than half of $1,000* MXN monetary gift	11293	.375	.484	0	1
FC– Instrumental Money Management Dimension:					
Problematic credit constituent factors					
Has loan debt amounts in need to be paid back (binary 1 – in arrears)	11293	.044	.205	0	1
Has total debt outstanding > $1,000 MXN	11293	.241	.428	0	1
Made credit card withdrawals not paid-off by due date (last 12 months)	11293	.008	.089	0	1
Has outstanding credit card balance	11293	.013	.114	0	1
Did not pay any of the debts incurred (over last 12 months)	11293	.073	.260	0	1
Savings (resilience) indicators					
Has savings	11293	.121	.326	0	1
Has a retirement savings account (AFORE)	11293	.122	.327	0	1
Made voluntary contributions to retirement savings account (AFORE)	11293	.004	.066	0	1

All quantities calculated over estimation sample (restricted to those between 15 & 75 years old).

MxFLS-II (2005-2006) Correlation Tables : FC Dimensions

Table 2.A.4.1

MxFLS-II Tetrachoric Correlation Matrix
Money Management FC Dimension: *Not Keeping Track – Problematic Credit Mgt*

Variables	(1)	(2)	(3)	(4)	(5)
(1) Has unpaid loan & credit amnts	1.0000				
(2) Hhd unpaid debts > $ 1000	0.6057*	1.0000			
(3) Made cc withdrawal not fully paid	0.6144*	0.5578*	1.0000		
(4) Has outstanding cc balance to pay	0.5387*	0.5502*	0.9756*	1.0000	
(5) Hhd did not pay any debts incurred	0.4004*	0.6913*	0.1837	0.0878	1.0000

* Shows significance at the 0.05 level.

Table 2.A.4.2

MxFLS-II Tetrachoric Correlation Matrix
Money Management FC Dimension: *Savings Orientation & Resilience*

Variables	(1)	(2)	(3)
(1) Has savings	1.0000		
(2) Has retirement savings account	0.4580*	1.0000	
(3) Voluntary cont. to retirement acct	0.5090*	0.9983*	1.0000

* Shows significance at the 0.05 level.

Table 2.A.4.3

MxFLS-II Polychoric Correlation Matrix
Attitudinal & Behavioural FC Dimension: *Patience (extent of impulsivity)*

Variables	(1)	(2)	(3)
(1) Time-value preferences (categorical indicator)	1.0000		
(2) Considers the future in spending & saving decisions	0.0256*	1.0000	
(3) Spent nothing or less than half of $1,000 (MXN) gift	-0.0032	0.0831*	1.0000

* Shows significance at the 0.05 level.

MxFLS-III (2009-2012) Correlation Tables : FC Dimensions

Table 2.A.4.4

MxFLS-III Tetrachoric Correlation Matrix
Money Management FC Dimension: *Not Keeping Track – Problematic Credit Mgt*

Variables	(1)	(2)	(3)	(4)	(5)
(1) Has unpaid loan & credit amnts	1.0000				
(2) Hhd unpaid debts > $ 1000	0.5189*	1.0000			
(3) Made cc withdrawal not fully paid	0.4748*	0.4934*	1.0000		
(4) Has outstanding cc balance to pay	0.4150*	0.5044*	0.9636*	1.0000	
(5) Hhd did not pay any debts incurred	0.2770*	0.7216*	0.0019	-0.0042	1.0000

* Shows significance at the 0.05 level.

Table 2.A.4.5

MxFLS-III Tetrachoric Correlation Matrix
Money Management FC Dimension: *Savings Orientation & Resilience*

Variables	(1)	(2)	(3)
(1) Has savings	1.0000		
(2) Has retirement savings account	0.3566*	1.0000	
(3) Voluntary cont. to retirement acct	0.4425*	0.9957*	1.0000

* Shows significance at the 0.05 level

Table 2.A.4.6

MxFLS-III Polychoric Correlation Matrix
Attitudinal & Behavioural FC Dimension: *Patience (extent of impulsivity)*

Variables	(1)	(2)	(3)
(1) Time-value preferences (categorical indicator)	1.0000		
(2) Considers the future in spending & saving decisions	0.0861*	1.0000	
(3) Spent nothing or less than half of $20,000 $_{(MXN)}$ gift	-0.0229	0.0770*	1.000

* Shows significance at the 0.05 level.

Table 2.A.5

MxFLS-II Descriptive Statistics: FC Indices

	Mean	Std. Dev.	Min	Max	Explained Variance	*f*
Problematic Credit Management FC Index	0.164	0.298	0	2.207	0.628	5
Savings Orientation & Resilience FC Index	0.136	0.286	0	1.714	0.782	3
Attitudinal & Behavioural (Patience) FC Index	1.075	0.565	0	2.318	0.362	3
Hhd. Durable Assets & Dwell. Characs. Index	2.844	0.709	0.021	3.734	0.515	15

* *f* column indicates the number of constituent factors used to derive each index
Scores for the first, second and fourth indices predicted from tetrachoric PCA over the constituent factors of each index.
Scores for the third index predicted from polychoric PCA over its constituent factor variables.
Quantities calculated over estimation sample (restricted to those between 15 & 75 years) & none of the scores are standardised.

Table 2.A.6

MxFLS-II Mean FC index scores per sociodemographic & affective wellbeing characteristics

	Money management	Behav. FC

	FC Dimension		Dimension	
MxFLS-II	***Problematic Credit Index***[A] *(Keeping-track)*	***Saving Index***[A] *(Resilience)*	***Patience Index***[B] *(Low impulsivity)*	***Affective Wellbeing Score***
Urban Locality (people ≥ 15,000)	.206	.208	1.084	25.515
Male	.171	.183	1.061	24.061
Female	.159	.101	1.085	26.552
Married (couple, partnership, etc.)	.178	.144	1.086	25.536
Not married (single, divorced, etc.)	.143	.125	1.058	25.355
Age Group: 15-30 years old	.160	.135	1.098	24.555
Age Group: 31-45 years old	.208	.178	1.099	25.425
Age Group: 46-60 years old	.154	.127	1.046	26.166
Age Group: 60-75 years old	.088	.049	0.977	27.794
No Schooling & Preschool/ Kinder	.101	.039	0.967	28.105
Elementary School (1st - 6th grade)	.134	.079	1.041	26.056
Jr. High School (7th -9th grade)	.177	.152	1.085	24.778
High School (10th -12th)	.204	.195	1.123	24.588
University/Graduate School	.241	.309	1.197	23.993
Cognitive Ability (average or higher)	.178	.160	1.093	24.781

*All index scores are reported as non-standardised average values.
Quantities calculated over estimation sample (restricted to those between 15 & 75 years).
[A] superscript: indices based on tetrachoric correlation matrices of constituent factors (i.e. on tetrachoric principal component)
[B] superscript: index based on polychoric correlation matrix of constituent factors (i.e. on polychoric principal component)

Table 2.A.7

MxFLS-II (2005-2006) FC Cross-sectional Analysis Regression

SWB (Calderon Depression Score [CDS])	(1) Baseline (no FC)	(2) Money management FC	(3) Behavioural FC	(4) Both: Money Mgt & Behavioural FC
Problematic Credit Management FC Index[A]		0.416***		0.415***
		(0.0674)		(0.0674)
Saving & Building Resilience FC Index[A]		0.101		0.105
		(0.0682)		(0.0685)
Patience FC Index[B]			-0.0461	-0.0537
			(0.0656)	(0.0658)
Fluid Cognition (2009 Raven score)	-0.110***	-0.112***	-0.110***	-0.112***
	(0.0245)	(0.0245)	(0.0245)	(0.0245)
Age	0.0429	0.0361	0.0430	0.0361
	(0.0336)	(0.0337)	(0.0336)	(0.0337)
Age^2	0.000226	0.000326	0.000222	0.000323
	(0.000451)	(0.000452)	(0.000451)	(0.000452)
Male	-2.165***	-2.178***	-2.169***	-2.183***
	(0.146)	(0.146)	(0.147)	(0.146)
Married/domestic partnership	-0.527***	-0.600***	-0.521***	-0.594***
	(0.155)	(0.155)	(0.155)	(0.156)
Elementary School (1st - 6th)	-0.978***	-0.986***	-0.978***	-0.986***
	(0.369)	(0.370)	(0.369)	(0.370)
Jr. High School (7th -9th)	-1.504***	-1.549***	-1.502***	-1.547***
	(0.381)	(0.382)	(0.381)	(0.382)
High School (10th -12th)	-1.507***	-1.590***	-1.501***	-1.584***
	(0.406)	(0.406)	(0.406)	(0.406)
Higher Educ: Univ. & Col. Grad	-2.318***	-2.447***	-2.307***	-2.437***

	(0.412)	(0.414)	(0.412)	(0.414)
Income earnt last 12m (ln)	-0.0372**	-0.0484***	-0.0369**	-0.0482***
	(0.0152)	(0.0157)	(0.0152)	(0.0157)
Victim assault or prop theft	1.665***	1.472***	1.668***	1.475***
	(0.190)	(0.194)	(0.190)	(0.194)
Cohesive & inclusive community	-0.636***	-0.658***	-0.631***	-0.652***
	(0.203)	(0.203)	(0.203)	(0.202)
Urban (people ≥ 15,000)	0.691***	0.634***	0.686***	0.628***
	(0.144)	(0.145)	(0.144)	(0.145)
Personal & hhd econ shocks (5 yrs)	1.445***	1.331***	1.447***	1.333***
	(0.160)	(0.160)	(0.160)	(0.160)
Hhd Living Conditions & Assets Index[A]	-0.202**	-0.256***	-0.199**	-0.253***
	(0.0892)	(0.0895)	(0.0894)	(0.0897)
Constant	26.68***	27.02***	26.68***	27.02***
	(0.660)	(0.665)	(0.661)	(0.665)
Observations	11,293	11,293	11,293	11,293
R-squared	0.073	0.076	0.073	0.076

All quantities calculated over the estimation sample (restricted to those between 15 & 75 years).
[A] superscript: indices based on tetrachoric correlation matrices of constituent factors (i.e. gives the tetrachoric PC)
[B] superscript: index based on polychoric correlation matrix of constituent factors (i.e. gives the polychoric PC)
*All index scores are reported as a standardized score (z-score)..
Robust standard errors in parentheses

Table 2.A.8

Time-Value Lotteries MxFLS-II (2005-2006)

	Present - Immediate Payoff (V)	Future - Delayed Payoff (A)	Delay Length (D)	Implicit Discount Rate* (k)
a	\$ 10,000	\$ 10,000	3 years	$k = 0$
b	\$ 10,000	\$ 12,000	3 years	$k = 0.07$
c	\$ 10,000	\$ 15,000	3 years	$k = 0.17$
d	\$ 10,000	\$ 20,000	3 years	$k = 0.33$
e	\$ 10,000	\$ 40,000	3 years	$k = 1$
f	\$ 12,000	\$ 10,000	3 years	$k = -0.06$

Source: Self-generated based on MxFLS-II questionnaire (risk module).
* *Implicit* discount rates give the discount factors necessary to render respondents indifferent between the present (immediate) payoff and the future (delayed) payoff.

Table 2.A.9

Time-Value Lotteries MxFLS-III (2009-2012)

	Present - Immediate Payoff (V)	Future - Delayed Payoff (A)	Delay Length (D)	Implicit Discount Rate* (k)
a	\$ 1,000	\$ 1,000	1 year	$k = 0$
b	\$ 1,000	\$ 1,500	1 year	$k = 0.50$
c	\$ 1,000	\$ 1,200	1 year	$k = 0.20$
d	\$ 1,000	\$ 3,000	1 year	$k = 2$
e	\$ 1,000	\$ 2,000	1 year	$k = 1$

f	$ 1,200	$ 1,000	**1 year**	$k = -0.17$

Source: Self-generated based on MxFLS-III questionnaire (TV module).
* *Implicit* discount rates give the discount factors necessary to render respondents indifferent between the present (immediate) payoff and the future (delayed) payoff.

Panel Analysis Tables

Table 2.A.10

Descriptive Statistics Panel: MxFLS-II (2005) & MxFLS-III (2009)

Individual Level	N	Mean	Std. Dev.	Min	Max
Dependent Variable:					
Calderon Depression Score (CDS)	20565	25.405	7.193	18	80
Demographic Controls:					
Age	20565	32.723	13.988	15	73
Male	20565	.417	.493	0	1
Marital Status (1: married/domestic partnership)	20565	.584	.493	0	1
Income earnt last 12 months (amount)	20565	18088.827	68928.784	0	5000000
Education Level 1 - No Schooling & Preschool/ Kinder	20565	.059	.236	0	1
Education Level 2 - Elementary School (1st - 6th grade)	20565	.320	.466	0	1
Education Level 3 - Jr. High School (7th -9th grade)	20565	.319	.466	0	1
Education Level 4 - High School (10th -12th)	20565	.190	.393	0	1
Education Level 5 - Higher Education: Univ. & Col. Grad	20565	.112	.315	0	1
Cognitive Ability Score (2009-05), No. of correct answers: 0 – 12	20565	6.254	2.893	0	12
Urban Locality (people ≥ 15,000)	20565	.453	.498	0	1
Sum of loan debt still outstanding (amount)	20565	759.840	8604.448	0	625000
Sum of savings (amount)	20565	1674.295	21011.399	0	2000000
Household Level					
Other correlates of wellbeing & wealth:					
Experienced robbery or assault to person or to property	20610	.289	.453	0	1
Cohesive, inclusive & trustworthy community	20610	.864	.342	0	1
Household experienced damages due to shocks, prior 5 years	20610	.181	.385	0	1

All quantities calculated over panel estimation sample (restricted to those between 15 & 75 years).
Monetary amounts expressed in Mexican pesos (MXN) corresponding to an exchange rate of: $29.5 MXN per £ 1 (.034 £ per MXN).

Table 2.A.11

Panel Analysis Regression

SWB ***(Calderon Depression Score [CDS])***	(1) ***Random Effects*** Baseline (no FC)	(2) ***Random Effects*** Money Mgt. FC	(3) ***Random Effects*** Behavioural FC	(4) ***Random Effects*** Both: Money Mgt & Behavioural FC
Keeping Track Credit Management FC Index[A]		0.525***		0.526***
		(0.0503)		(0.0503)
Saving & Building Resilience FC Index[A]		-0.00774		-0.0138

		(0.0517)		(0.0519)
Patience FC Index[B]			0.0672	0.0613
			(0.0506)	(0.0507)
Fluid Cognition (Raven score)	-0.0942***	-0.0976***	-0.0897***	-0.0926***
	(0.0187)	(0.0187)	(0.0190)	(0.0189)
Age	0.0600**	0.0525**	0.0579**	0.0504**
	(0.0248)	(0.0248)	(0.0248)	(0.0249)
Age^2	-0.000292	-0.000178	-0.000268	-0.000156
	(0.000325)	(0.000326)	(0.000325)	(0.000326)
Male	-2.266***	-2.271***	-2.263***	-2.269***
	(0.112)	(0.111)	(0.112)	(0.111)
Married/domestic partnership	-0.390***	-0.468***	-0.404***	-0.483***
	(0.122)	(0.122)	(0.122)	(0.122)
Elementary School (1st - 6th)	-1.011***	-1.016***	-1.015***	-1.020***
	(0.258)	(0.257)	(0.258)	(0.258)
Jr. High School (7th -9th)	-1.517***	-1.552***	-1.539***	-1.574***
	(0.270)	(0.270)	(0.270)	(0.270)
High School (10th -12th)	-1.641***	-1.690***	-1.678***	-1.729***
	(0.285)	(0.285)	(0.285)	(0.286)
Higher Educ: Univ. & Col. Grad	-2.404***	-2.487***	-2.451***	-2.534***
	(0.297)	(0.298)	(0.298)	(0.299)
Income earnt last 12m (ln)	-0.0272**	-0.0353***	-0.0273**	-0.0350***
	(0.0115)	(0.0119)	(0.0115)	(0.0119)
Victim assault or prop theft	1.540***	1.353***	1.525***	1.337***
	(0.137)	(0.138)	(0.137)	(0.139)
Cohesive & inclusive community	-0.774***	-0.782***	-0.782***	-0.790***
	(0.156)	(0.155)	(0.155)	(0.155)
Urban (people >=15,000)	0.575***	0.541***	0.582***	0.549***
	(0.112)	(0.113)	(0.113)	(0.113)
Personal & hhd econ shocks (5 yrs)	1.357***	1.211***	1.338***	1.189***
	(0.111)	(0.111)	(0.112)	(0.112)
Hhd Living Conditions & Assets Index[A]	-0.0807	-0.134**	-0.0845	-0.136**
	(0.0655)	(0.0658)	(0.0657)	(0.0659)
Post Global Financial Crisis			0.138	0.154
			(0.0982)	(0.0982)
Constant	26.82***	27.14***	26.80***	27.12***
	(0.498)	(0.504)	(0.498)	(0.504)
Observations	20,565	20,565	20,565	20,565
Number of groups	16,815	16,815	16,815	16,815

All quantities calculated over the estimation sample.
[A] superscript: indices based on tetrachoric correlation matrices of constituent factors (i.e. on tetrachoric principal component)
[B] superscript: index based on polychoric correlation matrix of constituent factors (i.e. on polychoric principal component)
*All index scores are reported as a standardized score (z-score)..
Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 2.A.12

Hausman Test
Panel Specifications (FE vs RE)

Model:	**Baseline**	**Money Mgt. FC**	**Behavioral FC**	**Both: Money Mgt. & Behavioral FCs**
Chi-square test value	59.26	66.59	59.16	66.46
P-value	0	0	0	0

All tests conducted over the estimation sample.

Table 2.A.13

Time-Fixed Effects Test
Panel Specifications (*testparm*)

Model:	Baseline	Money Mgt. FC	Behavioral FC	Both: Money Mgt. & Behavioral FCs
Joint F test value	0.790	1.050	0.810	1.070
Prob > F	0.374	0.307	0.367	0.302

All tests conducted over the estimation sample.

Table 2.A.14

Modified Wald Test – Groupwise Heteroskedasticity
Panel Specifications (*xttest3*)

Model:	Baseline	Money Mgt. FC	Behavioral FC	Both: Money Mgt. & Behavioral FCs
Chi-square test value	4.0e+37	9.6e+36	7.9e+35	1.4e+37
Prob > Chi2	0	0	0	0

All tests conducted over the estimation sample.

Chapter 3

Financial Balances and Subjective Wellbeing in Mexico

"Never spend your money before you have earned it."

(Thomas Jefferson)

"When prosperity comes, do not use all of it".

(Confucius)

3.1 INTRODUCTION

Challenges over 2019-2023 made it difficult for households (worldwide) to manage their financial wellbeing (FWB). For one, the Covid-19 pandemic acted as an exogenous shock that highlighted the importance of nurturing healthy financial habits to 'weather the storm' shall it hit. In countries with good structural conditions (i.e. economic stability, high income, and reliable welfare systems), many households were unable to meet financial obligations, saw their budgets curtailed and their saving ability reduced due to unemployment, sickness, furlough or working-hours cuts (UK Office of National Statistics [ONS], 2021).[104] For example, in the UK, the Financial Conduct Authority (FCA) reported that between 2020 and 2021 the number of adults with signs of financial vulnerability increased by 15% (mostly driven by people experiencing redundancy or reduced working hours [+45%] or by being over-indebted and with limited capacity to withstand financial shocks [+35%]).[105] The FCA also noted that Covid-19 had a disproportionate impact on those of working age (with the largest increases in vulnerability seen among younger adults aged 18-34 and the self-employed [+40%]).[106] Similarly, evaluating the impact of the UK's Coronavirus Job Retention Scheme (CJRS), Görtz, McGowan and Yeromonahos (2021) found that furloughed individuals significantly decreased expenditures and spent their savings to offset the pandemic-induced income reductions experienced. Additionally, Covid-19 lockdown measures had significant negative effects on mental health and emotional resilience which, for some, translated in difficulties dealing with financial services (FCA, 2021).

[104] Based on ONS (2021) report which, drawing on data from the Living Costs and Food Survey (LCF), the Survey on Living Conditions (SLC), the Wealth and Assets Survey (WAS), and the Opinions and Lifestyle Survey (OPN), estimated that during the first year of the pandemic UK households reduced spending on average by £109.10 (or 19%) a week.

[105] All estimates reflect the findings from the FCA's Financial Lives 2020 survey and October 2020 Covid-19 panel survey.

[106] In contrast, retirees were better insulated from the financial impacts of Covid-19 with the retired population even seeing a small decrease in those reaching characteristics of *financial* vulnerability. The fact that their key sources of income—State pension and defined benefit pensions— remained unchanged throughout the pandemic has been used to explain this group's robust *financial* resilience to Covid-19.

Financial distress was more prominent in countries with worse structural and institutional conditions. Based on a global survey evaluating the unequal financial impact of the pandemic on households, Khetan et al. (2022) observed that the most disadvantaged socio-economic subgroups in High Income Countries (HIC) experienced lower financial impacts from the pandemic than the most advantaged subgroups in countries with less income.[107] Similarly, Yazdanparast and Alhenawi (2022) showed that the magnitude of pandemic-induced vulnerability[108] varied across countries and that the resulting changes in household behaviours were not similar among consumers in developed vs. developing countries.

Additionally, the post-pandemic (global) inflationary spurt has eroded purchasing power and diminished households' ability to save or to maintain prior consumption levels without incurring debt. These scenarios underscore the relevance of fostering resilient financial balances[109] which in turn affect people's mental health, a dimension of subjective wellbeing (SWB).

As explained in Chapter 2, problematic debt holdings (e.g., debt falling into arrears) or, conversely, having savings (to face unforeseen shocks or to fund retirement) can both be considered outcomes of personal features conforming the instrumental money management dimension of people's financial capability (FC). While Chapter 2 sought to assess potential effects on SWB of qualities—antecedent to and shaping people's financial standing—that characterise individuals' FC, the current chapter evaluates whether measures of financial balances, such as savings and debt levels—when considered as self-standing constructs (rather than resulting from FC attributes)—have any influence on people's experience of depression symptoms. Such analysis seeks to understand better how people's financial health directly interacts with their emotional health and whether the former exerts any influence on the latter beyond its role facilitating consumption.

We use data from the Mexican Family Life Survey (MxFLS) as in Chapter 2 because, to date, MxFLS is the only existing longitudinal survey that provides information regarding household finances, mental health, biomarkers, and other pertinent sociodemographic characteristics of people in Mexico. Since, as a project, our main data source—the MxFLS—did not continue beyond 2012, despite today's amplified concerns about how inflation has put increasing pressures on the wellbeing of households in Mexico and worldwide (part of which can be traced to sequels of Covid-19 pandemic policies and to the Russia-Ukraine war), our study focuses on a much earlier period, the 2005-2012 timespan.

[107] Khetan et al. (2022) based their analysis on information from 24,506 community-dwelling participants of the Prospective Urban-Rural Epidemiology (PURE) survey conducted between August 2020 and September 2021 across countries differing according to the World Bank (WB) country-income classifications in 2020. Beyond the clinical data collected, the researchers gathered information on participants' self-reported personal finances and sources of income. Information from the selected cohort (itself well-characterized prior to the pandemic) was collected in a standardized manner across countries.
[108] Yazdanparast and Alhenawi (2022) follow Baker (2006) and Baker et al. (2005) in understanding vulnerability as a temporary 'state' during which control is out of consumers' hand, creating dependence on peripheral considerations and causing decisions to be influenced by external factors.
[109] That is, maintaining levels of debt and of savings that allow people to face unexpected income shocks.

Nonetheless, during our period of analysis the main exogenous shock to household finances came from the 2008 Global Financial Crisis (GFC) which, just as current socioeconomic conditions, revived interest in the impact of households' financial position[110] on their SWB especially as the sequels of the crisis and the general discontent with financial markets have turned attention back to households' balance sheets.

To assess the extent to which MxFLS respondents experienced a battery of *affective* states associated with depression during the month prior to the survey, we conduct cross-sectional and panel fixed effect (FE) estimations of SWB regressions taking as dependent variable the Calderón Depression Score (CDS)—a measure similar to the UK's General Health Questionnaire (GHQ-12) Score that uses 20 questions (instead of 12). However, contrasting Chapter 1, the current chapter's key explanatory indicators are total amounts of personal debt and savings and their ratios with respect to income (and to each other). Their impact is evaluated through the standard set of controls used in SWB research in addition to indicators accounting for personal income shocks (in cross-sectional analyses) and for the effects of the GFC (in panel estimations). Furthermore, following the behavioural economics (BE) literature documenting the relationship between financial decision making, RA and TV preferences, we also control for respondents' level of RA and degree of present bias (or of patience) to assess whether these exert any influence in the relationship between financial balances holdings (i.e. outstanding debts, savings, DTI and DTS ratios) and SWB.

The chapter is organised as follows. Section 3.2 reviews the literature motivating the research question presented in Section 3.3. Section 3.4 describes the data and Section 3.5 provides its descriptive statistics. Section 3.6 specifies the empirical model underlying our estimations and stipulates our hypotheses. Section 3.7 presents the empirical results of both cross-sectional and longitudinal regressions. Section 3.8 concludes.

3.2 LITERATURE REVIEW

To review the literature, we first discuss research evaluating the influence of debt and savings on SWB. Because such literature is heavily focused on developed countries, and as stated above, the impact of diverse economic conditions and shocks varies across countries with different income levels and institutions, we also review insights related to our research question from the financial development, financial inclusion and financial diaries literatures of developing countries, focusing specifically on Mexico.

3.2.1 Debt and SWB

[110] Generally evaluated in the literature as the balance between income, wealth, assets and debt or other liabilities (i.e., as net income and net wealth).

Systematic reviews and meta-analyses of the debt and SWB literature (Fitch et al. 2011, Tay et al. 2016) point that the literature has provided mixed evidence and with limited policy contributions due to its insufficient conceptual and empirical specificity.[111]

Studies assessing the relationship between debt and SWB can be divided into those that conceptualize debt objectively and those focusing on subjective debt. Articles employing an *objective* conceptualization of monetary debt define it in terms of: (1) consolidated debt stocks; (2) actual flow amounts of outstanding debts; (3) total amounts per type of debt (e.g. credit card [CC], loans and mortgage debt); or in terms of (4) debt delinquency (e.g. falling into arrears, overdue loans, unpaid invoices, bankruptcy filing, etc).[112] *Objective debt* is often obtained from household surveys asking respondents to report the total amount of debt or loans held or the amount of money owed monthly either individually or at the household level (Tay et al, 2017). The accuracy of such measures is often hampered by cognitive bias commonly affecting survey data such as selection bias, non-response bias, recall bias, proxy-response bias and social desirability bias. Additionally, more research covers gross debt rather than net debt measures (i.e., debts minus savings) although some articles focusing on financial resilience (i.e., ability to withstand financial shocks) consider the impact of debts relative to savings through debt-to-savings (DTS) ratios. For example, analysing evidence from twenty-two countries, McKnight and Rucci (2020) find that households with high levels of debt and low levels of savings (thus with a high DTS ratio) are less likely to recover from financial shocks than others.

As implied by the name, *subjective debt* measures refer to people's *personal perceptions* of their *own* financial standing, which are contextually dependent and influenced by people's reference points. Studies relying on *subjective debt* indicators recognize that objective debt measures may not be factually indicative of how individuals perceive their own level of indebtedness (even if objectively high) which, depending on their given point of reference, might encourage reckless and impulsive financial behaviours leading to even lower financial resilience in the future. The latter could then affect individuals' SWB through negative effects on their FWB.

For example, in housing boom periods with low interest rates, the prevalence and normalcy of home loans, may result in perceiving accumulated mortgage and other household debts as 'conventional' and none-detrimental, thus not necessarily affecting debtors' SWB negatively—or even having positive effects on it, due to the role mortgages have helping households cover basic needs for shelter or other status-driven prerogatives (Tay et al, 2017). However, misunderstanding the responsibilities implicit in debt acquisition can place households in vulnerable conditions (including in terms of their SWB) whenever interest rates increase, or general economic conditions change.

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[111] Definitional differences regarding problematic debt thresholds, diversity of SWB conceptualisations and discrepancies in the methodologies employed account for the large variance of results in the literature.

[112] For example, Drentea (2000) showed that anxiety is positively related to CC debt levels and to debt-to-income ratios.

Articles analysing the effects of *subjective debt* use indicators reflecting either the extent to which individuals feel burdened by debt (itself manifesting through signs of worry, stress, concern, fear and/or anxiety) or consider it useful and manageable (especially when it serves to facilitate other personal goals, to fulfil specific needs, or to finance a higher level of personal comfort). *Subjective debt* measures also tend to be sourced from household surveys, making them subject to the abovementioned survey-data caveats, in addition to sequential biases and those induced by framing and referential peer-groups.

Tay et al. (2017) found that only a third of sampled empirical studies in their meta-analysis provided adequate information to calculate effect sizes.[113] Overall, Tay et al. (2017) found that the effect size of (undifferentiated) debt measures on SWB was 3 to 4 times smaller than the effect size of the relationship between income and SWB estimated by Lucas and Schimmack (2009).[114] After separating the reviewed articles according to whether they focused on subjective or objective debt measures, Tay et al (2017) found that the inverse relationship between *subjective debt* and SWB[115] was more negative than the size of the effect between SWB and *objective debt*.[116] Given the small effect size of *objective debt*, Tay et al (2017) warn against concluding that debt unequivocally decreases SWB.

Aligning with the literature on the interdependence of preferences and the importance of relative position,[117] the larger effect size observed in articles using *subjective debt* measures can be explained by their greater acknowledgement of the importance of reference points, life cycle stages, and of cognitive and behavioural biases influencing people's *personal* debt *perceptions*.

Using data from the Household, Income and Labour Dynamics Survey in Australia (HILDA) Brown and Gray (2016) conducted a longitudinal analysis based on FE methodology to ascertain the impact of household's financial position on overall life satisfaction, financial satisfaction and subjective prosperity. They found that whilst net wealth and asset levels were positively associated with overall life satisfaction, financial satisfaction and subjective prosperity, total debt levels and unsecured debt (in particular) were inversely related to them. Brown and Gray (2016) also argued that households' financial position relative to their reference group importantly determined overall life satisfaction and FWB. They also observed that reference-group influence was asymmetric[118] with information effects, on average, dominating comparison effects.[119]

[113] To estimate the effect-size (i.e., the strength or magnitude of the relationship between debt and SWB), Tay et al. (2017) calculated the meta-analytic Pearson correlation coefficient (r)—a commonly used metric based on explained variance—of debt (conceived broadly) and SWB. Tay et al. (2017) obtained an overall effect size of $r = -0.07$, providing some evidence of a negative, albeit small linear relationship. Indeed, according to Cohen's (1988) guidelines for statistical analysis in the social sciences, correlation coefficients lower than 0.10 are considered fairly small.

[114] Which fell along the range $0.20 < r < 0.30$.

[115] Estimated by an effect size of $r = -0.21$.

[116] Estimated by the meta-analytic Pearson: $r = -0.04$.

[117] See: Ferrer-i-Carbonell (2005), Luttmer (2005) and Clark et al. (2008).

[118] Depending on whether a household's financial position was above or below the average of the group of reference.

[119] Comparison-effects refer to the negative effects on wellbeing arising out of feelings of relative deprivation in relation to the reference group. Information-effects (also called 'tunnel effect' [see Hirschman and Rothschild, 1973]) arise when

Other studies have focused on how various types of debt provoke different SWB outcomes, thus recognising that the source and purpose of debt matters. Most of such studies distinguish between secured debt (i.e., when debt is guaranteed by an asset or collateral as in mortgages and consumer durables' loans) or unsecured debt (which lacks collateral or indemnity pledges as in the case of CC debt).

An important empirical challenge to the debt and SWB sub-literature is simultaneity between SWB and individuals' reported perceptions of debt and financial status. Most scholars tackle this by relying on lender-provided debt data or through instrumental variables (IVs) approaches. Gathergood (2012) used the UK British Household Panel Survey (BHPS) GHQ-12 Score and local house price movements (considered exogenous) to instrument causality from *problematic* mortgage debt[120] to psychological health in the UK. Using both *objective*[121] and *subjective debt*[122] measures as predictors and panel FE estimations Gathergood (2012) found a clear association between the onset of problem debt and worsening of psychological health.[123] To reduce bias induced by respondent's perceptions, Gathergood (2012) instrumented self-reported subjective debt problems using local-level mortgage and consumer credit delinquency rates.[124] These instruments exploited the geographic variation of unpaid debts and were deemed valid because housing prices are orthogonal to psychological health and correlate with problematic debt.[125] Using county-level repossessions data and locally defined reference groups, Gathergood (2012) found that the negative psychological impact of problematic debt[126] (secured and unsecured) was less severe for individuals who lived in areas where problem debt was more prevalent and widespread, therefore providing some evidence of social norm effects. Such findings aligned with the wider literature on bankruptcy filings which argued that early 2000s bankruptcy filings in the UK and the US rose—regardless of how many people could actually benefit from filing—partly because bankruptcy rates of higher status reference groups attenuated the social stigma attached to declaring personal bankruptcy (Fay et al., 2002; Cohen-Cole and Duygan-Bopp, 2008). Despite its contribution, Gathergood (2012) study was country-specific and uniquely considered formal types of debt.

individuals interpret the rising incomes of a comparison group as a signal of future prospects, thus experiencing (optimistic) positive effects on wellbeing.

[120] *Problem* or *problematic debt* generally refers to over-indebtedness or to the incapacity to repay debts and financial commitments. Gathergood specifically focused on unserviceable mortgage payments, that is on problematic mortgage debt.

[121] Gatherwood (2012) *objective debt* measure consisted of a binary variable indicating whether respondents were two months behind their rent and mortgage payments.

[122] Gatherwood (2012) *subjective debt* measures included dummy variables coding for respondents' *perceived* difficulty paying for housing as well as unsecured debt payments.

[123] The effects were weaker than in unconditional mean comparisons performed by Gathergood (2012) as the coefficients on problem debt predictors were highly reduced whilst maintaining their significance as did the vector of demographic control variables.

[124] Data used by Gathergood (2012) was provided by the Council of Mortgage Lenders (CML) and Experian—a multinational data analytics and consumer credit reporting company.

[125] As increasing house prices influence the frequency of late servicing or of non-payment of mortgage debts.

[126] E.g., having arrears and facing housing repossession.

Recognising scant use of formal credit by low-income families in the UK, Bridges and Disney (2010) exploited the panel structure of the UK Families and Children Survey (FACS),[127] and assessed the impact of indebtedness through informal loans.[128] Bridges and Disney (2010) used an univariate probit model taking the (unobserved) propensity of being depressed as dependent variable, to test whether the correlation between self-reported depression and financial difficulties arose primarily from responses to subjective financial wellbeing (SFWB) questions, or whether objective measures of households' financial circumstances explained psychological wellbeing (PWB) better.[129] Bridges and Disney (2010) results suggested that: (1) self-reported debt problems and *financial stress* have adverse effects on (self-reported) PWB (depression), (2) objective measures have a limited direct effect on PWB[130], and (3) the small effect on depression is mediated through the individual's likelihood to perceive their condition as resulting from financial difficulties. The main respondent group of FACS were low-income women, thus, Bridges and Disney's (2010) results were not representative. To the extent that their sampled group was more likely to be disproportionately affected by certain types of health problems and of financial difficulties, Bridges and Disney's (2010) results could be biased.

Using fitted GHQ-12 scores from several BHPS waves, Brown et al. (2005) investigated the extent to which having outstanding credit and savings influenced the PWB of household heads in the UK. Preliminarily, Brown et al. (2005) treated outstanding credit level and annual savings variables as exogenous. Then using predictions of debt and savings (at both individuals and household levels) obtained through a Tobit model, Brown et al. (2005) instrumented their initial ordered probit models. Their results showed that when predicted measures were used coefficients on savings variables (initially considered exogeneous) changed little but the association between SWB and outstanding credit increased.[131] Additionally, Brown et al. (2005) found that the average increase in psychological distress was greater when outstanding unsecured credit was measured at the individual, as opposed to the household, level.[132] Brown et al. (2005) concluded that exogenous debt estimates should be interpreted as lower bounds of the true effect. Furthermore, Brown et al.'s (2005) showed that outstanding non-

[127] Originally known as the Survey of Low-Income Families, (SOLIF); the latter transformed into the FACS in 2001 to examine the effectiveness of the early 2000s UK government's work incentive measures (Family Credit and its replacement, the Working Families' Tax Credit/Working Tax Credit). FACS consisted of seven waves (the first two stemming from SOLIF) and its data coverage ended in 2005. Compared to other UK panel data sets, FACS provided very detailed information on a range of health questions, on families' financial circumstances, as well as on respondents perceived financial difficulties and debt problems.

[128] Advances from employers, loans from family and friends, or from money lenders.

[129] Bridges and Disney (2010) specifications included a health status index derived using principal component analysis (PCA)—which helped reduce the number of health-related FACS' questions into a more manageable dimensionality—as well as typical household demographics as controls.

[130] Importantly, Bridges and Disney (2010) found that while the number of outstanding debts was statistically insignificant, cumulative arrears in excess of £2000 were significant.

[131] Both at the individual and household levels.

[132] No such significant association was found in the case of mortgage debt.

mortgage loans were significantly associated with lower levels of SWB, whereas mortgage loans were not, therefore providing evidence that unsecured debt can have greater influence on PWB than secured debt. Conversely, the relatively more favourable association of secured debt—such as mortgage debt—with SWB found by Brown et al. (2005) could also be explained by the positive psychological effects of owning property. Since mortgage payments imply making contributions towards the acquisition of an important asset—housing—which also confers social status, the latter could counterbalance any stress or anxiety arising from mortgage loan repayments, on net resulting in a better effect on SWB.

3.2.2 Savings and SWB

According to economic theory, household savings can both increase or decrease SWB. Three common perspectives suggesting that household savings may improve SWB are as follows. Precautionary savings can help to alleviate the detrimental consequences of unexpected shocks, such that those with savings experience less hardship in tough economic periods and thus present higher levels of SWB. As suggested by Modigliani and Brumberg's (1954) life cycle theory, savings allow consumers to defer and smooth consumption levels which can also help bolster SWB. Others argue that since savings tend to be intentional, they may increase the SWB of savers thanks to the intrinsic satisfaction obtained from goal-achievements (either material, or personal [i.e., from attaining self-autonomy and discipline]) as well as that of further generations (through bequests). Three perspectives suggesting that household savings may decrease SWB are as follows. Under Keynes (1936) “Paradox of Thrift” increasing savings can lead to insufficient effective demand and slow economic development (or even a recession) which could cause declining income and SWB of some individuals in society. Relatedly, high savings rates have sometimes been associated with high unemployment as the declining effective demand ensued through savings causes substantial idle production capacity, high inventories and conditions that destabilise labour markets and with it SWB. Others argue that household savings (in the form of bank deposits) have high opportunity costs since the very low return on deposits entails that consumers using saving accounts forgo other more profitable uses of money with higher returns such as the stock and real estate markets (Alexander, 2004). As far as the above conceptualisations regarding the effects of savings on SWB, those arguing that having savings can improve SWB apply at the level of the individual, however two of the three views contending that savings can hamper SWB relate to lagged aggregates rather than to the habitual financial decisions of average households.

From the perspective of empirical research, prior studies reveal a distinct association between household savings and SWB, however (as in the case of debt holdings), empirical results remain inconclusive. Some studies suggest the association between household savings and SWB is negative (Kountouris and Remoundou, 2014). Others argue it is positive (Brown et al. 2021; Gokdemir and Tahsin, 2013; Headey et al., 2008). Brown et al. (2021) develop a flexible Bayesian framework to jointly examine the incidence and extent of financial problems amongst the UK population and their implications for people's FWB. Their analysis revealed that having savings played an important role reducing the future incidence and extent of financial problems for all types households, regardless of socioeconomic status. Therefore, their results show that, in the UK, the protective role of savings also applies to low-income households.

Other studies have suggested savings have limited effectiveness in shaping positive health behaviours. Betz-Hamilton et al. (2019) use multiple regression analysis to predict participants' health behaviours based on four positive financial behaviours: saving, investing, having an emergency fund (defined by setting aside at least 3 to 6 months of expenses), and having positive cash flows (i.e. income greater than expenses). After controlling for gender, age, and income, Betz-Hamilton et al. (2019) found that, while all predictors were positive and statistically significant, savings had the least positive impact on promoting healthy behaviours, whereas having a positive cash flow (i.e., living below one's means) had the largest influence. The narrow specificity of the measures used by Betz-Hamilton et al. (2019) might have clouded the interpretation of their results. For example, their savings indicator measured the *habit of saving* rather than the effects of holding a minimum amount of savings. While it could be argued that the latter was measured through their emergency fund indicator, Betz-Hamilton et al. (2019) treat emergency funds as a separate (independent) construct from savings, which incidentally might lead to undervaluing the importance of savings. Similarly, from the Hicks–Hansen model[133] perspective, it could be argued that having positive cash flows is akin to having positive savings (defined as income minus consumption), with the subtle distinction between the two resting on liquidity differences, itself unspecified by Betz-Hamilton et al. (2019). Thus, further research regarding the simultaneous interactions between Betz-Hamilton et al. (2019) predictors would be useful. Nonetheless, given that budgeting[134] can help households nurture positive cash flows, Betz-Hamilton et al. (2019) results aligned with prior research showing that budgeting associates with a higher likelihood of engaging in positive physical health behaviours (see O'Neill et al., 2017).

Few other studies have explored nonlinear relationships between savings and SWB. Using data from China's Household Finance Survey (CHFS) Chen, Jiang and Gu (2021) test the hypothesis that household savings and SWB follow a concave down association. Defining SWB through a life satisfaction measure, non-linearity through quadratic savings, and using ordered logit, IVs, and two-

[133] The Hicks–Hansen model, more commonly known as the investment-savings and liquidity-model (IS-LM model), was first introduced by the British economist John Hicks in 1937 and later extended by American Economist Alvin Hansen. The IS-LM model served as a formalized mathematical and graphical representation of John Maynard Keynes' theories. Indeed, a proto version of the model was presented at a 1936 Econometric Society conference held in Oxford where presented papers attempted to summarize John Maynard Keynes' General Theory of Employment, Interest, and Money. The IS-LM model is still taught and used today as a heuristic device despite its flaws including that it cannot simultaneously account for high unemployment and inflation and that it is also undercut when central banks use an interest-rate rule rather than a money supply target.

[134] I.e., the act of keeping track of expenses and of monetary inflows.

stage least-squares (2SLS) regressions, Chen, Jiang and Gu (2021) provide evidence of an inverted U-shaped association between household savings and SWB. Therefore, their results implied the existence of a threshold amount of savings that maximises SWB. Chen, Jiang and Gu (2021) also show that the nonlinearity between savings and SWB varies among subgroups in terms of region, income, age, and risk attitude.

Relatedly, Sarofim et al. (2018) study financial behaviours (including saving and investing) and FWB outcomes across 3 different religious groups (Christian, Buddhist and Muslim) and find that Christians, while generally conservative and risk averse, used savings to invest out of a belief of being 'stewards of resources' and out of the duty to generate more to be used in helping others (Parable of the Talents); Buddhists were found to believe savings are a reflection of a determined and disciplined mind while Muslims noted that saving behaviours follow faith guidelines (i.e. halal/haram) and are therefore encouraged.

Finally, some studies have focused on the converse causality between savings and SWB. For example, Bogan and Fertig (2018) found that in the U.S. psychological distress decreases both retirement savings as a share of financial assets and the probability of holding retirement accounts.[135]

3.2.3 Financial position and SWB in LMICs and in Mexico

Within the economic development literature, several studies have evaluated the impact of financial instruments on poverty alleviation and financial outcomes, but rarely on SWB. For example, the financial diaries[136] literature has shown that poor households combine different financial tools (formal, informal, in-kind payments and monetary transfers) to cope with expected and unexpected financial gaps (Collins et al. 2009; Dattasharma et al., 2015; Rutherford 2003; Smits and Günther, 2018).

In Mexico, financial diaries research[137] (see Meka and Grider, 2016) revealed that participating households struggled to smooth consumption even though many earnt income from multiple sources. Throughout the project’s length participating households used on average seven different financial instruments and relied more heavily on informal finance. Additionally, participating poor households in Mexico were found to value certainty and predictability in financial instruments and their motivations

[135] By 67 percentage points and 24 percentage points respectively. They also find that effects for single and married individuals were of the same order of magnitude.

[136] Financial Diaries constitute a research methodology focused on collecting ongoing economic and financial data from low-income families. Most financial diaries research has been undertaken in developing countries (Latin America, Africa, South Asia and Southeast Asia). However, the US has also used financial diaries to monitor the economic life of low-income populations (see Morduch and Siwicki, 2017). In South and Southeast Asia and parts of Africa, several microfinance institutions have paired-up with financial diaries initiatives and several studies have used financial diaries to evaluate the impact of microfinance.

[137] The Mexican Financial Diaries project (2013-2015) followed 185 families in three locations (Mexico City, Puebla, and rural Oaxaca) representing three very different examples of Mexican life to obtain granular, long-term, first person (provider-side) data about the financial lives of low-income Mexicans. The project's data was used by Mexico’s National Savings and Financial Services Bank (BANSEFI for its Spanish initials) to design and administer the distribution of government social transfer payments such as those for the program *Oportunidades*.

to save included preparing for emergencies and achieving aspirations (i.e., buying land, property, machinery, livestock, financing education, or even establishing a small business). Due to a strong reliance on credit, many poor households used short-term savings for credit repayments or informal savings (ROSCAs)[138] to meet the more rigid repayment schedules of formal financial products (Meka and Grider, 2016).[139] While useful for policymakers seeking to better understand and serve low income market segments, financial diaries have focused on material wellbeing and do not provide any information on how poor households' financial lives affect their SWB or mental health.

Similarly, Townsend (2006) developed structural models to evaluate the impact of financial services on Mexican household's welfare. While aiming to assess both the macroeconomic implications and the microeconomic effects of financial services on households' decisions, Townsend's (2006) study focused on welfare impacts (defined in terms of poverty alleviation, wealth distribution and financial deepening) and did not consider SWB. Thus, evaluating a different construct than the current chapter.

The low levels of financial access and financial literacy in Mexico, much lower than in similar Latin American Countries, help explain why a large portion of the relatively small[140] household finance research about Mexico has focused on the relationship between household finance and financial inclusion. Part of such literature has evaluated the effects of remittances on financial access and inclusion because remittances are one of the most important sources of foreign finance in Mexico (Ambrosius and Cuecuecha, 2014). Additionally, migration and financial services are both considered asset-building and risk-management tools therefore underscoring the dual role remittances have as substitutes and complements of financial services.

Substitution and collateral effects of remittances emerge from the relationship between remittances and credit, which can be explained via demand and supply side mechanisms. Demand side explanations argue that remittances-receiving households enjoy a more flexible budgetary constraint which reduces their RA and increases their propensity to take up debt. This helps remittances-receiving households (usually low-income, rural households) to overcome liquidity constraints that restrict investment in human or physical capital.[141] For example, Ambrosius and Cuecuecha (2013) found that remittances make households less reliant on debt-financing during emergencies or when they suffer from health-related negative events.[142] On the other hand, Ambrosius and Cuecuecha (2014) found positive and statistically significant effects of remittances on borrowing (loans uptake) and on the existence of debts.[143] Acknowledging the possibility that remittances may also substitute for credit, Ambrosius and

[138] Acronym denoting Rotating Savings and Credit Associations.

[139] Especially rural households borrowed frequently (in small amounts) to bridge expenses.

[140] Small relative to that of HIC.

[141] See: Calero, Bedi, and Sparrow (2009) and Taylor and T.J. Wyatt (1996).

[142] Relatedly, Woodruff and Zenteno (2007) explained how credit-constrained Mexican microenterprises with transnational ties invested more than microentrepreneurs without such ties through the substitution between remittances and credit.

[143] Ambrosius and Cuecuecha (2014) also control for endogeneity using IVs based on distance to train lines and labour market conditions in the US as exogenous determinants of remittances.

Cuecuecha (2014) do not constrain the analysis to loans from formal financial institutions[144], thus enhancing the external validity of results.

The literature focusing on lenders' perspective has explained the collateral-effect of remittances arguing that remittances—as additional and relatively stable income sources from outside the local economy—enhance the creditworthiness of borrowers or even serve as collateral.

Other studies have found positive effects of remittances on savings (Ambrosius, 2012; Demirgüç-Kunt et al., 2011)[145] explained through the lumpiness of remittances which can create demand for savings. Other studies have addressed the effects of remittances on spending behaviour (Adams and Cuecuecha, 2010; Edwards and Ureta, 2003; Massey and Parrado, 1998; Yang, 2005; Woodruff and Zenteno, 2007). Yet, despite the breadth and diversity of the research linking remittances to financial resilience in Mexico, to date, no study has attempted to evaluate the effects of the latter on Mexicans SWB.

More generally, using a population-wide approach, Ceballos-Mina (2018) uses a synthetic panel to provide a semi-parametric estimation of Mexican households' savings and debt patterns over the life cycle. Contrasting the predictions of the standard life-cycle model, Ceballos-Mina (2018) found that at early stages Mexican families mainly depend on credit, while at the end, families hold high monetary saving profiles. Therefore, Ceballos-Mina (2018) results aligned with prior research showing that in Mexico there are important liquidity restrictions at the early stages of family life, so that households' precautionary savings tend to show up after the maximum income flow is reached.

Focusing on middle-and-higher income population segments, Ponce et. al (2014) analysed how consumers allocate debt across CC they already hold and show that debt revolvers with two comparable cards often borrowed on their high-interest card even though they could feasibly transfer the balances to cards with a lower interest rate, therefore providing evidence against the cost-minimizing hypothesis.[146] Ponce et al.(2014) attributed the results to limited attention to prices, anchoring, and mental accounting processes. Thus, their research aligns with Benartzi and Thaler (2001) who argued that consumers use naive diversification strategies in making saving-allocation decisions.

Finally, in terms of savings, while evaluating the impact of extending formal credit to households in the informal sector through the 2008 entry of Banco Azteca—the first bank in Mexico targeting households from the informal sector— Ruiz (2013) showed that the use of savings as a buffer on income

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[144] Since, due to limited access to formal loans, poor households usually rely on various formal and informal sources of credit and most remittance-receiving households are low-income households.

[145] For a similar case study on the effects of remittances on savings in El Salvador see Anzoategui, Demirgüç-Kunt, and Martínez Pería (2014).

[146] This hypothesis holds that with readily accessible information, low switching costs, and homogeneous products, consumers unconstrained by the contractual features of their cards (e.g., credit limits and minimum payments) would minimize financing costs and borrow on the CC with the lowest interest rate.

fluctuations declined once formal credit was made available.[147] Similarly, using a quasi-experimental research design to assess the impact of Mexico's *Oportunidades* (Opportunities) programme switch from cash payments to electronic payments delivered via bank accounts, Masino and Niño-Zarazúa (2014) found that the change influenced households reallocation between saving portfolio choices, transaction costs, and coping strategies. The study also revealed heterogeneity between rural and urban areas and observed that, following the intervention, recipient households: decreased their use of informal saving, increased their remittances receipt, and that beneficiaries of bank accounts were more likely to use savings to cope with idiosyncratic shocks rather than contracting loans or reducing consumption.

Despite their important documentation of advances in terms of financial inclusion, neither of the above articles analysed what changes in financial access in Mexico signified in terms of the SWB of those recently financially included.

3.2.4 Limitations of pre-existing research

The review of the literature has shown that despite the number of studies analysing the relationship between financial balances and SWB, research on the topic is far from mature, especially when considering the topic in the context of developing countries. As described above, the literature is characterised by a larger proportion of studies based on data from HICs whose results are not always generalisable to countries with less developed financial markets or where many citizens use cash and informal sources of finance more prominently, as is the case in Mexico. Additionally, except for Brown and Gray (2016) several of such studies have adopted a narrow focus, analysing the impact of a single type of debt on specific within-county demographic groups[148] rather than evaluating consolidated measures of financial balances across an aggregated national population or regional blocks.

Furthermore, the literature's policy implications have been precluded by definitional ambiguity regarding SWB, types of debt (i.e., secured vs. unsecured; serviceable [manageable] vs. problematic [non-payable] debt) and methodological differences (objective vs subjective measures) resulting in incomparable and inconclusive effect sizes. As a result, it has been considered best practice to avoid formulating sweeping conclusions when the analysis solely uses objective debt explanatory variables and/or fails to specify the type of debt considered.

[147] More specifically, Ruiz (2013) found that in municipalities where the bank opened, informal households were more likely to borrow from banks, less likely to obtain loans from pawnshops, better able to smooth their consumption and accumulate more durable goods even though they were less likely to hold savings (with the proportion of households saving falling by 6.6 percent). The effects also varied across households, with those never receiving formal job offers experiencing the highest decline in saving rates.

[148] A large number of studies have concentrating solely on the impact of (university) students' card debts and account overdrafts, on the debt levels of pensioners, or on working age adults' mortgage debt.

Moreover, most of the household finance and development economics research about Mexico has focused either on how households reallocate resources to cope with financial obligations or on issues related to financial access and financial education, therefore overlooking how important elements of Mexican households' balance sheets interact with individuals' affective states. Additionally, to our knowledge, none of the few studies on SWB in Mexico have explored how households' financial position influences their emotional and mental health, all of which motivates this study.

3.3 RESEARCH AIM AND RESEARCH QUESTION

The current chapter seeks to evaluate how the balances of financial resources constituting households' balance sheets influence people's SWB (measured through an index of depression) in order to provide empirical evidence of the influence that financial health has on people's affective-state balance and emotional health. In light of the above gaps in the literature, we focus on Mexico and adopt a country-wide perspective. Hence, the chapter responds to the question:

- *How do savings, problematic debts, DTI and DTS ratios—considered independently (as self-contained regressors)—influence the SWB*[149] *of people in Mexico?*

While the analysis focuses on the effects of objective indicators (i.e., total debts and savings) our specification also allowed us to measure whether the impact of the former is influenced by Mexicans' subjective TV and risk preferences.

Relevance

As noted in subsection 3.2.4, although a large literature has studied the effects of financial balances such as debts and of savings on SWB (with studies on the effects of debts outnumbering those regarding savings), the findings have been ambiguous. Moreover, the literature has focused on HIC with mature financial markets and high levels of financial inclusion. Few studies have analysed the case of countries with low financial inclusion like Mexico, where not only does cash remain king but a substantial share of the population employs a combination of formal and informal financial tools. Thus, the chapter firstly contributes by expanding the household finance and SWB literatures about LMICs.

The chapter also contributes by being one of the few that considers the evolution of both savings and debts for the whole population rather than for singled-out groups.

Additionally, while most studies have analysed the effects of a particular type of financial balance on SWB in light of heterogeneity determined by conventional sociodemographic characteristics such as age, gender, and education, we expand the analysis by including other important controls influencing financial decisions such as abstract reasoning abilities (relating to resourcefulness in problem solving) as well as indicators regarding experiences of crime, assault, personal shocks or sense of community

[149] Measured through the CDS.

(all of which influence levels of trust and thus of decisions regarding credit acquisition and the use of formal and informal financial services).

Moreover, to our knowledge, this is one of the few studies that explores the influence that heterogeneity in terms of RA and TV preferences across-individuals has over how debts and savings contribute to people's SWB.

3.4 DATA

This chapter uses indicators derived from the second and third waves of the MxFLS to analyse effects—outside of the FC framework—of financial balances on the experience of depression symptoms in Mexico. Even though the data collection of each wave comprised, respectively, the periods 2005-2006 and 2009-2012, for simplicity, throughout we also refer to them as either the 2005 (MxFLS-II) or the 2009 (MxFLS-III) waves.

Several sociodemographic covariates in this chapter correspond to those of Chapter 2, including the CDS score—our dependent SWB measure—and the Raven Progressive Matrices (RPM) test score used as our cognitive ability indicator. However, the FC indexes constructed for and used as key explanatory variables in Chapter 2 are excluded from the current chapter. In place of the FC indexes, this chapter employs as main predictors four measures of financial balances derived from the MxFLS (individual level) credit modules containing information on amount of savings and debts held.[150]

Additionally, this chapter includes two sets of behavioural controls respectively standing for TV preferences (i.e., for respondents' predilection amongst immediate vs. delayed utilities [conceived through monetary payoffs]) and levels of RA (i.e., the extent to which people prefer lower returns with known [estimable] risks rather than higher returns with unknown [non-estimable] risks).[151]

As in Chapter 2, respondents' extent of patience vs present-bias is measured through MxFLS TV preference questions[152] which, representing a common method used to elicit discount rates, ask respondents a series of choices between immediate (smaller) rewards and larger, delayed payoffs (with delays and rewards varying in each subsequent choice-option).

[150] Both indicators stemmed from individual level MxFLS databases (specifically from the credit modules of each waves' individual level IIIB books of data). The raw data variables used to derive the 'total value (sum) of unpaid loan debts' indicator used as one of the key explanatory variables in the chapter mostly referred to unsecured debt such as unpaid CC balances and unserviceable, undifferentiated loans. While the set of raw variables used to derive the sum of unpaid loan debts specifically asked respondents about the debts incurred and/or held over the 12 months prior to the data collection period of each wave, the raw survey variables used to derive the sum of savings indicator did not specify a recall time-period to respondents. (See appendix Table 2.A.1 [last segment] for more details).

[151] While the concepts of risk and uncertainty are sometimes used interchangeably, the two are not necessarily equal. For example, under Knightian uncertainty when outcomes are assumed to occur with some probability, but which is not estimable, there is uncertainty. However, risk denotes outcomes that are assumed to occur with estimable (thus 'known') probabilities. On the other hand, certainty can be conceived as a special case of risk in which the known probabilities are either zero or one. In MxFLS questionnaires some of the hypothetical choice pairs constituting the risk modules correspond to the latter especial case, as they ask respondents to choose between (certain) amounts of money with 100% probability and gambles of payoffs with estimable probabilities (different from zero and one).

[152] Consisting of a sequence of hypothetical gambles.

However, as explained in Section 3.6, contrasting Chapter 2, we do not derive a summarizing index from our categorical TV preferences indicator and other temporal-orientation indicators (as in Chapter 2); instead, the current chapter uses the TV preferences indicator as a unique, single-standing, independent covariate. Temporal preferences garner special interest because their fluctuation can diminish the expected utility of future consequences and therefore lead to changing financial behaviours, including spending and saving (Frederick, Loewenstein and O'Donohue, 2002). As noted in Chapter 2, wording changes between MxFLS-II and MxFLS-III TV preference modules entailed that the immediate payoff and the waiting period to receive a higher payment were larger in 2005 than in 2009. Nonetheless, both waves mapped out their respective temporal choice sequences such that they both tested respondents' preferences for the same underlying TV payment-premia thresholds.[153] Thus, despite differences in the waiting periods and absolute payment amounts offered by each wave's gamble sets, the corresponding delay-reward ratios (relative values) in both waves gauged whether respondents preferred receiving a base payment immediately as opposed to a future payment being either more than double, double, 50% or 20% higher than the initial (base) payment. The latter allowed us to classify respondents along the same TV categories and eased interpretation of findings.[154] Moreover, the wording changes in the sets of TV lottery questions used to derive the TV preferences indicator in each wave did not modify the latent construct being measured (or approximated) by each wave's TV module—namely extent of patience (or of present bias). This allowed for the inclusion of TV preferences in our panel analysis.

Intertemporal choice research has argued that temporal preferences arise from several conflicting psychological motives that tend to be stable over-time (Frederick, Loewenstein and O'Donohue, 2002). Some of these include people's: different propensities and abilities to exercise self-restraint; varied predominance of reflection over impulsivity; various extents of visceral influences; variations in the psychological discomfort [and cultural acceptance] associated with self-denial; mixed reactions to uncertainty [precautious frugality vs disinterested profligacy]; diverse anticipatory utilities resulting from different abilities to imagine the future; distinct habit formation intervals; and systematic tendencies to underestimate future wants. Several of the aforementioned psychological constituents of time preferences derive from temperamental and character differences among economic agents which tend to be slow-moving and might even be considered as invariant over the relatively short time span of the current analysis.[155] Nonetheless, TV preferences are included in the chapter's FE panel

[153] Additionally, base (0) level for the TV preferences indicator in both waves was irrationally and/or misunderstanding of the lottery question, i.e., those showing preference for a gamble that implied they would wait and receive a lower payoff in the future than the present payment.

[154] It also allowed us to calculate 5 levels of discount rates ascending in patience and descending in present bias since TV category (TV_C) 5 had the lowest positive non-zero discount rate which implied TV_C 5 represented the least present biased temporal preference (most patience) whilst TV_C 1 had the largest positive non-zero discount rate thus signalling the most present biased TV preference (least patience).

[155] Preferences deriving from people's temperament are very hard to modify because temperament is the biological and instinctive part of the personality that is inherited through genetic traits (hence foundational temperamental tendencies are always naturally part of people's personality). Preferences more related to character, the other element of individuals'

estimations for substantive completeness and also to test the validity of the literature's presumed (relative) stability of temporal preferences amongst LMICs individuals (such as Mexicans).

Research in finance has shown that RA—a fundamental part of individuals' risk profile—can mediate the impact of risk perceptions on people's financial behaviours and influence their use of financial instruments. Following such literature, this chapter makes use of the MxFLS risk module (in each wave) to include a RA ordinal indicator with 5 categories, each standing for the extent of risk aversion (or of risk tolerance) of individuals. The derived RA indicator's categories were organised in ascending order of risk tolerance (decreasing RA)[156] and, overall, the indicator helped to control for diverse levels of risk attitudes among sample respondents.[157]

While the MxFLS RA module was first introduced in 2005-2006, a modified version was applied in the 2009-2012 wave (MxFLS-III). From each wave we use questions presenting respondents pairs of (known) uncertainty (risk)[158] vs assured payoff trade-offs (hypothetical gambles) from which to choose.[159] Figures 3.A.1 and 3.A.2 in the appendix provide a visual representation of each wave's gamble-set sequences (2005 and 2009, respectively) and appendix Tables 3.A.1 and 3.A.2 present each wave's gamble payoffs along with their corresponding expected values (EV) and the EV differences (or premia) between each question's gamble-pair.[160] The trade-offs implied by each of the gamble-sets

personality, while more flexible, also require time to change as character evolves out of the interaction of people's temperament with their personal experiences and social interactions. While character partly reflects a person's experiences is it indeed developed through a person's life stages (mostly in childhood and early adolescence). Hence it is unlikely that MxFLS respondents (all of whom were at least 18 years old) underwent any major character change during our period of study (no longer than 7 years) which entailed changes in their temporal preferences.

[156] Such that RA category (RA_C) 1 represented the highest level of RA (lowest level of risk tolerance) as it entailed the highest RP required to choose the uncertain gamble whereas RA_C 5 stood for the lowest level of RA (highest level of risk tolerance) and implied the lowest requisite amount of RP to choose the uncertain gamble.

[157] As in the case of the TV preferences indicator, in both MxFLS-II and MxFLS-III samples the base (0) level of RA represented choosing irrationally over the risk gambles. While capturing the same construct "irrational preferences or lack of understanding of the question prompts" how such irrationality was framed varied depending on the wave due to the wording changes between the 2 waves. In the MxFLS-III (2009-2012) sample, the base (0) RA category represented those preferring (irrationally) a guaranteed amount (i.e. \$2,000, with no risk) being stochastically dominated by a gamble which offered at least as much and an even higher payoff than the sure amount of money (abbreviated through Mellers at al. (1992) notation by [$\$2{,}500, 0.5;\ \$5{,}000$] and with an $EV = \$1{,}750$ higher than the guaranteed amount). In contrast, the base (0) RA category in the MxFLS-II (2005-2006) sample were respondents revealing irrationality by choosing an option in the lottery with an equal implicit probability (extent of risk) as another gamble but with a lower overall expected value. That is, in 2005, the reference group were those choosing the gamble offering equivalent probabilities of occurrence and the same lower-bound payoff as the opposing gamble option but with a smaller upper-bound payoff than the alternative (i.e. preferring gamble [$\$100, 0.5;\ \$4{,}000$] with $EV^{LB1} = \$2{,}050$ over [$\$100, 0.5;\ \$7{,}000$] with $EV^{LB2} = \$3{,}550$.

[158] While, from the perspective of Knightian uncertainty, *risk* can be technically differentiated from *uncertainty* by constituting a situation in which outcomes can be estimated with known probabilities (whereas in cases of uncertainty, outcomes' probability of occurrence cannot be estimated or known), we refer to the gambles presenting payoffs with a known probability distribution other than 1 (100%) as the risky gambles in order to contrast them with the payoffs embedded by amounts offered with certainty (i.e. with 100% probability of occurrence, themselves also akin to the particular case in which the risk of lower payoffs is zero).

[159] Since the 1950s, risk attitude measures represented by choice dilemmas (gambles) have been constituent elements of assessments used to guide consumers' personal financial planning.

[160] Operationally, hypothetical-gamble questions' payoffs were inscribed in balls within bags from which respondents made selections (without looking at the content). In both waves, each of the 2 bags in each question could contain either 1 or 2 balls. Regardless of the survey period, each set of questions began by announcing the implicit payoffs represented by the ball(s) contained in each bag as well as their respective likelihood. Respondents were then told that, even though some bags could have more than one ball, *they could only pick a single ball from the bag of their choice at any decision point.*

are interpreted as revealing respondents' uncertainty preferences and attitudes toward risk[161] because they allowed us to estimate the minimum risk premia (RP)—i.e. the additional amount of payment—that different respondents' required to opt in favour of the (uncertain) gamble instead of selecting the sure payoff. Once respondents preferred an uncertain gamble over the certain amount offered in any of the different questions in the risk module sequence, they were directed to a different survey section. Such terminal decision points thus allowed us to classify respondents into the RA level (within our ordinal RA indicator) that corresponded to the specific RP implied by respondents' terminal decision point.[162]

Even though the value of monetary rewards implicit in the RA gambles was modified between the two waves, the framing and scaling effects introduced by wording alterations regarding the risk trade-offs of each gamble-set did not invalidate the use of the RA categorical indicator to conduct panel analysis as the wording variations did not change the latent construct being approximated or measured by the risk module in each MxFLS wave.[163]

Research on the temporal stability (or variability) of RA has reached mixed results, especially in light of exogenous shocks (e.g., GFC), as occurred between the two MxFLS waves. Based on Harrison et al. (2005), we control for the impact of the GFC in our panel specification to absorb the effects of changes in the 'state of nature' under which individuals formed their risk preferences and after which preferences tend to be assumed as stable. While, in line with Harrison et al. (2005), we presume that RA did not exhibit drastic changes during our relatively short analysis timespan (2005-2012)—specially after accounting for our research period's main exogenous shock (the GFC)—we included a RA predictor in the longitudinal analysis because of the important relationship between risk attitudes and personal finance (documented by the literature) and to test the relative stability of influence of RA over people's financial outcomes in Mexico, where the literature on RA is not as profuse as in HICs.

3.5 DESCRIPTIVE STATISTICS

As both Chapter 2 and Chapter 3 are based on MxFLS data (and share some controls), we begin by summarising the main data patterns of Chapter 2 to thereafter present descriptive statistics of the distinctive indicators of the current chapter.

As represented in Table 3.1 and in appendix Table 3.A.3[164], which gives summary descriptive statistics of MxFLS-II, on average, respondents in both MxFLS waves were in their early 30s and a slight majority lived in non-urban localities (i.e. places with less than 15,000 inhabitants, the threshold used

[161] That is, risk tolerance and risk (loss) aversion.

[162] That is to the RP of the question point in the set at which they preferred uncertain option to ensured amount.

[163] Granted, identical measures of RA in both waves (with exact same wording) would have provided a more straightforward measure for the panel analysis. Nevertheless, despite the wording differences in the risk module between MxFLS-II and MxFLS-III, the derived RA categorical indicator permitted us to track respondents' evolution of risk attitudes over time.

[164] Also, as detailed in Chapter 2.

in Mexico to distinguish rural localities from urban ones).[165] The latter helped explain why the educational attainment of respondents in both waves was low with only 10.78% of 2005 respondents and 11.11% of 2009 respondents achieving University level education. By design, MxFLS grouped all levels of education beyond High School into a single category; thus, we were unable to ascertain the precise level of tertiary education attainment. Nonetheless, in line with census data, it is likely that the highest level of education achieved by the majority of those reaching tertiary schooling was bachelor's degree.[166] Almost half of respondents in both waves (~46% in 2005 and ~45% in 2009) obtained an intermediate fluid cognition score[167], as determined through the RPM test. However, a larger proportion of respondents in 2005 obtained a perfect score than in 2009, therefore signalling that while general educational attainment (and thus crystallized intelligence) was higher in 2009, some respondents in the earlier wave showed higher abstract reasoning skills, robust ability to build relations through analogy and capacity to draw inferences.[168]

Table 3.1

Descriptive Statistics : MxFLS-III (2009-2012)

Individual Level	**N**	**Mean**	**Std. Dev.**	**Min**	**Max**
Dependent Variable:					
Calderon Depression Score (CDS)	13549	25.648	7.233	20	80
Demographic Controls:					
Age	13549	32.927	14.090	15	69
Male	13549	.419	0.493	0	1
Marital Status (1: married/domestic partnership)	13549	.623	0.485	0	1
Education Level 1 - No Schooling & Preschool/ Kinder	13549	.059	0.235	0	1
Education Level 2 - Elementary School (1st - 6th grade)	13549	.3	0.458	0	1
Education Level 3 - Jr. High School (7th -9th grade)	13549	.337	0.473	0	1
Education Level 4 - High School (10th -12th)	13549	.194	0.396	0	1
Education Level 5 - Higher Education: Univ. & Col. Grad	13549	.111	0.314	0	1
Cognitive Ability Score (2009), No. correct answers: 0 – 12	13549	5.771	2.835	0	12
Urban Locality (people ≥ 15,000)	13549	.453	0.498	0	1
Risk Aversion (categorical)	13549	2.336	1.700	0	5
Time-value Preferences (categorical)	13549	1.434	1.068	0	5
Considers the future in financial decisions (binary)	13549	.583	0.493	0	1
Spent nothing or < half of monetary gift (binary)	13549	.65	0.477	0	1
Financial Balances:					
Income earnt last 12 months (amount)	13549	19301.981	79144.318	0	5000000
Income earnt last 12 months (ln)	13549	4.275	5.071	0	15.425
Sum of loan debt still outstanding (amount)	13549	1018.761	10320.617	0	625000
Sum of loan debt still outstanding (ln)	13549	.757	2.397	0	13.346
Sum of savings (amount)	13317	1777.06	17596.645	0	1000000
Sum of savings (ln)	13317	1.004	2.732	0	13.816
Debt to labour income ratio (ln difference)	13549	-3.518	5.303	-15.425	12.206
Debt to savings ratio (ln difference)	13317	-.247	3.545	-13.816	13.346
Household Level					
Other correlates of wellbeing & wealth:					

[165] Refer to Chapter 2 appendix Table 2.A.1 for further details.

[166] Or the equivalent certification in specialised trade and commerce schools.

[167] That is between 5 and 8 (inclusive) correct responses out of 12 questions.

[168] The RPM test assesses such three skills and as described in Chapter 2, in 2005 about 2.97% respondents had a perfect RPM score, more than doubling the corresponding percentage of 2009 respondents.

Experienced robbery or assault to person or to property	13549	.211	0.408	0	1
Cohesive, inclusive & trustworthy community	13549	.866	0.340	0	1
Household experienced damages due to shocks, prior 5 years	13549	.34	0.474	0	1
Household Living Conditions & Assets Index[A]	13549	.075	0.930	-4.487	1.224

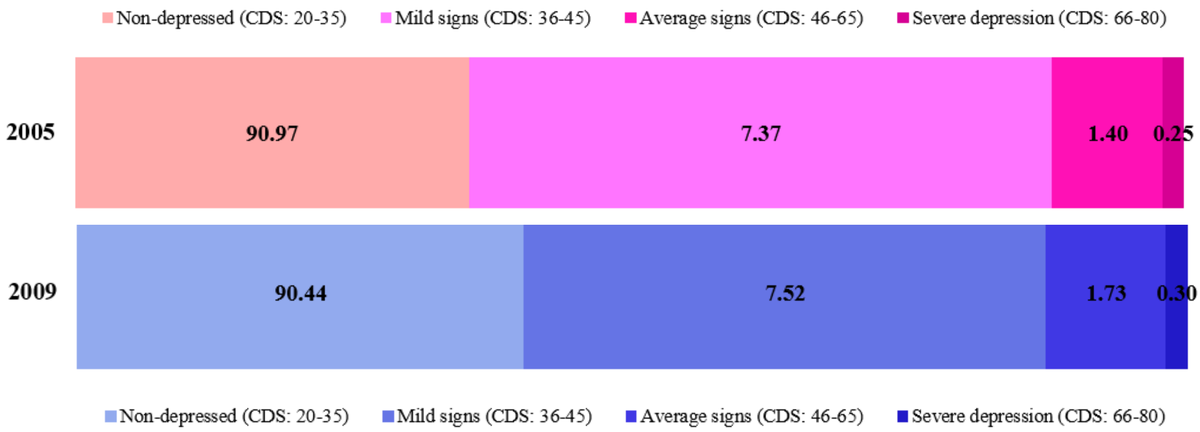
All quantities calculated over estimation sample (restricted to those between 15 & 75 years).
Monetary amounts expressed in Mexican pesos (MXN) corresponding to average exchange rate: $29.5 MXN per £1 (.034 £ per MXN).

The large majority of respondents in both waves (90.97% in 2005 and 90.44% in 2009) scored within the non-depressive range of the CDS (between 20-35 points). Moreover, as shown in Table 3.1 and Table 3.A.3, the mean CDS of respondents in 2009 was slightly higher than that of 2005 (respectively standing at 25.65 and 25.19). Since lower CDS signifies better affective states (i.e., less symptoms of depression and anxiety), the increase in average CDS between the waves entailed that surveyed Mexicans experienced a slight deterioration in SWB from 2005 to 2009, as per MxFLS data. Specific descriptive statistics of the panel sample used in this chapter are provided in appendix Table 3.A.8.

Figure 3.1 presents the distribution of experienced symptoms of depression and anxiety (as captured by CDS intensity categories)[169] of each MxFLS wave sample whilst Figure 3.2 further disaggregates the levels of depression and anxiety per wave-period according to the metrics of household financial balances used in our analyses.

Figure 3.1

MxFLS Samples



Source: Self-generated based on MxFLS-II and MxFLS-III questionnaires (emotional wellbeing module).
All quantities calculated over estimation sample (restricted to those between 15 & 75 years).

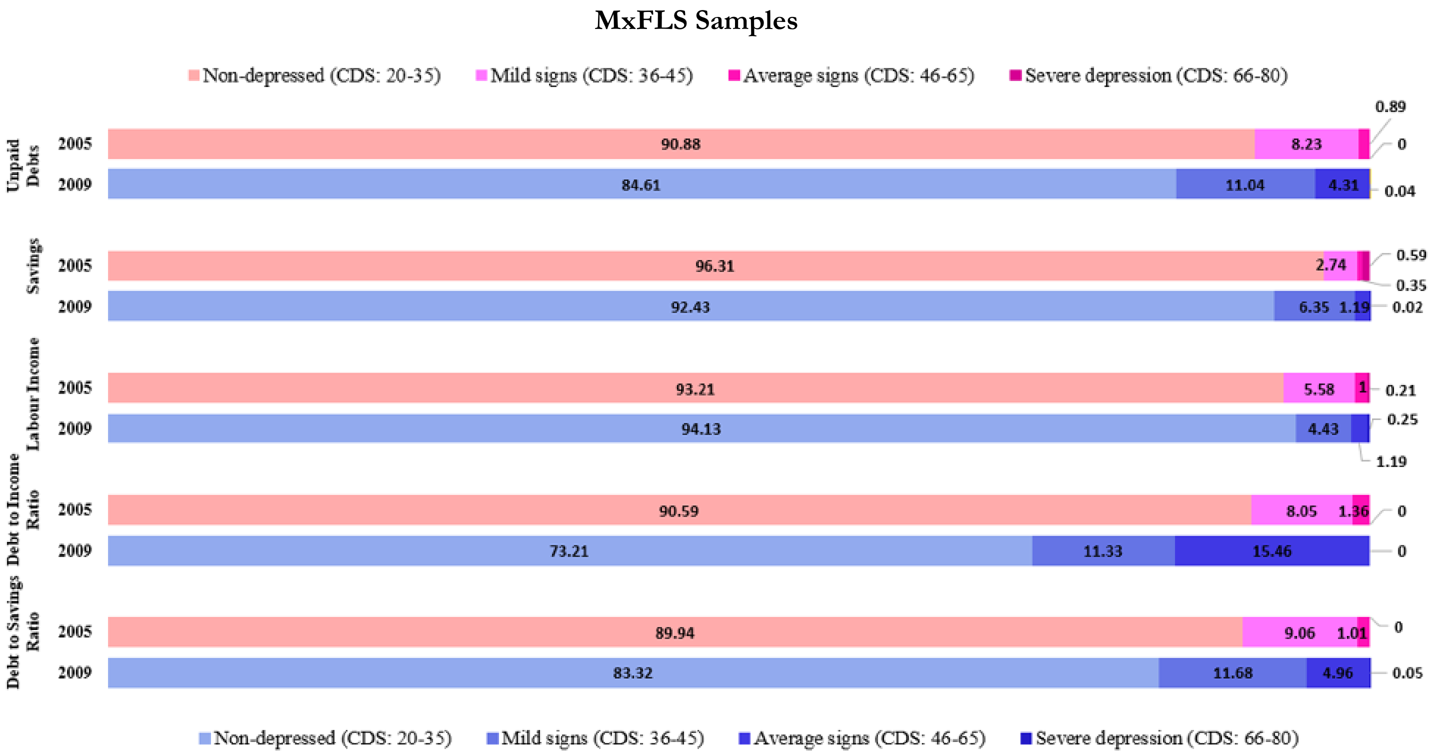
The progression from light to dark colour hues in each wave's stacked bars represents increased intensity of depression symptoms (i.e., higher reported CDS).[170] Both Figures show that the

[169] The four categories follow the scale stipulated by Dr. Guillermo Calderon in the methodology section of the 1997 article where he proposed the then new questionnaire to diagnose clinical depression (i.e., the 20 questions prefiguring in the MxFLS emotional wellbeing module from which we calculated the CDS). See Calderón-Narvaez (1997) for details.
[170] While the stacked bars in Figure 3.1 were not drawn to scale, the transitioning of the colour hues and the percentage labels in each portion are an accurate representation of the distribution of SWB in each MxFLS sample.

predominant state of SWB in the two waves (regardless of the financial balance in question) was having very little to no depression and anxiety symptoms (i.e., a CDS in range 20-35).

Figure 3.1 further reveals that the 2% deterioration[171] of SWB between MxFLS-II and MxFLS-III was mainly driven by increases in the proportion of people reporting depression signs of medium intensity (CDS in the 46-65 range) which increased by 0.33 percentage points between the two periods[172] as well as by increases in the share of respondents claiming to experience severe depression (CDS of at least 66) which, although still amounting to less than 1% of the MxFLS samples, rose by 20% between the two waves.

Figure 3.2



Source: Self-generated based on MxFLS-II and MxFLS-III questionnaires (emotional wellbeing module).
All quantities calculated over estimation sample (restricted to those between 15 & 75 years).

To better understand Figure 3.2, one can interpret the segments of each stacked bar as the share of people in each wave, that holding a non-zero (positive) amount of the given financial balance (indicated in the left vertical axis), fell within each depression level category due to their answers to the 20 CDS questions comprising the MxFLS emotional wellbeing module.[173] For example, we can see that only

[171] Namely, the 2% growth from an average CDS score of 25.19 in 2005 to an average score of 25.65 in 2009.

[172] Respondents reporting medium-intensity symptoms of depression went from being 1.4% of the 2005 sample to 1.73% of the 2009 sample, implying a 24% increase of their share between the two MxFLS waves.

[173] Figure 3.2 can also be interpreted as presenting the proportions of people in each level (or category) of depression conditional on holding non-zero (positive) values of the financial balances indicated by the left vertical legend items. As such, Figure 3.2 constitutes a very simple and coarse depiction of the distributions of CDS by financial balance for it is not completely drawn to scale and it does not break down the distribution of depression and anxiety levels any further to show its dispersal across different value-thresholds of each financial balance (i.e. by levels of income, values of debts or of values of savings).

0.89% of 2005 respondents with unpaid debts reported a CDS within the range of average depression (45-65) whereas in 2009 the share of people with a CDS signalling a depression level within average bounds amounted to 4.31% of those that reported having outstanding debt balances in 2009.

Unsurprisingly, Figure 3.2 showed that people with savings had one of the best distributions of SWB, as some of the largest shares of respondents classified within the non-depressed range coincided with them having savings. Similarly, earning labour income consistently over the prior year (considered in isolation from debts in each wave-period) was also associated with a distribution revealing high levels of SWB. Only 6.79% and 5.87% of respondents reporting some income in 2005 and in 2009, respectively, had at least some signs of depression and anxiety, since more than 93% and 94% of respondents with consistent income in each respective wave-period were diagnosed as not depressed according to the CDS scale. Considering unpaid debts in isolation, Figure 3.2 shows that in both waves, the shares people holding positive unpaid debts classified as non-depressed (CDS: 20-35) were smaller than the proportions of people with positive labour income and savings balances showing no signs of depression.

In line with the literature's treatment of DTI and DTS ratios as related measures of financial resilience, the distributions of CDS according to these ratios were relatively similar in both years. From Figures 3.1 and 3.2 it can be observed that the slight deterioration of SWB between 2005 and 2009 was mostly attributed to increases in the proportion of people experiencing depression symptoms of medium intensity as people with CDS in the 46-65 range were the segment whose share increased the most between the two waves (regardless of which financial balance the distribution of SWB was considered over).[174] The latter most likely implied that the experiences of people with no, to very mild symptoms of depression and anxiety in 2005 intensified between the two waves since, for most financial balances (except savings and DTI ratio), the proportion of people experiencing severe depression (CDS: 66-80) was higher in 2009 than in 2005.[175] Therefore, the higher proportions of people in the CDS 46-65 range did not seem to result from improvements in the SWB of people classifying in 2005 as having severe depression and anxiety but rather signalled deterioration of SWB (i.e., progression of some people from lower to higher symptomatic categories of depression and anxiety).

[174] Specifically, Figure 3.1 shows that the share of people with average signs of depression (CDS: 46-65) was the one that increased the most between the two waves. Once we examine the distribution of CDS conditional on holding a given non-zero financial balance, Figure 3.2 shows that when considering SWB by savings and DTI ratio, the level of depression that saw the greatest increase in terms of share of people being diagnosed with the given extent of depression was CDS in the 46-65 range (average depression). When examining the distribution of CDS conditional on holding some labour income, the increase in the shares of people classifying as having severe depression (CDS: 66-80) was of comparable size to the increase in the share of people classified as having average depression levels (CDS: 46-65), both segments saw ~19% increase between MxFLS-II and MxFLS-III. Considering the distribution of CDS conditional on holding non-zero unpaid debts and DTS ratio, severe depression (CDS: 66-80) was the intensity level or extent of depression that saw the greatest growth in terms of the proportion of people diagnosed within its bounds (nonetheless, the share of people with severe depression remained extremely low).

[175] See shares on the right-most vertical axis of Figure 3.2.

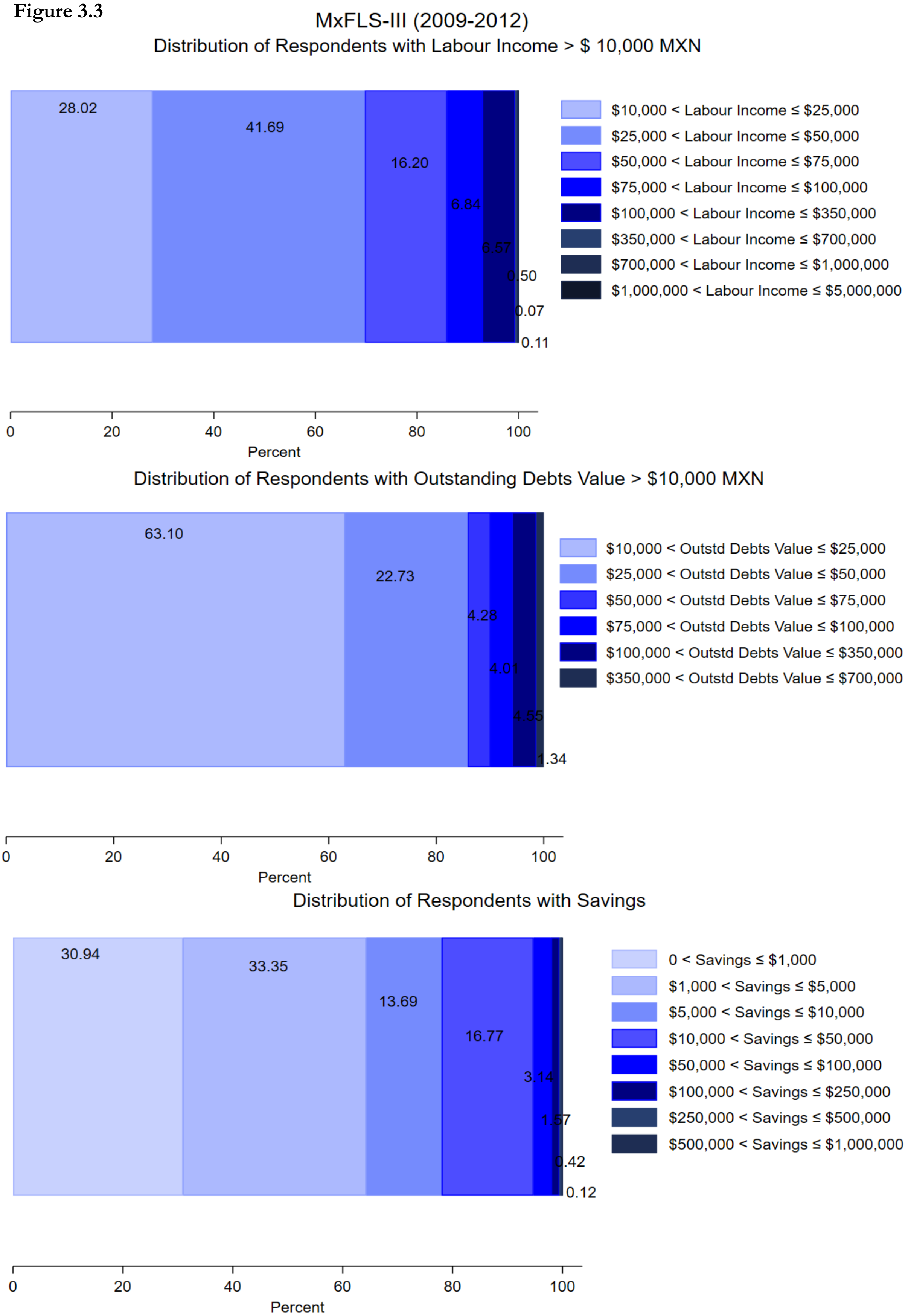
Descriptive results from Figures 3.1 and 3.2 can be further contextualised by understanding the distribution of values of each type of financial balance held by respondents. About 65% of the MxFLS-II (2005-2006) sample reported having earnt either no income or at most $\$10,000_{MXN}$ over the year prior to the survey while 89% of the same sample reported holding no savings. Close to 94% of the sample in the same period (2005-2006) reported holding no outstanding debts over the year prior to the survey while about 5% of respondents reported having positive debts equalling at most $\$10,000_{MXN}$. The pattern of balances was similar in the 2009-2012 period as 66% of respondents reported having earnt either no income or at most $\$10,000_{MXN}$ over the 12 months prior to MxFLS-III and 88% claimed to have no savings. Additionally, over the year prior to MxFLS-III about 97% of the (2009-2012) sample had either no debts or outstanding debts at most equalling $\$10,000_{MXN.}$

Figure 3.3 further disaggregates the remaining (minority) shares of the MxFLS-III (2009-2012) sample according to different (higher) threshold values of labour income, outstanding debts and savings to complement the information above. Appendix Figure 3.A.3 provides the corresponding depiction in terms of the MxFLS-II (2005-2006) sample. From both Figure 3.3 and 3.A.3 it is clear that even amongst the better-off respondents in each wave, the *majority* had: labour incomes greater than $\$10,000_{MXN}$ but at most equalling $\$50,000_{MXN}$, outstanding debts exceeding $\$10,000_{MXN}$ up until $\$25,000_{MXN}$, and savings of at most $\$5,000_{MXN}$.

To complete the descriptive analysis of the different financial balances held and their relationship to SWB, we describe the general economic climate during our period of study and to which Mexicans SWB and financial decisions responded. No major financial reforms came into force in Mexico between the collection periods of MxFLS data used (i.e., between 2005-2006 and 2009-2012). However, changes in the country between the two MxFLS waves resulted from the Presidential election of Felipe Calderon who assumed power in December 2006. Although Calderon was from the same political party as his predecessor—the National Action Party (PAN), a centre-right party—his presidency saw a thorough anti-drug cartels initiative and, on the economic front, spurred a 2007 pension system reform,[176] two fiscal reforms (in 2007 and 2009),[177] and a 2008 energy reform.[178]

[176] Primarily affecting civil servants as it required government employees to have individual (independent) retirement accounts.
[177] Both sought to strengthen the government's finances by increasing its tax intake (which stood at about 3 % of gross domestic product) and to reduce the government's dependence on oil revenue. The 2007 fiscal reform also introduced a minimum income tax on companies or business enterprises—the single tax rate (IETU)—beginning at 16.5% and set to increase gradually (Gutierrez, 2012).
[178] The energy reform sought, among other things, to reduce Mexico's dependence on processed gasoline imports by developing refineries in Mexico via collaboration of Pemex (the Mexican state-owned petroleum company [managed and operated by the Mexican government]) with private oil companies. However, the latter was blocked by the opposing left party as it was seen as a stepping-stone towards the privatisation of Pemex. The diluted approved policy thence simply allowed collaboration with private companies in terms of research and exploration projects (Gutierrez, 2012).

Figure 3.3



Source: Self-generated based on MxFLS-III (credit module). Calculated over estimation sample (restricted to 15-75 years old).

Furthermore, on the financial regulation front, Calderon's presidency saw changes to the regulatory framework of saving and loans cooperatives in 2009 and an increase in development banks´ allowance to supply funds to private investors in credit-rationed sectors, a 2011 antitrust reform[179] and the 2011 creation of the National Council of Financial Inclusion (CONAIF)[180]—responsible for planning, implementing and overseeing the (first) Mexican Nacional Financial Inclusion Policy (PNIF) framework.

Calderon's persistent 'war on drug cartels' resulted in a wave of violence ensuing thousands of individual casualties as cartels retaliated the government's initiative. This was reflected by the 36% increase[181] in MxFLS respondents' experiences of robbery or assault to person and/or to personal property between the two waves. The increased violence and death toll[182] likely also spurred generalised negative emotions such as fear and anxiety across the population thus providing some intuitive explanation for the slight deterioration of CDS between 2005-2006 and 2009-2012.

The economic reforms most directly affecting households (financially) between the two MxFLS waves were the 2007 fiscal reform (which among other things included a new tax on cash deposits and gradual increases in the price of gasoline) and changes to the laws overseeing development banks and saving and loan cooperatives (which improved their monitoring in order to avoid unregulated speculative uses of their funds). As seen from Table 3.1 and appendix Table 3.A.3, both the average *nominal* value of savings held and the average *nominal* value of debts outstanding increased between the two MxFLS, with the growth of the mean *nominal* outstanding debts far exceeding the growth in mean *nominal* savings.[183] However, after deflating MxFLS-III values to MxFLS-II Mexican pesos using the average annualised CPI inflation rate (equalling 23.82% as per INEGI estimates)[184], summary MxFLS descriptives statistics revealed that while the average *real* value of outstanding debts in fact increased, the mean *real* value of savings decreased between the two waves.[185] While the impact evaluation of

[179] The antitrust reform increased penalties and fines (of up to 10% of gross income) to corporations breaking antitrust regulation or engaging in absolute monopolistic practices (Gutierrez, 2012).

[180] CONAIF for the institution's Spanish name 'Consejo Nacional de Inclusion Financiera' and PNIF for the Spanish 'Politica Nacional de Inclusion Financiera'.

[181] As the proportion of people reporting to have experienced robbery or assault to person and/or to personal property increased from 15.51% in MxFLS-II (2005-2006) to 21.09% in MxFLS-III (2009-2012).

[182] Data based on official statistics estimate that 50,000 drug related homicides occurred during Calderon's 6-year presidential term (2006-2012), while other sources (in the media) claim that more than 120,000 murders happened as result of his militaristic anti-drug policy. However, to contextualise, roughly 63,000 people were murdered in the first half of the presidential term of the successor (2012-2018), Pena Nieto, 50% more than in Calderon's first three years (Lakhani and Tirado, 2016). Furthermore, the homicide rate in Mexico due to cartel related violence under President Andres Manuel Lopez Obrador (2018-2023 term)—and his ridiculous "hugs, not bullets" excuse to allow violence to reign the country—has far exceeded that of any of his predecessors (Stott and Murray, 2024).

[183] As mean savings grew by 6.11% while the mean value of outstanding debts increased by 136%.

[184] Equivalently: by a 0.36% average monthly rate (INEGI, 2024)

[185] Specifically, after bringing MxFLS-III nominal values to MxFLS-II values (2005) it was found that the real value of average outstanding debts increased by 91% while the real value of savings decreased by 14% between the two waves.

the bundle of reforms described above is out of the scope of this study, one can at least argue that MxFLS data suggests that, together, the bundle of reforms coincided with augmented participation in the credit market[186] amongst Mexican households. The latter could have been influenced by the development of the PNIF, one of whose core components is financial education (aimed at improving people's ability to manage their personal finances through increased financial knowledge and to take better financial decisions based on understanding the rights and obligations associated with diverse financial products).[187] While the 2009 fiscal reform increased the value-added tax (VAT) rate by one percentage point and the income tax rate by two percentage points, those changes were implemented when the data collection period of the 2009 MxFLS wave was already underway, thus its effects could not be fully represented by MxFLS-III data.

In addition to the above policy-changes, the 2006 US subprime crisis and the 2008 GFC happened in the period between the two MxFLS waves.[188] Due to its proximity to the US, Mexico saw sharp reductions in foreign direct investment (FDI) and in exports (including of oil which at the time accounted for close to 40% of government revenues). Other ways through which the Mexican economy was affected included: contracted volumes of remittances, decreased outward migration (and increased return migration), increased informal employment and unemployment, higher volatility of short-term capital, and a credit crunch which, along with the depreciation of the MXN peso vis-a-vis the US dollar, provoked the deterioration of banks' balance sheets (Moreno-Brid, 2010). However, a liquidity swap facility agreed between Banco de Mexico (Banxico) and the Federal Reserve as well as an International Monetary Fund (IMF) flexible credit line grant to Mexico helped counteract capital flight swiftly. Additionally, the government undertook a number of countercyclical policies and launched a series of initiatives to protect employment and the income of families (Moreno-Brid, 2010).[189] While as per Table 3.1 and appendix Table 3.A.3 the average *nominal* value of labour income earnt by respondents (over the year prior to each survey) grew by almost 20% between the two waves; after accounting for an average (accumulated) annualised CPI rate of inflation of 23.82% between the two wave-periods, it was found that in *real terms* average labour income decreased by 3% between MxFLS-II and MxFLS-

[186] It is also out of the purview of the current study to analyse the extent to which such increased financial participation was disproportionally attained by a particular socio-economic class rather than by all others.
[187] Thus, in the PNIF financial education is conceptualised in terms of knowledge of financial terms, consumer protection and of financial regulations affecting retail personal finance products rather than in terms of FC.
[188] Some scholars (see Mishkin, 2011) consider both events as part of a single crisis: with the US subprime crisis as a beginning stage (2006 until August 2008) and the more virulent and globally contagious stage (from September 2008 onwards) as the GFC. Here we differentiate them because given Mexico's proximity to the US, the impact of the US subprime crisis in Mexico did not only work through financial markets but also through trade (i.e., decreased exports) and labour mobility (i.e., via decreased outward migration to US and increased return migration, as Mexican migrants working in the construction sector lost employment in US). Both crises inspired part of the policies implemented in Mexico as preliminary responses to the crises in the period between the MxFLS-II and MxFLS-III waves.
[189] Such as a temporary employment program, freezing of petrol prices, reduction in the price of utilities (electricity and gas), and funding for development banks in an effort.

III.[190] The latter decrease can therefore be explained by the challenging economic conditions (both domestically and abroad) of the period extending across both waves.

The literature exploring the relationship between emotions, risk attitudes, and financial choices can help shed light onto how the changing economic conditions of the 2005-2012 period mapped into the patterns of SWB and financial balances revealed by MxFLS data. Part of such literature argues that (exogenous) shocks (like the 2008 GFC) can increase the curvature of Bernoulli-type utility functions,[191] thus altering people's perceived utility loss from bad outcomes and decreasing their willingness to take (both financial and non-financial) risks (Guiso et al., 2018; Loewenstein, 2000). The latter, in turn, can alter financial decisions in terms of credit acquisition and accrual of precautionary savings. Additionally, the literature suggests that RA is an important moderating mechanism through which economic (and other) shocks can affect financial decisions and FWB, a component of SWB. We therefore explore some of the RA patterns observed in the 2005 and 2009 cross-sections of MxFLS data.

Based on Guiso et al. (2008) and on Bostic et al. (1989) we calculate the RP and choice indifference points (CIP)[192] for the selection of questions in each wave that presented respondents choices between a sure amount (represented by one bag and whose payoff amount stayed constant in all decision points or questions) and risky binary gambles (represented through the second bag) with equal probability outcomes that differed from one another through variation in the payoffs offered. Changes in the wording of MxFLS-II and MxFLS-III risk modules entailed that both the sure amounts and the payoffs of the risky gambles offered in the question-sets of each wave differed between them. Nonetheless, it was possible to infer from respondents' answers the amount of money (premia) *at or above which* respondents would choose the risky gamble over the certain money amount and below which they would prefer the sure amount.

Following Guiso et al. (2008)[193] we treat the assured amount of money offered in the question-sets of each wave as an approximation of respondents' certainty equivalent (CE) and calculate the RP as the

[190] The deflation of nominal amounts was calculated using 2005 as base year and the accumulated annualised rate of inflation (as measured by the CPI) between 2005 and 2010, itself approximated by INEGI data to equal a 23.82% inflation rate.
[191] Utility functions implying diminishing marginal returns over their argument (which in Bernoulli's model corresponds to wealth).
[192] Bostic et al. (1989) defined CIP as the monetary threshold above which assured money amounts (i.e., money amounts to be received with certainty) are preferred to gambles and below which gambles are preferred.
[193] Guiso et al. (2018) present their test participants several choices between a risky prospect ($10,000, 50%, $0) and a sequence of certain amounts progressively increasing from $100 to $9000 amongst which participants had to choose the sure amount at which they would give up the risky prospect. Once they chose a sure amount, participants progressed to another part of the questionnaire. Guiso et al. (2018) treated such amounts as CEs and calculated the RP as the difference between the prospect's EV and the CE. In Guiso et al. (2018), the first certain amount of money at which participants chose the certain prospect over the risky prospect identified an upper bound for the person's CE. However, as per the design of the MxFLS risk module questions, CEs emerging from them act as a lower bound.

difference between such CE (or sure amounts) and the EV of the binary gamble corresponding to each question.[194]

Figure 3.4 provides the distribution of our MxFLS-II (2005-2006) sample (top graph) and of our MxFLS-III (2009-2012) sample (bottom graph) according to the five different levels of RA identified by our RA ordinal indicator (as was the case in all other estimations both samples were restricted to people aged 15 to 75 years). Above each graph we include the EV implied by the two bags from which respondents had to choose at each decision point (or question) while the legend below each graph gives the minimum RP that made respondents choose the risky gamble over the sure amount.[195]

The bars in each graph represent the proportion of respondents, per wave sample, who, *at or above* the specified RP, chose the gamble over the sure amount. Since once respondents traded the sure amount for the gamble they moved to a different section of the survey, the sum of the percentages in each graph equals 100.

Given that more RA people require higher premia to choose a gamble over a sure amount, the share of respondents represented by the right-most bars are the most RA in each sample (the least RA are represented by the left-most bars). As noted by each graphs' legend, the most RA category was RA_c 1 whereas the least risk averse (more risk tolerant) level was RA_c 5.

While the wording changes between the two waves entailed that the amounts of the RP thresholds implied by the prospects in each wave differed, the two RP-sets maintained a common hierarchical relationship as they both represented 5 levels ascending in risk tolerance or falling in RA (and in terms of the RP needed to choose the risky alternative). Since, as explained in section 3.4, the wording changes did not modify the latent construct being captured by our two RA ordinal indicators comparisons between them remain valid.[196]

Figure 3.4 suggests that respondents were more RA in 2009-2012 than in the earlier period as two-fifths of respondents in MxFLS-III needed a high RP (of at least $1,250) to be willing to take the risky option over the certain amount of payoff whereas almost four-fifths of the 2005-2006 sample were willing to take the risky gamble over the assured amount when much lower RP (of at most $400) were offered.[197]

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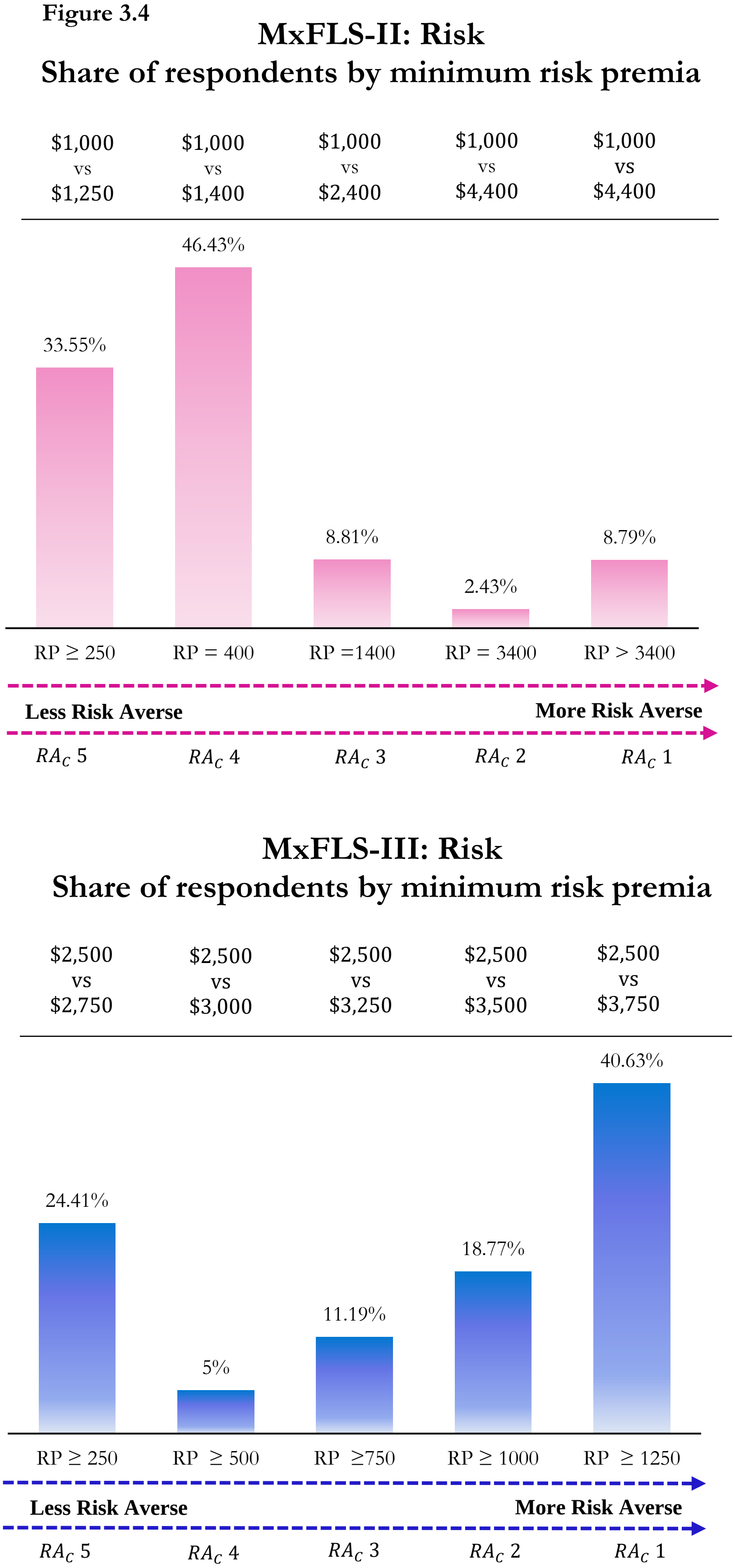
[194] After adapting Guiso et al. (2018) procedure to our data, that is, once we defined the amounts of money offered with certainty by each wave's question-set as their implied CE, our computed RP corresponded to what Bostic et al. (1989) called CIP.

[195] See appendix Figure 3.A.1 and 3.A.2 for more details regarding each wave's risk module questions' sequence and appendix Tables 3.A.1 and 3.A.2 for more information about the implied payoffs of their conforming questions.

[196] As does their use in longitudinal analysis.

[197] Therefore, only about 20% of the 2005 sample exhibited either intermediate or higher levels of RA (conceptualised as requiring an extra monetary reward for risk greater than $400 $_{\text{MXN}}$) whereas 80% of MxFLS-II respondents had more tolerance to risk (conceptualised as requiring an extra monetary reward for risk taking below and at most $400 $_{\text{MXN}}$)

Figure 3.4



Source: Self-generated based on MxFLS-II & MxFLS-III (RA modules).
Calculated over estimation sample (restricted to 15-75 years old).

In other words, the shares of respondents with higher levels of RA were larger than the shares of respondents with low levels of RA in the MxFLS-III sample but not so much in the earlier period sample (MxFLS-II).

The latter aligns with Guiso et al. (2018) who attribute RA increases in Italy between 2007 and 2009 to the 2008 GFC but differs from Weber et al. (2013) who find that risk attitudes in England did not change from September 2008 to June 2009 and explain the lack of temporal variation arguing that their baseline measures were taken when the economic situation was already strenuous.

However, Harrison et al. (2005) argue that the stability of RA over longer (than a few months) timeframe requires consideration of changes in the ‘states of nature’ individuals condition their risk preferences over since it is a priori possible to see a RA change coincide with major shocks, but for it to remain stable once controls for changes in the state of nature are added.

Following Harrison et al. (2005), we control for the plausible effects of the 2008 GFC in our analyses (as this was a relevant external shock happening in the period between the two waves). The lagged-influence of the GFC entailed that Mexico's real GDP contracted in the first part of 2009,[198] but Mexican economic activity rebounded from the fourth quarter of 2009 until at least half of 2010 and flattened thereafter (IMF, 2023; Moreno-Brid, 2010). Hence, the lengthy data collection period of MxFLS-III united with the rapid decrease and rebounding of Mexico's real GDP during the period makes it harder to ascertain the extent to which risk preferences in MxFLS-III fully reflected reactions (in terms of risk attitudes) to changes in the economic context and whether the latter implied a radically different state of nature from that reflected by MxFLS-II preferences.

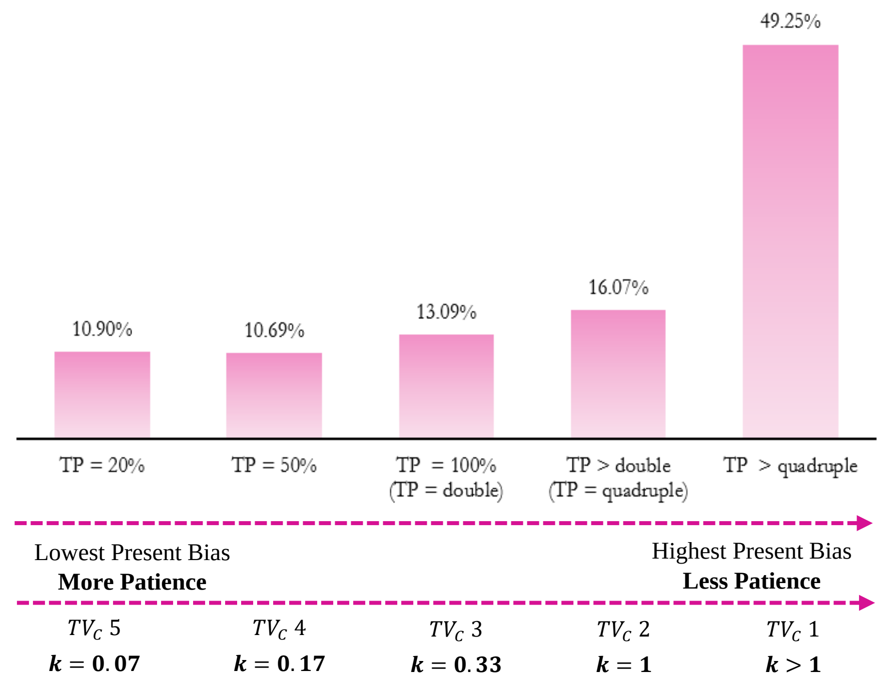
Another important contextual condition that might have affected 'the state of nature' under which preferences were elicited by MxFLS-III respondents pertains to the evolution of the extent of violence and criminality in the country. As noted earlier, an increase in violence accompanied the series of turf wars between drug-cartels and against the government of Felipe Calderon who took office in 2016. Thus, it is possible to infer that the increase in violence between the two waves could account for the higher RA observed in MxFLS-III since violence instigates fear which heightens the cost of uncertainty. As explained below, all our regression estimations included a control that proxied for extent of criminal activity in Mexico by measuring whether respondents had suffered any violent attack or assault to person or property during the 5 years preceding each MxFLS survey. The inclusion of such indicator not only helped to control for the effects of criminality on affective states but also indirectly helped to ensure that 'changes in the state of nature' provoked by increased criminality (e.g. lower sense of safety) were at least partially accounted for.

TV preferences were also likely affected by both the escalation of violence in Mexico in the period concurring between the two MxFLS waves and the contagion effects of the US subprime and related GFC. As hinted at above when reasoning about their effect on RA, these contextual conditions possibly eroded trust (and consumer confidence), increased uncertainty and its subjective costs (through fear). Hence, it is likely that such contextual factors also influenced TV preferences by increasing present bias, lessening patience, and a motivating a higher requisite premium to be willing to delay rewards. Figure 3.5 presents the distribution of each wave's sample (restricted to respondents being 15 to 75 years old) over the five levels of TV (ascending in terms of patience) measured by our ordinal TV indicator.

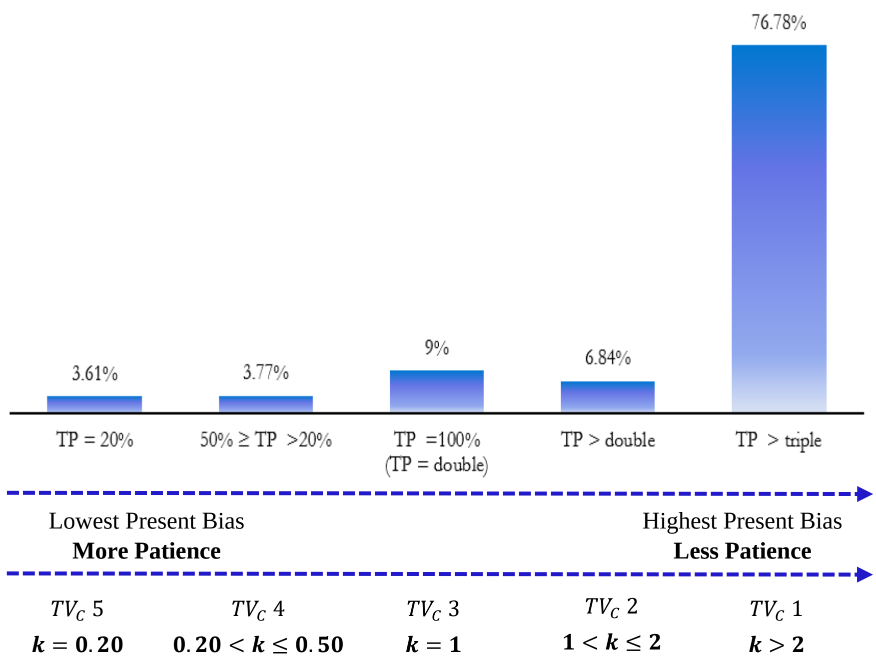
[198] However, the contraction was smaller than the one seen during the 1995 Tequila Crisis.

Figure 3.5

MxFLS-II: Time-Value Preferences
Share of respondents by minimum (time) premia



MxFLS-III: Time-Value Preferences
Share of respondents by minimum (time) premia



Source: Self-generated based on MxFLS-II & MxFLS-III (TV modules).
Calculated over estimation sample (restricted to 15-75 years old).

The bottom legend on each graph gives the '(time) premia' (TP) and discount rate (k) associated with each TV level where the TP is expressed as 'how much larger would the future (delayed) payment need to be for respondents to choose the delayed payoff over the immediate payment[199]' and k was estimated based on Green et al. (1994).[200]

While wording differences between MxFLS-II and MxFLS-III caused the *absolute* values of TP and k to vary between the two waves, each set of TPs and k values maintained the *same hierarchy* and *relative* position, thus capturing the same underlying latent construct—a given extent of patience—which validated their comparison and use for longitudinal analysis.

Figure 3.5 confirms our preliminary inference as it shows how the proportion of respondents choosing the most present-biased option (right-most one) almost doubled from MxFLS-II (2005-2006) to MxFLS-III (2009-2012), passing from 49.25% (or almost half of respondents in MxFLs-II) to at least 76.78% respondents in MxFLS-III.

3.6 EMPIRICAL SPECIFICATION

3.6.1 Specifications

Our empirical assessment consists of two sections: a cross-sectional and a panel analysis. The cross-sectional analysis helps us derive information regarding sources of between-respondents' variability in experienced depression given the status of their financial balances in each wave period. As cross-sectional studies cannot provide definite information about cause-and-effect relationships, we also conduct panel analysis to facilitate the later by evaluating within-respondent's variability. Specifically, the panel analysis allows us to fathom how respondents' affective state varied across time as the specific balances determining their financial position changed.
The preliminary cross-sectional specification of our multivariate regression analyses is given by:

$$CDS_{it} = \mathrm{k}_1 B_{it} + R_{it}\boldsymbol{\vartheta} + T_{it}\boldsymbol{\theta} + X_{it}\boldsymbol{\Gamma} + \xi_{it} \tag{3.1}$$

The main explanatory variable of interest is represented by term B_{it} which, in our design, denotes either one of four different measures of respondents' financial balances at time t, including: individual i's

[199] Instead of using a more standard representation of the premia as the monetary difference between the assured (present-immediate) payment and the future payment.
[200] In their life-span analysis of discounting of delayed rewards, Green et al. (1994) used the expression $V = \frac{A}{(1+kD)^S}$ where A denoted the amount of the delayed payment (i.e. the future payment value), V denoted the value of the payment offered immediately (i.e. the reward today) , D represented the duration of the delay and S stood for a scaling factor used to account for sensitivity to delay. Since in their analysis Green et al. (1994) acknowledged that S was not necessary and that the identity would hold even without controlling for it, we assumed $S = 1$ for all respondents in our sample and solved for k using Green et al. (1994) simplified equation $V = \frac{A}{1+kD}$. We arrived at the expression: $k = \frac{A-V}{VD}$ which we used to calculate the discount rate sets corresponding to the five TV levels in each wave.

sum of unpaid (loan) debts overdue; individual i's sum of savings; i's unpaid DTI ratio and respondent i's DTS ratio.

Even though studies in the related literature tend to employ a single kind of measure to typify households' financial position—either through total stock or flow amounts or through their ratios—following Kahneman (2003), who argued that differences in the presentation of information can evoke different evaluations; we analyse both the total amounts and their ratios to gain a more complete understanding of how people's financial status (framed in absolute or relativised terms) impact their SWB.

While DTI ratios are commonly used to assess the extent to which households are able to service debts and whether people spend beyond their means, we analyse the influence of DTS ratios on SWB as well because the latter ratio also helps to reveal financial resilience, especially that of households with intermittent earnings patterns (e.g. those working in the informal sector, casual employees, old people, entrepreneurs, young people on short-term or zero hours contracts, etc). Assessing the impact of DTS on SWB is all the more relevant in the case of Mexico, where the informal sector provides employment to almost half of the working age population but also in light of Mexican financial diaries research (Meka and Grider, 2016), which documented that poor households (well represented by MxFLS data) habitually use savings (mainly from informal sources) to cover financial obligations.

The terms R_{it} and T_{it} stand for RA and TV preference indicators, respectively, and were included to help us understand whether (and how) do such behavioural controls influence the effects of the key explanatory variable, B_{it}, (in any of its four modalities). The vector of measured socioeconomic characteristics is given through X_{it}[201] and the model's residual is given by ξ_{it} .

The panel form of our empirical model is:

$$CDS_{it} = \mathrm{k}_1 B_{it} + R_{it}\boldsymbol{\vartheta} + T_{it}\boldsymbol{\theta} + X_{it}\boldsymbol{\Gamma} + \Lambda_t + \upsilon_i + \eta_{it} \tag{3.2}$$

Where B_{it} , X_{it}, R_{it} and T_{it} are as above, Λ_t is a time dummy that controls for the sequels of the 2008 GFC and the two final terms in (3.2) signify what is left unexplained, representing respectively unobservable characteristics remaining stable during our period of study (υ_i) and unmeasured time-varying characteristics (η_{it}). As explained in Section 3.4, RA and TV preferences—i.e. R_{it} and T_{it}—are included in the panel FE specification because none of the wording modifications to the RA and TV modules of the two MxFLS waves implied a fundamental change in the latent construct that they measured. Both modules continued measuring the same constructs in the two waves (extent of aversion

[201] As in Chapter 2 these included: age, gender, marital status, highest schooling level, prior year income, victimization indicators (i.e., experience of crime or theft), sense of community belonging, type of location (urban vs rural), income shock experiences, cognitive ability, household asset ownership and living conditions indicator.

to risk and of patience) and both allowed to derive the same order of relationships between the preference level of each construct reported by respondents. Since our panel estimation model (3.2) includes a control for the effects of the GFC crisis on the state of nature under which people preferences were developed (Λ_t) as well as a control for violence or harm experienced during the preceding 5 years (as a proxy for the evolution of criminality in Mexico and contained within the vector of socioeconomic characteristics [X_{it}]), following Harrison et al. (2005) we only expect slow moving changes in RA and or in TV preferences over our relatively short panel period (2005-2012).

3.6.2 Hypotheses

In light of the reviewed literature on the effects of financial balances on SWB our empirical analyses evaluate the following hypotheses:

Table 3.2

Financial Balances Hypothesized Impact	
Regressors	***Effect on CDS***
Main	
$\beta^{Total\ outstanding\ Debts}$	> 0
$\beta^{Total\ Savings}$	$Ambiguous < 0$ or > 0
$\beta^{Debt-to-Income\ Ratio}$	> 0
$\beta^{Debt-to-Savings\ Ratio}$	> 0
Covariates	
$Risk\ Aversion\ (RA)$	$Ambiguous < 0$ or > 0
$Time\ Value\ (TV)\ Preferences$	$Ambiguous$ $High\ Present - Bias \mid (Low\ Patience) > 0$ $Low\ Present - Bias \mid (High\ Patience) < 0$

The hypothesised effects regarding the potential influence of risk attitudes and temporal preferences listed in the second panel of Table 3.2 build on the BE, economic psychology, and FC literatures regarding the effects of such covariates. While RA and TV preferences are considered as possible moderating variables of the effects of financial balances on both FWB and SWB, there is no clear consensus regarding the direct effect of these covariates on SWB.

The tri-partite view of impulsivity in relation to RA recognises there exists overlap between impulsivity and individual differences or heterogeneity in 'risky' behaviours. Under such a view it is argued that impulsivity is associated to sensation and novelty seeking and involves (1) reward sensitivity, (2) loss sensitivity and (3) inhibitory control (Hertwig et al, 2019). At the same time, RA has been found to correlate with aspirational and status seeking behaviours (which may involve novelty) and with loss sensitivity. Pownall et al. (2012) find that people whose aspirations are higher than they actual income

tend to be less RA (and less loss averse) that those whose income is higher than their aspirations (and thus have more risk and loss aversion).
Based on these views, people with lower RA (which can be understood as having more tolerance for risk, uncertainty, and losses) have attributes that at the same time make them more willing to search for immediate rewards (even if risky) which can improve SWB when shorter-term prerogatives are ingrained in their value system. However, they can also harm SWB if impulsive risk-taking leads people to unsustainable financial positions or financial distress thus potentially harming their SWB. At the same time, high RA can cause people to forgo opportunities that could have entailed both material (financial) gains and personal growth, both contributing positively to SWB. Hence, the literature tends to be inconclusive regarding the net effects of risk taking on SWB. It is plausible nonetheless, that the effects of RA on SWB are non-linear and even possibly concave, such that an optimal (balanced, intermediate level of RA) renders the most benefits to SWB (or the least harm). Since the evaluation of such a hypothesis is not central to the analyses in this chapter and beyond its scope, we leave it as an interest area for future research and simply recognise that the effect of RA on our model estimations could be ambiguous.

The influence of TV preferences on SWB is also likely ambiguous.[202] On the one hand more patience (also understood as less present bias) correlates with an enhanced internal locus of control which can improve SWB through the psychological benefits of self-restraint including a sense of autonomy, self-reliance and confidence on one's ability to persevere on one's goals. On the other hand, dual-self theory recognises that behind all our decisions our short-term and longer-term perspectives are involved to a greater or lesser extent that depends on both character constitution (nature), culture and value system (nurture) such that the net utility derived from self-controlled (patient) choices or from impulsive (presently biased) choices varies according to the relative dominance of our short-term self or long-term self-perspectives (Fudenberg and Levine, 2006; Thaler and Shefrin, 1981). Hence, while the propositions: $High\ Present - Bias \mid (Low\ Patience) > 0$ and $Low\ Present - Bias \mid (High\ Patience) < 0$ align with the stipulations of an internal locus of control, the ultimate effect of TV preferences (i.e. of extent of patience and/or of present bias) depends on the conditions that determine the predominance of our short-term selves interests over those of our long-term selves.

3.7 EMPIRICAL ANALYSIS

3.7.1 Financial balances and SWB cross-sectional study

As specified above, our empirical framework employs four distinct measures of the main variable of interest—financial balances (B_{it}) — namely: total (loan) debt overdue; total savings; DTI and DTS

[202] Although easier to summarize in an inequality statement as in Table 3.2 than RAs potential effects.

ratios. Consequently, we run four regression models per wave period, each one corresponding to a different characterisation of the main dependent variable.

Tables 3.3 through 3.6 (below) present cross-sectional results based on MxFLS-III (2009-2012) whereas the cross-sectional results obtained from MxFLS-II (2005-2006) are included in the appendix (Tables 3.A.6 – 3.A.9). To gauge whether innate psychological features or behavioural biases affect the strength and type of effect (positive or negative) of each financial balance on SWB, we include ordinal RA and TV preference indicators (see subsection 3.4) as part of the controls of all specifications. A caveat of ordinal indicators is that the true metric intervals between their levels are unknown. However, following Labovitz (1970) and Regorz (2021) we a-priori assume their levels hold an umbrella monotonic relationship and treat them as interval scale variables.[203] To validate our approach,[204] we use Spearman's (Rank) Correlations (p)[205] to test (monotonic) relationships (including their strength [size], direction, and significance) between our ordinal behavioural indicators, SWB as well as the four different financial balances analysed in this Chapter. Appendix Tables 3.A.4 and Table 3.A.5 report the Spearman's Rank test results of the relationship between the ordinal RA and TV indicators and the abovementioned variables for MxFLS-III and MxFLS-II samples, respectively.

Since values from the Spearman's Rank test can range from -1 to +1 with values further away from zero signifying a stronger monotonic relationship, as per appendix Table 3.A.4 results (first pane), in the MxFLS-III (2009-2012) sample RA had: a positive and significant monotonic relationship with labour income (implying that *greater* risk tolerance (lower RA) was significantly associated [at 0.001 significance] with *higher* labour income values)[206]; a negative and significant monotonic relationship with CDS (implying that a *higher* risk tolerance (less RA) was significantly associated [at 0.001 significance] with *lower* CDS [i.e. with better SWB]); and a negative but significant relationship with DTI ratio (implying that *greater* risk tolerance (lower RA) was significantly associated [at 0.001 significance] with a *decline* in the DTI ratio [i.e. improving resiliency]). While all the above associations were weak but significant, the associations of RA with outstanding debts, savings and the DTS ratio were negative (very weak) and not statistically significant according in 2009-2012.[207]

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[203] That is, we assume an equal interval (or gap) exists between their levels.

[204] Another justification for treating our ordinal RA and TV indicators as interval scale variables is based on Brown (2011) who argued that Likert scales can be used as if they were interval variables. As applied to our data, it is plausible to understand the TV and RA MxFLS modules as (separate) scales where each of the questions in their gamble-sets or lottery-sets constitute the scale items. Since, respondents are assigned to each TV or RA level based on their gamble's-decision/response path on the different items comprising each module (ultimately a sum of values), then under such an interpretation, our ordinal indicators could be used as intervals just as Likert scales are in Brown (2011).

[205] The Spearman's (Rank) Correlation test (p)–a nonparametric test suitable to evaluate (monotonic) relationships (including their strength [size], direction, and significance) between variables measured on an ordinal or continuous scale (i.e., interval or ratio scale). A monotonic relationship is not strictly an assumption of Spearman's correlation as it is possible to estimate Spearman's correlation on a non-monotonic relationship to determine if there is a *monotonic component* to the association.

[206] Follows from the construction of our ordinal RA indicator which is increasing in risk tolerance and decreasing in RA as RA_C 1 denotes the most RA level whereas RA_C 5 denotes the less RA level.

[207] Usually, Spearman rank correlation values are considered as very weak (0 to 0.19), weak (0.2 to 0.39), moderate (0.4 to 0.59), strong (0.6 to 0.79) and very strong (0.8 to 1).

Results in the second pane of appendix Table 3.A.4 show that in the MxFLS-III (2009-2012) sample TV preferences had: a positive and highly significant monotonic relationship with CDS (implying that a greater patience was significantly associated [at 0.001 significance] with a higher CDS [i.e. with worse SWB])[208]; a positive significant monotonic relationship with savings (implying that more patience [less present bias] was significantly associated [at 0.001 significance] with higher savings); a positive (barely) significant monotonic relationship with outstanding debts (implying that more patience [less present bias] was significantly associated [at 0.05 significance] with higher outstanding debts); and a negative highly significant monotonic relationship with DTS ratio (implying that more patience (less present bias) was significantly associated [at 0.001 significance] with lower DTS ratios). While all the above associations were weak but significant, the associations of TV preferences in 2009-2012 with labour income and with DTI ratio were not statistically significant.

Appendix Table 3.A.5 results show that the relationships between RA, financial balances and SWB implied by MxFLS-II (2005-2006) sample data revealed a similar directional pattern to that found in MxFLS-III. RA was found to have a (weak) positive and significant monotonic relationship with labour income while it showed a negative (weak) and significant monotonic relationship with DTI as in the 2009-2012 period. While in MxFLS-II RA revealed a negative (very weak) monotonic relationship with the CDS (as MxFLS-III), it was not significant. Similarly, as in MxFLS-III, RA did not show any statistically significant relationship with the value of outstanding debts, savings or with the DTS ratio during the 2005-2006 period. According to appendix Table 3.A.5 TV preferences had a very similar pattern of relationships with financial balances and SWB in MxFLS-II (2005-2006) to that revealed in the posterior wave (MxFLS-III) as TV preferences were found to have positive and significant monotonic relationships with CDS and with savings as well as a negative significant monotonic relationship with DTS. No significant relationships were found between TV preferences and income, DTI ratio nor with outstanding debts during the 2005-2006 period.

Table 3.3 presents results for the cross-sectional form of model (3.1) specified in Section 3.6 using total value of unpaid debts overdue (log-transformed) as main explanatory variable (B_{it}). All columns in Table 3.3 controlled for the standard set of socioeconomic covariates used in the SWB literature. However, the first column presents baseline results without considering any behavioural indicators in addition to the standard vector of sociodemographic controls (i.e., it excludes RA and TV preference covariates). The second column of results only adds the RA indicator while the third column excludes risk attitudes but includes the TV preference covariate. The fourth column contains both R_{it} and T_{it}.

[208] Follows from the derivation of our ordinal TV indicator which is increasing in patience and decreasing in present bias as TV_C 1 denotes the most patience (least presently biased level) whereas TV_C 5 denotes the least patience (least presently biased level).

The impact of our set of sociodemographic controls was quite similar across all Table 3.3 columns. The variables in X_{it} also showed the same direction and almost identical magnitude of impact as in Chapter 2, revealing relatively stable effects irrespective of the inclusion of FC or of rough financial balances' measures.

In terms of the main explanatory variable, we unambiguously observe from Table 3.3 that, regardless of the column, there is a positive relationship between respondents' total unpaid debts overdue and their experience of symptoms of depression, thus supporting our hypothesis regarding debts effects. Due to the log transformation of our independent variable—the (log) sum of unpaid debts overdue— the estimated effects of the main explanatory variable are not interpreted as linear. For example, holding the sociodemographic variables constant and without evaluating the impact of R_{it} and T_{it}, the first column of Table 3.3 shows that for a 10% increase[209] in the sum of unpaid debts due, the difference in the person's expected mean depression score increased by about 0.03 points ($k_1 \times ln(1.1) = 0.277 \times ln(1.1) = 0.0264$). The effect was similar (only slightly smaller) once we accounted for behavioural controls (see first row columns 2 – 4). Accounting for RA barely made any difference. Controlling for TV preferences faintly attenuated the effects as a 10% increase in the sum of unpaid debts now lead to a 0.0260 rise in CDS. Finally, when controlling for both behavioural characteristics (column 4) a 10% increase in total debts outstanding implied a 0.0258 increase in CDS (i.e., decrease in SWB).[210]

Table 3.3

Unpaid Debts & SWB Cross-sectional Analysis Regression
MxFLS-III (2009-2012)

Calderon Depression Score (CDS)	(1) Baseline (*Unpaid debts*)	(2) Unpaid debts & risk preferences	(3) Unpaid debts & time-value preferences	(4) Unpaid debts, risk & time-value preferences
Sum of unpaid (loan) debts (ln)	0.277***	0.276***	0.272***	0.271***
	(0.0272)	(0.0272)	(0.0272)	(0.0272)
Risk Aversion (categorical)		-0.0655*		-0.0606
		(0.0371)		(0.0372)
Time-value Preferences (categorical)			0.154***	0.154***
			(0.0571)	(0.0571)
Considers the future in financial decisions			0.353***	0.343***
			(0.127)	(0.127)
Spent nothing or < half of monetary gift			-0.201	-0.200
			(0.126)	(0.126)
Fluid Cognition (2009 Raven score)	-0.0692***	-0.0692***	-0.0726***	-0.0725***
	(0.0239)	(0.0239)	(0.0240)	(0.0240)
Age	0.0266	0.0278	0.0252	0.0264
	(0.0290)	(0.0290)	(0.0291)	(0.0291)
Age2	-9.41e-05	-0.000109	-5.55e-05	-7.06e-05
	(0.000379)	(0.000379)	(0.000381)	(0.000381)
Male	-2.405***	-2.399***	-2.389***	-2.383***

[209] Assuming that the percent increase in the variable of interest—the total sum of unpaid loans overdue—is fixed.

[210] From $k_1 \times ln(1.1) = 0.271 \times ln(1.1) = 0.0258$

	(0.136)	(0.136)	(0.136)	(0.136)
Married/domestic partnership	-0.485***	-0.483***	-0.512***	-0.509***
	(0.149)	(0.149)	(0.149)	(0.149)
Elementary School (1st - 6th)	-0.723**	-0.718**	-0.753**	-0.748**
	(0.300)	(0.300)	(0.300)	(0.301)
Jr. High School (7th -9th)	-1.347***	-1.337***	-1.382***	-1.372***
	(0.312)	(0.312)	(0.313)	(0.313)
High School (10th -12th)	-1.612***	-1.597***	-1.656***	-1.641***
	(0.330)	(0.330)	(0.330)	(0.331)
Higher Educ: Univ. & Col. Grad	-2.492***	-2.465***	-2.570***	-2.544***
	(0.354)	(0.355)	(0.357)	(0.358)
Income earnt last 12m (ln)	-0.0162	-0.0161	-0.0191	-0.0190
	(0.0147)	(0.0147)	(0.0147)	(0.0147)
Victim assault or prop theft	1.373***	1.365***	1.341***	1.334***
	(0.158)	(0.158)	(0.159)	(0.159)
Cohesive & inclusive community	-0.910***	-0.913***	-0.917***	-0.920***
	(0.192)	(0.192)	(0.192)	(0.192)
Urban (people >=15,000)	0.568***	0.574***	0.567***	0.572***
	(0.136)	(0.135)	(0.135)	(0.135)
Personal & hhd econ shocks (5 yrs)	1.221***	1.218***	1.201***	1.199***
	(0.130)	(0.130)	(0.130)	(0.130)
Hhd Living Conditions & Assets Index[A]	-0.0407	-0.0334	-0.0490	-0.0419
	(0.0774)	(0.0775)	(0.0774)	(0.0775)
Constant	27.55***	27.67***	27.35***	27.47***
	(0.592)	(0.597)	(0.611)	(0.616)
Observations	13,549	13,549	13,549	13,549
R-squared	0.068	0.068	0.069	0.069

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score (z-score).

Regarding the influence of the ordinal RA and TV preferences indicators (which, as argued above, are treated as interval scale variables), Table 3.3 not only shows that their inclusion did not perturb the stability of our main explanatory variable (the value of outstanding debts) but also shows that TV preferences had a positive, highly significant ($\alpha = 0.001$), and larger magnitude (in absolute terms) influence on CDS while RA revealed a negative, smaller size (in absolute terms) and barely significant ($\alpha = 0.05$) influence when TV preferences were not concurrently considered and a not significant one when TV preferences were also controlled for. Given the particularities of the derivation of our TV indicator (such that TV_c 1 stands for the most presently biased time preference while TV_c 5 gives the least presently biased temporal inclination), the positive coefficients observed for TV in columns (3) and (4) tell us that, as per MxFLS-III data, those with higher level of patience (i.e. lower impulsivity and less present-bias) tended to report more symptoms of depression and anxiety as well (i.e. higher CDS), implying some deterioration of SWB. Similarly, given the specific derivation of our RA indicator (such that RA_c 1 signals the most aversion to risk whilst TV_c 5 denotes the least), the negative coefficient observed in column (2) on the RA indicator suggests that according to the MxFLS-III sample, respondents with greater risk tolerance (i.e. lower RA) tended to experience less symptoms of expression and anxiety (i.e. greater SWB).

Appendix Table 3.A.6 presents results of the same specification (1) applied over MxFLS-II (2005) data. As in wave 3, the total value of unpaid debts overdue (log-transformed) bore a positive (0.1% statistically significant) relationship with experiencing depression symptoms. Therefore, holding everything else constant and not accounting for behavioural and attitudinal preferences, MxFLS-II respondents' SWB deteriorated on average by 0.024 points ($k_1 \times ln(1.1) = 0.248 \times ln(1.1) = 0.024$) whenever their unpaid debts increased by 10% in the 2005 period. The effect slightly decreased in magnitude once TV preferences were taken into account (as in wave 3) but slightly increased with the inclusion of risk attitudes. While not significant results were observed for the risk attitudes indicator in the 2005-2006 period, TV preferences revealed a positive (highly significant, $\alpha = 0.001$) influence on CDS just as in wave 3 (2009-2012 period).
Despite the wording changes between the two waves (which implied that MxFLS-II TV preferences involved a longer waiting period [3 years] and the implied payoffs scaled upwardly to being about 10 times the TV payoffs of the 2009/12 wave), MxFLS-II results pointed to the same conclusions regarding temporal preferences as in MxFLS-III. Respondents with more patience (less impulsivity) had, on average, a higher depression score than those showing less restraint and patience.

Mexicans' shorter time horizons, dual-self theory and time discounting can help explain the pattern of TV preferences in both waves. Research on temporal discounting has shown that present rewards (and losses) are weighted more heavily than future ones. According to dual-self theory, the gap between people's perception of their current and future selves determines the net utility they derive from self-controlled or impulse-driven choices. In light of this, the personal satisfaction the most patient respondents[211] derive from choosing the prudent, patient, and self-regulated option is outweighed by the utility loss they experience from forgoing the possibility of consuming more today as they choose to postpone receipt of payment. Together with empirical evidence documenting greater present bias than future orientation amongst the Mexican population (see Kempson et al. 2013a, 2013b, 2017) the above theories help explain TV preferences' influence on their SWB. The greater prevalence of short-term horizons among Mexicans imply that they tend to assign more weight to the immediate losses they face from choosing to wait than to the subjective gains derived from their sense of (patient) self-control and the objectively larger reward they would receive in the future.

Turning to other financial balances, Table 3.4 presents MxFLS-III results of regressions taking total savings as main explanatory variable. From Table 3.4 we observe that across all MxFLS-III regressions, respondents' total savings were negatively related to their experience of depression and anxiety (therefore positively associated to SWB). Hence, as far as MxFLS-III results were concerned, in the

[211] Who, on average, required the future compensatory amount to only be a fifth higher than todays' amount in order to prefer the future payment over the immediate one.

2009-2012 period the 'safety net', liquidity-provisioning, precautionary role of savings and the intrinsic satisfactions they procured (related to self-autonomy, discipline and goal-achievement) outweighed the potentially detrimental effects of savings on SWB (themselves mostly associated with loss from forgone present consumption and other opportunity costs resulting from 'parking' money in low interest earning savings tools).

Given that the model's key explanatory variable is expressed in natural logs, a non-linear effect was assumed between respondent's total savings and their SWB, implying that as savings increased, their enhancing effect on SWB (due to their negative effect on experienced depression) increased at a decreasing rate. Column 1 shows that, holding the rest of the covariates constant, and without consideration of risk and time preferences, as MxFLS-III respondents' total sum of savings increased by 10%, their expected mean depression score decreased minimally, by approximately 0.004 points ($-0.0418 \times ln(1.1) = -.0040$). As seen from column 2, the magnitude of the influence of savings (in absolute terms) on SWB slightly increased with the inclusion of the RA indicator (without simultaneously considering the effect of TV preferences). However, the negative effect of savings on CDS was more statistically significant and slightly more pronounced in magnitude (i.e., more negative) once TV preferences were accounted for. From columns 3 and 4, we see that a 10% increase in savings yielded an expected mean decrease in CDS of about 0.005.[212] The latter suggests that risk and TV preferences tended to induce a slight positive bias on the influence of savings on CDS when not accounted for.

Table 3.4

Savings Amount & SWB Cross-sectional Analysis Regression MxFLS-III (2009-2012)

Calderon Depression Score (CDS)	(1) Baseline *(Amount of savings)*	(2) Savings amt. & risk preferences	(3) Savings amt. & time-value preferences	(4) Savings amt., risk & time-value preferences
Sum of savings (ln)	-0.0418*	-0.0428**	-0.0566***	-0.0573***
	(0.0213)	(0.0213)	(0.0214)	(0.0214)
Risk Aversion (categorical)		-0.0754**		-0.0687*
		(0.0378)		(0.0379)
Time-value Preferences (categorical)			0.181***	0.181***
			(0.0581)	(0.0581)
Considers the future in financial decisions			0.437***	0.426***
			(0.129)	(0.130)
Spent nothing or < half of monetary gift			-0.292**	-0.290**
			(0.128)	(0.128)
Fluid Cognition (2009 Raven score)	-0.0639***	-0.0640***	-0.0671***	-0.0670***
	(0.0245)	(0.0245)	(0.0245)	(0.0245)
Age	0.0488*	0.0502*	0.0460	0.0473
	(0.0293)	(0.0293)	(0.0294)	(0.0294)
Age2	-0.000368	-0.000386	-0.000308	-0.000325

[212] More specifically a decline of 0.00539 when time-value preferences were considered separately (from: $-0.0566 \times ln(1.1) = -0.00539$) and of 0.00546 when they were considered along with RA predictors (from:$-0.0573 \times ln(1.1) = -0.00546$).

	(0.000383)	(0.000384)	(0.000385)	(0.000385)
Male	-2.401***	-2.394***	-2.382***	-2.376***
	(0.138)	(0.139)	(0.139)	(0.139)
Married/domestic partnership	-0.388**	-0.386**	-0.422***	-0.420***
	(0.151)	(0.151)	(0.151)	(0.151)
Elementary School (1st - 6th)	-0.745**	-0.741**	-0.784***	-0.779**
	(0.303)	(0.303)	(0.303)	(0.303)
Jr. High School (7th -9th)	-1.316***	-1.304***	-1.362***	-1.351***
	(0.315)	(0.315)	(0.315)	(0.316)
High School (10th -12th)	-1.593***	-1.576***	-1.643***	-1.627***
	(0.334)	(0.334)	(0.334)	(0.334)
Higher Educ: Univ. & Col. Grad	-2.358***	-2.326***	-2.436***	-2.406***
	(0.361)	(0.362)	(0.363)	(0.364)
Income earnt last 12m (ln)	-0.00317	-0.00316	-0.00635	-0.00630
	(0.0150)	(0.0150)	(0.0150)	(0.0150)
Victim assault or prop theft	1.481***	1.472***	1.444***	1.437***
	(0.161)	(0.162)	(0.162)	(0.162)
Cohesive & inclusive community	-0.924***	-0.927***	-0.931***	-0.934***
	(0.197)	(0.197)	(0.197)	(0.197)
Urban (people >=15,000)	0.609***	0.615***	0.607***	0.613***
	(0.138)	(0.138)	(0.138)	(0.137)
Personal & hhd econ shocks (5 yrs)	1.303***	1.300***	1.274***	1.271***
	(0.132)	(0.132)	(0.132)	(0.132)
Hhd Living Conditions & Assets Index[A]	-0.01000	-0.00154	-0.0143	-0.00640
	(0.0788)	(0.0788)	(0.0787)	(0.0788)
Constant	27.22***	27.36***	27.04***	27.17***
	(0.598)	(0.603)	(0.618)	(0.623)
Observations	13,326	13,326	13,326	13,326
R-squared	0.059	0.060	0.061	0.061

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score (z-score).

The effect of risk and TV preferences presented the same pattern as in the regression where total unpaid debts due was our main explanatory variable [213]with the coefficient of the RA indicator suggesting that on average respondents with more risk tolerance experienced less depression and anxiety while the coefficient on TV preferences suggested that respondents with more patience, less impulsivity and more restraint reported, on average, a higher CDS.

Table 3.A.7 in the appendix presents MxFLS-II (2005) results of cross-sectional SWB regressions using respondents' sum of savings (expressed in natural logs) as main explanatory variable. In contrast with wave 3 findings, the sum of savings showed a small positive impact (statistically significant at 1%) on depression. This implied that as far as MxFLS-II results were concerned, in 2005 the losses (opportunity costs) from postponing consumption in order to save loomed larger than any potential present and longer-term benefits from saving and were also larger than the losses perceived from saving in 2009-2012. The contrasting results observed in each MxFLS wave regarding the influence of savings on CDS

[213] However, the RA indicator was the more significant (reaching at most 1% significance) in the context of the model considering savings as main explanatory variable than in the case of evaluating the concurrent influence of RA and any other financial balance.

can be best understood in light of the differences in the DTS and DTI ratios between the two waves. While in MxFLS-II (2005-2006) the reported value of savings was, on average, 3.89 times the reported value of outstanding debts; in MxFLS-III (2009-2012) the value of savings was, on average, only 1.79 times the value of outstanding debts. Similarly, while in MxFLS-II (2005-2006) labour income was, on average, 37.41 times the value of outstanding debts; in MxFLS-III (2009-2012) labour income was, on average, only about 18.95 times the size of respondents' outstanding debts unpaid. Furthermore, as alluded to in section 3.5, after adjusting both the nominal value of outstanding debts and of savings for inflation accruing between MxFLS-II and MxFLS-III, the average real value of outstanding debts increased between the two waves while the mean real value of savings decreased. Together, the above descriptive statistics highlight that the liquidity-provision and 'self-insuring' benefits of savings (an important source of funds for debt repayment for Mexicans as noted in subsection 3.2.3)[214] were more salient during the 2009-2012 period than in 2005-2006 as savings were less abundant (relative to debts and income) for the average respondent in the former period than during the latter. Thus, savings were found to influence CDS downward, (improving SWB) in 2009-2012 but not in 2005-2006 because in MxFLS-II, savings' higher relative abundance diminished their perceived utility and salience for respondents such that intrinsic benefits of savings (including providing liquidity to service debts) were not enough to outweigh the subjective costs of postponed consumption in 2005-2006 while they were so in 2009-2012. In other words, the heightened perceived usefulness of savings as a source for debt repayments and future liquidity for respondents during 2009-2012 (itself stemming from their scarcer abundance relative to debts in the latter period) helps to explain why they had, on net, beneficial influence on SWB in wave 3.

Appendix Table 3.A.7 also shows that based on the MxFLS-II sample, TV preferences appeared to influence CDS upward (as in the cross-sectional results of wave 3 [Table 3.4]) but with less statistical significance (only at 5%) while risk attitudes were not found to be significant.

Our non-gamble based, self-reported measure for considering the future in financial decisions and the binary indicator signalling choice to spend nothing or at most half of a random monetary gift received (both also measuring extent of patience and temporal orientation) revealed the same direction of influence on CDS on both the specification model based on MxFLS-III data considering outstanding debts as key regressor (Table 3.3) as well as on the one considering savings as key explanatory variable (also based on 2009-2012 data and reported in Table 3.4). Consistent with the order of influence revealed by the main TV preferences indicator in both specifications, the binary control indicating tendency to consider the future when making financial decisions consistently revealed a positive and highly significant (at $\alpha = 0.01\%$) influence on CDS. Thus, implying that those with a more precautionary and longer-term orientation tended to experience, on average, slightly more of the

[214] See Meka and Grider (2016)

symptoms associated with depression and anxiety, which, as explained above, can be explained through dual-self theory. However, considering the future when conducting financial decisions did not reveal significant influence on CDS on the models using outstanding debts and savings as main predictors based on MxFLS-II (2005-2006) data. Spending at most half of a monetary gift received revealed a negative influence on CDS (therefore suggesting improved SWB) on specifications pertaining to outstanding debts and those regarding savings on both waves. However, while according to wave 2 results the indicator was always significant, in wave 3 estimations the 'spending at most half of a monetary gift received' indicator was only significant when the effects of savings were being assessed. Moving beyond the impact of gross (total) amounts of financial balances on SWB, we evaluate the impact of DTI ratios, to gauge the extent to which having (difficult to service) outstanding debts entail a problematic psychological burden on people's SWB. Table 3.5 presents MxFLS-III (wave 3) regression results using DTI ratios as key explanatory variable while appendix Table 3.A.8 gives the corresponding results for MxFLS-II (wave 2). DTI ratios help to track individuals' ability to service recurring debt payments from their income generation. As such, they can be used to clarify the extent of people's solvency and the degree to which people's total unpaid debts could be interpreted as signs of bad debt management and as potential drivers of financial distress.

Table 3.5

Unpaid Debt to Labour Income & SWB Cross-sectional Analysis Regression MxFLS-III (2009-2012)

Calderon Depression Score (CDS)	(1) Baseline *(Unpaid debts to labour income ratio)*	(2) Unpaid debts to lab. income & risk preferences	(3) Unpaid debts to lab. income & time-value preferences	(4) Unpaid debts to lab. income, risk & time-value pref.
Debts to labour income ratio (ln difference)	0.0744***	0.0740***	0.0756***	0.0753***
	(0.0135)	(0.0135)	(0.0135)	(0.0135)
Risk Aversion (categorical)		-0.0723*		-0.0665*
		(0.0372)		(0.0373)
Time-value Preferences (categorical)			0.163***	0.163***
			(0.0570)	(0.0570)
Considers the future in financial decisions			0.392***	0.382***
			(0.127)	(0.128)
Spent nothing or < half of monetary gift			-0.279**	-0.277**
			(0.127)	(0.127)
Fluid Cognition (2009 Raven score)	-0.0661***	-0.0662***	-0.0699***	-0.0698***
	(0.0240)	(0.0240)	(0.0240)	(0.0240)
Age	0.0833***	0.0843***	0.0793***	0.0804***
	(0.0283)	(0.0284)	(0.0285)	(0.0285)
Age2	-0.000763**	-0.000777**	-0.000691*	-0.000705*
	(0.000373)	(0.000373)	(0.000374)	(0.000375)
Male	-2.112***	-2.107***	-2.106***	-2.102***
	(0.133)	(0.133)	(0.133)	(0.133)
Married/domestic partnership	-0.390***	-0.388***	-0.423***	-0.420***
	(0.149)	(0.149)	(0.149)	(0.149)
Elementary School (1st - 6th)	-0.688**	-0.683**	-0.723**	-0.718**
	(0.302)	(0.302)	(0.302)	(0.302)
Jr. High School (7th -9th)	-1.228***	-1.218***	-1.271***	-1.260***
	(0.313)	(0.313)	(0.313)	(0.313)

High School (10th -12th)	-1.519***	-1.503***	-1.571***	-1.555***
	(0.331)	(0.331)	(0.331)	(0.331)
Higher Educ: Univ. & Col. Grad	-2.334***	-2.306***	-2.425***	-2.397***
	(0.356)	(0.357)	(0.358)	(0.359)
Victim assault or prop theft	1.441***	1.432***	1.402***	1.394***
	(0.158)	(0.158)	(0.159)	(0.159)
Cohesive & inclusive community	-0.916***	-0.919***	-0.922***	-0.925***
	(0.193)	(0.193)	(0.193)	(0.193)
Urban (people >=15,000)	0.625***	0.630***	0.620***	0.625***
	(0.136)	(0.135)	(0.136)	(0.135)
Personal & hhd econ shocks (5 yrs)	1.285***	1.282***	1.260***	1.257***
	(0.131)	(0.131)	(0.130)	(0.130)
Hhd Living Conditions & Assets Index[A]	-0.0283	-0.0203	-0.0364	-0.0287
	(0.0776)	(0.0776)	(0.0776)	(0.0776)
Constant	26.60***	26.74***	26.47***	26.60***
	(0.582)	(0.587)	(0.601)	(0.606)
Observations	13,549	13,549	13,549	13,549
R-squared	0.062	0.062	0.063	0.064

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score (z-score).

In practice, DTI ratios are part of the metrics regularly used by lending institutions to assess whether to extend more credit to a borrower and are typically computed using monthly figures of individuals' outstanding debt balances and sources of income. Hence, their analysis has traditionally adopted the lenders perspective (i.e., they have been used to assess the rationality of credit offerings from a business growth perspective). In this chapter we adopt the borrowers' perspective instead, by assessing DTI ratios impact on the SWB of individuals requesting and using loaned amounts. Given the data available through MxFLS, the DTI ratios we used are based on annual figures that only took labour income into consideration (and no other sources of funds).

To align with the empirical literature, in the analysis we represent DTI ratios as natural log differences between respondent's unpaid debts due and their income. Following the literature, the higher the DTI ratio, the more burdensome the debt. Thus, we expect our DTI ratio coefficients to be positive. Table 3.5 and appendix Table 3.A.8 confirm our hypothesis, as wave 3 and wave 2 results revealed a positive relationship between DTI ratios and the CDS. While both estimations used *nominal* DTI values (expressed as log differences) we expect our hypothesis to hold for *real* DTI values in both waves as well since (as hinted at in section 3.5) DTI values did not decrease after they were adjusted for inflation; rather, *real* DTI ratios value increased over the two waves (granted by a lower growth rate than nominal DTI values).[215] Results from Table 3.5 and appendix Table 3.A.8 also stress the importance—beyond

[215] Using an accumulated annual inflation rate of 23.82 calculated as the mean value of accumulated inflation over the periods: 2005-2009, 2005-2010, 2005-2011 and 2005 and 2012 (all based on official INEGI and Banxico data) it was found that while, on average, *nominal* outstanding *debts* values *increased* by 136.72% between the two MxFLS waves, *real* outstanding *debt* values *increased* by roughly 91% (once inflation was accounted for). However, while according to our two MxFLS wave samples, *nominal* reported labour *income* values on average *grew* by 19.88% between the two waves, their *real* value *declined* by about 3% once inflation was controlled for. Therefore, while *nominal* DTI values *increased*, on average, by 97.46%, the *real* value of DTI ratios, on average *increased*, by 59%, a lower, yet still substantial rate of (inflation-adjusted) growth.

simply evaluating the effect of gross debt amounts—of considering the impact of outstanding debts relative to other financial balances (such as income and savings) from which resources could be allocated to liquidate debts in order to avoid shallow categorisations of diverse levels of indebtedness as problematic. The latter is made evident by the fact that in wave 3 the average size (magnitude) of the influence of outstanding debts on CDS was 3.7 times the size (magnitude) of the influence denoted by DTI coefficients, while in wave 2 the magnitude of debts' influence on CDS was 3.6 times the size of the influence of 2005-2005 DTI ratios on CDS. Thus, while both key explanatory variables—outstanding debts and DTI ratios—supported our hypotheses by revealing an upward impact on the experience of depression and anxiety symptoms (i.e. positive impact on CDS, negative on overall SWB), the magnitude of the influence of DTIs on SWB is more nuanced as it accounts for people's potential ability to service debts through their own resources. Thus, in wave 3, the influence of DTIs on SWB was only about 27% the impact revealed by debts alone and in wave 2 it was about 28% of the revealed influence of debts (considered in absolute rather than relative terms).

Overall, a 10% increase in each wave's average DTI ratio, approximately implied, in both waves, a 0.7% increase in respondents' mean expected CDS (after rounding). Additionally, as when considering the effect of total debts, the magnitude of the effect of DTI ratios on CDS changed little after controlling for risk and TV preferences.[216] R_{it} and T_{it} showed the same pattern of effect as in their respective waves' prior two tables evaluating the effects of total unpaid debts or of total savings.

Since it could also be possible to have both high debts and high savings (thus high gross debt but low in net), our final cross-sectional evaluation (presented in Table 3.6 and appendix Table 3.A.9) evaluates the effect of DTS ratios on SWB. Like the more traditional DTI quotients, DTS ratios aim to proxy the ease with which MxFLS respondents *could* service their unpaid debts overdue, but by drawing on their savings rather than on labour income. Hence, the DTS ratio is an additional criterion that (like the DTI ratio) measures the extent to which debt could turn to be psychologically troublesome. In the analysis, we represent (*nominal*) DTS ratios as natural log differences between (*nominal*) unpaid debts overdue and (*nominal*) savings (as we analogously did with DTI ratios). Looking at MxFLS-III data first, comparing Table 3.6 with Table 3.5 results reveals that the effect of DTS ratios on CDS were larger than the effects of DTI ratios on CDS. Table 3.6 shows that a 10% increase in the 2009 average DTS ratio bore a positive statistically significant effect (at 0.1% level) implying a 1.43% increase[217] in MxFLS-III respondents' average depression score (about ~0.0073 percentage points larger in magnitude than the average impact of the DTI ratio). In contrast, appendix Table 3.A.9 shows that

[216] Impact of DTI ratio became slightly larger mostly when time-value preferences were accounted for.
[217] I.e. an increase of 0.0143 on CDS.

MxFLS-II average DTS ratio influence on CDS, while positive and of close magnitude as the influence of MxFLS-II (wave 2) DTI ratios, was statistically insignificant.[218]

Table 3.6

Unpaid Debt to Savings & SWB Cross-sectional Analysis Regression MxFLS-III (2009-2012)

Calderon Depression Score (CDS)	(1) Baseline *(Unpaid debts to savings ratio)*	(2) Unpaid debts to savings & risk preferences	(3) Unpaid debts to savings & time-value preferences	(4) Unpaid debts to savings, risk & time-value pref.
Debts to savings ratio (ln difference)	0.149***	0.149***	0.157***	0.157***
	(0.0175)	(0.0175)	(0.0175)	(0.0175)
Risk Aversion (categorical)		-0.0717*		-0.0637*
		(0.0377)		(0.0378)
Time-value Preferences (categorical)			0.190***	0.189***
			(0.0579)	(0.0579)
Considers the future in financial decisions			0.505***	0.495***
			(0.129)	(0.129)
Spent nothing or <half of monetary gift			-0.223*	-0.222*
			(0.128)	(0.128)
Fluid Cognition (2009 Raven score)	-0.0591**	-0.0593**	-0.0636***	-0.0636***
	(0.0243)	(0.0243)	(0.0243)	(0.0243)
Age	0.0346	0.0359	0.0313	0.0326
	(0.0293)	(0.0293)	(0.0294)	(0.0294)
Age2	-0.000203	-0.000219	-0.000134	-0.000151
	(0.000383)	(0.000384)	(0.000385)	(0.000385)
Male	-2.394***	-2.387***	-2.373***	-2.367***
	(0.138)	(0.138)	(0.138)	(0.139)
Married/domestic partnership	-0.431***	-0.430***	-0.472***	-0.470***
	(0.151)	(0.151)	(0.151)	(0.151)
Elementary School (1st - 6th)	-0.746**	-0.741**	-0.788***	-0.783***
	(0.302)	(0.302)	(0.302)	(0.302)
Jr. High School (7th -9th)	-1.345***	-1.334***	-1.398***	-1.387***
	(0.314)	(0.314)	(0.314)	(0.314)
High School (10th -12th)	-1.571***	-1.555***	-1.630***	-1.614***
	(0.333)	(0.333)	(0.333)	(0.333)
Higher Educ: Univ. & Col. Grad	-2.271***	-2.242***	-2.371***	-2.343***
	(0.359)	(0.360)	(0.361)	(0.362)
Income earnt last 12m (ln)	-0.00478	-0.00481	-0.00886	-0.00882
	(0.0149)	(0.0149)	(0.0149)	(0.0149)
Victim assault or prop theft	1.476***	1.468***	1.433***	1.426***
	(0.160)	(0.160)	(0.161)	(0.161)
Cohesive & inclusive community	-0.912***	-0.915***	-0.923***	-0.925***
	(0.196)	(0.196)	(0.196)	(0.196)
Urban (people >=15,000)	0.603***	0.609***	0.602***	0.607***
	(0.138)	(0.137)	(0.137)	(0.137)
Personal & hhd econ shocks (5 yrs)	1.264***	1.261***	1.231***	1.229***
	(0.132)	(0.132)	(0.132)	(0.132)
Hhd Living Conditions & Assets Index[A]	0.0146	0.0223	0.00413	0.0113
	(0.0784)	(0.0784)	(0.0783)	(0.0784)
Constant	27.47***	27.60***	27.22***	27.34***
	(0.598)	(0.603)	(0.617)	(0.622)

[218] While not significant, in wave 2, the estimated coefficients of DTS ratios were on average 0.003 percentage points smaller than the estimated wave 2 DTI coefficients (which showed significance in both waves).

	13,317	13,317	13,317	13,317
Observations	0.064	0.064	0.066	0.067
R-squared	0.149***	0.149***	0.157***	0.157***

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score (z-score).

Nonetheless, in both waves, the effects of all other covariates, (including R_{it} and T_{it}, other behavioural and attitudinal controls [considering the future and spending nothing or at most half of a monetary gift received] and of the sociodemographic characteristics in X_{it}), echoed the pattern of results observed in the prior three cross-sectional regression results from specifications taking the other financial balances as main explanatory variable.

It is important to note that, across all four financial balances cross-sectional specifications (in both waves) the indicator we used to proxy for the level of experienced violence and criminality in Mexico consistently showed, as expected, and hypothesised, a highly statistically significant (at $\alpha = 0.1\%$) positive influence on depression and anxiety symptoms. Moreover, the size (magnitude of its implied impact was much higher than that revealed on the financial balances variables, R_{it} and T_{it} or any other behavioural and sociodemographic control) thus attesting to its (unsurprising) substantive significance as a determinant of SWB in Mexico. Similarly, other correlates of SWB—including experience of personal or household economic shocks over prior five years, residing in a locality with more than 15,000 inhabitants and living in a community or neighbourhood perceived to be cohesive and/or inclusive—revealed the hypothesised impact on CDS across all four cross-sectional financial balances regressions in both waves.

To conclude this section, Table 3.7 summarizes the observed patterns of effects (per wave) of each of the four financial balances considered in the four (per wave) cross-sectional models as well as of the models' risk attitudes and TV preferences.

Table 3.7

	MxFLS-III (2009-2012)			**MxFLS-II (2005-2006)**		
Regression 1	$\boldsymbol{\beta^{Debts} > 0}$	$RA < 0$	$TV > 0$	$\beta^{Debts} > 0$	$RA > 0$	$TV > 0$
Regression 2	$\boldsymbol{\beta^{Saving} < 0}$	$RA < 0$	$TV > 0$	$\beta^{Saving} > 0$	$RA > 0$	$TV > 0$
Regression 3	$\boldsymbol{\beta^{DTI} > 0}$	$RA < 0$	$TV > 0$	$\beta^{DTI} > 0$	$RA > 0$	$TV > 0$
Regression 4	$\boldsymbol{\beta^{DTS} > 0}$	$RA < 0$	$TV > 0$	$\beta^{DTS} > 0$	$RA > 0$	$TV > 0$

Significance: 0.1% 1% 5% 0 % **Significance:** 0.1% 1% 5% 0 %

Significant results are represented by coloured cells where darker hues signal higher levels of significance than lighter (attenuated) hues (as expressed by each panel's label). Non-significant results are represented in uncoloured (white) cells. From comparing Table 3.7 with Table 3.2—which contained the principal hypotheses of this chapter—it can be seen that most of the hypotheses were supported by the cross-sectional estimations, especially by those based on wave 3 sample data.

3.7.2 Financial balances and SWB longitudinal analysis

Results from subsection 3.7.1 are interpreted as the expected percentage variation across the depression score of identical individuals surveyed in each wave period when the amount of debt arrears, amount of savings, DTI ratio, or DTS ratio of respondents increased with respect to that of other respondents.
As a snapshot in time, the cross-sectional findings from subsection 3.7.1 may not provide definite information about cause-and-effect relationships. While useful to identify the patterns of the variables of interest and whether they conformed with our expectations in different wave-periods (2005-2006 vs 2009-2012), the uncontrolled-for individual heterogeneity of cross-sectional estimations can cause spurious rejection of exogeneity and result in confounded effects. Hence, the cross-sectional regressions of part 3.7.1 helped us to identify a number of important static associations, many of which supported the hypothesised relationships regarding the effects of financial balances and of behavioural (RA and TV preference) covariates stipulated in Table 3.2 of sub-section 3.6.2.
In contrast to cross-sectional data analysis, by combining time series and cross-sectional dimensions, longitudinal panel data analysis helped us explore the dynamic, rather than static, effects of financial balances on SWB. Additionally, by limiting confounding from unobserved heterogeneity (through FE estimations) panel analysis allowed us to offer more plausible evidence for causality of the underlying processes (VanderWeele et al. 2020).

As noted previously[219], despite the wording changes in MxFLS-II and MxFLS-III risk and TV modules' questionnaires, we include the RA and TV ordinal indicators (R_{it} and T_{it}) derived from them to the longitudinal analysis because the specific personal characteristic or attribute measured by the RA and TV modules in each wave did not itself change due to the wording modifications. The risk and TV modules in each wave still measured, respectively, individuals' extent of aversion to risk (conversely denoting tolerance to risk and thus to uncertainty) and individuals' extent of patience (self-control or conversely of impulsivity). Moreover, as noted in sections 3.4, 3.5 and 3.6, we were able to classify respondents' choices to the risk-gamble questions-sequence and to the TV-lotteries sequence of questions into levels of RA and of TV preferences directly comparable between the two waves, i.e. into levels that maintained the same hierarchy and proportionality relationship (regarding extent of each

[219] See sections 3.4, 3.5 and 3.6.

behavioural attribute) amongst each other in the two waves (regardless of the variations in the wording of the RA and TV modules from which they were derived).

Given the above and capitalising on the variability of MxFLS respondents' holdings of financial balances and on the content consistency of the MxFLS credit information modules, Tables 3.8 through 3.11 present the findings from FE panel regressions evaluating the causal effects of the four main explanatory financial balances considered in subsection 3.7.1 to see how these affected the SWB of MxFLS respondents over the two wave periods, together comprising the timeframe 2005-2012.
Our panel FE estimations were intended to parallel the cross-sectional regressions presented in subsection 3.7.1 whilst incorporating the time variability dimension of the variables for which a panel was possible. Therefore, the panel FE estimations followed the form of section 3.6's longitudinal model specification (3.2) which included a binary (time) control to capture the sequels of the 2008 GFC and, as the cross-sectional specifications model (3.1), also contained an indicator for whether respondents had been victims of assault, robbery or other criminal act to proxy for the extent of violence and criminality experienced by respondents over our panel timeframe. Following Harrison et al. (2005), given the inclusion of the latter two controls—which attempt to capture any changes in the state of nature under which preferences are conditioned—we expect risk and TV preferences to adjust slowly over our panel analysis period (2005-2012).

Table 3.8 presents panel FE findings from the specification using unpaid outstanding debts as the main financial balance regressor. From it we can observe that the within-time variation of total unpaid debts was positive and highly significant (at α=0.001) thus supporting our hypothesis of the psychological toll that having unpaid debts exerts, raising depression and anxiety symptoms amongst high-value debt holders.

Table 3.8

Unpaid Debts & SWB Panel Analysis Regression

Calderon Depression Score (CDS)	(1) ***Fixed Effects*** Baseline (*Unpaid debts*)	(2) ***Fixed Effects*** Unpaid debts & risk preferences	(3) ***Fixed Effects*** Unpaid debts & time-value preferences	(4) ***Fixed Effects*** Unpaid debts, risk & time-value preferences
Sum of unpaid (loan) debts (ln)	0.165*** (0.0509)	0.164*** (0.0509)	0.167*** (0.0510)	0.166*** (0.0510)
Risk Aversion (categorical)		-0.0746 (0.0656)		-0.0727 (0.0657)
Time-value Preferences (categorical)			0.0987 (0.0894)	0.102 (0.0893)
Considers the future in financial decisions			0.336 (0.232)	0.326 (0.233)
Spent nothing or < half of monetary gift			0.0335 (0.217)	0.0368 (0.217)
Fluid Cognition (2009 Raven score)	-0.0430	-0.0419	-0.0437	-0.0426

	(0.0447)	(0.0448)	(0.0447)	(0.0448)
Age	0.196	0.198	0.190	0.191
	(0.152)	(0.152)	(0.152)	(0.152)
Age2	-0.00194	-0.00195	-0.00189	-0.00191
	(0.00149)	(0.00149)	(0.00149)	(0.00150)
Married/domestic partnership	-0.627	-0.631	-0.642	-0.645
	(0.393)	(0.393)	(0.395)	(0.394)
Elementary School (1st - 6th)	0.986	0.975	1.051	1.040
	(0.839)	(0.839)	(0.846)	(0.846)
Jr. High School (7th -9th)	1.388	1.384	1.429	1.426
	(0.931)	(0.930)	(0.936)	(0.935)
High School (10th -12th)	1.483	1.490	1.506	1.512
	(0.972)	(0.971)	(0.977)	(0.976)
Higher Educ: Univ. & Col. Grad	1.461	1.483	1.475	1.496
	(1.011)	(1.009)	(1.015)	(1.013)
Income earnt last 12m (ln)	-0.00826	-0.00809	-0.0116	-0.0114
	(0.0294)	(0.0294)	(0.0294)	(0.0294)
Victim assault or prop theft	1.031***	1.030***	1.035***	1.034***
	(0.310)	(0.309)	(0.308)	(0.308)
Cohesive & inclusive community	-0.423	-0.426	-0.447	-0.450
	(0.353)	(0.353)	(0.355)	(0.355)
Urban (people >=15,000)	0.161	0.146	0.139	0.126
	(0.556)	(0.556)	(0.559)	(0.558)
Personal & hhd econ shocks (5 yrs)	0.519**	0.509**	0.499**	0.489**
	(0.247)	(0.247)	(0.247)	(0.247)
Hhd Living Conditions & Assets Index[A]	-0.122	-0.121	-0.133	-0.132
	(0.203)	(0.203)	(0.203)	(0.203)
Post Global Financial Crisis (2009-2012)	0.394	0.282	0.510	0.404
	(0.475)	(0.487)	(0.493)	(0.505)
Constant	20.57***	20.83***	20.32***	20.56***
	(3.713)	(3.710)	(3.705)	(3.701)
Observations	20,780	20,780	20,780	20,780
R-squared	0.019	0.020	0.020	0.021
Number of groups	16,955	16,955	16,955	16,955

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score (z-score).

The only other two significant controls in Table 3.8 were having been victim of a crime or theft and having had experiences of a personal and/or economic shock. Both sociodemographic covariates revealed a positive effect (respectively with 0.1% and 1% levels of statistical significance) on changes in experienced depression and anxiety symptoms after time-invariant heterogeneity across respondents was controlled for, an unsurprising result given the increase in violence in Mexico over 2005-2012. While Table 3.8 results suggested the within-time variation in RA tended to improve SWB (conversely that any possible increases in risk tolerance over our time-period exerted a small negative influence on CDS), such results were not statistically significant thus we are unable to conclude they were not a chance occurrence. Similarly, the TV preferences indicator suggested within-time variation had a small positive size impact on CDS but equally not significant.

Considering potential longitudinal effects of savings on SWB, Table 3.9 revealed that total amount of savings did not exert any statistically significant impact on SWB once time-invariant heterogeneity across respondents was accounted for. Indeed, the only two significant controls in the panel FE model specification taking savings as the main explanatory financial balance of interest, were 'personal and household economics shocks experienced over prior 5 years' and the indicator for 'having been victim of assault, property theft or other harm to person and property'. As in Table 3.8, both of these sociodemographic covariates revealed a positive effect on CDS (respectively with 1% and 0.1% statistical significance).

Table 3.9

Savings Amount & SWB Panel Analysis Regression

Calderon Depression Score (CDS)	(1) ***Fixed Effects*** Baseline (*Savings*)	(2) ***Fixed Effects*** Savings & risk preferences	(3) ***Fixed Effects*** Savings & time-value preferences	(4) ***Fixed Effects*** Savings, risk & time-value preferences
Sum of savings (ln)	0.0571 (0.0410)	0.0561 (0.0410)	0.0509 (0.0411)	0.0500 (0.0411)
Risk Aversion (categorical)		-0.0550 (0.0675)		-0.0539 (0.0676)
Time-value Preferences (categorical)			0.0802 (0.0912)	0.0821 (0.0911)
Considers the future in financial decisions			0.261 (0.236)	0.255 (0.237)
Spent nothing or < half of monetary gift			-0.0102 (0.221)	-0.00699 (0.222)
Fluid Cognition (2009 Raven score)	-0.0397 (0.0458)	-0.0390 (0.0458)	-0.0404 (0.0457)	-0.0397 (0.0458)
Age	0.172 (0.155)	0.174 (0.155)	0.168 (0.155)	0.170 (0.155)
Age2	-0.00163 (0.00153)	-0.00164 (0.00153)	-0.00160 (0.00153)	-0.00162 (0.00153)
Married/domestic partnership	-0.476 (0.400)	-0.479 (0.399)	-0.487 (0.402)	-0.490 (0.402)
Elementary School (1st - 6th)	0.981 (0.858)	0.972 (0.858)	1.029 (0.864)	1.020 (0.864)
Jr. High School (7th -9th)	1.368 (0.957)	1.364 (0.957)	1.398 (0.961)	1.394 (0.961)
High School (10th -12th)	1.514 (0.999)	1.517 (0.999)	1.528 (1.003)	1.531 (1.003)
Higher Educ: Univ. & Col. Grad	1.683 (1.047)	1.699 (1.046)	1.686 (1.050)	1.702 (1.049)
Income earnt last 12m (ln)	-0.0107 (0.0303)	-0.0106 (0.0303)	-0.0134 (0.0303)	-0.0132 (0.0303)
Victim assault or prop theft	1.085*** (0.317)	1.086*** (0.317)	1.091*** (0.316)	1.092*** (0.316)
Cohesive & inclusive community	-0.450 (0.359)	-0.452 (0.359)	-0.467 (0.362)	-0.469 (0.362)
Urban (people >=15,000)	0.157 (0.585)	0.146 (0.584)	0.140 (0.587)	0.130 (0.587)
Personal & hhd econ shocks (5 yrs)	0.567** (0.254)	0.561** (0.254)	0.550** (0.254)	0.544** (0.254)
Hhd Living Conditions & Assets Index[A]	-0.191 (0.207)	-0.190 (0.207)	-0.198 (0.207)	-0.196 (0.207)

	(1)	(2)	(3)	(4)
Post Global Financial Crisis (2009-2012)	0.470	0.387	0.556	0.477
	(0.482)	(0.496)	(0.503)	(0.514)
Constant	20.89***	21.08***	20.69***	20.86***
	(3.778)	(3.773)	(3.771)	(3.766)
Observations	20,432	20,432	20,432	20,432
R-squared	0.018	0.018	0.019	0.019
Number of groups	16,730	16,730	16,730	16,730

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
A superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score (z-score).

Table 3.10 takes DTI ratios as the main explanatory variable and, supporting our hypothesis (see Table 3.2), reveals that within-time variation in respondents' DTI ratios exerted a positive and statistically significant (at $\alpha = 0.05$) impact on depression and anxiety symptoms. Unsurprisingly, the size (magnitude) of the positive impact of DTI ratios on CDS over time was smaller than the size of the positive and significant panel FEs of outstanding debts on CDS.[220] The latter aligns with our expectations since DTI ratios account for the impact of debts once an essential resource of funds for respondents (labour income) is accounted for, thus they tend to measure the perceived burden of debts more comprehensively than absolute amounts of debt.

Table 3.10

Unpaid Debt to Labour Income (DTI) & SWB Panel Analysis Regression

Calderon Depression Score (CDS)	(1) ***Fixed Effects*** Baseline (*DTI ratio*)	(2) ***Fixed Effects*** DTI ratio & risk preferences	(3) ***Fixed Effects*** DTI ratio & time-value preferences	(4) ***Fixed Effects*** DTI ratio, risk & time-value preferences
Debts to labour income ratio (ln difference)	0.0436*	0.0432	0.0467*	0.0463*
	(0.0265)	(0.0265)	(0.0265)	(0.0265)
Risk Aversion (categorical)		-0.0771		-0.0750
		(0.0657)		(0.0659)
Time-value Preferences (categorical)			0.0997	0.103
			(0.0895)	(0.0894)
Considers the future in financial decisions			0.346	0.336
			(0.233)	(0.233)
Spent nothing or < half of monetary gift			0.0154	0.0188
			(0.217)	(0.217)
Fluid Cognition (2009 Raven score)	-0.0426	-0.0415	-0.0435	-0.0423
	(0.0448)	(0.0448)	(0.0447)	(0.0448)
Age	0.209	0.211	0.202	0.204
	(0.152)	(0.152)	(0.152)	(0.152)
Age2	-0.00217	-0.00218	-0.00211	-0.00212
	(0.00149)	(0.00149)	(0.00149)	(0.00149)
Married/domestic partnership	-0.604	-0.608	-0.618	-0.622
	(0.393)	(0.393)	(0.395)	(0.394)
Elementary School (1st - 6th)	1.029	1.018	1.093	1.082
	(0.838)	(0.838)	(0.844)	(0.845)
Jr. High School (7th -9th)	1.436	1.432	1.476	1.473

[220] With the panel FE of DTI ratios being on average close to but less than a third the size of the panel FE effect of DTI ratios on CDS.

	(0.931)	(0.930)	(0.935)	(0.934)
High School (10th -12th)	1.547	1.554	1.568	1.574
	(0.971)	(0.970)	(0.976)	(0.975)
Higher Educ: Univ. & Col. Grad	1.508	1.530	1.520	1.542
	(1.013)	(1.011)	(1.017)	(1.015)
Victim assault or prop theft	1.063***	1.061***	1.066***	1.065***
	(0.310)	(0.310)	(0.309)	(0.308)
Cohesive & inclusive community	-0.413	-0.417	-0.437	-0.440
	(0.354)	(0.353)	(0.356)	(0.356)
Urban (people >=15,000)	0.212	0.196	0.187	0.173
	(0.558)	(0.558)	(0.560)	(0.560)
Personal & hhd econ shocks (5 yrs)	0.548**	0.538**	0.527**	0.517**
	(0.247)	(0.247)	(0.247)	(0.247)
Hhd Living Conditions & Assets Index[A]	-0.123	-0.122	-0.134	-0.133
	(0.204)	(0.203)	(0.204)	(0.203)
Post Global Financial Crisis (2009-2012)	0.467	0.352	0.581	0.470
	(0.474)	(0.486)	(0.492)	(0.504)
Constant	20.52***	20.79***	20.27***	20.52***
	(3.716)	(3.713)	(3.708)	(3.704)
Observations	20,780	20,780	20,780	20,780
R-squared	0.018	0.018	0.019	0.019
Number of groups	16,955	16,955	16,955	16,955

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score (z-score).

Table 3.11 considers the impact on SWB of DTS ratios, another measure of the burden of debts relative to the other important source of funds for Mexicans, savings. DTS did not reveal a significant effect over 2005-2012 once the impact of constant unobservable characteristics was stripped away from our estimation. This was unsurprising given that the longitudinal (FE) analysis of the impact of savings (Table 3.9), revealed the latter did not produce significant within effects on SWB either. As in the three prior estimations of panel FEs of financial balances on SWB, the control for having been a victim of assault, robbery or any criminal activity had the strongest (in terms of magnitude) and most statistically significant ($\alpha = 0.001$) within effects on experienced depression and anxiety symptoms over 2005-2019. Similarly, just as in all prior three panel FE estimations, the second largest (by size) and significance (with $\alpha = 0.1$) within impact on CDS in Table 3.11 stemmed from having experienced personal or household economic shocks over the 5 years prior to the survey.

Risk attitudes and TV preferences were not significant in any of the panel FE estimations, nonetheless their observed longitudinal analysis results suggested the influence of RA overtime was small and negative (implying potential small improvements in SWB as the level of risk tolerance [within respondents] increased across time) while coefficients for our ordinal TV preferences indicator suggested a small positive influence on CDS (thus potential small deterioration of SWB) as patience increased within respondents. Unfortunately, our panel sample did not allow us to conclude RA and TV patterns of influence were not a chance occurrence once time-invariant individual heterogeneity was controlled for through FE.

For completeness, we also estimated the longitudinal model (3.2) using RE and include the findings of panel RE estimations on appendix Tables 3.A.11 – 3.A.14. The latter set of Tables showed that under RE panel estimations changes in all financial balances—except for savings—revealed statistically significant (at $\alpha = 0.001$) effects on SWB in the same direction of the impacts suggested by FE. Hence, while changes in savings did not reveal any significant impact on CDS on either longitudinal analysis method, the main differences between the findings of the two methods with respect to the effects of financial balances on SWB was that DTS ratios did not show any significant impact on CDS under FE but did so under RE and that DTI ratios revealed a much more significant impact under RE than under FE estimations.[221]

Other differences between RE and FE results pertained to the significance that changes in RA and in TV preferences had on SWB over the analysis period (2005-2012). Neither ordinal preference indicator was statistically significant in the FE estimations presented in Tables 3.7 to 3.10. As shown by appendix Tables 3.A.11 - 3.A.14, the ordinal RA indicator also revealed a none-significant impact on CDS across all panel RE estimations. Nonetheless, the TV preferences ordinal indicator showed highly significant ($\alpha = 0.001$) positive impacts on CDS across all panel RE estimations, implying that changes across individuals (between respondents) and across time (within respondents) of an individual's patience, on average increased depression and anxiety symptoms.
Results for 'having suffered a violent attack to person or property' and for 'personal and household shocks experienced over prior 5 years' were highly statistically significant ($\alpha = 0.001$) across all RE estimations and revealed a positive impact on CDS (as did in panel FE results). However, the starkest contrast between panel RE and FE estimation results was that under RE most sociodemographic controls were highly significant (including education and cognitive ability), while these were not significant when only within subject variability (but not across subjects variability) was considered under panel FE results.

The technical difference between panel FE and panel RE estimation methods can help to understand the above similarities and differences. A key difference between the two methods is that while FE assumed that (unobserved) individual characteristics (included in the error) were correlated with the model's explanatory variables—including for example with financial balances, TV preferences, cognitive ability, and schooling level—thus biasing their effect on SWB; RE estimations assumed that respondents' error term was not correlated with the predictors. Since FE explicitly controlled for (stripped away) heterogeneity deriving from time-invariant (within) unobservables—such as ingrained

[221] DTI ratios were significant at 0.1% level under RE estimations but had only 5% significant under FE.

values[222] and biological (genetic) predispositions of a person's temperament—it implied that any variation in SWB over time explained (with statistical significance) by the FE model (3.2) was due to influences other than unchanging personal characteristics. However, the RE estimations allowed for time-invariant variables (such as temperament or overarching philosophy, culture or values) to play a role as explanatory factors. Thus, taking the findings regarding TV preferences as example, since economic psychology research has suggested that TV preferences correlate with temperamental factors (including conscientiousness) as well as with cultural values favouring a present-oriented perspective over a future oriented one, it is not surprising that when the latter two unobservables are controlled away in FE estimations (due to their time-invariability) our TV preferences indicator did not suggest statistically significant effects over time but did so, with high significance, under RE estimations (which cannot remove the influence of unchanging unobservables [at least in our analysis timeframe] such as temperamental predispositions and overarching cultural values).

Since under RE method time-invariant variables play a role in explaining SWB and many of these (such as the biological components of personality or temperament) are very hard to measure or account for, RE estimation is more susceptible to omitted variable bias. Hence, we favour FE estimations' findings over RE results and use Hausman specification tests to validate our choice of panel method. As per Hausman test results (given in appendix Table 3.A.15), we rejected the null hypothesis stating that unique errors were not correlated with the predictors (or that the difference in the coefficients between the FE and RE model was not systematic) and therefore concluded that the best method to use and focus on was panel FE.

For robustness we also conducted time-fixed effect tests (reported in appendix Table 3.A.16) and modified Wald-tests for groupwise heteroskedasticity (reported in appendix Table 3.A.17). Time-fixed effect tests results did not provide sufficient evidence to reject the null hypothesis that the coefficients for all wave years are jointly equal to zero, hence according to our panel sample, no time-(fixed)-effects were needed for the longitudinal specifications. Nevertheless, we still included a time-effect binary variable to control for the potential impact of the GFC for substantive completeness as the GFC was an important exogenous shock that, theoretically, could have affected several of the variables in the empirical specifications (including financial balances, risk and patience levels and SWB). Based on the results from the modified Wald-test for groupwise heteroskedasticity, we rejected the null of constant variance (i.e. of homoskedasticity) and all reported cross-sectional and panel regression results employed robust standard errors (i.e. Huber/White standard errors).

[222] While we recognise that values can change over time, we assume that cultural values and dimension such as "Long- Versus Short-Term Orientation" and "Indulgence Versus Restraint" take a longer time to effectively change than the time-period considered in our study (2005-2012). Biological components of temperament are definitely considered to be maintained relatively static along a person's lifetime.

Finally, to evaluate the presence of panel effects (through the null hypothesis of zero variance across entities) we ran Breusch-Pagan Lagrange Multiplier (BPLM) tests[223]. Their results lent support for the existence of significant heterogeneity across individuals in the sample, led us to reject the hypothesis of no significant difference across units and therefore to the rejection of the assumption of no panel effects.

3.8 CONCLUSIONS

This chapter sought to provide evidence about the potential effects on SWB of financial balances such as total savings, problematic debt (construed both in terms of total value of outstanding debts and in relation to income and savings), DTI and DTS ratios when these measures of households' financial health are considered directly and independent from any latent capabilities influencing behaviours resulting in the financial balances specifically observed.

Given the scarcity of research on the topic in developing countries such as Mexico and the versatility of formal and informal financial tools used by Mexican households to make ends meet, despite low levels of financial inclusion, we used data from two MxFLS waves (covering the period 2005-2012) to elucidate how the above-mentioned financial balances affected Mexicans experience of depression and anxiety symptoms in such period.

As Table 3.11 summarises, the cross-sectional results provided evidence supporting our hypotheses since, in both waves, the total sum of unpaid debts overdue, respondents' DTI ratios and their DTS ratios bore a positive (mostly) statistically significant relationship with depression and anxiety (measured through CDS), as initially conjectured. Once time-invariant unobservable traits were accounted for through panel FE, the results also corroborated our hypotheses as they provided evidence in favour of a causal effect between increasing unpaid debts (whether measured as a total sum or as DTI ratios) and higher depression and anxiety symptoms.

Table 3.11

Regressors	*Hypothesized Effects*		*Observed Effects*		
			Cross-sectional		
Main	***CDS***	***SWB***	MxFLS-II	MxFLS-III	***Panel FE***
$\beta^{Total\ outstanding\ Debts}$	> 0	↓ SWB	$\beta^{TD} > 0$	$\beta^{TD} > 0$	$\beta^{TD} > 0$
$\beta^{Total\ Savings}$	< 0 or > 0	↑ or ↓ SWB	$\beta^{TS} > 0$	$\beta^{TS} < 0$	***Not Signif.***
$\beta^{Debt-to-Income\ Ratio}$	> 0	↓ SWB	$\beta^{DTI} > 0$	$\beta^{DtI} > 0$	$\beta^{DTI} > 0$

[223] BPLM test results across all four panel specifications had *Prob > Chi2* smaller than 0.05 therefore supporting the rejection of the assumption of no panel effects Test results are available upon request.

$\beta^{Debt-to-Savings\ Ratio}$	> 0	↓ S WB	***Not Signif.***	$\beta^{DTS} > 0$	***Not Signif.***

* Results supporting hypothesized effects in colored cells.

Significance Level: 0.1% 1% 5% 0 %

Grounded on the economics literature, which has recognised both positive and negative effects of savings, our initial hypothesis regarding the effects of savings on SWB admitted ambiguity. Only cross-sectional results based on MxFLS-III (2009) data supported (with 5% statistical significance) the hypothesis that savings on net can increase SWB (through a, on net, negative influence on CDS). Cross-sectional results regarding the influence of savings on SWB, based on MxFLS-II (2005) data, suggested a positive association with CDS (thus not necessarily improving SWB) but such results were not significant. The seemingly contrasting cross-sectional results observed in each MxFLS wave regarding the influence of savings on CDS was explained in light of the differences in the abundance of savings in each wave-period relative to other financial balances, especially that of debts. Savings were *less abundant* (relative to debts and income) for the average respondent in the MxFLS-III wave-period than during the earlier MxFLS-II wave-period. Thus, savings were found to influence CDS downward, (improving SWB) in 2009-2012 but not in 2005-2006 because of the heightened perceived usefulness of savings as a source for debt repayments and future liquidity for MxFLS respondents (itself stemming from their scarcer abundance relative to debts during the 2009-2012 period) which helped to surpass—more than in 2005-2006—the intrinsic subjective costs of savings (i.e. forgone present utility from immediate consumption), thus allowing savings to show, on net, a beneficial influence on SWB in wave 3 (but not in wave 2).

With regards to the influence of behavioural covariates usually considered to moderate the influence of financial balances on SWB, our ordinal RA indicator was only significant in MxFLS (2009-2012) cross-sectional regressions, and it suggested that, on average, respondents with more risk tolerance experienced less depression and anxiety. The ordinal TV preferences indicator had statistically significant results in the cross-sectional analysis performed on both waves and in both wave-years suggested that respondents with more patience (less impulsivity) had, on average, a higher CDS (lower SWB). Despite the wording modifications to the RA and TV modules of the two MxFLS waves, none of them implied a fundamental change in the latent construct being measured by the RA and TV modules in each of the waves. Both modules in each wave continued measuring the extent of respondents' aversion to risk and patience in each waves' period and both allowed to derive the same order of relationships between the preference levels of each construct reported by respondents which validated their comparison and use for longitudinal analysis.

We favoured the use of the panel FE method to conduct the longitudinal analysis of the effects of financial balances on SWB based on Hausman specification tests' results which led us to reject the null of no-correlation of the error terms, thus supporting the use of FE over RE and also due to RE high susceptibility to omitted variable bias. As summarised in Table 3.11, after controlling for unobserved time-invariant heterogeneity through panel FE, the results from our longitudinal (FE) estimations supported our hypotheses regarding the positive effect of outstanding debts and of DTS on CDs (thus lowering SWB) but did not reveal statistically significant evidence regarding the impact of changes in savings or in DTS ratios on SWB over the 2005-2012 period.

RA and TV preferences were *not significant* in any of the panel FE estimations, nonetheless their observed longitudinal analysis results suggested that RA had a small and negative influence over time (implying potential small improvements in SWB as the level of risk tolerance [within respondents] increased across time) while coefficients for our ordinal TV preferences indicator suggested a small positive influence on CDS (thus potential small deterioration of SWB) as patience increased within respondents. Unfortunately, our panel sample did not allow us to conclude such RA and TV patterns of influence were not merely a chance occurrence, since once time-invariant individual heterogeneity was controlled for through FE they were not significant.

Nonetheless, RE conducted for completeness shed some light into the potential mechanisms underlying the influence of TV preferences in the analysis. Under the presumption that unobserved (stable) personal characteristics included in the error term (such as ingrained cultural values or philosophies and the biological components of temperament) were not correlated with the predictors in our financial balances longitudinal estimations, RE results showed that TV preferences consistently exerted a positive highly significant impact on CDS overtime across all four financial balances model-estimations.

While such pattern of influence seemed to contradict the conclusions of the internal locus of control theory, according to which less patience could induce lower SWB, the obtained RE results can be explained through dual-self theory precepts. The latter theoretical framework recognises that the net utility derived from self-controlled (patient) choices or from impulsive (presently biased) choices varies according to the relative dominance of our short-term self or long-term self-perspectives which is itself a function of both nature (biological determinants of temperament or of ones' character constitution) and of nurture (cultural values and philosophical worldviews). Given the relatively presently biased orientation of the culture in Mexico (documented through prior research), dual self-theory can help explain why TV preferences showed a positive significant impact under RE but no significance under FE, as the latter method neutered away any bias deriving from the biological predispositions that incline some people to favour the present more over others as well as the overarching effects of culture.

A similar logic helps to understand why fluid reasoning (as measured via the RPM score) and education levels suggested a negative (within and across) significant influence on depression and anxiety symptoms (i.e. improved SWB) according to RE estimations, but their impact was not significant once time-invariant heterogeneity across respondents was accounted for.

A final important takeaway from our research pertained to the positive and highly significant impact of the controls 'having been victim of assault, property theft or other harm to person and property' and 'having experienced personal and household economics shocks over prior 5 years' on SWB in Mexico. Both indicators consistently showed—across all cross-sectional and panel (both FE and RE) estimations—the largest (in terms of size of effect) and most significant positive impacts on the incidence of depression and anxiety symptoms in Mexico therefore signifying detrimental effects on SWB in Mexico. As such they served to provide further factual evidence of the importance of restoring the rule of law and sense of safety in Mexico, which cannot be overstated (even now, almost a decade after MxFLS data was collected).

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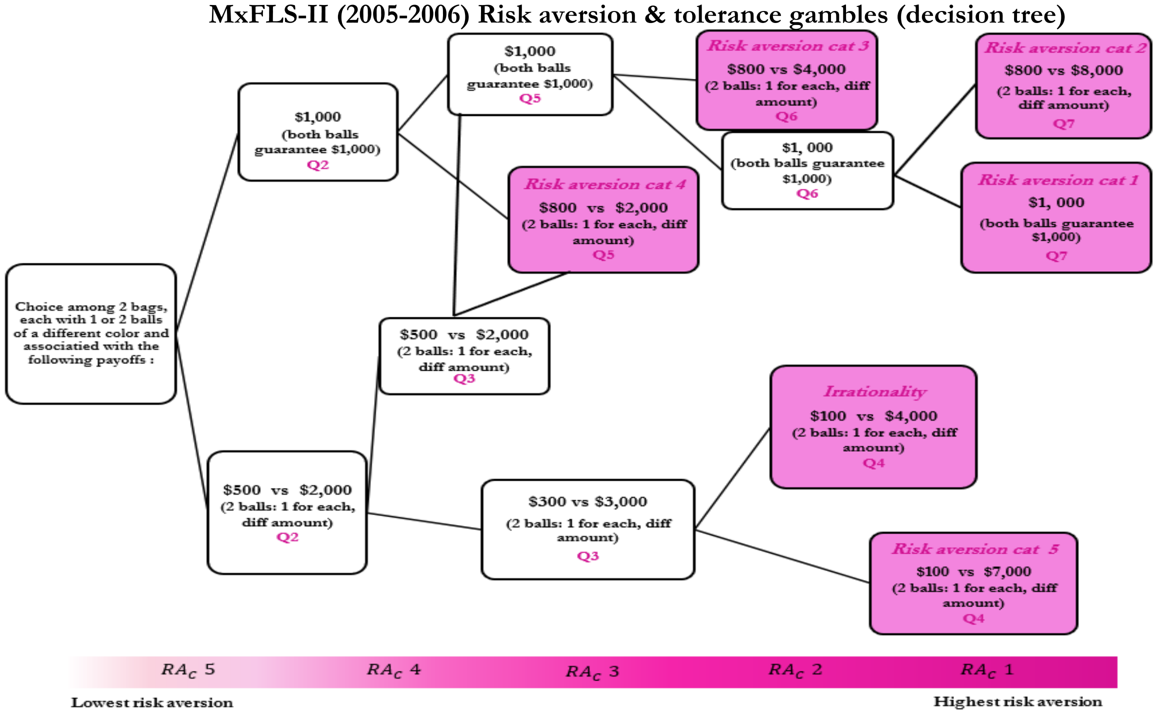
3.10 APPENDIX

Figure 3.A.1

MxFLS-II (2005-2006) Risk aversion & tolerance gambles (decision tree)



Source: Self-generated based on MxFLS-II questionnaire (risk module).

Table 3.A.1

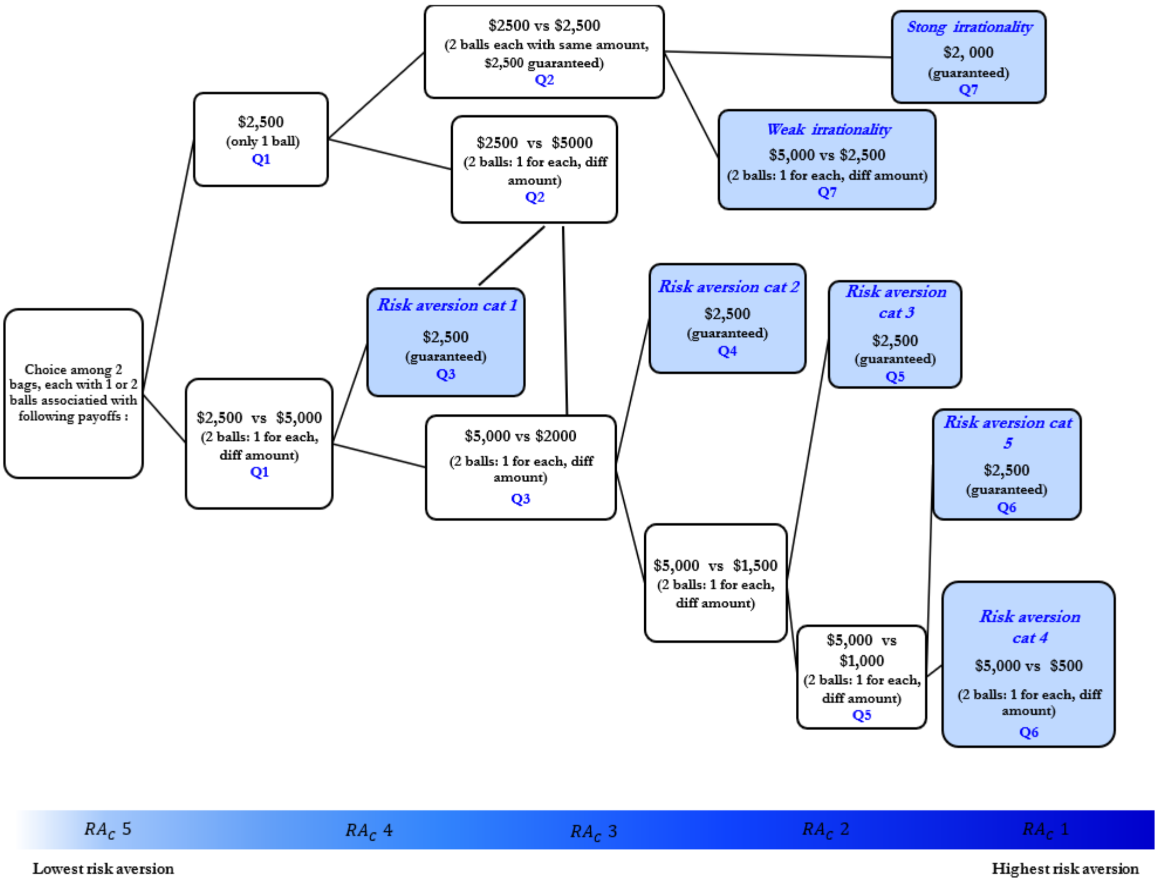
Risk Lotteries MxFLS-II (2005-2006)

	Lottery Bag (LB) 1				Lottery Bag (LB) 2				Expected Value (EV)		EV Difference
	Blue		Yellow		Blue		Yellow		EV^{LB1}	EV^{LB2}	
2	0.5	$ 1,000	0.5	$ 1,000	0.5	$ 500	0.5	$ 2,000	$ 1,000	$ 1,250	**$ 250**
3	0.5	$ 500	0.5	$ 2,000	0.5	$ 300	0.5	$ 3,000	$ 1,250	$ 1,650	**$ 400**
4	0.5	$ 100	0.5	$ 4,000	0.5	$ 100	0.5	$ 7,000	$ 2,050	$ 3,550	**$ 1,500**
5	0.5	$ 1,000	0.5	$ 1,000	0.5	$ 800	0.5	$ 2,000	$ 1,000	$ 1,400	**$ 400**
6	0.5	$ 1,000	0.5	$ 1,000	0.5	$ 800	0.5	$ 4,000	$ 1,000	$ 2,400	**$ 1,400**
7	0.5	$ 1,000	0.5	$ 1,000	0.5	$ 800	0.5	$ 8,000	$ 1,000	$ 4,400	**$ 3,400**

Source: Self-generated based on MxFLS-II questionnaire (risk module).

Figure 3.A.2

MxFLS-III (2009-2012) Risk aversion & tolerance gambles (decision tree)



Source: Self-generated based on MxFLS-III questionnaire (risk module).

Table 3.A.2

Risk Lotteries MxFLS-III (2009-2012)

	Lottery Bag (LB) 1				Lottery Bag (LB) 2				Expected Value (EV)		EV Difference
	Ball 1		Ball 2		Ball 1		Ball 2		EV^{LB1}	EV^{LB2}	
1	1	$ 2,500	---	---	0.5	$ 2,500	0.5	$ 5,000	$ 2,500	$ 3,750	**$ 1,250**
2	0.5	$ 2,500	0.5	$ 2,500	0.5	$ 2,500	0.5	$ 5,000	$ 2,500	$ 3,750	**$ 1,250**
3	0.5	$ 2,500	0.5	$ 2,500	0.5	$ 2,000	0.5	$ 5,000	$ 2,500	$ 3,500	**$ 1,000**
4	0.5	$ 2,500	0.5	$ 2,500	0.5	$ 1,500	0.5	$ 5,000	$ 2,500	$ 3,250	**$ 750**
5	0.5	$ 2,500	0.5	$ 2,500	0.5	$ 1,000	0.5	$ 5,000	$ 2,500	$ 3,000	**$ 500**
6	0.5	$ 2,500	0.5	$ 2,500	0.5	$ 500	0.5	$ 5,000	$ 2,500	$ 2,750	**$ 250**
7	0.5	$ 2,000	0.5	$ 2,000	0.5	$ 2,500	0.5	$ 5,000	$ 2,000	$ 3,750	**$ 1,750**

Source: Self-generated based on MxFLS-III questionnaire (risk module).

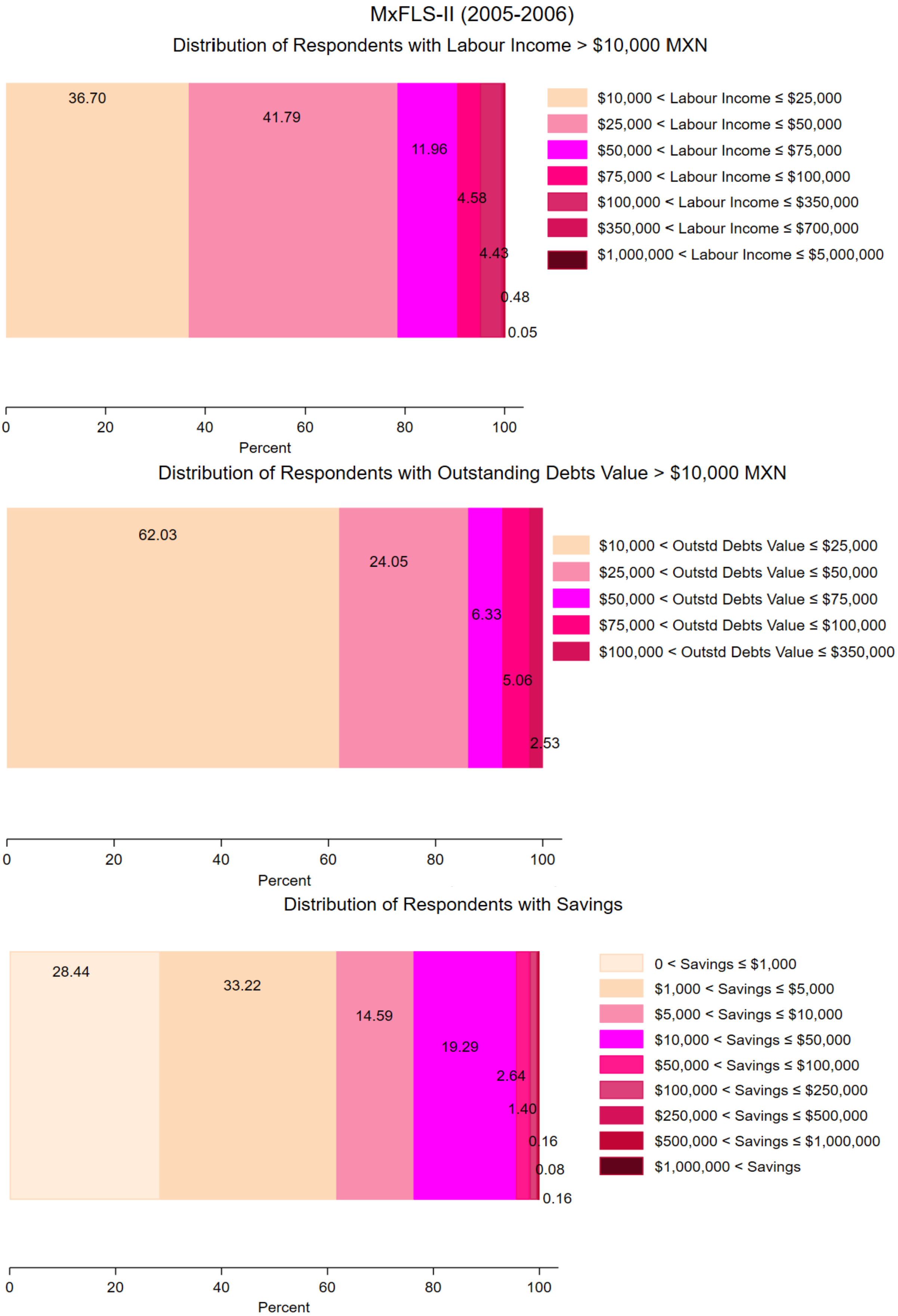
Table 3.A.3

Descriptive Statistics MxFLS-II (2005-2006)

Individual Level	N	Mean	Std. Dev.	Min	Max
Dependent Variable:					
Calderon Depression Score (CDS)	11401	25.190	7.090	20	80
Demographic Controls:					
Age	11401	30.846	13.687	15	74
Male	11401	.42	0.494	0	1
Marital Status (1: married/domestic partnership)	11401	.534	0.499	0	1
Education Level 1 - No Schooling & Preschool/ Kinder	11401	.056	0.231	0	1
Education Level 2 - Elementary School (1st - 6th grade)	11401	.32	0.467	0	1
Education Level 3 - Jr. High School (7th -9th grade)	11401	.329	0.470	0	1
Education Level 4 - High School (10th -12th)	11401	.186	0.389	0	1
Education Level 5 - Higher Education: Univ. & Col. Grad	11401	.108	0.310	0	1
Cognitive Ability Score (2009), No. correct answers: 0 – 12	11401	6.746	2.833	0	12
Urban Locality (people ≥ 15,000)	11401	.474	0.499	0	1
Risk Aversion (categorical)	11401	3.723	1.423	0	5
Time-value Preferences (categorical)	11401	2.061	1.461	0	5
Considers the future in financial decisions (binary)	11401	.636	0.481	0	1
Spent nothing or < half of monetary gift (binary)	11401	.375	0.484	0	1
Financial Balances:					
Income earnt last 12 months (amount)	11401	16101.18	41534.643	0	2000000
Income earnt last 12 months (ln)	11401	4.335	5.025	0	14.509
Sum of loan debt still outstanding (amount)	11401	430.369	5052.771	0	270000
Sum of loan debt still outstanding (ln)	11401	.35	1.671	0	12.506
Sum of savings (amount)	11179	1674.768	24342.631	0	2000000
Sum of savings (ln)	11179	.891	2.604	0	14.509
Debt to labour income ratio (ln difference)	11401	-3.986	5.137	-14.509	12.506
Debt to savings ratio (ln difference)	11179	-.543	2.995	-14.509	12.155
Household Level					
Other correlates of wellbeing & wealth:					
Experienced robbery or assault to person or to property	11401	.156	0.363	0	1
Cohesive, inclusive & trustworthy community	11401	.857	0.351	0	1
Household experienced damages due to shocks, prior 5 years	11401	.236	0.424	0	1
Household Living Conditions & Assets Index[A]	11401	.088	0.920	-3.788	1.263

All quantities calculated over estimation sample (restricted to those between 15 & 75 years).
Monetary amounts expressed in Mexican pesos (MXN) corresponding to average exchange rate: $29.5 MXN per £1 (.034 £ per MXN).

Figure 3.A.3



Source: Self-generated based on MxFLS-III (credit module). Calculated over estimation sample (restricted to 15-75 years old).

Table 3.A.4

MxFLS-III (2009-2012)

Spearman's Rank Correlation (ρ) Tests: Risk Aversion (RA) & Several Variables

RA & Variable: N: 13, 549	CDS	Income	Outstanding Debts	Savings	Debt-to-Income Ratio	Debt-to-Savings Ratio
Spearman's Rho (ρ)	-0.0607	0.0388	-0.0148	-0.0020	-0.0386	-0.0075
P-value (Prob > $\lvert t \rvert$)	0.0000	0.0000	0.0851	0.8211	0.0000	0.3898

Spearman's Rank Correlation (ρ) Tests: Time-Value Preferences (TV) & Several Variables

TV & Variable: N: 13, 549	CDS	Income	Outstanding Debts	Savings	Debt-to-Income Ratio	Debt-to-Savings Ratio
Spearman's Rho (ρ)	0.0429	-0.0029	0.0171	0.0687	0.0070	-0.0419
P-value (Prob > $\lvert t \rvert$)	0.0000	0.7335	0.0478	0.0000	0.4166	0.0000

All quantities calculated over the estimation sample.

Table 3.A.5

MxFLS-II (2005-2006)

Spearman's Rank Correlation (ρ) Tests: Risk Aversion (RA) & Several Variables

RA & Variable: N: 11,179	CDS	Income	Outstanding Debts	Savings	Debt-to-Income Ratio	Debt-to-Savings Ratio
Spearman's Rho (ρ)	-0.0050	0.0212	-0.0114	-0.0113	-0.0246	0.0014
P-value (Prob > $\lvert t \rvert$)	0.5928	0.0230	0.2226	0.2311	0.0087	0.8825

Spearman's Rank Correlation (ρ) Tests: Time-Value Preferences (TV) & Several Variables

RA & Variable: TV: 11,179	CDS	Income	Outstanding Debts	Savings	Debt-to-Income Ratio	Debt-to-Savings Ratio
Spearman's Rho (ρ)	0.0274	-0.0120	0.0105	0.0353	0.0128	-0.0237
P-value (Prob > $\lvert t \rvert$)	0.0035	0.2004	0.2631	0.0002	0.1707	0.0123

All quantities calculated over the estimation sample.

Cross-sectional Analysis Tables

Table 3.A.6

MxFLS-II (2005-2006) Unpaid Debts & SWB Cross-sectional Analysis Regression

Calderon Depression Score (CDS)	(1) Baseline *(Unpaid debts)*	(2) Unpaid debts and risk preferences	(3) Unpaid debts & time-value preferences	(4) Unpaid debts, risk & time-value prefs.
Sum of unpaid (loan) debts (ln)	0.248***	0.249***	0.245***	0.245***
	(0.0401)	(0.0401)	(0.0402)	(0.0402)
Risk Aversion (categorical)		0.0506		0.0445
		(0.0451)		(0.0455)
Time-value Preferences (categorical)			0.0895**	0.0878**
			(0.0446)	(0.0448)
Considers the future financial decisions			0.0201	0.0161
			(0.139)	(0.140)

Spent nothing or < half of monetary gift			-0.388*** (0.133)	-0.386*** (0.133)
Fluid Cognition (2005 Raven score)	-0.108*** (0.0243)	-0.108*** (0.0243)	-0.109*** (0.0243)	-0.109*** (0.0243)
Age	0.0310 (0.0334)	0.0314 (0.0334)	0.0327 (0.0334)	0.0330 (0.0334)
Age2	0.000377 (0.000448)	0.000372 (0.000448)	0.000367 (0.000448)	0.000362 (0.000448)
Male	-2.157*** (0.145)	-2.160*** (0.145)	-2.159*** (0.145)	-2.162*** (0.145)
Married/domestic partnership	-0.581*** (0.155)	-0.580*** (0.155)	-0.576*** (0.156)	-0.575*** (0.156)
Elementary School (1st - 6th)	-0.923** (0.365)	-0.925** (0.365)	-0.924** (0.365)	-0.926** (0.365)
Jr. High School (7th -9th)	-1.453*** (0.377)	-1.456*** (0.377)	-1.438*** (0.378)	-1.441*** (0.378)
High School (10th -12th)	-1.508*** (0.401)	-1.507*** (0.401)	-1.490*** (0.401)	-1.489*** (0.401)
Higher Educ: Univ. & Col. Grad	-2.304*** (0.408)	-2.310*** (0.408)	-2.288*** (0.408)	-2.293*** (0.408)
Income earnt last 12m (ln)	-0.0435*** (0.0151)	-0.0436*** (0.0151)	-0.0441*** (0.0151)	-0.0441*** (0.0151)
Victim assault or prop theft	1.556*** (0.189)	1.563*** (0.189)	1.545*** (0.189)	1.552*** (0.189)
Cohesive & inclusive community	-0.660*** (0.201)	-0.664*** (0.202)	-0.657*** (0.201)	-0.660*** (0.201)
Urban (people >=15,000)	0.696*** (0.143)	0.699*** (0.143)	0.688*** (0.143)	0.690*** (0.143)
Personal & hhd econ shocks (5 yrs)	1.371*** (0.159)	1.375*** (0.159)	1.366*** (0.159)	1.370*** (0.159)
Hhd Living Conditions & Assets Index[A]	-0.217** (0.0886)	-0.220** (0.0888)	-0.225** (0.0889)	-0.228** (0.0890)
Constant	26.84*** (0.656)	26.65*** (0.673)	26.75*** (0.667)	26.59*** (0.680)
Observations	11,401	11,401	11,401	11,401
R-squared	0.075	0.075	0.076	0.076

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score

Table 3.A.7

MxFLS-II (2005-2006) Savings Amount & SWB Cross-sectional Analysis Regression

Calderon Depression Score (CDS)	(1) Baseline *(Amount of savings)*	(2) Savings amt. & risk preferences	(3) Savings amt. & time-value preferences	(4) Savings amt., risk & time-value preferences
Sum of savings (ln)	0.0610** (0.0252)	0.0614** (0.0252)	0.0624** (0.0254)	0.0628** (0.0254)
Risk Aversion (categorical)		0.0507 (0.0456)		0.0448 (0.0459)
Time-value Preferences (categorical)			0.0874* (0.0452)	0.0858* (0.0454)
Considers the future in financial decisions			-0.00547 (0.142)	-0.00954 (0.142)

Spent nothing or <half of monetary gift			-0.427***	-0.424***
			(0.135)	(0.135)
Fluid Cognition (2005 Raven score)	-0.115***	-0.116***	-0.117***	-0.117***
	(0.0246)	(0.0246)	(0.0246)	(0.0246)
Age	0.0404	0.0408	0.0419	0.0423
	(0.0338)	(0.0339)	(0.0338)	(0.0339)
Age2	0.000273	0.000268	0.000266	0.000261
	(0.000454)	(0.000454)	(0.000454)	(0.000455)
Male	-2.158***	-2.161***	-2.162***	-2.165***
	(0.147)	(0.147)	(0.147)	(0.147)
Married/domestic partnership	-0.512***	-0.510***	-0.505***	-0.503***
	(0.156)	(0.156)	(0.157)	(0.157)
Elementary School (1st - 6th)	-0.923**	-0.926**	-0.923**	-0.925**
	(0.370)	(0.370)	(0.370)	(0.370)
Jr. High School (7th -9th)	-1.448***	-1.453***	-1.432***	-1.436***
	(0.382)	(0.382)	(0.382)	(0.383)
High School (10th -12th)	-1.448***	-1.448***	-1.426***	-1.426***
	(0.407)	(0.407)	(0.407)	(0.407)
Higher Educ: Univ. & Col. Grad	-2.254***	-2.260***	-2.233***	-2.239***
	(0.415)	(0.415)	(0.415)	(0.415)
Income earnt last 12m (ln)	-0.0390**	-0.0390**	-0.0396**	-0.0396**
	(0.0154)	(0.0154)	(0.0154)	(0.0154)
Victim assault or prop theft	1.619***	1.626***	1.607***	1.613***
	(0.192)	(0.191)	(0.192)	(0.191)
Cohesive & inclusive community	-0.636***	-0.640***	-0.632***	-0.635***
	(0.204)	(0.204)	(0.203)	(0.204)
Urban (people >=15,000)	0.676***	0.679***	0.665***	0.668***
	(0.145)	(0.145)	(0.146)	(0.146)
Personal & hhd econ shocks (5 yrs)	1.428***	1.433***	1.422***	1.426***
	(0.161)	(0.161)	(0.161)	(0.162)
Hhd Living Conditions & Assets Index[A]	-0.216**	-0.219**	-0.224**	-0.226**
	(0.0897)	(0.0899)	(0.0900)	(0.0901)
Constant	26.66***	26.47***	26.60***	26.44***
	(0.663)	(0.680)	(0.673)	(0.687)
Observations	11,186	11,186	11,186	11,186
R-squared	0.072	0.073	0.074	0.074

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score

Table 3.A.8

MxFLS-II (2005-2006) Unpaid Debt to Labour Income & SWB Cross-sectional Analysis Regression

Calderon Depression Score (CDS)	(1) Baseline *(Unpaid debts to labour income ratio)*	(2) Unpaid debts to lab. income & risk preferences	(3) Unpaid debts to lab. income & time-value preferences	(4) Unpaid debts to lab. income, risk & time-value pref.
Debts to labour income ratio (ln difference)	0.0687***	0.0688***	0.0689***	0.0690***
	(0.0143)	(0.0143)	(0.0143)	(0.0143)
Risk Aversion (categorical)		0.0483		0.0418
		(0.0451)		(0.0455)
Time-value Preferences (categorical)			0.0917**	0.0902**
			(0.0447)	(0.0448)
Considers the future in financial decisions			0.0462	0.0426

			(0.139)	(0.140)
Spent nothing or <half of monetary gift			-0.406***	-0.403***
			(0.133)	(0.133)
Fluid Cognition (2005 Raven score)	-0.108***	-0.109***	-0.109***	-0.110***
	(0.0243)	(0.0243)	(0.0243)	(0.0243)
Age	0.0577*	0.0580*	0.0586*	0.0590*
	(0.0330)	(0.0330)	(0.0330)	(0.0330)
Age2	5.94e-05	5.42e-05	5.91e-05	5.44e-05
	(0.000444)	(0.000444)	(0.000444)	(0.000444)
Male	-2.028***	-2.031***	-2.032***	-2.035***
	(0.142)	(0.142)	(0.142)	(0.142)
Married/domestic partnership	-0.541***	-0.540***	-0.538***	-0.537***
	(0.155)	(0.155)	(0.155)	(0.155)
Elementary School (1st - 6th)	-0.900**	-0.902**	-0.903**	-0.905**
	(0.365)	(0.365)	(0.365)	(0.365)
Jr. High School (7th -9th)	-1.387***	-1.390***	-1.376***	-1.378***
	(0.377)	(0.377)	(0.378)	(0.378)
High School (10th -12th)	-1.443***	-1.442***	-1.428***	-1.427***
	(0.401)	(0.401)	(0.401)	(0.401)
Higher Educ: Univ. & Col. Grad	-2.210***	-2.216***	-2.201***	-2.205***
	(0.408)	(0.408)	(0.408)	(0.408)
Victim assault or prop theft	1.618***	1.625***	1.604***	1.611***
	(0.189)	(0.189)	(0.189)	(0.189)
Cohesive & inclusive community	-0.659***	-0.663***	-0.657***	-0.660***
	(0.202)	(0.202)	(0.201)	(0.201)
Urban (people >=15,000)	0.719***	0.722***	0.710***	0.713***
	(0.143)	(0.143)	(0.144)	(0.144)
Personal & hhd econ shocks (5 yrs)	1.405***	1.409***	1.398***	1.402***
	(0.159)	(0.159)	(0.159)	(0.159)
Hhd Living Conditions & Assets Index[A]	-0.212**	-0.215**	-0.222**	-0.225**
	(0.0887)	(0.0889)	(0.0890)	(0.0891)
Constant	26.40***	26.22***	26.31***	26.16***
	(0.652)	(0.669)	(0.662)	(0.676)
Observations	11,401	11,401	11,401	11,401
R-squared	0.073	0.073	0.074	0.074

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score

Table 3.A.9

MxFLS-II (2005-2006) Unpaid Debt to Savings & SWB Cross-sectional Analysis Regression

Calderon Depression Score (CDS)	(1) Baseline *(Unpaid debts to savings ratio)*	(2) Unpaid debts to savings & risk preferences	(3) Unpaid debts to savings & time-value preferences	(4) Unpaid debts to savings, risk & time-value pref.
Debts to savings ratio (ln difference)	0.0311	0.0309	0.0297	0.0296
	(0.0223)	(0.0223)	(0.0224)	(0.0224)
Risk Aversion (categorical)		0.0487		0.0424
		(0.0457)		(0.0460)
Time-value Preferences (categorical)			0.0908**	0.0893**
			(0.0453)	(0.0454)
Considers the future in financial decisions			0.0430	0.0392
			(0.142)	(0.142)
Spent nothing or <half of monetary gift			-0.411***	-0.409***

			(0.135)	(0.135)
Fluid Cognition (2005 Raven score)	-0.114***	-0.114***	-0.115***	-0.116***
	(0.0246)	(0.0246)	(0.0246)	(0.0246)
Age	0.0402	0.0406	0.0415	0.0418
	(0.0339)	(0.0339)	(0.0339)	(0.0339)
Age2	0.000269	0.000264	0.000265	0.000261
	(0.000454)	(0.000454)	(0.000455)	(0.000455)
Male	-2.155***	-2.159***	-2.158***	-2.161***
	(0.147)	(0.147)	(0.147)	(0.147)
Married/domestic partnership	-0.517***	-0.515***	-0.514***	-0.512***
	(0.156)	(0.156)	(0.157)	(0.157)
Elementary School (1st - 6th)	-0.927**	-0.930**	-0.929**	-0.932**
	(0.369)	(0.370)	(0.370)	(0.370)
Jr. High School (7th -9th)	-1.448***	-1.452***	-1.435***	-1.438***
	(0.382)	(0.382)	(0.382)	(0.382)
High School (10th -12th)	-1.418***	-1.418***	-1.402***	-1.402***
	(0.407)	(0.406)	(0.407)	(0.407)
Higher Educ: Univ. & Col. Grad	-2.171***	-2.177***	-2.159***	-2.164***
	(0.414)	(0.414)	(0.415)	(0.415)
Income earnt last 12m (ln)	-0.0351**	-0.0352**	-0.0360**	-0.0360**
	(0.0153)	(0.0154)	(0.0154)	(0.0154)
Victim assault or prop theft	1.643***	1.650***	1.630***	1.636***
	(0.192)	(0.191)	(0.192)	(0.191)
Cohesive & inclusive community	-0.639***	-0.643***	-0.639***	-0.642***
	(0.204)	(0.205)	(0.204)	(0.204)
Urban (people >=15,000)	0.688***	0.691***	0.679***	0.682***
	(0.145)	(0.145)	(0.146)	(0.146)
Personal & hhd econ shocks (5 yrs)	1.439***	1.444***	1.432***	1.436***
	(0.161)	(0.162)	(0.162)	(0.162)
Hhd Living Conditions & Assets Index[A]	-0.190**	-0.193**	-0.201**	-0.204**
	(0.0898)	(0.0899)	(0.0900)	(0.0901)
Constant	26.69***	26.51***	26.61***	26.46***
	(0.664)	(0.680)	(0.674)	(0.688)
Observations	11,179	11,179	11,179	11,179
R-squared	0.072	0.072	0.073	0.073

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score

Panel Data

Table 3.A.10

Descriptive Statistics Panel: MxFLS-II (2005) & MxFLS-III (2009)

Individual Level	N	Mean	Std. Dev.	Min	Max
Dependent Variable:					
Calderon Depression Score (CDS)	20780	25.404	7.188	20	80
Demographic Controls:					
Age	20780	32.751	13.991	15	73
Male	20780	.418	0.493	0	1
Marital Status (1: married/domestic partnership)	20780	.584	0.493	0	1
Education Level 1 - No Schooling & Preschool/ Kinder	20780	.059	0.236	0	1
Education Level 2 - Elementary School (1st - 6th grade)	20780	.319	0.466	0	1
Education Level 3 - Jr. High School (7th -9th grade)	20780	.319	0.466	0	1

Education Level 4 - High School (10th -12th)	20780	.19	0.393	0	1
Education Level 5 - Higher Education: Univ. & Col. Grad	20780	.112	0.316	0	1
Cognitive Ability Score (2009), No. correct answers: 0 – 12	20780	6.255	2.892	0	12
Urban Locality (people ≥ 15,000)	20780	.454	0.498	0	1
Risk Aversion (categorical)	20780	3.026	1.715	0	5
Time-value Preferences (categorical)	20780	1.633	1.229	0	5
Considers the future in financial decisions (binary)	20780	.608	0.488	0	1
Spent nothing or < half of monetary gift (binary)	20780	.536	0.499	0	1
Financial Balances:					
Income earnt last 12 months (amount)	20780	18276.577	68907.940	0	5000000
Income earnt last 12 months (ln)	20780	4.422	5.065	0	15.425
Sum of loan debt still outstanding (amount)	20780	772.184	8617.790	0	625000
Sum of loan debt still outstanding (ln)	20780	.567	2.103	0	13.346
Sum of savings (amount)	20417	1690.893	21009.145	0	2000000
Sum of savings (ln)	20417	.931	2.655	0	14.509
Debt to labour income ratio (ln difference)	20780	-3.855	5.248	-15.425	12.206
Debt to savings ratio (ln difference)	20417	-.366	3.282	-14.509	13.346
Household Level					
Other correlates of wellbeing & wealth:					
Experienced robbery or assault to person or to property	20780	.182	0.386	0	1
Cohesive, inclusive & trustworthy community	20780	.864	0.343	0	1
Household experienced damages due to shocks, prior 5 years	20780	.289	0.453	0	1
Household Living Conditions & Assets Index[A]	20780	.075	0.927	-4.487	1.263

All quantities calculated over estimation sample of observations for which both prior and current cognitive ability data was available.
Monetary amounts expressed in Mexican pesos (MXN) corresponding to an average exchange rate of: $29.5 MXN per £ 1 (.034 £ per MXN).

Table 3.A.11

Unpaid Debts & SWB Panel Analysis Regression

Calderon Depression Score (CDS)	(1) ***Random Effects*** Baseline (*Unpaid debts*)	(2) ***Random Effects*** Unpaid debts & risk preferences	(3) ***Random Effects*** Unpaid debts & time-value preferences	(4) ***Random Effects*** Unpaid debts, risk & time-value preferences
Sum of unpaid (loan) debts (ln)	0.250***	0.250***	0.246***	0.246***
	(0.0239)	(0.0239)	(0.0239)	(0.0239)
Risk Aversion (categorical)		0.00920		0.00842
		(0.0316)		(0.0316)
Time-value Preferences (categorical)			0.119***	0.119***
			(0.0430)	(0.0430)
Considers the future in financial decisions			0.151	0.151
			(0.103)	(0.103)
Spent nothing or < half of monetary gift			-0.246**	-0.246**
			(0.0993)	(0.0992)
Fluid Cognition (2009 Raven score)	-0.0910***	-0.0911***	-0.0928***	-0.0929***
	(0.0188)	(0.0188)	(0.0188)	(0.0188)
Age	0.0398	0.0398	0.0408*	0.0408*
	(0.0247)	(0.0247)	(0.0247)	(0.0247)
Age2	-4.64e-05	-4.63e-05	-4.56e-05	-4.54e-05
	(0.000323)	(0.000323)	(0.000324)	(0.000324)
Male	-2.264***	-2.265***	-2.258***	-2.258***
	(0.111)	(0.111)	(0.111)	(0.111)
Married/domestic partnership	-0.481***	-0.481***	-0.488***	-0.488***
	(0.121)	(0.121)	(0.122)	(0.122)
Elementary School (1st - 6th)	-0.971***	-0.972***	-0.976***	-0.977***

	(0.255)	(0.255)	(0.255)	(0.255)
Jr. High School (7th -9th)	-1.532***	-1.533***	-1.530***	-1.531***
	(0.267)	(0.267)	(0.267)	(0.267)
High School (10th -12th)	-1.687***	-1.688***	-1.688***	-1.689***
	(0.282)	(0.282)	(0.282)	(0.282)
Higher Educ: Univ. & Col. Grad	-2.461***	-2.464***	-2.474***	-2.476***
	(0.295)	(0.295)	(0.296)	(0.296)
Income earnt last 12m (ln)	-0.0355***	-0.0355***	-0.0372***	-0.0372***
	(0.0114)	(0.0114)	(0.0114)	(0.0114)
Victim assault or prop theft	1.459***	1.460***	1.451***	1.452***
	(0.136)	(0.136)	(0.136)	(0.136)
Cohesive & inclusive community	-0.778***	-0.778***	-0.778***	-0.778***
	(0.154)	(0.154)	(0.154)	(0.154)
Urban (people >=15,000)	0.555***	0.554***	0.559***	0.559***
	(0.111)	(0.111)	(0.112)	(0.112)
Personal & hhd econ shocks (5 yrs)	1.270***	1.270***	1.260***	1.261***
	(0.111)	(0.111)	(0.111)	(0.111)
Hhd Living Conditions & Assets Index[A]	-0.0857	-0.0865	-0.0919	-0.0926
	(0.0651)	(0.0652)	(0.0652)	(0.0653)
Post Global Financial Crisis (2009-2012)	0.0654	0.0780	0.132	0.143
	(0.0976)	(0.108)	(0.107)	(0.115)
Constant	27.13***	27.10***	26.93***	26.90***
	(0.495)	(0.505)	(0.510)	(0.519)
Observations	20,780	20,780	20,780	20,780
Number of groups	16,955	16,955	16,955	16,955

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score (z-score).

Table 3.A.12

Savings Amount & SWB Panel Analysis Regression

Calderon Depression Score (CDS)	(1) ***Random Effects*** Baseline (*Unpaid debts*)	(2) ***Random Effects*** Unpaid debts & risk preferences	(3) ***Random Effects*** Unpaid debts & time-value preferences	(4) ***Random Effects*** Unpaid debts, risk & time-value preferences
Sum of savings (ln)	0.00685	0.00693	0.00296	0.00303
	(0.0180)	(0.0180)	(0.0182)	(0.0181)
Risk Aversion (categorical)		0.00754		0.00709
		(0.0321)		(0.0321)
Time-value Preferences (categorical)			0.125***	0.125***
			(0.0436)	(0.0436)
Considers the future in financial decisions			0.156	0.156
			(0.105)	(0.105)
Spent nothing or < half of monetary gift			-0.297***	-0.297***
			(0.101)	(0.101)
Fluid Cognition (2009 Raven score)	-0.0934***	-0.0935***	-0.0954***	-0.0954***
	(0.0191)	(0.0191)	(0.0191)	(0.0191)
Age	0.0565**	0.0565**	0.0572**	0.0572**
	(0.0250)	(0.0250)	(0.0250)	(0.0250)
Age2	-0.000249	-0.000249	-0.000244	-0.000243
	(0.000328)	(0.000328)	(0.000328)	(0.000328)
Male	-2.257***	-2.257***	-2.251***	-2.251***
	(0.112)	(0.113)	(0.112)	(0.113)

Married/domestic partnership	-0.401***	-0.401***	-0.408***	-0.409***
	(0.123)	(0.123)	(0.123)	(0.123)
Elementary School (1st - 6th)	-0.991***	-0.991***	-0.997***	-0.997***
	(0.257)	(0.257)	(0.258)	(0.258)
Jr. High School (7th -9th)	-1.518***	-1.519***	-1.516***	-1.518***
	(0.270)	(0.270)	(0.270)	(0.270)
High School (10th -12th)	-1.646***	-1.647***	-1.646***	-1.647***
	(0.285)	(0.285)	(0.285)	(0.285)
Higher Educ: Univ. & Col. Grad	-2.367***	-2.369***	-2.375***	-2.378***
	(0.299)	(0.299)	(0.300)	(0.300)
Income earnt last 12m (ln)	-0.0274**	-0.0274**	-0.0292**	-0.0292**
	(0.0116)	(0.0116)	(0.0117)	(0.0117)
Victim assault or prop theft	1.547***	1.548***	1.540***	1.541***
	(0.138)	(0.138)	(0.139)	(0.139)
Cohesive & inclusive community	-0.777***	-0.778***	-0.777***	-0.778***
	(0.156)	(0.156)	(0.156)	(0.156)
Urban (people >=15,000)	0.567***	0.567***	0.571***	0.571***
	(0.113)	(0.113)	(0.113)	(0.113)
Personal & hhd econ shocks (5 yrs)	1.343***	1.344***	1.331***	1.331***
	(0.112)	(0.112)	(0.112)	(0.112)
Hhd Living Conditions & Assets Index[A]	-0.0718	-0.0724	-0.0764	-0.0770
	(0.0660)	(0.0660)	(0.0661)	(0.0661)
Post Global Financial Crisis (2009-2012)	0.145	0.155	0.207*	0.216*
	(0.0989)	(0.109)	(0.108)	(0.117)
Constant	26.82***	26.80***	26.65***	26.63***
	(0.500)	(0.510)	(0.515)	(0.524)
Observations	20,432	20,432	20,432	20,432
Number of groups	16,730	16,730	16,730	16,730

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score (z-score).

Table 3.A.13

Unpaid Debt to Labour Income (DTI) & SWB Panel Analysis Regression

Calderon Depression Score (CDS)	(1) ***Random Effects*** Baseline (*Unpaid debts*)	(2) ***Random Effects*** Unpaid debts & risk preferences	(3) ***Random Effects*** Unpaid debts & time-value preferences	(4) ***Random Effects*** Unpaid debts, risk & time-value preferences
Debts to labour income ratio (ln difference)	0.0739***	0.0739***	0.0747***	0.0747***
	(0.0106)	(0.0106)	(0.0106)	(0.0106)
Risk Aversion (categorical)		0.00570		0.00519
		(0.0317)		(0.0317)
Time-value Preferences (categorical)			0.124***	0.123***
			(0.0430)	(0.0431)
Considers the future in financial decisions			0.181*	0.181*
			(0.103)	(0.103)
Spent nothing or < half of monetary gift			-0.289***	-0.289***
			(0.0994)	(0.0993)
Fluid Cognition (2009 Raven score)	-0.0896***	-0.0896***	-0.0918***	-0.0918***
	(0.0188)	(0.0188)	(0.0188)	(0.0188)
Age	0.0784***	0.0784***	0.0781***	0.0781***
	(0.0243)	(0.0243)	(0.0243)	(0.0243)
Age2	-0.000500	-0.000500	-0.000482	-0.000482

	(0.000319)	(0.000319)	(0.000320)	(0.000320)
Male	-2.066***	-2.067***	-2.066***	-2.066***
	(0.108)	(0.108)	(0.108)	(0.108)
Married/domestic partnership	-0.433***	-0.433***	-0.442***	-0.442***
	(0.121)	(0.121)	(0.122)	(0.122)
Elementary School (1st - 6th)	-0.953***	-0.953***	-0.961***	-0.961***
	(0.255)	(0.255)	(0.255)	(0.256)
Jr. High School (7th -9th)	-1.445***	-1.446***	-1.448***	-1.449***
	(0.267)	(0.267)	(0.268)	(0.268)
High School (10th -12th)	-1.615***	-1.616***	-1.621***	-1.621***
	(0.282)	(0.282)	(0.282)	(0.283)
Higher Educ: Univ. & Col. Grad	-2.352***	-2.354***	-2.372***	-2.373***
	(0.295)	(0.295)	(0.296)	(0.296)
Victim assault or prop theft	1.516***	1.517***	1.506***	1.506***
	(0.136)	(0.136)	(0.136)	(0.136)
Cohesive & inclusive community	-0.778***	-0.778***	-0.777***	-0.778***
	(0.154)	(0.154)	(0.154)	(0.154)
Urban (people >=15,000)	0.592***	0.591***	0.595***	0.595***
	(0.112)	(0.112)	(0.112)	(0.112)
Personal & hhd econ shocks (5 yrs)	1.318***	1.318***	1.306***	1.306***
	(0.111)	(0.111)	(0.111)	(0.111)
Hhd Living Conditions & Assets Index[A]	-0.0788	-0.0792	-0.0861	-0.0866
	(0.0652)	(0.0652)	(0.0653)	(0.0654)
Post Global Financial Crisis (2009-2012)	0.108	0.116	0.171	0.178
	(0.0976)	(0.108)	(0.107)	(0.115)
Constant	26.47***	26.45***	26.30***	26.28***
	(0.490)	(0.500)	(0.505)	(0.514)
Observations	20,780	20,780	20,780	20,780
Number of groups	16,955	16,955	16,955	16,955

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
[A] superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score (z-score).

Table 3.A.14

Unpaid Debt to Savings (DTS) & SWB Panel Analysis Regression

Calderon Depression Score (CDS)	(1) ***Random Effects*** Baseline (*Unpaid debts*)	(2) ***Random Effects*** Unpaid debts & risk preferences	(3) ***Random Effects*** Unpaid debts & time-value preferences	(4) ***Random Effects*** Unpaid debts, risk & time-value preferences
Debts to savings ratio (ln difference)	0.0959***	0.0959***	0.0979***	0.0979***
	(0.0148)	(0.0148)	(0.0149)	(0.0149)
Risk Aversion (categorical)		0.00716		0.00678
		(0.0321)		(0.0321)
Time-value Preferences (categorical)			0.129***	0.129***
			(0.0436)	(0.0436)
Considers the future in financial decisions			0.222**	0.222**
			(0.105)	(0.105)
Spent nothing or <half of monetary gift			-0.265***	-0.265***
			(0.101)	(0.101)
Fluid Cognition (2005 Raven score)	-0.0901***	-0.0901***	-0.0923***	-0.0924***
	(0.0191)	(0.0191)	(0.0190)	(0.0190)
Age	0.0507**	0.0506**	0.0508**	0.0508**

	(0.0250)	(0.0250)	(0.0250)	(0.0250)
Age2	-0.000188	-0.000188	-0.000174	-0.000173
	(0.000327)	(0.000327)	(0.000328)	(0.000328)
Male	-2.253***	-2.254***	-2.245***	-2.245***
	(0.112)	(0.112)	(0.112)	(0.113)
Married/domestic partnership	-0.420***	-0.420***	-0.433***	-0.433***
	(0.122)	(0.122)	(0.123)	(0.123)
Elementary School (1st - 6th)	-0.997***	-0.997***	-1.005***	-1.006***
	(0.257)	(0.257)	(0.257)	(0.257)
Jr. High School (7th -9th)	-1.534***	-1.535***	-1.538***	-1.539***
	(0.269)	(0.270)	(0.270)	(0.270)
High School (10th -12th)	-1.629***	-1.630***	-1.636***	-1.637***
	(0.285)	(0.285)	(0.285)	(0.285)
Higher Educ: Univ. & Col. Grad	-2.300***	-2.302***	-2.323***	-2.325***
	(0.299)	(0.299)	(0.300)	(0.300)
Income earnt last 12m (ln)	-0.0264**	-0.0264**	-0.0286**	-0.0286**
	(0.0116)	(0.0116)	(0.0116)	(0.0116)
Victim assault or prop theft	1.555***	1.556***	1.542***	1.543***
	(0.138)	(0.138)	(0.138)	(0.138)
Cohesive & inclusive community	-0.779***	-0.780***	-0.783***	-0.783***
	(0.157)	(0.157)	(0.156)	(0.156)
Urban (people >=15,000)	0.573***	0.572***	0.578***	0.578***
	(0.113)	(0.113)	(0.113)	(0.113)
Personal & hhd econ shocks (5 yrs)	1.331***	1.331***	1.317***	1.317***
	(0.112)	(0.112)	(0.112)	(0.112)
Hhd Living Conditions & Assets Index^{A}	-0.0472	-0.0478	-0.0563	-0.0568
	(0.0659)	(0.0659)	(0.0660)	(0.0660)
Post Global Financial Crisis (2009-2012)	0.121	0.131	0.194*	0.203*
	(0.0987)	(0.109)	(0.108)	(0.117)
Constant	26.97***	26.94***	26.75***	26.73***
	(0.500)	(0.510)	(0.515)	(0.524)
Observations	20,417	20,417	20,417	20,417
Number of groups	16,721	16,721	16,721	16,721

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05
All quantities calculated over the estimation sample.
^{A} superscript: indicates index was derived from the tetrachoric principal component reported as a standardized score

Table 3.A.15

Hausman Test

Panel Specifications (FE vs RE)

Model: Unpaid Debts	**Baseline**	**With Risk Aversion (RA)**	**With Time-value (TV) preferences**	**Both: RA & TV Preferences**
Chi-square test value	61.72	63.75	63.72	65.64
P-value (Prob > Chi2)	0	0	0	0

Model: Savings	**Baseline**	**With Risk Aversion (RA)**	**With Time-value (TV) preferences**	**Both: RA & TV Preferences**
Chi-square test value	56.94	58.06	58.69	59.75
P-value (Prob > Chi2	0	0	0	0

Model: Debt to Income	**Baseline**	**With Risk Aversion (RA)**	**With Time-value (TV) preferences**	**Both: RA & TV Preferences**
Chi-square test value	58.09	60.07	60.37	62.24
P-value (Prob > Chi2)	0	0	0	0

Model: Debt to Savings	Baseline	With Risk Aversion (RA)	With Time-value (TV) preferences	Both: RA & TV Preferences
Chi-square test value	59.87	61.11	61.11	62.27
P-value (Prob > Chi2)	0	0	0	0

Table 3.A.16

Time-Fixed Effects Test

Panel Specifications (*testparm*)

Model: Unpaid Debts	Baseline	With Risk Aversion (RA)	With Time-value (TV) preferences	Both: RA & TV Preferences
Joint F test value	0.540	0.270	0.880	0.530
Prob > F	0.463	0.605	0.348	0.465

Model: Savings	Baseline	With Risk Aversion (RA)	With Time-value (TV) preferences	Both: RA & TV Preferences
Joint F test value	0.740	0.480	1.010	0.720
Prob > F	0.389	0.487	0.315	0.397

Model: Debt to Income	Baseline	With Risk Aversion (RA)	With Time-value (TV) preferences	Both: RA & TV Preferences
Joint F test value	0.760	0.420	1.140	0.730
Prob > F	0.383	0.519	0.285	0.395

Model: Debt to Savings	Baseline	With Risk Aversion (RA)	With Time-value (TV) preferences	Both: RA & TV Preferences
Joint F test value	0.680	0.420	0.970	0.670
Prob > F	0.410	0.516	0.325	0.415

Table 3.A.17

Modified Wald Test – Groupwise Heteroskedasticity

Panel Specifications (*xttest3*)

Model: Unpaid Debts	Baseline	With Risk Aversion (RA)	With Time-value (TV) preferences	Both: RA & TV Preferences
Chi-square test value	6.4e+37	3.1e+36	3.4e+36	5.3e+37
Prob > Chi2	0	0	0	0

Model: Savings	Baseline	With Risk Aversion (RA)	With Time-value (TV) preferences	Both: RA & TV Preferences
Chi-square test value	3.1e+41	1.5e+36	2.1e+37	8.2e+38
Prob > Chi2	0	0	0	0

Model: Debt to Income	Baseline	With Risk Aversion (RA)	With Time-value (TV) preferences	Both: RA & TV Preferences
Chi-square test value	1.5e+36	2.6e+36	9.2e+36	4.4e+36
Prob > Chi2	0	0	0	0

Model: Debt to Savings	Baseline	With Risk Aversion (RA)	With Time-value (TV) preferences	Both: RA & TV Preferences
Chi-square test value	1.5e+37	2.7e+37	4.0e+37	2.0e+37
Prob > Chi2	0	0	0	0

Chapter 4

Behavioural impacts of payment methods in Mexico

"To minimize the risk of falling prey to negative biases, be willing to keep learning and unlearning what you think you already know."

(Adaptation of common maxim).

4.1 INTRODUCTION

Money, as a social institution, medium of exchange, and payment technology has taken several forms throughout its history. Its many transformations have entailed a departure from hard matter (including commodities, bullion, paper, cards) toward increasingly abstract, electronic, and virtual representations of it (and of its backing).[224] The evolution of money has therefore followed a trajectory of increased dematerialization or decreased physicality.

Non-cash payment technologies have fast evolved particularly during the past 20 years, driven in no small measure by the incontestable digital transformations permeating most industries (even prior to the Covid-19 pandemic). Moreover, post-Covid-19 pandemic reforms have involved ambitious programmes of digitalisation and innovation, including (but not limited to) the realm of finance (see: European Commission [EC], 2019; Organisation for Economic Co-operation and Development [OECD], 2020; Demirgüç-Kunt et al., 2021). Leading public policy figures have gone as far as claiming that 'digitalisation is of utmost importance to narrow socio-economic inequality' (Ghiglione and Romei, 2021).[225] However, few empirical studies have actually measured the effects of using different payment forms on people's financial management and well-being, especially in countries with high inequality and low financial inclusion.

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[224] For example, while the first recorded use of banknote-type money was in seventh century China, it only began to be used by goldsmith-bankers as a 'promise to pay the bearer on demand' in the 16th century. While being tied to bullion it gained widespread traction in Europe until the 17th and 18th century. In the early 20th century, the first world war broke the link between notes and gold and by 1931, in England, banknotes issuing became entirely backed by securities instead of gold. Other countries followed suit thereafter. The first CC emerged in the early post World War two period: in the United States (US) in the 1950's and in the United Kingdom (UK) in the 1960's. Contactless cards and payments have been on the rise in both countries since 2007 and in 2008 the rather self-referential Bitcoin emerged. Since then, a number of cryptocurrencies have created a dynamic trading marketplace which, among other things, has spurred the creation of private stablecoins. The combination of the latter has spurred the exploration, design and adoption of central bank digital currencies (CBDCs) in some countries (e.g Jamaica [adopted], China [pilot], Nigeria [pilot], Brazil [proof of concept], India [research], Norway [research] and US, UK, EU [research]). Unlike cryptocurrencies, the latter are not merely volatile assets but rather stand as 'safer', fully backed, and 'protected' new forms of legal tender.

[225] Press conference commentary by Mario Draghi—Italy's former Prime Minister (13 February 2021 – 22 October 2022) and former President of the European Central Bank (1 November 2011 – 31 October 2019). His commentary also emphasised the importance of digitalisation for rapid post-COVID-19 economic recovery (Ghiglione and Romei, 2021).

Despite being a global phenomenon, the pace of development of payments has not been homogenous. For example, payments processor Worldplay pre-pandemic 2017 point of sale (POS) data show that in the U.S. only 16% of total retail in-store payments were done in cash, 35% through debit cards (DCs) and 40% with credit cards (CCs). In the United Kingdom only 22% of POS payments were in cash, 55% through DCs and 15% with CCs. In contrast, in emerging and less developed markets like the Mexican, data reveals that 76% of total in-store POS payments were in cash in 2017, 10% through DCs, and 8% via CCs (Worldpay, 2022). Mexico's slow adoption of new payment technologies and Mexican's attachment to cash is akin to that of poorer (by GDP measures) African countries and high even in comparison to other culturally similar middle income countries (MICs)[226] in Latin America including: Colombia (with 55% of 2017 POS payments in cash, 22% with DCs and 22% with CCs), Brazil (with 52% of 2017 in-store sales in cash) and Argentina (with only 44% of 2017 POS payments in cash).

Because most non-cash methods of payment have been developed in high income countries (HICs) the majority of research on the effects of payment mechanisms on people's financial wellbeing has focused on HICs. Yet, such empirical studies have limited external validity (beyond HICs) because these countries have broader financial infrastructures, deeper financial markets, and consumer groups which face different spending constrains than groups in less affluent societies with less developed financial markets.

The smaller set of articles on the use of payments in MICs like Mexico have barely studied any of the behavioural effects of payments or how the latter help to reinforce inequalities through their impact on financial behaviours (FBs) and outcomes.[227] Moreover, the limited amount of pre-existing research on MICs employs a standard microeconomics perspective at the expense of more holistic frameworks that incorporate the interplay of psychological and institutional factors.[228]

Given such gaps, this chapter seeks to expand the small literature on the behavioural effects of payment methods in MICs, and especially in Mexico where the (non-macro) payments literature is scant. Mexico represents an interest case study because: (1) it consistently ranks among the top 10 countries worldwide with the largest share of unbanked populations—estimated at 51 million (World Bank [WB], 2018); (2) the share of people in informal employment (who are usually paid in cash) in Mexico was estimated at 53% (Mexican National Institute of Statistics and Geography [INEGI][229], 2022); (3) despite expansion of financial access in Mexico, cash remains 'king'; and (4) in 2021 Mexico was the second largest

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[226] In this chapter, MICs include a broad number of countries since, for simplicity, we grouped into the same category of "Middle Income" both, countries that would be categorised as low-middle-income by the World Bank (WB) that is with an Atlas GNI pc. in the range: $1{,}086 \leq$ Atlas GNI pc. $\leq 4{,}255$, as well as those falling in the WB's upper-middle-income group (i.e., those in the range: $4{,}256 \leq$ Atlas GNI pc. $\leq 13{,}205$). By income level the WB consistently classifies Mexico as within the upper-middle-income set. However, its level of financial inclusion is unfortunately akin to that of lower middle-income countries.

[227] There is also limited research on these aspects in the context of lower income countries (LICs).

[228] Ibid.

[229] Acronym of its name in Spanish: 'Instituto Nacional de Estadistica y Geografia'.

remittance recipient country worldwide, after India, and replacing China (WB, 2022). The latter is relevant because according to the 2021 Mexican Financial Inclusion Survey (ENIF)[230] roughly 54% of remittance receivers had an account and a third of them made remittance transfers electronically (own estimations, 2022). It has therefore been suggested that remittances tend to expose the parties involved to account ownership and financial services—including non-cash payment forms—as individuals receiving (or sending) remittances are most likely to use an account to do so.

The complex features of the demand side of Mexico's retail financial sector makes the exploration of the behavioural and psychological effects of payment instruments all the more relevant as insights on how payment forms influence Mexicans financial management could have implications for areas beyond financial development, including: (1) how people perceive and account for inflation through payments and (2) whether the use of certain payment forms helps to perpetuate, increase or decrease inequalities.

Using the most recent ENIF wave (2021), we specifically explore the following questions: (1) how do Mexicans' demographic profiles and personal characteristics affect the type of payments they use to conduct different transactions? and (2) do different methods of payment, diversified by their extent of physicality, impact Mexican households' financial management behaviours through their interplay with cognitive biases and mental accounting processes?

The paper adopts a behavioural economics (BE) theoretical framework—suitable for capturing the multidimensional nature of payments use—and expands the approach by analysing how the influence of diverse sociodemographic factors on the use of specific payment forms varies per type of transaction, an inquiry that is also largely lacking in MICs (in general), and to our knowledge, has not been conducted in Mexico in particular.

Two empirical analyses were conducted. The first research question is evaluated through a multinomial logit model using a categorical variable indicating the payment method used across different types of transactions regressed on a diverse set of independent controls including: standard demographic and socio-economic indicators; structural (geographic) variables and personal characteristics such as trust in financial institutions (FIs), financial knowledge, financial attitudes, subjective financial well-being (SFWB), fraud experiences, use of banking correspondents[231] and of informal finance.

[230] Acronym of its name in Spanish: 'Encuesta Nacional de Inclusion Financiera'

[231] Type of branchless banking arrangement established by High Street banks with convenience stores and retailers which makes use of the latter's networks of pre-existing customers to extend part of their banking services. High Street banks relegate part of their financial services to their non-banking retail agents, considerably lowering their fixed costs while reaching more customers. Such arrangements are also believed to lower customers' transaction costs since they reduce travelling and waiting times to use financial services in urban areas (but especially in rural areas where little to no bank branching presence exists). Correspondents win directly through commissions per transaction and indirectly through higher customer traffic.

The second research inquiry is assessed through multiple regression models using an index of FBs being explained by three distinct payment forms differentiated by their degree of physicality whilst controlling for part of the factors mentioned above. We address endogenous selection by calculating bias-adjusted estimates of the three payment forms based on recent techniques (2019; 2022) that use information on selection on observables (overt bias) to retrieve information on selection along unobservables (hidden bias).

Seeking to inform the prevalent financial inclusion agenda and to add to the research investigating the effects of payment methods on purchasing and financial management behaviours in MICs like Mexico, the chapter is structured as follows. Section 4.2 reviews the (theoretical and empirical) literature on payments effects as well as the small, related research focusing on Mexico. In light of the literature, section 4.3 specifies the research questions and section 4.4 presents the data. Section 4.5 develops formally the empirical strategies used in each part of the analysis. Section 4.6 provides an in-depth descriptive overview of the data to help contextualise the findings. Section 4.7 presents and interprets the results of the econometric estimations. Section 4.8 concludes.

4.2 LITERATURE REVIEW

BE has been the economics subfield more specifically focused on how payment methods interact with our cognitive biases, heuristics, perceptions, emotions and impulses, ultimately affecting our personal finance choices (including spending and saving) and therefore our financial wellbeing. Subsection 4.2.1 summarises such theoretical frameworks. Subsection 4.2.2 covers the relevant findings from the literature on the effects of payments in HICs. Subsection 4.2.3 discusses the literature on payments in Mexico and other MICs while subsection 4.2.4 presents some literature limitations to which this study responds.

4.2.1 Theoretical Frameworks and Mechanisms

4.2.1.1 Mental Accounting and Prospect Theory

Building on Kahneman and Tversky's (1979) Prospect Theory, through his Mental Accounting Theory, Thaler (1980, 1985) formalised the psychology of spending and expanded the total utility function to include two separate but related utilities: acquisition and transaction utility. Acquisition utility is determined by the mental value consumers' ascribe to a product or service relative to the expense associated with it whereas transaction utility depends on the extent to which the product or service's actual price is considered fair in relation to the consumer's reference price. Consumers assign mental budgets to different transaction types and then allocate a portion of their actual income to the different mental accounts at the moment of purchase. In theory, consumers mental budgets act as the internal benchmarks or subjective reference prices against which customers judge observed prices. As such, mental budgets act as self-control mechanisms that help regulate consumers purchasing impulses, especially when the given mental budget per type of good or transaction is depleted (Thaler and Shefrin, 1981).

However, people's mental budgets are not strict constraints on spending, and they interact with other psychological mechanisms that are elicited by the form of different payments to induce diverse FBs and outcomes across users.

4.2.1.2 Pain of Paying

Pain of paying—the dominant theory explaining differences in the effects of payments (especially with regards to spending and WTP)—posits that specific features of the form of payments, namely: physicality (how material vs digital/virtual they are), transparency (value representation) and concurrency (coupling), influence consumers' payment experience and therefore how much they spend. These payment features matter because they affect the ease and friction of payments. A number of studies have supported the influence of such three payment-form aspects and evidence regarding their neurological basis has been gathered from neural patterns activated during purchasing decisions.

Based on the above, pain of paying theory argues that the more physical, transparent, and concurrent a payment method, the more pain (from disbursement) is experienced by consumers from using it and therefore the more the given payment method constrains spending (relative to other payment forms). Given this, according to pain of paying, cash is the most painful payment method. Research on places where cash remains prevalent (like Mexico) show that other mechanisms, both psychological (trust) and structural (access), might underlie cash persistence in such areas without invalidating the pain of paying theory.

Other important insights of the pain of paying theory include: (1) people prefer paying before consumption rather than after; (2) continuous payments are more painful than one-off outflows, (3) and current expenditures reductions are less painful when anticipated (e.g., savings, as they are expected to generate future utility).

4.2.1.3 Transparency, salience and coupling.

Transparency, salience and coupling are interrelated concepts highly associated with pain of paying theory. Saliency refers to a payment's prominence or the extent to which it stands out in our memory. The latter also relates to a payments' transparency, itself a by-product of its physical form. Soman (2003) defines transparency as a feature of the form of payments measuring the extent to which individuals using the payment think of it as "real" (tangible and fungible) money as well how much the given payment allows users to 'keep track' of expenses (and therefore of how much money is left out). Overall, studies on transparency argue that the more transparent a form of payment, the higher the salience of parting with money, the greater the pain from paying (and the aversion to it), and thus the lower the likelihood and level of spending (see Raghubir and Srivastava, 2008).

Under such characterisation, cash is considered the most transparent payment form because it directly shows its value as legal tender and due to its different shapes, materials, and design it also has high physical salience. Soman (2003) argued that though physical and linked to ‘real’ (fiat) money, cards do not induce the same meaning and feelings as cash since they fail to suggest the legal tender trustworthy status evoked by cash. In line with Soman (2003) others have argued that when people feel they are not spending “real” money, they spend more and feel less in control of their finances.

By virtue of being non-physical, digital (mobile) payments have the lowest transparency of all current forms of payments. This has important implications because low transparency is associated with more spending, inaccurate expenditure recall and ineffective budgeting.

Coupling refers to the extent to which the purchasing decision, the parting of money therein resulting, and the actual enjoyment of the purchase are psychologically linked due to their temporal proximity.[232] The higher the coupling (i.e., the more temporal proximity between consumption and actual loss of money from paying), the greater the pain of paying, which in turn constrains the desire to purchase. Like transparency, coupling also relates to the payments’ saliency. The lower a payments’ coupling, the less salient the monetary outlay due to purchasing, the less people pay attention to how much they spend, the less recall and budgeting and the more willingness to pay (WTP).

While cash is believed to be the most concurrent payment (followed by DC); CCs and schemes such as ‘buy-now-pay-later’ (BNPL) have low concurrency and coupling (therefore lower pain from paying) because they separate the benefits from acquisitions from the post-payment costs (Loewenstein & Prelec, 1992; Prelec & Loewenstein, 1998; Thaler, 1999; Tokunaga, 1993).[233]

Hence, payment coupling helps explain the ‘spending credit-card effect’ described in the empirical literature, namely, that compared to cash, CCs increase spending and WTP.

Despite the settlement immediacy of mobile payments, their coupling can be as immediate as that of cash (e.g., when you pay for coffee through your banks’ mobile payment app) or quite distant (e.g., when you make an e-commerce mobile payment). While less research exists on mobile payments’ coupling, the consensus is that their virtual nature makes them less salient than cash payments and therefore prone to induce more spending.

[232] In other words, coupling refers to the time between purchase and payment.

[233] With CCs the actual parting of the money occurs after the purchase rather than simultaneously as happens with cash payments, therefore causing less pain from paying.

4.2.2 *Empirical studies on the Effects of Payment Methods (HICs).*

4.2.2.1 Demographic determinants of CC and DC usage

The bulk of the literature on the economic psychology of payment methods and of their effects on users' financial management has thus far focused on CCs and (to a lesser extent) on DCs. The first variety of studies emerged in the 1960s and early 1970's (when CCs were still an innovation) and it combined psychographic analysis with demographic data to identify characteristics that distinguished CC users from non-users or that helped differentiate across various types of CC holders types. Plummer (1971) applied lifestyle analysis to a nationwide US survey and found that CC users (only 17% of his sample) were more active, urbane, fashion conscious, risk-oriented, achievement-oriented, and contemporary minded than non-users. Plummer (1971) also claimed that CC users were on average more involved in decision-making and came from higher socioeconomic levels than non-users. Wiley and Richard (1974) corroborated Plummer's (1971) findings while Matthews and Slocum (1972, 1970, 1969) and Curtis (1972) debated the relative merits of social class and income as predictors of CC usage patterns.
Once CCs reached mass-market stage adoption in the U.S., Adcock et al. (1977) evaluated whether the profile of bank CC users differed from that of early adopters (7 years prior).[234] Consistent with prior research Adcock et al. (1977) found that users were more likely than non-users to have middle or upper-middle incomes, be better educated, middle-aged or older, married, and to be males. However, Adcock et al. (1977) found that, once CC stopped being considered an innovation, lifestyle differences between CC users and non-users were not any more significant.

Research on DCs focused at first on identifying the determinants of their use and gained momentum in the 1980s-1990s, just after their 1975 introduction in the U.S. Using the 1995 U.S. Survey of Consumer Finances (SCF), Kennickell and Kwast (1997) found that DC use was not significantly related to income but was positively associated with financial assets and education. Using the 1998 SCF, King and King (2005) found that DC usage was positively associated with negative views on CCs, higher educational achievement, CCs ownership, and higher amounts of revolving CC balances. However, they found a negative relation between DCs and the dollar value of a household's financial and non-financial assets. Carow and Staten (1999) found that compared to non-users, DC users were less likely to be married, own a home, and that the probability of using DCs increases with the number of general-purpose cards held by the consumer. All documented negative effects of age on DC use.

4.2.2.2 Effects of CC and DC usage

[234] In the survey used by Adcock et al. (1977) the share of bank CC was 47.8 percent of respondents, 30.8 percentage points or almost three times larger than Plummer's sample.

A second strand in the literature developed in the late 1970s and 1980s as scholars shifted from determining card users' profiles to analyse the *possible effects* of using different payment instruments (and mainly CCs) on consumers' financial wellbeing and management.

Table 4.1 summarizes the main findings of the second strand of the literature, further detailed below.

Table 4.1:

Effects of payment methods compared to cash:		
CC	***DC***	***Mobile Payments***
▪ **Higher expenditure at the point of sale** (Hirschman, 1979; Feinberg, 1986; Tokunaga, 1993; Prelec and Simester, 2001; Soman, 2003; Raghubir and Srivastava, 2008) ▪ **Worsened expenditure recall** (Gross and Souleles, 2002; Raghubir and Srivastava, 2008) ▪ **Lower pain of payment** (Loewenstein and Prelec, 1992; Prelec and Loewenstein, 1998; Thomas et al., 2011; Shah et al., 2016) ▪ **Lower product connectivity** (Shah et al., 2016) ▪ **Reduced impulse control** (Thomas et al., 2011) ▪ **Increased debt accumulation** (Gross and Souleles, 2002).	▪ **Increased willingness to pay** (Runnemark et al., 2015) ▪ **Lower pain of payment** (Loewenstein and Prelec, 1992; Prelec and Loewenstein, 1998; Thomas et al., 2011; Shah et al., 2016) ▪ **Reduced impulse control** (Thomas et al. 2011) ▪ **Lower product connectivity** (Shah et al., 2016) ▪ **Used as hedging mechanism (households with revolving debt more likely to use DC)** (Lee et al. 2007; Shah et al., 2016)	▪ **Increased willingness to pay** Most authors studying them. ▪ **Lower pain of payment** Most authors studying them. ▪ **Reduced impulse control** (Falk et al., 2016; Garrett et al., 2014; Meyll and Walter, 2019) ▪ **Lower product connectivity** Most authors studying them. ▪ **Low awareness and dispersed attention** (Gafeeva et al., 2018) ▪ **Low recall accuracy** (Falk et al., 2016; Garrett et al., 2014; Meyll and Walter, 2019)

Hirschman (1979) analysed whether possession of alternative types of CCs (bank versus retailers[235] CCs) affected shoppers' behaviour and found that compared to customers paying in cash, shoppers' using *either* type of CC had higher amount and more frequent purchases. Hirschman (1979) also found that the more CCs consumers had, the higher their spending amount. Deshpande and Krishnan (1980) found that card possession was related to buying higher priced items. Related studies found that

[235] E.g., store-issued cards.

shoppers using CCs instead of cash had on average higher grocery store expenditures (Soman, 2003; Thomas et al., 2011).
Using principal component analysis and discriminatory analysis, Tokunaga (1993) found that people with credit-card debt problems display greater external locus of control, lower self-efficacy, view money as a source of power and prestige, display lower risk-taking and sensation-seeking tendencies, and express greater anxiety about financial matters than successful CC users.

Experimental studies also corroborate the 'spending credit-card effect' documented by observational studies. Conducting experiments regarding university students' WTP for different items and their willingness to donate (WTD) to charity, Feinberg (1986) exposed treatment group students to visual CC paraphernalia (insignias or logo) while the control group was not and found that both WTP and WTD were higher among treatment group students. Soman (2003) used the replacement of coins and banknotes by prepaid cards in laundry rooms as a 'natural experiment' and observed that, compared to consumers paying in cash, consumers using prepaid cards spent significantly more on laundry (despite equivalent rates in facilities accepting either payment technology).

Other observational studies have documented that CCs are associated with reduced accuracy of expenditure recall. Srivastava and Raghubir (2002) observed that, compared cash users, *total* expenditure recall was significantly lower among people using CCs and that the gap in recall accuracy could be reduced by having participants remember subtotals from different spending categories rather than a total final sum. Gross and Souleles (2002) observed that CC users had higher debt accumulation (and overdrafts) than non-users and argued that this was due to double-spending and CC users forgetting small prior expenditures.

Examining the effects of payment forms and mental accounting estimations of expenditures, Raghubir and Srivastava (2008) found that piecemeal decomposition (i.e. evaluating the cost of each item in a basket separately and then adding them to approximate a total) increases the salience of individual payments and attenuates differences between CC and cash purchases while holistic estimation (i.e. ballparking the total cost of the basket without pondering about each item's cost) produced the usual CC effects.[236] The scholars explained the findings arguing that piecemeal decomposition makes each small cost appear larger (thus accentuating pain of paying even when using CCs) and also narrows the perception between time of payment and consumption (tightens coupling) all of which helps to decrease CCs spending effects (Menon, 1997; Thaler, 1999; Raghubir and Srivastava, 2002, 2008). Overall, Raghubir and Srivastava (2008) work emphasises that highlighting the difference between cash and non-cash payment alternatives decreases the salience of parting with real money associated with non-

[236] I.e., shoppers using CCs exhibiting higher WTP and spending amounts than those using cash.

cash payment alternatives thus reducing the mental constraints of spending with them. The latter is of great current relevance given the upsurge of very low coupling mechanisms (e.g., BNPL schemes).

In a series of studies Shah et al. (2016) evaluated whether different payment forms influence consumers' post-transaction connection with the acquisition and showed that the more painful the payment form used, the more financially, psychologically, and behaviourally committed would individuals be to the items bought or causes supported.

Another important strand of the literature has focused on people's emotional sensitivity to modes of payment and evidenced that cash payments feel different from other less vivid and emotionally more inert modes of payments (Prelec and Loewenstein, 1998; Soman 2001; Mishra et al. 2006; Raghubir and Srivastava 2008, 2009).

Prelec et al. (1997), recognised that individuals differ in their sensitivity to pain of paying and developed a Spendthrift-Tightwad (STTW) scale that measures respondents' spending habits in relation to pain of paying. Challenging the view that only expected emotions influence spending and financial decisions, Prelec and Loewenstein (1998) argued that consumers rely more on immediate emotions—i.e. pain of paying—to control their spending.[237] In line with such work, and recognising the divergence between people's *desired* and *realised* (actual) spending habits, Rick et al. (2008) used Prelec et al. (1997) STTW scale to demonstrate that tightwads (consumers with low STTW scores whose affective reactions to spending lead them to spend less than they would ideally like to) and spendthrifts (consumers with high STTW scores whose minimal pain of payment experience leads them to spend more than what they would consider normatively appropriate) behave similarly when pain of paying is diminished by contextual factors while their spending differences are the greatest in contexts that amplify the pain of paying. These findings remain substantively important because they explain how undersaving—even amongst tightwads—is facilitated by environments providing increasingly painless ways to pay (e.g., contactless, tap and go systems as well as BNPL schemes or e-commerce one-click checkouts).

Analysing consumers' shopping baskets Thomas et all. (2011) found that, consumers paying with either CCs or DCs purchased more impulsive ('sin' or 'vice') products than consumers paying with cash which they explained arguing for a *vice-regulation effect* of cash mediated by its higher pain of paying (the highest of all payment forms). Overall, Thomas et al. (2011) research concluded that: (1) pain of paying plays a beneficial role in impulse-control, (2) less vivid and more emotionally inert modes of payment cause consumers to experience less pain from paying, thus, weakening their impulse-control abilities, (3) such effect may not be mitigated by heightened attention to prices, (4) cash's vice-regulation effect

[237] See similar conclusions in Zellermayer (1996).

is moderated by shoppers chronic sensitivity to pain from paying[238], and (5) at least some consumers (tightwads) could curb impulsive purchasing urges by paying with cash. Thomas et al. (2011) conceptualised pain of payment as being influenced *solely* by the payments' form, therefore failing to account for the higher pain of payment that CC users experience in comparison to DC users due to the psychological burden of carrying debt into the future (itself resulting from CCs' lower coupling). Hence, they argued that *all* types of cards (CCs and DCs) would be relatively painless.
While the majority of the literature has focused on spending differences between cash and CC users, scholars analysing spending differences between DC and CC users have ascribed the discrepancies to their respective coupling, arguing that DCs higher coupling causes consumers to perceive DCs' pain of paying as larger than that of CCs (Thaler, 1980, 1985; Kahneman and Tversky, 1979).

Prelec and Lowenstein (1998) explained preferences of DCs use over CCs arguing that *post-payment* thoughts associated with CCs lowered the net utility of household purchases. Their reasoning rests on the recognition that while DC users evaluate both the gains from instant consumption (without worrying about later repayment duties) and immediate parting of money (pain of payment) at the purchase stage, pain of payment is deferred to a later date for CC users and, if they accumulate CC-debt, the pain from payment spreads throughout their lifetime, significantly decreasing the net pleasure from purchases.
Rook (1987) argued that impulsive spending would be more prevalent amongst CC users due to their financing ability (absent in DCs). Similarly, Lee et al. (2007) argued that DC users usually have less unsecured debt than CCs users because they are restricted by the amount of money available in their bank account which makes them more likely to forego unnecessary and/or impulsive purchases as they realize how DC purchases translate into instantaneous reductions in their account balances. As in King and King (2005), Lee et al. (2007) also found a positive relationship between revolving credit debt and DC usage among consumers with both types of cards which they reconciled arguing that some households use DCs to leverage and avoid further debt accumulation. Other scholars studying the associations between consumer debt and the use of card payments have supported the post-payment psychological burden of CCs. For example, Zinman (2004) argued that debt-averse households tend to use DCs.

The relatively smaller body of experimental work conducted on DCs indicates that, just as CC, DCs are associated with increased WTP and lower product attachment than cash (Shah et al., 2016). In a study controlling for cash-on-hand constraints, spending type, price familiarity and consumption habits, Runnemark et al. (2015) showed that, compared to shoppers paying in cash, DC users had higher WTP whilst bidding for products. Soetevent (2011) examined the impact of payment mode on charitable

[238] For example, they observed that the vice-regulation effect of cash was stronger amongst tightwads because the latter were the most sensitive to pain from paying.

giving in the Netherlands and found that almost nobody donated through DCs if they could donate with cash. Yet, propensity score matching estimates suggested that average donors in the 'debit-only' treatment group were significantly more generous than similar donors in the 'cash-only' group. Soetevent (2011) attributed the findings to DCs' lower pain of payment (relative to cash) as well as to the higher gains in reputation from prosocial behaviour (Benabou and Tirole, 2006) that their study (by construction) allocated to DC donations as opposed to cash donations.

4.2.2.3 Contactless Payments

The next iteration in the evolution of money has been the development of contactless payments[239] (including tap-and-go instruments) introduced in 2007 in the UK and booming ever since, especially in HICs. In Mexico, contactless payment forms were first introduced in 2012 by few private banks and since 2019 they have been encouraged by Banco de Mexico (Banxico) through its introduction of a new (national) fast-retail electronic payment technology 'Cobro Digital' (CoDi).[240] Despite being a staple in HICs (e.g. UK, Europe and the U.S.), contactless payments in Mexico have only gained marginal traction. As a result, the majority of the (still small) literature on the effects of contactless on consumers' financial management has focused on HICs —where a strong preference for contactless (over other payment modes) has been documented despite contactless users' higher propensity for increased spending and reduced awareness (and recall) of expenditures than that of non-users. In Mexico, the few studies on contactless payments have been done by banks, consulting firms or industry associations. Thus, they have focused on increasing their penetration rates rather than on users financial well-being (see: Americas Market Intelligence [AMI], 2018; Mexico Business, 2020; WFL Management and BBVA Mexico [n.d.]).

4.2.2.4 Mobile Payments

Mobile payments (including mobile transfers and mobile money)— a subcategory of contactless technologies—are the latest echelon in the dematerialisation (or digitalisation) of money and have gained wider global uptake than contactless card payments (including in MICs and in emerging markets like Mexico). While mobile payment methods have existed for more than a decade, scarce research has investigated their consequences on users' personal financial management and the few existing studies speak of the same kind of effects observed by the research on card payments, but intensified.

Garrett et al. (2014) found that mobile payments increase users susceptibility to spend impulsively and to prioritise convenience at the expense of their financial well-being, leading them to troubled financial

[239] While contactless are typically associated with a feature of card payments, they encompass a wider range of payment methods since, by definition, contactless payments refer to payment forms that operate via radio frequency (RF) technology, near-field communication (NFC) or magnetic secure transmission (MST) technologies.

[240] Introduced in 2019, as other forms of contactless payments, CoDi works using a smart phone, NFC technology, and quick response (QR) codes.

strategies including using high cost debt to make ends meet (payday loans, auto-title loans) and risky credit behaviours (taking cash advances and paying over the limit fees).

Meyll and Walter (2019) studied the impact of mobile payments on people's financial outcomes and found that compared to non-users, individuals using mobile payments (i.e., using smartphones to conduct mobile transactions) were less financially literate, had higher levels of financial risk tolerance, and were more likely to exhibit costly CC behaviour (defined as only making the minimum payment, paying late fees or over the limit fees)[241]. Meyll and Walter (2019) attributed the findings to the lower transparency and pain of paying effects of mobile payments.

Examining the effect of payments on WTP and overall store price image (OSPI)—i.e., customers' beliefs about a store's price levels relative to their own reference prices and to competition—Falk et al. (2016) found that mobile payments (the least transparent payment form) led to more favourable (low) OSPI judgments and significantly increased customers' WTP compared to cash and card payments (both more transparent payment forms). Falk et al. (2016) explained the findings arguing that a product's (or service's) benefits are emphasized (relative to its costs) whenever the pain from paying is lower, which in turn is determined by the transparency of the payment method used. The less transparent the payment, the less pain experienced from paying and the more shoppers underestimate the real cost of the purchase, biasing down their OSPI formation (judging it lower). Combined, these effects elicit more joy from shopping and increase consumers' WTP and spending when using mobile payments than when purchasing with more transparent (thus more painful means such as cash).

4.2.3 Contextualizing the Use of Payment Methods in Mexico and other LMICs

The majority of the applied microeconomic research on payments in Mexico has focused on their link to financial inclusion, poverty reduction and financial development.

4.2.3.1 Remittances and payments

Ambrosius (2011) evaluates the indirect effects remittances have on receiving localities by estimating the treatment effect of a change in remittance status on changes in financial access. Measuring access to financial services as changes in ownership of savings accounts and/or as changes in the availability of borrowing options, Ambrosius (2011) results showed that remittances have an important impact on financial access in Mexico. Furthermore, Ambrosius (2011) found that remittance effects were stronger and significant for rural households (but not significant for urban households) and also more important in terms of access to microfinance institutions than to commercial banks.

4.2.3.2 DCs, spending and cash transfers

[241] They further noted that frequent mobile payment users were about 5.0 percentage points more likely to exhibit costly CC behaviours than infrequent mobile payment users.

Bachas et al. (2021) use household survey and high-frequency administrative data to evaluate the causal effect on account use and savings of a 2009 rollout of DCs to beneficiaries of the Mexican conditional cash transfer program *Oportunidades*.[242]

Contrasting with savings interventions elsewhere (showing very small or insignificant effects)[243], Bachas et al. (2021) results revealed that DCs rollout to *Oportunidades* beneficiaries caused large and significant increases in the number of active account users (in terms of quantity of withdrawals and savings) as well as a 2% increase in the savings stock of beneficiaries after two years with their *Oportunidades* DC.[244] Bachas et al. (2021) also found that beneficiaries did not increase savings through substitution from decreasing investments in human or physical capital (spending on education and other assets), but rather by lowering their consumption of temptation and nondurable goods. Such findings seemed to undermine prior theoretical presumptions as DCs—assumed to have lower transparency, lower saliency and greater pain of paying than cash—would not have been expected to contribute to increase savings, However, Bachas et al. (2021) did not link their findings with research documenting how payment methods with high pain of paying and coupling (such as cash followed by DCs) have been shown to curtail people's expenditures (see prior section).

Observing that poor Mexican cash transfers recipients used DCs and accumulated savings in their accounts voluntarily, Bachas et al. (2021) concluded that low transaction costs of access and trust in banks were necessary but not (individually) sufficient conditions to save in formal financial institutions. Beneficiaries revealed a preference for saving in banks only once both elements were procured *simultaneously* by the payments' intervention. Without reference to any BE theory on the effects of payment methods on personal finance, Bachas et al (2021) leaved unaddressed whether part of their results could be attributable to endowment effects, loss aversion, pain of payment or any other common cognitive biases interacting with payment mechanisms.[245]

4.2.3.3 Correspondent banking

Other studies have looked at the effects of banking correspondence as an alternate intervention to facilitate savings and financial inclusion in Mexico. Along with mobile phone transactions, personal identification number (PIN) verified and contactless payment cards, the banking correspondent model is a branchless banking service and has spread since the turn of the 21st century due to the consensual belief that it lowers transaction costs for both users and providers (Mas, 2009). In Mexico, the correspondent model has gained traction since 2009 when banking correspondence operations became

[242] That is, rolled-out DC were tied to pre-existing savings accounts of *Oportunidades* beneficiaries.

[243] Bachas et al. (2021) argued that the *Oportunidades* DCs rollout effect was higher than that of any of the other common savings interventions used elsewhere including: offering commitment devices, no-fee accounts, higher interest rates, lower transaction costs and financial education.

[244] Such results seemingly contradict findings of studies on the psychology of payments arguing that along with the preponderance of ATMs and POS terminals, DCs would incentivise more spending rather than saving. However, it might be the case that some of the spending effects of card payments (mostly documented in HICs) ensue after users reach a certain level of threshold income.

[245] Bachas et al. (2021) also make no allusion to any income effects from cash transfers.

allowed by regulation.[246] An enormous heterogeneity of correspondent banking agreements exists in Mexico. Not all banking correspondents supply the same range of services[247] and the services that each bank-correspondent pair chooses to offer greatly depends on the type of bank and of correspondent (and of their respective market power) as well as on the type of locality in which the services will be active. Such heterogeneity complicates addressing their impact and the results of studies evaluating banking correspondents as channels for financial inclusion in Mexico have been inconclusive.

Peña and Vázquez (2012) found no significant effects of banking correspondents' use on neither savings (measured by number of accounts and number of DCs) nor on credit (measured through number of CCs). However, they spoke only of the initial stage of the banking correspondents' boom in Mexico.[248] In contrast, Eisele and Villarreal (2015) argued that the introduction of banking correspondence in Mexico had a positive effect on household income. Nonetheless, Eisele and Villarreal (2015) results were inconclusive because they did not control for prior banking access, an important selection confounder of banking correspondents' users.

Carabarin et al. (2018) estimated the effect of banking correspondents on savings through a difference in differences (DID) model with multiple time periods (from 2011 to 2016). Analysing a larger timeframe than Peña and Vázquez (2012) and contrary to the latter findings, Carabarin et al. (2018) found that banking correspondents had a positive effect on savings (due to the observed positive effect on the volume of formal savings in Mexico) and on financial inclusion (through a positive effect in the number of accounts). Further, Carabarin et al. (2018) argued that the impact appeared to be homogenous across rural and urban areas.[249] They also found evidence of prominent spill-over effects as the activation of banking correspondence deals inside a municipality negatively impacted rival banks (while maintaining a positive aggregate level effect). However, due to the heterogeneity in banking-correspondence agreements in Mexico, Carabarin et al. (2018) were unable to differentiate deals that allowed correspondents to open new accounts with their banking principal from those that do not. This undermined the strength of their results since the former type of bank-correspondent agreement, by definition, entailed greater financial inclusion than the later.

While comprehensive, Carabarin et al. (2018) study did not clarify whether the increase in formal savings was attributable to an increase in overall savings or to shifts from informal to formal services.

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[246] The regulation was published in December 4th, 2008 in the Diario Oficial de la Federación (Official Government Diary) and became active until November 2009 (first between smaller banks and retailers and then amongst larger banks). Participation of larger banks in correspondent banking has sharply increased since 2011.

[247] The full range of financial services that a banking correspondent could offer include: making deposits, loan and services payments, cash withdrawals, opening low-risk bank accounts, collecting checks, checking balances, receiving and sending remittances.

[248] As the authors only analysed the years 2010 and 2011.

[249] The authors did not find a significantly greater effect of banking correspondents on rural municipalities than on urban municipalities.

Just as Bachas et al (2021), Carabarin et al. (2018) neglected considering the possible psychological and behavioural channels underlying their results. For example, one is left to wonder whether the increased use of retailers, supermarkets and convenience stores for financial services increases or not impulse spending and temptation goods' purchases through nudges and framing effects arising from having banking services 'conveniently' placed in the same location as fast-moving consumer goods and other retail items.

4.2.3.4 Banco Azteca: retail-based bank transcending correspondence

Similar studies have analysed the effects on financial access and on other economic outcomes of the sudden appearance and expansion of Banco Azteca—a bank targeting low-income or previously unbanked individuals.[250] Taking the 2002 emergence of Banco Azteca as a natural experiment and using DID estimation, Bruhn and Love (2014) found that the introduction of Banco Azteca significantly impacted the number of informal business owners, overall employment, and average income in the 'treated' municipalities where the bank opened. Evaluating the same event Ruiz (2013) found that households in municipalities where Banco Azteca had entered were more likely to borrow from banks and less likely to borrow from pawnshops.

As the sample of studies in the above subsections show, most of the personal finance, microeconomics and development literature concerning payment forms and financial services in Mexico has focused on their impact on either financial inclusion, financial literacy or on their relationship with financial well-being variables like savings (itself neither homogeneously nor clearly defined). To our knowledge none have yet evaluated the specific psychological and behavioural effects that different payment forms—as financial services vehicles—have on Mexicans personal financial management, the specific research gap this study attempts to address. Therefore, we now detail recent research conducted in emerging economies (like Mexico) from which part of this study's empirical specification is derived.

4.2.3.5 Psychological effects of payments in emerging markets

Hou, Hsueh & Zhang (2021) analyse the impact of digital payments on Chinese households' consumption and spending behaviour in light of mental accounting principles. Based on Thaler and Shefrin's (1981) dualist conceptualization of individuals as farsighted planners employing self-controlling methods (rules and incentives) to influence their myopic doer's side behaviours, Hou, Hsueh & Zhang (2021) tested the hypothesis that digital payments have a stronger stimulating effect on people with lower self-control and liquidity constraints, thence leading them to higher levels of consumption (especially of long-term and hedonic items).

[250] Banco Azteca originated from the approval of a banking licence granted to one of the largest electronics and household goods retailers in Mexico: Grupo Elektra.

Using matching and instrumental variables as sensitivity tests Hou, Hsueh & Zhang (2021) found that digital payments augmented consumers' transaction utility[251], facilitated intentional adjustment of mental accounts, and increased unplanned consumption (particularly of long-term, durable and entertainment goods). Hou, Hsueh & Zhang (2021) explained their results arguing that digital payments relax individuals' explicit liquidity budget constraints and implicit mental budget restraints because they allow people to pool all their disposable income together, thereby diminishing the motivation to plan purchases, challenging the rigor of consumers self-control ability, and facilitating impulsive spending.

Taking as main regressor a binary variable representing Chinese respondents' choice to pay through digital means[252], Hou, Hsueh & Zhang (2021) analysis only focused on the effects of digital payments on spending. Nonetheless, their framework could be extended to hypothesise about the impact that payment instruments with different extents of physicality (or lack-thereof) have on people's financial management behaviours.

Studies analysing the persistent use of cash also offer valuable insights. Empirical microeconomics research highlights aspects such as: transaction size and speed; social marginal costs; demographic characteristics; privacy concerns; and perceptions of safety, risk, convenience and ease of use among the most relevant factors influencing consumers' choice over mode of payment.

In particular, research on consumer behaviour and payment choice has found that privacy concerns are an influential psychological factor biasing transactions in favour of cash (Png I, Tan C, 2019). Other researchers have argued that high cash use is grounded on inertia[253] (Jonker, 2007).

Motivated by the still persistent use of cash in India, Shree et al. (2021) studied how the *perception of* and *trust in* digital payments as well as users' prior experiences with online fraud affected Indian consumers' FBs and use of different payment forms. Using multinomial logistic and maximum likelihood methods to analyse the primary data collected through their self-developed survey, Shree et al. (2021) found that negative outlooks on cash paired with confidence in new digital retail payment systems as well as with positive perceptions and trust towards service providers and regulators motivated their survey respondents to go digital.

4.2.4 Limitations of Pre-existing Research

Many of the empirical works reviewed have limited external validity beyond HICs because the majority focused on countries with broader financial infrastructures, deeper financial markets and with consumer

[251] According to mental accounting theory, transactional utility refers to the extent to which a product or service's actual price is considered fair in comparison to the buyer's reference price.
[252] Via either a computer, a mobile terminal using either a cell phone or a pad.
[253] In this context understood as the endurance of financial and payment habits.

groups which de facto face different spending constrains than groups in less affluent societies with less developed financial markets (like Mexico). While the literature's strong focus on card payments is justified by them being one of the most significant 20th century retail payments innovations, the literature's unbalanced concentration on CCs has come at the expense of DCs and, especially, of newer, non-traditional payment instruments.

While the rapid evolution of telecommunication, information technologies and electronic payments has entailed the development and sprawl of less physical, immaterial or contactless forms of payments, a more limited amount of studies exist on the latter and only a few of these focus on emerging markets and less developed countries.

Moreover, the smaller set of articles on the use of payments in MICs (like Mexico) have mainly studied the extent of use of given modes of payment as expressions of people's level of financial inclusion and therefore have neither explored psychological causes nor their behavioural effects. Additionally, most of them have focused on a single payment instrument (i.e., either cash, CCs or DCs or more virtual payment forms such as digital transfers or mobile money) therefore forgoing an analysis of their relative (comparative) effects.

Methodologically, the limited amount of pre-existing personal finance research on payments in MICs tends to employ a standard microeconomics perspective at the expense of more holistic frameworks that incorporate the interplay of psychological and institutional factors. Furthermore, most existing microeconomics studies have prioritized analysing the impact of demographic factors on the use of payment instruments without considering other determinants such as cognitive biases and consumer finance policies. Likewise, the few existing works regarding Mexico have primarily focused on subgroups of the population (such as those receiving government transfers or remittances) while leaving out other groups also important to contextualise results at the country level.

Finally, academic research on how the impact of factors influencing the payment form used might vary per type of transaction conducted—a question naturally deriving from mental accounting theory—is also largely lacking in low- and middle-income countries (in general), and to our knowledge, has not been conducted in Mexico in particular.

4.3 RESEARCH QUESTIONS

In light of the caveats in the literature, and with the aim of generating data insights on the purposive use of payments[254] and on how different forms of payment might influence money management behaviours (and financial wellbeing thereafter), this study uses Mexico as a case study to explore the following questions:

[254] I.e., on how the form used might change depending on the nature of the transaction in question.

4.3.1 How do Mexican's demographic profiles and variables such as their: level of financial knowledge, experience of fraud, trust in FIs, use of informal sources of finance, subjective financial well-being perceptions and attitudes towards money affect the frequency in which they use diverse payment methods to conduct different transactions?

4.3.2 Do diverse modes of payment—differentiated by their physicality (vs. digitalisation level)— impact Mexican's financial management behaviours through their interplay with cognitive biases and mental accounting processes? More specifically:

- How are less material (more electronic or digital) forms of payment related to financial management behaviours (including budgeting, not overspending, having active savings, making informed purchases, etc)?

4.4 DATA

We use the ENIF survey conducted every three years by the Mexican National Banking and Stock Exchange Commission (CNBV)[255] in collaboration with INEGI. The ENIF emerged in 2012 in response to the growing promotion, at least among policy circles,[256] of financial inclusion as 'a pillar of development' and 'tool' to weaken poverty cycles, diminish inequalities, and provide social mobility opportunities (Global Partnership for Financial Inclusion [GPFI] n.d.).

To ensure international comparability, since its creation, the ENIF has been based on the FBs, financial knowledge and financial attitudes measurement methodologies contained in the OECD International Network on Financial Education (INFE) Financial Literacy and Inclusion Toolkits.[257]

Following the standard of similar international surveys, and of other Mexican surveys (including the MxFLS), the ENIF uses a probabilistic, stratified and multi-staged sampling design.

Despite having four waves[258], we constrain our study exclusively to data from the 2021 wave because the ENIF is not a panel survey and the information contained in earlier waves is more limited than that found in the 2021 wave. For example, ENIF 2018 does not differentiate between mobile and internet banking, instead, it combines the two into a single indicator that suggests the use of web-based banking but does not specify it is cell-phone based. To the contrary, in addition to standard indicators on DC and CC holding and use, ENIF 2021 includes information on both mobile and internet banking.

[255] Acronym of its name in Spanish: 'Comision Nacional Bancaria y de Valores'.

[256] Including in international financial institutions (WB,), development institutions (OECD), intergovernmental forums (G20, 2010; GPFI, 2020).

[257] The first OECD/INFE Toolkit was developed in 2010 and released for use by G20 and member countries in 2013. Thereafter the OECD/INFE Toolkit underwent several revisions to incorporate new metrics including: the 2015 revision (to broaden sample of using counties), the 2018 revision (to include subjective financial well-being measurements) and the 2022 revision (to include questions on digital financial literacy). Revisions made to the metrics found in the OECD/INFE Toolkit guidelines during the years between the ENIF waves were incorporated into the subsequent wave.

[258] Thus far consisting of waves: 2012, 2015, 2018 and 2021

Specifically, in ENIF 2021, mobile banking (MB)—a key variable of interest in this chapter—refers to conducting personal finance operations using a mobile phone application (cell-phone app) but using an internet webpage to consult account balances or to make transfers is recorded separately under 'internet banking'.
Despite the effort of both ENIF 2018 and 2021 to gather some information on contactless, web-based payments forms (through either internet or MB) neither really represents mobile money (such as Kenya's M-Pesa) nor do they measure the holding or use of a digital currency. The only official digital non-cash payment instrument alternative closest to the latter is Mexico's low-cost instant retail payment collection system, CoDi. As the country's most digitalised (least material) form of payment (beyond electronic payments) entailing the use of a mobile phone to both initiate and terminate a financial transaction, CoDi is relevant to the research question. However, it still requires banking intermediaries and because it was introduced in 2019, none of the waves prior to ENIF 2021 contain information about it. Due to its recency, microdata on its uptake is still limited. Therefore, this study's discussion about CoDi is only preliminary and descriptive: simply aimed at providing the most complete panorama of the main official payment instruments currently available to individuals in Mexico.

Neither the ENIF 2012 nor the ENIF 2015 surveys asked respondents which payment methods they used most recurrently by type of transaction (the key dependent variable of the first part of our empirical analysis). ENIF 2012 also lacked information regarding the variability of income, used in this chapter to create a proxy indicator for informal employment. Moreover, despite Mexico being the 2nd most important remittance receiving country in the world, after India (WB, 2021), ENIF 2018 lacked metrics regarding this important source of funds for some Mexican households. While the 2012 and 2015 ENIF waves did include questions about remittances, they lacked information regarding financial literacy and financial fraud. The latter two concepts are important controls in our analysis, and both were measured on the 2018 and 2021 ENIF waves.

As the main official demand side survey of financial inclusion in Mexico, ENIF 2021 consists of household and individual level data of people 18 and older who reside permanently within the national territory. As such, it offers national, urban, rural and regional (6 subregions) geographical coverage. In addition to data on standard socio-demographic indicators, ENIF 2021 contains information on people's money management through questions asking about : possession (or not) of a given financial product (bank account, CC and DC, MB, CoDi and other); affordability of expenditures; use frequency of payment methods per type of transaction; ability to meet payments and to cover monthly expenditures throughout the year; sources of funds, financial resilience, ability to face income shocks through savings, use of banking correspondents and of informal financial channels.

ENIF 2021 also includes a fraud and financial information theft module as well as a series of questions aimed at gauging people's trust (or lack thereof) towards formal FIs and their product offerings. Additionally, the 2021 wave contains a series of financial competency enquiries divided into financial knowledge and financial attitudes questions. Finally, in contrast to previous waves, and in line with the latest OECD/INFE Toolkit, ENIF 2021 asks a set of subjective financial wellbeing questions. (See appendix Table 4.A.1 and/or subsection 4.5.2 below for more details on the variables in this study).

4.5 EMPIRICAL SPECIFICATION

Our empirical analysis is divided in two parts both of which are grounded on the theoretical effects of payment mechanisms (described in Section 4.2) and adapt empirical methodologies employed by prior studies analysing the interrelationships between the use of different payment methods and consumers' financial habits in emerging economies, specifically in India and China, which, like Mexico, have some of the largest shares of unbanked populations worldwide (Demirgüç-Kunt et al., 2021).[259]

4.5.1 Determinants of the Use of Different Modes of Payment

4.5.1.1 Baseline Model

The first part of our analysis is more descriptive in nature and draws upon Shree et al. (2021) analysis of how perceptions, trust in digital payments, and prior exposure to online fraud affect the payment behaviour of Indian consumers. Adapting part of Shree et al.'s (2021) specification to our study is justified because India and Mexico share important resemblances. Beyond their mutually large proportions of unbanked populations, and despite advances in digital payment systems' infrastructures, cash still prevails as the most widely used payment method in both. Studies conducted independently on each country have reported that new payment methods rarely challenge the dominance of cash in them (despite Covid-19).[260] Moreover, pre-pandemic POS data on the proportion of transactions conducted through different payment forms revealed stark similarities between Indian and Mexican data (see introduction) with POS cash payments in Mexico being only four percentage points higher than those in India, and both DC and CC POS payments being one percentage point higher in India than in Mexico (Worldpay, 2022).[261]

As in Shree et al. (2021), our dependent variable is a categorical indicator standing for the payment method most commonly used across different types of transactions. Because in our data the latter has three categories, we employ a multinomial logit (or logistic) regression model to align with the literature.

[259] According to Demirgüç-Kunt et al. (2021, p.34) out of the 1.4 billion unbanked adults worldwide 17% were from India and 9% Chinese.

[260] Shree et al. (2021) even claim that cash use increased in India after the introduction of more novel payment methods.

[261] Specific 2017 POS payment shares in India were: 72% conducted in cash, 11% through DCs, and 9% with CC. These compared to 76% of Mexican POS payments done in cash, 10% through DCs and 8% in CC (Worldpay Global Payments Report, 2022).

Letting $j = 0, 1, 2$ denote the categories of the dependent variable y and $\mathbf{X}$ designate the matrix of independent variables, we estimate the model:

For $j > 0$

$$\Pr(y = j|\mathbf{X}) = \frac{\exp(\mathbf{X}\boldsymbol{\beta}_j)}{1 + \sum_{j=0}^{2} \exp(\boldsymbol{X}\boldsymbol{\beta}_j)} . \tag{4.1}$$

Where the set of coefficients $\beta_j = \beta_0,\ \beta_1, \beta_2$ correspond to each categorical (nominal) outcome of the dependent variable.

Taking $j = 0$ as the reference or base category, the model becomes:

$$\Pr(y = 0|\mathbf{X}) = \frac{1}{1 + \sum_{j=0}^{2} \exp(\boldsymbol{X}\boldsymbol{\beta}_j)} . \tag{4.2}$$

The outcome variable y derives from a set of questions that asked respondents to select from among three payment methods the one they used *most often* to conduct each one of four different types of transactions from July 2020 up until the ENIF 2021 data collection period. In line with the literature, we take the answer option *cash* ($y = c = 0$) as the reference category signalling the most material (physical) form of payment.[262] We set the other payment forms per type of transaction (given by $y = d$) as the categories: 1 – *cards (debit and/or credit)* and 2 – *electronic or digital transfers (through smartphone or apps).* While some scholars consider card payments a proto-virtual payment form,[263] for the purposes of our analysis, given available data, we treat cards as separate from electronic and digital payments simply due to their greater physicality.[264]

All four purchasing situations are given the same payment method categories. By clearly demarcating the most virtual (and abstract) forms of payment (i.e., electronic transfers and/or digital payments through apps) from the rest, (more material or physical) payment methods the above classification is well suited for evaluating our first research question. We exclude from the analysis all individuals that did not incur any given transaction.

The matrix of independent variables $\mathbf{X}$ includes standard demographic and socio-economic controls such as: age, education level, gender, marital status, standard of living score, whether respondent received any remittances in the previous year, and labour market indicators such as having worked last month, monthly earnings, and a categorical indicator for earnings frequency used to gauge the impact

[262] We treat bank notes (paper money) and currency (coins) as part of the 'cash' ($y = c$) payment mode category and use it as reference category of the outcome variable y to align with the literature on the persistent primacy of cash (a pertinent literature for the case of Mexico since ENIF 2021 respondents answered 'paid by cash' the most frequently when asked about the payment form they normally used to settle each different type of transaction.

[263] Since card payments are vehicles that help initiate electronic transfers of funds.

[264] In the form of small plastic rectangles, DC and CC are tangible, physical representations of people's monetary funds. Hence, even though they are users' endpoint instruments to transmit money electronically, they retain a material dimension that digital payments enacted through QR codes, apps or mobile banking transfers do not have. Thus, we treat DC and CC as more physical than 'electronic or digital transfers (through smartphone or apps)'. Conversely, some might argue that plastic cards are just as material as paper money (cash). However, we treat DC and CC as less material than cash because while cash is money in itself, DC and CC are not in themselves money but a representation (they are instruments or vehicles standing for money that allow for its movements). Hence, we treat card payments as less 'material' than cash.

of informal employment (which is associated with variable earnings). The matrix of controls also includes structural (geographic) indicators such as locality size (urban vs rural), a regional identifier, and prior year (2020 to 2021) average count of ATMs (per respondents' state of residence) in order to evaluate the (relatively fixed) effects of financial infrastructure measures on Mexicans use of diverse payment forms.

We apply the specification to data on the four types of transactions measured by the ENIF 2021, namely: (1) *small shop purchases;* (2) *purchases in large retailers and chains;* (3) *payments for public and private services (including utilities [water, gas and electricity], telephone and internet broadband, cell-phone [top-up and plans], cable-TV and/or other digital subscriptions [Netflix, Amazon Prime], etc);* and (4) *public and private transportation payments (including bus, metro, taxi, gasoline for own car, Uber, etc).*

Average marginal effects (AME) are reported to present results as probabilities that express the actual likelihood of using any of the three payment forms given our set of explanatory controls **X**.[265]

4.5.1.2 Extended Model

We add eight key regressors to the baseline specification to estimate the impact that factors—beyond demographics and relevant to the research question—have on the mode of payment used. These include variables representing respondents: experience of fraud, mistrust towards formal FIs and their product offerings, use of banking correspondents, use of informal credit and saving mechanisms, level of financial knowledge, financial attitudes and subjective financial well-being (SFWB) perceptions.
The last three metrics are based on the OECD/INFE (2018 and 2022) toolkit measurement guidelines. In particular, the financial knowledge index score[266] used in the analysis is calculated as the total sum of correct answers given to seven ENIF 2021 questions gauging respondents' familiarity with: (1) inflation definition, (2) risk-return relationship, (3) diversification principle, (4) earned interest (paid interest), (5) simple interest, (6) compound interest, and (7) erosion of purchasing power (through

[265] In estimating AME, we leave the values of covariates in **X** as observed rather than holding them fixed at certain values or at their respective means.
[266] In this chapter, we use the terms financial knowledge and financial education interchangeably (indeed using the latter as a metonymy of the former, as it is safe to assume that through financial education, one can acquire financial knowledge). Additionally, we consider financial knowledge as more comprehensive than financial literary (FL), thus containing it. However, our treatment of these terms is slightly different to the one employed by the OECD.
At its core, the discrepancy arises because the OECD does not distinguish financial capability (FC) from FL. Moreover, the OECD considers aspects which under the framework exposed in Chapter 1 would be part of FC such as financial behaviours and financial attitudes as part of FL along with financial knowledge. Thus, under the OECD/INFE framework, FL is considered broader than financial knowledge and encompassing it.
We do not follow such a treatment and contend that it is misleading because it confounds the long held meaning of literacy (of any subject)—which refers to the ability to read and write about a particular topic—and also seems to disregard pedagogical and neuroscience studies proving there are different types of learning and of knowledge (beyond those stemming solely from literacy, properly understood). Ignoring the root meaning of literacy, the OECD uses the term FL as an all-encompassing repository for every policy related to financial education. We contend that the polysemy surrounding FL trivialises it, causing the term and those it is confounded for to lose specificity and with this their ability to clarify what findings really mean.

inflation). Following the methodology proposed in the OECD/INFE Toolkits, the study's financial knowledge index weights all seven questions equally with one point.[267]

The financial attitudes index consists of the total sum of answers given to three ENIF 2021 attitudinal (preference) statements measuring respondents: (1) time orientation (present bias vs. future inclination)[268], (2) tendency to plan ahead, and (3) purchasing impulsivity. The scale used for each of the component questions follows that prescribed by the OECD/INFE Toolkits with higher per question scores given to answers symbolising favouring savings and the future over impulsive and/or contemporaneous spending.

The SFWB index represents the total sum of answers given to five ENIF 2021 statements attempting to measure: (1) people's perceived financial independence, (2) agency or sense of control, (3) monetary autonomy, (4) good money management, and (5) other perceptions regarding their own financial status and engagement with it. Like the financial attitudes index, answers to each component question of the SFWB index were scored using the scales proposed in the OECD/INFE measurement guidelines with higher per question scores given to answers symbolising 'feeling on top of, at peace with, and not constrained by' financial burdens.

Our fraud index variable indicates the total number of fraud experiences per respondent and is calculated as the sum of four binary variables based on ENIF 2021 questions asking respondents whether during the three years prior to the survey they had experienced: (1) their cards being cloned, (2) identity theft or phishing, (3) pharming (i.e. falling for a fake draw or prize lot), or (4) invested money into Ponzi schemes (or on any non-transparent pyramidal scams).[269]

Experiencing any of the above-mentioned types of fraud as well as having scarce understanding of payment instruments likely decreases trust in banks and in the payment mechanisms they offer. While several development studies have explored the importance of (proper) 'trust' in reaping the benefits of financialization, the wording and design of the ENIF questionnaire led us to develop a 'mistrust' indicator for the current paper. Our mistrust variable captures instances where absence of trust in formal FIs (and in their payment products) stems from either: (1) general mistrust towards the banking sector; (2) having received bad service, (3) having had a bad experience with banks or been mistreated; and (4) lacking confidence and trust in non-cash payment mechanisms (including DC and CC).

To evaluate the impact of informal sources of finance two variables are included each representing respectively: the total sum of use cases of informal savings or of informal credit entities. Finally, we include a binary variable that records the use of correspondent banking over the previous year. This

[267]Therefore, it does not consider neither the objective nor the subjective level of difficulty of the concepts asked about.
[268] Tendency to understand money as an instrument to enhance either present consumption or a future one.
[269] The estimation constitutes a row-sum of dummies coding 1—when person experienced fraudulent or deceitful situation.

control is particularly pertinent because in several Mexican localities the quantity of correspondent outlets outnumbers the number of branches of parent financial institutions so much so that prior research has argued correspondent banking has positively affected financial inclusion (Carabarin et al., 2018). For example, according to the Mexican National Council of Financial Inclusion (CONAIF) 8th report on financial inclusion, through correspondent banking relationships there has been a 281% increase in financial services access points in Mexico (as a whole) and a 56% increase in financial coverage at the municipal level (CNBV, 2017).

From banking correspondents people can conduct simple transactions such as: cash withdrawals and deposits, paying for outstanding credits, making utilities payments (water, energy, etc), receiving international remittances (including those addressed to recipients without bank cards) or sending cash domestically to unbanked Mexican recipients. The ubiquity of correspondents likely influences Mexicans use of different methods of payment and might even help maintain the prevalence of cash because they are popular among unbanked consumers (who perform all transactions in cash). Additionally, given that some major correspondents in Mexico are actually 'small shops'[270], some banked consumers might even prefer using banking correspondents over the parent institutions out of convenience. However, as will be described, the typically small monetary value of small shop purchases makes it more likely that they are settled in cash than otherwise.
As before, results are reported in terms of AME. (Further details on construction of the variables on appendix Table A.1.)

4.5.1.3 Hypotheses

Based on the theory presented in section 2, we expect specifications 4.5.1.1 and 4.5.1.2 to help answer *how do personal characteristics (demographic and behavioural) and structural factors influence the payment forms people use to settle different transaction categories* through some of the following conjectured effects:

Table 4.2 : Model Part I Hypotheses

Explanatory Variable	*Hypothesized impact on type of payment*		
Main demographic factors	Y_p^{CASH}	Y_p^{CARDS}	$Y_p^{DIG\,\&\,E-PYMNT}$
x_{age}	$+$	$+$	$-$
$x_{gender\,(male)}$	ambiguous	ambiguous	$+$
$x_{marital\ status}$	ambiguous	ambiguous	ambiguous
$x_{std\ of\ living\ score}$	$-$	$+$	$+$

[270] The most common banking correspondents in Mexico are: convenience store chains, retail and department store chains, pharmacy chains, telecom operators and Pemex (Mexico's state-owned producer, refiner, and distributor of petroleum) service stations. For example, the convenience store chain Oxxo (a leader in correspondent banking) has multiple correspondent banking agreements with several High Street banks including: BBVA Bancomer, Citibanamex, Santander, Scotiabank, Inbursa and HSBC. Oxxo is also an agent of international remittances service providers such as: Western Union, MoneyGram, XOOM, Follow, Intermex, Vigo, Orlandi,Valuta, Viamericas, Maxi Transfer, and Exchange Express.

$x_{schooling}$	$-$	$+$	$+$
$x_{worked\ last\ month}$	$-$	$+$	$+$
$x_{monthly\ earnings}$	$-$	$+$	$+$
$x_{earnings\ freq\ type}$	$-$	$+$	$+$
$x_{receives\ remittances}$	ambiguous	ambiguous	$+$
Structural controls			
x_{urban}	$-$	$+$	$+$
$x_{region(NWCDMx)}$	$-$	$+$	$+$
x_{ATMs}	ambiguous	$+$	ambiguous
Behavioural controls			
$x_{financial\ knowledge}$	$-$	$+$	$+$
$x_{financial\ attitudes}$	$-$	$+$	$+$
x_{SFWB}	ambiguous	ambiguous	ambiguous
$x_{fraud\ experience}$	$+$	$-$	$-$
$x_{mistrust\ FIs}$	$+$	$-$	$-$
$x_{correspondents\ use}$	ambiguous	$+$	ambiguous
$x_{informal\ finance}$	$+$	$-$	$-$

Where the subscript $p = 1, \dots, 4$ in the outcome of interest Y denotes the type of transaction or purchase considered. We expect the impact of: demographic factors such as gender, marital status and whether the respondent receives remittances; structural factors such as prior year average number of ATMs in state of residence; and of behavioural variables such as perceptions of own financial status (SFWB) and use of correspondent banking to be ambiguous because such variables tend to bear dual, counterbalancing (and often context-dependent) relationships with payment methods. Moreover, because some of their channels of impact cannot be measured through our data (for example the impact of personality types, religious or cultural views), the pre-analysis hypotheses regarding their net influence are, at best, ambiguous.

We expect the pattern of effects outlined in Table 4.2 to hold across the four types of transactions. Nonetheless, we anticipate the magnitude and significance of impact of the explanatory controls to be more pronounced on the probability of cash use for small shop purchases not only because small value purchases are the most common in Mexico but also because given the prevalence of cash use in Mexico, it is plausible that even bank account holders and owners of cards still use cash for small purchases following the inertia of cultural norms or due to shops' accepted payment constraints. Likewise, we expect the explanatory variables in our specifications to have a more significant and greater (magnitude) influence on the probability of using digital and electronic payments when settling transactions related to public and private services and public and private transportation payments because, in Mexico, these payment categories have adapted the most rapidly to accept digital and electronic payments.

4.5.1.4 Robustness checks

We conduct robustness checks of the model presented in subsection 4.5.1.2 that consist in rerunning the extended specification on two other sets of transaction-outcome-variables that combine card payments and digital payments (including virtual transfers) into a single payment form option (see appendix Table 4.A.1 for a detailed description of the alternative dependent variables used in this subsection). One of the sets comprises precisely the same four outcome variables used for the core extended specification in subsection 4.5.1.2 but with the distinction that each of them present only two categories of payment options to conduct each given transaction. The other set consists of two transaction outcome variables distinguishable on the basis of their value (one standing for small transactions [i.e. worth $\leq 500_{\text{MXN}}$] and the other for large transactions [i.e. in ENIF those $> 500_{\text{MXN}}$] and both of which also group card payments and digital payments into one single payment form.

The goal of such checks is, on the one hand, to verify the reliability of the results obtained regarding the determinants of the use of payment forms over alternative outcome variables that classify transactions based on different criteria: one being the value of the outlay and the other the purpose, motive or place of acquisition of the purchase. It is important to note that ENIF indicators regarding purchases are differentiated by either value (expressed as a range), purpose or location of purchase and are nominal—with their categories representing the payment form most frequently used by respondents to conduct the given transaction in the months prior to the survey. Additionally, as per ENIF2021 data (and aligning with literature indicating that people leverage across different financial instruments [including Mexican financial diaries[271]]), a proportion of respondents use different methods of payment for purchases of different nature hence constraining our ability to consolidate all transactions data into a single broader indicator to test whether the results differ from those in which purchases are somehow differentiated. Nonetheless, the specific classifications of transactions used in the ENIF align with mental accounting theory, for the latter stipulates that people group desired transactions according to both value and purpose or source of the purchase. Hence, one goal of the robustness checks is to assess whether new or different information is obtained from evaluating separately the determinants of payment forms' use over a very granular classification of transactions (i.e. four different dependent variables based on purpose or location of purchase) versus over a more aggregated classification of transactions (purely based on the transaction's value).

The second goal of the robustness checks is to understand whether any information is lost from consolidating all non-cash payment options into a single payment category. Together, both checks would help to shed further light onto our understanding of the extent to which the presupposition that people might be more inclined to use a specific payment form over another (if available) depending on the nature of the transaction in question holds.

[271] See the Mexican financial diaries analysis conducted by Meka and Grider (2016).

Given that all the dependent variables used for the robustness checks consist of two (rather than three) payment form categories, the analyses are based on logit regression estimations rather than on the multinomial logit method.

4.5.2 Cognitive Biases & Payment Method Effects

4.5.2.1 Baseline Model

To evaluate whether payment methods with different degree of physicality (or, conversely, of digitalisation) affect Mexicans' financial management habits, the second part of our empirical analysis draws upon Hou et al. (2021) who used standard consumption regressions to evaluate the stimulating effects of digital payments on household spending.

While Hou et al. (2021) took Chinese households' consumption value per category of goods and services as dependent variable, because the ENIF does not disaggregate consumption data by type of goods, we adjust the specification and use a financial behaviours index (FBI) as outcome variable. Based on the OECD/INFE financial literacy and inclusion measurement guidelines, the index is computed as the total sum of answers to nine ENIF 2021 questions corresponding to the nine component-metrics of FBs stipulated by the OECD/INFE Toolkits.

Specifically, the index measures resilient money management behaviours[272] and its constituent parts include: (1) budgeting, (2) having active savings[273], (3) avoiding borrowing 'to make ends meet', (4) evaluating affordability of desired purchases (not overspending), (5) shopping around for financial products (comparing them) before acquisition, (6) paying bills on time, (7) using specialised sources of information about products and services to make educated purchases, (8) working to achieve long-term financial goals, (9) keeping constant watch over one's personal finances. In line with the OECD/INFE principles, all nine questions are weighted equally and give respondents a 1-point score whenever they answered having practised the financial behaviour inquired through each question. Therefore, a higher index score indicates that, overall, the respondent has better financial (management) behaviours.

Hou et al. (2021) use as key regressor a binary indicator symbolizing purchases done via digital means (i.e., giving '1' to payments performed through mobile terminals such as a cell phone, a pad or a computer). In our data, the most similar indicator is a binary variable recording the use of CoDi, the most digital means of payment measured by ENIF 2021. However, the still small proportion of CoDi users precludes treating it as main explanatory variable. Hence, we adapt the specification to the available data by employing three different key explanatory variables representing three non-cash payment forms, each construed as a binary indicator reflecting whether respondents held the given instrument.

[272] Also deemed 'positive' financial management behaviours.
[273] Including formal and informal savings.

To align with our research question, the three non-cash payment forms differ by extent of physicality. Thus, the main explanatory variables for this part of the analysis are: a CC dummy (coding '1' if person has a CC), a DC dummy (equal to '1' if person has a DC), and a MB dummy (that gives '1' whenever respondent reported having enabled the cell-phone MB app of one [or more] of his/her accounts[274]).

Based on the above, we first analyse the effects of each of the three non-cash payment forms analysed in our specification using a standard linear multiple regression model[275] following the form:

$$FBI = \alpha + \beta_j P_j + \boldsymbol{X}\,\boldsymbol{\Phi} + \varepsilon \quad . \tag{4.3}$$

Where FBI stands for the OECD/INFE-inspired index of FBs and P_j signals our main treatment variable (i.e., each of the non-cash payment forms held by respondents) with the subscript *j* denoting: $1 - DC$, $2 - CC$ and $3 - MB$ and β_j giving their corresponding estimated impact. The matrix of independent controls is given by $\boldsymbol{X}$ and includes the same standard socio-economic, demographic and structural controls employed in the baseline specification of the first part of the empirical analysis of the prior section (subsection 4.5.1.1). The error is given by ε.

In line with the research documenting the positive association between revolving CC debt and DC use[276] and with the literature exploring how DC, CC, and MB (as alternative 'virtual' delivery channel (VDC) for financial and non-financial transactions) are used to leverage desired increases in consumption[277], we also analyse the simultaneous effects of non-cash payments use on FBs via the model:

$$FBI = \alpha + \beta_{DC} DC + \beta_{CC} CC + \beta_{MB} MB + \boldsymbol{X}\,\boldsymbol{\Phi} + \varepsilon \quad . \tag{4.4}$$

The latter explicitly includes all non-cash payment forms available in our model and uses the same set of observable controls $\boldsymbol{X}$ as before.

4.5.2.2 Extended Model

We expect some of the factors used in the extended version of the model in part l (subsection 4.5.1.2) to impact the mechanisms[278] through which payment forms might influence financial management behaviours.

Therefore, the specifications in subsection 4.5.2.1 are expanded to include the matrix of independent variables $\boldsymbol{\Lambda}$ which, in addition to the baseline demographic and structural controls found in **X**, include factors such as: (1) financial knowledge, (2) having been a victim of fraud, (3) mistrust in banking institutions and in their products, and (4) use of correspondent banking outlets. We refrain from including indicators for the use of informal sources of finance as additional explanatory variables to avoid simultaneity problems since the latter are implicit in the active savings subcomponent of our

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[274] Presumably 'banking' accounts, although respondents could have other non-traditional accounts from either neo-banks, or non-financial institutions with which to make payments from.

[275] The use of a linear multiple regression model is granted because our outcome variable—a score constructed as the sum of the answer to nine categorical questions—can be assumed to represent a continuous variable in which higher values represent better financial management but the ordering of the scores of its constituent elements is irrelevant.

[276] See: King and King (2005); Lee et al. (2007), Scholnick et al. (2008); Basnet and Donou-Adonsou (2016).

[277] See: Dahlberg et al. (2007); Nicoletti (2014); and Shaikh and Karjaluoto (2015).

[278] Interplay with our cognitive biases, heuristics and mental accounting processes (see section 5.2.3 [Figure 1]).

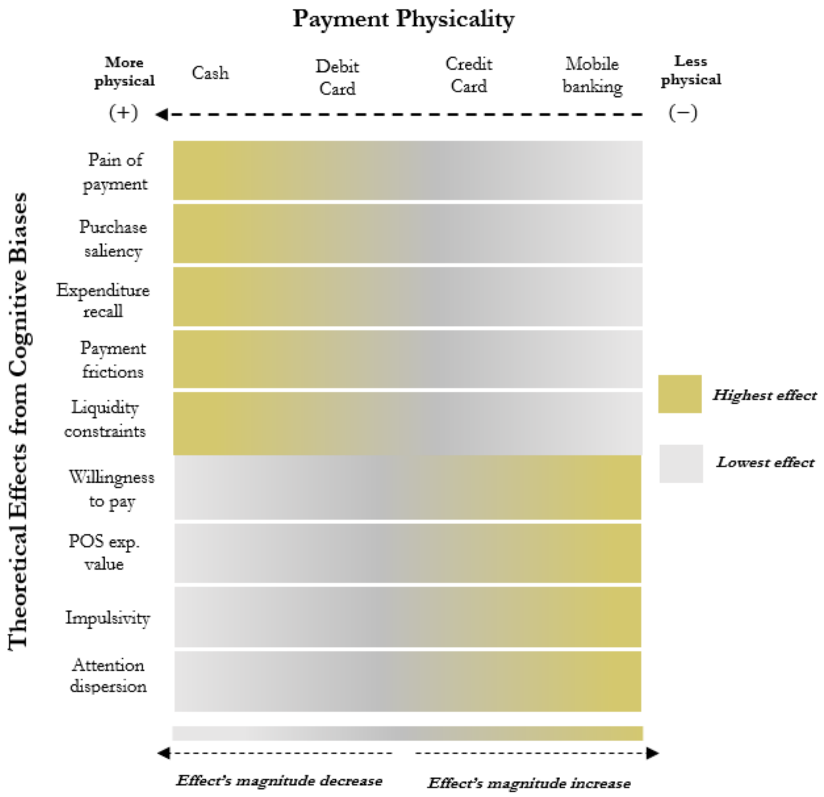
dependent variable, the FBI. Likewise, to eschew simultaneity problems, we exclude the financial attitudes index and the SFWB index employed in specification 4.5.1.2 because both of these indexes are just as likely to affect FBs as to be influenced by them. While important, understanding such bi-directional causalities is beyond this chapter's scope and we leave it for further research.

4.5.2.3 Hypotheses

Drawing on the literature (Section 4.2), Figure 4.1 summarizes the main effects we expect to find as our cognitive biases and mental processes interact with features of payment methods, specifically their degree of physicality. The general theoretical hypotheses we can derive from it are that the less physical a payment method (the more virtual or digital) the less users would experience: pain from paying, saliency of the purchase, expenditure recall, and liquidity frictions or constraints. At the same time, users would experience higher willingness to pay, undertake higher-value POS purchases, exhibit stronger impulsivity (less impulse control), and more attention dispersion when using less material (physical) payment forms. Combined, these effects likely translate to compromised FBs.

As explained in 4.5.2.1, our dependent variable—the FBI—by construction reflects positive and sound money management behaviours (i.e., higher score indicating better personal finance behaviours). Therefore, in light of the mechanisms in Figure 4.1, and as summarised in Table 4.3, we expect the effects of the three payment forms considered to show an overall negative effect on the FBI.

Figure 4.1.



Source: Self-generated based on review of the literature.

Additionally, we expect the magnitude of effects to be larger for the most digital (less material) form of payment used, i.e., for MB payments. (See appendix Table 4.A.2, for details on the breakdown of the hypothesized payment effects on the components of the FBI response variable).

Table 4.3: Model Part II Hypotheses

Payment Forms Hypothesized Impact			
Main regressors' coefficients	***Hypothesized impact on***	***Dependent Variable*** ***Component Dimensions***	***Overall Index***
β_{DC} β_{CC} β_{MB}	$\beta_j < 0$ With j: $1 - DC, 2 - CC, 3 - MB$ $\beta_{MB} < \beta_{CC} < \beta_{DC} < 0$	Budgeting and 'keeping track' Ability to face income shock or to modify behaviour for doing so (e.g., no overspending) Responsible and informed financial decisions and spending	$Y^{FINANCIAL\ BEHAVIOURS}$ $\beta_j < 0$

4.5.3 *Empirical Challenge*

The multidimensional interplay of payment forms with cognitive biases (outlined in Figure 4.1) suggests there exists a complex relationship between the use of different payment forms and FBs. This, and our use of observational data (correlational in nature), restrict our ability to establish the causation of the relationships found.

A particularly important empirical challenge to our research is endogeneity[279] which, in our case, likely arises from: measurement error (as we do not have continuous data about ENIF respondents' actual transactions or about their use of each payment form);[280] some simultaneity (especially in the model of part 2); and due to omitted variable bias (OVB).

Our ability to rectify simultaneity (and reverse causality) is rather constrained by data limitations as not only is the ENIF not a panel survey (which precludes fixed effects estimations) but time series monetary data on flows per type of payment are not publicly available to develop lagged instruments for the use of payment forms at individual or household levels of granularity. Likewise, the level of identification of observation units in ENIF does not provide sufficient granularity to construct valid instruments through geostatistical data and structural information on financial access.

We therefore concentrate on addressing endogenous selection from unobservable characteristics that can affect our (endogenous) explanatory variables and our outcome (FBI). The usual approach to evaluating robustness to OVB-endogeneity is to observe coefficient movements after including more controls. Yet, as pointed by Oster (2019), the latter should be supplemented by ensuring the quality of

[279] A challenge common to most nonexperimental work in economics.
[280] Neither in the form of current account data, ATM usage, nor from POS terminals information.

the additional controls through evaluation of how much of the outcome's variance they explain.[281] Given some caveats in the data we use, and despite having followed the literature to select our controls, it is not possible to argue that the battery of controls we added in our specifications (inclusive of the extended forms) fully eliminates OVB.

Even though we have included measures such as level of education, a standard of living score and labour market indicators (such as monthly earnings and their frequency) to gauge the socio-economic standing of our respondents, it is commonly acknowledged in the economics literature that such indicators do not perfectly capture it (for overall socioeconomic status is multidimensional). The same is true of our regional and locality indicators which, being dummies, can only imperfectly capture some of the disparities in levels of development between urban and rural areas in Mexico. Likewise, our average number of ATMs indicator is an imperfect control for structural financial access because it is not possible to retrieve the number of ATMs in the precise Basic Geostatistical Areas where ENIF 2021 respondents live due to constraints in the level of reported identifiers of ENIF respondents. Therefore, several of our controls are but incomplete proxies. Additionally, due to data limitations we were not able to incorporate into our analysis any of the psychometric personality traits, measures of values (either ideological or moral), nor of preferences indicators mentioned in the literature that might motivate the use of payment methods (once income level is accounted for).

The above limitations inevitably constrained our ability to provide an unbiased holistic profile of the demographic, psychological, and contextual determinants of payment instruments holding and of their use to settle particular types of transactions in the first part of our empirical analysis. The caveats in our data also precluded our ability to provide a more comprehensive picture of how different payment methods affect respondents' personal financial management behaviours. The latter would have needed value-level (numerical and continuous) information on respondents actual: spending, account activity, fees (overdraft) occurrence, debt accumulation, savings, and actual flows or transaction counts per payment form used. Yet, through the ENIF we were only able to obtain categorical information regarding respondents' cash and non-cash (cards and mobile) payments usage and on respondents FBs. Such limits also affected the robustness of causal claims from specifications (4.3) and (4.4) and their extensions in the second part of our empirical analysis.

Nonetheless, to address the endogeneity posed by the latter and by unobserved confounders, we employ the prominent technique proposed by Oster (2019)[282] which uses information about selection on

[281] Other authors have recognised the importance of the appropriate selection of controls in addressing challenges to the validity of results (e.g., see Rosenbaum and Rubin [1983]; Pearl [2000], Imbens [2003] or Angrist and Pischke [2010]) however Oster emphasises the importance of evaluating how much of the outcome's variance is explained by the inclusion of controls.

[282] The acceptance and success of the method in Oster (2019) can be gauged by the large number of times it has been cited (with 664 IDEAS/RePEc citations, 1063 Scopus citations, 1138 Web of Science Citations, and 2750 Google Scholar citations) as well as by top 5 journals in economics publishing papers using Oster's technique.

observables to approximate selection on unobservables and estimate unbiased (treatment) effects of non-cash payment forms on FBs.

4.5.3.1 Solution

We address endogenous selection posed by OVB in the second part of our analysis by calculating bias-adjusted estimates of our main controls (treatments) using the consistent, closed-form estimator for OVB developed by Oster (2019).

Oster (2019) bases her estimator on the work by Altonji, Elder, and Taber (2005a, henceforward: AET) who developed a method for evaluating the robustness of results under the assumption that the relationship between treatment and unobservable controls can be recovered from the relationship between treatment and observables. As Oster, AET criticised the widespread belief that observing coefficient stability[283] after the addition of controls offers sufficient proof of results robustness and limited OVB. Despite acknowledging that coefficient stability correlates with smaller bias, they stressed that coefficient stability is not enough to calculate bias without information about how much of the variance in the outcome is captured by the controls (provided by the R-squared) because it is possible to observe relatively unchanged coefficients after introducing low variance controls that add scarce further explanation about the outcome variable.

Oster identifies and responds to some of the reasons behind the relatively low uptake of the AET method in empirical work including that AET is only consistent under the null of a zero-treatment effect,[284] that AET do not empirically validate their approach, and that AET do not explicitly link their calculation to coefficient stability.[285] Oster (2019) addresses the aforementioned caveats and expands the AET method specifically by connecting the bias to coefficient movement though an application of AET to the linear model (under less restrictive assumptions). In doing so, Oster develops an estimator of the size of the *bias-adjusted treatment effect*.

Thus far, Oster's contribution has been interpreted as either a method to derive upper and lower bounds of the treatment effect—therefore, as a robustness evaluation technique (see Bryan et al. [2022])[286]—or as a bias-adjustment (i.e. correction) mechanism for treatment effects. In this chapter we focus on the latter use of Oster's technique because we have a validation setting with some biased observational

[283] Limited movement in coefficients magnitude and/or sign.

[284] Making the evaluation of robustness under other null hypothesis impossible.

[285] The absence of such association limits the evaluation of robustness as it is possible for a large bias to persist even in cases when the treatment coefficient remains unchanged by the inclusion of new controls whilst the R-squared increases little. An additional caveat of AET is found in their assumption that the outcome variance would be fully explained if one could observe the full set of unobservables. The latter belittles the robustness of results in cases where there is measurement error in the outcome.

[286] Bryan et al (2022) use panel data and apply Oster to assess the robustness of a FE framework evaluating the effects of mental health changes on employment in the UK.

relationships and a sense of the causal effect of confounding unobservables on FBs and payments use from external sources and theory.[287]

4.5.3.2 Bias-correction Specifications

Oster's method presupposes the use of a linear model in which the outcome is fully determined by a treatment variable (main explanatory variable), a set of observed and of unobserved covariates (linked by shared covariance properties with the treatment variable), and an iid error.

As such, the bias-adjustment mechanism proposed by Oster (2019) is not applicable to the multinomial logit analysis of the factors influencing the use of distinct forms of payment for different transaction types (the first part of our empirical analysis). Nonetheless, Oster's bias-adjustment technique, by design, can be applied straightforwardly to linear models. Since Oster's methodology can only accommodate a single endogenous treatment variable at a time, despite the need for studies capable of analysing the concomitant use of different payment forms (to elucidate their complementarity and substitutability), in the current study we cannot apply the Oster correction to baseline specification (4.4) which includes all three non-cash payments simultaneously. Notwithstanding this limitation, we adopt Oster's method to correct the bias on estimates regarding the separate effect of each payment form (respectively differing according to its physicality) on FBI scores (specification [4.3]).

Following the general set-up (and notation) of Oster's (2019) bias-adjustment estimator, the model comprises several elements described below.

A single variable (uncontrolled and unadjusted) linear model speciation given by:

$$Y_{Financial\ Behaviour\ Index} = \alpha + \dot{\beta}_1 x_j + \epsilon \ . \qquad (4.5)$$

Where the left term refers to the FBI being explained; x_j is the main (and only) regressor[288] of the uncontrolled model which through subscript j refers to a payment method (either: 1- DC, 2 - CC or 3- MB), $\dot{\beta}_1$ is the key regressor's coefficient*;* α is a constant; and ϵ the error. The uncontrolled model's coefficient of determination is given by $\dot{R}$.

After including the additional relevant controls (described in subsections 4.5.2.1 and 4.5.2.2), the multiple regression ('controlled' and unadjusted) speciation is given by:

$$Y_{Financial\ Behaviour\ Index} = \alpha + \tilde{\beta}_1 x_j + \psi\, \omega^o + \epsilon \ . \qquad (4.6)$$

Where the outcome variable, constant and error are as above and $\tilde{\beta}_1$ is the coefficient of the main regressor x_j in the controlled specification. As in Oster (2019), ω^o represents the vector of observed controls ω_1^o, ω_2^o, $\omega_3^o, \ldots$, ω_k^o [289] taken from the original specifications (baseline and extended) of our model (see subsections 4.5.2.1 and 4.5.2.2) and its effect is given by the vector of coefficients ψ. A measure for how

[287] See Oster (2019), pp. 198 – 204.
[288] 'Treatment' in Oster's set-up.
[289] With the subscript k in ω_k^o denoting the number of observed controls: $k = 1, 2, 3$ ...

much additional variation in $Y_{Financial\ Behaviour\ Index}$ is explained by including ω^o along with the treatment x_j is given by the controlled regression coefficient of determination $\widetilde{R}$.

Following Oster (2019) we define R_{max} as the theoretical measure of the variation in our outcome $Y_{Financial\ Behaviour\ Index}$ that would be explained if both the set of observed ω^o and of unobserved controls W_2 could be included in the hypothetical equation:

$$Y_{Financial\ Behaviour\ Index} = \alpha + \beta_1^* x_j + \psi\, \omega^o + W_2 + \epsilon \,. \tag{4.7}$$

Where β_1^* gives the biased-adjusted coefficient of a given method of payment x_j in the hypothetical model that would include all the variables necessary to account for respondents' financial management behaviors. The vector of observable controls ω^o is the same as in the controlled form in (4.6).

W_2 stands for the set of unobservables potentially including variables such as: occupation (profession), type of employment (formal, informal, contractual, temporary)[290]; asset ownership (housing properties, appliances, work-equipment, financial etc..); other financial management outcome indicators (actual value of expenditures, overdraft fees, debts, savings, etc); health status; other household characteristics (e.g. number of dependents[291], years employed, etc); psychometric indicators of personality or character-type traits as well as preferences (including of adoption of digital technologies), RA, peer effects, religion, cognitive abilities, etc. Following AET and Oster (2019), we assume the controls in ω^o are orthogonal to those in W_2, therefore the model assumes W_2 is residualized with respect to ω^o (i.e., that the portion of variability that unobservables share with observables is relinquished). Given this, $W_1 = \psi\, \omega^o$ and W_2 are also orthogonal.[292]

Turning to the two key parameters identifying the relationships assumed in the Oster (2019) method we define R_{max} as the maximum amount of variation that can be explained by the model and (following Oster) specify the proportional selection on observables and unobservables through the ratio:

$$\delta \frac{\sigma_{1X}}{\sigma_1^2} = \frac{\sigma_{2X}}{\sigma_2^2} \,. \tag{4.8}$$

Where σ_{1X} gives the covariance of observables and the treatment, σ_{2X} gives the covariance of unobservables and treatment, σ_1^2 is the variance of observables, and σ_2^2 the variance of unobservables. Therefore, δ represents the extent of unobservables selection relative to selection of observables that would be necessary to explain away the observed result (under the full hypothesized model).

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290 While we include a proxy for informality (i.e., a categorical variable coding for earnings frequency with 0-none, 1-variable, 2-fixed) that presumes fixed earnings stand for formal employment, the surrogate variable is imperfect. Therefore, we treat having more accurate and direct information regarding participation in formal vs informal labour markets as an omitted variable.

291 The ENIF 2021 question asking for 'the amount of people under a single budget' used in our standard of living score was asked at dwelling level rather than at household level. Because one or more households could live in a single dwelling, having information on the number of dependents at a household level would be more useful and precise. The latter is not available in ENIF 2021, therefore constituting an un-observable household characteristic.

292 As shown in subsection 4.7.2.4, the results will hold to relaxations of this assumption.

For example, given an assumed value for R_{max}, a value of $\delta = 3$, would indicate that unobservables need to be three times as important as the observables to produce a treatment effect of zero ($\beta = 0$). Conversely, $\delta = 1$ implies equal selection of unobservables and observables (given presumed R_{max}). From this, the expression of the bias-adjusted *restricted* estimator is given by:

$$\beta^* \approx \tilde{\beta} - \delta[\,\dot{\beta} - \tilde{\beta}\,]\,\frac{R_{max}-\tilde{R}}{\tilde{R}-\dot{R}}\,. \tag{4.9}$$

Where the bias can be denoted by: $\Pi = [\,\dot{\beta} - \tilde{\beta}\,]\,\frac{R_{max}-\tilde{R}}{\tilde{R}-\dot{R}}\,.$ (4.10)

The estimator in (4.9) assumes that the relative contributions of each of the controls in vector ω^o to our treatment (i.e., the payment method used) is the same as their contribution to our outcome variable (the financial behaviour index).[293] Because this condition is hard to satisfy, we rather use the *unrestricted* form estimator which drops the aforementioned restraint[294] and incorporates instead the residual $\tilde{x_j}$ from a regression of x_i on ω^o (obtained from the R^2 of the regression of x_j on ω^o along with the variance of x_j given by: $var(x_j) = \sigma^2_{x_j}$).

The bias of the *unrestricted* form estimator we use in our estimations is *asymptotic* and denoted by:

$$\Pi = \frac{\delta\sigma_{1x}\,\sigma_2^2}{\sigma_1^2\tau_x}\,. \tag{4.11}$$

Where τ_x represents the population analogue of the variance of the residual $\tilde{x_j}$ and, as before, δ is the coefficient of proportionality between unobservables (W_2) and observables (W_1). For $i \in \{1, 2\}$, the covariances of observables and of unobservables with respect to the treatment are (respectively) $\sigma_{iX} = cov\ (W_i, X)$ and their corresponding variances are $\sigma_i^2 = var\ (W_i)$.

We calculate all our bias-adjusted coefficients through Oster's user-generated Stata command $psacalc$. Such code corrects the biased treatment effects obtained from the controlled models in (4.6)[295] using Oster's estimator and recommended bounds for the latter's key parameters: R_{max} and δ.

While our selection of bounds for R_{max} and δ might appear arbitrary, we based them on the empirical validation exercises performed by Oster on her technique as well as on the literature emerging from it. To explain the logic used, assuming that the omitted variables (OV) have been stripped of the portion related to included variables[296] and that the selection of observables is based on educated ex-ante hypotheses of which factors most likely influence financial behaviours (as we did), $\delta = 1$ is considered an adequate upper bound for δ by both Oster (2019) and the AET literature on which she based her technique. To follow the literature, we first compute the bias-adjusted coefficients under $\delta = 1$ which implies that observables are at least as important as unobservables. For robustness, we

[293] Presenting the restricted form estimator first is useful to developing the overall intuition of the approach.
[294] That is, our unrestricted estimator drops any assumption regarding how the contributions of controls to the treatment compare to their contribution to the outcome variable.
[295] Because (4.6) stands for the controlled-form baseline models (4.3) and (4.4) in subsections 4.5.2.1 and 4.5.2.2, but written following Oster's notation, this means that through *psacalc* we obtain bias-adjusted payment treatment effects from specifications containing only one payment as treatment and no others in the controls as well as from specifications in which one payment is considered the treatment while alternative payment forms are also included as observable controls.
[296] As is the case in Oster's method.

also compute the bias-adjusted coefficients under the scenario presuming higher selection of unobservables than of observables ($\delta > 1$) and in the converse case—i.e. when unobservables selection is considered smaller than that of observables ($0 < \delta < 1$).

Turning to the other key input on Oster's bias-adjustment estimator (R_{max}), we first calculate the bias-corrected coefficients setting $R_{max} = 1$, i.e., to the hypothetical, 'theoretical population bound' accepted in the methodological literature corresponding to the R^2 obtained if we could control for all unobservables. Subsequently, we follow Oster's recommendation for a 'realistic bound' as one found in the interval between $\tilde{R}$ (the R^2 value of the controlled regression) and the rather conjectural $R_{max} = 1$ value. Thence, we test the use of different values of R_{max} according to the relation $R_{max} = \Pi\tilde{R}$ where, in the unrestricted form of the Oster estimator, the asymptotic bias is approximated by:

$$\frac{\delta\sigma_{1x}\sigma_2^2}{\sigma_1^2\tau_x} \quad (4.12)$$ [297]

While the variance inflation factor (VIF) tests used to assess potential multicollinearity (and hence independence) across our observables were consistently below the consensual tolerable level of (at most) five, we use bootstrapped standard errors in all our regressions (uncontrolled and controlled).

4.6 DESCRIPTIVE STATISTICS

Table 4.4 presents summary statistics of the 2021 ENIF sample which has 13,554 observations aged 18 and older and an average age of 44 years (irrespective of gender). A little under a third of the sample (62%) were between 25 and 56 years old.[298] The age distribution of the sample was slightly positively skewed suggesting that more than half the total number of respondents in 2021 were younger than 44 years old. These patterns are consistent with Mexican decennial census data which has shown an upward movement of the median age of the population over time (going from 26 years in 2010 to 29 in 2020).

Table 4.4

Descriptive Statistics : ENIF 2021

Variables	N	Mean	Std. Dev.	Min	Max
Demographic Controls:					
Gender (male = 1)	13554	.458	.498	0	1
Age	13554	44.118	17.331	18	98
Married (in couple)	13554	.585	.493	0	1
None or Preschool	13554	.052	.221	0	1
Elementary School	13554	.220	.414	0	1
Junior High	13554	.282	.450	0	1
High School	13554	.227	.419	0	1
University Degree (Grad. & Postgrad)	13554	.219	.414	0	1
Employed (last month)	13554	.644	.479	0	1
Employment type (position type)	13554	1.668	1.466	0	5
Monthly earning/income	13554	5.228	4,577.493	0	120,000
Earnings type (0 - none, 1 - variable, 2 - fixed)	13554	.878	.804	0	2

[297] In the restricted form the bias is $\pi = [\,\dot{\beta} - \tilde{\beta}\,]\frac{R_{max}-\tilde{R}}{\tilde{R}-\dot{R}}$.

[298] The 25-to-40 years old cohort accounted for 35% of the 2021 sample and those aged between 41 and 56 years accounted for 27% of responses.

Receives remittances	13554	.142	.349	0	1
Has smartphone	13554	.720	.449	0	1
Standard of Living Index (score)	13554	40.228	13.699	5.556	83.333
Financial Products & Payment Methods:					
Has bank account (binary)	13554	.530	.499	0	1
Sum of different types of bank account(s) held	13554	.665	.737	0	5
Sum of products across all bank account(s) held	13554	.637	.762	0	12
Has account from gov. support prog. (binary)	13554	.068	.252	0	1
Has debit card (binary)	13554	.488	.500	0	1
Sum of DC held	13554	.584	.676	0	4
Has credit card (binary, all types considered)	13554	.254	.435	0	1
Sum of CC held	13554	.310	.718	0	10
Has HS Bank credit card (binary)	13554	.106	.308	0	1
Has retailer credit card (binary)	13554	.202	.401	0	1
Has mobile banking (binary)	13554	.233	.423	0	1
Has heard about CoDi (binary)	13554	.311	.463	0	1
Use of CoDi (binary)	13554	.025	.156	0	1
Use of correspondent banking (binary)	13554	.452	.498	0	1
Financial Fraud & Mistrust:					
Financial fraud (sum of times experienced)	13554	.175	.496	0	4
Mistrusts DCs & providers	13554	.064	.245	0	1
Mistrusts CCs & providers	13554	.032	.176	0	1
No trust in DC & CC financial services	13554	.088	.284	0	1
Informal Financial Resources:					
Use informal saving channels (count of times)	13554	.897	1.054	0	6
Use informal credit channels (count of times)	13554	.431	.756	0	4

All quantities calculated over estimation sample.

Reflecting the larger proportion of females than of males observed in both the 2020 and 2010 Mexican censuses, 54% (7,345) of ENIF 2021 respondents were female whereas 46% (6,209) were males.[299] The age distribution of females and males was fairly similar, and no big differences were observed in age distribution by locality size or region. The mean monthly income of 2021 respondents was: \$4,577.5 $_{\text{MXN}}$ (equivalent to £168 $_{\text{GBP}}$ or \$222 $_{\text{USD}}$).[300]

Mental accounting posits that people group expenditures into specific categories (or accounts) to which they ascribe artificial subjective budgets to facilitate decision-making processes over them. The categorisation of transactions is based on several factors including the: purpose of the acquired goods or services, monetary value (small [$\leq$ \$500 $_{\text{MXN}}$] vs large purchases [$>$ \$500 $_{\text{MXN}}$]), place of acquisition, and payment method used. Figure 4.2 displays the distribution of ENIF 2021 respondents' transactions across 4 categories to illustrate some of these factors (appendix Table 4.A.3 contains the corresponding summary descriptive statistics). During the quarter prior to the survey a little over 40% of respondents engaged in all four categories of transactions, a little over 35% made payments under three of the categories, 15% had two different types of purchases, and 7% undertook only a single type of

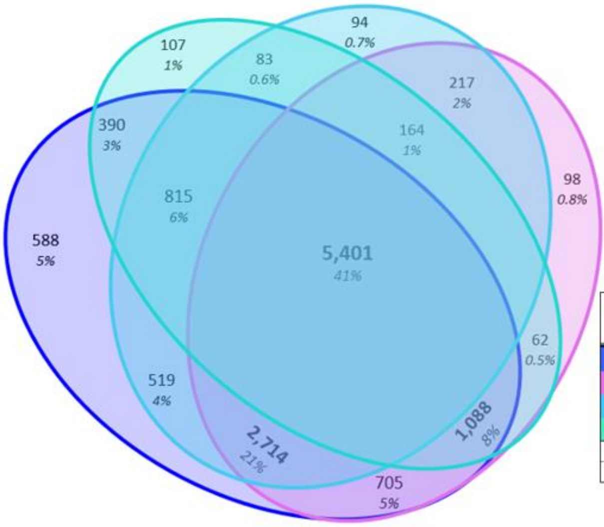
[299] In the 2020 Census: 51.4% of Mexicans aged between 18-70 years (42 million) were females and 48.1% (39.3 million) were males. The corresponding figures in 2010 were: 52.1% (35.2 million) females and 47.9% (32.4 million) males.
[300] Assuming a 2-year average (2019-2021) historical exchange rate in direct currency terms of \$27.3 $_{\text{MXN}}$ per £1 GBP and of \$20.59 $_{\text{MXN}}$ per \$1 USD.

transaction (commonly small shop purchases which are usually small value purchases). No category had less than two thirds of respondents conducting it (the lowest numbers seen in terms of transport payments) and most respondents (90%) made purchases in small shops either solely (close to 5%) or in addition to conducting other types of purchases.

Appendix Figure 4.A.1 shows that when looking exclusively at bank account holders the frequency of transactions across categories remained similar (within ± 0.2 percentage points of the patterns observed in the whole sample).[301] Yet, as expected, the predominance of small shop purchases weakened in the subsample of account holders. While for the entire sample the number of people making purchases in small shops was 17% higher than the number purchasing in large retail stores, 22% larger than that of public and private services payments, and 51% bigger than that of transport payments; the number of respondents with at least one account purchasing in small shop purchases was only 6% higher than those purchasing in large retail stores, 13% larger than payments for services and 52% bigger than those conducting transport payments.

Figure 4.2: **Distribution of transactions by category (last 3 months)**

$N = 13,554$ Total ENIF 2021 sample.
$n = 13,045$ In diagram, undertake transactions.
$n' = 509$ Do not conduct any transactions.



	Transaction Types (purchases & payments in…)	Count	Percentage (count/N)
	Small Shops	12, 220	90
	Large Retailers	10, 449	77
	Public & Private Services	10, 007	74
	Public & Private Transport	8, 110	60
n	Total B. acct & Transactions	13,045	96
n'	Does not Conduct Transaction	509	4

*Percentages in elliptical rose diagram are based $n = 13{,}045$, the total number of conducted transactions.

The preponderance of small shop purchases is consistent with the pervasiveness of small value ($\leq$ $\$500$ MXN) payments in Mexico and both are supported—from a supply and demand side perspective—by the high number of micro enterprises (businesses with at most 10 employees and average monthly sales below \$300k MXN) in Mexico.

According to the latest (2018) Mexican Economic Census (in Spanish CE), microbusinesses accounted for 95% of the economic units in the country and for 37% of the total employed population. At the same time, the most recent (2018) Mexican National Survey on Productivity and Competitiveness of Micro,

[301] In terms of financial (bank) account holders, over the 3 months prior to the ENIF 2021 survey close to 45% engaged in all four types of transaction categories, a little over 36% made transactions under three category types, around 12% made payments of two types of categories, and 5% undertook transactions of a single category.

Small and Medium Enterprises (in Spanish ENAPROCE) indicated that while cash is accepted in all businesses (regardless of size), DC, CC and cheques are only accepted (in addition to cash) in 17% of microbusinesses and barely 16% of microenterprises accept also electronic payments (including mobile bank transfers). In contrast, 69% of small and medium sized businesses (SMEs) accept DC, CC and cheques and 82% of Mexican SMEs accept electronic (and digital) payments in addition to cash. The large share of very small (micro) enterprises in Mexico and the differences in non-cash payments acceptance rates amongst them and businesses of larger size suggest that the choice of payment method used by Mexicans' is at least partly constrained in favour of cash by supply side factors.

Figure 4.3 reveals the dominance of cash (darker shaded areas) as the most commonly used payment form across the four transaction categories evaluated by the ENIF (counts in appendix Table 4.A.4).

Figure 4.3: ENIF 2021 Forms of payment per type of transaction (usage percentages)

* Percentages of those who conduct each type of transaction based on total sample (unrestricted by bank account holding).

In line with the above discussion, Figure 4.3 shows how cash is prevalent for small shops purchases and that once having the choice (due to greater inclusion or access), at least a quarter of ENIF 2021 respondents were willing to use DC and CC for purchases of larger value in bigger retailers or service conglomerates.

Table 4.5 restricts the sample to bank account holders to determine whether different patterns of payment forms use were evidenced in this group. Columns a, c, e, g give the proportion of bank account holders using each payment method per category of purchase (counts in appendix Table 4.A.5). Columns b, d, f, g show the percentage point differences between use proportions of bank account holders with respect to those observed in the whole, unrestricted sample (with account holders and non-holders).

Table 4.5: ENIF 2021 Payment Form per Transactions Type (usage percentages acct. holders vs total)

Payment Method	*Small Shops*		*Large Retailers*		*Pub. & Priv. Services & Utilities*		*Public or Priv. Transport*	
	Acct H. % (a)	PP. Diff (b)	Acct H. % (c)	PP. Diff (d)	Acct H. % (e)	PP. Diff (f)	Acct H. % (g)	PP. Diff (h)
Cash	87	**- 5**	55	**-16.8**	71	**-11**	85	**-5.8**
DC and CC	12	4.6	42	15.8	16	6	10	3.7
Electronic or Digital Transfers (apps)	1	0.4	3	1	13	5	5	2

* Cells on columns (a), (c), (e), and (g) give proportion among those who conduct each type of transaction based on sample restricted by bank account holding.
* Cells on columns (b), (d), (f), and (h) give percentage point (pp.) differences in payment instrument used between the whole sample and the sample restricted to account holders. Pp. differences calculated as: $x_{account\ holders} - x_{total\ sample}$.

Percentage point differences unequivocally show that, compared to considering the whole sample, bank account holders use cash less prominently, especially for purchases in large retailers and services but also even for small value purchases (as are those incurred at small shops) or for transport expenses. The difference between the subsample of account holders and the entire sample in the use frequency of DC and CC for large retail shops purchases and the difference in the use frequency of electronic and digital means to pay for public (or private) services and utilities also suggest that some consumers do opt for non-cash payment forms when they can. Nonetheless, given that cash payment shares are still large (on average) even amongst account holders, the prevalence of cash use in Mexico is undeniable.

While ENIF 2021 did not explicitly ask about informal working conditions, we proxy informality using the survey's information on occupation and earnings frequency.[302] In line with official data on informality (INEGI, ENOEN 2022), our informality proxy showed that 53% of ENIF 2021 respondents who declared having worked during the month prior to the survey also reported having variable earnings during the month.[303]

Most respondents (8,840 or 66% of sample) answered they preferred receiving incoming money (payments, salaries, remittances, etc) in cash as opposed to it being sent electronically (directly debited to an account or on a card). Not surprisingly, the preference for cash receipts decreased when restricting the sample to those having worked last month and who were bank account holders.[304]

Without specifying neither the frequency nor the value of the transfers, 1,928 respondents (14.22% of the sample) in 2021 acknowledged having received international remittances throughout the year

[302] See appendix Table 4.A.1 for details on the derivation of the informality proxy used as well as footnote 59.
[303] Out of 8,732 respondents having worked during the prior month 4,592 reported variable earnings.
[304] Only 62% of those having worked last month preferred receiving money in cash. Bank account holders seemed ambivalent as half reported preference for receiving money in cash while the remaining 50% preferred to receive money electronically. Among bank account holders that worked last month only 32% preferred in cash money receipts.

leading up to the 2021 ENIF and 54% of remittance receivers (1,034) had a bank account.[305] Additionally, close to a quarter of 2021 remittance recipients received funds electronically (through an account or card). Contrastingly, only 6.07% of respondents in the first ENIF wave (2012) claimed to have received international remittances. Whilst roughly 33% of those 2012 remittance-receivers had a bank account (thus were 'banked') not all of them received remittance transfers electronically through their bank account (about 29% of the banked remittance recipients in 2012 received the international funds via other means such as through family members and friends or via their accounts in popular large retailing corporations with financial divisions specialising in cash advancements, payday loans and remittances' disbursements).[306] The more than 100% increase in the proportion of remittance recipients between the 2012 and 2021 ENIF waves[307] aligns with Banxico's time series data on annual remittance inflows as the value of total remittances received in Mexico in 2021 was 2.25 times larger than the total value of 2012 inflows (implying a 126% growth rate in remittance inflows between the 2012 and the 2021 ENIF).[308]

Focusing more narrowly on remittance recipients in 2021, according to ENIF 2021 data, about 30% (143) of those who received remittances electronically in 2021 preferred receiving other types of incoming money in cash. Therefore, our ENIF 2021 estimations suggest that, for at least a third of migrant-exposed households, the financial digitalisation acculturation processes linked to the migratory experience were not sufficient to change their payment methods use preferences (perhaps due to ongoing structural limits to financial access in Mexico). However, while only 2% of remittance receivers had used CoDi, 15% of CoDi users were also remittance receivers suggesting that the relationship between migration-acculturation processes and the use of digital technologies amongst migrant groups and their families in origin location grants further research.

Throughout the prior year leading to the 2021 ENIF survey, 45% of respondents used correspondent banking services from convenience store chains such as Oxxo to deposit or withdraw money, receive remittances, or to pay for utilities, CC balances and other prepaid services. Roughly 54% of the 2021 ENIF sample used informal saving channels[309] and about 30% of respondents used informal credit channels in 2021.[310]

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[305] The amount of remittance receivers with a bank account represented 8% of the total sample.

[306] In absolute terms, in the 2012 ENIF only 371 or the total 6113 respondents reported having received international remittances and merely 122 of such 371 remittance receivers (thus ~33%) had a bank account in 2012.

[307] The proportion of ENIF 2021 respondents claiming to have received remittances from abroad was 8.15 percentage points higher than the proportion of ENIF 2012 reporting to have received international remittances, thus implying a 134% increase in the share of respondents receiving remittances between the 2012 and 2021 ENIF waves.

[308] According to Banxico's remittance income series (CE81) whilst remittance inflows to Mexico in 2012 totalled $23,286.3 million USD by 2021 total remittance inflows to Mexico equalled $52,522.6 million USD.

[309] Including saving by: keeping money at home; entrusting sums with family, friends and acquaintances; depositing money in rotating savings communal associations; lending money to friends; or investing it in household or farming appliances, livestock or equipment to lease.

[310] Including requesting a loan from: friends, family and acquaintances; pawn shops; rotating (community) savings and credit associations.

While only 7% of the people surveyed for the ENIF 2018 declared having been victims of financial fraud offences during the 3 prior years (2015 to 2018), 13% (1,796) of the people surveyed for ENIF 2021 reported having experienced financial fraud during the 2018-2021 year-period, representing an 86% increase in the incidence of financial fraud between the two ENIF waves. Of those who experienced financial fraud 41% (738) had their cards cloned, 41% (734) experienced identity theft or phishing, 29% (526) fell for a pharming scam and 21% (369) fell into a Ponzi scheme. Additionally, a little over a quarter (26%) reported having experienced several different types of fraud offences in the 3-year period. Further details on the distribution of fraud offenses over the 3 years prior to the survey on appendix Figure 4.A.2. ENIF 2021 fraud numbers align with the rapid increase in cybernetic and e-commerce fraud observed by the Mexican National Commission for the Protection and Defence of Financial Services Users (in Spanish CONDUSEF) which pointed that solely throughout 2018 e-commerce financial fraud increased 74% in Mexico while between 2020 and 2021 there was a 52% increase in MB fraud, both of which are related to the four offences captured in ENIF data.

More than half of the 2021 sample answered correctly more than 50% of the 7 financial knowledge questions: 25% answered correctly 6 out of the 7 financial questions (scoring $86/_{100}$), 30% answered correctly 5 questions (scoring 71/100) and 21% responded correctly 4 out of 7 financial knowledge questions (scoring $57/_{100}$). The average schooling level for the total ENIF 2021sample was Jr High while the average level of schooling of Mexicans aged 15 and older reported in the Mexican 2020 census was 9.7 years of education (i.e., having completed all years of Jr. High (9 years) as well as some High School). Aligning with Mexican censuses findings, as well as with prior ENIF waves, the 2021 ENIF revealed lower educational attainment amongst older cohorts.

Mexico is a highly urbanised country[311] with nearly 79% of the Mexican population (99.5 million) living in urban areas according to the 2020 census.[312] Following the census, ENIF ranks localities into four size categories and classifies those with less than 2,500 residents as rural and all those above as urban. In line with census data, about 77% of the 2021 ENIF sample came from urban localities (appendix Table 4.A.6 presents summary descriptive statistics of ENIF 2021 geographic controls used in the analysis). Significant differences in income and wealth between Mexico's urban and rural localities go hand in hand with persistent disparities in educational attainment as well as in access to

[311] Mexico ranks 6th among countries with the highest proportion of cities exceeding 300,000 residents and Mexico City alone is considered: the 15th largest mega region worldwide by economic activity (with an output contribution estimated at $519 billion USD in 2020) the 5th largest metropolitan agglomeration in the world, and the 1st in North America (UN, 2018a, 2018b, 2020, 2022).

[312] The specific official INEGI categorisation of localities used in the ENIF and in the Censuses is: 1—localities with 100,000+ residents, 2—localities with 15,000 to 99,999 residents, 3—localities with 2,500 to 14,999 residents, and 4—localities with at most 2,500 residents. However, another official institution in charge of urban development in Mexico—the Secretary of Territorial and Urban Agrarian Development (SEDATU)—employs an alternative classification for the National Urban System (NUS) which only counts as 'urban' localities with 15,000 and more residents. Therefore, the NUS classification differs from that used by the Censuses and in the ENIF because the latter two count localities with 2,500-14,999 residents in addition to those 15,000+ as urban.

formal financial services by type of locality.[313] As expected, and in line with the Mexican census[314] and international organizations findings,[315] our sample evidences that the larger or more urbanised a locality in Mexico, the greater the level of education of its inhabitants.

Mexico is one of the top 5 countries worldwide with the largest proportion of unbanked populations (WB, 2018)[316] and is well below the average level of financial inclusion in the Latin American and Caribbean region (WB, 2018). Political economy scholars (Suarez, 2015) have stressed that banks' regulatory capture has greatly limited the growth and potential benefit of novel forms of payment in Mexico—such as mobile money—by making bank accounts the necessary pre-condition for the latter. The problematic is circular since, as pointed out in the literature, one of the obstacles to financial inclusion in Mexico is that the availability and use of payment methods (except for some forms of retailer CC) are tied to having a bank account. Even Mexico's newest (2019) official low-cost digital instant retail payment collection system, CoDi,[317] has holding an account in a financial institution as prerequisite, despite its aim to promote financial inclusion through lower access costs.

To illustrate the extent of access, Figure 4.4 shows the distribution of account holding and therefore of the payment method alternatives (in addition to cash) held by some ENIF 2021 respondents.[318] While the majority (53%) of respondents in ENIF 2021 had at least one type of account in a financial institution (some had several different types of accounts and different products within the same account), the survey's large proportion of unbanked people (without account) attests to the low level of financial inclusion in Mexico.

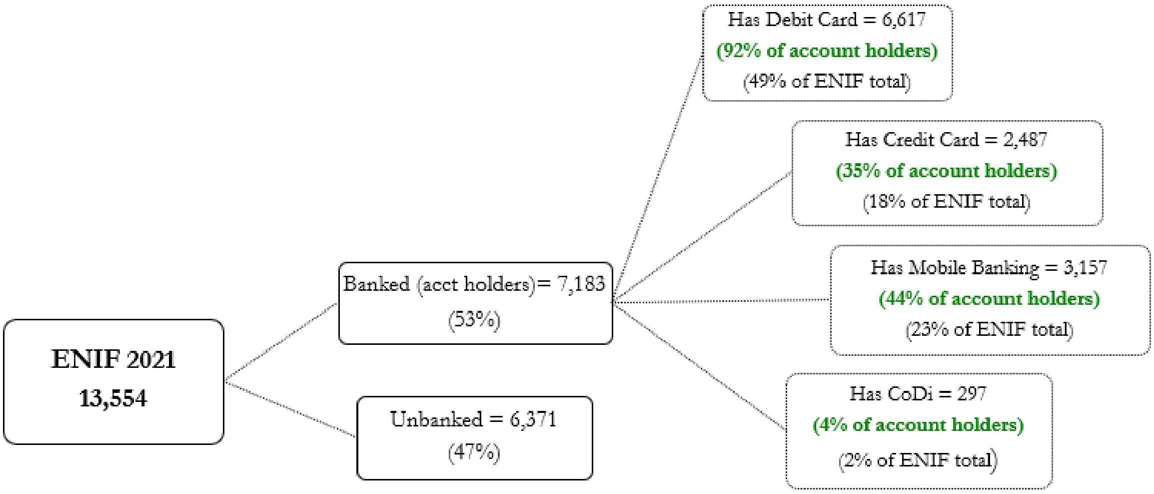
As Figure 4.4 shows, 92% of account holders had at least one DC. However, 35% of them reported not once using their DCs. Of such 2,285 non-using DC holders, 20% (i.e., 458 respondents) reported 'mistrust' and 62% (1,409) reported 'preferring to pay in cash' as main reasons for not once using their DCs. Notably, 40% of the latter claimed they paid in cash rather than using their DC by inertia, status quo bias or habit.[319]

From Figure 4.4 we also know that 8% (566) of the total amount of bank account holders had no DCs and that 6,371 of respondents (47% of total ENIF 2021) did not have a DC because they were unbanked. Analysing account holders without DC by schooling level revealed their largest share was found among respondents with no schooling to at most pre-school (see Table 4.6 below). Having 'had a bad

[313] The disparity in educational attainment is more pronounced in terms of locality size than by age group in ENIF 2021.
[314] According to the 2020 census: 81% of the 18 to 70 year-old population residing in rural areas had less than High School completed and only 6% had some form of University education. At the same time the 2020 census revealed that 11% of Low Urban, 16% of Mid Urban and 23% of High Urban & Metro area residents aged between 18-70 years had University instruction.
[315] OECD (2016, 2018, 2021) and United Nations (2018a, 2018b, 2020, 2022).
[316] Others include Morocco, Vietnam, Egypt and the Philippines.
[317] Launched by Bank of Mexico in September 2019, the commonly used acronym CoDi derives from the Spanish 'Cobro Digital' (digital collection system).
[318] Those 'Unbanked' can only pay in cash whereas bank holders have other payment alternatives beyond cash.
[319] The specific reason given, as translated from the Spanish 'costumbre' was: 'by habit'.

experience with a FI', 'receiving suboptimal service from FIs', and/or 'mistrusting FIs' were given as principal reasons for not having an account by 6% (412) of unbanked respondents. Overall, 870 respondents or 6.41% of the total ENIF 2021 sample did not use DC due to mistrust (towards formal FIs).

Figure 4.4



Source: Self-generated based on ENIF 2021 data.

According to Figure 4.4 only 35% (2,487) of account holders had at least one CC, and 95% (2,374) of them had a DC in addition to their CC.[320] About a quarter of the total ENIF 2021 sample (3,455 respondents) had CCs. While 72% of respondents with some form of CC had a bank account, the remaining 28% (958) had retailing or convenience stores CCs instead (such as Oxxo card) because they did not have a banking account. About 3% (436) of the total ENIF 2021 sample reported 'lack of trust in FIs' or having 'had bad prior experiences with FIs' as primary reasons for not having (and therefore not using) *banking* CCs.

As explained in the data section, in the ENIF 2021, MB refers to using a mobile phone application (cell-phone app) to consult balances and to make transfers/payments to and from one's account(s). Figure 4.4 shows that 3,157 of respondents had MB, amounting to: 44% of all account holders and to 23% of the total ENIF 2021 sample. Less than half (46%) of DC holders had MB however only 4% of respondents with MB did not have a DC.[321] About 1% (160) of all ENIF 2021 respondents reported using an internet webpage (not an app)[322] to make transactions and balance consults on their account. While these proportions are still small when compared to the level of use of MB in other countries, they

[320] Only 113 bank account holders had a 'banking' CC without also holding a DC (representing 5% of bank CC holders and 0.02% of the total ENIF 2021 sample).
[321] The actual count of respondents with mobile banking and at least one DC was 3, 032 respondents which corresponds to 46% of all DC holders and to 96% of respondents with MB.
[322] While MB also necessarily uses the internet through a mobile (smart device), ENIF employs the term "internet-banking" to refer to the service that is mostly accessed through non-portable devices with internet (i.e. desktops and instruments less portable than a cell phone or tablet with internet).

do reflect that Mexico has experienced a steep increase in the level of MB uptake during the past decade for, according to data from the first wave of the ENIF, in 2012 only 5.41% of respondents with an account had MB.[323] Conversely, roughly 13% of account holders in 2012 used internet banking.[324] Together these statistics suggest that Mexico has achieved some improvement in terms of financial inclusion since 2012 as, based on the definition of internet and MB used by the ENIF, neither are plausible for the unbanked. Moreover, these statistics also suggest that over the past decade more and more Mexicans prefer to consult their balances or to perform transactions through the most portable and convenient mediums available with digital capabilities (i.e. through apps embedded in mobile phones and tablets) rather than through other non-portable devices with internet.[325]

Just over a third of the ENIF 2021 (31% or 4,213 respondents) had heard about CoDi and 8% of them (337) had used it by the time of the survey. Thus, only 2% of the total sample had used CoDi by the ENIF 2021 data recollection period. Respondents whose account resulted from participating in a government support program represented 19% of the total amount of bank account holders and 10% of the total ENIF 2021 sample. Of them: 69% solely had a DC, 1% solely had a CC,14% had both types of cards and 16% had neither.[326] About 18% of respondents with an account to obtain government support also received remittances. Additionally, 9% had MB in their government provided welfare support accounts, 21% knew about CoDi but only 2% of the latter used it.[327]

Given the positive correlations found in the literature between educational attainment and use of payment technologies Table 4.6 presents the pattern of bank account holding by education level in 2021 (column a) along with the proportion of respondents in each schooling level who—conditional on having a bank account—held a given payment method in 2021 (corresponding counts are provided in appendix Table 4.A.7). Not surprisingly, Table 4.6 reveals that as education level increases so does the percentage of people within each schooling category with a bank account and who—given that they have a bank account—also had another payment method beyond cash. Supporting claims that in Mexico 'debit is king', Table 4.6 shows that out of the 3 payment methods, DC were the only instrument held by more than 75% of bank account holders at each education level. Whereas the lowest proportion of

[323] Expressed as a share of the total ENIF 2012 sample (including both account holders and people without banking accounts) the percentage of people with MB in 2012 was even smaller, amounting to merely 1.88%.
[324] Expressed as a share of the total ENIF 2012 sample, the proportion of account holders in 2012 that used internet banking was only 4%.
[325] The above statistics imply that between 2012 and 2021 the proportion of ENIF respondents that were account holders and had activated MB on at least one account increased by over 700%.
[326] Corresponding counts: of the 1,113 respondents with an account to receive government support money 919 only had a DC, 14 only had a CC and 194 had both types of cards. Additionally, 218 respondents with a government account had neither type of card.
[327] Respondents with bank accounts resulting from them being government support beneficiaries were no different than other groups of respondents in terms of their CoDi usage rate, since, mirroring the pattern of CoDi usage across other types of respondents, only 8% of all the welfare stipend recipients with bank accounts who knew about CoDi also used it.

DC holders (77%) was seen amongst respondents with none-to-at most Pre-school, the proportion of bank account holders with a DC in all levels above Elementary was above 90%.[328]

Table 4.6

Schooling	Holding (%) of product or service (ENIF 2021)			
	Bank Acct (a)	***DC*** (b)	***CC**** (c)	***MB*** (d)
None or (at most) Preschool	35.66	76.80	6.80	2.40
Elementary	37.72	87.71	17.28	7.48
Junior High	44.56	91.73	26.76	28.87
High School	57.12	92.50	34.19	53.95
University (Bachelors, Masters, PhD)	78.98	95.86	51.94	69.30

* Cells on column (a) represent row percentages taking the whole of the sample population at each given level of education into account.
* Cells on columns (b)-(d) represent row percentages conditional on having a bank account (i.e. each row's base to calculate the corresponding proportion of payment instrument holding is the number of respondents per education level with a bank account).
(a) Percentage of respondents of total sample with a bank account.
(b) Percentage of respondents ***with bank account*** that ***have*** a DC per level of schooling.
(c) Percentage of respondents ***with bank account*** that ***have*** a CC per level of schooling.
(d) Percentage of respondents ***with bank account*** that ***have*** mobile banking per level of schooling.
* Percentages for CC holders exclude those that hold retailing CCs but no high street banks' CC. Consideration of the latter type of CCs would inevitably imply higher percentages for CC holding as 25.42% of all respondents claiming to have some type of CC in 2021 (i.e. 958 of the total 3,445 with CCs) held a non-banking (retailing or non-financial institutions [NFIs]) CC.

While an education gradient exists for holding any non-cash payment method, it is much steeper for MB. For example, the amount of bank account holders with MB and University education is 271 times larger than that amongst respondents with none or at most Pre-school education and 20 times larger than those with only Elementary schooling. However, it is only 3 and 2 times higher than the amount of bank account holders with MB with Jr High or High School completed, respectively. f

To contextualise the most recent ENIF data (2021) regarding account and payment instruments' holding per level of education and to provide descriptive evidence of the gradual improvements in financial inclusion achieved in Mexico over the past decade Table 4.7 presents statistics analogous to those in Table 4.6 but based on the first wave of the ENIF (2012) while Table 4.8 gives the percentage change observed in account and non-cash payment instruments' holding rates between the two ENIF waves (2012 and 2021).[329]

Table 4.7

Schooling	Holding (%) of product or service (ENIF 2012)			
	Bank Acct (a)	***DC*** (b)	***CC**** (c)	***MB*** (d)
None or (at most) Preschool	12.16	62.50	27.50	2.50
Elementary	19.99	70.64	21.88	1.94
Junior High	30.81	79.32	34.76	2.14
High School	43.08	79.33	33.40	5.22
University (Bachelors, Masters, PhD)	65.32	87.94	49.56	10.29

* Cells on column (a) represent row percentages taking the whole of the sample population at each given level of education into account.
* Cells on columns (b)-(d) represent row percentages conditional on having a bank account (i.e. each row's base to calculate the corresponding proportion of payment instrument holding is the number of respondents per education level with a bank account).
(a) Percentage of respondents of total sample with a bank account.
(b) Percentage of respondents ***with bank account*** that ***have*** a DC per level of schooling.

[328] Unsurprisingly, the highest share was observed across those with University level education.

[329] Counts for Table 4.7 are provided in appendix Table 4.A.8.

(c) Percentage of respondents ***with bank account*** that ***have*** a CC per level of schooling.
(d) Percentage of respondents ***with bank account*** that ***have*** mobile banking per level of schooling.
* Percentages for CC holders exclude those that held retail-shop CCs but no high street banks CC. Consideration of the former type of CCs would inevitably imply higher percentages for CC holding as 43.37% of all respondents claiming to have some type of CC in 2012 (i.e. 599 of the total 1,381 with CCs) held a non-banking (retailing or NFIs) CC.

Table 4.8

Schooling	**Holding change (2012-2021)**							
	Bank Acct		***DC***		***CC***		***MB***	
	Growth Rate % (a)	**PP Diff** (b)	**Growth Rate %** (c)	**PP Diff** (d)	**Growth Rate%** (e)	**PP Diff** (f)	**Growth Rate %** (g)	**PP Diff** (h)
None or (at most) Preschool	193.26	23.50	22.88	14.30	**-75.27**	**-20.70**	**-4**	**-0.10**
Elementary	88.69	17.73	24.16	17.07	**-21.02**	**-4.60**	285.57	5.54
Junior High	44.63	13.75	15.65	12.41	**-23.01**	**-8.00**	1249.07	26.73
High School	32.59	14.04	16.60	13.17	2.37	0.79	933.52	48.73
University (Bachelors, Masters, PhD)	20.91	13.66	9.01	7.92	4.80	2.38	573.47	59.01

* Cells on columns (a), (c), (e), and (g) give percentage changes (growth rates). Grow rates calculated as: $\left[\frac{(x_{2021}-x_{2012})}{x_{2012}}\right]$
* Cells on columns (b), (d), (f), and (h) give percentage point (pp.) differences. The latter calculated as: $x_{2021} - x_{2012}$.

Unsurprisingly, holding rates at each (and all) levels of education were smaller in 2012 than in 2021. Moreover, Table 4.7 shows that the schooling gradient observed in the pattern of account and non-cash payment instruments holding in 2021 has been maintained since 2012 (and likely earlier periods) as it results from historical and structural educational disparities. As in 2021, the education gradient was the steepest for MB in 2012. However, the difference in MB holding between the least and the most educated groups was less pronounced in 2012 than in 2021 since the amount of bank account holders with MB and University education in 2012 was 70 times larger than that amongst respondents with none or at most Pre-school education and 10 times larger than those with only elementary schooling.[330]
As per Table 4.8, the fact that the growth in holding rates of bank accounts and of non-cash payment instruments was mainly positive and substantial (implying more than a 20% increase in holding rates and several evidencing more than 100% rates of increase) at all education levels provide evidence that there have been considerable improvements in financial inclusion in Mexico since the latter became a national policy priority. Moreover, as seen from Table 4.8, the highest holding growth rates were materialised amongst the least educated population segments—evincing that the improvements have been, to some extent, progressive.
Importantly, and as shown by appendix Tables 4.A.7 and 4.A.8, the negative growth rates observed for (high-street banks) CC holding do not imply there was a decline in the absolute number of people having bank CCs within a given schooling level group. Rather, the negative growth rates simply reflect that while the absolute number of people with CCs at each education level indeed increased between 2012 and 2021, the absolute number of people with less than High School level of education and a bank

[330] As opposed to those with University schooling having MB holding rates 271 times larger than the unschooled or 20 times larger than those with Elementary schooling (as was observed in ENIF 2021 data).

account increased more than the amount of people within education levels below High School with bank CCs. Indeed, we can see from comparing columns (a) and (c) in Table 4.A.7 with those of Table 4.A.8 that while the amount of bank account holders with no schooling or at most Pre-school in 2021 was 6.25 times larger than the amount of bank account holders without schooling in 2012, the number of bank account holders with an associated CC and no schooling in 2021 was only 1.55 times the number of people with no schooling in 2012 that were account holders and had an associated banking CC.

Thus, the negative percentage changes observed for CC holding rates among respondents with either no schooling or Preschool, Elementary schooling or Junior High simply reflect that the increase in the amount of bank holding at these levels of education between the first and latest ENIF waves was larger than the increase in the amount of people within such schooling levels that also held an associated bank CC. Similarly, as shown by columns (a) and (c) in Tables 4.A.7 and 4.A.8, the negative growth rate obtained in terms of MB holding amongst people with no schooling to Preschool between 2012 and 2021 simply reflects that even though the absolute amount of people with MB and no-to-little education did increase between the two ENIF waves, the number of bank account holders increased by more than the increase in the amount of people with no schooling (and a bank account) that activated MB between the first ENIF (2012) and 2021.

To provide a more recent depiction of the change in holding rates, Table 4.9 compares ENIF 2021 bank account and non-cash payment instruments' holding rates to those observed in the 2018 sample.[331] The largest growth in the share of bank account holding was seen for people with High School instruction. Their large share of bank holding increase might simply be the result of the natural progression in schooling of some account holders who were in Junior High in 2018. An unmatched progression in the number of people moving from Elementary to Junior High in the period would explain the negative growth rate in the share of people with Junior High holding an account in 2021. However, because the ENIF data is not panel, this explanation cannot be tested.

Table 4.9

Schooling	Holding change (2018-2021)							
	Bank Acct		***DC***		***CC***		***MB***	
	Growth Rate % (a)	**PP Diff** (b)	**Growth Rate %** (c)	**PP Diff** (d)	**Growth Rate%** (e)	**PP Diff** (f)	**Growth Rate %** (g)	**PP Diff** (h)
None or (at most) Preschool	**-9.9**	**-3.92**	64	29.97	**-22.55**	**-1.98**	389.8	1.91
Elementary	2.33	0.86	56.68	31.73	**-10.51**	**-2.03**	167.14	4.68
Junior High	**-1.85**	**-0.84**	30.47	21.42	**-9.01**	**-2.65**	209.76	19.55
High School	11.45	5.87	19.31	14.97	**-2.26**	**-0.79**	116.93	29.08
University (Bachelors, Masters, PhD)	5.19	3.9	9.03	7.94	6.13	3	52.71	23.92

* Cells on columns (a), (c), (e), and (g) give percentage changes (growth rates). Grow rates calculated as: $\left[\frac{(x_{2021}-x_{2018})}{x_{2018}}\right]$

* Cells on columns (b), (d), (f), and (h) give percentage point (pp.) differences. The latter calculated as: $x_{2021}-x_{2018}$.

[331] Specific 2018 Table available upon request.

Of the three payment methods, the holding shares of MB grew the most across all education levels. Moreover, column g suggests a catch-up effect in terms of MB uptake between 2018-2021, as the MB holding rate among the least educated group (those with no-to-at most Preschool) grew seven times as fast as the holding rate of MB among the most educated (even though the share of University educated people with MB remained much higher than the share of those with MB and at most Preschool in 2021, as it also did in 2018). A similar 'catch-up' effect is observed in terms of DC uptake with the growth rates of DC holding among people with lower levels of schooling being much higher than those of groups with University training. As in Table 4.8, negative percentage changes do not imply a decline in holding rates between 2018 and 2021. Instead, they suggest that the amount of bank account holders at each education level below University increased by more than the amount of people with schooling levels below University and bank CC holding between 2018 and 2021.

Acknowledging that holding rates are partly a function of a country's financial infrastructure and of the distribution of formal FIs' access points across its territory, Tables 4.10 and 4.11 show how the proportion of ENIF 2012 and ENIF 2021 bank account and payment methods holding varied by size and type of locality. In both tables shares in columns b, c, d are conditioned on respondents having a bank account. (Corresponding counts in appendix Tables 4.A.9 and 4.A.10).

Table 4.10

Locality Size	Holding (%) by locality size (2012)			
	Bank Acct (a)	***DC*** (b)	***CC**** (c)	***MB*** (d)
High-Urban (100,000+ residents)	46.22	83.64	43.79	6.64
Mid-Urban (15,000 – 99,999 residents)	34.52	78.77	34.59	5.14
Low-Urban (2,500 – 14,999 residents)	25.61	68.66	20.90	4.98
Rural (residents < 2, 500)	20.97	76.50	23.22	1.64
Totals across localities	*34.75*	*80.32*	*36.82*	*5.41*

* Cells on column (a) represent row percentages taking the whole of the sample population living in each type of locality into account.
* Cells on columns (b)-(d) represent row percentages conditional on having a bank account (i.e. each row's base to calculate the corresponding proportion of payment instrument holding is the number of respondents per locality size with a bank account).
* Percentages for CC holders exclude those that hold retailing CCs but no high street banks' CC. Consideration of the latter type of CCs would inevitably imply higher percentages for CC holding as 43.37% of all respondents claiming to have some type of CC in 2012 (i.e. 599 of the total 1,381 with CCs) held a non-banking (retailing or NFIs) CC.

Table 4.11

Locality Size	Holding (%) by locality size (2021)			
	Bank Acct (a)	***DC*** (b)	***CC**** (c)	***MB*** (d)
High-Urban (100,000+ residents)	61.83	94.20	38.69	51.27
Mid-Urban (15,000 – 99,999 residents)	53.26	92.99	35.36	43.98
Low-Urban (2,500 – 14,999 residents)	43.89	88.99	28.71	38.49
Rural (residents < 2, 500)	39.68	86.63	24.58	23.62
Totals across localities	*53.00*	*92.12*	*34.62*	*43.95*

* Cells on column (a) represent row percentages taking the whole of the sample population living in each type of locality into account.

* Cells on columns (b)-(d) represent row percentages conditional on having a bank account (i.e. each row's base to calculate the corresponding proportion of payment instrument holding is the number of respondents per locality size with a bank account).
* Percentages for CC holders exclude those that hold retailing CCs but no high street banks' CC. Consideration of the latter type of CCs would inevitably imply higher percentages for CC holding as 25.42% of all respondents claiming to have some type of CC in 2021 (i.e. 958 of the total 3,445 with CCs) held a non-banking (retailing or non-financial institutions [NFIs]) CC.

The tables show that the largest proportions of financial instruments holding (on both 2012 and 2021) were found in the more urbanised areas. Given the higher level of educational attainment in more urbanised localities (evidenced both by the Mexican census and ENIF data), the patterns observed in Table 4.10 and Table 4.11 match those seen in the tables related to holding rates per schooling categories. Unsurprisingly, (especially given the evidence in terms of financial inclusion progress reflected by other ENIF indicators) the proportions of people having bank accounts and/or non-cash payment instruments at all locality size levels were greater in 2021 than in 2012 (except for the share of bank account holders with related banking CCs in large conurbations [i.e localities with ≥ 100, 000 inhabitants]). To confirm the growth in holding rates by locality size, Table 4.12 presents the percentage change in holding rates of financial instruments per type of locality between the ENIF 2012 and ENIF 2021.

Table 4.12

Locality Size	Holding change (2012-2021)							
	Bank Acct		*DC*		*CC*		*MB*	
	Growth Rate % (a)	PP Diff (b)	Growth Rate % (c)	PP Diff (d)	Growth Rate % (e)	PP Diff (f)	Growth Rate % (g)	PP Diff (h)
High-Urban (100,000+ residents)	33.77	15.61	12.63	10.56	**-11.65**	**-5.10**	672.14	44.63
Mid-Urban (15,000 – 99,999 residents)	54.29	18.74	18.05	14.22	2.23	0.77	755.64	38.84
Low-Urban (2,500 – 14,999 residents)	71.38	18.28	29.62	20.33	37.37	7.81	673.65	33.51
Rural (residents < 2, 500)	89.22	18.71	13.24	10.13	5.86	1.36	1340.24	21.98
Totals across localities	*52.52*	*18.25*	*14.69*	*11.80*	***-5.98***	***-2.20***	*712.38*	*38.54*

* Cells on columns (a), (c), (e), and (g) give percentage changes (growth rates). Grow rates calculated as: $\left[\frac{(x_{2021}-x_{2012})}{x_{2012}}\right]$
* Cells on columns (b), (d), (f), and (h) give percentage point (pp.) differences. The latter calculated as: $x_{2021} - x_{2012}$.

As expected, most growth rates (both at rural and urban levels) were positive and the largest rates of growth were observed in the most rural locations, itself providing evidence that the gains in financial inclusion (while not limited to the most vulnerable and poor populations in Mexico) have indeed been progressive. Similar to the pattern of CC holding evidenced amongst respondents by schooling level, the negative percentage change observed in terms of CC holding in the most urban localities simply reflects the fact that in cities with 100 000 inhabitants or more bank account holding rates were 3.22 times higher in 2021 than in 2012 whereas 2021 CC holding rates were only 2.84 times the CC holding rates of 2012. Since the amount of people with bank accounts in each locality size per year constitutes the base from which holding rates for non-cash payment instruments are calculated, it follows that the percentage change in CC holding rates for the largest urban conglomerates was negative as in these locations the increase in the amount of people having bank accounts between 2012 and 2021 was larger than the increase amongst bank holders deciding to have a high street bank CC.

The most striking evidence provided by Table 4.12 are the high levels of growth in MB uptake between 2012 and 2021. Importantly, the highest growth rate was observed in small rural Mexican communities where the increase in MB holding between the first and the most recent ENIF wave was twice as high as that observed in low-urban and high-urban localities. The latter gives proof that despite Mexico's still lagging levels of adoption of digitalised personal finance instruments and of still low financial inclusion (as per international standards), Mexico has nonetheless followed the global trends that have endorsed the uptake of virtual (digital) payment instruments across all socioeconomic levels (a trend we can only expect to strengthen as the use of CoDi becomes more pervasive).

Table 4.13 compares the proportion of people in the total ENIF 2012 sample that reported having been engaged in any one of the given financial management behaviours with the corresponding shares found solely amongst account holders (counts in appendix Table 4.A.11). Analogous figures based on ENIF 2021 data are presented in Table 4.14 (with corresponding counts given by appendix Table 4.A.12).

Table 4.13

Financial Management Behaviours	***Share of respondents ENIF 2012***		
	Total sample % (a)	Account holders % (b)	PP. Diff (c)
Saved through formal fin institution (last month)	14.84	42.70	27.87
Budgets (keeps record of personal finances)	19.53	29.24	9.71
Overspends (binary)	61.95	47.22	**-14.73**
Capacity to face unexpected econ shock	33.49	47.08	13.59

* Column (c) gives the percentage point (pp.) difference between (a) & (b). Thus, pp. differences = $x_{acct\ holders} - x_{total\ sample}$

Table 4.14

Financial Management Behaviours	***Share of respondents ENIF 2021***		
	Total sample % (a)	Account holders % (b)	PP. Diff (c)
Saved through formal fin institution (last month)	22.03	41.57	19.54
Budgets (keeps record of personal finances)	22.68	30.54	7.86
Overspends (binary)	48.69	43.38	**-5.31**
Capacity to face unexpected econ shock	62.78	70.97	8.19

* Column (c) gives the percentage point (pp.) difference between (a) & (b). Thus, pp. differences = $x_{acct\ holders} - x_{total\ sample}$.

It is easy to recognise that the four financial behaviours described in Tables 4.13 and 4.14 refer to actions associated with the instrumental money management dimension of FC. While saving through a formal institution, budgeting, and having the capacity to overcome an economic shock through savings [of any type] are considered positive financial behaviours likely leading to healthy financial outcomes and positive SFWB, overspending is the only one of the four behaviours in Tables 4.13 and 4.14 that relates to potential negative financial outcomes and lower SFWB. In line with development and household finance research on the benefits of financial inclusion, Tables 4.13 and 4.14 show that the proportions of account holders (in each year: 2012 and 2021) practicing positive instrumental money management behaviours—i.e.: budgeting, saving through formal financial institutions and fostering the capacity to face unforeseen economic shocks through formal or informal savings—were larger than the corresponding proportions observed for the complete ENIF samples (which also considered the financial behaviours of unbanked respondents). The fact that all behavioural shares (except for overspending) in Tables 4.13 and 4.14 were unequivocally higher for account holders than for the general samples in each year suggests that holding an account is, to some extent, associated with engaging in positive financial management behaviours.

At the same time, the fact that the shares of respondents overspending in 2021 were significantly lower than in 2012 (for both the complete ENIF samples and amongst account holders) suggests there was a generalised improvement in financial habits amongst Mexicans between the two ENIF waves. The latter could be associated to the effects of a number of public and private sector financial education programs that have been carried out in Mexico over the past twelve years such as: (a) CONDUSEF's (annual) National Week of Financial Education, training workshops for young people in secondary and higher education, and online financial education tools that provide guidance on goods and services offered by financial institutions in Mexico and disseminate information regarding conscientious personal finance and responsible use of financial services; (b) Banxicos' similar online financial education tools via *MiBanxico* (MyBanxico) website and the financial literacy contents within the Interactive Museum of Economics it administers; (c) Mexico's National Savings and Financial Services Bank's (in Spanish BANSEFI) *Finance For All* initiative which provides training modules for the general public with information on saving, credit, interest rates and other topics and the multiple financial education workshops specifically tailored for PROSPERA[332] recipients ran by BANSEFI; and Banco Azteca's *edutainment* and mass media initiatives that present financial education content in an array of formats including: comics, soap operas[333] with analysis interludes moderated by different animators, apps, games, theatre performances, videos, expert interviews and printable publications (Hernandez and Marouze, 2016).[334]

Table 4.15 more explicitly presents the percentage changes observed in the incidence of each reported financial management behaviour between 2012 and 2021 across both: each year's total wave samples

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[332] *Prospera* was a conditional cash transfer (CCT) and social inclusion program launched in Mexico in 2014 after its predecessors: the Program for Human Development *Oportunidades* and the Program for Education, Health, and Nutrition (*Progresa*), which entered into force in 2002 and 1997, respectively. Despite the internationally reputed legacy and recognition of the positive impact evaluations of *Oportunidades* and of its sequel program *Prospera*, the latter was discontinued in 2019 by leftist president Andres Manuel Lopez Obrador (AMLO) who assumed office in December 2018, effectively leaving a vacuum in social assistance programs in Mexico that to-date has not yet been remediated.

[333] A form of entertainment very popular in Mexico and whose popularity is especially high—though not limited to—low-income individuals.

[334] Unfortunately, despite the multiplicity of financial education initiatives that emerged, those based on online financial education tools still failed to reach and include (primarily rural) low-income populations with limited access to computers and/or the Internet which indirectly helps to explains the persistent disparity of holding rates among urban and rural localities.

and their respective subsamples of account holders. The comparison of columns (a) and (c) shows that percentage change differences between the proportion of respondents practicing any of the financial behaviours in 2021 and in 2012 were more acute or pronounced amongst the total samples of ENIF respondents—which considered the financial habits of both account holders and of the unbanked—than among the 2021 and 2012 subsamples of respondents with bank accounts.

Table 4.15

Financial Management Behaviours	***Change in share of respondents (2012-2021)***			
	Percentage in Total sample		*Percentage* Account holders	
	Growth Rate % (a)	**PP Diff** (b)	**Growth Rate %** (c)	**PP Diff** (d)
Saved through formal fin institution (last month)	48.45	7.19	**-2.65**	**-1.13**
Budgets (keeps record of personal finances)	16.13	3.15	4.45	1.3
Overspends (binary)	**-21.40**	**-13.26**	**-8.13**	**-3.84**
Capacity to face unexpected econ shock	87.46	29.29	50.74	23.89

* Cells on columns (a), (c), (e), and (g) give percentage changes (growth rates). Grow rates calculated as: $\left[\frac{(x_{2021}-x_{2012})}{x_{2012}}\right]$
* Cells on columns (b), (d), (f), and (h) give percentage point (pp.) differences. The latter calculated as: $x_{2021} - x_{2012}$.

The fact that—as per Table 4.15—the shares of people fostering positive financial management behaviours grew more among the complete samples of respondents than uniquely amongst account holders suggests that the improvements in financial behaviours were not only the byproduct of greater financial access (reflected by growth in positive behaviours due to higher proportions of bank account holders) but also importantly due to the diverse financial education and financial literacy campaigns that have been propelled in Mexico over the past twelve years. The larger decline in overspending shares seen among the total samples than amongst the subsamples of account holders similarly supports the role of financial education campaigns. While the impact evaluation of any of the aforementioned financial education initiatives is out of the scope of the chapter, the descriptive statistics provided in Tables 4.13—4.15 suggest that the causal evaluation of the effects of recent financial education projects in Mexico on instrumental money management behaviours among different population groups is an area of further research potential.

Finally, Table 4.15 reveals that the largest growth rates in positive financial behaviours manifested in terms of the substantially increased capacity to face unexpected economic shocks through savings (formal or informal) observed in 2021 with respect to that of 2012 (across both the subsamples of account holders and across the total samples that also included unbanked groups). This not only reiterates the possible influence of financial education campaigns but could also be attributed to the adoption of precautionary, future oriented personal finance practices amongst Mexicans. While the latter rationale is also descriptively supported by the decline in overspending and the increase in budgeting shown in Table 4.15—both of which could relate to declines in impulsivity—the causal evaluation of such mechanism is out of the scope of this chapter, thus offering a promising area for future research.

To conclude our descriptive exploration of the data, Table 4.16 compares ENIF 2021 respondents scores on: financial knowledge, financial attitudes, financial behaviours and SFWB indexes after dividing the ENIF sample into a subsample of unbanked respondents (lacking any FI account) and one of account holders. The four indexes are based on the OECD International Network on Financial Education (OECD/INFE) framework for measuring financial literacy, well-being and inclusion and are widely used in the literature.[335] Since ENIF waves prior to 2021 did not contain all the indicators necessary to derive the four indexes as per the OECD/INFE guidelines, we limit the discussion of the indexes in Table 4.16 to ENIF 2021 data. (Summary descriptive statistics of the 2021 ENIF indexes in appendix Table 4.A.13.)

Table 4.16

Financial Attitudes, Perceptions & Knowledge	***Mean Scores ENIF 2021***			
	Unbanked n'= 6,371 (a)	Account holders n=7,183 (b)	Difference (c)	*Total sample* N =13,554 (d)
Financial Knowledge (nb correct, normalized)	63.73	69.73	6	66.91
Financial Attitudes (normalized)	49.58	55.14	5.56	52.53
Financial Behaviors (normalized)	43.43	56.40	12.97	50.30
Subjective Financial WB (normalized)	44.39	53.91	9.52	49.44

* Column (c) gives the difference between (b - a).

As expected, account holders scored higher across all indexes than non-holders Moreover, the largest scoring differences between the banked (account holders) and the unbanked pertained to financial management behaviours and to respondents' own perceptions regarding their financial well-being. The latter could suggest that greater financial access has some positive effects on people's personal finance management and on their perceived financial health. However, there could also be confounding factors influencing both people's ability and willingness to get an account in a formal FI as well as on their attitudes, behaviours, understanding and perceptions about their personal finances. The analysis of such 'selectivity into banking' is out of the scope of our current research question, however it would be a promising area to explore through further research.

4.7 ANALYSIS

This section presents results for our two research inquiries. We first present results regarding how personal characteristics, socio-demographic and structural factors influence using diverse payment forms to settle different categories of transactions (our first inquiry). We then evaluate BE hypotheses about the causal effects of payment forms on Mexicans' personal financial management behaviours (our second inquiry).

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[335] Because since its creation ENIF has adhered to the guidelines outlined in the OECD/INFE Toolkits for Measuring Financial Literacy and Inclusion (including all its revisions), it follows, that it is possible to generate the precise financial knowledge, financial attitudes, FBs and SFWB indexes developed by the OECD/INFE using ENIF data.

4.7.1 *Factors Determining the Use of Different Modes of Payment*

4.7.1.1 Main Multinomial Logit Results

To date, the bias-adjustment mechanisms explained in subsection 4.5.3.2 can only be applied to the generalized linear model (Oster, 2019) or to probit models (as in AET)[336] and not to multinomial logit regressions. Therefore, the results in this first part of the analysis retain a more descriptive character. Tables 4.17a and 4.18a detail the magnitude of the AMEs on the probability of using either cash, card payments, or electronic and digital payments to settle each of the transactions considered by the empirical model (explained in subsection 4.5.1). Based on these, Tables 4.17b and 4.18b compare the pattern of results observed from the multinomial logit estimations (presented in columns a, c and e) to the hypothesised effects stipulated in subsection 4.5.1.3—Table 4.2 (presented in columns b, d and f). Uncoloured cells in Tables 4.17b and 4.18b signal cases in which results (while significant) did not support the hypothesised effects of the given controls, results in the hypothesised direction of impact but which lacked significance and the results of variables hypothesised to have ambiguous impact. As seen from Tables 4.17b and 4.18b—where coloured cells represent all the cases of variables for which the findings supported (with different significance levels) the effects hypothesised in Table 4.2—several results corroborate some of the hypotheses of the model.

For example, the results support the proposed inverse relationship between age and the use of more virtual and digital forms of payment as is evidenced by the negative and significant association of age with making electronic or mobile app payments across most of the transaction types. Furthermore, the negative relationship between age and the use of cash for large purchases (contrary to our proposition) can be interpreted as reflecting the consequence of financial access restrictions as certain FIs place minimum age and deposit requirements to open an account.

Table 4.2 noted we expected the effect of gender to be at best ambiguous because in itself, gender is not a predictor of the use of payments: there is no substantive reason why gender—as a construct—would influence the use of one payment form over another.[337] Rather, the influence of gender is

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[336] Specifically, AET (2001) apply their technique to a single probit and AET (2002) to bivariate probit models although their main model of interest is the single probit.

[337] Research has demonstrated that presumed gender differences in decision making do not hold when considering psychological traits (see: Durand et al., 2008; Durand et al.,2013). Therefore, by itself, gender bears no direct influence on the use frequency of payment forms.

From a psychological standpoint, research based on the Big Five conceptualization of personality traits argues that the distribution of personality types and of their specific character traits (including: *openness* [enjoying abstract ideas and trying out new things, seeking the unconventional, high in imagination, curiosity, working memory and cognitive control], *conscientiousness* [goal-directed behaviour, good impulse control, planning ahead, diligence, persistence, high organization and control], *agreeableness* [high in trust and empathy, altruism, cooperativeness, susceptible to please], *neuroticism* [extent of resilience to uncertainty, high withdrawal behaviours, RA, overconfidence, negative affect and loss-avoidance behaviours], *extraversion* [proactiveness, overconfidence, need for stimulation, optimism, risk taking and high range of attachments either material or personal]) differs across biological sexes. Heterogeneity in character traits might account for differential preferences over forms of payment. However, any causal relationship arising from such mechanism would be more directly traceable to differences in attitudes towards money arising from diverse personality types rather than from gender itself.

mediated and moderated by other factors such as income, socioeconomic status, age, personality traits and education. Accordingly, the AMEs on gender were mostly insignificant and of weak magnitude. Similarly, being married (or in couple) was largely insignificant. The sample data suggested it only mattered for payments in large retail shops or chains where those in a relationship showed a lower probability of using cash and a higher probability of using card payments for large value purchases (significant at 0.1% and 1% respectively).

Table 4.17a: AME of Multinomial Logit Regressions (Purchases in Small and Large Shops)

Transaction Types	*Cash*		*DC & CC*		*Electronic transfer / mobile app payment*	
	$\hat{\beta}_{AME}$	Standard error	$\hat{\beta}_{AME}$	Standard error	$\hat{\beta}_{AME}$	Standard error
Small Shop Purchases					N = 12, 220	$R^2 = 0.1058$
Age	-0.002	(0.002)	0.004*	(0.002)	-0.002*	(0.001)
Gender	-0.007	(0.005)	0.006	(0.005)	0.001	(0.002)
In couple	-0.008	(0.005)	0.006	(0.005)	0.001	(0.002)
Urban	-0.029***	(0.005)	0.031***	(0.006)	-0.001	(0.003)
Region	-0.039***	(0.005)	0.037***	(0.005)	0.002	(0.002)
ATMs in state (avg last yr)	-0.000	(0.003)	-0.002	(0.003)	0.002	(0.001)
Standard of Living Index	-0.001***	(0.000)	0.001***	(0.000)	0.000*	(0.000)
Elementary	-0.021	(0.045)	0.019	(0.041)	0.002	(0.021)
Jr. High	-0.047	(0.045)	0.046	(0.041)	0.001	(0.021)
High School	-0.067	(0.047)	0.059	(0.042)	0.008	(0.020)
University	-0.096*	(0.046)	0.090*	(0.042)	0.006	(0.020)
Worked last month	-0.012	(0.010)	0.010	(0.009)	0.003	(0.002)
Earnings (fixed vs variable)	-0.006	(0.006)	0.008	(0.006)	-0.002	(0.002)
Monthly earnings	0.000	(0.002)	-0.000	(0.001)	0.000	(0.000)
Receives remittances	0.004	(0.007)	-0.007	(0.007)	0.002	(0.003)
Financial knowledge score	-0.003	(0.002)	0.003	(0.002)	-0.000	(0.001)
Financial Attitudes score	-0.005**	(0.002)	0.005**	(0.002)	-0.000	(0.001)
Subjective Fin WB score	-0.008***	(0.002)	0.007***	(0.002)	0.000	(0.001)
Mistrust in FIs (DC&CC)	0.044	(0.038)	-0.034***	(0.010)	-0.009	(0.039)
Fraud experience	-0.013***	(0.003)	0.012***	(0.003)	0.002	(0.001)
Banking corresp. use	-0.014**	(0.005)	0.011*	(0.005)	0.004	(0.002)
Informal savings use	-0.010***	(0.002)	0.008***	(0.002)	0.002*	(0.001)
Informal credits use	-0.001	(0.003)	0.002	(0.003)	-0.001	(0.001)
Large Retail & Pharmacy Store Purchases					N = 10, 449	$R^2 = 0.2052$
Age	-0.019***	(0.003)	0.021***	(0.003)	-0.002	(0.001)
Gender	-0.010	(0.007)	0.010	(0.007)	-0.001	(0.003)
In couple	-0.024***	(0.007)	0.020**	(0.007)	0.003	(0.003)
Urban	-0.049***	(0.013)	0.047***	(0.013)	0.001	(0.005)
Region	-0.020*	(0.008)	0.022**	(0.008)	-0.002	(0.003)
ATMs in state (avg last yr)	-0.021***	(0.005)	0.015***	(0.004)	0.006***	(0.002)
Standard of Living Index	-0.004***	(0.000)	0.003***	(0.000)	0.001***	(0.000)
Elementary	-0.036	(0.056)	0.039	(0.024)	-0.003	(0.056)
Jr. High	-0.130*	(0.057)	0.127***	(0.024)	0.003	(0.056)
High School	-0.234***	(0.056)	0.226***	(0.026)	0.008	(0.056)
University	-0.384***	(0.056)	0.361***	(0.026)	0.023	(0.056)
Worked last month	-0.025	(0.014)	0.020	(0.014)	0.005	(0.005)
Earnings (fixed vs variable)	-0.047***	(0.008)	0.051***	(0.008)	-0.004	(0.004)

Monthly earnings	-0.001	(0.002)	0.000	(0.002)	0.001	(0.001)
Receives remittances	0.004	(0.012)	-0.011	(0.012)	0.006	(0.004)
Financial knowledge score	-0.019***	(0.004)	0.017***	(0.004)	0.002	(0.001)
Financial Attitudes score	-0.020***	(0.003)	0.019***	(0.003)	0.001	(0.001)
Subjective Fin WB score	-0.028***	(0.003)	0.027***	(0.003)	0.001	(0.001)
Mistrust in FIs (DC&CC)	0.196***	(0.015)	-0.180***	(0.016)	-0.016	(0.009)
Fraud experience	-0.047***	(0.008)	0.044***	(0.007)	0.003	(0.002)
Banking corresp. use	-0.032***	(0.008)	0.031***	(0.009)	0.002	(0.003)
Informal savings use	-0.015***	(0.004)	0.014***	(0.003)	0.001	(0.001)
Informal credits use	-0.000	(0.005)	0.002	(0.005)	-0.002	(0.002)

All quantities calculated over entire estimation sample using bootstrapped standard errors.
*** p<0.001, ** p<0.01, * p<0.05

The AMEs of urban residence significantly supported our hypothesis as they consistently showed that, relative to rural residence, living in an urban environment lowered the probability of using cash to settle all four types of transactions and increased the probability of using DC and CC. For example, on average, the probability of using DC or CC to pay for large value purchases in big retail shops was 4.7 percentage points higher for urban residents than for rural ones (with 0.001 significance). Given the larger presence of financial institutions in urban areas, such results are consistent with expectations based on financial access.

Urban residence only showed a significant positive effect on the probability of using electronic or digital (mobile app) payments when making payments for public and private services. While the positive effect of urban residence on the probability of using electronic or digital (mobile app) payments to purchase in large retailers could relate to increased online purchases, it was insignificant. Rather than contradicting expectations resulting from the largely documented rise of e-commerce in Mexico (Cantú and Ulloa, 2020), the observed results likely derive from ambiguity in ENIF questions. The latter include department stores, large retailers, chains and pharmacies in the same category without any differentiation for e-commerce outlets. This clouds the extent to which the indicator for purchases in large retailers reflects the influence of urban residence on the probability of making online purchases rather than on brick-and-mortar stores.

Our regional indicator differentiates areas with higher levels of financial infrastructure and access (i.e. North, West and Mexico City) from those with lower levels (i.e., South, Centre South and Eastern regions). Therefore, the observed AMEs on the regional control conform with our hypothesis as the average probability of using cards for any type of payment was higher (positive and significant) amongst respondents from regions with deeper financial infrastructures.

In Table 4.2 (subsection 4.5.1.3) we hypothesized the average number of ATMs over the prior year (another commonly used measure of financial access) would have ambiguous AMEs on the use of cash because while a wider availability of ATMs might reduce the costs of getting cash thus incentivizing its use (positive effect), close to a fifth of our sample of account holders had gotten a transactions account in order to receive government support payments. As pointed by the literature, some recipients of government programs tend to use ATMs to monitor their account (and save) rather than to constantly withdraw cash (implying a negative AME). Given the above, the AMEs of ATMs presented in Tables $4.17a$ and $4.18a$ (positive for non-cash payments) suggest that in our sample the beneficial influence of ATM functionalities (other than cash withdrawals) on money management were more important than the negative effects associated with a greater number of withdrawal points.

Out of all the variables in the model, standard of living was the only control with a significant influence on the probability of using each payment form across all transaction types. Due to its construction, a higher score implies better living conditions, therefore, as expected (as supporting our hypotheses), standard of living AMEs revealed a negative relationship with cash use and a positive one with the use of cards and more digital payment forms. Despite the clearly important role played by respondents' standard of living, neither monthly earnings nor having worked last month were consistently significant in the direction of influence hypothesized across all transaction types.

Given the variability of earnings associated with the informal sector, to proxy the impact of labour informality on the use of payment forms we included an earnings frequency categorical control whose highest value denoted fixed earnings (likely from formal work), the intermediate value signaled variable earnings (most likely from informal work usually paid in cash) and the lowest value denoted no earnings.[338] The AMEs of our earnings frequency indicator supported our hypotheses and expectations. For example, it showed that respondents with fixed earnings (and thus probably formal employment) increased the probability of paying large value purchases in big retailers with cards and reduced the probability of using cash.

Table $4.17b$: AME of Multinomial Logit Regressions (Purchases in Small and Large Shops)

Transaction Types	*Cash*		*DC & CC*		*Electronic transfer / mobile app payment*	
	(a) Observed	(b) Hypotheses	(c) Observed	(d) Hypotheses	(e) Observed	(f) Hypotheses
Small Shop Purchases						
Age	−	> 0	+	> 0	−	< 0
Gender	−	ambiguous	+	ambiguous	+	> 0
In couple	−	ambiguous	+	ambiguous	+	ambiguous
Urban	−	< 0	+	> 0	−	> 0
Region	−	< 0	+	> 0	+	> 0

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[338] The lowest value category of our earnings frequency indicator comprised all respondents who had no earnings (including those that did not work due to unemployment as well as: stay at home moms/housewives, students, pensioners, and people with disability). One caveat of our indicator is that it seems to suggest that going from no earnings to variable earnings has the same effect as going from variable earnings to fixed earnings. Understandably, another possibility would have been to include a dummy variable per earnings type. However, our indicator is only intended as a proxy and, given the already large amount of controls and that analysing the effects of participation in the informal labour market was not a central inquiry of the analysis, we chose to include a single categorical variable that could approximate, even if imperfectly, informal employment. Additionally, due to the caveats regarding employment data contained in the ENIF (expressed in footnote 59) we treat having more accurate and direct information regarding participation in formal vs informal labour markets as a (contingent) omitted variable.

ATMs in state (avg last yr)	−	ambiguous	−	> 0	+	ambiguous
Standard of Living Index	−	< 0	+	> 0	+	> 0
Elementary	−	< 0	+	> 0	+	> 0
Jr. High	−	< 0	+	> 0	+	> 0
High School	−	< 0	+	> 0	+	> 0
University	−	< 0	+	> 0	+	> 0
Worked last month	−	< 0	+	> 0	+	> 0
Earnings (fixed vs variable)	−	< 0	+	> 0	−	> 0
Monthly earnings	+	< 0	−	> 0	+	> 0
Receives remittances	+	ambiguous	−	ambiguous	+	> 0
Financial knowledge score	−	< 0	+	> 0	−	> 0
Financial Attitudes score	−	< 0	+	> 0	−	> 0
Subjective Fin WB score	−	ambiguous	+	ambiguous	+	ambiguous
Mistrust in FIs (DC&CC)	+	> 0	−	< 0	−	< 0
Fraud experience	−	> 0	+	< 0	+	< 0
Banking corresp. use	−	ambiguous	+	> 0	+	ambiguous
Informal savings use	−	> 0	+	< 0	+	< 0
Informal credits use	−	> 0	+	< 0	−	< 0

Large Retail & Pharmacy Store Purchases

Age	−	> 0	+	> 0	−	< 0
Gender	−	ambiguous	+	ambiguous	−	> 0
In couple	−	ambiguous	+	ambiguous	+	ambiguous
Urban	−	< 0	+	> 0	+	> 0
Region	−	< 0	+	> 0	−	> 0
ATMs in state (avg last yr)	−	ambiguous	+	> 0	+	ambiguous
Standard of Living Index	−	< 0	+	> 0	+	> 0
Elementary	−	< 0	+	> 0	−	> 0
Jr. High	−	< 0	+	> 0	+	> 0
High School	−	< 0	+	> 0	+	> 0
University	−	< 0	+	> 0	+	> 0
Worked last month	−	< 0	+	> 0	+	> 0
Earnings (fixed vs variable)	−	< 0	+	> 0	−	> 0
Monthly earnings	−	< 0	+	> 0	+	> 0
Receives remittances	+	ambiguous	−	ambiguous	+	> 0
Financial knowledge score	−	< 0	+	> 0	+	> 0
Financial Attitudes score	−	< 0	+	> 0	+	> 0
Subjective Fin WB score	−	ambiguous	+	ambiguous	+	ambiguous
Mistrust in FIs (DC&CC)	+	> 0	−	< 0	−	< 0
Fraud experience	−	> 0	+	< 0	+	< 0
Banking corresp. use	−	ambiguous	+	> 0	+	ambiguous
Informal savings use	−	> 0	+	< 0	+	< 0
Informal credits use	−	> 0	+	< 0	−	< 0

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*** p<0.001, ** p<0.01, * p<0.05

We expected the impact of remittances to be ambiguous because prior empirical research analyzing the link between remittances and financial intermediation in Mexico is inconclusive. Some articles found a positive correlation between remittances and the deepening of the commercial financial sector (see Demirgüç-Kunt et al., 2011 and Martinez-Pería et al., 2008) whereas others (e.g., Ambrosius, 2011) found that changes in remittance receipts did not have significant effects on access to commercial banking in Mexico. Our binary remittance indicator revealed a positive relationship between remittances and dominance of cash payments across all transactions and a negative relationship with card payments.

While mainly insignificant, the pattern reflected by our results is congruent with the literature reporting that despite the income buffer function of remittances, their use as access pathways to traditional forms of financial intermediation remains largely untapped as many recipients still rely heavily on cash and do not incorporate into the formal banking sector. As described in Section 4.6, part of the low integration of remittance receivers into the banking system could be habitual, due to preferences, peer effects or even mistrust. Given that a large portion of remittance-receivers in Mexico are poor rural residents, the scarce significance of the indicator likely stems from the fact that the results presented are for the whole ENIF 2021 sample which pools urban and rural residents. Stratification based on locality size or on standard of living would likely reveal more significant AMEs for the remittance indicator (see Ambrosius, 2011).

Our indicator for the number of fraud instances experienced revealed a consistent negative association with the probability of using cash and a positive association with the probability of using card payments across the four transaction types (both with 0.1% significance). While the relationship between our fraud indicator and electronic and digital payments was also positive, it was insignificant. Since the regression results did not support the hypothesized effects of fraud on the use of different payment forms, none of the cells corresponding to fraud experience were colored in Tables $4.17b$ and $4.18b$. Given that the ENIF is not a panel, the AMEs revealed by the data provide a snapshot of the correlations between experiences of fraud and payment forms use, not their causation. Therefore, we caution against interpreting the AMEs of our fraud indicator as suggesting that despite the high incidence of fraud offenses (such as card cloning and identity theft), the probability of using card payments is not negatively affected. Only a separate analysis evaluating the effect of *changes* in fraud incidence per type of offense on *changes* in the probability of using each payment form would establish causality between the two variables.

In contrast, our binary indicator for mistrust in FIs consistently supported its hypothesized direction of influence on the use of payments, namely: revealing a positive relationship with the probability of using cash and a negative influence on the probability of using card, electronic and/or digital (mobile) payments (most of them significant at 0.1%).

AMEs of banking correspondents use supported our hypothesis (showing a positive influence on the probability of using card payments) in the case of small shop and large retail purchases but not when considering neither payments for public or private services and utilities nor payments for public or private transportation. Moreover, even though the retail chain with the largest network of correspondent banking licenses in Mexico—Oxxo, accounting for 60% of the Mexican market (Carabarin et al., 2018)— is a convenience store (akin to a ‘small shop’), our correspondent banking indicator’s AMEs suggest that the use of correspondents influences most significantly and positively the probability of using card payments for purchases in large retailers rather than in small shops. The results can be explained through the range of personal finance management services offered by correspondents such as Oxxo—which includes its own payment card Saldazo Card[339]—and those of its competitors. Similar in function to a DC, Saldazo Card takes deposits up to a maximum of \$18,000 MXN (~ £ 659 GBP or \$ 874 USD)[340] a month and allows users to make purchases and withdrawals, transfer money, and to pay for outstanding bills (including utilities). Such functionalities increase the payment options of frequent Oxxo shoppers and might even eschew the use of cash for in-store purchases if complementary rewards are offered through Saldazo Card.

Table 4.18a: AME of Multinomial Logit Regressions (Public and Private Utilities & Transportation)

Transaction Types	*Cash*		*DC & CC*		*Electronic transfer or mobile payment*	
	$\hat{\beta}_{AME}$	Standard error	$\hat{\beta}_{AME}$	Standard error	$\hat{\beta}_{AME}$	Standard error
Public & Private Utilities Payments					**N = 10, 007**	$R^2 = 0.2039$
Age	0.002	(0.003)	0.003	(0.002)	-0.005*	(0.002)
Gender	-0.003	(0.007)	0.002	(0.006)	0.000	(0.005)
In couple	-0.004	(0.006)	-0.006	(0.006)	0.010	(0.005)
Urban	-0.057***	(0.010)	0.031***	(0.010)	0.027***	(0.008)
Region	-0.014	(0.008)	0.017*	(0.007)	-0.002	(0.006)
ATMs in state (avg last yr)	-0.007	(0.005)	0.001	(0.004)	0.006	(0.004)
Standard of Living Index	-0.003***	(0.000)	0.002***	(0.000)	0.001***	(0.000)
Elementary	-0.008	(0.091)	0.007	(0.016)	0.000	(0.093)
Jr. High	-0.043	(0.090)	0.031*	(0.015)	0.012	(0.093)
High School	-0.112	(0.088)	0.059***	(0.016)	0.053	(0.093)
University	-0.248**	(0.089)	0.134***	(0.016)	0.115	(0.093)
Worked last month	-0.026*	(0.012)	0.022*	(0.010)	0.004	(0.010)
Earnings (fixed vs variable)	-0.018**	(0.007)	0.008	(0.007)	0.010	(0.006)
Monthly earnings	-0.001	(0.002)	-0.000	(0.001)	0.001	(0.001)
Receives remittances	0.015	(0.009)	-0.010	(0.008)	-0.005	(0.007)
Financial knowledge score	-0.019***	(0.003)	0.008**	(0.003)	0.011***	(0.002)
Financial Attitudes score	-0.011***	(0.002)	0.004	(0.002)	0.007***	(0.002)
Subjective Fin WB score	-0.022***	(0.002)	0.011***	(0.003)	0.011***	(0.002)
Mistrust in FIs (DC&CC)	0.144***	(0.015)	-0.095***	(0.015)	-0.049***	(0.012)
Fraud experience	-0.036***	(0.006)	0.020***	(0.005)	0.016***	(0.004)
Banking corresp. use	0.013	(0.008)	-0.006	(0.006)	-0.007	(0.006)
Informal savings use	-0.006*	(0.003)	0.002	(0.003)	0.004	(0.002)
Informal credits use	0.000	(0.004)	-0.000	(0.004)	-0.000	(0.004)
Public & Private Transportation Payments					**N = 8, 110**	$R^2 = 0.1993$
Age	0.012***	(0.003)	-0.006*	(0.002)	-0.007**	(0.002)
Gender	-0.007	(0.005)	0.014**	(0.005)	-0.007*	(0.003)
In couple	-0.005	(0.006)	0.005	(0.005)	-0.000	(0.004)
Urban	-0.018*	(0.009)	0.007	(0.008)	0.011	(0.006)
Region	-0.034***	(0.007)	0.024***	(0.006)	0.011**	(0.004)
ATMs in state (avg last yr)	-0.026***	(0.004)	0.018***	(0.003)	0.008***	(0.002)
Standard of Living Index	-0.002***	(0.000)	0.002***	(0.000)	0.001***	(0.000)
Elementary	0.016	(0.136)	-0.001	(0.051)	-0.015	(0.137)
Jr. High	0.006	(0.137)	0.008	(0.051)	-0.014	(0.137)
High School	-0.020	(0.138)	0.018	(0.050)	0.002	(0.138)

339 Launched in 2014 thanks to a partnership with the Mexican unit of Citigroup Inc. and Visa.
340 Assuming a 2-year average (2019-2021) historical exchange rate in direct currency terms of \$27.3 MXN per £1 GBP and of \$20.59 MXN per \$1 USD

University	-0.096	(0.138)	0.077	(0.051)	0.019	(0.137)
Worked last month	-0.028**	(0.010)	0.013	(0.009)	0.015**	(0.005)
Earnings (fixed vs variable)	0.008	(0.007)	-0.006	(0.006)	-0.002	(0.004)
Monthly earnings	-0.003	(0.002)	0.002	(0.001)	0.001	(0.001)
Receives remittances	0.017	(0.009)	-0.003	(0.008)	-0.014*	(0.007)
Financial knowledge score	-0.006*	(0.003)	0.000	(0.002)	0.006*	(0.002)
Financial Attitudes score	-0.006**	(0.002)	0.004*	(0.002)	0.002	(0.001)
Subjective Fin WB score	-0.012***	(0.003)	0.007***	(0.002)	0.005***	(0.001)
Mistrust in FIs (DC&CC)	0.039**	(0.013)	-0.030*	(0.012)	-0.009	(0.009)
Fraud experience	-0.022***	(0.005)	0.018***	(0.004)	0.004	(0.003)
Banking corresp. use	0.006	(0.006)	-0.012*	(0.006)	0.006	(0.003)
Informal savings use	0.002	(0.003)	0.002	(0.003)	-0.004*	(0.002)
Informal credits use	0.005	(0.005)	0.000	(0.004)	-0.005	(0.003)

All quantities calculated over entire estimation sample using bootstrapped standard errors.
*** p<0.001, ** p<0.01, * p<0.05

While we expected informal finance indicators (both informal savings and informal credits) to positively influence the probability of using cash and to negatively influence the probability of using cards and virtual electronic transfers or mobile payments across all transactions types, our results revealed that: 1) the influence of informal savings on payments usage was not always in the same direction to that of informal credit; 2) informal credit results consistently supported (without significance) their hypothesized negative influence on the use of electronic transfers or mobile payments across all transactions and supported (also without statistical significance) the hypothesis of its positive influence on cash usage for public and/or private services, utilities and transport payments; 3) the only hypothesis pertaining to informal savings significantly supported by the results was that of their negative influence on the probability of using electronic transfers or mobile payments for public and private transportation (all other informal savings results revealed a pattern of influence opposite to that hypothesized or were insignificant). In particular, our findings showed that using informal savings significantly decreased (with $\alpha = 0.1\%$) the probability of using cash for small shop and large retailing purchases whilst increasing (also significantly at $\alpha = 0.1\%$) the probability of paying such transactions with DC and/or CC.[341] Overall, the results could reflect that some respondents with bank accounts (and cards associated with them) use informal savings to deposit additional money in their accounts that they later use, in non-cash form, to pay for purchases. For example, money from informal savings could be used to pay for CC monthly installments and fees. Otherwise, informal savings could be used to hedge for transaction categories not covered through our dependent variables (e.g., health and education expenses, leisure and travel, rent installments, car payments, etc.) hence liberating some disposable income that can then be used via non-cash payment forms to facilitate the four transaction types covered in this study. Similarly, rather than negating the significance of informal credit sources (in general), the

[341] While the impact of informal savings was significant for using cash and cards to conduct purchases in small shop and large retailers in Table 4.17a the corresponding cells comparing the observed results of informal savings with hypothesised effects on Table 4.17b were not coloured because the direction of the observed influence of informal savings on the use of cash or of DC & CC was in the opposite directed to our hypotheses.

lack of significance observed in our informal credit results could suggest that non-traditional forms of credit are not used to facilitate the specific transaction types evaluated in our model.

Consistent with expectations set in the literature and with our hypotheses (subsection 4.5.1.3), the results reveal a general education gradient discernible through the direction, magnitude and significance of schooling effects. This is illustrated through the negative AMEs of all schooling levels (beyond the reference no-schooling group) on the probability of using cash across all transactions and by the fact that their decreasing (negative) effect increases in both magnitude (becomes more negative) and statistical significance as the education level improves. Similarly, the AMEs of schooling levels on the probability of using card payments were mostly positive and their increasing effect (positive magnitude) escalated with higher schooling levels. The hypothesised educational gradient was more strongly supported by results obtained when analysing the factors determining the payment form used for large retail purchases and for public and private services and utilities payments as our schooling-level variables were more significant (in the hypothesised direction of impact) in such regressions. Indeed, the most significant and substantive results (by magnitude of education levels' AMEs) were obtained for purchases at large retailers (which tend to coincide with large value purchases [above $500 $_{\text{MXN}}$]).
In the cases where schooling effects lacked significance, the direction of their influence also mostly accorded with the initial hypothesis stipulated in Table 4.2.

Despite the relative consistency in the pattern of AMEs of education levels across different categories of transactions, schooling AMEs cannot be assumed as linear and homogeneous. University level education was the schooling level that most consistently supported our hypothesis regarding the influence of schooling (favouring the probability of use of non-cash payment forms), also showing the largest (by magnitude) and most statistically significant effects (several with $\alpha = 0.01\%$). Results reflecting the influence of High School education revealed similar patterns, albeit with fewer significant AMEs and of lesser magnitude. While our results revealed non-significant schooling effects on the use of virtual electronic transfers or mobile payments across the four types of transactions evaluated, the direction of the effects coincided with those hypothesised on Table 4.2. Their absent significance is likely related with the lower use prevalence of virtual electronic transfers and mobile payments in Mexico and in our sample.
The findings even suggested a steeper education gradient for electronic transfers or mobile payments for transactions such as transport payments since neither elementary nor junior high education levels were associated with an increased probability of using the most digital or virtual forms of payment to settle transportation expenses relative to those lacking any schooling. In other words, relative to unschooled individuals, an increased probability of using virtual electronic transfers and mobile payments to cover transportation expenses was only reflected at education levels beyond junior high.

Table 4.18*b*: AME of Multinomial Logit Regressions (Public and Private Utilities & Transportation)

Transaction Types	*Cash*		*DC & CC*		*Electronic transfer / mobile app payment*	
	(a) Observed	(b) Hypotheses	(c) Observed	(d) Hypotheses	(e) Observed	(f) Hypotheses
Public & Private Utilities Payments						
Age	+	> 0	+	> 0	−	< 0
Gender	−	ambiguous	+	ambiguous	+	> 0
In couple	−	ambiguous	−	ambiguous	+	ambiguous
Urban	−	< 0	+	> 0	+	> 0
Region	−	< 0	+	> 0	−	> 0
ATMs in state (avg last yr)	−	ambiguous	+	> 0	+	ambiguous
Standard of Living Index	−	< 0	+	> 0	+	> 0
Elementary	−	< 0	+	> 0	+	> 0
Jr. High	−	< 0	+	> 0	+	> 0
High School	−	< 0	+	> 0	+	> 0
University	−	< 0	+	> 0	+	> 0
Worked last month	−	< 0	+	> 0	+	> 0
Earnings (fixed vs variable)	−	< 0	+	> 0	+	> 0
Monthly earnings	−	< 0	−	> 0	+	> 0
Receives remittances	+	ambiguous	−	ambiguous	−	> 0
Financial knowledge score	−	< 0	+	> 0	+	> 0
Financial Attitudes score	−	< 0	+	> 0	+	> 0
Subjective Fin WB score	−	ambiguous	+	ambiguous	+	ambiguous
Mistrust in FIs (DC&CC)	+	> 0	−	< 0	−	< 0
Fraud experience	−	> 0	+	< 0	+	< 0
Banking corresp. use	+	ambiguous	−	> 0	−	ambiguous
Informal savings use	−	> 0	+	< 0	+	< 0
Informal credits use	+	> 0	−	< 0	−	< 0

*** ** *

Public & Private Transportation Payments	(a) Observed	(b) Hypotheses	(c) Observed	(d) Hypotheses	(e) Observed	(f) Hypotheses
Age	+	> 0	−	> 0	−	< 0
Gender	−	ambiguous	+	ambiguous	−	> 0
In couple	−	ambiguous	+	ambiguous	−	ambiguous
Urban	−	< 0	+	> 0	+	> 0
Region	−	< 0	+	> 0	+	> 0
ATMs in state (avg last yr)	−	ambiguous	+	> 0	+	ambiguous
Standard of Living Index	−	< 0	+	> 0	+	> 0
Elementary	+	< 0	−	> 0	−	> 0
Jr. High	+	< 0	+	> 0	−	> 0
High School	−	< 0	+	> 0	+	> 0
University	−	< 0	+	> 0	+	> 0
Worked last month	−	< 0	+	> 0	+	> 0
Earnings (fixed vs variable)	+	< 0	−	> 0	−	> 0
Monthly earnings	−	< 0	+	> 0	+	> 0
Receives remittances	+	ambiguous	−	ambiguous	−	> 0
Financial knowledge score	−	< 0	+	> 0	+	> 0
Financial Attitudes score	−	< 0	+	> 0	+	> 0
Subjective Fin WB score	−	ambiguous	+	ambiguous	+	ambiguous
Mistrust in FIs (DC&CC)	+	> 0	−	< 0	−	< 0
Fraud experience	−	> 0	+	< 0	+	< 0
Banking corresp. use	+	ambiguous	−	> 0	+	ambiguous
Informal savings use	+	> 0	+	< 0	−	< 0

*** ** *

Informal credits use	+	> 0	+	< 0	−	< 0

*** p<0.001, ** p<0.01, * p<0.05

The AME of financial knowledge can be interpreted as the ceteris paribus average contribution that a (unitary) increase in the financial knowledge score (corresponding to another correct answer) has on the probability of using a particular form of payment. Aligning with Table 4.2 hypotheses and with the results observed for schooling levels, financial knowledge negatively affected the probability of using cash for any of the transactions considered (all significant except for small shop purchases).

The AMEs of financial knowledge were the most significant (and positive) for purchases in large retailers (as expected due to the usefulness of concepts such as simple and compound interest or inflation when making purchases of durable goods or other large value items) and for public and private utility payments. Knowledge of personal finance concepts was not significantly associated with using virtual electronic transfers and mobile payments when conducting small shop purchases.

The AMEs of the financial attitudes index revealed a consistent negative and significant relationship with cash usage and a positive relationship with cards and digital or electronic payment forms. The results could be explained through the large and consistent increase of e-commerce in Mexico because impulsive consumers with high present bias likely make frequent purchases online, an environment where transactions rely on non-cash (principally digital or electronic) payments.

SFWB, capturing respondents' own perceptions regarding their financial autonomy, self-control, and peace regarding their financial status, was one of the most significant controls (after standard of living) in our model. Almost all SFWB AMEs were highly significant (at 0.1%) and the largest magnitude (positive) SFWB effects were obtained for the probability of using card payments for purchases on large retailers. Specifically, an increase in the SFWB score was associated with 2.7 percentage points increase in the probability of using card payments for large value purchases in big retailers[342] and with a 1.1 percentage point increase in the use of both card payments and of digital (mobile app) payments for public and private services payments. Conversely, across all four transaction types, SFWB revealed negative significant effects implying that an increase in respondents' sense of financial wellbeing, autonomy, self-control, and peace regarding their financial situation significantly decreased their probability of using cash payments when conducting any type of purchase.[343]

[342] Conversely, with a 2.8 percentage points decrease in the probability of using cash for large retail purchases.

[343] Specifically Tables $4.17a$ and $4.18a$ show that an increase in SFWB was associated with: a 0.8 percentage points decrease in the use of cash for small-shop purchases, a 2.8 percentage point decrease in the probability of using cash for purchases in large retailers and big shops, a 2.2 percentage points decrease in the probability of using cash for private and public services' payments and a 1.2 percentage points decrease in the probability of using cash to settle public and private transportation expenses.

To summarize, as per the results in Tables $4.17a, b - 4.18a, b$ and the above discussion, our multinomial logic analysis revealed that the most statistically significant and substantively relevant determinants of the use of diverse modes of payment with varying extent of virtuality (or physicality) over different kinds of transactions were: urbanization, (higher levels of) education, standard of living, financial knowledge, financial attitudes, and mistrust towards FIs. Moreover, their observed influence supported the direction of impact we hypothesized such controls would have on payments usage (as per Table 4.2) the most consistently across almost all four transaction categories (see pattern of colored cells in Tables $4.17b$ and $4.18b$). We also interpret SFWB as a key determinant of the use of payment methods because, although its influence was presumed to be ambiguous, it revealed a consistent and highly significant (with $\alpha = 0.001$ across all transactions) pattern of effects that can be justified through behavioural economics. The latter recognizes that as people feel a greater sense of control and of proficiency in managing their personal finances they might both more willing to spend money (due to their perception of having healthy liquidity levels) and more willing to try new payment methods as the sense of financial competence derived from increased SFWB helps to counteract any RA and mistrust they might have regarding using other forms of payment thus helping to explain the observed positive influence on the probability of using non-cash payments and the negative influence on the probability of using cash exerted by SFWB increases.[344]

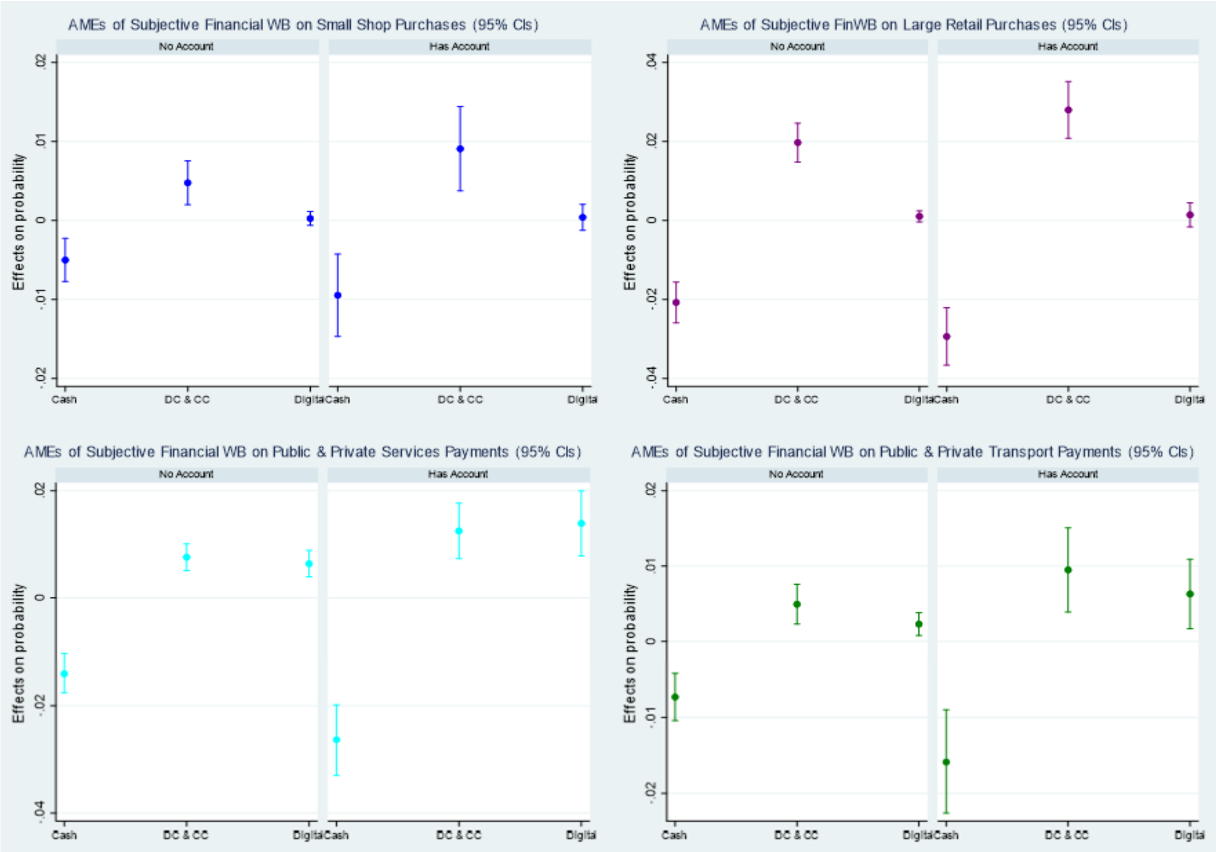
In light of these findings and given the observed educational and income differences between account holders and non-account holders (also largely documented by the literature), we stratified the sample according to account-holding status to compare the predicted AMEs of the two subpopulations (respondents with account vs those without) of the most significant controls revealed above.
Figure 4.5 presents predicted AMEs (stratified by account ownership) for the effect of SFWB on the use of cash, cards (DC or CC), or virtual electronic transfers and digital payments to conduct small shop purchases (royal blue), large retail purchases (purple), public and private services (light turquoise), public and private transport (green). Retaining the same color scheme classification per type of transaction, Figure 4.6 gives predicted AMEs (stratified by account ownership) for the impact of standard of living on the use of each of the three payment forms per transaction category.

In both Figures, predicted AMEs for the two groups (with and without bank account) were in the same direction (i.e. negative AMEs for cash amongst respondents without bank accounts were also negative across account holders and positive AMEs for non-cash payment methods were positive when considering either account holders or non-holders). Following expectations, account holders predicted AMEs were of greater magnitude (more positive or more negative) than those of non-account holders.

[344] Thus, although the effect-cells of SFWB were not coloured in Tables $4.17b$ and $4.18b$ (columns a, c, and e) this was because in Table 4.2 we had hypothesized the effect of SFWB as ambiguous. However, the absent coloring for SFWB should not be interpreted as if it lacks relevance.

However, as expected given the still large extent of financial exclusion in Mexico, the dispersion (uncertainty) of the AMEs obtained amongst account holders was larger than that obtained when analyzing the effects of the aforementioned explanatory factors on the use of payment forms amongst respondents without a bank account.

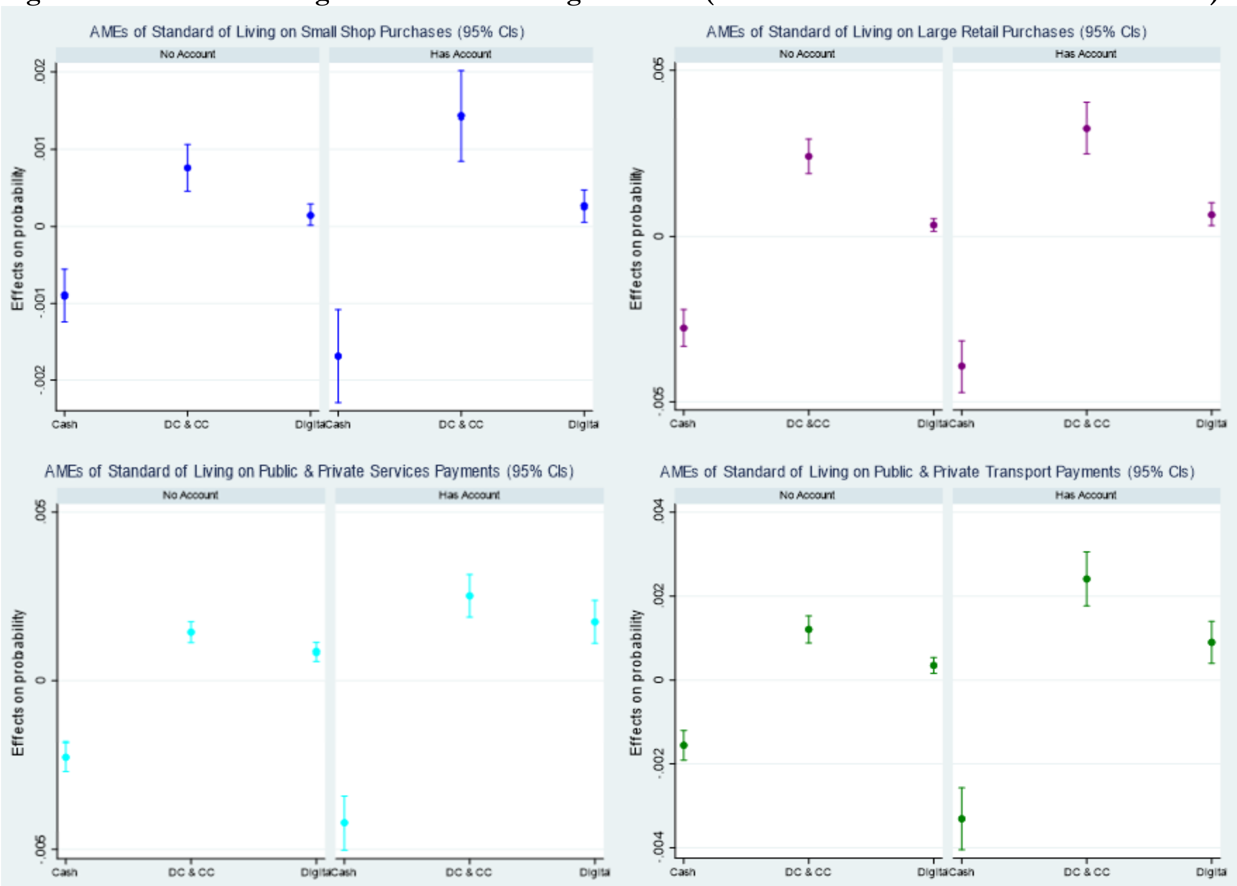
Figure 4.5: Predicted Marginal Effects of SFWB (Non-account holders vs Account Holders)



Predicted AMEs stratified by account ownership of the rest of the controls that consistently showed a statistically significant influence as per Tables $4.17a, b$ and $4.18a, b$ (namely: financial knowledge, financial attitudes, mistrust in FIs and urbanity) are included on appendix Figures: $4.A.3 - 4.A.6$. Their results showed similar patterns to those revealed in Figures 4.5 and 4.6 (i.e. same direction of effects of the given control regardless of whether their influence was considered for account holders or [unbanked] non-holders, more pronounced effects [more positive or more negative] amongst account holders and more variability surrounding estimates calculated for account holders).

All the main determinants of the use of payments identified above (i.e.: urbanity, standard of living, SFWB, financial knowledge, financial attitudes, and mistrust in FIs) had the largest influence on the probability of using card payments (as amongst the three payment forms, each of the above-mentioned controls had the largest size AMEs on card payments across the four transaction types). The largest (absolute) size difference in the influence of such key determinants of the use of payments were observed between AMEs of cash usage and those of card payments (regardless of type of transaction considered).

Figure 4.6: Predicted Marginal Effects of Living Standard (Non-account holders vs Account Holders)



Furthermore, regardless of the transaction type being evaluated and of the key explanatory variable analyzed, the (absolute) size differences in key controls' AMEs on the probability of using card payments versus the probability of using virtual electronic and mobile payments were consistently smaller than the size differences between the controls' influence on the use of cash versus card payments. Finally, as per the analyses from this subsection (4.7.1.1)—stratified and not stratified—the control with the most substantial influence (by size of AMEs) on the probability of using either of the three forms of payment across any transaction was mistrust in FIs.

4.7.1.2 Robustness Checks

The terms "electronic" and "digital" are recognized as having distinct meanings in computer science—with "electronic" referring to any device or system using electricity to operate and "digital" referring to a specific type of electronic device that uses binary codes (1s and 0s) to represent and process information. In financial economics "electronic" payments are understood as transfers of financial values over the Internet while "digital" payments are defined as a type of electronic payments that do not use any physical element and are thus conducted entirely through virtual means. Under such definitions, DC and CC payments classify as electronic payments while mobile banking transactions are both electronic and digital as are mobile (phone or tablet based) payments (such as CoDi—the most digitalized official form of payment in Mexico). Given that the distinction between "electronic" and "digital" payments in household finance research is blurry, the two tend to be used interchangeably and are often treated as representing any type of payment not made in cash. As explained in the literature review (section 4.2) economic psychology and BE theory suggest that the effects of both electronic payments (i.e. cards) and of digital payments (mobile banking and transfers through apps in tablets and mobile-phones) have similar cognitive effects—with those of the most virtual (non-physical) form of payments conjectured as being more pronounced. The latter is reflected by the similarity of the hypothesized impact of the explanatory variables of Model I on the use of cards versus digital payments stipulated in Table 4.2 (subsection 4.5.1.3)—all expected to hold across transaction types.

In alignment with the very similar presumed effects of the model's controls on the use of the two non-cash payment forms, the findings from the multinomial logit analyses of the prior subsection (4.7.1.1) showed that the direction of influence of most of our model's sociodemographic, behavioural, and geographic (structural) variables on the use of card payments and of digital payments (through smartphones or apps) was largely the same and opposite to the controls' influence over cash payments. Moreover, as detailed above, regardless of the transaction type being evaluated and of the key explanatory variable analyzed, the size differences between the key controls' AMEs on the probability of using card payments versus on the probability of using digital payments were consistently smaller than the size differences between the controls' influence on the use of cash versus card payments. This also suggested a degree of similarity between card and digital payments as well as some correspondence in the results obtained across the four types of transactions considered.

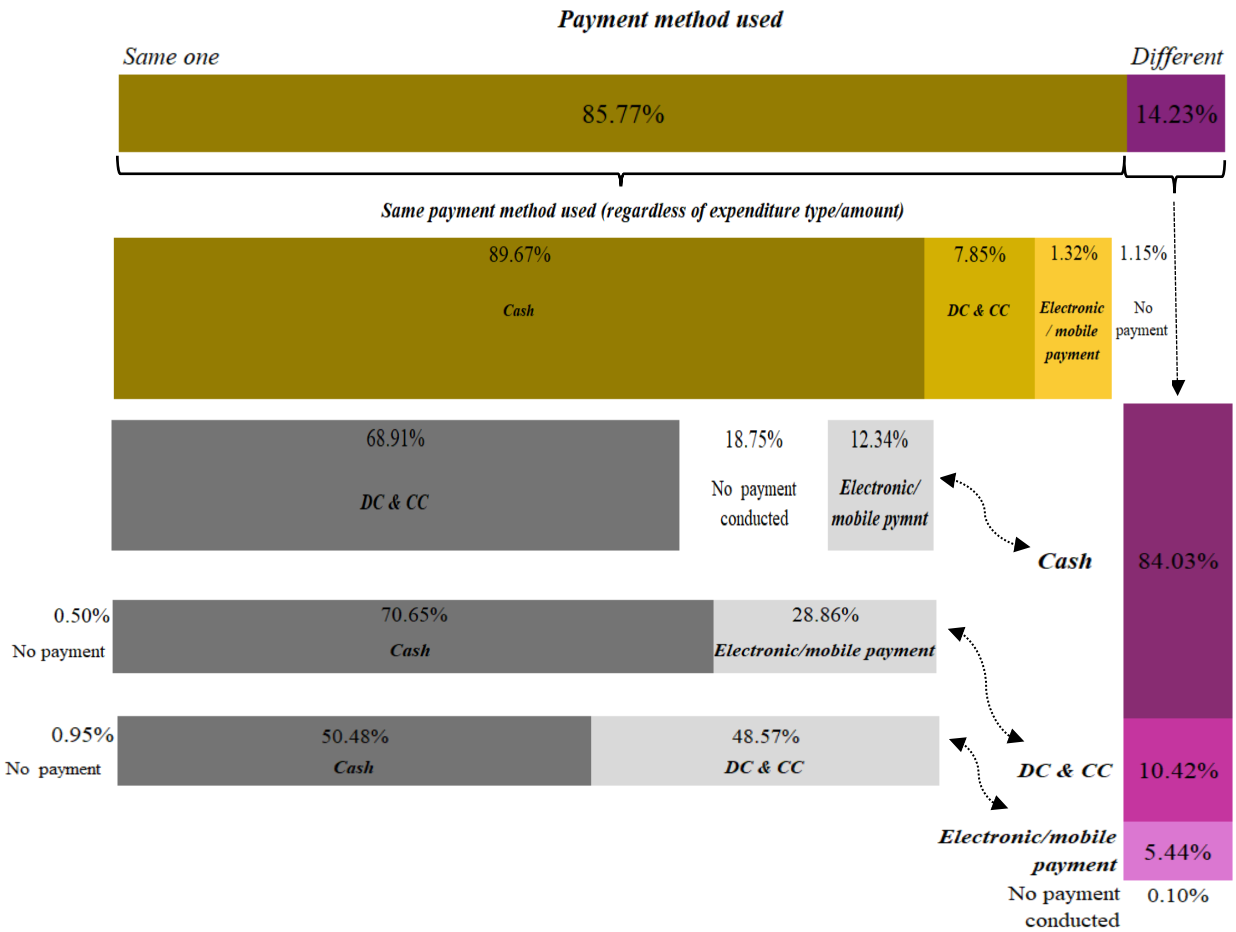
The multinomial logit specification used in the prior analyses differentiated between cards and digital payments (comprising both completely virtual electronic transfers and payments through smart-devices' apps) and separated the evaluation of payments' usage per transaction type in order to test the implications of both mental accounting and of pain of paying theories (including related concepts such as transparency, concurrency, saliency, and coupling) in Mexico where the empirical literature on these concepts is very scarce. To recall, mental accounting posits that people group their desired expenditures into specific categories (or accounts) basing such classification of transactions on factors such as: the purpose of the acquired goods or services, their monetary value (small vs large purchases), the relation between their (perceived) intrinsic value to their price (acquisition utility) and with the quality of the deal and place of acquisition. Pain of paying theory in turn describes the cognitive-psychological effects of payments that stem from specific features of the payments' form (i.e. physicality, transparency, concurrency, saliency, and coupling) and implies that the total utility derived by people from any given transaction would also depend on the type of payment method used (after the net effects of its form are accounted for). From insights of the two theories, the prior analyses (subsection 4.7.1.1) also reflected the assumption that, if consumers have a diversity of payment methods to choose from (i.e. have some access to various payment instruments), they might use different forms of payment according to the specific transaction being conducted, which in turn could be heterogeneously determined by several sociodemographic, psychological, and structural controls.

Given the similarity of the results presented in subsection 4.7.1.1 and the hazy definitional distinction between electronic and digital payments amongst users, researchers and practitioners, this section presents a series of robustness checks that will help to evaluate the stability of the results obtained from the multinomial logit regressions of the prior subsection whilst using more consolidated outcome variables. Specifically, our robustness checks replicate the prior analyses using variables that combine card payments with digital transfer payments and consolidate transaction types into only two categories—small payments ($\leq 500_{\text{MXN}}$) and large payments ($> 500_{\text{MXN}}$)—that respond solely to value characteristics instead of other attributes such as the purpose of payment. By design, ENIF data does not allow the amalgamation of all transaction types into a single indicator because: (1) the survey contains two sets of variables about purchases: one that consider purchases either by value ($\leq 500_{\text{MXN}}$ or $> 500_{\text{MXN}}$) and the other by motive of purchase (four different transaction-types), (2) all such ENIF purchasing variables are nominal indicators whose categories stand for the method of payment used per transaction, (3) some people use a different form of payment for each type of transaction hindering the consolidation of payment methods used for a portion of respondents.

Considering the above, our first robustness check is to evaluate the influence of the controls in Model I on the use of cash versus non-cash payments when conducting either small-value ($\leq 500_{\text{MXN}}$) or large-value ($> 500_{\text{MXN}}$) purchases. To justify the evaluation of the two transaction-types separately, Figure 4.7 disaggregates the distribution of the payment form used amongst ENIF2021 respondents when conducting small-value or large-value purchases (see appendix Figure 4.A.7 for corresponding counts). The top panel distinguishes the proportion of respondents that used the same form of payment regardless of the monetary value of the transaction (representing either those who did not support the deduction that people might choose to pay with different instruments according to the type of transaction or those who had access to only one payment form [cash]) from those that employed a different method of payment depending on whether the expense was larger than 500_{MXN} or at most 500_{MXN}.[345] Note that beyond constituting a data constraint, in Mexico's context, the consolidation of purchases into the latter two value categories allows us to understand whether Mexicans use different payment methods when purchasing necessities and common-basket goods ($\leq 500_{\text{MXN}}$) than when acquiring non-essentials and/or luxuries ($> 500_{\text{MXN}}$). The middle (golden-ochre) panel further disaggregates the 85.77% share of people paying with the same instrument when conducting small or large value purchases according to the specific payment method used in both cases.

[345] Chi-squared test results obtained from the contingency tables evaluating association between the payment method used for small-value purchases versus large ones were highly significant ($\alpha = 0.001$), providing evidence that the observed relationship between the use of payment forms across the two transactions was not simply by error or chance.

Figure 4.7:



*All proportions derived from cross-tabulations (contingency tables) revealing highly significant associations (p<0.001) as per Chi-squared test results.

The lower (purple-magenta) vertical panel in Figure 4.7 breaks down the 14.23% of respondents that used a different payment method for large value purchases than for small value ones by showing the distribution of the payment methods used when making small payments ($\leq 500_{MXN}$) but not for large ones. Finally, the left-bottom (grey) panels show the distribution of the alternative payment form used for large value purchases when: (1) 84.03% of those using different payment methods according to the value of transactions used cash for small purchases but not for large ones (upper grey panel), (2) 10.42% used either DC or CC for small value purchases but not for large value ones (middle grey panel) and (3) 5.44% used digital or virtual electronic transfer for purchases $\leq 500_{MXN}$ but not for those $> 500_{MXN}$ (lower grey panel). The shares with "no payment" do not represent people with outstanding debts (or accounts payable) rather, they represent the proportion of respondents claiming to not have incurred the given type of transaction in the months leading up to the survey.

Consolidating card payments with digital payments into a single non-cash payments category, Table 4.19 compares the results of logit regressions evaluating the influence of Model I sociodemographic, behavioural, and geographic (structural) variables on the use of payments when conducting either small or large value purchases (columns a and b) against the hypothesised effects (column c) stipulated in Table 4.2 (subsection 4.5.1.3). As in Tables 4.17b and 4.18b, coloured cells represent all the variables for which the findings supported (with different significance levels) hypothesised effects while uncoloured cells represent variables for which: results did not support the hypothesised effects (despite being significant), results were in the hypothesised direction of influence but lacked significance, or the results of variables whose effects were hypothesised as ambiguous. As per Table 4.19, most of the hypothesised effects of variables in Model I were supported by the results obtained for both small and large value purchases with the results from purchases $> 500_{\text{MXN}}$ offering slightly stronger support (more variables confirmed hypotheses and with high significance). Importantly, variables that the logit regression results of Table 4.19 highlight as the most statistically significant and substantively relevant determinants of the use of non-cash payment methods in both small value and large value transactions were precisely the same variables signalled as pertinent throughout the multinomial logit analyses of the prior subsection (4.7.1.1), including: urbanization, (higher levels of) education, standard of living, financial knowledge, financial attitudes, SFWB and mistrust towards FIs.

Table 4.19: AME of Logit Regressions (Small value & Large value purchases)

Transaction Types	*Observed Predicted Probabilities of Using Non-cash Payment Forms* (a) $\hat{\beta}_{AME}$	 (b) Standard error	*Hypothesised Effects* (c)
Small Purchases (≤ 500)	**N = 13, 418**	$\boldsymbol{R^2} = \mathbf{0.2090}$	
Age	0.007***	(0.002)	ambiguous
Gender	0.010	(0.006)	ambiguous
In couple	-0.004	(0.005)	ambiguous
Urban	0.047***	(0.007)	> 0
Region	0.009	(0.005)	> 0
ATMs in state (avg last yr)	-0.009**	(0.003)	ambiguous
Standard of Living Index	0.002***	(0.000)	> 0
Elementary	0.017	(0.010)	> 0
Jr. High	0.047***	(0.010)	> 0
High School	0.078***	(0.011)	> 0
University	0.154***	(0.012)	> 0
Worked last month	0.007	(0.009)	> 0
Earnings (fixed vs variable)	0.020**	(0.006)	> 0
Monthly earnings	0.009***	(0.001)	> 0
Receives remittances	0.008	(0.007)	ambiguous
Financial knowledge score	0.006**	(0.002)	> 0
Financial Attitudes score	0.007***	(0.002)	> 0
Subjective Fin WB score	0.012***	(0.002)	ambiguous
Mistrust in FIs (DC&CC)	-0.080***	(0.012)	< 0
Fraud experience	0.025***	(0.003)	< 0
Banking corresp. Use	0.013*	(0.005)	ambiguous
Informal savings use	0.009***	(0.003)	< 0
Informal credits use	-0.008*	(0.004)	< 0

***
**
*

Large Purchases (> 500)	N = 13, 114	R^2 = 0.2869		
Age	0.010***	(0.003)	ambiguous	***
Gender	0.004	(0.006)	ambiguous	**
In couple	0.007	(0.007)	ambiguous	*
Urban	0.052***	(0.008)	> 0	
Region	0.007	(0.006)	> 0	
ATMs in state (avg last yr)	0.007	(0.004)	ambiguous	
Standard of Living Index	0.003***	(0.000)	> 0	
Elementary	0.030*	(0.013)	> 0	
Jr. High	0.076***	(0.014)	> 0	
High School	0.164***	(0.013)	> 0	
University	0.291***	(0.016)	> 0	
Worked last month	0.029**	(0.010)	> 0	
Earnings (fixed vs variable)	0.043***	(0.006)	> 0	
Monthly earnings	0.015***	(0.002)	> 0	
Receives remittances	0.002	(0.008)	ambiguous	
Financial knowledge score	0.016***	(0.003)	> 0	
Financial Attitudes score	0.014***	(0.002)	> 0	
Subjective Fin WB score	0.022***	(0.003)	ambiguous	
Mistrust in FIs (DC&CC)	-0.136***	(0.015)	< 0	
Fraud experience	0.037***	(0.006)	< 0	
Banking corresp. Use	0.025***	(0.006)	ambiguous	
Informal savings use	0.016***	(0.003)	< 0	
Informal credits use	-0.010*	(0.004)	< 0	

All quantities calculated over entire estimation sample using bootstrapped standard errors.
*** p<0.001, ** p<0.01, * p<0.05

In other words, we arrived at the same conclusions regarding which controls are key determinants of payments use per transaction type whilst using as outcome variables the two different sets of indicators with information on transactions (purchases) found on the ENIF. Additionally, there is correspondence between the two sets of classification of transactions we used as dependent variables since purchases in small shops are usually small value purchases (≤500MXN) while large value purchases (>500MXN) are more likely in large retailers and big shops. At the same time, payments related to public services in Mexico tend to be small value expenses whereas those of private services can be either small or large in value. Similarly public transportation payments tend to be small value expenses whereas those of private transportation tend to exceed £500MXN. Thus, the four transaction types analysed in subsection 4.7.1.1 are well covered by the small versus large value transactions' outcome indicators used in the first robustness check.

Our second robustness check involves re-assessing Model I with our initial set of four transaction types as dependent variables but consolidating card payments with digital payment (including virtual electronic transfers) options in those variables into a single "non-cash" payment category. To do so we evaluate Model I's empirical specification using logit regressions instead of multinomial logit ones because each of our four transaction outcome variables now have consolidated payments and thus only two categories: cash versus non-cash payment forms. Results are presented in appendix Tables 4.A.14 and 4.A.15 and corroborate our prior subsection findings—that the most statistically significant and greater size effects are observed for urbanity, standard of living, education, financial knowledge, financial attitudes, SFWB and mistrust in FIs. Moreover, the AMEs of these variables once again supported the hypothesised effects of such controls.

Finally, as per both of our robustness checks (i.e. as per Table 4.19 and appendix Tables 4.A.14 and 4.A.15) an extra value added of the consolidation of non-cash payment forms into a single payment form category was that it improved the statistical significance and support for the hypothesised effects of our earnings type indicator—suggesting that a decrease in the variability of income (represented through an increase in the earnings type indicator) can enhance the probability of using non-cash payment methods across a variety of purchases (especially those of larger value).

Overall, results from the first part of our empirical analyses (including those from Model I's the core specification [subsection 4.7.1.1] and robustness checks [logit regressions in subsection 4.7.1.2]) showed that the main determinants of the use of different payment methods in Mexico include factors such as: education level, standard of living (itself a proxy of socioeconomic status), residing in a urban locality, financial knowledge, SFWB, financial attitudes oriented towards the future (less present bias and impulsivity) and mistrust towards FIs. The hypothesised effects of these variables (see Table 4.2) were supported across most transaction types and the strongest size and most significant AMEs over the probability of using non-cash (especially card payments) were (as expected) obtained when evaluating either large value transactions or purchases in large retailers.

The findings also reiterated the expectation that our controls would have similar effects on the probability of use of cards versus of digital payments forms. The weaker significance observed from some of the results pertaining to the use of digital forms of payment (including virtual electronic transfers) does not render them inconsequential as the former is likely a product of the lower rate of adoption and prevalence of use of digital payments amongst the Mexican population, rather than an indication of them having indistinctive determinants or effects than other payment forms.

The fact that our results still reflect ample use of cash does not invalidate the relevance of evaluating the use of different methods of payment across diverse transaction types as, given the advances in fintech technologies, even unbanked populations may have access to digital payment forms provided by the shadow banking sector and non-financial institutions (including payment instruments from popular convenience stores like Oxxo, large discounters or telecommunication giants offering remittance services). As such, the findings obtained from evaluating our first research question (presented in this section, 4.7.1) provide preliminary insights of the sociodemographic, behavioural and structural factors that most determine the use of diverse payment methods amongst Mexicans across different transactions—which will become all the more relevant as the digitalisation of household finances continues and the levels of financial inclusion improve in Mexico.

4.7.2 Payment Methods Effects on Financial Behaviours

4.7.2.1 Unadjusted Results

This section assesses the effects of payment forms with different extents of digitalization (physicality) on an index of positive and resilient FBs (see section 4.5.2). Table 4.20 summarizes the 'raw' results obtained prior to applying Oster's (2019) bias-adjustment procedure (coefficients in the top panel and explained variation in the bottom one). Appendix Figure 4.A.8. presents the corresponding set of controlled-form unadjusted regression coefficient plots.

Column (a) lists the results from uncontrolled models (i.e., those obtained from simple regressions of the FBI on either DCs, CCs or MB). Column (b) presents the results from the three controlled-form regressions obtained after the observables set ($\boldsymbol{\omega^o}$) was included in each of the simple regressions. Regressions from columns (a) and (b) included *no other payment form* as control than the payment type indicated by the row, which is used as treatment (their beta coefficient and adjusted R-squared estimates[346] are given by $\widetilde{\beta_{NoP}}$ and R^2_{NoP}). Column (c) shows the results from a multiple regression that includes all non-cash payment forms simultaneously, in addition to the set of explanatory variables in the vector $\boldsymbol{\omega^o}$ (with corresponding estimates given by $\widetilde{\beta_{AP}}$ and $\widetilde{R^2_{AP}}$).

Table 4.20:

Results Comparison: Uncontrolled vs Controlled Models

Coefficients	(a) $\dot{\boldsymbol{\beta}}$	(b) $\widetilde{\boldsymbol{\beta_{NoP}}}$	(c) $\widetilde{\boldsymbol{\beta_{AP}}}$	(d) $\widetilde{\boldsymbol{\beta_{NoP}}} - \dot{\boldsymbol{\beta}}$	(e) $\widetilde{\boldsymbol{\beta_{AP}}} - \dot{\boldsymbol{\beta}}$	(f) $\widetilde{\boldsymbol{\beta_{NoP}}} - \widetilde{\boldsymbol{\beta_{AP}}}$
DC	1.179^{***}	0.682^{***}	0.448^{***}	-0.497	-0.731	0.234
CC	1.255^{***}	0.622^{***}	0.484^{***}	-0.634	-0.771	0.138
MB	1.661^{***}	0.853^{***}	0.525^{***}	-0.808	-1.136	0.328
Explained Variation	$\dot{\boldsymbol{R}}^2$	$\widetilde{\boldsymbol{R^2_{NoP}}}$	$\widetilde{\boldsymbol{R^2_{AP}}}$	$\widetilde{\boldsymbol{R^2_{NoP}}} - \dot{\boldsymbol{R}}^2$	$\widetilde{\boldsymbol{R^2_{AP}}} - \dot{\boldsymbol{R}}^2$	$\widetilde{\boldsymbol{R^2_{NoP}}} - \widetilde{\boldsymbol{R^2_{AP}}}$
DC	0.098	0.261	0.282	0.163	0.184	-0.021
CC	0.085	0.252	0.282	0.168	0.198	-0.030
MB	0.140	0.261	0.282	0.121	0.142	-0.021

Table 4.20 shows that the three payment methods are equally significant (at the 0.1% level) in the uncontrolled regressions as well as in (all) the controlled ones.[347] The effect sizes of payment forms

[346] We report adjusted R-squares (here and throughout the rest of the chapter) rather than normal R-squared estimates because the latter can go up due to redundant and collinear predictors that add no meaningful explanatory value whereas, by adjusting for the number of regressors, changes in adjusted R-squared values give more trustworthy information regarding the model's explanatory power (beyond what would be expected by chance).

[347] The 3 payment forms were as significant, regardless of whether the controlled regressions only included a single payment method or treatment (see the significance of each payment methods' $\widetilde{\beta_{NoP}}$ in column (b) where each one comes from a different multiple regression [as reflected by their changing $\widetilde{R^2_{NoP}}$ in column (h)]), or whether all payment forms were considered simultaneously in one multiple regression model (see significance of the $\widetilde{\beta_{AP}}$'s in column (c), with each payment's coefficient stemming from the same regression [as signalled by the common $\widetilde{R^2_{AP}}$ in column (i)]).

decrease once we include socioeconomic and geographic controls, with the percentage change decline in CC effect being the largest (see column 3 in appendix Table 4.A.16). The latter explains why, while in simple regressions the effect of CC on financial behaviour is 6% higher than that of DC, in controlled regressions DC and CC reveal very similar sized effects, suggesting that part of the initial (simple model) difference in their effect was due to demographic factors. Size differences between payment effects of uncontrolled and controlled models are even larger when the controlled model considered all payments simultaneously (implying an even greater percentage decline in coefficients' size after the addition of controls, see appendix Table 4.A.16). Conceptually, such difference[348] could represent the portion of the variation in FBs that is explained by a greater extent of financial inclusion (here defined as holding more methods of payment) than when people hold a single non-cash payment form.

The simple (uncontrolled) regression with MB as treatment has the largest effect on average FBs; this was maintained after controlling for sociodemographic characteristics since MB still had the largest effect size across all controlled models (see Table 4.20 columns [b] and [c]). Nonetheless, among the payment forms analysed, MB effect size declines the most when the impact of other non-cash payment methods on FBs are considered concomitantly, indicating that MB variation is more influenced by other payment forms than card payment forms are (see Table 4.20, column [f] and Table 4.A.16 column [5]).

Neither the uncontrolled ($\dot{\beta}$) nor the preliminary results of controlled regressions ($\tilde{\beta}$) support the hypotheses stipulated in Table 4.3, namely that payment forms less physical than cash would negatively affect the FBI. Nonetheless, the drop in the effect sizes on FBI observed between the payment-effects of uncontrolled (single-payment treatment) regressions and payment-effects from the controlled model including the three payment forms simultaneously aligns with the literature documenting that people leverage the use of different payment forms to increase consumption[349] so that the use of a payment form (such as MB) might be directly conditioned by the use of other payment forms (e.g. DC and CC) henceforth biasing the effect of any single payment instrument when the others are not controlled for (as the reduction in effect sizes in column (e) showed). Table 4.20 (unadjusted) results also aligned with our expectation that the effects of MB would be larger (more drastic) than those of card payments. Yet, absent support for the direction of impact of payment forms could be a by-product of selection bias in the specification.

Before examining bias, since the quality of payment effects cannot be determined through coefficient movements alone, we compare the latter to movements in the explanatory power of their respective

[348] Namely, the difference between the percentage change decline seen in payment effects when shifting from single variable specifications (where the unique variable is one payment form) to controlled models with the same single payment and a set of sociodemographic controls as well as the percentage change decline in payment effects between the single variable and controlled models of specifications including all payments simultaneously.

[349] See: Basnet and Donou-Adonsou (2016); Dahlberg et al. (2007), King and King (2005); Lee et al. (2007); Nicoletti (2014); Scholnick et al. (2008); and Shaikh and Karjaluoto (2015).

regression models. From Table 4.20 we see that the uncontrolled MB regression has the largest coefficient of determination of the three uncontrolled regressions. From controlled regressions, the multiple regression model that included all payment methods simultaneously has the highest (adjusted) R^2.[350] Among multiple regressions including only one payment method as treatment (in addition to the vector of observable controls $\boldsymbol{\omega^o}$) the model using MB as treatment explains just as much of the average variation in our FBI as does the model using DC as treatment and more than the variation explained by the model having CC as treatment.[351] Appendix Table 4.A.16 shows that the explanatory power (adjusted-$\widetilde{R^2}$) of the models using MB as key treatment increase the least as we add the set of observable controls $(\omega_1^o,\ \omega_2^o,\ \omega_3^o, \dots,\ \omega_k^o)$ to uncontrolled (single-variable) models. Together, the aforementioned preliminary results suggest that MB might be the payment form influencing FBs the most directly (by itself), or, conversely, the payment type most affected by bias from the unobservable factors set (W_2).[352]

Given the endogeneity of the raw results, we apply Oster (2019) bias-correction mechanism to minimize bias arising from omitted variables. As stipulated in subsection 4.5.3.2, we only apply Oster's bias-correction to specifications containing a single payment treatment because the method does not allow for the concurrent bias-adjustment of more than one endogenous treatment. Therefore, we leave the evaluation of synchronous effects of multiple payment forms on FBs as an area of further study.

4.7.2.2 Unobservables and Extent of Selection.

As explained in subsection 4.5.3.2, Oster's method is grounded on the specification of two key parameters: R_{max} (maximum amount of variation explained by the model inclusive of all related confounders) and δ (the value of proportional selection between unobservables and observables). The two in turn depend on the identification of the unobserved confounders of the model which in this study was largely informed by prior research in the psychology of payments and behavioural household finance.

Following Angrist and Pischke (2015) acknowledgement that thorough reasoning about OVB is essential to any analysis, we employ the pragmatic distinction between contingent and genuine unobservable confounders to elucidate what the set of unobservables (W_2) of our model[353] imply for the appropriate choice of δ and R_{max} in the application of Oster's bias-adjustments to specification (4.3). Cerulli (2015) denotes relevant controls excluded from the analysis as 'contingent unobservables' when

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[350] See Table 4.20, column (c) bottom panel. Since the controlled regression including all non-cash payment forms simultaneously is the same for the three payment forms, the three bottom rows in column (c) show the same value $\widetilde{R^2_{AP}} = 0.282$.

[351] See from appendix Table $4.A.16$, columns (2) bottom panel how: $\widetilde{R^2_{CC_{NoP}}} < \widetilde{R^2_{DC\ NoP}} = \widetilde{R^2_{MB_{NoP}}} < \widetilde{R^2_{AP}}$

[352] Variance inflation factor (VIF) analysis revealed that the MB controlled model had the same mean VIF as the DC controlled model (5.31) and was only slightly more than that of CCs (5.29). Therefore, we do not attribute the differences in the adjusted $\widetilde{R^2}$ of the three payment effects models to collinearity issues.

[353] To recall from subsection 4.5.3.2 the set W_2 includes: occupation (profession); assets ownership; actual value of financial outcomes (i.e., of expenditures, overdraft fees, debts, and savings); health status; number of dependents; years employed; cognitive abilities; preferences; RA; personality indicators; peer effects and belief system (i.e., religion or system of values).

their absence results from data limitations and calls 'genuine unobservables' those factors that are largely unmeasurable (i.e., impossible to measure objectively) even with abundant information. From our models' OVs, factors such as: occupation or profession, years of employment, number of dependents, health status, value of financial outcomes, other assets ownership, RA, cognitive ability, preferences, and internet use can be considered 'contingent' because, while measurable in practice, they are 'not observed' in our study because our dataset lacked information about them. Conversely, confounders such as religious beliefs or values, personality traits, and peer effects can be considered genuine unobservables as they are notoriously difficult to quantify in any meaningful and precise way, even with abundant data.

Based on the literature presented in Section 4.2, it is likely that most of the aforementioned contingent unobservables bare a positive relationship with each of the three non-cash payment methods used as treatment and with our outcome variable (FBI), which supports the persistent upward bias seen in the pre-Oster-controlled regression coefficients ($\tilde{\beta}$). While their inclusion would reduce selection bias, some contingent unobservables might be collinear with part of our pre-existing controls ($\boldsymbol{\omega^o}$). For example, there could be some correlation between occupation and monthly earnings; likewise, certain multicollinearity might be present between age, years of employment, health and number of dependents. Hence, while potentially improving the explanatory power and reliability of the model as a whole, including some of the contingent unobservables might also hamper the validity of results of individual controls and stun our capacity to determine which predictors are redundant with respect to others. Given this, as far as the subset of contingent confounders in W_2 is concerned, we assume the extent of their selection is not greater than that of the pre-included controls (justifying setting $0 < \delta \leq 1$ for the application of Oster's bias-adjustments) and expect their inclusion to explain the variance of FBs about twice as much what included controls do (hence, justifying setting $R_{max} = 2\tilde{R}$ as an intuitive and realistic upper bound for R_{max}]).

Lastly, we discuss the role of genuine unobservables (i.e. religious beliefs or values, peer effects, and personality traits) in the specification of Oster's parameters in our analysis. A body of research has shown that religion-based values influence: the use of financial instruments (such as credit), financial decision making and well-being through its effects on trust[354], risk perception[355], RA[356], attitudes and preferences (e.g. thriftiness, attitudes towards savings and debt; shame, guilt and regret avoidance)[357],

[354] For a non-comprehensive list see: Weber (1905); La Porta et al. (1997); Guiso et al. (2006); Arrunda (2010); Paciotti et al. (2011).
[355] Scherer and Cho (2003).
[356] Hilary and Hui (2009); Benjamin, Choi, and Fisher (2010); Kumar, Page, and Spalt (2011).
[357] Abdullah and Majid (2003); Guiso et al. (2003); Hess (2012); Renneboog and Spaenjers (2012); Sipon et al.(2014); Chen et al.(2016); Iftekhar et al. (2019)

psychological behaviours (e.g. self-control and accountability)[358] and pro-social behaviours (e.g. cooperation, altruism, responsible acts).[359] Despite existing census data on Mexicans' religious affiliation, de-facto, it cannot be considered a valid measure of people's actual moral guiding principles especially in light of high non-practising rates[360] thus we consider religious beliefs and values as genuine (rather than contingent) unobservables. Additionally, given the increasing rates of moral disengagement—whose research has shown that people tend to selectively disengage from their sense of moral accountability to avoid the negative affects arising from the cognitive dissonance between their actual behaviours and their professed standards or values[361]—the effects of religious beliefs and values would be less direct (and more partial) than those of observed (included) controls (and of the abovementioned contingent unobservables). Hence, the effect of religion-infused values and beliefs would be at most that of the included controls (and likely smaller).[362]

Prior research on peer effects suggests their effects are inconclusive. For example, Wydick et al. (2011) estimated endogenous effects of social networks in Guatemala and found that church networks displayed the strongest endogenous effects in credit access (whereas only mild endogenous peer effects appeared among neighbours). While Wydick et al. (2011) found social network effects on the adoption of microfinance, Banerjee et al. (2012) found that, conditioned on being informed, individuals' decision to participate in microfinance programs was not significantly affected by the participation of peers or acquaintances. As shown by the literature, including a broad measure of peer effects would yield at best an inconclusive impact on payments use and financial behaviours since peer effects are highly dependent on the *referent* peer-group chosen.

Studies using the 'Big Five' personality traits taxonomy[363] to analyse financial decisions have focused on the effects of personality on risk taking (and RA), overconfidence (and optimism), impulsiveness (vs. self-control), goal directedness and time preferences. Nicholson et al. (2005) found that risk taking is positively associated with extraversion and openness to experience and negatively associated with neuroticism, agreeableness, and conscientiousness. In a study about overconfidence (i.e., tendency to overestimate one's self-accuracy or to inflate the subjective probability of an outcome's occurrence) Schaefer et al. (2004) found that openness correlated with both confidence and accuracy while extroversion was associated with confidence and low accuracy (therefore with overconfidence).

[358] Sunstein (1996); Renneboog and Spaenjers (2012).
[359] Nofsinger (2005); Norenzayan and Shariff (2008); Al-Hajieh, Redhead, and Rodgers (2011); Paciotti et al. (2011).
[360] This alludes to the chasm between truly practising a given faith versus simply being categorised as part of a particular religious ideology by tradition and family inheritance.
[361] See: Alessandri et al. (2020) and Caprara et al. (2014).
[362] Therefore, justifying setting $0 < \delta \leq 1$ and $R_{max} \sim 2\tilde{R}$.
[363] Also known as the Five Factor model, has been the dominant paradigm in personality research since the 1980s. Its hierarchical structure of personality proposes five higher order factors each representing a summary of a sample of constituent traits that have been found to be genetically based (Yamagata et al. 2006) and which have been validated in cross-cultural research (McCrae et al., 2005).

Neuroticism, agreeableness, and conscientiousness were not found significantly related to confidence, accuracy, nor to overconfidence.
Given the heterogeneity of personality traits and the diverse associations that each one has with latent factors affecting financial products' use and financial decision making, their predictive force might be ambiguous and dependent on the specific distribution of personality types in our sample, making the indirect effects of personality traits on FBs and payments use genuinely unobservable. Additionally, personality traits act as mediators rather than as direct predictors, hence their influence is likely lower than that of observables.

Overall, guided by the literature on the potential effects of contingent and genuine unobservables in the model we assume that the inclusion of contingent omitted factors would help explain the variance of FBs just about two times as much as observables in the controlled model do and given the ambiguous and mediating influence of potential genuine unobservables we assume their contribution towards explaining the variance of FBs would be slightly lower hence substantiating the selection of $R_{max} = 2\tilde{R}$ as a plausible R_{max} value to estimate Oster-corrected payment effects. Additionally, the latter R_{max} bound was validated by Oster herself when applying her technique on non-randomized studies based on observational data like our study. Furthermore, given the nature of (both contingent and genuine) unobserved factors in the model, we conclude that while hidden bias remains important in our analysis, bounding Oster's bias-adjustment mechanism to $\delta = 0.5$ and $\delta = 1$ might yield the most accurate presentation of payment estimates effects.[364] We discuss implications regarding our W_2 set and its orthogonality with included controls in subsection 4.7.2.4, after presenting bias-adjusted results based on Oster (2019).

4.7.2.3 Oster Bias-Adjusted Results

Figure 4.8 contains three panels of coefficient plots representing the estimated impact of each non-cash payment instrument (when considered as single payment treatment) on the FBI. Each panel presents eight coefficients corresponding to the given payment's effects from: the simple (uncontrolled) regression (black diamond), the controlled unadjusted regression (grey diamond) and bias-correcting regressions under six different specifications of Oster's parameters (δ and R_{max}). Bias-adjusted payment-effects are distinguished through different shapes each representing the R_{max} value assumed in the estimation.[365] The extent of selection on unobservables relative to observables presumed followed the conclusions of the analysis of the likely effects of different types of unobservables in W_2 and is indicated through the size of the shapes (large: $\delta = 1$; small: $\delta = 0.5$).[366] All panels include a

[364] More generally, our Oster bias-adjusted results hold for $0.5 \leq \delta \leq 1$.
[365] Squares when $R_{max} = 1$,circles when $R_{max} = 1.3\tilde{R}$ and triangles when $R_{max} = 2\tilde{R}$.
[366] Bias-adjusted payment effects are also differentiated through colour hues. Each colour-pair (beyond black and grey) indicates a different R_{max} value while colour brightness indicates different δ values (brighter/vivid hues [yellow, magenta, sky-blue]: less selection on unobservables vs darker/more opaque hues [gold, lavender-purple, forest-green]: equal selection).

zero effect (red) line and a dashed grey line that represents the value of $\tilde{\beta}$, i.e. the effect from the controlled-form—unadjusted (biased) multiple regression—of each payment type. Therefore, each dashed line serves as a reference line against which all post-Oster-bias-correction payment effects can be compared. The larger the horizontal distances from the dashed reference line (i.e. the larger the difference $|\beta^* - \tilde{\beta}|$), the greater the adjustment. Estimate-numbers underlying the coefficient plots of Figure 4.8 are presented in appendix Table 4.A.18.

A couple of patterns (traceable to the definition of Oster's bias-correction estimator [Section 4.5.3]) emerge from Figure 4.8. Firstly, for all payment forms, the largest corrections (greater $|\beta^* - \tilde{\beta}|$) occur when we assume $R_{max} = 1$ (i.e., that variation in our outcome is fully explained) and the least when $R_{max} = 1.3\tilde{R}$, regardless of δ.[367] Additionally, holding constant the model's assumed coefficient of determination (R_{max}), the bias-correction is larger when we presume that selection on unobservables is just as important as that of observables (or even larger).[368]

As in Table 4.20, Figure 4.8 shows how, neither of the raw (unadjusted) controlled results (grey diamonds) support our hypotheses (as all were positive). However, all bias-adjusted coefficient estimates are (as expected) to the left of raw, unadjusted effects. Furthermore, all bias-adjusted payment effects to the left of the zero-reference (red) line in each panel indicate a negative effect of the given payment form on the average FBI score and therefore support our hypotheses (Table 4.3, subsection 4.5.2.3) across all non-cash payment methods. Estimates represented by squares give bias-adjusted effects (β^*) of a theoretical 'full' model (i.e. with $R_{max} = 1$) and their position in all panels indicates that, were it possible to include all the omitted variables set W_2 in our model, the estimated coefficients of non-cash payment forms would reveal the negative influence on FBs expected based on BE theories presented in Section 4.2.

While this confirmation of hypotheses might appear tautological it is worth noting that the $R_{max} = 1$ results hold regardless of the non-zero values of δ tried[369] and effectively suggest that on the hypothetical case that we could purge our payments' coefficients from the bias of *all* unobservable confounders in the model—so as to perfectly explain the variation in the FBI—the relationship between (less material than cash) payment forms and FBs would indeed be negative as suggested by the theories described in Section 4.2.

[367] Across all three panels, when $\delta = 1$, the largest distance from the dashed reference line representing each payment's unadjusted controlled effect is found with respect to the large golden squares representing Oster bias-adjusted regression coefficients obtained when assuming $R_{max} = 1$. Similarly, across all three panels, when $\delta = 0.5$, the largest distance from the dashed reference line representing each payment's unadjusted controlled effect is found with respect to the small yellow squares representing the coefficient of Oster bias-adjusted regressions that assumed $R_{max} = 1$.
[368] See from Tables 4.A.18 and 4.A.19 how the largest change in effects or adjustments (i.e., largest $|\beta^* - \tilde{\beta}|$) happen when $\delta = 1.5$
[369] That is, assuming there is some proportionality coefficient or ratio of selection of unobservables to observables. As per Oster's construction, the negative influence of non-cash payment methods on FBI would not presumably always hold under $R_{max} = 1$ if $\delta = 0$.

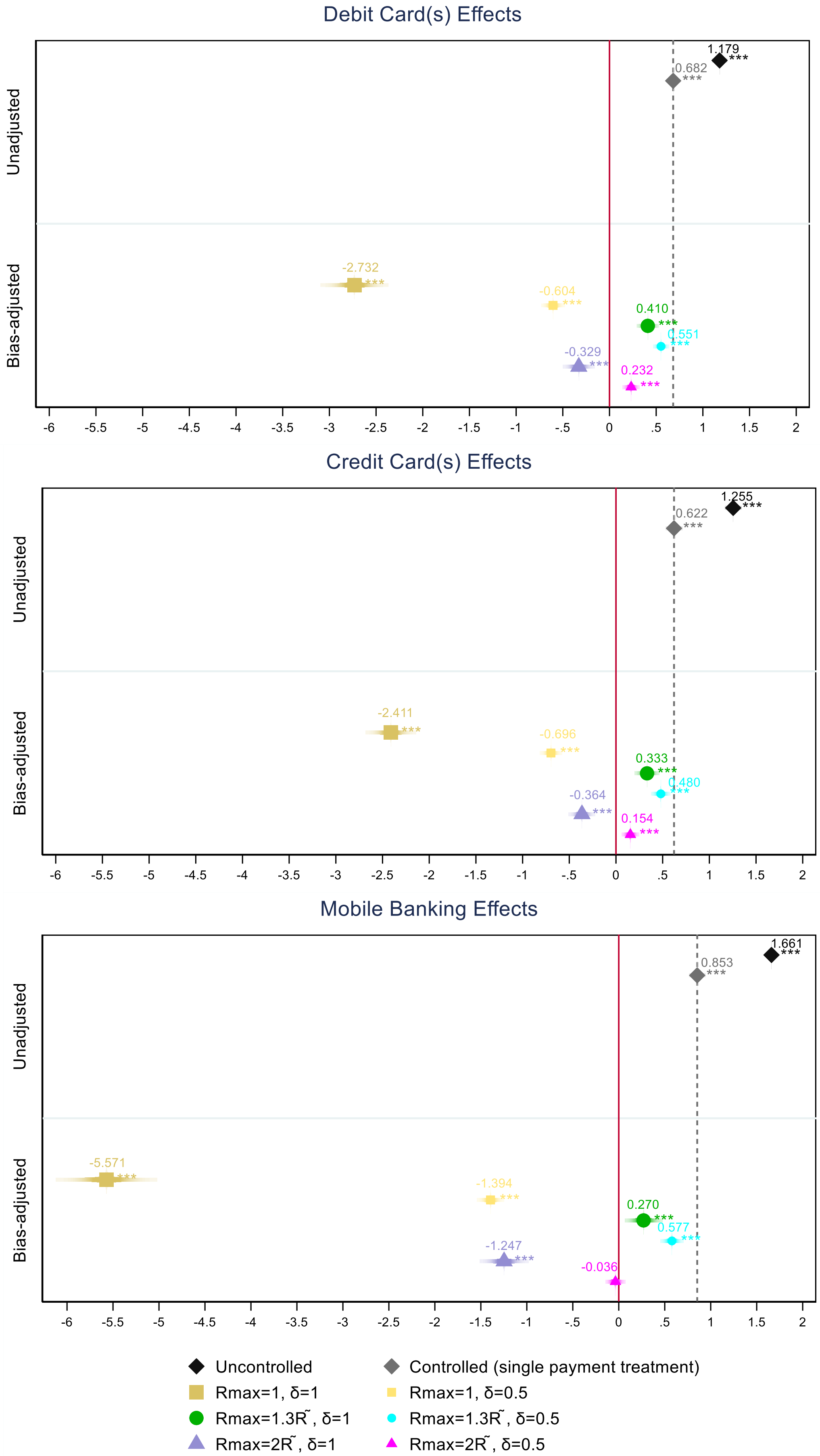
Given the highly unlikely possibility of attaining $R_{max} = 1$ in practice, following Oster, we include such specification to illustrate her methods' logic as well as to reveal conditions under which the theoretical expectations of payment effects would be validated empirically (which in this case would involve including all possible omitted confounders and granting some rate of selection of unobservables to observables).

Bias-adjusted estimates symbolized by large (lavender-purple) triangles also support the hypothesized effects across all payments. Such effects result from assuming $\delta = 1$ and that the bias[370] arising from the set of unobservables in our model is $\Pi = 2$ therefore making $R_{max} = 2\tilde{R}$. This R_{max} bound appeared appropriate to our specific analysis because, due to the amount of unobservables influencing payment forms' selection[371] and their likely effect on FBs (explained in subsection 4.7.2.2), it seemed sensible to assume that adding the missing (unobservable) controls would double the variance explained through observed controls. The $R_{max} = 2\tilde{R}$ bound also aligns with the maximum R_{max} value arrived at by Oster when validating her technique through its application on non-randomised studies that used observational data like this study.[372] Additionally, recent survey-based empirical microeconomics studies using Oster have employed a similar R_{max} bound, for example Bryan et al. (2022) use $R_{max} = 2.2\tilde{R}$.

As expected, assuming that selection on unobservables equals that on observables (i.e., $\delta = 1$) when $R_{max} = 2\tilde{R}$ implies a larger correction of the controlled model estimates ($\tilde{\beta}$) than when assuming less selection on unobservables relative to observables (i.e., than when $\delta = 0.5$). Hence, from Figure 4.8 we see that the bias-correction specification based on $R_{max} = 2\tilde{R}$ and $\delta = 1$ yields corrected effects (β^*) in accordance with theoretical expectations and with our model hypotheses across the three payment forms.[373] However, not all the adjusted payment effects from conditions $R_{max} = 2\tilde{R}$ and $\delta = 0.5$ support our hypotheses. This is evidenced by the position of DC and CC adjusted effects (small magenta triangles) to the right of the zero-effect line when $R_{max} = 2\tilde{R}$ and $\delta = 0.5$.[374] Nonetheless, the hypothesized negative impact of MB on the FBI score remains supported by its bias-adjusted effects under $R_{max} = 2\tilde{R}$ and $\delta = 0.5$ (just as when $R_{max} = 2\tilde{R}$ and $\delta = 1$).

[370] Represented by Π (see Section 4.5.3 for more details).
[371] As stated in Section 4.5.3, unobservables include factors like: occupation or profession, years of employment, number of dependents, health status, religious beliefs or values, other assets ownership, RA, character traits or personality type, internet use, preferences, cognitive ability, and peer- effects.
[372] Almost a third of the results from nonrandomized studies used by Oster to determine a realistic bound for $R_{max} = \Pi\tilde{R}$, survived the robustness criteria setting $\Pi = 2$.
[373] See the (purple) significant negative effects represented with large triangles to the left of the zero-effect line of each payment form in Figure 4.8 when $R_{max} = 2\tilde{R}$ and $\delta = 1$.
[374] While there clearly were some bias-correction effects for DC and CC (as evidenced by the reduction in the upward bias [horizontal distance between the unadjusted controlled reference line estimates and the post-Oster correction estimated under $R_{max} = 2\tilde{R}$ and $\delta = 0.5$]) the correction was not enough to recover $\beta^* < 0$ for card payments when selection on unobservables is assumed to be half as important that on observables.

Figure 4.8: Payment Effects Coefficient Plots (Single Payment Form Specifications)



The last R_{max} value considered for the Oster-adjustments in Figure 4.8 assumed that the unobservables in the model (W_2) introduced a 1.3 bias making $R_{max} = 1.3\tilde{R}$. Oster (2019) determined $1.3\tilde{R}$ as a realistic bound for R_{max} when applying her estimator to empirical studies based on randomized control trials.
Having already explored Oster-bias-adjustments under the idealised condition that assumes the inclusion of all pertinent confounders to perfectly explain variation in the FBI (i.e. with $R_{max} = 1$) and having also determined $R_{max} = 2\tilde{R}$ as a literature informed, intuitively realistic and empirically valid R_{max} value for Oster-bias corrections in our model (see subsection 4.7.2.2), we perform Oster-adjustments under $R_{max} = 1.3\tilde{R}$ to better determine the likely lower-bound of a realistic range of explained FBI variation needed in the model to help purge our payments' coefficients from the bias.
In Figure 4.8, bias-adjusted estimates denoted by circles assume that the maximum amount of variation in FBI scores explained by a model including OV would be $R_{max} = 1.3\tilde{R}$. Since $1.3\tilde{R} < 2\tilde{R} < 1$ (see Table 4.A.17 for details on the exact R_{max} values for each payment treatment regression), Figure 4.8 shows that when the bias assumed to arise from OVs is only $\Pi = 1.3$ we are further from restoring the condition of randomization in payment forms' treatment effects than in the other R_{max} cases considered. Particularly, Figure 4.8, reveals that, regardless of the degree of selection of unobservables to observables, under $R_{max} = 1.3\tilde{R}$ neither of the payments' effects support our research hypotheses.

Given that our study is based on reported (observational) data—which, by definition is more likely than randomised data to present unbalanced information about (both observed and unobserved) characteristics between respondents holding and not holding the given payment instruments[375]—selecting a higher R_{max} bound than the one obtained by Oster when validating her bias-adjustment mechanism using randomized results (i.e. $R_{max} > 1.3\tilde{R}$) is adequate for our analysis. Moreover, in the context of this study, setting R_{max} greater than $1.3\tilde{R}$ is also more reasonable to allow for the possibility of idiosyncratic measurement error in the factors making up the FBI.
From the above we can conclude that $R_{max} = 2\tilde{R}$—amounting to approximately 0.5 of explained FBI variation (see column (c) of Table 4.A.17)—is likely a lower bound of the realistic range of R_{max} values suitable for this study, with the latter interval expressed as: $2\tilde{R} \leq R_{max} < 1$.
Similarly, as explained in subsection 4.7.2.2, using $\delta = 0.5$ and $\delta = 1$ as lower and upper limit values for δ in our Oster corrections was informed and empirically validated by the literature and is intuitively realistic given the collinearity, indirect, attenuated and ambiguous effects that some of the model's unobservables potentially have.

To better understand the different sensitivity of payment methods to the degree of selection on unobservables compared to that of observables, we first examine the precise values taken by R_{max} in our bias-correction specifications. Column (c) in appendix Table 4.A.17. shows that the amount of

[375] With respondents holding the payment form considered as 'treatment group' whereas non-holders viewed as 'control group'.

variation in the FBI presumably explained by each payment form's bias-adjusted model was fairly similar, with models DC and MB having $R_{max} = 0.522$ while CC's $R_{max} = 0.504$. From Figure 4.8 and appendix Table 4.A.19 we also know that, across all Oster bias-correction specifications, the largest percentage changes in payment effects were obtained for MB (when $\delta = 0.5$ or $\delta = 1$, regardless of R_{max}) while post-Oster-bias-corrections percentage changes on DC and CC effects were of similar magnitude (differing by at most 25 percentage points and always below the amount of change seen for MB, especially when $\delta \neq 1.5$).

Overall, Figure 4.8 results suggest that when we can at most explain half of the variation in FBs through our model (i.e. when $R_{max} = 2\tilde{R}$), and assuming there is less than proportional selection on unobservables relative to observables (i.e. with $\delta = 0.5$), sample selection in terms of DC and CC holding is still strong enough to deviate their effect from the theoretical expectations derived from BE (Table 4.3). Moreover, $R_{max} = 2\tilde{R}$ results with different δ values suggest that the influence of unobservable factors driving sample selection of DC and CC holding is more than half that of selection on observables.

The same is not true for MB for which the sample selection initially deviating MB effects from BE-based theoretical expectations is reduced significantly even under $\delta = 0.5$. Even though conditions of randomization (i.e. 'bias correction') seem to be more sufficiently restored for MB than for card payment forms with less than equal selection on unobservables than on observables, this does not entail that selection on unobservables is generally less important than that of observables for MB effects than it is for card payments. Indeed, the size difference of the bias-corrections achieved (represented by the horizontal distance between same-shape bias-adjusted estimates in Figure 4.8)[376] when assuming equal selection ($\delta = 1$) and when assuming $\delta = 0.5$ are larger for MB than for DC and CC regardless of R_{max}.[377] The latter difference in the size of adjustment aligns with hypothesised effects since the behavioural effects illustrated in Figure 4.1 and Table 4.3 are expected to be more pronounced (of greater magnitude) for the most digital or least physical payment forms (in this study epitomised by MB).

Having addressed the validity of assuming $\delta = 0.5$ and $\delta = 1$, acknowledged $R_{max} = 1$ as an idealised—theoretical value of R_{max}—and having determined the inadequacy of $R_{max} = 1.3\tilde{R}$ for our study, we can focus on bias-adjusted estimates resulting from $R_{max} = 2\tilde{R}$ and $\delta = 1$ or $\delta = 0.5$ to

[376] The size of the difference between the bias-corrections achieved with each pair of parameters (δ, R_{max}) is also evident from appendix Table 4.A.18.

[377] That is, regardless of how much variation in FBI is presumed to be explained by adding the set of unobservables (W_2) in the bias-adjusted model, the difference between the size of the adjustment achieved with $\delta = 1$ and that achieved with $\delta = 0.5$ is the largest for mobile banking payments. For example, from the information in Table 4.A.18 it can be shown that whereas the difference in the size of the adjustment $|\beta^*_{\delta=1} - \tilde{\beta}|$—$|\beta^*_{\delta=0.5} - \tilde{\beta}|$ was 0.6 for DC and 0.5 for CC it was 1.2 for MB.

discuss the valuable implications of applying Oster's method to improve our understanding of the effects of payment forms on FBs in Mexico.

Table 4.21 summarises the main results of the analysis against the chapter's hypotheses (per Figure 4.1 and Table 4.3). As noted on subsection 4.7.2.1, column (c) reflects that while pre-Oster results supported the hypothesis that the effects of MB would be more pronounced or intense than those of card payments and suggested that some people do leverage their use non-cash payments across each other, none of the pre-Oster estimates corroborated our initial conjecture regarding the direction of payment effects due to the selection bias introduced by the model's OV. After determining the extent of proportionality of the selection of unobservables to included variables in the model and their likely contribution to explaining the variance of FBI, Oster's bias-adjusting procedure allowed us to correct part of the model's endogeneity.

Table 4.21 columns (d) and (e) give the main post-Oster bias-adjusted estimates which provide evidence supporting the negative influence that payment forms less physical than cash (especially MB) were hypothesised to have on FBI. Such findings are especially valuable given the nature of several OV in the model (e.g. occupation, employment years, number of dependents, health status, value of financial outcomes, assets ownership, RA, cognitive ability, risk preferences, and internet use) as their contingency implies that performing our model's analysis on richer datasets accounting for such factors could minimise the bias and potentially render the hypothesised results without much post-estimation bias-adjustments. Given that the analysis of payment effects on FBI in Mexico and LMICs is recent and relatively untapped, the Oster analysis in this section contributes to the literature by at least suggesting the conditions under which the psychological and cognitive implications of the use of more digital (less material) payment forms could be found to induce negative effects on FBs through the mechanisms described by Figure 4.1, hopefully motivating more research on the topic henceforth as more complete data becomes available.

Table 4.21: Results Summary

(a) *Main regressors*	(b) *Hypothesized impact*	*Observed impact.*		
		(c) *Unadjusted impact*	(d) $\boldsymbol{R_{max} = 2\tilde{R};\ \delta = 1}$	(e) $\boldsymbol{R_{max} = 2\tilde{R};\ \delta = 0.5}$
β_{DC}	$\beta_j < 0$ With j: $1 - DC, 2 - CC, 3 - MB$ $\beta_{MB} < \beta_{CC} < \beta_{DC} < 0$	$\beta_{DC} > 0$	$\beta_{DC} < 0$	$\beta_{DC} > 0$
β_{CC}		$\beta_{CC} > 0$	$\beta_{CC} < 0$	$\beta_{CC} > 0$
β_{MB}		$\beta_{MB} > 0$	$\beta_{MB} < 0$	$\beta_{MB} < 0$

* Bias-adjusted Oster results supporting hypothesized payment effects in colored cells.

4.7.2.4 Discussion and Endogenous Controls

Despite the usefulness of Oster's method, recent methodological literature (see Diegert et al. [2022]) highlights its underlying assumption of exogenous controls[378] as a drawback. The latter not only assumes that pertinent OV are uncorrelated with all included observables but that the treatment variable is uncorrelated with OV after conditioning for the observable controls included in the analysis. While not uncommonly used, the exogenous controls assumption is controversial since it is considered too strong, implausible, and non-refutable based on data alone.

In line with the large literature on endogenous controls[379] and given the nature of unobservable covariates (see subsection 4.7.2.2) potentially influencing the effects of payment forms on FBs, exogeneity of controls is not likely to hold in our estimations.

While Oster (2019, p. 192) claims her method can accommodate non-orthogonality of observables and unobservables (W_2) by redefining W_2[380] such that "the results still hold under some δ value", Diegert et al. (2022) argue that the residualization approach to relaxing the exogenous controls assumption employed by Oster is incomplete since residualization does not only entail redefining W_2 (as in Oster) but also the redefinition of the observables set ($\boldsymbol{\omega^o}$) relative to which selection is compared. Moreover, Diegert et al. (2022) argue that such redefinitions change the scale and interpretation of Oster's δ hampering its usefulness.[381] Acknowledging that OV do not necessarily have an explanatory power akin to all observables, Diegert et al. (2022) favour calibrating selection on unobservables against the set of included variables that are most important for treatment selection (denoting the latter 'calibration' observables [W_1] and the remaining included controls [W_o]).[382]

Given the above, we consider bias-corrected effects while relaxing the exogenous controls assumption based on Diegert et al. (2022) who, building on Oster, develop an alternative technique to assess the magnitude of OVB (and therefore adjust for it) that allows for endogeneity of controls based on the parameter: $\bar{r}_x = \frac{\pi_2 \sigma_2}{\pi_1 \sigma_1}$ where for $i \in \{1,2\}$, $\sigma_i = \sqrt{var\,(W_i)}$ and π_i denote the coefficients in the selection equation of the treatment regressed on (calibrating) observables (W_1) and unobservables (W_2).

[378] Oster (2019, p.192) presents the condition as "orthogonality of W_1 and W_2" (also assumed in AET analyses).

[379] See Barnow, Cain, and Goldberger (1980), Masten and Poirier (2018), Diegert et al. (2022).

[380] Through its residual from a projection of W_2 on the observables. See Oster (2019) appendix A.1 and Diegert et al. (2022) appendices 4.A.1and 4.A.2 for further detail.

[381] Moreover, the changes hamper the plausibility of using it as a threshold of robust or not robust results (see Diegert et al. [2022]). Additionally, once the corrected redefinitions are accounted for, the revised δ does not simply compare the magnitude of selection on unobservables relative to observables but also requires an implicit judgment about the endogeneity of control variables.

[382] That is, Diegert et al. (2022) divide Oster's set of observables $\boldsymbol{\omega^o}$into calibrating observables W_1 and simple controls W_0 that, while observable and included, are not necessarily useful to gauge the ratio of hidden (unobservables) to overt (observable) bias. Diegert et al. (2022) also recognise that the choice of observables against which to calibrate W_2 changes the scale and interpretation of Oster's δ.

The measure for (included) controls endogeneity in Diegert et al. (2022) is derived through a constraint on $cov(W_1, W_2)$ identified as $\bar{c} \geq R_{W_2 \sim W_1 \circ W_0}$ where $R^2_{W_2 \sim W_1}$ is the population R^2 of the linear regression of W_2 on W_1. As a bound, $\bar{c}$ examines the correlation structure of observed covariates and is calibrated by computing $c_k = R_{W_{1k} \sim W_{1,-k} \circ W_0}$ where each c_k represents the square root of the $R^{2\prime}s$ from regressing each element in W_1 on the remaining calibrating covariates ($W_{1,-k}$) after partialling out W_0 (i.e. the non-calibrating controls).

For the purposes of our analysis, we are mainly interested in estimating the amount of selection on unobservables relative to observables that overturns payment effect results in controlled models ($\tilde{\beta} > 0$) while allowing for endogenous controls (i.e., the breakdown point, $\bar{r}_x^{BP}$) approximated in Diegert et al. (2022)[383] through:

$$\bar{r}_x^{BP} = \left[\frac{R^2_{Y \sim X \circ W_1}}{\frac{R^2_{X \sim W_1}}{1 - R^2_{X \sim W_1}} + R^2_{Y \sim X \circ W_1}} \right]^{1/2} . \tag{4.13}$$

From (4.13) it is clear that Diegert et al. (2022) express breakdown points ($\bar{r}_x^{BP}$) as depending on the relationship between treatment (x) and outcome (Y) (after adjusting for [calibration] observables [W_1]) as well as on the relationship between treatment and observables. Like Oster (2019), Diegert et al. (2022) provide an accompanying Stata command ($regsensitivity$) based on their methodology which we use to compute the breakdown points for payment effects on FBs. The $regsensitivity$ command provides results under the null hypothesis of non-negative β^*.[384]

As the maximum amount of hidden bias relative to overt bias permitted before $\beta^* > 0$ is overturned, breakdown point estimates of payment effects will help to elucidate conditions regarding selection on unobservables under endogenous controls for which the theoretical expectation of $\beta^* < 0$ would be supported.

Table 4.22 presents the results. The first panel gives breakdown points ($\bar{r}_X^{BP}$) computed using all observable controls in $\boldsymbol{\omega^o}$ for calibrations against selection on unobservables (like in Oster) whereas the second panel presents breakdown points estimated using a more limited set of observables in the comparison group for calibration (W_1); namely: age, gender, marital status, education, worked last month, monthly earnings, earning type, remittances, standard of living, fraud experience and financial

[383] Diegert et al. (2022) also identify $\left[\underline{B^*}(\bar{r}_x, \bar{c}\,), \overline{B^*}(\bar{r}_x, \bar{c}) \right]$ as an interval for bias-adjusted treatment effects, where: $\underline{B^*}(\bar{r}_x) = \tilde{\beta} - dev(\bar{r}_x, \bar{c})$ and $\overline{B^*}(\bar{r}_x) = \tilde{\beta} + dev(\bar{r}_x, \bar{c})$.

[384] Conceptually, Oster's β^* corresponds to β_{long} in Diegert et al. (2022). We maintain Oster's nomenclature to facilitate comparisons between the two models. The $regsensitivity$ command can handle hypotheses of the form, $\beta^* \gtrless$ b for any value of b. The default hypothesis is that sign (β^*) = sign ($\tilde{\beta}$), where $\tilde{\beta}$ is the coefficient of each payment treatment on the controlled form regression that has not yet been corrected for OVB. In our study $\tilde{\beta}$ > 0 for all payment forms, therefore, $regsensitivity$ tests the hypothesis β^* > 0 on each payment type bias correcting regression.

knowledge.[385] Following Diegert et al. (2022) our selection of W_1 is based on their relevance for treatment selection, their explanatory significance in controlled regressions and in treatment regressions on observables.

As expected, first panel breakdown points are smaller than second panel ones because the explanatory power of the observables used to calibrate selection against W_2 in the first panel is larger than in the second. Since all $\bar{r}_X^{BP} < 1$, Table 4.22 reveals that with endogenous controls, the hypothesised negative influence of non-material forms of payment on FBs is restored with smaller selection on unobservables than on observables across all payment forms considered.

Table 4.22:

Sensitivity Analysis

Breakdown Point	**Payment Form Effect**		
	DC	**CC**	**MB**
Endogenous Controls: Calibration with all Observables			
Diegert et al. (2022) $\bar{r}_X^{BP}$; $(\bar{c})$	$\bar{r}_X^{BP} = 0.364$ $\bar{c} = 4$	$\bar{r}_X^{BP} = 0.366$ $\bar{c} = 4$	$\bar{r}_X^{BP} = 0.285$ $\bar{c} = 3$
Endogenous Controls: Calibration uniquely with W_1 **.**			
Diegert et al .(2022) $\bar{r}_X^{BP}$; $(\bar{c})$	$\bar{r}_X^{BP} = 0.409$ $\bar{c} = 4$	$\bar{r}_X^{BP} = 0.420$ $\bar{c} = 4$	$\bar{r}_X^{BP} = 0.321$ $\bar{c} = 3$

Table 4.22 also shows that in the presence of endogenous controls, the payment form requiring the lowest minimum amount of selection on unobservables as a percentage of selection on observables to remove bias and attain $\beta^* < 0$ is MB. For example, to ease comparability with Oster results[386], we first focus on the first panel's breakdown point ($\bar{r}_X^{BP}$) and see that with endogenous controls the effect of MB on FBs will be negative as long as selection on unobservables is 28.5% or more the selection on observables, whereas the theoretically expected effect on FBs of DC and CC is not restored until hidden bias is at least 36.4% and 36.6% of overt bias (respectively). The $\bar{r}_X^{BP'}s$ of the second panel also show that the minimum value of relative selection on unobservables to observables yielding $\beta^* < 0$ with endogenous controls is lower for MB than for card payments.

Given expression (4.13), the stronger the relationship between a given payment treatment and the set of controls used to calibrate selection on observables, the lower the $\bar{r}_X^{BP}$. Since among the auxiliary regressions of each payment form on observables the one with the highest explanatory power was that of MB, Table 4.22 results can be explained by the greater capacity of observables to explain variation

[385] The remaining observable controls (W_0) included: locality size (urban vs rural), region, average count of ATMs (per state), mistrust and use of correspondent banks. While these are used in controlled and bias-adjusting regressions they were not included in estimations of relative selection on unobservables to observables nor in computations of breakdown points (since the latter depend on the former).

[386] Because first panel's breakdown point ($\bar{r}_X^{BP}$) uses all the observable controls in $\boldsymbol{\omega^o}$ as in Oster.

in MB than on either of the card payments. Although in Oster, the breakdown point is defined differently (as a function of R_{max}), Table 4.22 results do coincide with Oster-based findings from subsection 4.7.2.3 since MB was the only payment form for which the positive bias from OV was corrected to yield $\beta^* < 0$ when $R_{max} = 2\tilde{R}$ and $\delta = 0.5$.

Since $\bar{c}$ is a bound measure of included covariates' endogeneity (with $\bar{c} = 0$ denoting exogeneity and $\bar{c} = 1$ arbitrary endogeneity), Table 4.22 also indicates that the minimum amount of selection of unobservables relative to observables that restores $\beta^* < 0$ is recovered under less control endogeneity in the case of MB than in the case of card payments (as $3 < 4$). Indeed, the results suggest that control endogeneity is only minor and partial in our analysis rather than arbitrary.[387]

Appendix Table 4.A.20 presents the corresponding Oster breakdown points (δ^{BP}). The first line gives the estimations using Oster's technique whereas the second line presents breakdown points using the revision of Oster's δ proposed by Diegert et al. (2022, p.30-35). Comparing appendix Table 4.A.20 and Table 4.22 we see that the breakdown points for all payments under Oster's method, the plausible bound given by $R_{max} = 2\tilde{R}$ are higher than those in Table 4.22. This implied that a greater extent of hidden to overt selection[388] was needed to overturn the biased $\tilde{\beta} > 0$ controlled form results than when endogenous controls were allowed for Table 4.22 computation. Such results are consistent since the lower the magnitude of control endogeneity (i.e., the closer to exogeneity), the more selection on unobservables that can be allowed. Since Oster's method is based on the strongest restriction on exogeneity ($\bar{c} = 0$), the amount of selection on unobservables as percentage of observables that it needs to restore payment effects to their theoretical expectation ($\beta^* < 0$) is higher than when partial endogeneity of included controls is allowed (as in Table 4.22).

Overall, evaluating the conditions that correct for OVB through the single parameter $\bar{r}_X^{BP}$ developed by Diegert et al. (2022) while relaxing the orthogonality condition of W_1, W_2 revealed the same pattern of results as those found using Oster's method (section 4.7.2.3), thus supporting the latter even when some of our included controls are partially endogenous. Additionally, both methods showed that hypothesised negative effects of less physical payment forms on FBs were restored for MB more easily (i.e., under less selection on unobservables relative to selection on observables and even under less endogeneity of observable controls) than for card payments, as was expected from MB being the most virtual payment form considered.

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[387] The breakdown point that yields $\beta^* < 0$ is attained at an endogeneity upper bound $\bar{c}$ closer to zero (exogeneity) than to one (arbitrary endogeneity).

[388] Another name to refer for unobservables to observables selection.

4.8 CONCLUSIONS AND FURTHER RESEARCH

This chapter arose from the realisation that despite the more ubiquitous use of digital retail payment infrastructures, less is known about the effects of more virtual (less material) payment forms on our uses of money and financial management behaviours. Since financial markets' evolution is both a reflection and a component of broader levels of development, the above trends, though global, are unevenly paced. MICs and LICs are still catching up. Such is the case of Mexico, where the preponderance of cash (despite widespread non-cash pandemic measures) and Banxico's 2019 launch of CoDi (a technology that could turn QR-code payments via smartphone apps into a norm) call us to question: (1) which factors likely influence the payment methods Mexicans use to settle different transaction types and (2) whether holding (and using) diverse payment methods differentiated by their extent of physicality (vs. digitalisation) influence Mexicans' FBs.

We address the first question through a multinomial logit model estimating the probability of using either cash, card payments, or virtual electronic transfers and digital payments to settle four different transactions (small and large shops payments, public and private services and transportation). To assess the value added of differentiating amongst transaction types, diverse payment-form options and to evaluate the robustness of our results, we estimate logit regressions over specifications using 2 transaction outcome variables distinguished by value ($\leq 500_{MXN}$ versus $> 500_{MXN}$) as well as over the four transaction-type outcomes used in the multinomial models but (in both cases) with non-cash payment options consolidated into a single payment form category rather than divided into card payments and digital payments (including virtual transfers). Results from both multinomial logit estimations and from our robustness checks revealed that the main determinants of the method of payment used by Mexicans were: education level, standard of living (itself a proxy of socioeconomic status), residing in an urban locality, financial knowledge, SFWB, financial attitudes oriented towards the future (less present bias and impulsivity) and mistrust towards FIs. Regardless of transaction type, the AMEs of these variables on the use of different payment forms consistently supported the variables' hypothesised effects and revealed the most significant and substantial effects (as per their size).

Retaining a descriptive character, the results not only aligned with our theoretical hypotheses but revealed interesting patterns, including: an inverse relationship between age and the use of digital payment forms, a positive relationship between living in an urban environment and using non-cash payment forms, and a steep (general) education gradient where higher levels of education are consistently associated with lower probabilities of cash usage in favour non-cash payments (financial knowledge likewise revealed a negative relationship with cash). As expected, higher standard of living was negatively associated with cash use and positively with cards and digital payments while trust in FIs had the converse effects, favoring cash. Financial autonomy, self-control and peace with own financial status (as measured through SFWB) were consistently significant, revealing a positive association with non-cash payments. As expected by BE theories related to pain of paying and coupling, financial attitudes reflecting future orientation, lower present bias and less impulsivity bore a negative relationship with cash and a positive relationship with non-cash payment forms.

The fact that observed effects on the use of non-cash payment forms were similar does not invalidate the importance of evaluating them separately and indeed the similarities in the impact of controls on the probability of using cards versus using digital payments supported our hypotheses, themselves reflecting the literature's theoretical understanding of the influence of payment methods with lower extent of physicality (greater virtuality) than cash (see subsection 4.2.2.2).

The fact that results were similar across different transaction types does not delegitimise the relevance of considering whether people use different payment methods for distinct transactions since our findings showed that the effect sizes of sociodemographic characteristics, behavioural and structural indicators do vary according to the type of transaction being evaluated and this aligns with the early findings of literature combining psychographic analysis with demographic data to differentiate among users of non-cash payments and cash users (see subsection 4.2.2.1).

The fact that the results revealed that cash is still king in Mexico do not render our analysis of the determinants of different payment forms' use invaluable for, as revealed through Figure 4.7 and in line with the literature documenting how people leverage amongst different payment methods, even amongst those that use cash for certain types of transactions (e.g. small essential payments) a proportion of people use alternative payment forms to settle other payments. Moreover, given fintech advances, the availability of non-cash payment forms able to bypass high-street banks' account holding will continue to increase, consequently broadening the availability of non-cash payment forms amongst the unbanked. Hence, despite their limitation to prove causality, the results obtained from evaluating our first research question act as first approximations of the relationship between payment forms and their uses in Mexico, an inquiry whose relevance can only increase as digital payments continue to become normalised in Mexico.

We address the second question through multiple linear regressions of an index of FBs on non-cash payment instrument(s) and a standard set of controls. We apply Oster's (2019) innovative technique to correct for OVB by assuming that the bias arising from observed (imperfect) controls is informative of the bias arising from the full set of controls that would explain outcome FBs (including unobservables). Based on an extensive review of the literature we identified that religious values and beliefs, peer effects and personality types are amongst the most important genuine unobservables of our model. However, their effects have been documented as ambiguous. Thus, they likely only mediate the effects of other a-priori included controls or those of contingent unobservables such as occupation, number of dependents, years of employment, other assets ownership, preferences, and cognitive ability. Given this, we expect that including all the above controls would likely double the explained variance of FBI and argue that the selection on unobservables is about half that of observables or at most equal to it.

Under such criteria—backed by both the pertinent payments literature as well as by Oster's observational data validation exercises—and assuming orthogonality between included controls and unobservable factors, our bias-adjusted results supported the hypothesised negative effect of increasingly dematerialised (more digital) payments on resilient FBs due to them ensuing impulse spending, low expenditure recall, inattention, and low levels of pain from paying.

Relaxing the orthogonality restriction to allow for partially endogenous observable controls restored the hypothesised negative influence of less physical forms of payment on FBs under a lower selection on unobservables (hidden bias) to observables (overt bias selection). All psychological effects were stronger for MB. Hence, as expected, the bias-adjusted results revealed that the payment form most associated with a negative impact on FBs was indeed the most virtual (least material) one (i.e., MB). These findings hope to motivate financial capability campaigns that can raise awareness about common cognitive biases and psychological blind-spots that affect financial resilience among digital payments users especially as the rate of adoption of payment instruments such as CoDi continues to expand in Mexico (or in countries with a similar situation).

Generally speaking, our results contribute to the scarce empirical literature about the psychological effects of payments on MICs. More particularly, they contribute to the literature on financial inclusion and development in Mexico, by being (to our knowledge) one of the first studies analysing the behavioural effects of payment forms in Mexico as well as by employing ENIF 2021, the most updated official database on financial inclusion in Mexico at the time of the study.[389]

Despite the contributions, the first part of the study is still subject to endogeneity which could be addressed in the future via instrumentation or through a panel. Were panel data available, it would be particularly useful for estimating the real effects of variables such as (financial) fraud which, as mentioned in the descriptive statistics section, has continued to increase in Mexico.

Simultaneity-driven endogeneity in the second part of the analysis precluded us from evaluating the impact of using different payments on attitudes towards money and on SFWB. For example, evaluating whether the use of different payments influences SFWB directly or indirectly (by influencing FBs thence leading to diverse financial outcomes) would be of interest.

The simultaneous relationship between payments use and financial attitudes would also be promising. Different belief systems and personality traits influence people's attitudes towards money. At the same

[389] Released a month prior to when this study began.

time, through cognitive adaptation[390], using specific payment forms could reinforce users innate or acquired money attitudes, which could then translate into diverse FBs and outcomes. Investigating such self-reinforcing cycles could help design financial education campaigns and within-banking triggers to curtail customers' negative cycles. Both inquiries could be addressed via the instrumentation of some variables as well as through pertinent data with a time dimension.

Lastly, while the concurrent causal evaluation of non-cash payments on FBs was not possible in this paper, analysis of the former could help to better understand how payments relate to each other and whether each payment's influence on users' FBs changes according to the number and type of alternative payments available to them. This would be valuable since the literature exploring how CC and DC are used to leverage desired increases in consumption suggests that payments act as contingent unobservables of each other. While less has been researched regarding the complementary role of MB, it is plausible that MB users could have different FBI scores depending on how they leverage MB with other payment methods they have access to. One person could use MB often to 'keep track of expenses', be less likely to go on overdraft and/or avoid borrowing to make ends meet, therefore having a high FBI score. Another might use MB to make frequent e-commerce purchases which, due to lower product attachment, pain of payment and/or reduced expenditure recall associated with such payments could cause him/her to go on overdraft on cards, leverage across the latter, or have trouble paying bills thus potentially having a lower FBI score than that of the first MB user. Controlling for DC and CC concurrently during evaluations of the psychological effects of MB on FBs could therefore help to disentangle the effects on FBs attributable to the abstract nature of MB from any card payments effects on the former.

Such evaluations are important because, according to our sample, more than 40% of account holders held more than one non-cash payment form and the figure is likely to increase in the coming years.

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[390] A hedonic adaptation process (see: Frederick and Loewenstein, 1999).

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4.10 APPENDIX

Table 4.A.1:

ENIF 2021 VARIABLES DESCRIPTION

Derived variables	ENIF 2021 Raw survey questions & variables	Description of derived variable
Age	*edad* Continuous variable giving age of respondent.	Only modification made to variable was rescaling it by a factor of 10 to express it in decimal terms.
Gender	*sexo* Please indicate your sexuality (biological gender): 1 –Masculine (male) 2 – Feminine (female)	Recoded variable as binary (dummy) indicator: 1 –Male 0 – Female

Marital status	*p3_2* Currently (at time of survey: June 28th – August 13th, 2021) you are: 1 –Living with your partner in free union 2 – Separated from your partner 3 – Divorced from your partner 4 – Widowed (your partner passed away) 5 – Married 6– Single	Used information from *p3_2* to derive a binary variable indicating whether respondent has a significant other or is in a relationship 1 –If married or in partnership living together with couple but not married 0 – Otherwise
Education Level	*p3_1_1* Which was the latest year or grade of schooling you approved? Answer options provided in raw data correspond to levels: 0 – None 1 – Preschool / Kindergarten 2 – Elementary (Middle) School 3 – Junior High 4 – Technical (apprentice) studies with Jr. High 5– Normal Superior School 6 – High School 7 – Technical (apprentice) studies with High School 8 – Undergraduate Degree University or Technical Bachelors' Degree (in apprentice studies) 9– Master and Doctoral Studies (University)	Created 5 different dummy variables based on *p3_1_1.* Each dummy indicates whether respondent had completed one of the following levels of schooling: *SchoolingL_L1* 1 – None or (at most) preschool *SchoolingL_L2* 1 – Elementary/Middle School *SchoolingL_L3* 1 – Junior High / Technical (apprentice) studies with Jr. High *SchoolingL_L4* 1 – High School / Technical (apprentice) studies with High School / Normal Superior *SchoolingL_L5* 1 – University (Bachelors, Masters or Doctorate) In all 5 dummies 0 codes for having "another level" (above or below) than the one indicated by category 1 of given level.
Urban	*Tloc* Contains information of stratification of localities by size according to geographical area used by INEGI in all ENIF waves and in all Censuses. 1 – 100,000 and more residents 2 – 15,000 to 99,999 residents 3 – 2,500 to 14,999 residents 4 – less than 2,500 residents	Derived a single dummy variable based on the raw variable *Tloc* to differentiate urban from non-urban areas: 1 – If respondent is from a locality with at least 2, 500 residents (and many more (millions of) residents) 0 – Only includes RURAL localities (those with less than 2, 500)
Northern, Centre-North and Mexico City	*region* Contains classification of national territory into the 6 regions used by INEGI in all ENIF waves and in all Censuses: 1 – Northwest (Baja California, Baja California Sur, Chihuahua, Durango, Sinaloa & Sonora) 2 – Northeast (Coahuila, Nuevo León, San Luis Potosí & Tamaulipas) 3 – West and Bajio (Aguascalientes, Colima, Guanajuato, Jalisco, Michoacán, Nayarit, Querétaro & Zacatecas) 4 – Mexico City 5 –Centre-South and West (Estado de México, Hidalgo, Morelos, Puebla, Tlaxcala & Veracruz) 6 – South (Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco & Yucatán)	Derived a single dummy variable based on the raw variable *region* to differentiate the regions with higher financial access from those with a lower one. It codes: 1 – If respondent lived in a HIGH financial access region (either in Northwest, Northeast, West & Bajio or in Mexico City) 0 – If respondent lived in a LOW financial access region (East, Centre-South & South regions)

Local financial access: ATMs prior year	Quarterly data on number of ATM's by state Only variable whose source is not ENIF but the Mexican National Banking and Stock Exchange Commission (CNBV) which contributed to the development of the ENIF.	Computed as the average number of ATM's by state over the year prior and leading to the 2021 ENIF survey collection period (i.e. average number of ATMs per state from June 2020 to June 2021)
Worked last month	*p3_5* Please answer which case (only 1) most describes your situation during the last month: 1 – Employed & worked for at least 1 hour 2 – Employed but did not work 3 – Looked for work 4 – Student 5 – Housework/housekeeping/ stay at home parent 6 – Retiree/pensioner 7 – Permanent disability (not able to work for life) 8 – Did not work Information on *p3_5* supplemented to with that contained in *p3_6* to create variable.	Recoded variable as binary (dummy) indicator: 1 – Had work/was employed last month 0 – Otherwise Note: 1 – in this variable does not entail that they were also paid for work during past month. About 13.81% (1,321) of those having worked last month reported having no earnings or income over prior month because of several reasons including performing unpaid/unsalaried jobs for relatives and non-relatives.
Monthly earnings	*p3_8a* – Open question asking respondents to write how much money they earn or receive for their work or occupation? & *p3_8b* – How often?	Converted reported answer amounts given on open question *p3_8a* to monthly terms according to categorical answer given in *p3_8b*. Reported values in logarithmic scale.
Earnings type	*p3_9* The earnings you receive from your work or occupation are (select only one answer): 1 – Fixed 2 – Variable	Recoded variable to account for unemployed or unsalaried (unpaid) respondents. Resulting categories: 0 – No earnings (unemployed / not paid for work / no income) 1 – Variable 2 – Fixed
Remittances	*p7_5* From July 2020 to date, have you received any money sent by friends or relatives residing abroad (remittances)? 1 – Yes 2 – No	Recoded indicator to make it a dummy variable: 1 – Yes 0 – No
CoDi knowledge (regardless of use)	*p7_2* Have you heard or know about *CoDi*– '*Cobro Digital*'? Answer options in raw data: 1 – Yes / 2 – No / 9 – Do not know	Recoded *p7_2* to make it a dummy variable: 1 – Yes 0 – No '9 – Do not know' answers in raw data treated as '0 – No' in dummy.
CoDi use	*p7_3* Have you used *CoDi*– '*Cobro Digital*'? Answer options in raw data: 1 – Yes / 2 – No	Recoded *p7_3* to make it a dummy variable: 1 – Yes 0 – No
Having an account	Questions *p5_4_1–p5_4_5, p5_4_8 & p5_4_9* Do you currently (at time of survey) have a: *p5_4_1*– Payroll account (or payroll card) *p5_4_2* – Pension receipt account (or pension payments card) *p5_4_3*– Government support payments account (or card) *p5_4_4*– Savings account *p5_4_5*– Checking account	Created dummy variable from the information on *p5_4_1–p5_4_5, p5_4_8 & p5_4_9* that coded: 1– If respondent answered YES to 1 or more of the questions *p5_4_1–p5_4_5, p5_4_8 & p5_4_9* 0– Answered NO in all *p5_4_1–p5_4_5, p5_4_8 & p5_4_9* questions

	p5_4_8– Digital account /open mobile bank account (*Albo* account) or digital (usually e-commerce) payment platforms such as Mercado Pago *p5_4_9*– Other Answer options in raw data: 1 – Yes / 2 – No	
Has account from gov. support prog. (binary)	Question *p5_4_3* Do you have an account or card to receive government support payments? Answer options in raw data: 1 – Yes / 2 – No	Created binary variable coding: 1 – If respondent answered he/she had a government support account (or card) but no other type of accounts (cards) 0 – Otherwise (including respondents without any type of account as well as those with one of more accounts that were not provided by the government)
Saved through formal institutions over the last month	Questions *p5_7_1- p5_7_5, p5_7_8* & *p5_7_9* From July 2020 until currently (at time of survey, June 28th 2021) did you save in any of the accounts signalled in questions *p5_4_1 – p5_4_5, p5_4_8 & p5_4_9?* (descriptions of each of the latter types above) In raw data each of the variables in series *p5_7_1- p5_7_5, p5_7_8* & *p5_7_9* hare linked to those in series *p5_4_1 – p5_4_5, p5_4_8 & p5_4_9* and had 3 possible answer values options: 1 – YES, if respondent had the given type of account the question stood for AND SAVED money on/ through it 2 – NO, if respondent had the given type of account the question stood for but DID NOT SAVE money on/ through it Missing value – Respondent did not have any accounts (from any type)	Consolidated information from answers given in variable set *p5_7_1- p5_7_5, p5_7_8* & *p5_7_9* to create an **overarching dummy variable coding**: 1 – If respondent answered 1 – YES in 1 or more of the variables in set *p5_7_1- p5_7_5, p5_7_8* & *p5_7_9* 0 – Otherwise (when respondent did not have any accounts (from any type) and therefore could not save through them. Derived indicator helps to **account for people that saved through at least one formal institution** over the prior month
Has DC	Questions *p5_6_1 – p5_6_5 , p5_6_8,* & *p5_6_9* (linked to *p5_4_1 – p5_4_5, p5_4_8* & *p5_4_9)* ask: Do you have? *p5_6_1*– Payroll account *p5_6_2*– Retirement or pension account *p5_6_3*–Government support (subsidies) account *p5_6_4*– Savings account *p5_6_5*– Checking account *p5_6_8*– Digital account /open mobile bank account (*Albo* account) or an account from digital (usually e-commerce) payment platforms such as Mercado Pago *p5_4_9*– Other Answer options in raw data: 1 – Yes / 2 – No	Used information from *p5_6_1 – p5_6_5 , p5_6_8,* & *p5_6_9* themselves linked to *p5_4_1 – p5_4_5, p5_4_8* & *p5_4_9 (*i.e. to questions regarding having given type of account) to derive a binary (dummy) variable coding: 1 – If respondent answered YES to 1 or more of the questions in *p5_6_1 – p5_6_5 , p5_6_8,* & *p5_6_9* 0 – otherwise **Indicates whether respondents have at least one debit card form.**
Has CC	Questions *p6_2_1* & *p6_2_2* *p6_2_1* Do you have a CC from a department store or convenience store? *p6_2_2* Do you have a CC from a bank? Answer options in raw data: 1 – Yes / 2 – No	Used information from *p6_2_1* & *p6_2_2* to derive a binary (dummy) coding: 1 – If respondent answered YES to 1 or both of *p6_2_1* & *p6_2_2* 0 – Otherwise **Indicates whether respondents have at least one CC form.**
Having MB	*p5_19_2* Do you have and use MB to consult balances and make transfers or payments to and from your account(s)?	Recoded *p5_19_2* as a binary variable: 1 – Yes / 0 – No

	In raw data variable had 3 answer value options: Answer options in raw data: 1 – Yes, if respondent had at least one non-government provided DC and used MB 2 – No, if respondent had at least one non-government provided DC but did not use MB with it Missing value – If respondent did not have any accounts nor DC (from any type) or if the only account and DC held were to receive government support payments.	
Small value purchases (≤ 500 MXN)	Question *p7_1_1* *p7_1_1* What form of payment do you use the most frequently when you conduct purchases **worth $ 500 MXN or less**? Answer options in raw data: 1 – Electronic transfer 2 – Direct debit 3 – Debit card 4 – Credit card 5 – Cheques 6 – Prepaid card 7 – Cash 8 – Other 9 – Does not conduct this type of purchase	Recoded *p7_1_1* to derive a binary outcome variable for small value purchases with only two payment form options: cash vs no-cash payments. Variable followed the coding: 0 – If in *p7_1_1* respondent answered: 7 1 – If in *p7_1_1* respondent answered: 1, 2, 3, 4, 5, 6, 8 Missing value if respondent answered 9 in *p7_1_1.*
Large value purchases (> 500 MXN)	Question *p7_1_2* *p7_1_2* What form of payment do you use the most frequently when you conduct purchases **worth more than $ 500 MXN**? Answer options in raw data: 1 – Electronic transfer 2 – Direct debit 3 – Debit card 4 – Credit card 5 – Cheques 6 – Prepaid card 7 – Cash 8 – Other 9 – Does not conduct this type of purchase	Recoded *p7_1_2* to derive a binary outcome variable for large value purchases with only two payment form options: cash vs no-cash payments. Variable followed the coding: 0 – If in *p7_1_2* respondent answered: 7 1 – If in *p7_1_2* respondent answered: 1, 2, 3, 4, 5, 6, 8 Missing value if respondent answered 9 in *p7_1_2.*
Purchases in small shops and markets	Questions *p7_7_1, p7_8_1_1, p7_8_1_2 & p7_8_1_3* *p7_7_1* Did you **make purchases in small shops** (including convenience shops) **and markets** since April 2021 until the time of the survey (June 28th – August 13th, 2021) i.e. throughout the past 3 months)? Answer options in raw data: 1 – Yes / 2 – No If p7_7_1 = 1 – Yes , then ask series *p7_8_1_1-p7_8_1_3* *p7_8_1_1* Paid for purchases in small shops and markets **through electronic or digital transfer or through smartphone (cell-phone) app** *p7_8_1_2* Paid for purchases in small shops and markets (in-person /in store) **using DC or CC.**	**Main multinomial logit specification:** Used information in *p7_7_1, p7_8_1_1, p7_8_1_2 & p7_8_1_3* to construct single categorical outcome variable that indicates method of payment used for "*purchases in small shops and markets*" during the 3 months prior to the survey with codes: 0 – Cash 1 – DC or CC 2 – Electronic or digital transfer or through smartphone (cell-phone) app 4 – Did not conduct purchases in small shops and markets in prior 3 months **Robustness check specification:** Used information in *p7_7_1, p7_8_1_1, p7_8_1_2 & p7_8_1_3* to construct single binary outcome variable indicating

	p7_8_1_3 Paid for purchases in small shops and markets **using cash**. If p7_7_1 = 1 – Yes , then answer options of series *p7_8_1_1- p7_8_1_3* in raw data: 1 – Yes / 2 – No If p7_7_1 = 2 – No , then series *p7_8_1_1- p7_8_1_3* in raw data had missing values (i.e. missing values if respondent did not make purchases in small shops and markets during prior 3 months).	method of payment used for "*purchases in small shops and markets*" during the 3 months prior to the survey with codes: 0 – Cash 1 – DC / CC, digital (virtual) transfer or payment through smartphone (cell-phone) app 4 – Did not conduct purchases in small shops and markets in prior 3 months
Purchases in large retailers and pharmacy chains	Questions *p7_7_2, P7_8_2_1, p7_8_2_2 & p7_8_2_3* *p7_7_2* Did you **make purchases in large retailers & pharmacy chains** since April 2021 until the time of the survey (June 28th – August 13th, 2021) i.e. throughout the past 3 months? Answer options in raw data: 1 – Yes / 2 – No If p7_7_2 = 1 – Yes , then ask series *p7_8_2_1- p7_8_2_3* *p7_8_2_1* Paid for purchases in large retailers & pharmacy chains **through electronic or digital transfer or through smartphone (cell-phone) app**. *p7_8_2_2* Paid for purchases in large retailers & pharmacy chains **using DC or CC**. *p7_8_2_3* Paid for purchases in large retailers & pharmacy chains **using cash.** If p7_7_2 = 1 – Yes , then answer options of series *p7_8_2_1- p7_8_2_3* in raw data raw data: 1 – Yes / 2 – No If p7_7_2 = 2 – No , then series *p7_8_2_1- p7_8_2_3* in raw data had missing values (i.e. missing values if respondent did not make purchases in large retailers & pharmacy chains during prior 3 months).	**Main multinomial logit specification:** Used information in *p7_7_2, p7_8_2_1, p7_8_2_2 & p7_8_2_3,* to construct single categorical outcome variable that indicates method of payment used for "*purchases in large retailers & pharmacy chains*" during the 3 months prior to the survey with codes: 0 – Cash 1 – DC or CC 2 – Electronic or digital transfer or through smartphone (cell-phone) app. 4 – Did not conduct purchases in large retailers & pharmacy chains in prior 3 months **Robustness check specification:** Used information in *p7_7_2, p7_8_2_1, p7_8_2_2 & p7_8_2_3,* to construct single binary outcome variable indicating method of payment used for "*purchases in large retailers & pharmacy chains*" during the 3 months prior to the survey with codes: 0 – Cash 1 – DC / CC, digital (virtual) transfer or payment through smartphone (cell-phone) app 4 – Did not conduct purchases in small shops and markets in prior 3 months
Paid for public or private services and utilities	Questions *p7_7_3, p7_8_3_1, p7_8_3_2 & p7_8_3_3* *p7_7_3* Did you **pay for public or private services and utilities (water, electricity, gas, internet, etc)** since April 2021 until the time of the survey (June 28th – August 13th, 2021) i.e. throughout the past 3 months? Answer options in raw data: 1 – Yes / 2 – No If p7_7_3 = 1 – Yes , then ask series *p7_8_3_1- p7_8_3_3* *p7_8_3_1* Paid for public or private services and utilities **through electronic or digital transfer or through smartphone (cell-phone) app.** *p7_8_3_2* Paid for public or private services and utilities **using DC or CC.** *p7_8_3_3* Paid for public or private services and utilities **using cash.**	**Main multinomial logit specification:** Used information in *p7_7_3, p7_8_3_1, p7_8_3_2 & p7_8_3_3,* to construct single categorical variable that indicates method of payment used to "*pay for public or private services and utilities*" during the 3 months prior to the survey with codes: 0 – Cash 1 – DC or CC 2 – Electronic or digital transfer or through smartphone (cell-phone) app 4 – Did not pay for public or private services and utilities in prior 3 months **Robustness check specification:** Used information in *p7_7_3, p7_8_3_1, p7_8_3 & p7_8_3_3,* to construct single binary outcome variable indicating the method of payment used to "*pay for public or private services and utilities*" *during* the 3 months prior to the survey with codes:

	If p7_7_3 = 1 – Yes , then answer options of series *p7_8_3_1- p7_8_3_3* in raw data raw: 1 – Yes / 2 – No If p7_7_3 = 2 – No , then series *p7_8_3_1- p7_8_3_3* in raw data had missing values (i.e. missing values if respondent did not pay for public or private services and utilities during prior 3 months).	0 – Cash 1 – DC / CC, digital (virtual) transfer or payment through smartphone (cell-phone) app 4 – Did not conduct purchases in small shops and markets in prior 3 months
Paid for public or private transportation services	Questions *p7_7_4, P7_8_4_1, p7_8_4_2 & p7_8_4_3* *p7_7_4* Did you **pay for public or private transportation services** since April 2021 until the time of the survey (June 28th – August 13th, 2021) i.e. throughout the past 3 months? Answer options in raw data: 1 – Yes / 2 – No If p7_7_4 = 1 – Yes , then ask series *p7_8_4_1-p7_8_4_3* *p7_8_4_1.* Paid for public or private transportation services **through electronic or digital transfer or through smartphone (cell-phone) app** *p7_8_4_2* Paid for public or private transportation services **using DC or CC.** *p7_8_4_3* Paid for public or private transportation services **using cash.** If p7_7_4 = 1 – Yes , then answer options of series *p7_8_4_1- p7_8_4_3* in raw data raw: 1 – Yes / 2 – No If p7_7_4 = 2 – No , then series *p7_8_4_1- p7_8_4_3* in raw data had missing values (i.e. missing values if respondent did not pay for public or private transportation services during prior 3 months).	**Main multinomial logit specification:** Used information in *p7_7_4, p7_8_4_1, p7_8_4_2 & p7_8_4_3* to construct single categorical variable that indicates method of payment used to "*pay for public or private transportation services"* during the 3 months prior to the survey with codes: 0 – Cash 1 – DC or CC 2 – Electronic or digital transfer or through smartphone (cell-phone) app 4 – Did not pay for public or private transportation services in prior 3 months. **Robustness check specification:** Used information in *p7_7_4, p7_8_4_1, p7_8_4_2 & p7_8_4_3* to construct single binary outcome variable indicating the method of payment used to "*pay for public or private transportation services"* during the 3 months prior to the survey with codes: 0 – Cash 1 – DC / CC, digital (virtual) transfer or payment through smartphone (cell-phone) app 4 – Did not conduct purchases in small shops and markets in prior 3 months
Use of banking correspondents	*p10_7* From July 2020 to June 28th 2021 (when survey data was gathered) have you used any retail outlet or convenience store to make cash withdrawals, deposits, or to pay for a credit or service (water, energy, etc)?	Recoded indicator to make it a dummy variable: 1 – Yes 0 – No
Victim of fraud or deceit (total number of times)	Series of questions *p11_2_1– p11_2_4* *p11_2_1* – Have your CCs or DCs been cloned and used without your authorisation? *p11_2_2* – Have you experienced identity theft? Has your personal data been used without your authorisation to acquire goods, or services or to make purchases or payments without your consent? *p11_2_3* – Have you invested or paid money to a service or chain pyramid that was fraudulent or on a Ponzi scheme? *p11_2_4* – Have you spent money acquiring a financial product, draw or lot that were a scam? Each provide 1 – Yes / 2 – No / 9 – Do not know answer options in raw data.	Created dummy variables of each of the survey questions in set *p11_2_1–p11_2_4* so that they coded: 1 – Yes 0 – No Created second variable that calculates the total sum of fraud experiences incidence (sum of binary variables coding 1—when person experienced situation & 0—otherwise). '9 – Do not know' answers in raw data treated as '0 – No' in dummy.
Financial Knowledge Index (FKSI)	Questions *p4_7_1, p4_7_2, p4_7_3, p13_1, p13_2, p13_3*, and *p13_4:*	Computed **Financial Knowledge Sub-index** based on the methodology described on "*ENIF2021 Official Findings Report*" which closely follows the

	In the following 3 questions please respond whether you think the following phrases are true or false: *p4_7_1* Inflation refers to a general increase in the price of things. *p4_7_2* If someone offers you the chance to make a lot of money easily, it is likely that there is also a chance that you will lose a lot of money easily. *p4_7_3* It is better to save money in two or more places or financial instruments (for example in: savings account, in a Tanda with relatives or trusted friends, etc…) Raw data answer options for questions *p4_7_1, p4_7_2* & *p4_7_3:* 1 – True / 2 – False / 8 – No response / 9 – Does not know For questions *p13_1, p13_2, p13_3*, and *p13_4* please select the correct answer to the following questions (only 1 correct answer per question is possible). All amounts refer to Mexican pesos (MXN). *p13_1* If you lend $25 to a friend/acquaintance and he/she gives you $25 back the next day. How much interest has he paid on this loan? Raw data answer options: 1 – Nothing / 2 – Different amount / 9 – Does not know *p13_2* You deposit $100 into a savings account with a guaranteed interest rate of 2% per year. No further payments are made into this account and no money is withdrawn. How much would there be in the account at the end of the first year, once the interest payment is made? Raw data answer options: 1 – More than $102 / 2 – Exactly $102 / 3 – Less than $102 / 8 – No response / 9 –Does not know. *p13_3* You deposit $100 into a savings account with a guaranteed interest rate of 2% per year. No further payments are made into this account and no money is withdrawn. How much would there be in the account at the end 5 years, once interest payments are made? Raw data answer options: 1 – More than $110 / 2 – Exactly $110 / 3 – Less than $110 / 8 – No response / 9 –Does not know. *p13_4* You are given a gift of $1,000 but have to wait one year to spend it. Inflation was 5% that year. In one year you will be able to buy: Raw data answer options : 1 – More than you can buy today / 2 – The same amount of things / 3 – Less than you can buy today / 9 –Does not know.	variables and methodology outlined in "*OECD/INFE 2018 & 2022 Toolkit for Measuring Financial Literacy and Financial Inclusion*". As per the latter, the index consists of the total sum of answers given to 7 survey questions gauging respondents' familiarity with: *p4_7_1*– Inflation definition *p4_7_2*– Risk-return relationship *p4_7_3*– Diversification *p13_1*– Meaning of earning/paying interest *p13_2*– Simple interest computation *p13_3*– Compound interest computation *p13_4*– Erosion of purchasing power Correct answers: 1 point Incorrect answers: 0 points Maximum (total) index score: 7 points. Results are also normalised to 100 for reporting ease.
Financial Behaviours Index (FBI)	• *Choice over financial matters & budgeting* (p14_1, p4_1, p4_2_1 – p4_2_5)	Computed **FBI** based on the methodology described on "*ENIF2021*

	p14_1 Solely you or you and another household member take decisions over when to save and what to spend on (1 – Yes /2– No) *p4_1* – You keep a budget or register of your income and expenses (1 – Yes /2– No) *p4_2_1 – p4_2_5*: five forms of keeping a register or control of expenses (1 – Yes /2– No) • *Has active savings (formal and /or informal)* (p5_7_1 – p5_7_9 & p5_1_2 – p5_1_6) p5_1_2 – p5_1_6 Each variable represents an informal form/ entity to save with *p5_7_1 – p5_7_9* Each variable represents a formal financial product that can be used to save • *Avoids borrowing to make ends meet (faced no insufficiency of funds or modified behaviour to avoid it)* *p4_3* From July 2020 to July 2021 your monthly income was enough to cover your monthly expenses (1 – Yes /2– No) If *p4_3==2 'No'*, how did you face the shortfall of funds when you had it? *p4_4_2*–Used savings to pay for overspending *p4_4_3*–Reduced expenses *p4_4_4*–Sold or pawned goods *p4_4_5*–Salary advance, worked additional hours, took additional part time or temp job. All p4_4_2 – p4_4_5 questions: 1 – Yes / 2– No • *Compared financial products before acquiring them (p5_15, p6_11 & p8_11)* *p5_15*–Before getting acct you compared it to those of other FIs or entities (1 – Yes /2– No) *p6_11*–Before up-taking credit instrument you compared it to those of other FIs or entities (1 – Yes / 2 – No) *p8_11*–Before up-taking insurance you compared it to those of other FIs or entities (1 – Yes /2– No) • *Used official government or specialised sources to compare financial products prior to uptake* *p5_16_3* and/or *p5_16_5* – For accounts *p6_12_3* and/or *p6_12_5* – For credit instruments *p8_12_3* and/or *p8_12_5* – For insurance All *p5_16_3, p5_16_5, p6_12_3, p6_12_5, p8_12_3* and *p8_12_5* questions: 1 – Yes / 2– No For the following 3 questions please indicate your extent of agreement with statement or frequency of behaviour • *p4_6_1 – You only make considered (affordable / within budget) purchases* • *p4_6_2 – You pay your bills on time* • *p4_6_4 – You set long term economic goals (buy house, save for retirement) & strive to achieve them* Raw data answers for *p4_6_1, p4_6_2, p4_6_4:* 1 – always / 2 – sometimes / 3 – never / 8 – no response / 9 – Does not know • *p4_8_3 – You keep close watch (detail oversight) on your personal finance affairs*	*Official Findings Report*" which closely follows the variables and methodology outlined in "*OECD/INFE 2018 & 2022 Toolkit for Measuring Financial Literacy and Financial Inclusion*". As per the latter, the index consists of the total sum of answers given to 9 survey questions gauging respondents' financial behaviours: • *Choice over financial matters & budgeting* 1 point given if respondent was responsible (even if jointly) for money management [if p14_1=1] and actively kept tract of money [at least 2 within p4_2_1 – p4_2_5 =1] ; 0 points otherwise • *Has active savings (formal and /or informal)* 1 point given if respondent answers yes to any option (formal or informal type of savings) ; 0 points otherwise • *Avoids borrowing to make ends meet (faced no insufficiency of funds or modified behaviour to avoid it)* 1 point given if respondent had enough funds to cover monthly expenses [p4_3=1] or if when facing short-fall he/she answered 1 – Yes to any one of p4_4_2 – p4_4_5 ; 0 points otherwise • *Compared financial products before acquiring them* 1 point given if respondent attempted to make informed decision [answered 1 – Yes to any one of p5_15, p6_11 & p8_11] ; 0 points otherwise • *Used official government or specialised sources to compare financial products prior to uptake* 1 point given if respondent attempted to make informed decision [answered 1 – Yes to any one of p5_16_3, p5_16_5, p6_12_3, p6_12_5, p8_12_3 & p8_12_5] ; 0 points otherwise • *Makes considered (affordable / within budget) purchases* 1 point given if respondent answered option 1 (always) • *Pays bills on time* 1 point given if respondent answered option 1 (always) • *Strives to achieve long term economic goals* 1 point given if respondent answered option 1 (always) • *Keeping watch (oversight) over financial affairs.* 1 point given if respondent answered 1 (agreeing)

	Raw data answers for *p4_8_3:* 1 – agrees / 2 – neutral / 3 – disagrees / 8 – no response / 9 – Does not know.	Maximum (total) index score: 9 points. Results are also normalised to 100 for reporting ease.
Financial Attitudes Index	Questions *p4_6_3, p4_8_1, & p4_8_2* For the following 3 questions please indicate your extent of agreement with statement or frequency of behaviour • *p4_6_3 – You prefer to spend money rather than saving it* Raw data answers for *p4_6_3:* 1 – always / 2 – sometimes / 3 – never / 8 – no response / 9 – Does not know • *p4_8_1 – You usually concentrate in the present without thinking about the future* • *p4_8_2 – Money is there to be spent* Raw data answers for *p4_8_1* & *p4_8_2:* 1 – agrees / 2 – neutral / 3 – disagrees / 8 – no response / 9 – Does not know.	Computed **Financial Attitudes Sub-index** based on the methodology described on "*ENIF2021 Official Findings Report*" which closely follows the variables and methodology outlined in "*OECD/INFE 2018 & 2022 Toolkit for Measuring Financial Literacy and Financial Inclusion*". As per the latter, the index consists of the total sum of answers given to 3 attitudinal (preference) statements regarding financial matters, namely: • *p4_6_3 – you prefer to spend money rather than saving it* 5 points to answer option 3 (never), 3 points to answer options 2, 8 & 9 (sometimes / no response / does not know), 0 points to answer option 1 (always) • p4_8_1 – *You usually concentrate in the present without thinking about the future* 5 points to answer option 3 (disagrees), 3 points to answers 2, 8 & 9 (neutral / no response / does not know), 0 points to answer option 1 (agrees) • p4_8_2 – money is there to be spent 5 points to answer option 3 (disagrees), 3 points to answers 2, 8 & 9 (neutral/ no response / does not know) 0 points to answer option 1 (agrees) Points on each question are added and averaged. Maximum (total) index score is 5 points. Results are also normalised to 100 for reporting ease.
Subjective Financial Well-being Index (SFWB)	Questions *p4_6_5, p4_6_6, p4_8_4, p4_8_5 & p4_8_6* For the following 5 questions please indicate your extent of agreement with statement or frequency of behaviour • *p4_6_5 – Managing **your personal finances** (money and expenses) **control your life*** • *p4_6_6 – You have some money left over at the end of the month* Raw data answers for *p4_6_5* & *p4_6_6:* 1 – always / 2 – sometimes / 3 – never / 8 – no response / 9 – Does not know • *p4_8_4 – Given your financial situation you feel **you can have** the things you want* • *p4_8_5 – The money **you have** is **enough** to cover your expenses* • *p4_8_6 – You feel **at peace that you have enough money*** Raw data answers for *p4_8_4, p4_8_5* & *p4_8_6:* 1 – agrees / 2 – neutral / 3 – disagrees / 8 – no response / 9 – Does not know.	Computed **Subjective Financial Well-being Sub-index** based on the methodology described on "*ENIF2021 Official Findings Report*" which closely follows the variables and methodology outlined in "*OECD/INFE 2018 & 2022 Toolkit for Measuring Financial Literacy and Financial Inclusion*". The index consists of the total sum of answers given to 5 statements regarding subjective perception of financial status, namely: • *p4_6_5 – Your finances control your life* 5 points to answer option 3 (never), 3 points to answers 2, 8 & 9 (sometimes / no response / does not know), 0 points to answer option 1 (always) • *p4_6_6 – You have some money left over at the end of the month* 5 points to answer option 1 (always),

		3 points to answers 2, 8 & 9 (sometimes / no response / does not know), 0 points to answer option 3 (never) • *p4_8_4 – Given your financial situation you feel* ***you can have*** *the things you want* 5 points to answer option 1 (agrees), 3 points to answers 2, 8 & 9 (neutral/ no response / does not know), 0 points to answer option 3 (disagrees) • *p4_8_5 – The money* ***you have*** *is* ***enough*** *to cover your expenses* 5 points to answer option 1 (agrees), 3 points to answers 2, 8 & 9 (neutral/ no response / does not know), 0 points to answer option 3 (disagrees) • *p4_8_4 – You feel* ***at peace that you have enough money*** 5 points to answer option 1 (agrees), 3 points to answers 2, 8 & 9 (neutral/ no response / does not know), 0 points to answer option 3 (disagrees) Points on each question are added and averaged. Maximum (total) index score is 5 points. Results are also normalised to 100 for reporting ease.
Standard of Living Index Score	Based on of Schreiner *"Poverty Score Mexico"* (2009) and *"Poverty-Assessment Tool Mexico"* (2017). Involved deriving 5 intermediate variables that help measure household and dwelling characteristics that approximate general socioeconomic status & living conditions of respondents. Variables used for interim variables are: • *Rooms per person in dwelling* *p0_2* – Total number of rooms in dwelling (including kitchen & not counting bathroom) *p0_3* – Total number of full-bathrooms (shower & toilet) in dwelling *p1_1* – Total number of people normally living in dwelling (including children, elderly people, domestic household employees, relatives) • *Vehicles* *p0_4_1* – People in this dwelling have a vehicle (car or van) (1 – Yes /2– No) *p0_4_1a* – Total number of vehicles (cars or vans) in this dwelling • *Internet* *p0_4_2* – Dwelling has internet (1 – Yes /2– No) *p0_4_2a* – Internet service in dwelling is fixed (1 – Yes /2– No) • *People under a single budget* *p1_1* (see variable description above) *p1_2* – Do all the people you claim to normally live in this dwelling (total number mentioned in p1_1) fall under the same household expenditures budget (i.e. is there only one budget for all)? (1 – Yes /2– No) *p1_3* – How many separate household budgets exist in this dwelling (including yours)?	I adapt Schreiner 's *"Poverty Score Mexico"* (2009) and *"Poverty-Assessment Tool Mexico"* (2017) methodology and Ambrosius (2011) scoring to the data available through ENIF 2021. Intermediate variables measuring household & dwelling characteristics approximating general socioeconomic status & living conditions: • *Rooms per person in dwelling index* Total number of rooms (including kitchen and full bathrooms) in household divided by total number of people living in dwelling [(p0_2+ p0_3)/p1_1] Index score given as follows: 0 – if rooms per person ≤ 0.5 7 – if 0.5 < rooms per person ≤ 1.1 14 – if 1.1 < rooms per person ≤ 1.7 21 – if 1.7 < rooms per person ≤ 2.4 28 – if 2.4 < rooms per person • *Vehicles index* Consolidated information from p0_4_1 & p0_4_1 into single variable giving total number of vehicles in dwelling. Index score given as follows: 0 – if number of vehicles = 0 7 – if number of vehicles = 1 14 – if number of vehicles = 2 21 – if number of vehicles =3 28 – if number of vehicles ≥ 4 • *Internet index* 0 – If dwelling has no internet [p0_4_2=2]

	• *Per household number of members working* *p2_8* – Number of people in your household that work	7 – If dwelling has internet but it is not fixed [p0_4_2=1 & p0_4_2a=2] 14 – If dwelling has internet and it is fixed [p0_4_2=1 & p0_4_2a=1] • *People under a single budget index* Consolidated information from p1_1, p1_2 & p1_3 into single variable giving total number of separate household budgets in dwelling. Divided the latter by total number of people living in dwelling [consolidated number of budgets/ p1_1] Index score given as follows: 0 – if number of budgets ≤ 0.1 7 – if 0.1 < number of diff. budgets ≤ 0.2 14 – if 0.2 < number of diff. budgets ≤ 0.3 21 – if 0.3 < number of diff. budgets ≤ 0.4 28 – if 0.4 < number of diff. budgets • *Per household number of members working index* Used information in p2_8 (as given) Computed overall score as the total sum of the prior 5 intermediate variables. Maximum Score is : 126 points (28 x 4 + 14 = 126). Results are normalised (multiplied by 100/126) for reporting ease. **By the valence of the component items in the index a higher score implies better living conditions (and thus less material poverty). We therefore denote the index as a Standard of Living Score rather than a Poverty Score.**
Mistrust DCs, CC s& their providers	Series of questions used to derive the intermediate mistrust variables for: DCs and their use: *p5_4_1 to p5_4_9 ; p5_20, p5_21 & p5_22* CCs: *p6_2_1, p6_2_2, p6_14, p6_15 & p6_16* (See above for full description on the 2 intermediate mistrust variables).	Consolidated the information from the variables to derive overarching dummy variable coding: 1– If respondent gave as main reason for not having (neither before nor now) and/or using DCs or CC: *"mistrust in financial institutions and in card payments; having had prior bad experiences with financial institutions, believing FIs give bad service, etc"* 0– Otherwise (when respondent had the financial instrument, or did not have it but gave different main reason for not having them).
Informal savings channels use (total)	Series of questions *p5_1_1- p5_1_6*: *p5_1_1* – Saved by lending money *p5_1_2* – Saved by purchasing livestock or capital goods *p5_1_3* – Saved on a workplace '*caja*' or in a community cooperative *p5_1_4* – Left savings with family or friends *p5_1_5* – Participated in a '*Tanda*' or Rotating Savings and Credit Association (ROSCA) round *p5_1_6* – Saved your money in your house	Created dummy variables of each of the survey questions in set *p5_1_1 – p5_1_6* so that they coded: 1 – Whenever respondent had used the given informal saving channel in prior year Then I created second variable that records the number of informal saving channels used (calculated as the total

		sum of all instances a person used an informal saving channel).
Informal credit channels use (total)	Series of questions *p6_1_1- p6_1_5*: *p6_1_1* – Borrowed from workplace '*caja*' or in a community lending cooperative *p6_1_2* – Borrowed from a pawn shop / pawn house *p6_1_3* – Borrowed from friends or acquaintances *p6_1_4* – Borrowed from family *p6_1_5* – Other informal sources of credit	Created dummy variables of each of the survey questions in set *p6_1_1 – p6_1_5* so that they coded*:* 1 – Whenever respondent had used the given informal credit channel in prior year Then I created second variable that records the number of informal credit channels used (calculated as the total sum of all instances a person used an informal credit channel).

EMPIRICAL SPECIFICATION: Payment Behavioural Effects

Table 4.A.2:

Hypothesized Effects on Financial Behaviours Index Components $Y^{FINANCIAL\ BEHAVIOURS}$		
'*Budgeting*' & '*keeping track*' behaviours	**Behaviours to enhance ability to '*face unexpected income shock*'**	**Responsible and informed spending behaviours**
1. ↓ Budgets 6. ↓ Makes considered (affordable / within budget) purchases 9. ↓ 'Keeping watch' over one's own finances	2. ↓ Has active savings 3. ↓ Avoids borrowing to make ends meet (modifies behaviour to avoid insufficiency of funds) 8. ↓ Works to achieve long-term financial goals (indirect effect due to ↓ impulse-control)	4. ↓ Evaluates and compares products before acquisition 5. ↓ Gathers and uses specialized information about products before up taking (incl. financial). 7. ↓ Pays bills on time

* Upper-scripts denote the number of the ENIF 2021 question used to provide data on each concept.
More details on the derivation of the FBI in preceding appendix Table A.1.

DESCRIPTIVE STATISTICS

Table 4.A.3 :

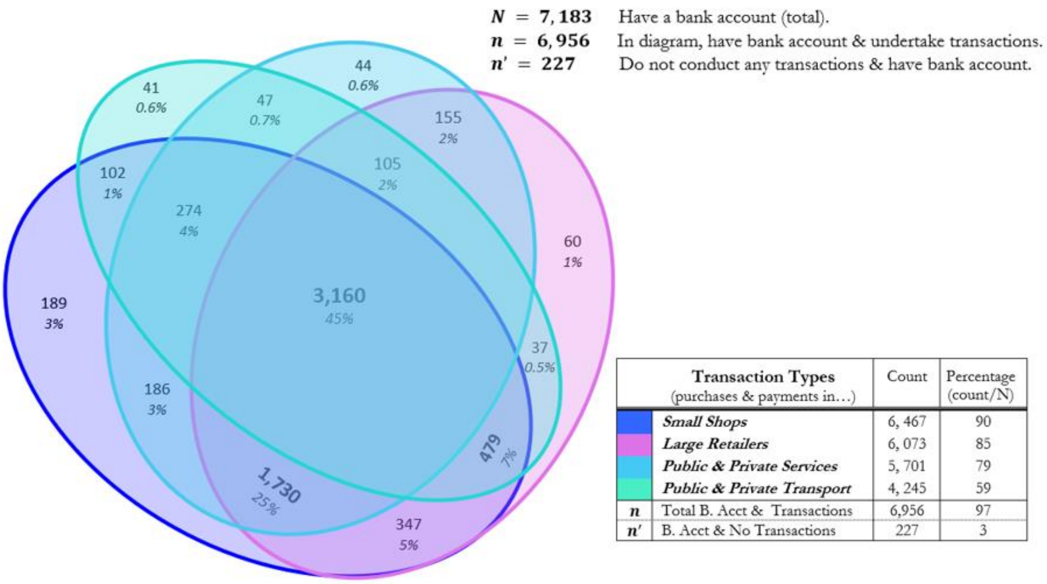
Descriptive Statistics ENIF 2021: Type of Transactions

Variables	N	Mean	Std. Dev.	Min	Max
<u>Transaction Type Controls:</u>					
Small value purchases	13554	.192	.643	0	4
Large value purchases	13554	.406	.936	0	4
Purchases in small shops	13554	.474	1.202	0	4
Purchases in large retailers & chains	13554	1.148	1.615	0	4
Public & private services & utility payments	13554	1.237	1.721	0	4
Public & private transport payments	13554	1.678	1.928	0	4

All quantities calculated over estimation sample.

Figure 4.A.1:

Distribution of account holders' transactions by category (last 3 months)



*Percentages in elliptical rose diagram are based $n = 6{,}956$, the total number of conducted transactions.

Table 4.A.4: ENIF 2021 Forms of Payment per Type of Transaction: (total sample usage counts)

Payment Method	***Small Shops***	***Large Retailers***	***Public or Priv. Services & Utilities***	***Public or Priv. Transport***
Cash [a]	11,223	7,504	8,210	7,369
DC and CC [b]	905	2,745	1,016	520
Electronic or Digital Transfers (apps) [c]	92	200	781	221
Conducts transaction (total) [d]	12,220	10,449	10,007	8,110
Does not conduct transaction [e]	1,334	3,105	3,547	5,444
Total (observations) [f]	13,554	13,554	13,554	13,554

* Counts based on total sample (unrestricted by bank account holding).
* $d = a + b + c$ and $f = d + e$

Table 4.A.5: ENIF 2021 Forms of Payment per Type of Transaction (usage counts among acct. holders)

Payment Method	***Small Shops Purchases***	***Large Retailers & Pharmacies***	***Public or Private Services & Utilities***	***Public or Private Transport Services***
Cash [a]	5,616	3,344	4,049	3,613
DC and CC [b]	778	2,555	919	427
Electronic or Digital Transfers (apps) [c]	73	174	733	205
Conducts transaction (total) [d]	6,467	6,073	5,701	4,245
Does not conduct transaction [e]	716	1,110	1,482	2,938
Total (observations) [f]	7,183	7,183	7,183	7,183

* Counts based on sample restricted by bank account holding.

$* \, d = a + b + c$ and $f = d + e$

Figure 4.A.2

Distribution of financial fraud claims experienced per type of offence (last 3 years)

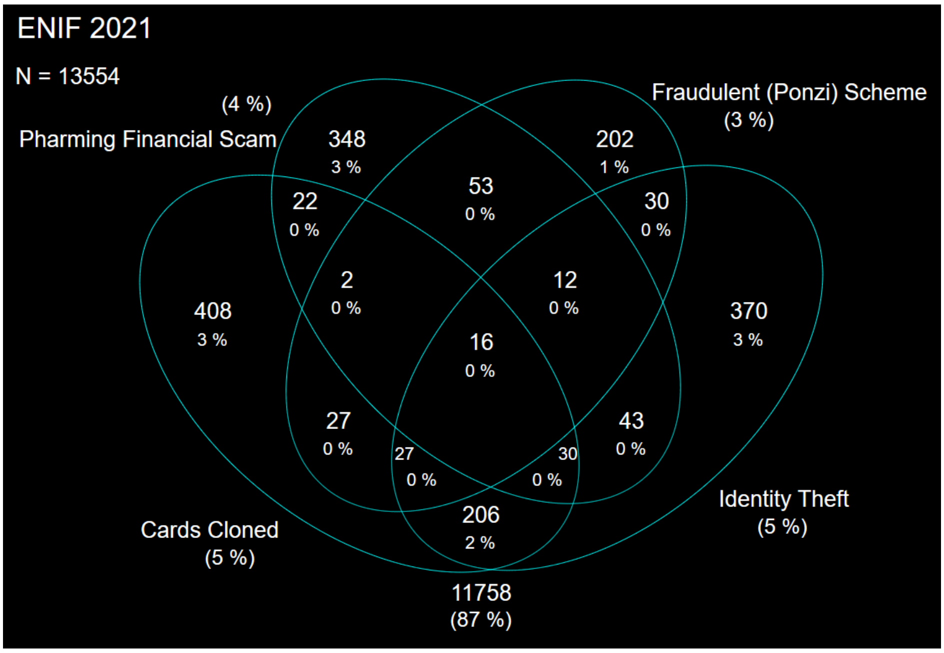


Table 4.A.6:

Descriptive Statistics ENIF 2021: Geographic Controls

Variables	N	Mean	Std. Dev.	Min	Max
Geographic Controls:					
Locality size > 100,000 inhabitants	13554	.486	.500	0	1
15,000 < Locality size < 99,999	13554	.146	.353	0	1
2,500 < Locality size <14,999	13554	.136	.343	0	1
Locality size < 2,499 inhabitants	13554	.232	.422	0	1
Region: Northwestern states	13554	.185	.388	0	1
Region: Northeastern states	13554	.182	.386	0	1
Region: West & Bajío states	13554	.190	.392	0	1
Mexico City	13554	.069	.254	0	1
Region: Center, Centre-South & Eastern states	13554	.187	.390	0	1
Region: Southern states	13554	.187	.390	0	1
Urban (binary)	13554	.768	.422	0	1
Local Fin Access: ATM per state (avg last yr)	13554	2152.136	2123.931	371	8533

All quantities calculated over estimation sample.

Table 4.A.7:

Schooling	Holding (counts) of product or service (ENIF 2021)			
	Bank Acct (a)	***DC*** (b)	***CC**** (c)	***MB*** (d)
None or (at most) Preschool	250	192	17	6
Elementary	1,123	985	194	84
Junior High	1,704	1,563	456	492
High School	1,761	1,629	602	950

University (Bachelors, Masters, PhD)	2,345	2,248	1,218	1,625

* All cells represent counts.
* Cells on columns (b)-(d) represent total counts conditioned on having a bank account (counts of respondents that given that they have bank account they held or have the payment method denoted by the column, per education level).
(a) Total amount of respondents with a bank account per level of schooling.
(b) Total amount of respondents ***with bank account*** that ***have*** a DC per level of schooling.
(c) Total amount of respondents ***with bank account*** that ***have*** a CC per level of schooling.
(d) Total amount of respondents ***with bank account*** that ***have*** MB per level of schooling.
* Counts of CC holders exclude those that held retail-shop CCs but no high street banks CC. Consideration of the former type of CC holding would inevitably imply higher counts for CC holding as 25.42% of all respondents claiming to have some type of CC in 2021 (i.e. 958 of the total 3,445 with CCs) held a non-banking (retailing or NFIs) CC.

Table 4.A.8:

Schooling	Holding (counts) of product or service (ENIF 2012)			
	Bank Acct (a)	***DC*** (b)	***CC**** (c)	***MB*** (d)
None or (at most) Preschool	40	25	11	1
Elementary	361	255	79	7
Junior High	561	445	195	12
High School	479	380	160	25
University (Bachelors, Masters, PhD)	680	598	337	70

* All cells represent counts.
* Cells on columns (b)-(d) represent total counts conditioned on having a bank account (counts of respondents that given that they have bank account they held or have the payment method denoted by the column, per education level).
(a) Total amount of respondents with a bank account per level of schooling.
(b) Total amount of respondents ***with bank account*** that ***have*** a DC per level of schooling.
(c) Total amount of respondents ***with bank account*** that ***have*** a CC per level of schooling.
(d) Total amount of respondents ***with bank account*** that ***have*** MB per level of schooling.
* Counts of CC holders exclude those that held retail-shop CCs but no high street banks CC. Consideration of the former type of CC holding would inevitably imply higher counts for CC holding as 43.37% of all respondents claiming to have some type of CC in 2012 (i.e. 599 of the total 1,381 with CCs) held a non-banking (retailing or NFIs) CC.

Table 4.A.9:

Locality Size	Holding (counts) by locality size (2012)			
	Bank Acct (a)	***DC*** (b)	***CC**** (c)	***MB*** (d)
High-Urban (100,000+ residents)	1,265	1,058	554	84
Mid-Urban (15,000 – 99,999 residents)	292	230	101	15
Low-Urban (2,500 – 14,999 residents)	201	138	42	10
Rural (residents < 2, 500)	366	280	85	6
Totals across localities	*2,124*	*1,706*	*782*	*115*

* Cells on column (a) represent row counts taking the whole of the sample population living in each type of locality into account.
* Cells on columns (b)-(d) represent row counts conditional on having a bank account and living in each type of locality size.
* Counts of CC holders exclude those that held retail-shop CCs but no high street banks CC. Consideration of the former type of CC holding would inevitably imply higher counts for CC holding as 43.37% of all respondents claiming to have some type of CC in 2012 (i.e. 599 of the total 1,381 with CCs) held a non-banking (retailing or NFIs) CC.

Table 4.A.10:

Locality Size	Holding (counts) by locality size (ENIF 2021)			
	Bank Acct (a)	***DC*** (b)	***CC**** (c)	***MB*** (d)

High-Urban (100,000+ residents)	4,071	3,835	1,575	2,087
Mid-Urban (15,000 – 99,999 residents)	1,055	981	373	464
Low-Urban (2,500 – 14,999 residents)	808	719	232	311
Rural (residents < 2, 500)	1,249	1,082	307	295
Totals	7,183	6,617	2,487	3,157

* Cells on column (a) represent row counts taking the whole of the sample population living in each type of locality into account.
* Cells on columns (b)-(d) represent row counts conditional on having a bank account and living in each type of locality size
* Counts of CC holders exclude those that held retail-shop CCs but no high street banks CC. Consideration of the former type of CC holding would inevitably imply higher counts for CC holding as 25.42% of all respondents claiming to have some type of CC in 2021 (i.e. 958 of the total 3,445 with CCs) held a non-banking (retailing or NFIs) CC.

Table 4.A.11:

Counts and Difference in Financial Management Behaviours (ENIF 2012)

Financial Management Behaviours	***Counts of respondents ENIF 2012***		
	Total sample (a)	Account holders. (b)	Difference (c)
Saved through formal fin institution (last month)	907	907	0
Budgets (keeps record of personal finances)	573	621	48
Overspends (binary)	2,784	1,003	**-1,781**
Capacity to face unexpected econ shock	1,047	1,000	**-47**

* Column (c) gives count difference (b -a).

Table 4.A.12:

Counts and Difference in Financial Management Behaviours (ENIF 2021)

Financial Management Behaviours	***Counts of respondents ENIF 2021***		
	Total sample (a)	Account holders. (b)	Difference (c)
Saved through formal fin institution (last month)	2,986	2,986	0
Budgets (keeps record of personal finances)	3,074	2,194	**-880**
Overspends (binary)	6,600	3,116	**-3,484**
Capacity to face unexpected econ shock	8,509	5,098	**-3,411**

* Column (c) gives count difference (b -a).

Table 4.A.13:

Descriptive Statistics ENIF 2021: Financial Behaviours and Attitudes

Variables	N	Mean	Std. Dev.	Min	Max
Financial Management Behaviours:					
Saved through formal fin institution (last month)	13554	.220	.414	0	1
Numb. accts save in formal FI (last month)	13554	.261	.534	0	4
Budgets (keeps record of personal finances)	13554	.227	.419	0	1
Overspends (binary)	13554	.487	.500	0	1
Capacity to face unexpected econ shock	13554	.628	.483	0	1
Financial Knowledge, Attitudes, WB & Behavior:					
Financial Knowledge (nb correct, normalized)	13554	66.909	20.041	0	100
Financial Attitudes (normalized)	13554	52.525	27.432	0	100
Financial Behaviors (normalized)	13554	50.302	20.88	0	100
Subjective Financial WB (normalized)	13554	49.439	27.413	0	100

All quantities calculated over estimation sample.

Figure 4.A.3:
Predicted Marginal Effects of Financial Knowledge (Non-account holders vs Account Holders)

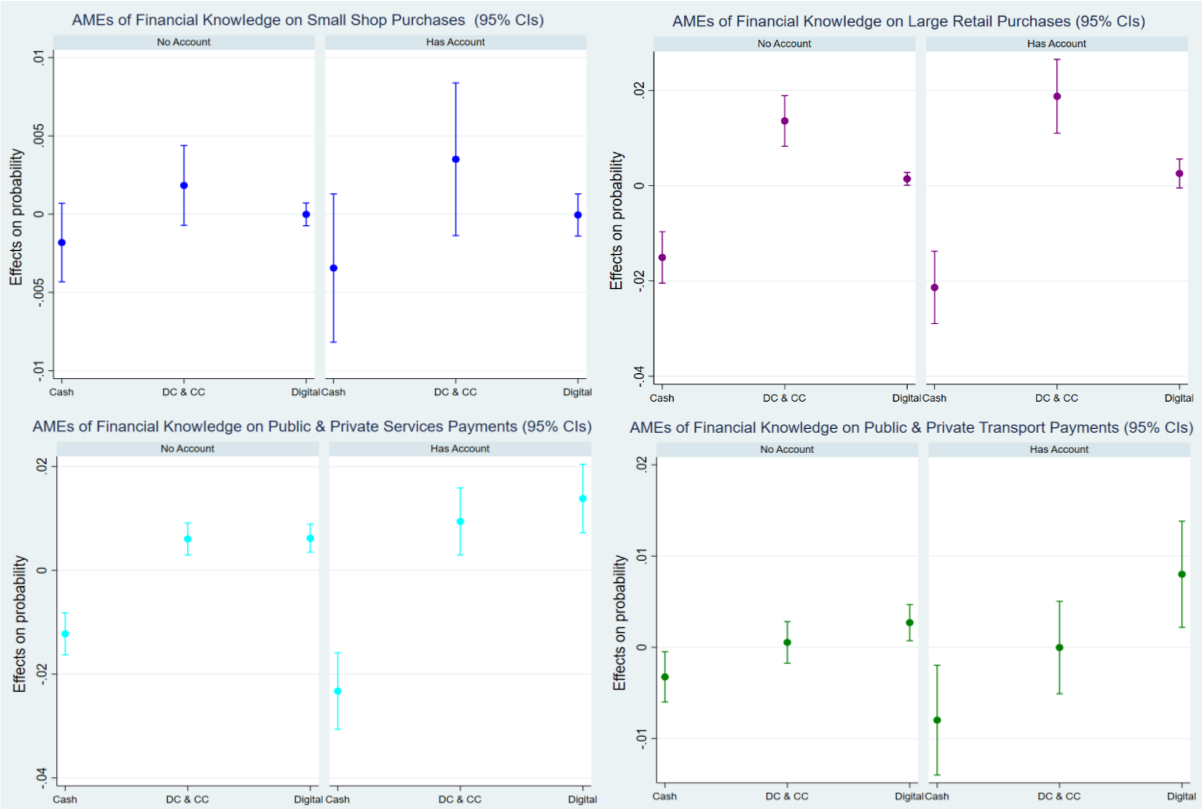


Figure 4.A.4:
Predicted Marginal Effects of Financial Attitudes (Non-account holders vs Account Holders)

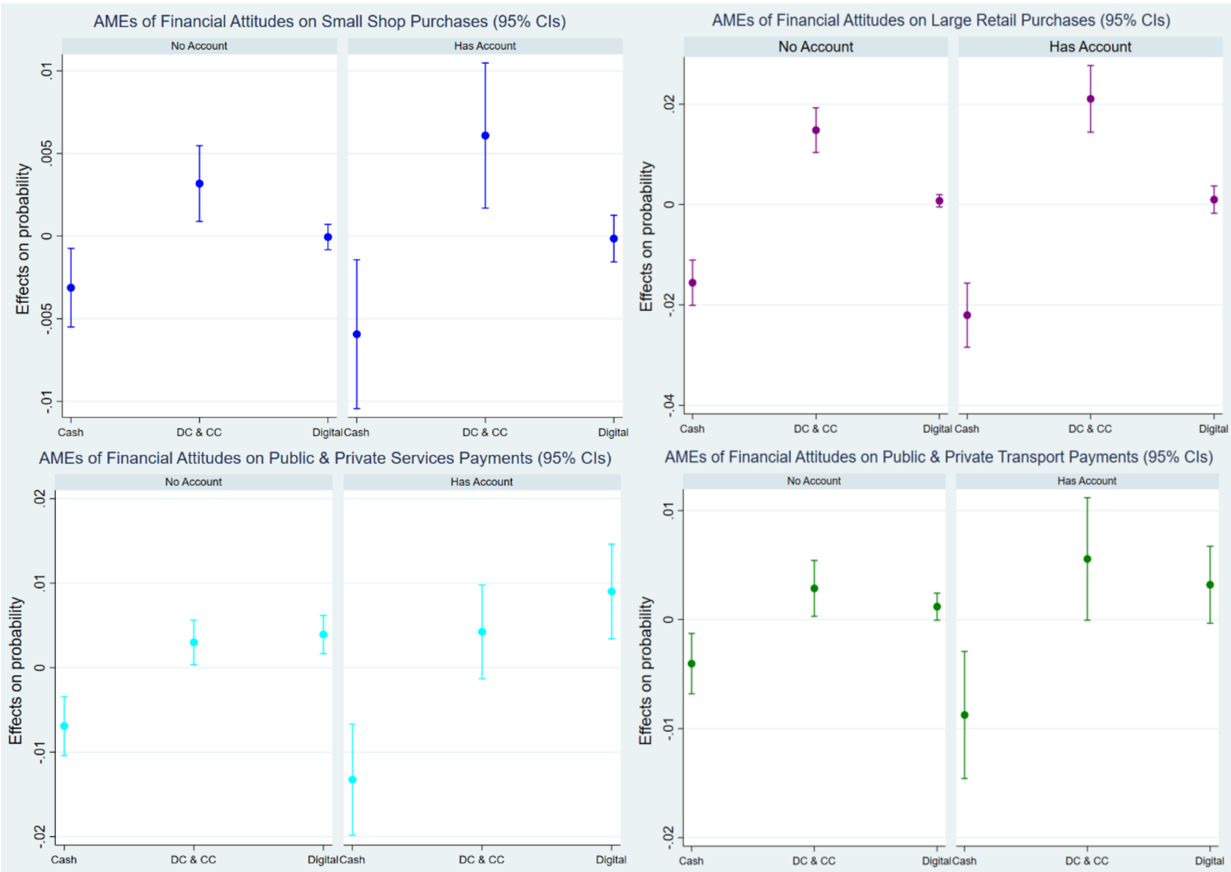


Figure 4.A.5:

Predicted Marginal Effects of Mistrust (Non-account holders vs Account Holders)

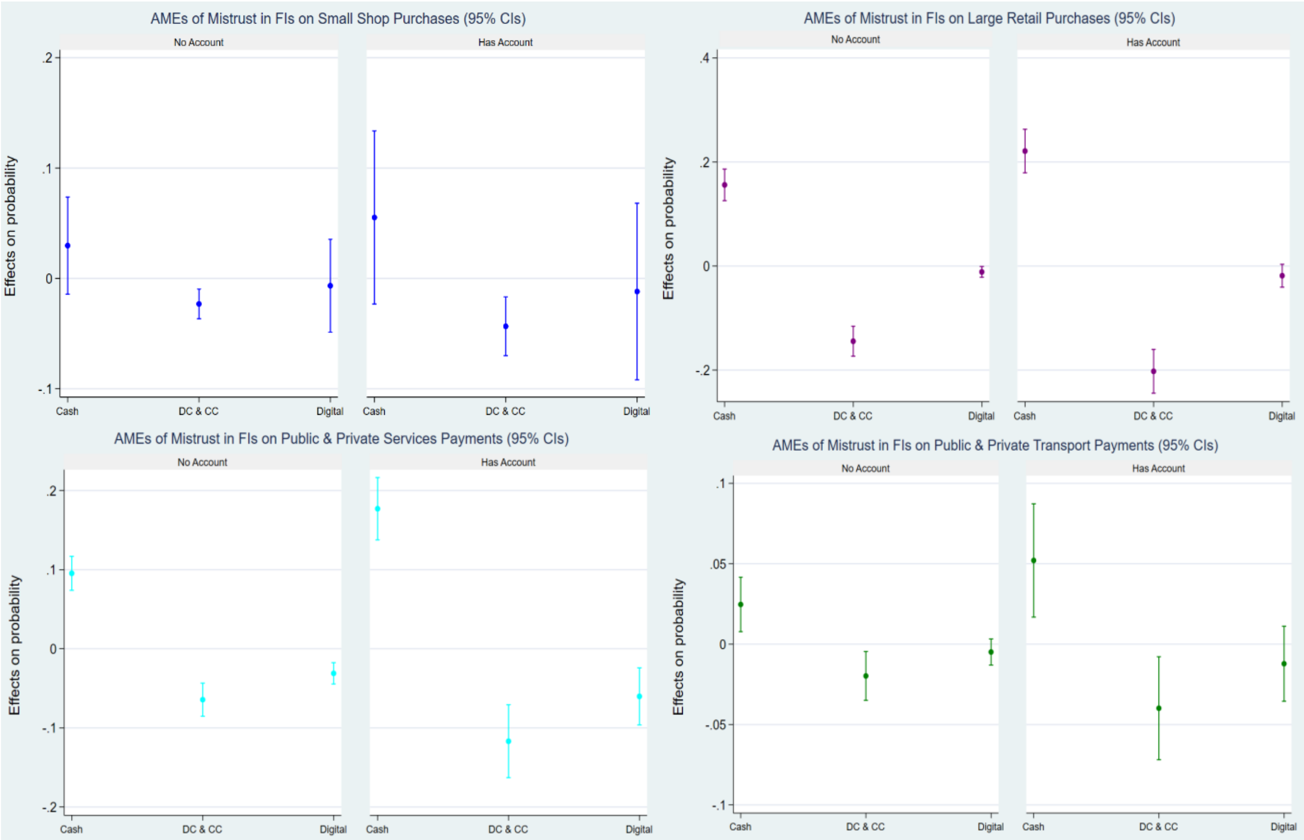


Figure 4.A.6:

Predicted Marginal Effects of Urban Locality (Non-account holders vs Account Holders)

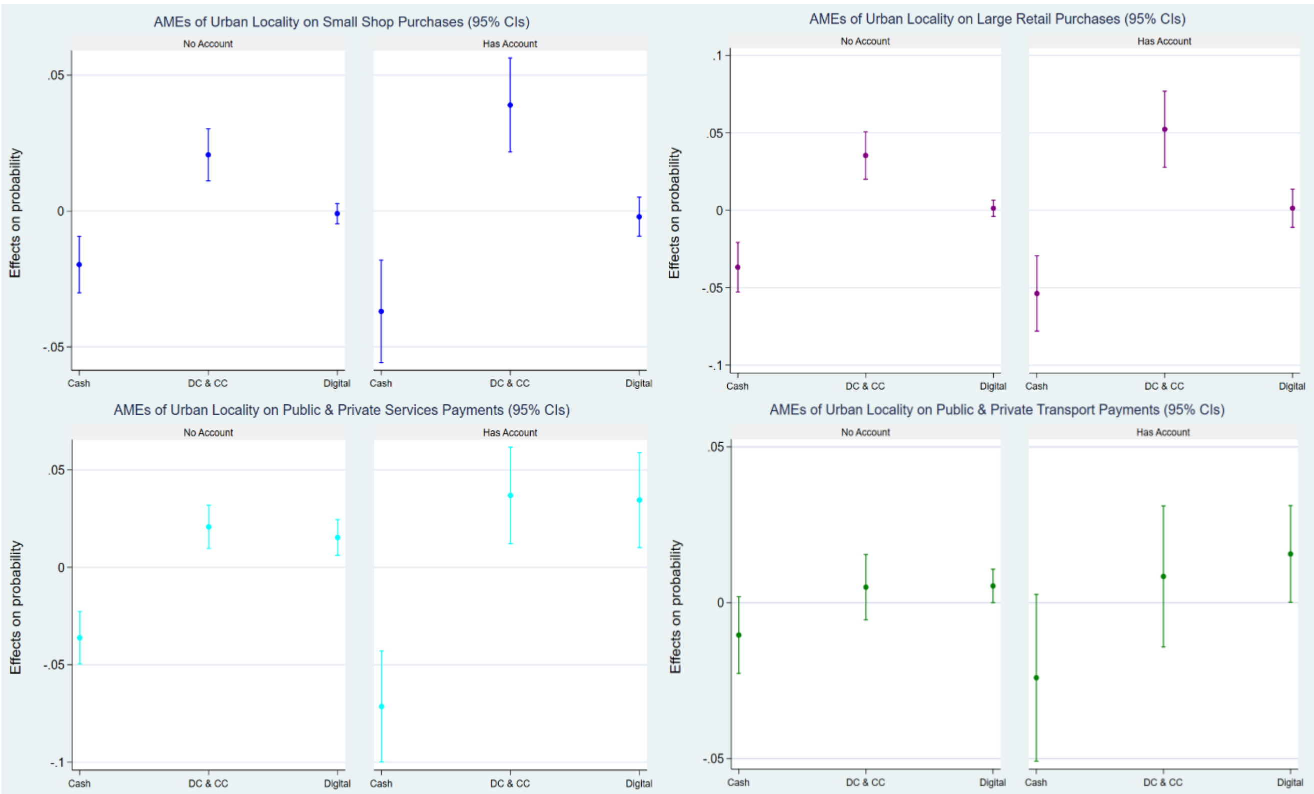
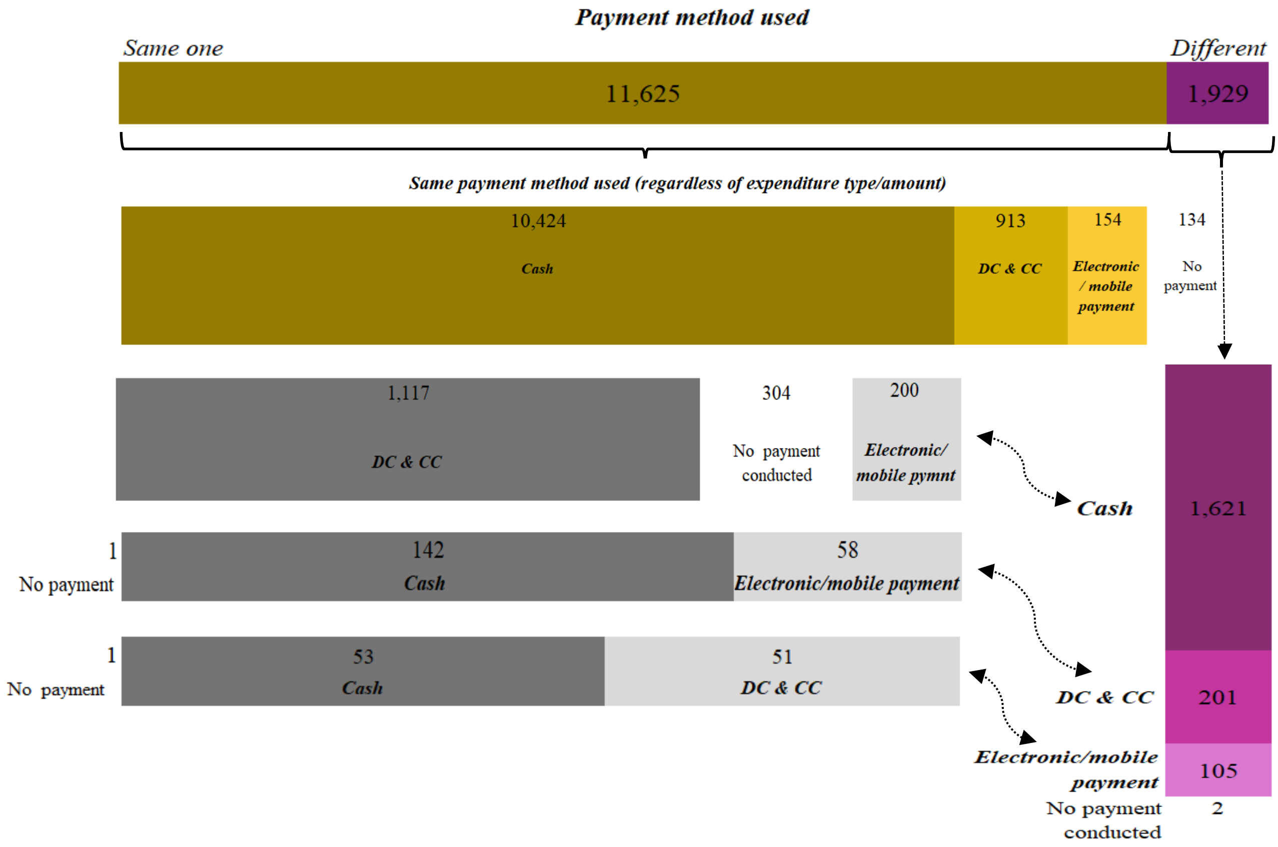


Figure 4.A.7:



*All counts derived from cross-tabulations (contingency tables) revealing highly significant associations (p<0.001) as per Chi-squared test results.

Table 4.A.14: AME of Logit Regressions (Purchases in Small and Large Shops)

Transaction Types	*Observed Predicted Probabilities of Using Non-cash Payment Forms* (a) $\hat{\beta}_{AME}$	(b) Standard error	*Hypothesised Effects* (c)
Small Shop Purchases	**N = 12, 220**	$R^2 = 0.1098$	
Age	0.002	(0.002)	ambiguous
Gender	0.007	(0.005)	ambiguous
In couple	0.008	(0.005)	ambiguous
Urban	0.029***	(0.007)	> 0
Region	0.038***	(0.005)	> 0
ATMs in state (avg last yr)	-0.000	(0.003)	ambiguous
Standard of Living Index	0.001***	(0.000)	> 0
Elementary	0.021*	(0.009)	> 0
Jr. High	0.048***	(0.011)	> 0
High School	0.067***	(0.010)	> 0
University	0.094***	(0.012)	> 0
Worked last month	0.012	(0.009)	> 0
Earnings (fixed vs variable)	0.006	(0.006)	> 0

***
**
*

Monthly earnings	0.003^{*}	(0.001)	> 0	
Receives remittances	-0.003	(0.007)	ambiguous	
Financial knowledge score	0.003	(0.002)	> 0	
Financial Attitudes score	0.005^{*}	(0.002)	> 0	
Subjective Fin WB score	0.007^{***}	(0.002)	ambiguous	
Mistrust in FIs (DC&CC)	-0.041^{***}	(0.011)	< 0	
Fraud experience	0.013^{***}	(0.004)	< 0	
Banking corresp. use	0.014^{**}	(0.005)	ambiguous	
Informal savings use	0.010^{***}	(0.002)	< 0	
Informal credits use	0.001	(0.003)	< 0	
Large Retail & Pharmacy Store Purchases	**N = 10, 449**	$R^2 = 0.2306$		
Age	0.018^{***}	(0.003)	ambiguous	***
Gender	0.006	(0.008)	ambiguous	**
In couple	0.023^{**}	(0.008)	ambiguous	*
Urban	0.047^{***}	(0.012)	> 0	
Region	0.016	(0.009)	> 0	
ATMs in state (avg last yr)	0.020^{***}	(0.005)	ambiguous	
Standard of Living Index	0.003^{***}	(0.000)	> 0	
Elementary	0.037	(0.029)	> 0	
Jr. High	0.130^{***}	(0.028)	> 0	
High School	0.231^{***}	(0.027)	> 0	
University	0.373^{***}	(0.030)	> 0	
Worked last month	0.024	(0.014)	> 0	
Earnings (fixed vs variable)	0.047^{***}	(0.010)	> 0	
Monthly earnings	0.021^{***}	(0.002)	> 0	
Receives remittances	-0.002	(0.011)	ambiguous	
Financial knowledge score	0.019^{***}	(0.004)	> 0	
Financial Attitudes score	0.019^{***}	(0.003)	> 0	
Subjective Fin WB score	0.026^{***}	(0.003)	ambiguous	
Mistrust in FIs (DC&CC)	-0.194^{***}	(0.017)	< 0	
Fraud experience	0.046^{***}	(0.006)	< 0	
Banking corresp. use	0.032^{***}	(0.008)	ambiguous	
Informal savings use	0.015^{***}	(0.004)	< 0	
Informal credits use	0.000	(0.005)	< 0	

All quantities calculated over entire estimation sample using bootstrapped standard errors.
*** p<0.001, ** p<0.01, * p<0.05

Table 4.A.15: AME of Logit Regressions (Public and Private Utilities & Transportation)

Transaction Types	***Observed Predicted Probabilities of Using Non-cash Payment Forms*** (a) $\hat{\beta}_{AME}$	(b) Standard error	***Hypothesised Effects*** (c)	
Public & Private Utilities Payments	**N = 10, 007**	$R^2 = 0.2544$		
Age	-0.002	(0.003)	ambiguous	***
Gender	0.002	(0.006)	ambiguous	**
In couple	0.004	(0.007)	ambiguous	*
Urban	0.056^{***}	(0.009)	> 0	
Region	0.012	(0.007)	> 0	
ATMs in state (avg last yr)	0.006	(0.004)	ambiguous	
Standard of Living Index	0.003^{***}	(0.000)	> 0	
Elementary	0.007	(0.023)	> 0	

Jr. High	0.041	(0.023)	> 0
High School	0.107***	(0.022)	> 0
University	0.237***	(0.025)	> 0
Worked last month	0.026*	(0.013)	> 0
Earnings (fixed vs variable)	0.018*	(0.009)	> 0
Monthly earnings	0.012***	(0.002)	> 0
Receives remittances	-0.013	(0.011)	ambiguous
Financial knowledge score	0.018***	(0.003)	> 0
Financial Attitudes score	0.010***	(0.002)	> 0
Subjective Fin WB score	0.021***	(0.003)	ambiguous
Mistrust in FIs (DC&CC)	-0.142***	(0.015)	< 0
Fraud experience	0.035***	(0.006)	< 0
Banking corresp. use	-0.013	(0.007)	ambiguous
Informal savings use	0.006	(0.003)	< 0
Informal credits use	0.000	(0.005)	< 0
Public & Private Transportation Payments	**N = 8, 110**	$R^2 = 0.2204$	
Age	-0.013***	(0.003)	ambiguous
Gender	0.008	(0.006)	ambiguous
In couple	0.007	(0.007)	ambiguous
Urban	0.016	(0.010)	> 0
Region	0.033***	(0.007)	> 0
ATMs in state (avg last yr)	0.026***	(0.004)	ambiguous
Standard of Living Index	0.002***	(0.000)	> 0
Elementary	-0.012	(0.024)	> 0
Jr. High	-0.003	(0.023)	> 0
High School	0.022	(0.024)	> 0
University	0.096***	(0.023)	> 0
Worked last month	0.027**	(0.011)	> 0
Earnings (fixed vs variable)	-0.008	(0.007)	> 0
Monthly earnings	0.003*	(0.001)	> 0
Receives remittances	-0.014	(0.010)	ambiguous
Financial knowledge score	0.005*	(0.002)	> 0
Financial Attitudes score	0.006**	(0.002)	> 0
Subjective Fin WB score	0.012***	(0.002)	ambiguous
Mistrust in FIs (DC&CC)	-0.039**	(0.013)	< 0
Fraud experience	0.023***	(0.004)	< 0
Banking corresp. use	-0.006	(0.007)	ambiguous
Informal savings use	-0.002	(0.003)	< 0
Informal credits use	-0.004	(0.004)	< 0

	***
	**
	*

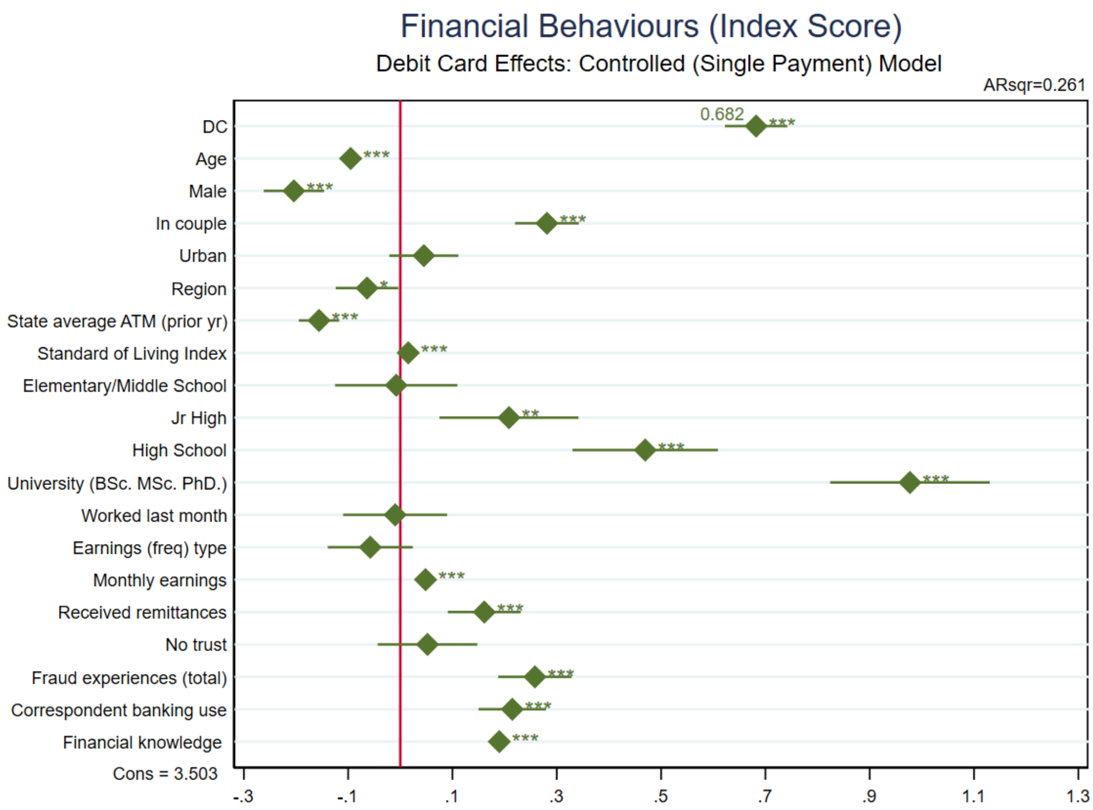
All quantities calculated over entire estimation sample using bootstrapped standard errors.
*** p<0.001, ** p<0.01, * p<0.05

REGRESSION ANALYSES TABLES

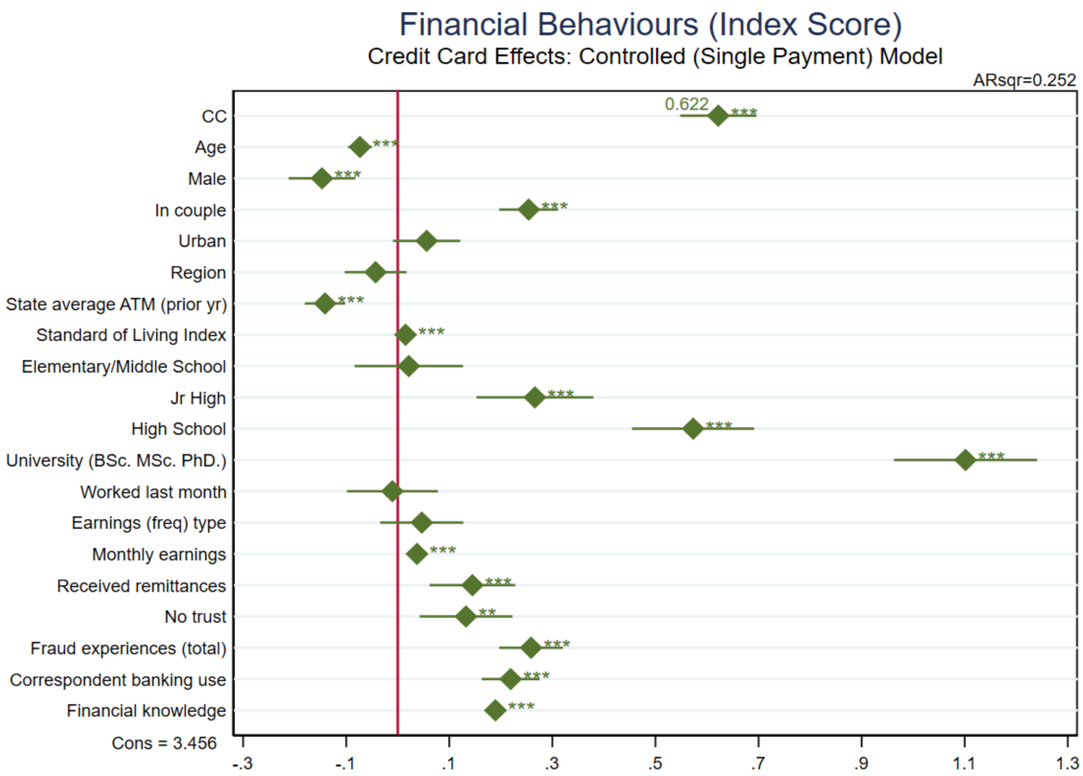
Part 2

Figure 4.A.8:

Controlled single payment treatment regressions (pre-Oster adjustments)



Financial Behaviours (Index Score)
Debit Card Effects: Controlled (Single Payment) Model
ARsqr=0.261
0.682
DC
Age
Male
In couple
Urban
Region
State average ATM (prior yr)
Standard of Living Index
Elementary/Middle School
Jr High
High School
University (BSc. MSc. PhD.)
Worked last month
Earnings (freq) type
Monthly earnings
Received remittances
No trust
Fraud experiences (total)
Correspondent banking use
Financial knowledge
Cons = 3.503
-.3
-.1
.1
.3
.5
.7
.9
1.1
1.3



Financial Behaviours (Index Score)
Credit Card Effects: Controlled (Single Payment) Model
ARsqr=0.252
0.622
CC
Age
Male
In couple
Urban
Region
State average ATM (prior yr)
Standard of Living Index
Elementary/Middle School
Jr High
High School
University (BSc. MSc. PhD.)
Worked last month
Earnings (freq) type
Monthly earnings
Received remittances
No trust
Fraud experiences (total)
Correspondent banking use
Financial knowledge
Cons = 3.456
-.3
-.1
.1
.3
.5
.7
.9
1.1
1.3

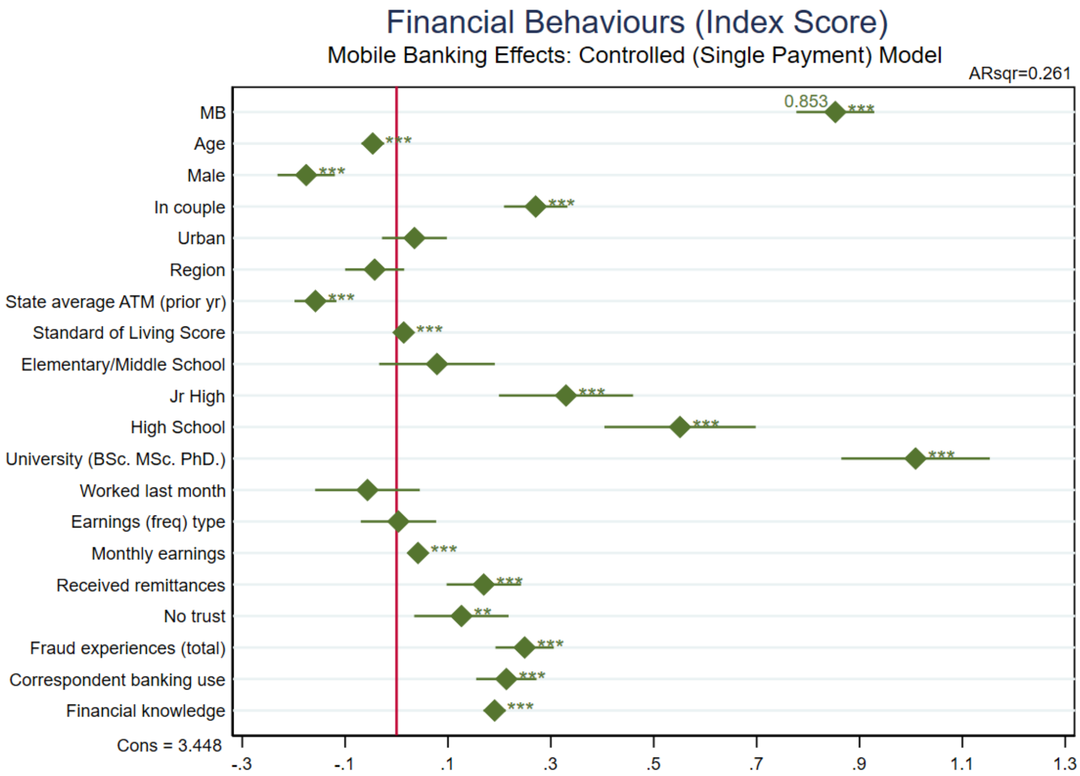


Table 4.A.16 :

Pre-Oster Adjustment Results Comparison: Uncontrolled vs Controlled

Payments Coefficients	(1) $\dot{\beta}$	(2) $\widetilde{\beta_{NoP}}$	(3) $\left(\frac{\widetilde{\beta_{NoP}}-\dot{\beta}}{\dot{\beta}}\right)$	(4) $\widetilde{\beta_{AP}}$	(5) $\left(\frac{\widetilde{\beta_{AP}}-\dot{\beta}}{\dot{\beta}}\right)$
DC	1.179***	0.682***	*-42%*	0.448***	*-62%*
CC	1.255***	0.622***	*-50%*	0.484***	*-61%*
MB	1.661***	0.853***	*-49%*	0.525***	*-68%*
Explained Variation	$\dot{R}^2$	$\widetilde{R^2_{NoP}}$	$\left(\frac{\widetilde{R^2_{NoP}}-\dot{R}}{\dot{R}}\right)$	$\widetilde{R^2_{AP}}$	$\left(\frac{\widetilde{R^2_{AP}}-\dot{R}}{\dot{R}}\right)$
DC	0.098	0.261	*165%*	0.282	*187%*
CC	0.085	0.252	*198%*	0.282	*234%*
MB	0.140	0.261	*87%*	0.282	*102%*

Table 4.A.17: Oster Model's R_{max} Parameter Derived Values:

Payment Form (Treatment)	***Models considering a single payment form***			
		R_{max}		
	(a) $\widetilde{R^2_{NoP}}$	(b) $1.3(\widetilde{R^2_{NoP}})$	(c) $2(\widetilde{R^2_{NoP}})$	(d) **1**

DC	0.261	0.339	0.522	1
CC	0.252	0.328	0.504	1
MB	0.261	0.339	0.522	1

Table 4.A.18: Oster-Adjustment Results Comparison

$\boldsymbol{\delta = 1}$

Equal selection on unobservables and observables

Coef. Values	**DC**			**CC**			**MB**		
Unadjusted $\widetilde{\beta_{NoP}}$	0.682^{***}			0.622^{***}			0.853^{***}		
Bias-adjusted	$\boldsymbol{R_M = 1}$	$\boldsymbol{R_M = 2\tilde{R}}$	$\boldsymbol{R_M = 1.3\tilde{R}}$	$\boldsymbol{R_M = 1}$	$\boldsymbol{R_M = 2\tilde{R}}$	$\boldsymbol{R_M = 1.3\tilde{R}}$	$\boldsymbol{R_M = 1}$	$\boldsymbol{R_M = 2\tilde{R}}$	$\boldsymbol{R_M = 1.3\tilde{R}}$
$\beta_{NoP}{}^*$	-2.732^{***}	-0.329^{***}	0.410^{***}	-2.411^{***}	-0.364^{***}	0.333^{***}	-5.571^{***}	-1.247^{***}	0.270^{***}
Adjustment Size $\beta_{NoP}{}^* - \widetilde{\beta_{NoP}}$	-3.414	-1.011	-0.272	-3.033	-0.986	-0.289	-6.424	-2.100	-0.583

$\boldsymbol{\delta = 0.5}$

Less selection on unobservables than on observables

Coef. Values	**DC**			**CC**			**MB**		
Unadjusted $\widetilde{\beta_{NoP}}$	0.682^{***}			0.622^{***}			0.853^{***}		
Bias-adjusted	$\boldsymbol{R_M = 1}$	$\boldsymbol{R_M = 2\tilde{R}}$	$\boldsymbol{R_M = 1.3\tilde{R}}$	$\boldsymbol{R_M = 1}$	$\boldsymbol{R_M = 2\tilde{R}}$	$\boldsymbol{R_M = 1.3\tilde{R}}$	$\boldsymbol{R_M = 1}$	$\boldsymbol{R_M = 2\tilde{R}}$	$\boldsymbol{R_M = 1.3\tilde{R}}$
$\beta_{NoP}{}^*$	-0.604^{***}	0.232^{***}	0.551^{***}	-0.696^{***}	0.154^{***}	0.480^{***}	-1.394^{***}	-0.036	0.577^{***}
Adjustment Size $\beta_{NoP}{}^* - \widetilde{\beta_{NoP}}$	-1.286	-0.450	-0.131	-1.318	-0.467	-0.142	-2.247	-0.889	-0.276

$\boldsymbol{\delta = 1.5}$

More selection on unobservables than on observables

Coef. Values	**DC**			**CC**			**MB**		
Unadjusted $\widetilde{\beta_{NoP}}$	0.682^{***}			0.622^{***}			0.853^{***}		
Bias-adjusted	$\boldsymbol{R_M = 1}$	$\boldsymbol{R_M = 2\tilde{R}}$	$\boldsymbol{R_M = 1.3\tilde{R}}$	$\boldsymbol{R_M = 1}$	$\boldsymbol{R_M = 2\tilde{R}}$	$\boldsymbol{R_M = 1.3\tilde{R}}$	$\boldsymbol{R_M = 1}$	$\boldsymbol{R_M = 2\tilde{R}}$	$\boldsymbol{R_M = 1.3\tilde{R}}$
$\beta_{NoP}{}^*$	4.003^{***}	-1.854	0.244^{***}	5.736^{***}	-1.183^{***}	0.168^{**}	3.910^{***}	4.064^{***}	-0.202
Adjustment Size $\beta_{NoP}{}^* - \widetilde{\beta_{NoP}}$	3.321	-2.536	-0.438	5.114	-1.805	-0.454	3.057	3.211	-1.055

Bias-adjustment size ($\beta^* - \tilde{\beta}$) approximates: $\approx \delta[\tilde{\beta} - \dot{\beta}]\frac{R_{max}-\tilde{R}}{\tilde{R}-\dot{R}}$ in the unrestricted case and $\approx \delta\ \frac{\delta\sigma_{1x}\sigma_2^2}{\sigma_1^2\tau_x}$ in the restricted one.

R_M denotes parameter R_{max} and subscript: NOP denotes coefficient values obtained from regression forms taking a single payment form as treatment.

Table 4.A.19: Payment Forms Effect Percentage Changes (Pre and Post Oster Correction for Single Payment Specifications)

$R_{max} = 1$	(1) $\widetilde{\beta_{NoP}}$	$\delta = 0.5$ (2) $\beta_{NoP}{}^*$	(3) $\left(\frac{\beta_{NoP}{}^* - \widetilde{\beta_{NoP}}}{\widetilde{\beta_{NoP}}}\right)$	$\delta = 1$ (4) $\beta_{NoP}{}^*$	(5) $\left(\frac{\beta_{NoP}{}^* - \widetilde{\beta_{NoP}}}{\widetilde{\beta_{NoP}}}\right)$	$\delta = 1.5$ (6) $\beta_{NoP}{}^*$	(7) $\left(\frac{\beta_{NoP}{}^* - \widetilde{\beta_{NoP}}}{\widetilde{\beta_{NoP}}}\right)$
DC	0.682***	-0.604***	*-189%*	-2.732***	*-500%*	4.003***	*487%*
CC	0.622***	-0.696***	*-212%*	-2.411***	*-488%*	5.736***	*822%*
MB	0.853***	-1.394***	*-263%*	-5.571***	*-753%*	3.910***	*358%*
$R_{max} = 2\left(\widetilde{R^2_{NoP}}\right)$	(8) $\widetilde{\beta_{NoP}}$	$\delta = 0.5$ (9) $\beta_{NoP}{}^*$	(10) $\left(\frac{\beta_{NoP}{}^* - \widetilde{\beta_{NoP}}}{\widetilde{\beta_{NoP}}}\right)$	$\delta = 1$ (11) $\beta_{NoP}{}^*$	(12) $\left(\frac{\beta_{NoP}{}^* - \widetilde{\beta_{NoP}}}{\widetilde{\beta_{NoP}}}\right)$	$\delta = 1.5$ (13) $\beta_{NoP}{}^*$	(14) $\left(\frac{\beta_{NoP}{}^* - \widetilde{\beta_{NoP}}}{\widetilde{\beta_{NoP}}}\right)$
DC	0.682***	0.232***	*-66%*	-0.329***	*-148%*	-1.853	*-372%*
CC	0.622***	0.154***	*-75%*	-0.364***	*-159%*	-1.183***	*-290%*
MB	0.853***	-0.036	*-104%*	-1.247***	*-246%*	4.064***	*376%*
$R_{max} = 1.3\left(\widetilde{R^2_{NoP}}\right)$	(15) $\widetilde{\beta_{NoP}}$	$\delta = 0.5$ (16) $\beta_{NoP}{}^*$	(17) $\left(\frac{\beta_{NoP}{}^* - \widetilde{\beta_{NoP}}}{\widetilde{\beta_{NoP}}}\right)$	$\delta = 1$ (18) $\beta_{NoP}{}^*$	(19) $\left(\frac{\beta_{NoP}{}^* - \widetilde{\beta_{NoP}}}{\widetilde{\beta_{NoP}}}\right)$	$\delta = 1.5$ (20) $\beta_{NoP}{}^*$	(21) $\left(\frac{\beta_{NoP}{}^* - \widetilde{\beta_{NoP}}}{\widetilde{\beta_{NoP}}}\right)$
DC	0.682***	0.551***	-19%	0.410***	-40%	0.244***	*-64%*
CC	0.622***	0.480***	-23%	0.333***	-46%	0.168**	*-73%*
MB	0.853***	0.577***	-32%	0.270***	-68%	-0.202	*-124%*

Table 4.A.20:

Sensitivity Analysis [Diegert et al. (2022)]						
Treatment: Payment Form	**DC**		**CC**		**MB**	
Breakdown Points	$R_M = 1$	$R_M = 2\tilde{R}$	$R_M = 1$	$R_M = 2\tilde{R}$	$R_M = 1$	$R_M = 2\tilde{R}$
δ^{BP}_{Oster}	0.273	0.729	0.232	0.666	0.180	0.480
$\delta^{BP}_{Oster-Diegert}$	0.279	0.680	0.236	0.608	0.178	0.433

Chapter 5

Conclusions

"To the extent that an object sets limits to our freedom, does it give way to our freedom; this antithesis reaches its maximum in money. We possess it more than anything but have less of it than all other objects."

(Simmel, 1907, p. 326)

5.1 SUMMARY

The motivation for this thesis emerged from the realization that, despite the growth in the economics of wellbeing literature since the turn of the 21st century, and despite its numerous attempts to enlighten old ponderations regarding money (income) and happiness, there are still gaps in our understanding about how people's engagement with their personal finances influences their SWB.

As explained in Chapter 1, the SWB effects of involvement with one's financial affairs is broader than the analysis of income as a predictor of happiness or of other measures of SWB. In fact, the research presented in this thesis explored effects beyond (and in addition to) those associated with the material wellbeing afforded through financial resources. Specifically, the empirical analyses conducted argued that an impact on SWB can also occur through: the self-autonomy, internal sense of control, and resilience stemming from FC; via affective responses to specific financial balances' holdings; or through people's interaction with and use of different payment instruments. The three empirical chapters of the thesis additionally highlight how the independent analysis of the above factors' impact on SWB is all the more relevant in the midst of the growing importance of financial inclusion as an international policy agenda because both FC and new payment technologies (fintech) have been endorsed as tools to facilitate financial decision making and inclusion of vulnerable populations through formal financial markets and because the latter two can result in behavior-driven changes in households' debt and savings holdings with SWB consequences.

Given that less research exists about the behavioural effects of payments, the effects of financial balances or about those of FC on people's SWB in LMICS than in HICs and given that financial inclusion has become a policy priority in LMICs (because most unbanked populations reside in less developed and developing countries), the empirical research presented in this thesis focused on the particular case of Mexico, still a developing country (or LMIC). Among the later (non-high-income group of countries) the case of Mexico is particularly interesting because, although by the WB's income level classifications Mexico is an upper-middle income country ($4{,}256$ USD $\leq$ Atlas GNI pc. $\leq$ $13{,}205$ USD) and its population evidences an average level of life satisfaction similar to that of other upper-middle income or high-income countries such as Italy, Chile and Poland[391]; according to Global Findex data, Mexico's level of financial inclusion (calculated as the proportion of working age population with a bank account) is at the level of financial inclusion (of much poorer) low-income countries (Atlas GNI pc. $\leq 1{,}085$ USD) such as Afghanistan, Lesotho and Zambia (which have much lower levels of life satisfaction).[392]

In response to gaps in our understanding of SWB's relation to the financial domain of people's lives, and to the puzzle placed by Mexico's situation, this thesis aimed to contribute to SWB research and to the literature on the psychology of payments focusing on developing countries, like Mexico, where financial inclusion is low, financial markets are less deep, and the related literature is scarce.
Using different micro-econometric techniques apt for each chapter's particular enquiry, the three empirical chapters of the thesis based their conceptual framework on diverse BE theories and economic psychology insights. The research questions and corresponding main findings of the three empirical chapters are summarised below.

5.1.1 Chapter 2

Chapter 2 was motivated by the realization that despite the various benefits identified by scholarship about FC in HICs, among the relatively small literature on SWB in Mexico, no studies had yet evaluated its relationship with FC. To date, Mexico does not officially measure FC (which, in addition to financial declarative knowledge encompasses preferences and other psychological traits that influence people's understanding and ability to take good financial decisions) but instead focuses on tracking financial literacy (i.e., propositional rather than practical critical knowledge regarding financial affairs).
Hence, to evaluate whether Mexican's FC influences their SWB, we used PCA over data from the second (2005-2006) and third (2009-2012) waves of the MxFLS and followed FC research guidelines to derive indices that could represent the two FC dimensions identified by the literature: (1) the instrumental money management dimension and (2) a behavioural-attitudinal dimension. Using such indices as main explanatory variables and the CDS as our SWB outcome variable, we ran a series of cross-sectional and panel FE SWB regressions that tested hypotheses grounded on mechanisms that capability theory, locus of control (agency) theory and mental models of finance postulate as arising from people's cognitive involvement with their financial affairs.
The first hypothesis proposed a positive relationship between Mexican's CDS and low FC (expressed through problematic debt and credit mismanagement). The second one hypothesised that values or

[391] According to Helliwell et al. (2022) happiness and wellbeing rankings (where a higher score represents greater reported SWB) Mexico's average life evaluation score was 6.330, Poland's—6.260, Chile's—6.334 and Italy's—6.405. To contextualize, Finland's (the 'happiest' country) was 7.804, the US's—6.894, Germany's—6.892, and the UK's—6.796. Conversely, Afghanistan's (the least happy county) was 1.859, Zambia's—3.982, India's—4.036, Kenya's—4.487, Colombia's—5.630 and China's—5.818. For the complete list of country rankings see Helliwell et al. (2013; 2022).
[392] For global financial inclusion rankings see Global Findex databases 2013-2022.

attributes (related to a sense of autonomy, self-reliance, and responsibility) that motivate people to take proactive measures to ensure financial resilience such as saving (all aspects of high FC) are negatively related with the depression and anxiety symptoms captured via the CDS. Relatedly, the third hypothesis posited that antecedent latent characteristics (such as people's TV preferences, extent of patience and temporal orientation) inclining people to reign in their spending impulsivity (also aspects of high FC) are negatively related with the depression and anxiety symptoms captured via the CDS.

Both waves' cross-sectional results and panel FE results supported the first hypothesis (i.e., a positive relation between the 'not keeping track' subindex reflecting low instrumental money management FC and depression and anxiety (as measured through the CDS). This revealed, a positive causal effect between latent personal attributes causing credit mismanagement (impulsivity, procrastination, status quo bias, negative peer effects, etc) and increased depression symptoms over time.

MxFLS third wave (2009-2012) cross-sectional regression results revealed the hypothesised direction of effect of the savings orientation (resilience) instrumental money management FC index but were not significant. MxFLS second wave (2005-2006) cross-sectional regressions results also revealed a non-significant influence of the savings orientation index but on opposite direction than hypothesised. Panel FE results suggested a positive, and not insignificant, association between the latent factors summarized by the savings orientation index (related to planning and building resilience) and respondents' depression symptoms throughout 2005-2012.

The third FC index whose impact was analysed in Chapter 2 was the behavioural-attitudinal 'patience' index so called because it synthetised in itself the common variance of MxFLS questions pertaining to TV preferences, consideration of the future in financial decisions, and willingness to save monetary gift received. The patience index bore a negative (thus hypothesis supporting) though not statistically significant relationship with CDS in MxFLS-II (2005-2006) cross-sectional regressions. However, in MxFLS-III (2009-2012) cross-sectional regressions the patience index had a significant effect but in opposite direction to our hypothesis. Similarly, on the panel FE estimations the patience index revealed a positive, though not significant impact on CDS.

We explained the latter findings through Fudenberg and Levine (2006) dual-self theory and the coincidence of several factors. According to dual-self theory, whenever we save or embrace patient and controlled (less impulsive) consumption and spending, the satisfactions forgone by our *short-term present-selves* tend to outweigh the gains of our farsighted planner (who normally considers our *future short-run selves)*. However, aligning with prior research, our sample data revealed that Mexican society tends to be present-biased as the TV preferences of all MxFLS age groups were skewed towards the most present-biased lottery option in both waves. Given this, we concluded that among Mexicans, the far-sighted (planning) self is, on average, less dominant than the short-run self therefore, the net effect of financial decisions on Mexicans' SWB is primarily determined by their impact on the short-run self. At the same time, descriptive analysis of the distribution of TV preferences revealed that MxFLS respondents were slightly less patient (had higher preference for the most present-biased lottery rewards) in 2009-2012 than in 2005-2006. Additionally, debts grew faster than savings and income between the two periods entailing that the subjective burden of debt (i.e. debt-based triggers of anxiety and depression) were likely higher in 2009-2012 as a lot of Mexicans use savings or income gains to leverage debts. Moreover, contextual exogenous factors not limited to the US subprime mortgage crisis and ensuing 2008 GFL but also the heightened violence seen in Mexico between the two waves raised perceived uncertainty regarding the future for many Mexicans. Together these factors increased the saliency of the present and the subjective costs (affective loss) of delayed receipt of money won and of delayed gratifications from consumption. This, united with the short-term orientation of people in Mexico helped to explain the positive and significant effect (i.e. increased depression and anxiety symptoms) of the behavioural-attitudinal patience FC index on CDS.

While not all our hypotheses were fully supported by the data, the analyses presented in Chapter 2 still point to the importance of FC as an instrumental aptitude influencing SWB. Chapter 2 also highlighted the relevance and need to incorporate the insights of dual-self theory to the other three mechanisms (capability theory, locus of control and mental models of finance) normally used to understand financial behaviour, financial outcomes and their impact on the SWB of individuals with present-bias and or different temporal valuations.

5.1.2 Chapter 3

Chapter 3 sought to improve our understanding of how individuals' financial health interacts with their SWB, (especially in LMICS where there is less research about it) by evaluating whether Mexicans' financial balances, considered as self-standing constructs, produce any effects on Mexican's SWB. As the first empirical chapter, the analysis in Chapter 3 was based on the second and third waves of the MxFLS because, official panel datasets in Mexico are rare and, to date, MxFLS is the only existing multi-thematic panel survey that permits the concurrent longitudinal analysis of variables as diverse as household finance indicators, mental and emotional health, biomarkers, preferences, migratory experience and other pertinent sociodemographic characteristics of people in Mexico.

Nonetheless, Chapter 3 differentiated itself from Chapter 2 by using as main independent predictors indicators such as total savings, total outstanding debts, DTI and DTS ratios instead of the FC indices whose influence was assessed in Chapter 2. This distinction is important because by using FC indicators Chapter 2 sought to evaluate the impact on Mexican's CDS of a combination of latent personal and psychological attributes underlying financial behaviours related to debts and savings accumulation and use, while Chapter 3 analysed the direct impact on Mexicans' depressive and anxious affective states (captured through the CDS) of the financial balances themselves, rather than of the latent factors leading to any particular financial position. Consideration of DTI and DTS also differentiated Chapter 3 from the wider literature because while most studies concentrate on either total stock amounts or levels of each of the fund types in households' balance sheets, in addition to considering the latter, following BE insights documenting that we interpret proportions differently than whole numbers[393], Chapter 3 also evaluated the impact of financial ratios (which relativise the magnitudes of any given financial balance) to account for the different ways in which people perceive their financial position. Additionally, DTI ratio served as a proxy to gauge whether respondents spent beyond their means while DTS was used as a proxy measure for financial resilience as it reflected the extent to which savings could help to liquidate debts if needed.

To evaluate the moderating influence that behavioural traits such as tolerance to uncertainty have on the effects of financial balances on SWB, Chapter 3 included RA levels as controls. The latter corresponded to answers to MxFLS risk module questions representing hypothetical gambles of risky vs assured payoff trade-offs. Likewise, Chapter 3 included TV preference controls to assess how different extents of present bias (conversely, of patience) influenced the effects of financial balances on SWB. While Chapter 2 also assessed the effects of temporal orientation, it did so through an index summarizing the variance shared by separate controls stemming from answers to different questions related to patience and impulsivity, including lottery questions from the MxFLS TV preferences module but also questions beyond it. However, Chapter 3 treated the latter indicators separately. One of these was a single ordinal TV preference indicator derived from answers to MxFLS lottery questions asking respondents to choose among pairs of options representing different time of payment or delay reward trade-offs. As a separate covariate whose levels indicated the different levels or extents of present bias (or of patience) it allowed to gauge how temporal preferences are directly (and independently) related to SWB.

While wording differences between MxFLS-II and MxFLS-III risk and TV preferences modules caused some changes in the *absolute* values of the premia implied by the risk and TV gambles and to the absolute values of the discount factors in the TV lotteries, the sets of premia and discount factors underlying the levels of the RA and TV ordinal indicators in each wave maintained the *same hierarchy* and *relative* position, thus capturing the same underlying latent construct—a given extent of tolerance to risk and an extent of patience—which validated the comparison of the ordinal RA and TV preferences controls and their use for longitudinal analysis.

Preliminary descriptive statistics regarding the distribution of RA and TV preferences across respondents in Chapter 3's sample data suggested that suggested that there was an increase in RA and

[393] For example, see Kahneman (2003) who through a discussing on bounded rationality described how proportions, changes and differences are more accessible than absolute values for people and argued that information presented in each of such frames can elicit a different response and evaluation.

in present bias (decrease in patience and in risk tolerance) between the two MxFLS wave since a larger proportion of respondents were highly risk averse in 2009-2012 than in the earlier MxFLS wave period. Similarly, the proportion of respondents choosing the most present-biased options almost doubled from the earlier wave MxFLS-II (2005-2006) to the latter one MxFLS-III (2009-2012). We attributed such preliminary results to contextual conditions such as the contagion sequels of the US subprime and GFC on Mexico's economy and most notably to the escalation of violence in Mexico between 2005 and 2012 due to drug cartel's turf wars and the incumbent government's 'war on drugs'.

Multivariate cross-sectional and panel FE results supported several of Chapter 3's research hypotheses. Cross-sectional results based on MxFLS-III (2009-2012) data supported with high statistical significance our hypotheses regarding the positive influence of total unpaid debts, DTI and DTS ratios on the incidence of depression and anxiety symptoms (i.e. positive effect on CDS). Cross-sectional results based on MxFLS-II (2005-2006) data also supported the hypotheses about the influence of sum of debts outstanding and DTI and while DTS coefficients were indeed positive (as conjectured) they were not statistically significant in the earlier wave period. MxFLS-II (2005-2006) results evidenced a positive relation between savings and CDS whereas MxFLS-III (2009-2012) results indicated a negative association of savings with depression and anxiety and both effect sizes were quite small and statistically significant. Despite the inconclusiveness of the cross-sectional findings on savings, they aligned with our research hypotheses which recognised the ambiguity of the effects of savings found in the existing literature as economic theory (and empirical research) has recognised both positive and negative effects of savings.

Moreover, the discrepancy regarding the influence of savings on SWB observed in the cross-sectional analysis was attributed to diminishing returns to savings and to differences in the relative abundance of savings with respect to other financial balances between the two MxFLS waves. Savings were *less abundant* (relative to debts and income) for the average respondent in the MxFLS-III wave-period than during the earlier MxFLS-II wave-period. Thus, it was argued that the relative scarcity of savings in 2009-2012 heightened the subjective benefits associated to savings (i.e. perception as 'safety net' sources for present and future liquidity) such that the subjective benefits could trump the subjective costs of savings (i.e. any forgone short-term utility loss from postponing consumption). The relative abundance of savings in the earlier wave period (2005-2006) similarly entailed that their subjective benefits were not perceived as high enough to overcome the subjective losses from forgone present consumption thus explaining the positive association observed between CDS and savings in 2005.

Panel FE results also corroborated our hypotheses by providing evidence of a causal effect between increasing unpaid debts (whether measured as a total sum or as DTI ratios) and higher depression and anxiety symptoms. However, once unobserved time-invariant heterogeneity was controlled for through panel FE estimations, savings and DTS ratios appeared to have a positive (though not statistically significant) effect on CDS. Hence, our longitudinal analysis (based on FE) provided no statistically significant evidence regarding a causal impact of neither savings nor of DTS ratios on SWB in Mexico during our panel analysis period (2005-2012).

Observed longitudinal analysis results regarding RA suggested it had a small negative influence over time on CDS, implying potential small improvements in SWB as the level of risk tolerance [within respondents] increased across time. Coefficients for the ordinal TV preferences indicator suggested a small positive influence on CDS (thus potential small deterioration of SWB) as patience increased within respondents. Unfortunately, our panel sample did not allow us to conclude such RA and TV patterns of influence were not merely a chance occurrence, since once time-invariant individual heterogeneity was controlled for through FE they were not significant. Therefore, Risk and TV preferences were not found to have a statistically significant causal effect on SWB in Mexico during 2005-2012, as per panel FE findings.

None of the sociodemographic controls, including levels of education and fluid cognitive ability (proxying abstract reasoning ability) revealed significant results in the longitudinal FE analysis, although the direction of their implied (not significant) influence supported the study's initial expectations. Theoretical assumptions regarding FE method help explain the findings especially given that most sociodemographic controls as well as TV preferences and DTS were significant under RE panel estimations. Assuming that time-invariant unobservables pertinent to our specification models—such as the biological determinants of temperament (or of ones' character constitution) and cultural values (or ingrained philosophical worldviews)—are correlated with the predictors of our financial balances SWB regression models, FE estimations essentially neutered away any bias introduced by such hard to measure characteristics (taking as invariable during our time-frame period) thus shedding light onto why the size of effects in FE tended to be smaller and non-significant for many of our predictors. Nonetheless, we favoured FE estimation results based on Hausman specification test results and due to the vulnerability of RE results to OVB.

A final important result was that both 'having been victim of assault, property theft or any other harm' and 'having experienced personal and household economics shocks' were consistently found to exert a positive influence on the incidence of depression and anxiety in Mexico, as would be expected. The results held across all cross-sectional and panel (FE and RE) estimations and both controls revealed some of the largest impacts in terms of substantive size on CDS. Such findings factually assert the importance of restoring the rule of law, justice and security in Mexico for the general subjective and objective well being of its population.

5.1.3 *Chapter 4*

Chapter 4 was motivated by the recognition that while money has had many transformations throughout history, all entailing a departure from hard matter towards increasingly abstract, electronic, and virtual representations of it, and despite the exceedingly rapid evolution of digital payments seen just in the last 20 years, few empirical studies have actually evaluated whether the form of money as payment influences how we use it, our financial management behaviours and, through the outcomes of the latter, ultimately people's SFWB. Chapter 4 addressed this gap by analysing the case of Mexico because, despite the advancements in payment technologies elsewhere, in Mexico, cash remains king. Moreover, since 2019 Banco de México launched CoDi, the new (national) fast-retail electronic payment technology that operates through Banxico's Interbank Electronic Payment System (SPEI) with the aim of facilitating the efficient payment and collection of transactions via electronic transfers sent and authorised through users' smartphones or any device with internet capabilities.[394] While CoDi has been promoted as an 'inclusive' tool to facilitate integration of more Mexicans to the formal financial system and to decrease cash dominance (itself tied to informality), the likelihood that the adoption of such a technology can actually be beneficial for the financial health and SWB of Mexican households also depends on understanding how different forms of payment impact financial behaviours and therefore SFWB. Chapter 4 aimed to present a preliminary assessment of the latter.

The core of the empirical analysis in the first part of the chapter used multinomial logit regressions to evaluate how structural, sociodemographic, and personal characteristics affect the payment forms Mexicans use to conduct distinct transaction-types. Robustness checks consisting of logit regressions over two different sets of outcome variables that consolidated all non-cash payment methods into a single payment form category[395] were also conducted. One set consisted of the same four transaction types used in the core multinomial logit estimations but with only two payment option categories—cash or non-cash payments—while the second, alternative, set of outcome variables consisted of only two transaction types differentiated solely based on their value ($\leqslant 500_{MXN}$ versus $>500_{MXN}$). Beyond seeking to evaluate the consistency or reliability of the results, the robustness checks also served to assess the additional knowledge gained from studying, separately, the determinants of the use of different payment forms over transactions distinguished by either purpose, place of acquisition, motive, or value.
Results from both multinomial logit and the robustness logit regressions coincided in revealing that the controls most significant, substantially relevant and supportive of the model's hypotheses were: education level, standard of living (itself a proxy of socioeconomic status), residing in a urban locality,

394 From the demand side CoDi simply requires users to download their financial institution's app, and to request, authorise and send transfers through NFC technology and QR codes read via smartphones, tablet and similar portable devices with internet and the latter technological capabilities.
395 Rather than separating card payments from digital payments.

financial knowledge, SFWB, financial attitudes oriented towards the future and mistrust towards FIs. For example, all observed AMEs obtained supported initial hypotheses, including: a negative relationship between age and the use of digital payments, a positive relationship between residing in a urban locality and using non-cash payment forms, a steep (general) education gradient revealing that higher levels of education are consistently associated with lower probabilities of using cash as well as a negative relationship between financial knowledge and the probability of using cash over other payment methods. As expected, higher standard of living was negatively associated with cash use and positively with the use of cards and digital payments while trust in FIs had the converse effects, favoring cash. Interestingly, the SFWB index (measuring financial autonomy, self-control and contentment with own financial status) revealed a positive association with non-cash payments whereas financial attitudes (reflecting future orientation or less extent of present bias) bore a negative relationship with cash and a positive relationship with non-cash payment forms (as expected by BE theories related to pain of paying and coupling).

While our results revealed that the model's explanatory variables exerted a very similar influence on the probability of using cards and on the probability of using digital payments this aligned with the model's hypotheses, themselves based on theoretical and empirical BE literature regarding the determinants of non-cash payments' use. While the AMEs of the model's controls did not change a lot according to the type of transaction being analysed, the consistency of our results does not devalue the importance of evaluating different kinds of transactions separately especially given that, as Figure 4.7 showed, a proportion of people uses different payment methods for different types of transactions and the size of AMEs did vary according to which specific kind of transaction was being analysed.

Lastly, while our results revealed that cash remains king in Mexico the latter does not invalidate the importance and usefulness of analysing the determinants of different forms of payment in Mexico especially as new payment technologies continue to be rapidly developed by non-financial institutions and the shadow-banking sector all of which promises to endow people with an array of payment forms able to bypass requirements such as holding a bank account, thus expanding access to the unbanked. The findings of the first part of the empirical analysis in Chapter 4 therefore serve to provide preliminary insight about which characteristics influence the most the use of different payment forms across diverse transactions in Mexico. Given the observed importance of factors such as lack of trust in FIs, financial knowledge, education and financial attitudes policy interventions seeking to improve confidence in the financial sector, financial capability, financial competence, and general education could—according to our model suggestions—decrease the probability of using of cash in favour of other payment technologies across more people in the longer term.

The empirical analysis of the first part of Chapter 4 used multiple regression models to evaluate how different forms of payment, diversified by their extent of physicality, impact Mexican households' financial management behaviours through their interplay with cognitive biases and mental accounting processes. In this section of the chapter a FBI (derived as the sum of answers to ENIF 2021 questions measuring resilient money management behaviours) was used as dependent variable and it was regressed on three non-cash payment forms (DC, CC and MB) acting as key (treatment) explanatory variables, and on a number of controls.

Aligning with our expectations, of the three non-cash payments, MB had the largest effect sizes on the FBI score in the preliminary estimations.[396] Additionally, in simple regressions using a single payment form as regressor, the MB uncontrolled regression had the largest coefficient of determination and it increased the least with the addition of sociodemographic controls, suggesting that, of the three payment forms, MB might influence FBs most directly. However, in these preliminary regressions, none of the non-cash payment effects supported our hypothesis that payment forms less physical than cash would negatively affect FBI. Acknowledging that absent support could be resulting from the main challenge to our specification—endogenous selection—we addressed it through Oster's (2019) bias-adjustment technique. The latter helped minimize OVB endogeneity by using information on selection on observables (overt bias) to retrieve information about selection along unobservables (hidden bias).

Specifically, we used Oster's self-generated command code to implement bias-corrections on our (linear) multiple regressions. The latter were based on Oster's estimator, on a parameter reflecting the maximum amount of variation explained by our models inclusive of all confounders (R_{max}) and on a coefficient of proportionality between unobservables and observables reflecting their relative extent of selection in our specifications. Following Oster (2019) we calculated the first parameter as the product of the coefficient of determination ($\tilde{R}$) of regressions of the FBI on each non-cash payment form and the models' observable controls by the bias likely induced by our specifications' unobservable confounders. Informed by our review of research on the psychology of payments and behavioural household finance and based on prior studies using Oster's bias-correction mechanism (including her own approximations of bias using observational data as in Chapter 4), we concluded that including all unobservable controls pertinent to our specification would likely double the explained variance of the outcome FBs.[397]

Similarly, based on the nature of (both contingent and genuine) unobserved factors in our specifications, and informed by prior literature evaluating their possible effects, we realised that many could be collinear to the observables, others presented ambiguous effects, and yet others had been found to have

[396] Both in the raw simple regressions only including a single payment as regressor as well as in multiple regressions which controlled for a number of sociodemographic and structural characteristics in addition to accounting for the impact of the given payment forms as main explanatory variables.

[397] In other words, we estimated that the bias induced by unobservables in our model would be equal to 2.

a (small size) mediating or attenuated influence. Thus, we concluded that while hidden bias existed, selection on unobservables was at least half the selection on observables and at most equal to it.

The bias-corrected results obtained after applying Oster's corrections supported the conjectured negative effect of increasingly dematerialised payments on resilient FBs. We reasoned the latter emerged due to less physical (more electronic and digital) forms' tendency to evoke lower levels of pain from paying and to ensue lower expenditure recall, scatter attention, decrease purchase attachment and to stimulate impulse spending. Bias-adjusted results also showed that, aligning with our expectations, all the aforementioned psychological effects proved to be stronger for MB than for card payments (DC and CC) hence supporting our hypothesis that the more virtual the payment form, the more it can bypass the cognitive functions and processes that naturally rein in our spending, thus potentially leading to compromised FBs.

Lastly, Chapter 4 confronted a common criticism about Oster's method, namely that it assumes observed and unobserved controls are orthogonal, a condition perceived as implausible and non-refutable based on data alone. Hence, we followed Diegert et al. (2022) technique which, building upon Oster's, allows for endogenous controls. While in Oster (2019) the breakdown points (i.e., the maximum amount of hidden bias relative to overt bias that corrects for the bias) is incidentally also determined by R_{max}, Diegert et al. (2022) acknowledge that OV do not necessarily have the same explanatory power as all observables. Thus, Diegert et al. (2022) not only differentiate types of unobservables (by their potential relevance explaining FBI and the impact of payments on it) but also of characterise observables' quality (calibrating observables vs all others) such that their adjustment mechanism also depends on observables' specific relevance for treatment selection.
The results obtained after applying Diegert et al. (2022) adjustment coincided with our Oster-based findings. They showed that the hypothesised negative effect of less physical forms of payment on FBs was attained at an upper bound level of endogeneity closer to zero (i.e., to exogeneity) than to one (i.e., to capricious endogeneity). In other words, our results suggested that endogeneity of controls was only minor and partial in our analysis rather than arbitrary. Moreover, results based on Diegert et al. (2022) adjustment indicated that, in the presence of endogenous controls, the payment form requiring the lowest minimum amount of selection on unobservables as a percentage of selection on observables to remove bias was MB.[398]

Overall, similar to our Oster-method-based results, in the presence of endogenous controls, the results obtained through the technique proposed by Diegert et al. (2022) supported the hypothesis that

[398] In other words, with endogenous controls, , less control endogeneity rendered the minimum amount of selection of unobservables relative to observables that restored the hypothetised net negative effects of more electronic and digital payments on resilient financial habit in the case of MB than in the case of card payments.

dematerialised payments have negative effects on resilient FBs under less selection of unobservables to observables.

5.2 CAVEATS AND FURTHER RESEARCH OPPORTUNITIES

As is common in most research endeavours, the analyses presented in this thesis contain some caveats that open promising avenues for future related research. These are discussed below.

5.2.1 Chapter 2

The first limitation of the study arose from bidirectionality between SWB and some of our predictors. While not included in the analyses reported in Chapter 2, we attempted to reduce the simultaneity bias specifically induced between CDS and abstract cognitive ability by using lagged variables. However, we acknowledge the limits of such approach and recognise that a more sophisticated technique such as instrumental variables would be ideal especially in terms of tackling simultaneity between SWB and FC. Since the chapter used three different FC indices, two of which measured attributes related to instrumental money management functions (i.e., attributes that affect credit and saving decisions) and one measuring behavioural preferences such as present-bias or impulsivity, finding a strong and valid instrument for each subindex was a challenge. Based on the related literature, and assuming that FC could be condensed in the notion of competent financial performance, one *potential* instrumental variable that could correlate with all three indices is sleeping quality. The latter has long been found to correlate with academic performance, with performance in cognitive tasks and in attention driven activities, such as financial decisions. Furthermore, related research has used sleeping quality as instrument; for example, Dominko and Verbič (2022) instrumented financial experience through a binary variable coding for restless sleep. Nonetheless, sleeping quality hardly respects the exclusion restriction in Chapter's 2 specification since it is possible for sleeping quality to impact affective states related to depression and anxiety beyond its effect on financial performance. In fact, one of the question-items comprising the CDS asked respondents "whether they had slept poorly at night during the prior 4 weeks", effectively making instruments related to sleeping quality neither valid nor suitable for our specification.

Another option could be to derive instruments from indicators presenting a more granular characterisation of respondents' place of residence (than the urbanity dummy employed in Chapter 2) during both their early adolescence and childhood. The logic backing such proposal derives from social psychology research documenting the importance of the environment during childhood and early adolescence in shaping our world view and part of our preferences and habits. Given the large urban-rural gap persisting in Mexico, especially in terms of education, occupation and availability of infrastructure including that of financial services, it is safe to assume that people growing up in more densely populated, less traditional and more cosmopolitan areas are exposed to more types of financial technologies, broader and deeper financial infrastructures as well as to social networks with higher familiarity with financial concepts and financial services use. These in turn can influence instrumental money management attributes (including propensities to budget, keep track of bills, plan ahead, shop around for financial products, exercise self-control) mental models of finance (trust or distrust of banks and of the financial system), and preferences (time-discounting, willingness to save, etc) that are encompassed in FC. Thus, more granular and specific characterisations of the place of residence during people's formative years could act as instruments for the money management dimension of FC.

Additionally, social discounting research has found that urban vs rural residence helps explain generosity since the latter decreases as a function of social distance (see Ma et al.,2015). Jones and Rachlin (2006) argue that it is reasonable to expect social discounting to relate to time discounting because they share similar hyperbolic functions. Furthermore, recognition of their link can be traced as far back as Plato's who noted that people's ability to make self-interested choices discounted over time was linked to their ability to make choices according to the interests of the larger social group with which they shared common interests, involving social discounting (Jones and Rachlin, 2006). Based on the above, it is plausible to assume that granular characterisations of the place of residence during people's formative years could also be a strong instrument for the behavioural dimension of FC capturing patience and impulsivity. Since the granular characterisations of the extent of rurality and urbanity of place of residence would refer to respondent's formative years (childhood and early adolescence) they are also likely to support the exclusion restriction (at least more than concurrent characterisations would).

While the migration module of the MxFLS contains categorical questions asking respondents to classify the place they were born at and where they lived when they were 12 years old across a spectrum of different types of social aggregations ranging from a ranch to a city, the answer categories provided to respondents in the 2005-2006 and 2009-2012 were different. Beyond such differences, place of residence questions at the lowest level of aggregation were only present in the migration module of the survey. In both waves the module contained a very large number of missing values since respondents could skip the module if they had not migrated, knew somebody that had, or simply if they chose not to disclose such personal information out of mistrust toward government institutions and public officials, especially if they had engaged in or knew someone who had moved outside of Mexico illegally. Ultimately, given the characteristics of our specification and of the MxFLS data used, this alternative instrument for FC was also deemed as not suited for our analysis. Thus, based on this case analysis, further research on potential valid instruments for FC is still a promising area for future research.

Finally, we acknowledge that prior research using measures similar to the CDS such as the UK's GHQ-12 score as dependent variable are usually based on its inverse-caseness version. Nevertheless, we do not reverse-code the CDS. Instead, we treat it as a continuous variable to follow the specific literature that has used the CDS and MxFLS data. Nonetheless, we leave alternative derivations and handling of the CDS as an area of further research.

5.2.2 Chapter 3

An easily identifiable caveat of the analyses presented in Chapter 3 is that they focused on the impact of the nominal values of financial balances on SWB. While the chapter did mention what some of the figures represented in real terms, it was merely done descriptively. Thus, an initial promising area of further research would be to contemplate analyses analogous to those proposed in Chapter 3 but based on real rather than nominal terms.

Secondly, whereas we recognise wording changes in the RA and TV preferences modules of the MxFLS project did not entail substantive changes in the construct or attribute each of these modules measured in MxFLS-II relative to MxFLS-III we recognise that a more accurate analysis of the moderating influence of these behavioural predictors on the effect of financial balances and on SWB could be achieved through metrics that entail neither framing nor scaling changes over time. Thus, in the event that a new survey similar to MxFLS were to be developed in the future, we encourage the design of risk and TV measures that undergo no wording changes over time.

We understand that some scholars might be interested in further studying the variation or stability of risk and TV preference in Mexico (and similar LMICs), especially given that the patterns of influence of these behavioural covariates suggested there could exist optimal levels of RA and of temporal preferences that can respond to contextual economic and institutional characteristics (including policy). However, since such analysis was secondary to the main research question in Chapter 3, we left it out of the scope of the chapter and acknowledge it as a promising area for future research. Based on the inevitable involvement of these preference traits during financial decision making and their susceptibility to be conditioned by external shocks, age and period effects, further investigating the evolution of intra-individual differences in preferences and how their influence on financial balances and on SWB might or not change throughout time would be worthwhile for both household finance and SWB research.

Another consideration related to the above is that the RA and TV preferences used in this thesis were elicited through a common choice procedure across hypothetical prospects. However, there is an ongoing debate surrounding the extent to which hypothetical choices are representative of decisions with real consequences. Results from empirical studies on the topic have been inconclusive with some arguing that real and hypothetical rewards generally yield qualitatively similar results[399] and others[400] finding systematic differences. Thus, more research is still needed to reduce uncertainty on whether people are motivated to, or capable of, predicting (accurately) what they would do in a real scenario.

As is evident from our use of an affect-based experiential measure of SWB as dependent variable, the chapter's result-interpretation had a hedonistic character. For example, the fact that cross-sectional findings in both waves (and even panel RE) regarding TV preferences suggested a positive association between being more patient regarding financial decisions and higher depression and anxiety symptoms or that the net effect of savings on the extent of depression and anxiety experienced in 2005 was positive due to the predominance of Mexican's short-run selves' presently biased interests over those of their future oriented, goal-seeking selves indirectly suggests an essentially Benthamite conceptualisation where the 'pleasurableness' or 'painfulness' of financial habits is the only relevant priority. However, as is evident from economic theory, savings have long been paired to investment. Thus, they are also intrinsically linked to forward-looking prerogatives that are valuable (render utility) beyond any pain and pleasure associated with forgone present consumption for the future.
In line with Dolan et al. (2017) who argued that the complementarity of SWB measures works well to better understand wellbeing, we encourage further research on the impact of financial balances on SWB in Mexico (and other LMICs) such as those covered in Chapter 3 but using eudemonic measures of SWB[401] as well as evaluative SWB measures. We were not able to evaluate whether a similar (or a rather different) pattern of results (from those obtained in Chapter 3) obtains when using other types of SWB as dependent variables because MxFLS data lacked any suitable indicators that could classify as measures of either eudemonic or evaluative SWB. Nonetheless, since 'the measure matters'[402], we expect results from future research analysing Chapter 3 (and even Chapter 2) enquiries using eudemonic and evaluative SWB outcome variables to render different insights, not only intuitively, but also based on pre-existing SWB research, as several studies have already documented the divergence between evaluative, eudemonic and experience-based measures of SWB.[403] Since few SWB studies actually compare the effects arising from the three main types of SWB measures, further research along these lines would be valuable. Furthermore, in the context of Chapter 3's research question it would potentially provide more substantive and conclusive proof of whether a present-biased outlook dominates personal finance decisions in Mexico.

[399] For a review of the literature Camerer and R. Hogarth (1999) provide.
[400] See Cummings, Harrison, and Rutstrom (1995) and Kroll, Levy, and Rapoport (1988).
[401] As, conceptually, eudemonic wellbeing more directly traces the meaningfulness and worthwhileness of activities, behaviours, and possessions.
[402] See Dolan et al. (2017).
[403] See Dolan (2014), Luhmann et al. (2012), Pavot and Diener (1993) and Ryff and Keyes (1995).

Finally, several of Chapter 3's findings aligned with part of Chapter 2 results. This is important because it is plausible to consider that Chapter 3 indirectly questioned the empirical relevance of financial capability—even though the latter's conceptual and empirical value has already been recognised by some scholars, at least in HICs. Chapter 3 deliberately treated the effects of financial balances and of psychological traits such as preferences as separate independent controls, thus isolating possible moderating effects of RA and TV preferences and highlighting the idea that toxic financial balances (i.e., large unserviceable debts, high DTI or high DTS) or savings can affect SWB by the simple pleasure or pain generated by them (i.e., through pains from forgone consumption in the case of savings and via the pleasures financed though debts, whose negative effects can be quieted through adaptation, disregard for the future or normalcy with respect to a [highly indebted] referent social group). However, FC encompasses the consequences of psychological traits and of behavioural preferences within itself and considers more of the eudemonic mechanisms through which a prudent and disciplined engagement with one's financial affairs affects individuals' SWB. Hence, further research using evaluative and eudemonic SWB measures as outcomes of interest would also help to elucidate the value added of studying the effect of FC instead of simply evaluating either FL or the effects of financial balances in isolation (i.e. without consideration of the psychological and behavioural preconditions leading to financial outcomes).

5.2.3 Chapter 4

The first limitation of Chapter 4 arose from the fact that, to date, Oster's bias-adjustment mechanism and related techniques can only be applied to the generalized linear model (as in Oster [2019] and the second empirical section of Chapter 4) or to probit models (as in AET) but not to multinomial logit regressions.[404] Hence, it was implausible to use Oster or related methods to address endogenous selection in the empirical assessment of how personal characteristics, socio-demographic and structural factors influence the use of diverse payment forms to settle different categories of transactions in Mexico (the chapter's first inquiry). Nonetheless, given the usefulness of techniques such as those in AET (2005a), Oster (2019), and in Diegert et al. (2022), we encourage more methodological research regarding endogenous selection, coefficient stability and OVB based on and applicable to multinomial logit specifications.

Additionally, we believe that endogeneity in the first empirical section of Chapter 4 could be reduced in the future through longitudinal analysis. While the ENIF is not yet a panel, were it (or a similar Mexican household survey) turned into one, it would be particularly useful for estimating more precisely the effects of covariates such as financial fraud on the choice of payment form used to conduct

[404] The multinomial logit specifications were our core model in the section thus we focus out discussion on their limitations rather than those of the robustness checks.

distinct transaction types. As noted in the descriptive statistics section of Chapter 4, the four main types of financial crime and fraud transgressions (i.e.: cards cloning, identity theft or phishing, pharming scams and Ponzi schemes) have consistently increased in Mexico,[405] partly due to the boom in e-commerce. However, contrary to what would have been intuitively expected, the observed AME of the indicator representing the number of fraud instances experienced used in Chapter 4 revealed a negative association with the probability of using cash and a positive association with the probability of using card payments. This can only be explained by the cross-sectional nature of the multinomial logit regressions, which could only provide a snapshot (in a single point-time) of the correlations between fraud experiences and payment forms use, not their causation. Only a separate longitudinal analysis evaluating the effect of changes in fraud incidence per type of offense on changes in the probability of using each payment form would establish causality between the two variables. We therefore encourage further research on this area.
Overall, despite the rather descriptive character of results from the first empirical section of Chapter 4[406], the assessment therein included remains of relevance since, to our knowledge, it constituted one of the first evaluating how diverse sociodemographic factors could influence the use choice of specific payment forms (over others) according to the type of transaction conducted (an inquiry also largely absent from research about in other LMICs research).

In terms of the second empirical analysis in Chapter 4—which evaluated the effects of payments on an index of resilient FBs—a particular caveat was that while three sources of endogeneity potentially challenged our findings (OVB, measurement error, and some simultaneity); we concentrated on rectifying OVB endogeneity through Oster's procedure. This was because our ability to rectify simultaneity (and reverse causality) was constrained by data limitations. Not only is the ENIF not a panel but time series monetary data on flows per payment form are not publicly available in Mexico at the granular level needed to develop lagged instruments of their use among individual. Additionally, the level of identification of ENIF observation-units does not provide sufficient granularity to construct valid instruments through geostatistical data coupled with structural information on financial access.

Another consideration is that we refrained from including in controlled models of the second empirical analysis in Chapter 4 indicators regarding the use of informal sources of finance as additional explanatory variables to avoid simultaneity problems since the former indicators were implicit in the active savings subcomponent of our dependent variable, the FBI. Nonetheless, given the low financial inclusion in Mexico, further research is still needed to evaluate whether reliance on informal finance conditions certain FBs and, or moderates the psychological effects of payments.

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[405] At least 50% each year since 2018, according to CONDUSEF data.
[406] As the results could not, yet, establish statistically significant causality.

An opportunity for further research also arises from the fact that despite the usefulness of the bias-adjustment methodology employed to correct for OVB endogeneity in the second part of Chapter 4, such methods were not conducive to correct for concurrent bias in specifications analysing the concomitant impact of more than one endogenous non-cash payment treatment.
Thus, while, based on the large literature documenting how CC and DC are used together to revolve credit and leverage desired consumption increases[407], our unadjusted pre-Oster specifications did evaluate the simultaneous influence of the three non-cash payment forms on FBI, we could not establish their concurrent unbiased causal impact on FBs. Indeed, since the largest size difference between unadjusted pre-Oster-uncontrolled regression results and the unadjusted pre-Oster-controlled regressions was found when the controlled model included the three payments together, we conjectured that such difference could represent the portion of the variation on FBI explained by a greater extent of financial inclusion (understood as having greater access to more methods of payment). The latter also suggested that in our Oster-bias-adjusted regressions (where, we could only evaluate the impact of single payment methods on FBs) the different payment forms (especially card payments) acted as contingent unbservables of each other.

Less has been researched regarding the complementary role of MB. Yet it is plausible that different MB users could have different FBI scores depending on how they leverage MB with other payment methods they have access to. For example, someone could capitalise on MB 'keeping track' features and thus become less likely to go on overdraft and/or avoid borrowing to make ends meet, therefore potentially having a high FBI score. However, others might mainly use MB to make online purchases which, due to lower product attachment, pain of payment and/or reduced expenditure recall could cause them to potentially develop a lower FBI if frequent purchases result on overdrafts and leveraging on cards, or not meeting their financial obligations. Further studies evaluating the concurrent psychological effects of MB, CC and DC on FBs could therefore help to disentangle the effects on FBs attributable to the abstract (virtual) nature of MB from any card payments effects on the former. The latter would become even more relevant for Mexico given that according to the 2021 ENIF sample more than 40% of account holders held more than one non-cash payment form and the figure is likely to increase in the coming years. Moreover, the complementary role of payments is likely more prevalent in HICs, where holding multiple payment forms (including several digital ones) at once is more common.

Moreover, causal analysis of the effects of the concurrent use of payments with different extents of physicality vs virtuality on FBs, would not only be useful to improve our understanding of how

[407] For example, see references of the literature on the positive association between revolving CC debt and DC use on footnote 234 (Chapter 4).

payments relate to each other and whether each payment's influence on users' FBs varies according to the number and type of alternative payments available to them, but it would also help to understand their influence over financial outcomes and households' SFWB. Therefore, we stress the evaluation of the synchronous effects of multiple payment forms use on FBs as a prominent are for future research.

Lastly, simultaneity-driven endogeneity in the second part of Chapter 4's empirical analyses precluded us from evaluating the impact of different payments on outcomes other than resilient FBs including, for example, on SFWB or on attitudes towards money (for which ENIF data contains relevant measures). In terms of the first proposal, future analysis using an index of SFWB as dependent variable could provide useful empirical evidence to compare with Chapter 4's findings in order to better ascertain the extent to which the psychological effects of payments affect SFWB directly or indirectly, by influencing FBs (that lead to different financial outcomes and thus to variation in SFWB), as attempted in Chapter 4.

Further research regarding the inevitable bi-directional relationship between different payment forms and attitudes towards money would also be promising especially due to cognitive adaptation. According to the latter, while different belief systems and personality traits influence people's attitudes towards money, the use of specific payment forms can also reinforce users innate or acquired money attitudes, which then translate into diverse FBs and outcomes. To our knowledge, barely any studies have analysed such self-reinforcing cycles. Yet, their further understanding could help design financial education campaigns and within-banking triggers to curtail negative habit-cycles among financial products' users. Due to endogeneity concerns, the latter two inquiries would need to be addressed via instrumentation of some variables, through pertinent data with a time dimension or via the bias adjustment techniques employed in Chapter 4.

5.3 CONCLUDING REMARKS

As noted in the introduction of this Thesis, two policy objectives have gained prominence over the past 20 years: augmenting SWB and financial inclusion, especially in LMICs where the proportion of account holders is lower than in HICs. Additionally, in the recent decade, financial digitalization has also rapidly become a policy priority across the world. Both financial inclusion and financial digitalization have been touted as tools to empower the citizenry since they aim to increase access to financial markets and to tools assumed to enhance people's freedom to better smooth consumption, leverage, undertake investments and ultimately increase their participation in economic life so as to reduce inequality and improve overall wellbeing. Such a discourse deserves critical evaluation to warrant that both policies indeed help to boost people's objective and subjective FWB and, through it, positively impact SWB.

By revisiting the role that people's engagement with their personal finances has on their SWB, the empirical chapters in this Thesis sought to provide evidence that could help ensure that financial inclusion (and related agendas such as financial digitalization) deliver on their promises and become, beyond the "access at all costs" narrative, a route to enhance the wellbeing of new financial technologies' adopters.

Three common themes, ripe for policy action, emerged from the findings of the empirical chapters of this thesis. First and foremost, the enduring importance of educational attainment cannot be overstated, as across all chapters an important education gradient emerged providing evidence of the causal effects that higher educational attainment has not only with respect to the use of financial instruments, but also in the formation of beneficial financial habits and even in affective self-regulation as (according to Chapters 2 and 3) education significantly influences downward (i.e. reduces) the incidence of symptoms of depression and anxiety. The latter is unsurprising given that education is not only thought to enhance social mobility and economic progression but also to strengthen people's reasoning ability and capacity to overcome visceral reactions. A second key finding reiterated across the thesis pertained to the importance of criminality, generalized sense of unsafety, and mistrust in institutions. Across all specifications of Chapters 2 - 4 variables measuring experiences of crime, violence, or harm (including fraud) as well as mistrust had large size and (mostly) statistically significant effects on SWB, financial instruments use and financial behaviors' formation. Thirdly, the three empirical chapters in this thesis provided further evidence of the short-term orientation and low-uncertainty-avoidance index of people in Mexico[408] which can be thought of as both generalized cultural traits relative to those of other countries (as in Hofstede [1984]) as well as resulting from structural conditions and economic development limitations (including high inequality, still low literacy, high corruption, and high impunity). Lastly, the important role of the urban-rural divide and the extent of labour informality cannot be overlooked as issues granting prompt and continuous remediation to enhance SWB and FWB for all Mexicans in an equitable fashion.

In the context of Mexico, where financial inclusion and digitalization follow a top-down approach, development policies have mainly focused on improving 'financial equality'—construed as the homogenous treatment of people (regardless of their particular characteristics or circumstances) as equally eligible users of financial services in need of more digital products. While important, the

[408] Under cultural dimension frameworks following Hofstede (1984) uncertainty avoidance is not defined as equivalent to avoiding risk. Hofstede (1984) argued it was possible to find people in high uncertainty-avoiding scoring countries who actively engaged in risky behaviour, precisely because it reduced ambiguities, or in order to avoid failure. Thus, under cultural dimensions frameworks, societies that score highly for uncertainty avoidance (like Mexico) include those where people attempt to make life as predictable and controllable as possible or where, if people find that they can't control their own lives (low locus of control), they may be tempted to stop trying, blame others and adopt a victimhood rhetoric. Thus, it is plausible to state that despite the high extent of RA observed by Chapters 2 and 3, Mexico is generally understood as a high uncertainty avoidance culture.

emphasis on ‘financial *equality’* has sometimes come at the expense of fostering greater ‘financial *equity’*—which prioritizes the development of financial tools and services adapted to the characteristics, needs and circumstances of different social groups in Mexico.

As the cursory comparison of successful mobile money initiatives (such as M-Pesa) in Kenya with Mexico’s inability to develop similar payment instruments reveals, financial equality and equity are complementary. Kenya’s M-Pesa success was based not only on the desire to increase financial access, but it emerged from designing an instrumental technology that incorporated pre-existing social customs (specifically those related to personal communications and sharing via mobile phone use) into a new payment method (Kirwan, 2021). It thus fueled greater financial inclusion and financial equality by remaining attentive to financial equity.

We hope that the research presented in Chapters 3 and 4—by informing about some of the determinants of financial balances holdings; about the uses of different payment forms and about how these, coupled with a greater understanding of the psychological effects of payments tend to affect FBs—can help motivate a greater focus on financial equity in Mexico as well.

The pre-amble of the Thesis and this chapters’ introduction contained phrases alluding to a paradoxical understanding of freedom that seemingly contrasts the ‘freedom of access’ (at all costs) promoted by part of the financial inclusion and digitalization narratives. Instead of construing freedom in terms of *quantity* of access, the phrases understand it in terms of personal dominion, itself capable of enhancing the *quality* of access.

In line with this, we hope that the research and discussion presented in Chapter 2 can help inform the content of financial education campaigns so that they not only stress familiarity with financial terminology but endow people with the ability to understand which financial services they might need and how best to use financial technologies to reach their personal goals.

Moreover, while raising awareness of the cognitive biases and behavioral effects coming into play when using financial services and instruments—part of the remits in FC—have a largely universal character (as most humans employ the same mental processes), in line with ‘financial equity’ principles, we believe FC should not be conceived as a ‘one size fits all’ model or toolkit. Users of financial markets in different countries (and even within a given country) have varied characteristics and face different needs and constraints including diverse availability of financial services and payment instruments; distinct financial balances patterns; varied levels of educational attainment; different risk tolerance and TV preferences; specific security concerns, etc. These in turn entail that people’s susceptibilities to fall into the trap of biases and of financial misinformation is just as varied. Thus, we believe that FC campaigns should also respond to the particularities of the groups they are addressed to. Based on the literature reviewed, stylized facts, and on the findings of this Thesis, in Mexico educational campaigns grounded on FC could prioritize: (1) helping people to become aware of the cognitive biases that trigger impatience and impulsivity and informing on how best to counteract them; (2) enhancing people's internal sense of control, self-confidence, responsibility and ability to self-manage regardless of level of educational attainment; (3) encouraging keeping track habits; (4) increasing awareness of financial crimes, frauds and scams and informing people how to protect from these; (5) encouraging future oriented thinking and goal planning; and (6) helping to re-build trust in the banking system and in financial markets regulatory institutions.

Throughout human history money's evolution has been inseparable from technological change. As digital financial services (including payment forms) continue to evolve, it is also up to us to increase our FC and understanding of the psychological effects of new financial technologies such that they help to enable our SWB rather than constraining it.

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