Household Financial Distress and Well-being: Evidence from the United Kingdom

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Dedicated to my late father
whose absence has always been a powerful presence

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Abstract

In the context of a steady rise of household indebtedness in the United Kingdom since the early nineties, household financial distress and its impact on individual well-being has drawn the attention of policy makers. Analysing a combined panel of the British Household Panel Survey and Understanding Society over the period 1991-2012, this thesis contributes to the existing literature by examining three distinct yet, interconnected topics related to household financial distress and its association with various measures of well-being.

Chapter 2 investigates the distributional heterogeneity in the impact of financial distress on life satisfaction and psychological well-being, measured through GHQ12 (General Health Questionnaire 12). The chapter deploys a fixed effect quantile regression which enables us to examine the association between financial distress and subjective well-being (SWB) across the well-being distribution while controlling for individuals' unobserved heterogeneity. Results indicate that there is a decreasing trend in the size of the negative coefficient estimates from the lower to the upper end of the distribution. Therefore, there is a larger negative impact of financial distress on individuals with lower levels of SWB than those who have already attained higher SWB.

Chapter 3 examines whether people adapt to a situation of long-standing financial distress. The chapter deploys a fixed effect regression to estimate the change in individuals' SWB scores after successive rounds of financial distress. Results indicate that individuals do not adapt to financial distress even after passing through four consecutive years of such distress. This finding suggests that the negative effects of financial distress on SWB persist over time. Like long-term unemployment or poverty, it seems that financial distress has a 'scarring effect' on individuals' SWB.

Chapter 4 focuses on the impact of financial distress on cognitive ability. Using a cross section of Understanding Society survey, this chapter provides an empirical test as to whether financially distressed individuals are likely to experience cognitive impairment. The analysis deploys a two-stage residual inclusion method to address the association between financial distress and cognitive ability. The analysis indicates that individuals reporting financial distress significantly underperform in standard cognitive tests.

Overall, the findings of the thesis indicate that household financial distress poses a real concern for mental health and well-being. They point towards the obvious need for future policy interventions to support those reporting low well-being. Although rising levels of household debt may be beneficial in maintaining aggregate demand, their negative effects on well-being suggest the need for policy action to alleviate financial distress.

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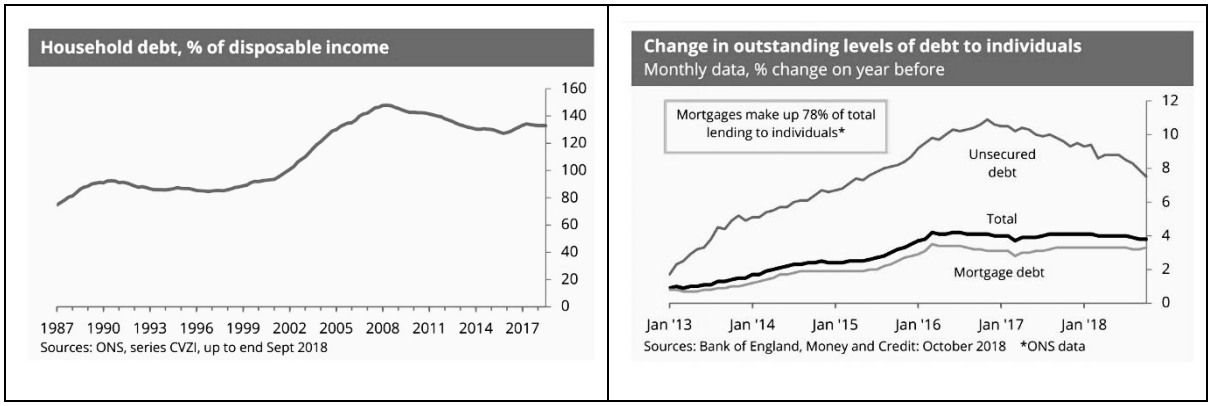
1 Introduction

1.1 Background and motivation

The United Kingdom has experienced a steady rise in household debt since the late 1990s. The household debt to income ratio has risen from 85% in 1997 to 148% in early 2008. After a temporary fall during the financial crisis, the ratio has again accelerated from 127% in Q4 2015 to 133% in Q4 2017.[1] As the cost of borrowing has fallen sharply since 2010 until 2017, the absolute level of household debt has increased noticeably in early 2017 (See **Figure 1-1**). The rise in overall household debt has been comprised of a 3.3% rise in secure (mortgage) debt, the most significant category of household debt and a 7.5% rise in unsecured debt. Financial lives survey (2017) conducted by Financial Conduct Authority[2], indicates that on average, UK adults have outstanding non-mortgage debt of £4,960 including student loans. However, the average among those with debt is £12,500 per person including student loans.

Figure 1-1: Household debt to income ratio in the United Kingdom[3]



In many economic models (e.g., permanent income or life cycle hypothesis), debt can be beneficial for households as well as economies. Debt allows individuals to smooth their consumption of goods and services over their lifetime. But high levels of household debt can cause over-indebtedness and financial distress as they make it difficult for individuals to keep up with repayments on their outstanding debts. It is estimated that 16% (or 8.3 million) of the

[1] Household debt: statistics and impact on economy; Commons briefing paper, number 7584, 21 December 2018 http://researchbriefings.files.parliament.uk/documents/CBP-7584/CBP-7584.pdf.

[2] Financial lives survey, https://www.fca.org.uk/publications/research/understanding-financial-lives-uk-adults

[3] Figure reproduced from Commons briefing paper, Number 7584, 21 December 2018

UK adult population were over-indebted (defined as failure to keep up with bills and credit commitments, reporting debt burden; and/or missing domestic bills or debt repayments) in 2017[4]. Over-indebtedness and financial distress have duly triggered concerns about the well-being of individuals in policy spheres as well as in academia. For example, the United Kingdom Government Office for Science (GO Science, under Department for Innovation, Universities and Skills) raises this concern in its 'Mental Capital and Well-being Report' which draws attention to indebtedness as an 'important risk factor for mental disorder'[5] (Beddington *et al.*, 2008; Capital, 2008). Boyce and Wood (2016) have identified household financial distress resulting from overwhelming indebtedness as a major concern due to its detrimental consequences for well-being. These concerns, in turn, have been recognised in the new strategy 'No Health without Mental Health' (Department of Health, 2011)[6].

1.2 Aim of the study

Against this background, this thesis aims to undertake an empirical investigation of household financial distress and its impact on well-being. Income has long been considered as the most important component of household financial situation. Therefore, household current income has received considerable attention in the studies focusing on the association of household financial situation with well-being. Clark *et al.* (2008b) provide a comprehensive review of the literature on income and SWB. Studies in this literature largely agree that income has a positive but diminishing impact on SWB (e.g., Easterlin, 1995). Fewer studies have investigated the impact of other aspects of household financial situation, such as wealth, assets and debt (see for example, Brown *et al.*, 2005; Headey and Wooden, 2004a) on well-being. The findings of these studies suggest that household wealth has a positive association with well-being while debt has a mixed impact. Secure debts, such as mortgages, have an insignificant impact; by contrast, unsecured debts have detrimental impacts on well-being (e.g., Brown *et al.*, 2005).

[4] Money Advice Service, Over indebtedness in the UK 2017, September 2017; https://www.moneyadviceservice.org.uk/en/corporate/one-in-six-people-in-the-uk-burdened-with-financial-difficulties

[5] The United Kingdom, Department of Industry and Business, Science and Innovation https://www.gov.uk/business-and-industry/science-and-innovation

[6] 'No health without mental health'- a cross-government mental health outcomes strategy for people of all ages https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/213761/dh_124058.pdf

Studies which focus on overall household financial situation are absent, potentially due to the limited availability of data.

This thesis attempts to fill this gap and adds to the existing literature by examining the impact of overall financial distress on well-being. In doing so, it analyses a combined panel of the two most acclaimed household panel surveys in the United Kingdom, namely British Household Panel Survey (BHPS) and Understanding Society (US) Survey over 23 years from 1991 to 2012. The following analysis demonstrates the impact of overall household financial distress on various aspects of well-being and therefore, aims to contribute to the policies related to household debt and well-being.

1.3 Financial distress

Financial distress is generally defined as the negative assessment of one's overall financial situation (Prawitz *et al.*, 2006). Researchers have used different terminologies, including 'financial stress' (Bailey *et al.*, 1998) and 'financial (dis)satisfaction' (Joo and Grable, 2004), to denote one's distressful financial situation. Household's overall financial distress is often measured through subjective responses, however, these subjective responses are influenced by numerous objective conditions such as, inability to meet various payment obligations (debt servicing, rent or bills) or other demographic conditions such as unemployment, divorce etc. (O'Neill *et al.*, 2006). Moreover, financial distress can be synonymous with one's financial worries (Kim and Garman, 2003; Mason and Wilson, 2000) linked to factors giving rise to unfavourable financial situation. Cobb-Clark and Ribar (2009) illustrate that financial distress is associated with high amounts of household debt, poor cash flow management and other socio demographic factors including size of the household. This thesis uses the self-report of overall financial situation available in both BHPS and US over the period 1991-2012.

1.4 Well-being

Well-being research has received significant attention as both academics and policymakers increasingly agree that monetary income alone is not an adequate indicator of quality of life (See for example, Cobb *et al.*, 1995; Easterlin, 1974). National governments as well as international organisations have taken initiatives to include various measures of well-being in conjunction with GDP as indicators of societal progress. The OECD, for example, has developed an eleven-point quality of life index. Likewise, the government of the United

Kingdom, which is seen as leading on many aspects of this agenda, has commissioned the Office of National Statistics (ONS) to collect data on well-being in pursuit of its public policy objectives.

Measures of well-being have emerged from different theoretical approaches. For example, commodity approaches (Edgeworth, 1881; Samuelson, 1947; in Van Praag and Frijters, 1999) reason mainly from an economic vantage point. Capability approaches, on the other hand, focus on the human capability to achieve valued functioning (Sen, 1985). This study intends to focus on the utilitarian approach, which accommodates psychological concerns. The utilitarian approach measures subjective well-being (SWB) to denote individual's emotional or mental achievements such as pleasure, happiness, or satisfaction. Jeremy Bentham (Bentham, 1789) introduced this approach as a form of morality and a guide to measuring progress, followed by J S Mill with some qualifications. The approach gives special attention to the benefits that individuals gain from the use of commodities (and services), not to commodities themselves and the emotional achievement is seen as the outcome of a process of experiencing consumption and activities in general, not only as the benefits of consuming a commodity itself. The utilitarian measure of 'subjective well-being' provides policymakers with an opportunity to get psychological feedback from the individual or the community.

This study relies primarily on two measures of SWB – overall life satisfaction and psychological well-being. Life satisfaction is a single item measure which represents the cognitive component of SWB and is the most widely used measure in current well-being research. The life satisfaction responses are available in the BHPS and US data over the period of 1996 through 2012, except in 2001. Psychological well-being is also a widely used measure of well-being derived from general health questionnaire, often known as GHQ12. It comprises twelve questions, each of which is believed to reflect individuals' emotions and mood (Suh *et al.*, 1996). These responses are available in BHPS and US data over 1991 through 2012. In addition, this study examines the association between financial distress and individual's cognitive ability. Cognitive ability is believed to significantly influence hedonic processes (Lyubomirsky, 2001); maintaining healthy cognition is a prerequisite not only for a normal everyday life, but also for a desired level of psychological well-being (see for example, Agarwal and Mazumder, 2013; Llewellyn et al., 2008). The cognitive scores of the respondents are available only in the third wave of the US data for the year 2010.

1.5 Overview of the thesis

This thesis comprises three empirical chapters which address three distinct, yet interconnected research questions related to household financial distress and well-being. Chapter 2 examines the association between financial distress and two measures of well-being, life satisfaction and psychological well-being. Previous studies (see, for example, Bridges and Disney, 2010; Johnson and Krueger, 2006; Wildman, 2003) have generally found a negative association between financial distress and well-being. However, these studies use traditional econometric methods which focus on the average point estimates of the impact of financial distress on well-being. Diener and Diener (1996) notice that SWB distributions are empirically quite skewed. This means studies which focus on the mean regressions may severely under or overestimate the effects of the predictors on well-being, or in some cases, may fail to identify the effects at all. Binder and Coad (2011) and Binder (2016) observe that the mean regression shows a statistically insignificant association of education with well-being; however, when examined across the SWB distribution, they find a positive association of education in the lower part of the distribution while a negative association in the upper parts. These studies indicate the importance of revealing the heterogeneous information contained in different segments of the SWB distribution while examining the impact of predictors on well-being.

Chapter 2 adds to the existing literature by taking distributional heterogeneity in attained SWB into consideration while examining the relationship with financial distress. Specifically, it asks the question: how differently does financial distress affect those who are reporting the higher levels of SWB from those reporting the lower levels of well-being? The chapter deploys a fixed effects quantile regression (Canay, 2011) to estimate the impact of financial distress at different quantiles of the well-being distribution. The method uses a two- step estimation where the first step performs a fixed effects regression while the second step applies a standard quantile regression. According to Canay (2011), the method provides a consistent and asymptotically normal estimate when ‘N’ and ‘T’ grow.

The findings of chapter 2 generally accord with the previous literature that financial distress, on average, negatively impacts well-being. The higher the level of financial distress, the stronger the negative impact on well-being. However, the findings go beyond the existing literature as they explore heterogeneity in this impact by using fixed effect quantile regression. It reveals that the same level of financial distress has a larger (based on the size of the estimates across quantiles) negative impact on individuals with lower SWB than those with higher well-

being. In other words, individuals with higher SWB seem to be less affected by the same level of financial distress than the individuals with lower well-being. In the case of homeownership, on average, mortgagors are associated with lower levels of SWB than the outright homeowners. The finding from the analysis indicates that pre-existing high levels of SWB might act as an insulator against the corrosive impacts of financial distress. Well-being provides emotional resilience which helps the individuals to avoid stress and respond to the events in a positive way. This, in turn, increases coping ability in adverse circumstances including financial distress.

Chapter 3 investigates the question whether individuals adapt to being in a state of financial distress. The idea of adaptation is prominent in the well-being literature. Easterlin (1974) observes that people gradually adapt to an increased level of income and their SWB scores return to the earlier level after any initial rise. Several recent studies have exploited nationally representative longitudinal surveys to examine whether people adapt to changes in a wide range of economic and demographic conditions including change in income, occupational status, marital status and number of children (see for example, Lucas *et al.*, 2003; Easterlin, 2005; Lucas and Clark, 2006; Zimmermann and Easterlin, 2006; Lucas, 2005; Clark *et al.*, 2008a). But the adaptation literature exploiting data from the United Kingdom is remarkably scarce. Even more scarce is literature concerning adaptation to overall financial situations. Therefore, this chapter contributes to the existing literature, by providing (to the best of my knowledge) the first empirical test of adaptation to financial distress using panel data from the United Kingdom. Recently Clark *et al.* (2016) have analysed German data to examine adaptation to poverty defined by low income. This chapter distinctively contributes to the above literature as it treats financial distress not just arising from low income. It argues that individuals with higher income too can experience financial distress when they struggle to maintain adequate cash inflow amidst an overwhelming amount of household debt. In this situation, both low and high-income households are susceptible to miss various payment obligations and find themselves in a state of financial distress.

The analysis presented in the chapter uses within person fixed effects estimation in an innovative way. It creates dummies which identify the point when an individual first reports financial distress in the panel and the subsequent years of distress within the spell. Coefficients corresponding to each dummy then measure the impact of financial distress on SWB for each year within the period. Based on the previous literature (e.g., Bridges and Disney, 2010), the model assumes that the onset of financial distress will have a negative shock on one's level of

well-being. Adaptation occurs if, after an initial negative shock of financial distress, SWB score gradually returns to the base level (the level corresponding to the state when a person is not financially distressed) over the period. Full or partial adaptation occurs, if the level of SWB completely or partially returns to the base level or otherwise no adaptation occurs, if the level of SWB does not return to the base level.

Results from the analysis indicate that people fail to adapt even after four consecutive years of financial distress. In other words, financially distressed individuals fail to regain the initial loss of SWB due to the negative shock of financial distress even after four years. This implies that financial distress has a persistent negative effect on the respondent's well-being. This result is robust to the length of the financial distress spell. However, the extent of adaptation varies with gender – males seem to adapt slightly to a greater extent than females. The analysis further contributes to existing literature by dissociating the impact of financial distress from the impact of other distressful life events, such as job loss, divorce or widowhood, which arguably lead to financial hardship. It indicates that despite potential overlaps in their effects, the incidence of financial distress has an independent negative effect upon well-being, distinct from the effects of other associated life events. These results imply that financial distress, like poverty and long-term unemployment, creates renewed negative stimuli in everyday life, leading to a 'scarring' effect on well-being, which our natural adaptive mechanism fails to heal over time.

Chapter 4 examines whether financial distress affects cognitive ability. Construal theory of happiness indicates that cognitive function influences hedonic processes (Lyubomirsky, 2001). Empirical work (see Agarwal and Mazumder, 2013; Llewellyn et al., 2008) in this area has explored a direct association of cognitive function with psychological and overall well-being. This chapter relies on recent work in behavioural economics which indicates a potential link between financial distress and cognitive impairment. 'Scarcity hypothesis' (see for example Mullainathan and Shafir, 2013; Mani et al., 2013; Mullainathan and Shafir, 2014) suggests that cognitive ability is a scarce resource which needs to be allocated according to competing demands and needs. Financially distressed people 'use up' or deploy disproportionately bigger shares of cognitive resources in managing financial problems, leaving inadequate resources for other tasks. This leads to a suboptimal performance of overall cognitive function, often termed as a 'cognitive tax'.

The analysis of this chapter aims to provide empirical evidence that financial distress can lead to a 'cognitive tax'. Previous studies have largely resorted to laboratory based experimental

data to test this hypothesis. To my knowledge, no previous study has exploited data outside the laboratory to test the same hypothesis. This chapter contributes to this literature by exploiting the third wave of the 'Understanding society' data where cognitive ability of over 40000 individuals living in the United Kingdom is reported.

The analysis presented in this chapter deploys a nonlinear, two-stage residual inclusion (2SRI) method (Terza *et al.*, 2008). In the first stage, the analysis assumes 'financial distress' and 'unemployment' as endogenous and estimates these variables from covariates including instruments using ordered logit (for financial distress) and logit (for unemployment) specifications. In the second stage, the analysis includes the residuals from the first stage and estimates the cognitive scores from financial distress, unemployment and other covariates using a fractional logit specification. The chapter replicates the analysis using bill payment status as a proxy for financial distress and compares the results.

The results from this analysis support the hypothesis that financial distress creates a 'cognitive tax'. The magnitude of this 'cognitive tax' is directly related to the respondents' reported level of financial difficulties. The higher the level of difficulties, the higher the 'cognitive tax', the lower the respondents are likely to score in the cognitive tests. These results are confirmed by replicating the analysis using bill payment status in place of financial distress. The results are also confirmed by collapsing five different cognitive scores into one latent cognitive ability through a confirmatory factor analysis (CFA) and measuring the impact of financial distress on the latent unified cognitive variable. The chapter also addresses the concern of endogeneity bias of health status by performing the analysis with or without controlling the health status of the respondents and confirms that the results remain broadly unchanged in both cases.

While the individual chapters contribute to the existing literature in different ways, the overall thesis contributes in a specific way. Using an array of contemporary econometric tools, it shows the various ways that financial distress negatively affects well-being. Analyses presented across the chapters indicate that, after controlling for overall financial situation, income has a significant but very small impact on different measures of well-being. In some cases, this impact even turns negative. This is contrary to the existing literature which generally finds a significant positive association between income and well-being. One plausible explanation for this finding is that current income constitutes only a part of the overall household financial situation which also include wealth (past income) and debts. Evidence from the United

Kingdom[7] emerges that higher income households also have higher amount of debts. Therefore, it is highly likely that the impact of high amounts of debt counteract the impact of current income on SWB leaving a minuscule positive or often negative impact of current income itself. Thus, the overall findings of this thesis point to the importance of considering overall financial distress rather than merely income deprivation in the analysis of well-being.

1.6 Organisation of the thesis

The thesis is organised as follows. Chapters 2, 3 and 4 present three empirical analyses which constitute the core of the thesis. Each empirical chapter is a standalone self-contained study with its own literature review, data description, econometric modelling and discussion of results. Chapter 5 provides concluding remarks outlining the limitations, broader policy implications and future avenues for further research.

[7] Household debt: statistics and impact on economy; Commons briefing paper, number 7584, 21 December 2018

2 Financial distress and well-being

2.1 Introduction

This chapter is concerned with the association between financial distress and self-reported well-being. The term 'financial distress' (or 'financial strain' (French, 2018); 'financial stress' (Kim and Garman, 2003)) is used to denote a negative assessment of an individual's overall financial situation (Prawitz *et al.*, 2006)[8]. A negative assessment would reflect an individual's worry about meeting everyday expenses, paying off debt or other financial obligations (Mason and Wilson, 2000; Kim and Garman, 2003) and can be interpreted as a sign of financial distress. Cobb-Clark and Ribar (2009) indicate that financial distress originates from the factors including cash flow problems arising from low income, poor money management and high levels of household debt.

Studies (see for example, Johnson and Krueger, 2006; Bridges and Disney, 2010; Wildman, 2003) generally indicate a negative association between financial distress and self-reported well-being. Causality here mainly runs from financial distress to well-being and the negative association is seen to reflect the corrosive impact of financial distress on the well-being of individuals. While these studies provide us with important insights, they use conventional regression methods which confine attention to the average of the measured well-being. If one takes into account the finding that SWB distributions are empirically quite skewed (e.g., Diener and Diener, 1996; Diener *et al.*, 2006), studies that focus only on the average regression might seriously under or overestimate the effects of the SWB predictors or in some cases, might fail to identify them at all (Cade and Noon, 2003). Some recent literature sheds light on this phenomenon. While studying the impact of education attainment upon well-being, Binder and Coad (2011) and Binder (2016) observe that the average regression shows a statistically insignificant impact of education on SWB but, when examined in different segments of the SWB distribution, education is seen to have a positive association in the upper segments and a negative association in the lower segments of the distribution. These studies indicate the

[8] In the literature, the opposite of financial distress is often referred to as 'financial satisfaction' (Joo and Grable, 2004) or 'financial well-being' (Penn, 2009) to denote one's contentment over overall financial situation.

importance of unpacking the heterogeneous information contained in different parts of the SWB distribution while examining the financial distress-SWB relationship.

This chapter seeks to address this distributional heterogeneity in the impacts of financial distress upon well-being. It deploys a fixed effect quantile regression (Canay, 2011) to a combined panel of eighteen waves of BHPS and five waves of US from 1991 to 2012. Fixed effects quantile regression allows us to estimate the impact of covariates at different points of SWB distribution. Rather than splitting the samples based on the respondent's SWB scores, it renders different weights to different quantiles of SWB distribution. The method essentially works like OLS except that it minimizes the sum of weighted residuals (weight being conditional to the quantiles) instead of minimizing the sum of squared residuals (in OLS) (Graham and Nikolova, 2015). Canay (2011) proposes a two-step fixed effect quantile regression estimator with additive fixed effects which separate the disturbance term and assume the parameters vary based only on the time-varying components of the disturbance term. In contrast, Powell (2016) proposes a single step non-additive fixed effects quantile regression where the fixed effects are never estimated or specified. One might raise the concern that a two-step estimator of Canay (2011) is prone to a potential bias arising from the first step estimation. However, in case of a large 'N' and 'T', both Canay (2011) and Powell (2016) provide consistent and asymptotically normal estimates. Therefore, the following analysis prefers Canay (2011) for its relative ease of implementation.

The analysis uses two measures of self-reported well-being: (i) reported life satisfaction and (ii) a measure of psychological well-being derived from the General Health Questionnaire (GHQ), both taken from BHPS and US. Ferrer-i-Carbonell and Frijters (2004) argue that it is important to control for individual unobserved heterogeneity while analysing well-being responses. This chapter takes advantage of the fixed effect quantile regression to control for individual unobserved heterogeneity and simultaneously, to explore heterogeneity in the impact of predictors across the SWB distribution[9]. Specifically, it addresses the question, how differently does financial distress affect individuals with low SWB than those with higher well-being?

The results from the following analysis accord with the expectation that financial distress, on average, negatively impacts well-being. The higher the level of financial distress, the lower the

[9] One of the ways to address heterogeneity in well-being analysis would be controlling personality traits where data on personality available. See for example, Boyce and Wood (2011).

level of well-being. However, the fixed effect quantile regression focusing on the association across the SWB distribution reveals that the same level of financial distress has a stronger negative impact on the individuals with lower well-being. By contrast, individuals who have already attained higher levels of SWB are less affected by the same level of financial distress. This finding indicates that well-being itself might act as an insulator against the corrosive impacts of financial distress. This is consistent with the resilience literature (see for example, Fredrickson and Joiner, 2002; Shi *et al.*, 2015; Ong *et al.*, 2006), which finds that well-being and positive emotions help to build emotional resilience and the ability to cope with distress. The analysis does not find any significant gender difference with respect to the association between financial distress and well-being. Current financial distress and future financial worries detriment SWB in a similar fashion. In addition, homeownership is found to have significant impact on well-being. Mortgagors experience a detrimental impact on their reported SWB as compared to the outright owners. Above all, the analysis reveals the heterogeneous impacts of financial distress based on the varying level of an individual's already attained well-being.

In terms of policy implications, this study indicates the need for government interventions at various levels. Policies aimed at improving well-being should address to improve household financial situation. For example, government can advise utility and mortgage companies to provide flexible payment options for the most disadvantaged segment of the society. In a broader perspective, government need to revisit Universal Credit policy as many stakeholders[10] warn that it is causing debt, financial hardship for the families concerned.

This chapter is organised as follows. Section 2 reviews relevant theories and literatures, section 3 describes the data, section 4 outlines the empirical strategy, section 5 outlines the results, section 6 discusses the results and section 7 concludes.

2.2 Theory and literature review

The association between income and reported well-being is widely studied. Clark *et al.* (2008b) provide a comprehensive review of relevant literature. Studies generally suggest that income has a positive impact on well-being, while higher income has a diminishing impact. There is

[10] The National Housing Federation, the Scottish Federation of Housing Associations, Community Housing Cymru and the Northern Irish Federation of Housing Associations warn that the Universal Credit system is "flawed" and causing debt, suffering and hardship for the families they house. Source: https://www.housing.org.uk/press/press-releases/flawed-universal-credit-causing-debt-hardship-families-in-social-housing/

evidence, however, that relative income matters more than the absolute income, suggesting the importance of status-seeking and social comparisons in influencing well-being (Dorn *et al.*, 2007). For a given income level, aspirations and expectations have a negative impact on well-being (Stutzer, 2004). This in turn, indicates that perceptions of relative income and financial status have stronger predictive power than actual income (Wildman and Jones, 2002).

Studies generally consider financial difficulties, debts and financial obligations as adverse life events and find a negative association with reported well-being (e.g., Jenkins *et al.*, 2008; Brown *et al.*, 2005; Nettleton and Burrows, 1998; Taylor *et al.*, 2007). This is evident in both cross sectional and longitudinal studies. However, the cross sectional studies often overestimate the association as they fail to control for individual's unobserved heterogeneity (Ferrer-i-Carbonell and Frijters, 2004). Jenkins *et al.* (2008) analyse cross sectional data from England, Scotland and Wales to show the association of low income, number of debt and mental health problems with mental health. Their initial findings suggest that low income is significantly and positively associated with poor mental health. However, once debt is controlled for, the association with low income disappears. 23% of the respondents with mental health issues holds debt; those who hold six or more separate debts are six times more likely to experience mental health problems compared to those without any debt. This study is complemented by Brown *et al.* (2005) which analyse two waves (1995 and 2000) of BHPS in an ordered probit specification to examine the impact of debts on psychological well-being. They measure psychological well-being by GHQ12 and segregate the total debt holdings into non-mortgage (unsecured) and mortgage (secured) debts. The authors find that non-mortgage debt has a significant negative impact on psychological well-being. The presence of an outstanding credit card debt reduces the probability of reporting of the highest psychological well-being by 6%. The study, however, does not find any statistically significant impact of mortgage debt on well-being. Similarly, Reading and Reynolds (2001) find an association between post maternal depression and debt. This study measures the level of depression through Edinburgh Postnatal Depression Scale (EPDS) and collects responses from 271 young mothers twice across six months. EPDS is a ten-item measure which the authors treat as continuous to fit in an OLS specification. The study finds that worries about debt are strongly related to higher levels of depression and it is the strongest predictor amongst the socio-economic variables controlled for in the model. The study concludes that being indebted to the point that causes individual worry is strongly and detrimentally associated with psychological well-being.

Several studies pay special attention to the impact of homeownership and mortgage debt on well-being. Cairney and Boyle (2004) examine the level of distress in homeowners with mortgages. They analyse sixth cycles of the General Social Survey of Canada in an OLS specification and measure distress through Bradburn Positive-Negative Affect Balance Scale. This study finds that mortgagors report higher distress than the homeowners without mortgages. Similarly, Nettleton and Burrows (1998) study the association between mortgage arears and mental health problems of indebted homeowners. They use first five waves of BHPS to construct the mental health measure from the GHQ12 Likert scale. This study finds that mortgage arears are positively associated with an increase in the number of visits to the doctors. The study also suggests that women experience a greater shock upon mental health than men at the onset of mortgage arears. In a longitudinal study of 13 waves of BHPS (1991-2003), Taylor *et al.* (2007) find that housing payment problems and arrears lead to poorer mental health. This study also measures mental health from GHQ12 on a Likert scale and deploys fixed effect specifications separately in male and female samples. Findings of the study indicate that housing arears is associated with an increase in male's GHQ by 1.95 units, an effect greater than the increase in GHQ due to unemployment, widowhood or divorce. On the other hand, housing payment problems are associated with an increase in female's GHQ by 0.62 units. In addition, the study indicates that the longer-term housing problems (12 months) worsen female's GHQ more than the shorter term (2 months) problems.

The psychological process behind the association between financial distress and well-being is explained by the 'relative standard model' proposed by Campbell *et al.* (1976). In this model, it is the value of the objective financial assets relative to one's expectations, desires, and standards of comparison that is of importance for one's reported well-being. Discrepancies between material desires and the ability to afford them plays the strongest role in predicting well-being as well as mediating the effects of comparison with socially important other's and with one's earlier financial situations (Crawford Solberg *et al.*, 2002). The 'relative standard model', therefore, puts more emphasis on one's perceived financial situation than the objective conditions in predicting the reported well-being.

A few studies have duly shed light on the impact of perceived financial situation. Drentea (2000) examines the association between credit card debts and reported anxiety amongst a sample of US individuals. He finds that having credit card debt does not have a detrimental impact on anxiety, but a higher debt to income ratio is positively associated with higher levels of anxiety. More importantly, participants' perceived worries related to their overall debt

situation significantly influence their anxiety levels. This is, however, is a cross section study, therefore, fails to control for individuals' fixed effects. In a similar study, Bridges and Disney (2010) find evidence of a positive association between subjective measures of financial situation and the likelihood of reporting depression. They exploit a six-item measure of subjective financial situation from Families and Children Survey (FACS) in the United Kingdom and collapse them into a dichotomous variable. Their initial finding suggests that respondents reporting 'financial stress' or 'debt problems' tend to report a higher chance of depression. The study then moves on to establish a link between the self-report financial stresses with 'objective' measures of household financial circumstances. They find that households differ in subjective responses to the similar objective situation. The authors conclude that the impact of objective financial situation on psychological well-being is mediated by the subjective measures of financial situation. Using seven waves of BHPS from 1991 to1997, Wildman (2003) finds that self-reported financial status and expected future financial position are significantly and positively associated with poor mental health (measured through GHQ12 Likert scale). This result is supported by the similar study of Mentzakis and Moro (2009). Johnson and Krueger (2006), using life satisfaction as a measure of well-being, demonstrate that perceived financial situation significantly influences reported well-being. This finding is also supported by Gray (2015). Taylor *et al.* (2011), in a different vain, construct an index of financial capability from several self-reported financial questions within the BHPS and find this index is positively associated with the measures of well-being.

The above literature broadly shows a negative association between the financial distress and measures of well-being. However, one major limitation of these literature is that they confine attention to the average impacts of financial distress on the measures of well-being and overlook the potential heterogeneity[11] of this impact. Binder and Coad (2011) address the distributional heterogeneity in SWB within a quantile regression framework to find a decreasing importance of the covariates across the well-being distribution. They find that higher education has an insignificant impact upon SWB in an average regression, but it has a positive impact in the lower quantiles and a negative impact in the higher quantiles of the SWB distribution. This is potentially because education helps deprived individuals to realise their

[11] Other sources of heterogeneity in well-being analysis may include individual's personality. Diener and Lucas (1999) note that the impacts of well-being predictors could vary significantly according to individual's personality traits. This proposition is confirmed by Boyce and Wood (2011) who find that personality traits cause significantly different magnitudes of impacts upon life satisfaction due to the rise in household income.

deprivations and opportunities while the least deprived individuals are probably so ambitious that they don't care about learning. Thus, the same opportunities can have different meaning for individuals at different points of the SWB distribution (Graham and Nikolova, 2015). In a later study, Binder and Coad (2015) also find a varying impact of unemployment across the SWB distribution. These studies significantly enhance our understanding of well-being by shedding lights on the distributional heterogeneity in the impact of the predictors. In this context, this chapter adds to the existing literature in two ways. First, it builds on the previous studies (e.g., Johnson and Krueger, 2006; Taylor *et al.*, 2011) that primarily deal with the average effect of financial distress on reported well-being and examine the distributional heterogeneity in the financial distress-well-being relationship. Specifically, the chapter addresses the question how differently financial distress affect individuals with low (high) reported well-being. Second, it extends the studies (e.g., Binder and Coad, 2011; 2015; 2016; Fang, 2017) which use quantile regression in the SWB analysis while studying the impact of financial distress across the SWB distribution. In doing so, the chapter innovatively exploits a combined panel of eighteen waves of BHPS and five waves of Understanding Society survey for the analysis.

2.3 Data

Analysis presented in this chapter is based upon a combined panel of two UK-wide longitudinal surveys: British Household Panel Survey (BHPS) and the United Kingdom Household Longitudinal Survey (UKHLS), also known as Understanding Society (US) survey.

The BHPS is an annual survey started in 1991 with approximately 10,000 individuals drawn from 5500 households, stratified through post code areas primarily in England. Later in 1999, another 1500 households were added to the sample from each of Scotland and Wales. Subsequently, in 2001, another 2000 households from Northern Ireland were added to the panel making an overall sample size of over 10000 households across the United Kingdom. In each successive year, the survey re-interviews the same individuals. It also follows anyone who might split off from the original household to form a new household, along with the other members of the new household. The adult survey starts at the age of 16, the children aged 10-15 are subject to youth questionnaires started in 1994 for. BHPS completes eighteen waves before it is merged with US in 2009.

US, on the other hand, is a panel survey of 40000 households in England, Scotland, Wales and Norther Ireland, starting in 2008. It consists of four samples – the innovation panel, General

Population Sample (GPS), Ethnic Minority Boost Sample (EMBS) and British Household Panel Survey (BHPS) Cohort. Innovation panel is a small sample collected for experimental purpose. GPS is the largest stratified sample randomly drawn from postcode sectors in England, Wales, Scotland and Norther Ireland. EMBS is an oversampling of five ethnic minority groups in UK, namely Indian, Pakistani, Bangladeshi, Black Caribbean and Black African[12]. BHPS cohort is the group which has been followed from the second wave of US to include respondents from BHPS.

This study merges eighteen waves of BHPS (1991-2008) and five waves (2009-2013) of the BHPS cohort of the US to get an overall 23 years of panel data. It uses both life satisfaction and psychological well-being responses as the measures of well-being. Therefore, the overall data is split into two sub-samples – 'life satisfaction' and 'psychological well-being'. Questions on life satisfaction are available in twelve waves of BHPS (from 1996 to 2013, excluding 2001) and in all the five waves of US. Therefore, life satisfaction sub-sample is constructed as a seventeen-year unbalanced panel. This subsample consists of 174,740 observations (males 80,852 and females 93,888), after discarding missing observations on any relevant variables. On the other hand, data on psychological well-being is available in all eighteen waves of BHPS and five waves of Understanding Society. Therefore, this subsample is constructed as a twenty-three-year unbalanced panel which contains 227,098 observations (males 105,430 and females 121,668), after discarding missing observations on any of the variables.

2.3.1 Life satisfaction and psychological well-being variables

In both BHPS and US survey, life satisfaction is measured through the responses to the single question, *"How dissatisfied or satisfied are you with your life?"* Responses are recorded on a standard 7-point Likert scale from *"not satisfied at all"* (1) to *"completely satisfied"* (7). The life satisfaction measure assumes individuals are in the best place to assess their individual level of satisfaction. Helliwell and Putnam (2004) argue that this single item measure of life satisfaction extracts a stable assessment of one's overall well-being as it '*triggers answers that are more reflective of one's whole life experience rather than current circumstances or mood*'. Moreover, life satisfaction responses highly correlate with overall happiness responses in different datasets. This correlation, for example, in World Value Survey is 0.81 (Inglehart and Klingemann, 2000). Diener *et al.* (1999), Krueger and Schkade (2008), Helliwell and Wang

[12] This sampling is done in a way that at least 1000 respondents from each ethnicity is included in the survey.

(2012) etc. have tested the validity, reliability, inclusiveness and interpersonal comparability of this single item measure to capture life satisfaction. However, this does not mean to ignore the concern that there are potential biases in the estimation of life satisfaction due to factors including the prevailing norms and expectations of the respondents. For the purposes of this study, we assume that the data on life satisfaction provides a reliable, if noisy, signal of the underlying SWB of respondents.

Psychological well-being, on the other hand, is measured from responses to a group of 12 questions within the General Health Questionnaire, known as GHQ12 (see **Table 2-7** in the appendix of this chapter) in both BHPS and Understanding Society survey. The GHQ12 score, originally developed by Goldberg and Williams (1988) for the purpose of investigating individual's psychological health, is now widely recognised as a reliable measure of psychological well-being (Argyle, 1989). GHQ12 includes questions on six positive and six negative mental states, some of these cover cognitive and evaluative aspects of one's psychology while others cover positive and negative affect. In BHPS and Understanding Society data, original responses to GHQ12 questions are coded on a four-point scale in a way that the lowest value indicated the highest psychological well-being or lowest level of mental stress. These values are reported to be robust to retest effects and suitable for longitudinal instruments (Pevalin, 2000). A 36-point Likert scale is constructed from scores for 12 individual questions by adding them together with equal weight for each. This study tests the internal consistency of the 12 item measures of psychological well-being in the combined panels of BHPS and US and finds a very high scale reliability with a Cronbach alpha=0.90[13]. In both BHPS and US datasets, an aggregated score for psychological well-being is readily available and therefore, this analysis takes the advantage of that measure. However, for convenience of interpretation and comparison with life satisfaction measure, the GHQ12 responses are reverse coded so that the highest value, 36, indicates the highest level of psychological well-being or the lowest level of mental stress.

2.3.2 Financial variables:

The main independent variable for this analysis, financial distress, is captured by the question about the respondents' current financial situation, *"How well are you managing financially these days?"* This question is available in both BHPS and US and the response is recorded on

[13] According to Jum (1978) a value of Cronbach alpha of 0.70 is considered as adequate in social sciences.

a 1-5 scale from *"living comfortably", "doing alright", "just about getting by", "finding it quite difficult",* to *"finding it very difficult"*. These responses have been used in several studies (see, Bridges and Disney, 2010) and are seen to capture the overall financial situation of the respondents.

The study also controls for respondent's anticipation about future financial situation, which is captured the question: *"... how do you think you yourself will be financially a year from now…?* The response is recorded on a 1-3 scale, *"better off", "worse off", "about the same".* These variable captures individuals' assessment and expectation of their financial situation over a year, relative to the current year. It also incorporates respondent's personal financial outlook with respect to income and labour market prospects, macroeconomic expectations (e.g., interest rates, taxation rates etc.) (Brown *et al.*, 2005).

The third variable related to respondent's overall financial situation is the home ownership status. Several empirical studies (e.g., Cairney and Boyle, 2004) report that home ownership and mortgage status are significantly related to well-being. The home ownership status is recorded in six categories, "*own outright", "owned/being bought on mortgage" "shared ownership (part-owned part-rented)" "rented" "rent free" and "other"*. This variable is available in both BHPS and Understanding Society data.

2.3.3 Control variables

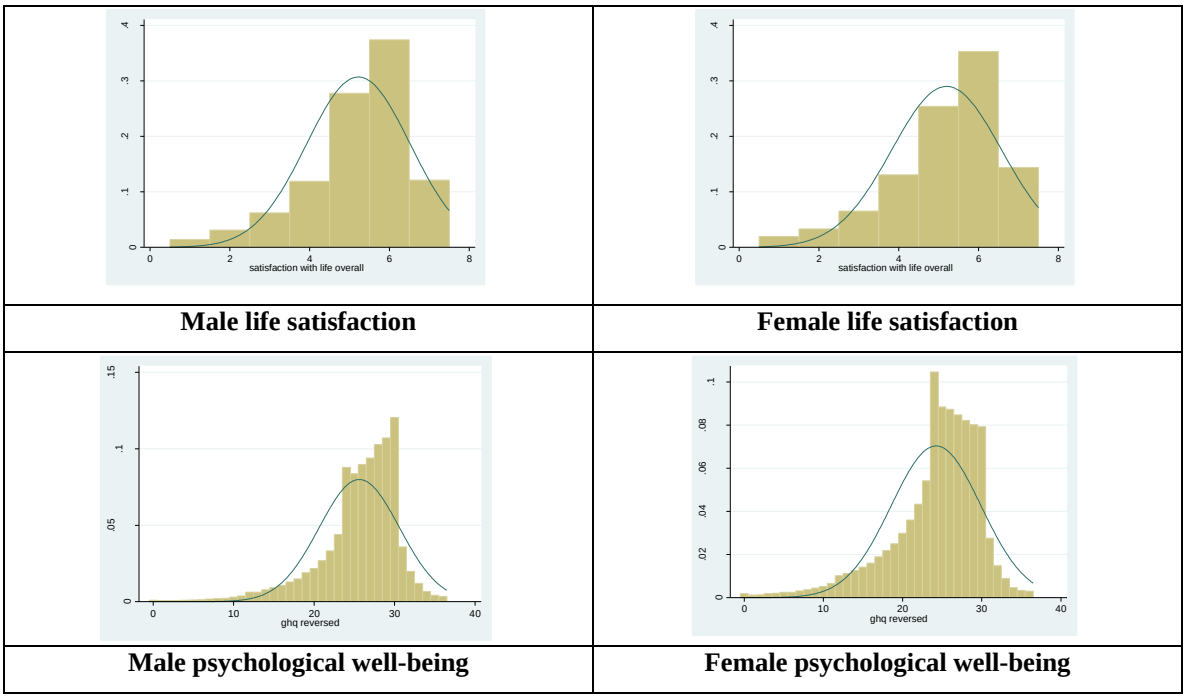
In addition to the financial variables, the study controls for the natural logarithm of real household equivalised income, which is calculated from net household income adjusted to the household size according to the OECD equivalence scale[14]. The study also controls for wide range of socio-demographic variables, which are found to be associated with life satisfaction and psychological well-being in the existing literature (see, Dolan *et al.*, 2008). In addition, Studies (e.g., Blanchflower and Oswald, 2004; Ferrer-i-Carbonell and Gowdy, 2007) consistently report a nonlinear relationship between age and different measures of well-being. Following these works, this study incorporates age and age-squared in all the empirical models to examine any potential nonlinear relationship of age with well-being in the BHPS and US data. **Table 2-5** in the appendix of this chapter reports a complete list of explanatory variables with descriptive statistics.

[14] Detailed documentation on the household equivalised income can be found in Bardasi *et al.* (2012).

2.3.4 Descriptive analysis:

Figure 2-1 below shows the distributions of life satisfaction and psychological well-being in both male and female samples. Both distributions are skewed to the right. Findings from earlier studies on US as well as on the global data (e.g., Diener and Diener, 1996; Blanchflower and Oswald, 2004) indicates that females have a higher life satisfaction than males. More recent analyses of BHPS (e.g., Della Giusta *et al.*, 2011) report that females are no longer more satisfied than males and in cases they are actually less satisfied than males (Office of the National Statistics, UK, 2016). Moreover, some studies (e.g., Clark and Oswald, 1994) report that females score worse in GHQ as they report higher anxiety and depression than males, especially at the late ages (National Health Survey, NHS, 2016). Preliminary examination of the BHPS and US data supports these earlier findings. Male's life satisfaction (5.22) is found to be slightly higher than females' (5.20) and likewise male's Psychological Well-being (25.62) is slightly higher than females' (24.23).

Figure 2-1: Gender-wise distribution of well-being



Male life satisfaction	Female life satisfaction
Male psychological well-being	**Female psychological well-being**

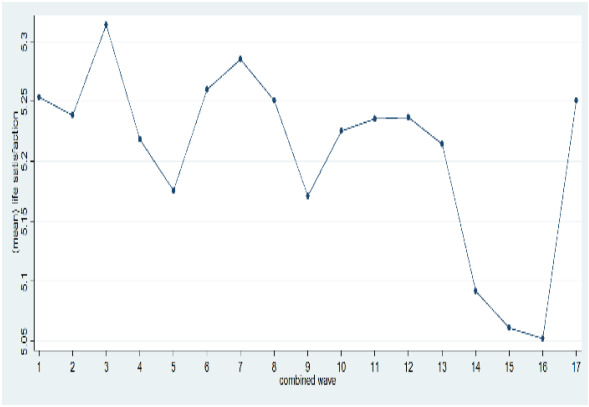
Table 2-1 below depicts average life satisfaction and psychological well-being with respect to different categories of overall financial situation. This clearly depicts a trend that respondents in the worse financial situation have lower scores across the well-being measures.

Table 2-1: Mean well-being according to categories of financial situation

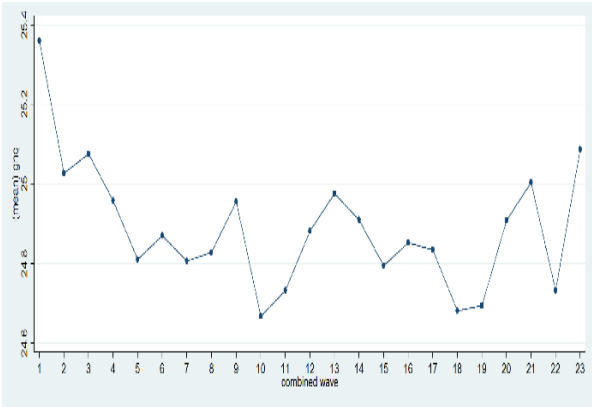
Categories of financial situation	Life satisfaction	Psychological well-being
'living comfortably''	5.6	26.1
'doing alright'	5.2	25.3
'just about going by'	4.8	23.9
'finding it quite difficult'	4.3	21.5
'finding it quite difficult'	3.7	18.9

At this stage, a simple pairwise comparison of means of life satisfaction and psychological well-being by different levels of financial distress shows there is a significant (at 5% level) difference in mean well-being scores in this data over the categories of financial distress responses. Results of the pairwise comparisons are reported in **Table 2-6** in the appendix of this chapter.

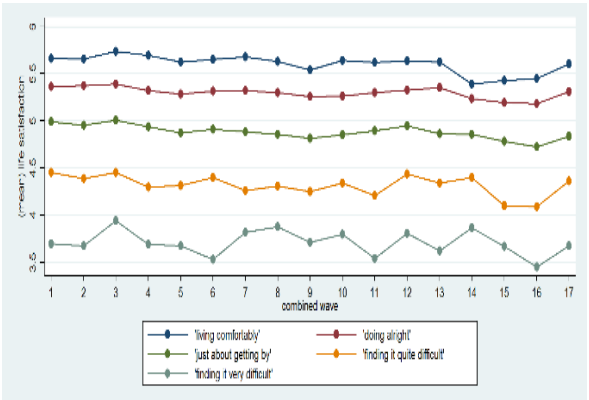
Figure 2-2: Mean life satisfaction and psychological well-being over the waves of survey



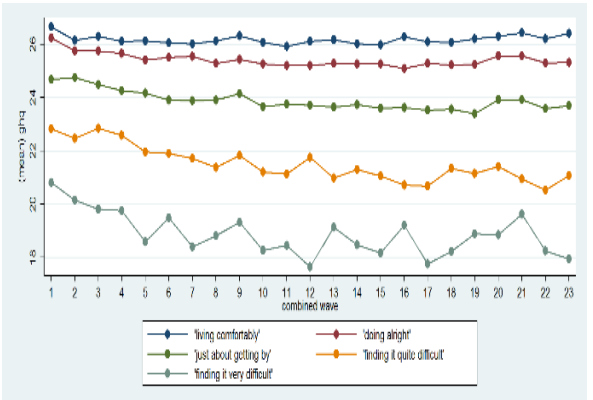
Mean life satisfaction over the waves



Mean psychological well-being over the waves



Mean life satisfaction by categories of financial distress responses over the waves



Mean psychological well-being by categories of financial distress responses over the waves

Year-wise (in this case wave-wise) movement of mean life satisfaction and psychological well-being is depicted in **Figure 2-2**. The upper panel of this figure shows that life satisfaction remains within the range of 5.05-5.30 throughout the years while mean psychological well-

being (reversed) remains within 24.8-25.4. This simple trend analysis indicates that the means of both life satisfaction and psychological well-being in this data remain reasonably stable over the year. This trend in the BHPS and US data, therefore, conforms to the earlier studies across different datasets (Diener *et al.*, 2006). Splitting the mean life satisfaction and psychological well-being by the categories of financial distress (lower panel of **Figure 2-2**) shows that the mean scores of well-being associated with each category of financial distress remain stable over the waves under consideration (in this case, life satisfaction for 17 waves (from 1996 to 2013 excluding 2001), and psychological well-being for 23 waves (from 1991 to 2013). However, the figure shows that the more financially distressed respondents have a lower mean well-being score throughout the waves. These findings pave the way for the following regression analysis.

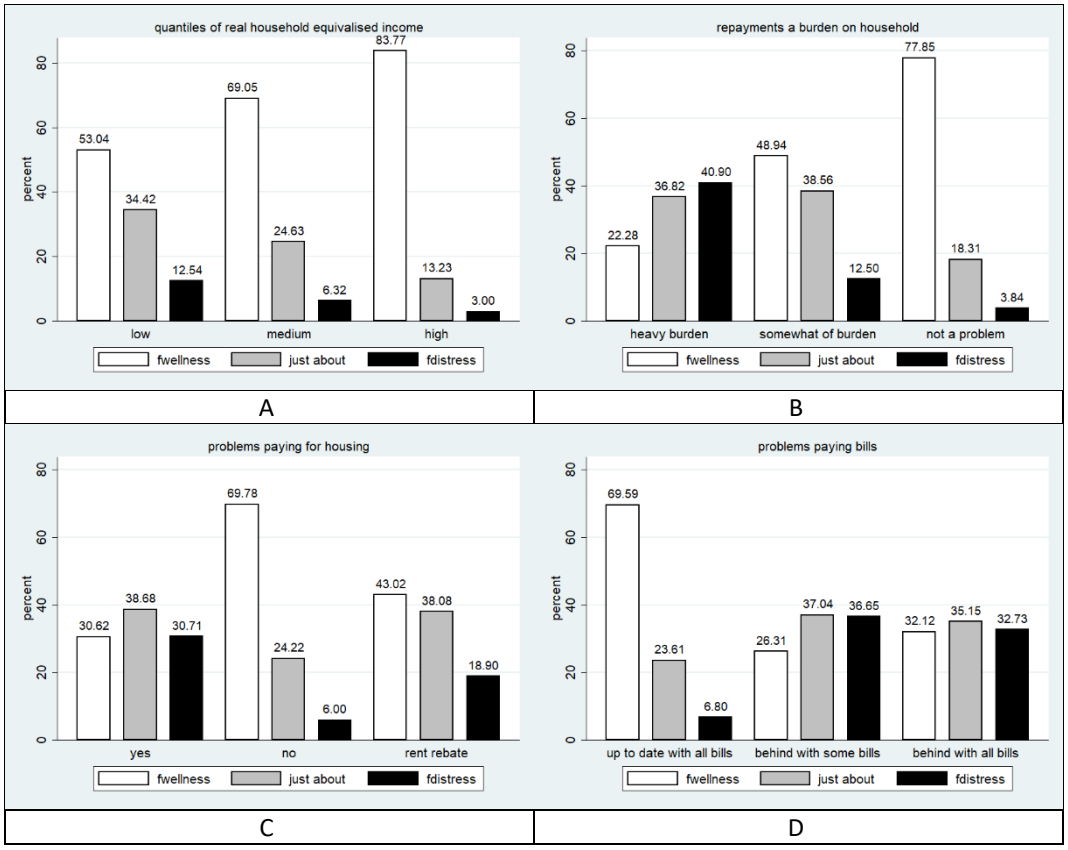
2.3.5 Financial distress, income deprivation and various payment obligations

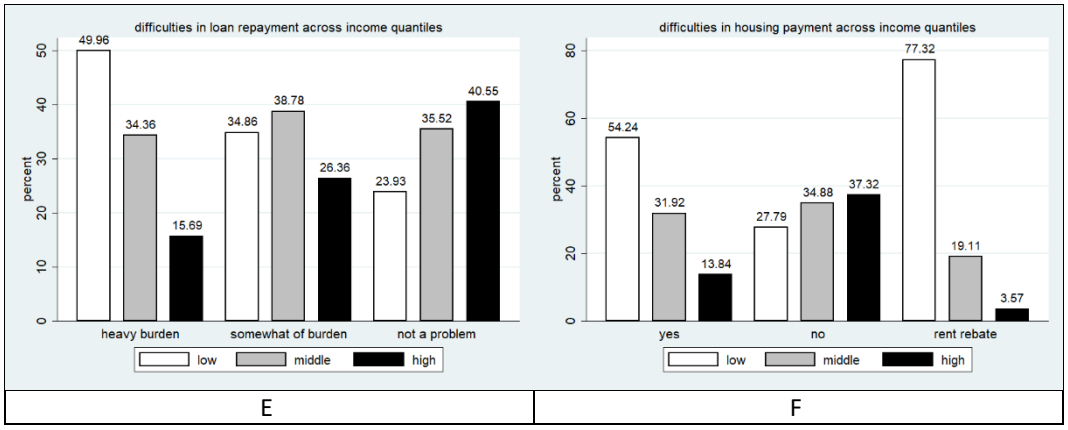
Two questions pertaining to the 'financial distress' variable remain vital to this analysis. First, what aspects of an individual's financial situation is reflected in this variable? And second, to what extent is this variable synonymous to individual's income deprivation or poverty? This section addresses these two questions by cross tabulating the financial distress variable with various aspects of respondents' financial situation. For the sake of simplicity, the analysis first transforms the five-point overall financial situation variable into three-point variable. In doing so, the uppermost categories, *"living comfortably"* and *"doing alright"*, which express financial wellness, are merged together. Similarly, the two lowermost categories, *"finding it quite difficult"* and *"finding it very difficult"* which express financial distress, are also merged together. The middle category *"just about getting by"* which expresses the average condition, remains unchanged. This three-point variable is then cross tabulated with household real equivalised income and household's level of difficulties to meet three payment obligations – loan repayment, bill payment and payments for housing. For assessing loan repayment burden, the respondents are asked, *'repayments a burden on household?* Answers are recorded on a three-point scale, *'heavy burden'*, *'somewhat burden'* and *'not a problem'*. For assessing the housing payment burden, respondents are asked, *'problems paying for housing?'* and responses are recorded on a three-point scale, *'yes problem'*, *'no problem'* and *'on rent rebate'*. Finally, for assessing the difficulties in meeting bill payment obligations, respondents are asked, *'problems paying bills?'* and the responses are recorded on a three-point scale *'up to date with all bills'*, *'behind with some bills'* and *'behind with all bills'*. The loan repayment question is asked only in fifth and the subsequent waves in BHPS, the housing payment question is asked

in both BHPS and US while the bill payment question is asked only in the US. It should be noted that the housing payment question is asked to mortgagors and renters but not to outright homeowners.

Figure 2-3 (A-D) shows how the respondents are split into three categories of financial situation responses within each category of the four aforesaid variables. For example, **Figure 2-3** (A) shows, 53.04%, 34.42% and 12.53% of the respondents of the lowest income quantile are financially 'well', 'average' and 'distressed' respectively. Similarly, **Figure 2-3** (C) shows, 38.68%, 38.68% and 30.71% of those who are in problems for paying for housing, consider their financial situation as 'well', 'average' and 'distressed' respectively. As expected, **Figure 2-3** (A) indicates an increasing percentage of financial distress responses belong to lower income quantiles. Therefore, income deprivation is one of the sources of financial distress. Yet, the analysis indicates that a larger fraction of respondents in the lowest income quantile does not report financial distress. This indicates, financial distress is not exclusively a phenomenon of income deprivation.

Figure 2-3: Cross tabulation of financial situation response categories





E F

Figure 2-3 (B-D) indicates that a large fraction of respondents who are facing problems with meeting various payment obligations reports financial distress. 69.38% respondents are behind with some bills or all; report financial distress. Similarly, 53.40% respondents reporting loan repayment a 'somewhat burden' or 'heavy burden' on household also report 'financial distresses'. In addition, 49.61% of those who consider paying for housing is a problem, are facing financial distress. This indicates that respondents who are in difficulties in meeting various payment obligations report significant amount of financial distress. One question which remains pertinent here is, whether low income is leading to difficulties in meeting payment obligations. **Figure 2-3** (E-F) reveals that less than 50% respondents saying repayment of loans is a burden, belong to lowest income quantile, which leaves more than 50% of the respondents belonging to middle- and higher-income quantiles, feel heavy burden to meet loan repayment obligations. Similarly, nearly 46% of those who say paying for housing is a problem, comes from middle- and higher-income quantiles. These indicate that difficulties in payment obligations does not necessary a phenomenon of income deprivation.

Therefore, the above analysis indicates that financial distress does not only come from income deprivation. Problems in meeting payment obligations are not limited to low income individuals; middle- and high-income individuals too experience difficulties in paying rents, bills or debt servicing obligations. The above cross tabulation, thus, indicates that the variable 'financial distress' in the dataset under examination signifies beyond the low income or poverty and captures individual's distressful financial situations arising from difficulties in various payment obligations.

2.4 Regression Method:

Substantial attention has been paid to examine whether SWB responses should be considered as ordinal or cardinal. Early studies in psychology[15] mostly assume cardinality and deploy ordinary least square methods. On the contrary, studies in economics typically assume ordinality and employ probabilistic models which treat ordinal data as a discrete expression of a continuous latent variable of an arbitrary scale. Ferrer-i-Carbonell and Frijters (2004) and Clark and Oswald (2002) compare the results of the determinants of SWB under both the assumptions and report no major differences in the results. The same explanatory variables are statistically significant and indicate the same relationship. Following Ferrer-i-Carbonell and Frijters (2004), a series of economics literature considers SWB responses as cardinal. For example, Meier and Stutzer (2008) analyse GSOEP (German Socio Economic Panel) within an OLS framework, Clark *et al.* (2008a) and Clark *et al.* (2016) analyse GSOEP in a linear fixed effect models and Clark and Georgellis (2013) analyse BHPS in a fixed effect model. Ferrer-i-Carbonell and Frijters (2004) further investigate the impact of unobserved, time invariant individual effects on the estimated coefficients and compare the results of a pooled model with a fixed effects model. They discover large disparities between the results in each specification; once individual fixed effects are controlled for, many explanatory variables become statistically insignificant. They conclude that it is important to control for individual fixed effects while analysing panel SWB data.

Conventional regression techniques, however, provide the average effect of the explanatory variables on average SWB measures. Focusing only on the average effects may under or overestimate the relevant coefficient estimates, or may even fail to detect important relationships (Binder and Coad, 2011). A focus on the average is therefore unsuitable for the analysis of complex interactions of variables in distributions containing heterogeneous individuals (Cade and Noon, 2003). This consideration may be even more important when the findings suggest that the life satisfaction and psychological well-being distributions of our sample are quite skewed to the right (Diener and Diener, 1996).

In this context, this chapter deploys a fixed effect quantile regression (Canay, 2011). The analysis starts with a panel fixed effect model,

[15]Argyle (1999) in Kahneman *et al.* (1999) outlines around fifty studies that employ OLS techniques on cross-sectional data

$$Y_{it} = X_{it}\beta_{\mu} + \alpha_i + u_{it},\ with\ E(u_{it}|X_{it,}\alpha_i) = 0,$$

Where Y_{it} denotes measures of SWB and X_{it} represents a vector of observable explanatory variables including financial distress. u_{it} is the usual error term and α_i corresponds to a vector of time-invariant individual fixed effects. To explore heterogeneity in the SWB responses, the sample is segregated into quantiles τ.

In the first step, unobserved fixed effects are estimated through a within person estimator, $\beta_{\mu} = E[\beta_{\mu}]$, where individual fixed effect α_i is present in the conditional mean of Y_{it}. In the next step, a standard quantile regression is conducted

$$\hat{Y}_{it} = Y_{it} - \hat{\alpha}_i \text{ on } X_{it}$$

The estimated fixed effect is defined as,

$$\hat{\alpha}_i \equiv E_T(Y_{it} - X_{it}\hat{\beta}(\tau_{\mu}), \text{ where } \hat{\beta}(\tau_{\mu}) \text{ is a } \sqrt{nT} \text{ consistent estimator of } \hat{\beta}(\tau_{\mu})$$

The two step estimator $\hat{\beta}(\tau_{\mu})$ is consistent and asymptotically normal under certain regularity conditions (Canay, 2011).

2.5 Results

Results of this analysis are presented in the following four subsections. The first two subsections summarise the results of two linear fixed effects estimations while two later subsections summarise the results of two fixed effects quantile regressions which calculate the estimates at 20th, 40th, 60th and 80th quantiles across the SWB distribution. Since gender is not a time-varying predictor and drops out of the fixed effect equations, the analysis performs both the fixed effects and fixed effects quantile regressions separately in the male and female samples. However, the fixed effects analysis also estimates gender interaction models to determine whether there is any statistically significant difference between the estimates associated with the main independent variables in the male and female samples and discuss the results where relevant. Besides, psychological well-being is found to be strongly (positively) associated with general health. For example, NHS in general health survey, 2016 in the UK[16] find, 61% of men and 75% of women who report their general health as 'very bad' have a very high GHQ (low psychological well-being). Incorporation of general health as a predictor of psychological well-being would potentially raise the question of strong endogeneity.

[16] Please see, https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england/health-survey-for-england-2016

Therefore, models estimating psychological well-being exclude general health from the right side of the equation.

2.5.1 Linear fixed effect regression – life satisfaction

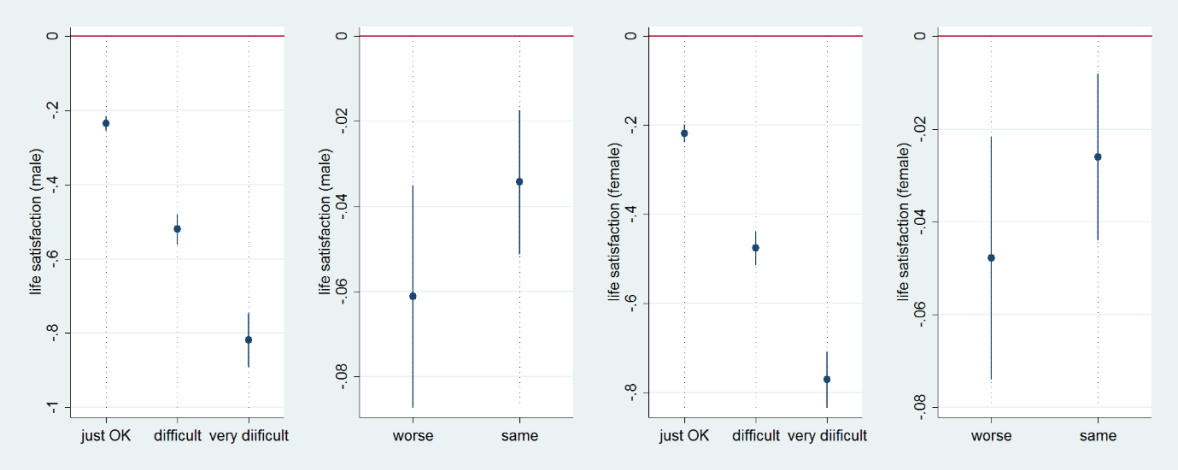
Results from fixed effect regression on life satisfaction are presented in **Table 2-2**. In this analysis, age does not show a 'U-shaped' relationship with life satisfaction across the male and female samples. This finding accords with Frijters and Beatton (2012), who do not find a 'U-shaped' relation between age and life satisfaction in a fixed effect analysis. However, it contradicts many other studies (Winkelmann and Winkelmann, 1998; Blanchflower and Oswald, 2008) which assert a 'U-shaped' relationship between the variables. The difference could potentially be attributed to the difference in datasets. Household equivalised income has no significant impact upon both male's and female's life satisfaction. This is in contrast to the earlier income-well-being literature (Easterlin, 1974; Easterlin, 1995; Easterlin, 2005; Clark et al., 2008b) which finds that the level of income has a diminishing yet positive impact upon life satisfaction. This contradiction is potentially due to the differences in samples since the gender interaction model (reported in **Table 2-2**), where male and female samples are aggregated, indicates that household equavalised income does have a significant positive impact upon life satisfaction.

Self-report general health shows a significant association with life satisfaction. Having poor health, on average, detriments one's life satisfaction by a significantly large magnitude in comparison to reporting an excellent general health. This result conforms to the earlier literature (Boes and Winkelmann, 2004; Diener *et al.*, 1999) which reports a positive relation between better health and higher life satisfaction. Similarly, married (or those in partnership) individuals have significantly higher life satisfaction than single and never married individuals while the separated individuals have significantly lower life satisfaction. These findings accord with (Clark *et al.*, 2008b; Dolan *et al.*, 2008)) who report a positive association of marriage with life satisfaction. However, in this analysis, widowhood shows a significantly detrimental impact only on male's life satisfaction, but not on females'. This result confirms the earlier notion (e.g., Van Grootheest *et al.*, 1999) that males become more depressed than females due to loss of partner.

Level of education does not show a significant impact upon female's life satisfaction. In males, it shows an inverse relationship; men with GCSE and no education have higher life satisfaction than those with higher degrees. This result contradicts Blanchflower and Oswald (2004) who

find that higher education is positively associated with higher life satisfaction. However, the above result accords with the earlier literature which finds that better educated people are less happy (Frey and Stutzer, 2002) than the individuals with lower level of education. It also supports the findings of Stutzer (2004) that individuals with mid-level of education (in this case GCSE) are the most satisfied of all the categories. In this analysis, having children does not have any significant effects upon male's and female's life satisfaction. This result contradicts Haller and Hadler (2006) who find that when income and financial satisfaction are controlled for, having children has a significant positive effect on life satisfaction. Respondents' employment status shows an expected association with overall life satisfaction. Unemployed, sick or disabled individuals have a significantly lower life satisfaction while retired individuals and full-time students have higher life satisfaction compared to the self-employed individuals. These results are consistent with the existing literature (e.g., Winkelmann and Winkelmann, 1998; Frey and Stutzer, 2002) which finds detrimental effects of unemployment, sickness and disability upon life satisfaction.

Figure 2-4: Effects of current and future financial situation upon life satisfaction[17]



The main independent variable, 'current financial situation', which captures the respondents' financial distress, shows a strong negative association with life satisfaction (see **Figure 2-4**). Those who perceive their current financial situation as, 'just about getting by', 'finding it quite difficult' and 'finding it very difficult' report significantly lower life satisfaction than the base category, which in this case, is a combination of 'living comfortably' and 'doing alright'. For

[17] In the figure, the response categories of 'current financial situation' are abridged due to paucity of space. The categories 'just OK' 'difficult' and 'very difficult' should be read as 'just about getting by', 'finding it quite difficult' and 'finding it very difficult'.

example, males, on average, reporting 'just about getting by' report 0.23 units less life satisfaction than the base category. Likewise, those reporting their financial situation 'finding it very difficult' on average, report 0.82 units less satisfaction than the base category. Since the category 'finding it very difficult' expresses a higher level of financial distress than the category 'just about getting by', the above results indicate that the higher level of financial distress has a greater negative impact on reported life satisfaction. The female sample confirms the similar results. These results are consistent with the existing literature (e.g., Kim and Garman, 2003; Wildman, 2003; Hayo and Seifert, 2003) that financial distress is a negative life event which detriments well-being. Estimates obtained from the gender interaction model indicate that females reporting their current financial situation as 'finding it quite difficult' have 0.057 units higher life satisfaction than males in the same category. This result indicates that, females report significantly higher life satisfaction than males in the most distressful financial situation.

Respondents' 'future financial situation' also has a strong impact upon life satisfaction. Males who predict their financial situation in a year would be 'worse' than now, report significantly lower (0.61 units) life satisfaction than those who predict their situation would be 'better' (the base category) than now. Similarly, males who predict their financial situation in a year would remain the 'same' as now, report 0.34 units less satisfaction than the base category. The female sample confirms similar results. The gender interaction model, in this case, finds no significant difference between male and female. These results accord with the earlier findings (e.g., Kim and Garman, 2003) that financial worries, on average, have a negative impact upon reported life satisfaction.

Homeownership status also exerts significant impacts on reported life satisfaction in both the male and female samples. Mortgagors report significantly lower life satisfaction than the outright owners. Rentiers also report lower levels of satisfaction compared to outright owners, but this impact is statistically insignificant in the male sample. On the contrary, the size of the impact of renting on female's satisfaction is comparable to that of mortgage. Therefore, when compared to outright owners, renting house is not as bad for male's satisfaction, but it seems to be as bad as having a mortgage for female's satisfaction.

In summary, the fixed effect regression with life satisfaction indicates that on an average, financial distress is significantly and negatively associated with both male's and female's life satisfaction. The strength of this association depends on the level of the financial distress;

Table 2-2: Fixed effect regression

	Life satisfaction			Psychological well-being		
	(1) Male	(2) Female	(3) Interaction	(4) Male	(5) Female	(6) Interaction
Age	0.004	-0.023	-0.011	-0.064	-0.053	-0.060*
	(0.015)	(0.015)	(0.011)	(0.052)	(0.050)	(0.036)
Age squared	-0.006	-0.033	-0.020	0.242*	0.077	0.143
	(0.043)	(0.040)	(0.029)	(0.132)	(0.124)	(0.091)
Log real equivalised HH income	0.015	0.014	0.014*	-0.100***	-0.057	-0.078***
	(0.010)	(0.010)	(0.007)	(0.036)	(0.038)	(0.026)
Marital status (Base-Single)						
Married	0.113***	0.064*	0.085***	-0.231**	-0.260**	-0.271***
	(0.036)	(0.034)	(0.025)	(0.117)	(0.132)	(0.089)
Living as couple	0.160***	0.107***	0.131***	0.065	-0.050	-0.015
	(0.030)	(0.029)	(0.021)	(0.104)	(0.113)	(0.078)
Divorced	-0.107*	-0.047	-0.068*	-0.264	-0.272	-0.271**
	(0.057)	(0.049)	(0.037)	(0.208)	(0.185)	(0.136)
Separated	-0.331***	-0.199***	-0.248***	-1.891***	-1.288***	-1.498***
	(0.060)	(0.055)	(0.041)	(0.240)	(0.221)	(0.162)
Widowed	-0.104	-0.121**	-0.115***	-1.316***	-1.336***	-1.347***
	(0.070)	(0.056)	(0.043)	(0.219)	(0.191)	(0.143)
General Health (Base-Excellent)						
Very good	-0.132***	-0.129***	-0.130***			
	(0.011)	(0.012)	(0.008)			
Good	-0.318***	-0.315***	-0.316***			
	(0.016)	(0.016)	(0.011)			
Fair	-0.580***	-0.555***	-0.565***			
	(0.024)	(0.022)	(0.016)			
Poor	-1.054***	-0.920***	-0.971***			
	(0.045)	(0.039)	(0.030)			
Highest Qualification (Base-Degree)						
A level	0.063	0.003	0.018	-0.189	0.117	-0.040
	(0.044)	(0.036)	(0.028)	(0.139)	(0.132)	(0.096)
GCSE	0.205***	-0.003	0.075**	0.003	-0.074	-0.051
	(0.051)	(0.040)	(0.031)	(0.157)	(0.136)	(0.103)
Other qualification	-0.021	-0.059	-0.045	-0.095	-0.105	-0.093
	(0.041)	(0.039)	(0.028)	(0.130)	(0.131)	(0.093)
No qualification	0.177***	0.012	0.079*	-0.023	-0.222	-0.117
	(0.065)	(0.056)	(0.042)	(0.182)	(0.181)	(0.129)
No of Children (Base-No child)						
1 Child	-0.014	-0.024	-0.016	-0.281***	-0.007	-0.130**
	(0.020)	(0.020)	(0.014)	(0.069)	(0.073)	(0.051)
2 Children	-0.055**	-0.030	-0.037**	-0.303***	0.178**	-0.037
	(0.023)	(0.024)	(0.017)	(0.083)	(0.085)	(0.060)
3 or more children	-0.047	-0.078**	-0.059**	-0.368***	0.076	-0.122
	(0.038)	(0.036)	(0.026)	(0.125)	(0.131)	(0.091)
Employment Status (Base-Self-employed)						
Paid employed	0.001	0.030	0.009	0.013	-0.192*	-0.059
	(0.025)	(0.032)	(0.020)	(0.077)	(0.115)	(0.064)
Unemployed	-0.200***	-0.134***	-0.174***	-1.176***	-1.418***	-1.263***
	(0.038)	(0.045)	(0.029)	(0.124)	(0.169)	(0.100)
Retired	0.115***	0.174***	0.141***	0.209*	0.005	0.145*
	(0.036)	(0.039)	(0.026)	(0.110)	(0.137)	(0.084)
On maternity leave	-0.017	0.280***	0.253***	0.530	-0.289*	-0.070
	(0.500)	(0.049)	(0.042)	(0.907)	(0.161)	(0.130)
Family care	-0.003	0.029	-0.001	-0.408*	-0.554***	-0.415***
	(0.076)	(0.036)	(0.026)	(0.228)	(0.128)	(0.087)
Full time student	0.132***	0.156***	0.140***	0.293**	0.155	0.257***
	(0.041)	(0.043)	(0.029)	(0.134)	(0.155)	(0.099)
Sick or disabled	-0.349***	-0.255***	-0.307***	-2.549***	-2.820***	-2.647***

	(0.048)	(0.050)	(0.034)	(0.190)	(0.214)	(0.141)
Training scheme	-0.012	0.116	0.044	0.572**	0.430	0.530**
	(0.098)	(0.127)	(0.078)	(0.278)	(0.494)	(0.262)
Other	-0.045	0.121**	0.041	-0.454	0.116	-0.061
	(0.075)	(0.060)	(0.046)	(0.285)	(0.266)	(0.193)
Current Financial Situation (Base-Living comfortably and Doing alright)						
Just about getting by	-0.235***	-0.218***	-0.238***	-0.980***	-0.929***	-0.991***
	(0.012)	(0.012)	(0.012)	(0.041)	(0.043)	(0.041)
Finding it quite difficult	-0.520***	-0.476***	-0.528***	-2.665***	-2.359***	-2.686***
	(0.025)	(0.023)	(0.025)	(0.092)	(0.087)	(0.092)
Finding it very difficult	-0.818***	-0.771***	-0.834***	-4.350***	-4.113***	-4.370***
	(0.043)	(0.038)	(0.043)	(0.171)	(0.152)	(0.170)
Future financial situation (Base-Better)						
Worse	-0.061***	-0.048***	-0.060***	-0.669***	-0.635***	-0.694***
	(0.016)	(0.016)	(0.016)	(0.058)	(0.062)	(0.058)
Same	-0.034***	-0.026**	-0.033***	-0.228***	-0.155***	-0.244***
	(0.010)	(0.011)	(0.010)	(0.037)	(0.043)	(0.037)
Homeownership status (Base-Owned outright)						
Owned/being bought on mortgage	-0.040**	-0.050**	-0.037*	-0.383***	-0.229***	-0.389***
	(0.020)	(0.021)	(0.020)	(0.067)	(0.072)	(0.066)
Shared ownership (part-owned part-rented)	0.016	-0.119	0.020	0.061	-0.689**	0.067
	(0.071)	(0.079)	(0.071)	(0.250)	(0.320)	(0.251)
Rented	-0.046	-0.051*	-0.052*	-0.234**	-0.140	-0.232**
	(0.029)	(0.029)	(0.029)	(0.098)	(0.105)	(0.097)
Rent free	-0.061	0.003	-0.063	-0.296	-0.383**	-0.286
	(0.056)	(0.050)	(0.056)	(0.183)	(0.181)	(0.182)
Other	-0.121	0.009	-0.127	-0.726**	-0.374	-0.741**
	(0.081)	(0.085)	(0.082)	(0.294)	(0.312)	(0.295)
Female & just about getting by			0.023			0.075
			(0.016)			(0.059)
Female & finding it quite difficult			0.057*			0.341***
			(0.033)			(0.126)
Female & finding it very difficult			0.072			0.268
			(0.057)			(0.227)
Female & worse			0.012			0.080
			(0.022)			(0.084)
Female & same			0.006			0.105*
			(0.015)			(0.056)
Female & owned/being bought on mortgage			-0.014			0.168*
			(0.028)			(0.095)
Female & shared ownership (part-owned part-rented)			-0.139			-0.749*
			(0.106)			(0.405)
female & rented			0.007			0.099
			(0.040)			(0.140)
female & rent free			0.072			-0.089
			(0.075)			(0.257)
female & other			0.144			0.382
			(0.118)			(0.429)
Constant	5.108***	6.174***	5.713***	30.087***	28.967***	29.526***
	(0.577)	(0.580)	(0.414)	(1.842)	(1.825)	(1.302)
N	80317	93298	173615	104598	120724	225322

Note: *, **, *** denotes significance at 1%, 5% and 10% levels. All the regressions, in addition, control for region and year dummies not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity

higher level of distress is seen to have a stronger negative impact on life satisfaction. Future financial worries have a similar negative impact on life satisfaction. In addition, mortgagors are seen to report lower satisfaction than the outright owners. These impacts of various financial variables on life satisfaction are broadly similar in both male and female samples.

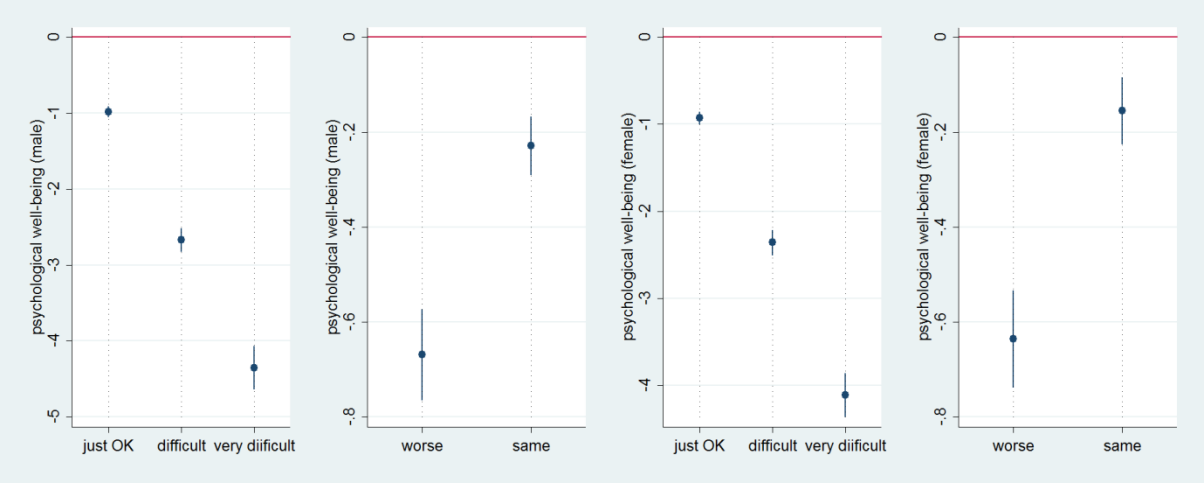
2.5.2 Linear fixed effect regression – psychological well-being

The results of the fixed effects regression on psychological well-being are presented in **Table 2-2**. The impacts of the covariates on psychological well-being are generally like those on life satisfaction described in the previous section with some notable differences. Real equivalised income is negatively associated with male's psychological well-being. This result contradicts the existing literature (e.g., Easterlin, 1995; Clark *et al.*, 2008b) which generally asserts that income has a diminishing but positive impact upon well-being. The potential explanation of such discrepancies would be the inclusion of the other financial variables as predictor. The overall financial situation variable takes accumulated wealth, debts and other payment obligations, in addition to household income, into consideration. In the United Kingdom, household debt is concentrated in the higher income households. The highest 5^{th} quantile holds six times household debt as much as the lowest 5^{th} quantile does (Commons briefing paper, 2016 using ONS data). Therefore, the negative effects of debt, mortgages or other payables is likely to counteract the positive effects of income. However, the association of household income with female's well-being is statistically insignificant. This finding accords with Headey and Wooden (2004b) who analyse Australian SF-36 mental health score to find that equivalised household income is not a significant predictor of mental health.

Contrary to the general notion that marriage increases psychological well-being (e.g., Dolan *et al.*, 2008) this analysis finds that married women have lower well-being than single women. This result, however, accords with Wildman and Jones (2002) who analyse BHPS to find that single women may have higher well-being than married women. In line with Clark (2003), Headey and Wooden (2004b) and Flouri (2004), higher education does not have a statistically significant impact upon respondents' psychological well-being. This result contrasts with the impacts of education on life satisfaction described earlier. However, studies (e.g., Dolan *et al.*, 2008) recognise that education attainments might have varying associations with the reported well-being depending upon different datasets and econometric methods. Having a child has a positive impact on male's psychological well-being but has a statistically insignificant impact on women's well-being. This finding accords with Della Giusta *et al.* (2011) who, using BHPS

find that females giving childcare for long hours might report less well-being than men. This finding also accords with the result that those who provide family care, report lower well-being than other employment categories.

Figure 2-5: Effects of current and future financial situation upon psychological well-being



The main independent variable, financial distress, is significantly and negatively associated with psychological well-being (see **Figure 2-5**). Males reporting their current financial situation as 'just about getting by', 'finding it quite difficult' and 'finding it very difficult' on an average report 0.98, 2.66 and 4.35 units less well-being respectively than the base category which, in this case, is a combination of 'living comfortably and 'doing alright'. Similar effects are confirmed in the female sample. Therefore, the results show that a higher level of financial distress has more detrimental impact on well-being. This result accords with the results obtained in the fixed effect regression on life satisfaction described in the previous section. Future financial worry also shows a similar negative association with both male's and female's psychological well-being. In addition, homeownership status has a significant impact on respondents' psychological well-being. Mortgagors report lower psychological well-being (0.38 units in male, 0.23 units in female samples) than the outright owners. These findings are consistent with Cairney and Boyle (2004) who find that mortgagors experience higher distress than the outright owners. Moreover, real household income and psychological well-being are found to be inversely related. One potential explanation for this result would be that the higher income is co-linear with higher amounts of mortgage debt, which in turn offsets the well-being gain from higher income.

In short, the fixed effects regressions on psychological well-being informs broadly similar results obtained from the fixed effects regressions on life satisfaction. It shows, that the current financial distress, future financial worries and mortgages, on average, detriment male's and female's psychological well-being. Higher levels of financial difficulties are associated with lower levels of psychological well-being and this is generally true across the genders.

2.5.3 Fixed effect quantile regression – life satisfaction

The results of the quantile regression on male and female life satisfaction are summarised in **Table 2-3**. In this analysis, age does not display a 'U-shaped' relation with life satisfaction in any quantiles of the distribution. This is true for both male and female samples. This finding accords with the earlier linear fixed effect analysis and with Frijters and Beatton (2012) who find that once unobserved heterogeneity is controlled for, age does not display a 'U-shaped' relation with well-being.

In contrast to the earlier linear fixed effects analysis which failed to find any significant impact of real household equivalised income on either male's or female's life satisfaction, the fixed effect quantile regression shows a significant impact of income on both male's and female's life satisfaction across the three lower quantiles. But, this effect is statistically insignificant in the uppermost quantile. This result indicates that the positive impact of household income upon life satisfaction does not hold for those who have already attained high level of satisfaction. Moreover, in the male sample, the positive impact of income gradually diminishes from the lowest to the uppermost quantile. This finding is consistent with Binder (2016) who finds that the impact of household income diminishes or may even turn negative from the lower to higher quantiles of the life satisfaction distribution. This result can be explained by the theory of adaptation as well as by the diminishing marginal utility of income. Individuals with higher life satisfaction might have adapted to the higher level of income. As a result, marginal income gives diminishing marginal satisfaction to those who have already attained high level of life satisfaction.

Better health has significant positive impact on male's and female's life satisfaction across all the quantiles. Generally, the better the health status, the higher the life satisfaction. However,

these impacts are larger[18] in lower quantiles and become progressively smaller as we move towards the upper quantiles. Similarly, across the entire life satisfaction distribution, married individuals and couples have significantly higher satisfaction, while divorced, widowed or separated individuals have lower satisfaction than the single males and females. Again, these impacts of marriage, divorce, separation and widowhood on life satisfaction are larger in the lower quantiles and gradually smaller in the upper quantiles. These results are consistent with previous analysis with fixed effects quantile regressions (e.g., Binder and Coad, 2011; Binder and Coad, 2015).

Education shows a mixed relationship with life satisfaction in both the genders throughout the life satisfaction distribution. For males, lower education is associated with higher level of life satisfaction. This finding accords with Frey and Stutzer (2002) who find better educated people are less happy. However, the same level education is associated with increasing levels of male's satisfaction across the quantiles. Males with no education experience the highest level of satisfaction in the uppermost quantile. In contrast, better education is positively associated with female's satisfaction only in the lower quantiles. In higher quantiles, better education means lower satisfaction. These results are consistent with Binder (2016) who finds that higher education has a positive impact in lower quantiles while a negative impact in the higher quantiles of well-being.

Having a child is negatively associated with male's and female's life satisfaction in the lowest quantiles. This in turn indicates individuals with lower life satisfaction are better off without a child. This result accords with the earlier literature (e.g., Alesina *et al.*, 2004) which find that when financial satisfaction is controlled for and when (for example) the family is poor, having a child may have a negative impact on life satisfaction. It also conforms to the finding (please see, Di Tella *et al.*, 2003; Smith, 2003) that having a child generally has a strong negative impact upon satisfaction in the UK and the US, but not in Europe or Russia, where the impacts are generally positive.

Being unemployed, sick or disabled have persistent negative impacts on life satisfaction across the quantiles. On the contrary, being retired or full-time student has a positive impact on satisfaction. Maternity leave shows a positive association with female's life satisfaction not

[18] In this case or elsewhere in this chapter, the impact is described as larger (stronger) or smaller (weaker) on the basis of the size of the coefficient estimates.

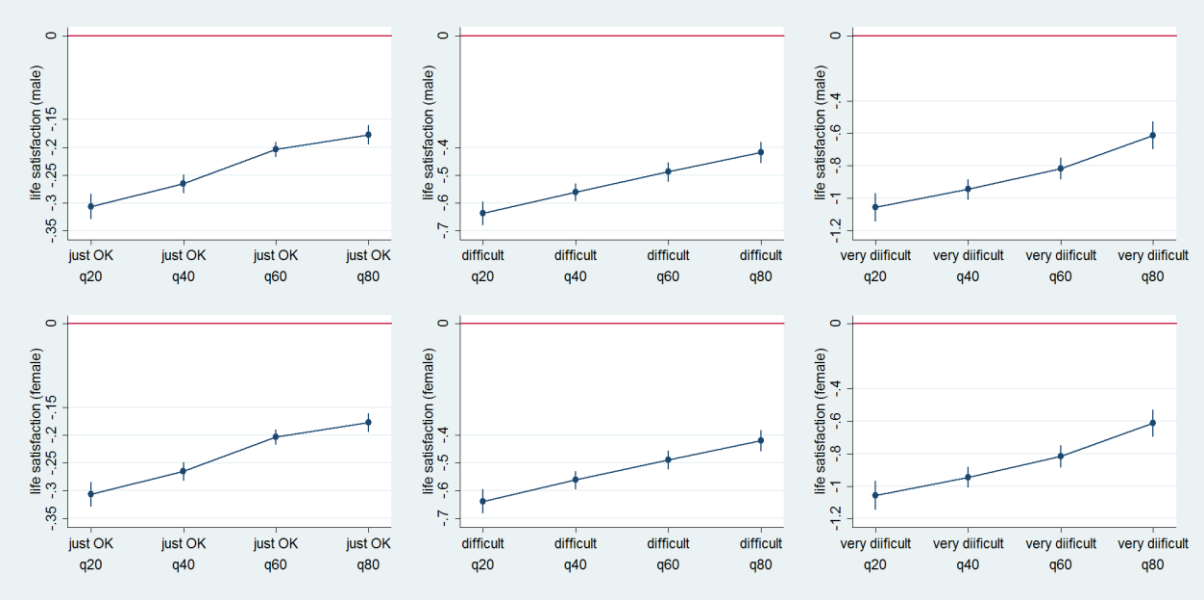
with males'. In case of unemployment, the negative impact is found to be the strongest in the lowest quantile, which then progressively weakens across the upper quantiles. This is evident in both male and female samples. This indicates that individuals with lower satisfaction suffer more from unemployment than the individuals who have already attained higher satisfaction. This finding is consistent with Binder and Coad (2015) who finds that the individuals with lower levels of life satisfaction suffer more from the negative shock of unemployment than those with higher levels of life satisfaction.

The main independent variable 'current financial situation' capturing the financial distress, shows (see **Figure 2-6**) varying impact on life satisfaction across the quantiles. Generally, the negative impact of financial distress is the strongest (based on the size of the coefficient estimates, larger the size, stronger/larger the impact) in the lowest quantile. Then the impact progressively gets weaker in upper quantiles. For example, males who perceive their financial situation as 'just about getting by' and are sitting in the lowest quantile of the distribution, report 0.30 units less life satisfaction than the base category[19]. In contrast, males belonging to the same category and are in the uppermost quantile, report 0.17 units less life satisfaction than the base category. Males belonging to other two categories, 'finding it quite difficult' and 'finding it very difficult', which express more difficult financial situations, generally report lower life satisfaction than the category 'just about getting by' across the quantiles. Generally, the impact of financial distress on life satisfaction weakens from the lowest to the upper quantiles within each category. For example, compared to the base category, males who perceive their financial situation as 'finding it very difficult' and are in the lowest quantile report 1.056 units less satisfaction, while males belonging to the same category but in the uppermost quantile, report 0.612 units less satisfaction. Similar pattern is confirmed in the female sample. Wald tests confirm that the coefficients associated with different categories of current financial situation at different quantiles are statistically different from each other in both male and female samples. These results not only indicate that the higher levels of financial difficulties have a stronger negative impact on life satisfaction, but also, they indicate that a certain level of financial difficulty has a stronger negative impact on the lower quantiles than the higher quantiles of the life satisfaction distribution.

[19] Base category, in this case, is a combination of those who perceive their financial situation 'living comfortably' and 'doing alright'. These two categories are combined as we consider that they express very similar financial situation.

Perceptions about the future financial situations also have similar associations with reported life satisfaction. Across the quantiles, individuals who predict a 'worse' financial situation in the future, report lower satisfaction than the base category (those who predict their future financial situation will be 'better'). The impact is generally larger in the lower quantiles (q20= -0.10) and progressively becomes smaller in the upper quantiles (q80= -0.02). In this case, Wald tests confirm the coefficients are statistically different across the quantiles. Those who predict their future financial situation will remain the 'same' as now also report lower satisfaction than the base category, but in this case, Wald tests fails to statistically differentiate the coefficients across the quantiles. Homeownership status indicates that mortgagors and rentiers report less life satisfaction than outright owners. The negative impact of mortgage on female's life satisfaction is the strongest in the lowest quantile. It then progressively weakens in the upper quantiles. However, in case of males, this impact may not vary statistically across the quantiles as the Wald tests with male sample fail to significantly differentiate the coefficients between the quantiles (see **Table 2-8** in the appendix of this chapter).

Figure 2-6: Impact of current financial situation on life satisfaction across the quantiles



In short, the above results show that financial distress is a negative life event which negatively impacts life satisfaction. However, this impact is stronger in lower quantiles and progressively weakens in the upper quantiles. This implies that individuals who have already attained higher life satisfaction are less affected by the financial distress. On the contrary, the impact of same level of financial distress is stronger on the individuals who report lower level of life satisfaction. These results indicate that the higher level of life satisfaction potentially makes

Table 2-3: Fixed effect quantile regression- life satisfaction

	Male				Female			
	q20	q40	q60	q80	q20	q40	q60	q80
Age	0.001	0.001	0.005***	0.004***	-0.028***	-0.025***	-0.018***	-0.023***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Age squared	0.022	0.027**	-0.008	-0.016	0.019	-0.016	-0.075***	-0.037**
	(0.020)	(0.011)	(0.013)	(0.014)	(0.018)	(0.012)	(0.013)	(0.015)
Log real equivalised HH income	0.032***	0.013***	0.012**	0.003	0.016**	0.007*	0.015***	0.011
	(0.007)	(0.005)	(0.005)	(0.007)	(0.008)	(0.004)	(0.005)	(0.007)
Marital status (Base-Single)								
Married	0.191***	0.114***	0.093***	0.057***	0.114***	0.091***	0.045***	0.046***
	(0.016)	(0.012)	(0.012)	(0.014)	(0.015)	(0.011)	(0.011)	(0.013)
Living as couple	0.202***	0.165***	0.150***	0.114***	0.141***	0.130***	0.109***	0.096***
	(0.015)	(0.010)	(0.011)	(0.015)	(0.018)	(0.011)	(0.012)	(0.015)
Divorced	-0.084***	-0.118***	-0.104***	-0.091***	-0.100***	-0.056***	-0.034*	0.001
	(0.030)	(0.022)	(0.020)	(0.024)	(0.023)	(0.018)	(0.017)	(0.017)
Separated	-0.406***	-0.331***	-0.292***	-0.260***	-0.282***	-0.208***	-0.182***	-0.125***
	(0.036)	(0.037)	(0.034)	(0.040)	(0.038)	(0.031)	(0.024)	(0.030)
Widowed	-0.131***	-0.127***	-0.085***	-0.061**	-0.163***	-0.124***	-0.132***	-0.081***
	(0.037)	(0.019)	(0.023)	(0.027)	(0.024)	(0.015)	(0.016)	(0.019)
General Health (Base-Excellent)								
Very good	-0.177***	-0.135***	-0.117***	-0.099***	-0.180***	-0.138***	-0.111***	-0.114***
	(0.011)	(0.005)	(0.007)	(0.008)	(0.012)	(0.006)	(0.006)	(0.009)
Good	-0.477***	-0.343***	-0.263***	-0.208***	-0.483***	-0.351***	-0.269***	-0.217***
	(0.016)	(0.009)	(0.009)	(0.012)	(0.014)	(0.009)	(0.009)	(0.011)
Fair	-0.876***	-0.642***	-0.487***	-0.373***	-0.847***	-0.644***	-0.479***	-0.357***
	(0.029)	(0.021)	(0.018)	(0.021)	(0.022)	(0.015)	(0.013)	(0.016)
Poor	-1.498***	-1.242***	-1.016***	-0.774***	-1.333***	-1.097***	-0.871***	-0.620***
	(0.062)	(0.043)	(0.038)	(0.040)	(0.039)	(0.027)	(0.030)	(0.035)
Highest Qualification (Base-Degree)								
A level	0.059***	0.046***	0.071***	0.104***	-0.030*	-0.029***	0.005	0.077***
	(0.012)	(0.009)	(0.010)	(0.011)	(0.016)	(0.009)	(0.008)	(0.010)
GCSE	0.193***	0.180***	0.196***	0.250***	-0.059***	-0.036***	0.022***	0.083***
	(0.012)	(0.008)	(0.008)	(0.010)	(0.014)	(0.008)	(0.007)	(0.011)

Other qualification	-0.042**	-0.019	-0.017	0.042***	-0.082***	-0.080***	-0.051***	0.031**
	(0.018)	(0.012)	(0.012)	(0.014)	(0.020)	(0.012)	(0.013)	(0.013)
No qualification	0.145***	0.169***	0.189***	0.246***	-0.083***	-0.012	0.051***	0.148***
	(0.018)	(0.009)	(0.011)	(0.010)	(0.019)	(0.009)	(0.010)	(0.014)
No of Children								
(Base-No child)								
1 Child	-0.041***	-0.013	0.001	0.008	-0.053***	-0.026***	0.004	-0.007
	(0.014)	(0.009)	(0.011)	(0.012)	(0.016)	(0.009)	(0.009)	(0.012)
2 Children	-0.079***	-0.054***	-0.018*	-0.028**	-0.041**	-0.035***	-0.003	-0.028**
	(0.016)	(0.010)	(0.010)	(0.013)	(0.016)	(0.011)	(0.010)	(0.011)
3 or more children	-0.081***	-0.037**	0.000	0.011	-0.112***	-0.099***	-0.056***	-0.046**
	(0.024)	(0.016)	(0.015)	(0.017)	(0.022)	(0.015)	(0.016)	(0.019)
Employment Status								
(Base-Self-employed)								
Paid employed	0.004	-0.020**	-0.010	-0.020*	0.030	0.025*	0.035**	-0.004
	(0.016)	(0.009)	(0.010)	(0.011)	(0.024)	(0.014)	(0.017)	(0.019)
Unemployed	-0.297***	-0.252***	-0.210***	-0.106***	-0.267***	-0.188***	-0.124***	-0.059*
	(0.037)	(0.022)	(0.022)	(0.027)	(0.041)	(0.030)	(0.030)	(0.033)
Retired	0.142***	0.084***	0.087***	0.107***	0.173***	0.177***	0.172***	0.124***
	(0.024)	(0.014)	(0.015)	(0.016)	(0.031)	(0.016)	(0.020)	(0.025)
On maternity leave	0.501	0.222	0.229	0.054	0.336***	0.251***	0.268***	0.277***
	(1.384)	(0.507)	(0.514)	(0.247)	(0.047)	(0.033)	(0.031)	(0.044)
Family care	-0.010	-0.087	-0.045	0.008	0.020	0.019	0.049**	0.025
	(0.058)	(0.064)	(0.053)	(0.060)	(0.029)	(0.018)	(0.020)	(0.024)
Full time student	0.175***	0.103***	0.043***	0.038	0.211***	0.160***	0.103***	0.042
	(0.025)	(0.014)	(0.016)	(0.026)	(0.031)	(0.020)	(0.024)	(0.028)
Sick or disabled	-0.376***	-0.426***	-0.357***	-0.318***	-0.272***	-0.315***	-0.263***	-0.239***
	(0.029)	(0.026)	(0.020)	(0.029)	(0.043)	(0.025)	(0.029)	(0.037)
Training scheme	-0.077	-0.070	0.071	0.062	0.282**	0.175***	0.144**	0.017
	(0.130)	(0.068)	(0.063)	(0.094)	(0.112)	(0.051)	(0.061)	(0.081)
Other	-0.053	-0.059	-0.050	-0.032	0.191***	0.061	0.078	0.083*
	(0.074)	(0.053)	(0.049)	(0.072)	(0.061)	(0.040)	(0.055)	(0.047)
Current Financial Situation								
(Base-Living comfortably and Doing alright)								
Just about getting by	-0.306***	-0.265***	-0.204***	-0.177***	-0.286***	-0.242***	-0.206***	-0.181***
	(0.011)	(0.009)	(0.007)	(0.008)	(0.012)	(0.008)	(0.007)	(0.009)
Finding it quite difficult	-0.637***	-0.561***	-0.489***	-0.419***	-0.628***	-0.512***	-0.444***	-0.376***
	(0.026)	(0.016)	(0.019)	(0.022)	(0.024)	(0.018)	(0.017)	(0.022)

Finding it very difficult	-1.056***	-0.945***	-0.816***	-0.612***	-0.956***	-0.853***	-0.762***	-0.644***
	(0.062)	(0.042)	(0.041)	(0.047)	(0.039)	(0.033)	(0.034)	(0.033)
Future financial situation (Base-Better)								
Worse	-0.109***	-0.074***	-0.045***	-0.049***	-0.066***	-0.059***	-0.042***	-0.041***
	(0.016)	(0.012)	(0.011)	(0.014)	(0.018)	(0.014)	(0.012)	(0.016)
Same	-0.036***	-0.037***	-0.027***	-0.024***	-0.008	-0.029***	-0.032***	-0.037***
	(0.010)	(0.006)	(0.006)	(0.008)	(0.012)	(0.008)	(0.007)	(0.009)
Homeownership status (Base-Owned outright)								
Owned/being bought on mortgage	-0.050***	-0.045***	-0.027***	-0.027***	-0.078***	-0.049***	-0.024***	-0.040***
	(0.014)	(0.009)	(0.008)	(0.010)	(0.014)	(0.008)	(0.008)	(0.009)
Shared ownership (part-owned part-rented)	0.054	0.063	0.031	0.004	-0.142*	-0.123**	-0.099**	-0.129**
	(0.077)	(0.047)	(0.043)	(0.057)	(0.080)	(0.053)	(0.039)	(0.063)
Rented	-0.063***	-0.029***	-0.051***	-0.026*	-0.078***	-0.047***	-0.052***	-0.039***
	(0.015)	(0.009)	(0.010)	(0.013)	(0.016)	(0.010)	(0.010)	(0.011)
Rent free	-0.044	-0.052	-0.050*	-0.032	0.045	0.005	-0.029	-0.021
	(0.046)	(0.032)	(0.030)	(0.038)	(0.035)	(0.021)	(0.022)	(0.033)
Other	-0.218**	-0.184***	-0.159**	-0.133	0.027	0.006	-0.045	0.030
	(0.085)	(0.035)	(0.075)	(0.120)	(0.074)	(0.049)	(0.051)	(0.068)
Constant	4.513***	5.136***	5.200***	5.689***	5.767***	6.244***	6.114***	6.748***
	(0.077)	(0.057)	(0.063)	(0.085)	(0.101)	(0.056)	(0.059)	(0.075)

Note: *, **, *** denotes significance at 1%, 5% and 10% levels. All the regressions, in addition, control for region and year dummies which are not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity.

the well-off respondents more resilient in the face of financial distress while lack of it makes the deprived individuals more vulnerable. The above analysis also indicates the importance of taking inequality in the societal well-being into consideration during the well-being analysis.

2.5.4 Fixed effect quantile regression – psychological well-being

The results of the fixed effect quantile regression on male and female's psychological well-being are summarised in **Table 2-4**. They are broadly like those obtained from fixed effect quantile regression on life satisfaction. Key results are summarised below.

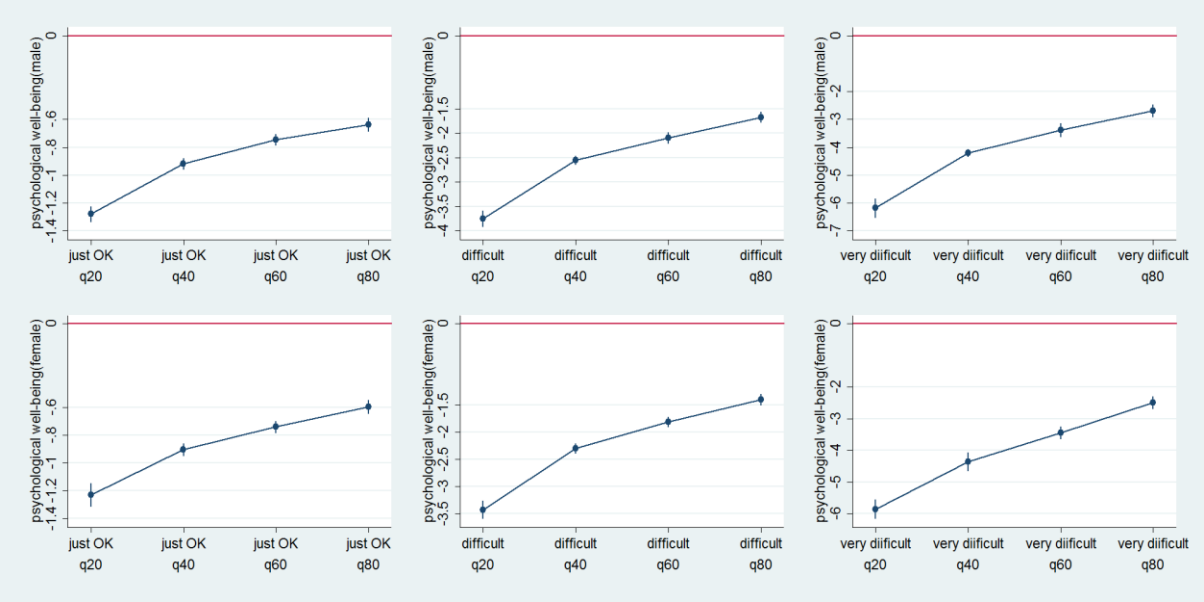
Age shows a 'U-shaped' relationship with male's psychological well-being across all the quantiles. In the female sample, this relationship is noticed only in one quantile (q40). This result contradicts to the results obtained from average fixed effects regression on psychological well-being reported in paragraph 2.5.2, where no statistically significant 'U-shaped' relationship has been observed. This difference can be attributed to the econometric technique applied in this section. The fixed effects quantile regression examines the association at different quantiles of well-being, therefore, even if the non-linear relationship of age with well-being may not appear during the full sample analysis but do appear in the analysis of one or more quantiles. Household equivalised income is negatively associated with psychological well-being across the quantiles. This result accords with the result obtained in fixed effects regression discussed earlier. The potential reason of negative impact of income is that the household income is a component of overall financial situation which also include assets and debts. Higher income often leads to higher level of debt. This might in turn causes higher level of financial distress which potentially counteracts the positive impact of higher income on well-being.

Divorced, separated, widowed and married individuals have less psychological well-being than the single individuals across the quantiles. These results accord with Wildman and Jones (2002) who, analysing BHPS, find that single women have higher well-being than married women. However, the negative impact of divorce, separation and widowhood on psychological well-being diminishes from the lowest to the highest quantiles of the well-being distribution. Employment status largely has similar impact on psychological well-being as it has on life satisfaction except that the positive impact of retirement (compared to the base category, which in this case is, self-employment) on women's psychological well-being is statistically insignificant in all quantiles. However, the impact of retirement on men's well-being is insignificant only in the lowest quantile of men sample. This result indicates that while

retirement generally boosts well-being (see for example, Latif, 2011), it doesn't do so for the men sitting in the lower end of the well-being distribution. This is potentially because individuals in the low well-being may experience financial constraint as an aftermath of retirement which in turn offset their well-being gain from retirement itself.

Higher education has a negative association with male's psychological well-being in the lowest quantile. In the higher quantiles, it is positively associated with male's well-being. In contrast, higher education is positively associated with female's psychological well-being across all the quantiles. This means, already well-off males experience higher well-being with increased level of education. This result contradicts to the earlier analysis with life satisfaction which shows an inverse association with higher education in the higher quantiles. However, this finding implies that the level of education has a varying effect on well-being. With different measures of well-being and in different dataset, the level of education shows mixed association with well-being (Binder, 2016). Therefore, further research is required to establish various aspects of the education-well-being relationship.

Figure 2-7: Impact of current financial situation upon psychological well-being across the quantiles



Like its association with life satisfaction, the main independent variable 'current financial situation', shows (see **Figure 2-7**) a negative association with psychological well-being across the quantiles. This association is the strongest in the lowest quantile and then progressively gets weaker in upper quantiles. Moreover, higher levels of financial distress are associated with lower levels of well-being across the quantiles. Wald tests confirms that the coefficients associated with different categories of the 'current financial situation variable' at different

Table 2-4: Fixed effect quantile regression -psychological well-being

	Male				Female			
	q20	q40	q60	q80	q20	q40	q60	q80
Age	-0.054***	-0.066***	-0.059***	-0.065***	-0.054***	-0.066***	-0.059***	-0.065***
	(0.006)	(0.004)	(0.004)	(0.005)	(0.006)	(0.004)	(0.004)	(0.005)
Age squared	0.199***	0.269***	0.184***	0.175***	0.199***	0.269***	0.184***	0.175***
	(0.064)	(0.042)	(0.036)	(0.050)	(0.064)	(0.042)	(0.036)	(0.050)
Log real equivalised HH income	-0.124***	-0.062***	-0.021	-0.066***	-0.124***	-0.062***	-0.021	-0.066***
	(0.027)	(0.018)	(0.015)	(0.023)	(0.027)	(0.018)	(0.015)	(0.023)
Marital status								
(Base-Single)								
Married	-0.198***	-0.209***	-0.223***	-0.300***	-0.198***	-0.209***	-0.223***	-0.300***
	(0.060)	(0.036)	(0.036)	(0.048)	(0.060)	(0.036)	(0.036)	(0.048)
Living as couple	0.071	0.065	0.060	0.027	0.071	0.065	0.060	0.027
	(0.060)	(0.046)	(0.047)	(0.061)	(0.060)	(0.046)	(0.047)	(0.061)
Divorced	-0.470***	-0.328***	-0.239***	-0.131*	-0.470***	-0.328***	-0.239***	-0.131*
	(0.085)	(0.052)	(0.056)	(0.076)	(0.085)	(0.052)	(0.056)	(0.076)
Separated	-2.885***	-1.875***	-1.422***	-0.802***	-2.885***	-1.875***	-1.422***	-0.802***
	(0.218)	(0.120)	(0.105)	(0.194)	(0.218)	(0.120)	(0.105)	(0.194)
Widowed	-1.609***	-1.369***	-1.103***	-0.897***	-1.609***	-1.369***	-1.103***	-0.897***
	(0.103)	(0.073)	(0.060)	(0.086)	(0.103)	(0.073)	(0.060)	(0.086)
Highest Qualification								
(Base-Degree)								
A level	0.016	-0.165***	-0.243***	-0.401***	0.016	-0.165***	-0.243***	-0.401***
	(0.058)	(0.038)	(0.033)	(0.040)	(0.058)	(0.038)	(0.033)	(0.040)
GCSE	0.308***	0.038	-0.054*	-0.283***	0.308***	0.038	-0.054*	-0.283***
	(0.050)	(0.034)	(0.030)	(0.041)	(0.050)	(0.034)	(0.030)	(0.041)
Other qualification	0.165**	-0.016	-0.123***	-0.269***	0.165**	-0.016	-0.123***	-0.269***
	(0.083)	(0.038)	(0.038)	(0.049)	(0.083)	(0.038)	(0.038)	(0.049)
No qualification	0.293***	-0.016	-0.124***	-0.396***	0.293***	-0.016	-0.124***	-0.396***
	(0.062)	(0.039)	(0.033)	(0.044)	(0.062)	(0.039)	(0.033)	(0.044)
No of Children								
(Base-No child)								
1 Child	-0.277***	-0.273***	-0.215***	-0.264***	-0.277***	-0.273***	-0.215***	-0.264***
	(0.059)	(0.033)	(0.033)	(0.046)	(0.059)	(0.033)	(0.033)	(0.046)
2 Children	-0.356***	-0.281***	-0.192***	-0.211***	-0.356***	-0.281***	-0.192***	-0.211***
	(0.061)	(0.035)	(0.034)	(0.043)	(0.061)	(0.035)	(0.034)	(0.043)

3 or more children	-0.429***	-0.431***	-0.305***	-0.254***	-0.429***	-0.431***	-0.305***	-0.254***
	(0.075)	(0.052)	(0.049)	(0.071)	(0.075)	(0.052)	(0.049)	(0.071)
Employment Status (Base-Self-employed)								
Paid employed	-0.053	0.006	0.037	0.149***	-0.053	0.006	0.037	0.149***
	(0.047)	(0.036)	(0.029)	(0.043)	(0.047)	(0.036)	(0.029)	(0.043)
Unemployed	-1.575***	-1.049***	-0.968***	-0.651***	-1.575***	-1.049***	-0.968***	-0.651***
	(0.114)	(0.057)	(0.054)	(0.084)	(0.114)	(0.057)	(0.054)	(0.084)
Retired	0.103	0.257***	0.307***	0.468***	0.103	0.257***	0.307***	0.468***
	(0.073)	(0.046)	(0.042)	(0.059)	(0.073)	(0.046)	(0.042)	(0.059)
On maternity leave	-0.849	0.400	0.374	1.028	-0.849	0.400	0.374	1.028
	(1.225)	(0.917)	(0.631)	(1.573)	(1.225)	(0.917)	(0.631)	(1.573)
Family care	-0.978***	-0.696***	-0.415***	0.051	-0.978***	-0.696***	-0.415***	0.051
	(0.229)	(0.135)	(0.139)	(0.195)	(0.229)	(0.135)	(0.139)	(0.195)
Full time student	0.386***	0.431***	0.173**	0.310***	0.386***	0.431***	0.173**	0.310***
	(0.090)	(0.053)	(0.067)	(0.087)	(0.090)	(0.053)	(0.067)	(0.087)
Sick or disabled	-3.765***	-2.519***	-1.876***	-1.182***	-3.765***	-2.519***	-1.876***	-1.182***
	(0.115)	(0.083)	(0.084)	(0.096)	(0.115)	(0.083)	(0.084)	(0.096)
Training scheme	0.693***	0.511***	0.291*	0.280	0.693***	0.511***	0.291*	0.280
	(0.226)	(0.139)	(0.156)	(0.353)	(0.226)	(0.139)	(0.156)	(0.353)
Other	-1.138***	-0.464***	-0.304*	0.172	-1.138***	-0.464***	-0.304*	0.172
	(0.355)	(0.158)	(0.156)	(0.206)	(0.355)	(0.158)	(0.156)	(0.206)
Current Financial Situation (Base-Living comfortably and Doing alright)								
Just about getting by	-1.280***	-0.918***	-0.746***	-0.637***	-1.280***	-0.918***	-0.746***	-0.637***
	(0.041)	(0.026)	(0.022)	(0.028)	(0.041)	(0.026)	(0.022)	(0.028)
Finding it quite difficult	-3.759***	-2.548***	-2.095***	-1.668***	-3.759***	-2.548***	-2.095***	-1.668***
	(0.113)	(0.057)	(0.061)	(0.064)	(0.113)	(0.057)	(0.061)	(0.064)
Finding it very difficult	-6.185***	-4.204***	-3.372***	-2.687***	-6.185***	-4.204***	-3.372***	-2.687***
	(0.191)	(0.079)	(0.137)	(0.145)	(0.191)	(0.079)	(0.137)	(0.145)
Future financial situation (Base-Better)								
Worse	-0.736***	-0.546***	-0.510***	-0.514***	-0.736***	-0.546***	-0.510***	-0.514***
	(0.062)	(0.036)	(0.034)	(0.048)	(0.062)	(0.036)	(0.034)	(0.048)
Same	-0.054	-0.151***	-0.260***	-0.393***	-0.054	-0.151***	-0.260***	-0.393***
	(0.037)	(0.024)	(0.024)	(0.034)	(0.037)	(0.024)	(0.024)	(0.034)
Homeownership status (Base-Owned outright)								

Owned/being bought on mortgage	-0.492***	-0.382***	-0.303***	-0.236***	-0.492***	-0.382***	-0.303***	-0.236***
	(0.044)	(0.027)	(0.025)	(0.033)	(0.044)	(0.027)	(0.025)	(0.033)
Shared ownership (part-owned part-rented)	0.240	0.055	0.050	0.244	0.240	0.055	0.050	0.244
	(0.290)	(0.149)	(0.168)	(0.188)	(0.290)	(0.149)	(0.168)	(0.188)
Rented	-0.298***	-0.223***	-0.292***	-0.131***	-0.298***	-0.223***	-0.292***	-0.131***
	(0.046)	(0.028)	(0.027)	(0.036)	(0.046)	(0.028)	(0.027)	(0.036)
Rent free	-0.378***	-0.306***	-0.277***	-0.206*	-0.378***	-0.306***	-0.277***	-0.206*
	(0.125)	(0.089)	(0.097)	(0.107)	(0.125)	(0.089)	(0.097)	(0.107)
Other	-1.060**	-0.582***	-0.641***	-0.487**	-1.060**	-0.582***	-0.641***	-0.487**
	(0.449)	(0.214)	(0.220)	(0.212)	(0.449)	(0.214)	(0.220)	(0.212)
Constant	27.968***	29.425***	29.530***	32.115***	27.968***	29.425***	29.530***	32.115***
	(0.353)	(0.216)	(0.194)	(0.254)	(0.353)	(0.216)	(0.194)	(0.254)

Note: *, **, *** denotes significance at 1%, 5% and 10% levels. All the regressions, in addition, control for region and year dummies which are not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity

quantiles are statistically different from each other. Like the 'current financial situation' variable, 'future financial situation' also shows similar negative association with psychological well-being across the quantiles. Individuals who predict 'worse' and 'same' financial situation in future, report less well-being than those who predict their future financial situation as 'better'. In addition, the homeownership status indicates that mortgagors and rentiers report less well-being than outright owners. However, in case of 'future financial situation' and 'homeownership status', this impact may not vary across the quantiles as some Wald tests fail to prove that the coefficients are statistically different (see **Table 2-8** in the appendix of this chapter).

In short, the above results largely accord with the results obtained from the life satisfaction analysis. Financial distress negatively impacts psychological well-being in both males and females, but the impact of the same level of financial distress is stronger on the individuals who have attained lower well-being. In general, the above analysis shows that the coefficients associated with financial distress and other predictors vary across the quantiles. This finding is broadly consistent with the literature which have used fixed effect quantile regression in the analysis of psychological well-being (e.g., Binder, 2016; Fang, 2017).

2.5.5 Robustness check 1:

Life satisfaction questions in this panel are available in 17 years starting from 1996 to 2013 excluding in 2001. On the other hand, psychological well-being questions are available in all 23 years of the panel. In order to better compare the results of psychological well-being panel to those obtained from the life satisfaction panel, this section performs the similar analysis by dropping the years in which life satisfaction questions are not available and thereby matching the years in both panels. Results are summarised in **Table 2-9** (for linear fixed regression) and in **Table 2-10** (for quantile regression) in the appendix of this chapter. These results confirm the similar impacts of financial distress and the covariates on psychological well-being to those obtained earlier with full (23) years of the panel.

2.5.6 Robustness check 2:

This section takes potential regional shocks over time into consideration. To this effect, the analysis incorporates region-time interactions in both the life satisfaction and psychological well-being panels to measure any potential regional shock on the measures of SWB over time. Due to the large number of interaction terms (17X12=204 in case of the life satisfaction panel and 23X12=276 in case of psychological well-being panel), it is not computationally feasible

to estimate the impact of the interaction terms in quantile regressions which multiplies the interaction terms with the number of quantiles estimated in each regression. However, linear fixed effect regressions indicate that the region-time interaction terms have statistically insignificant impact on both life satisfaction and psychological well-being. Therefore, the regressions are not reported in this thesis. However, this analysis confirms the main results of the quantile regressions reported earlier in the sections 2.5.3 and 0.

2.5.7 Robustness check 3:

Results from the quantile regressions presented in the sections 2.5.3 and 0 indicate that the same level of financial distress has varying impact in different quantiles of SWB distribution. Specifically, the results show that the individuals with higher level of SWB are less affected by the same level of financial distress. One plausible explanation of this findings is that individual's emotional resilience might be associated with higher level of SWB which in turn protect them from adverse financial situations. This section attempts to provide a direct empirical test as to whether higher level of SWB is associated with higher level of emotional resilience and the show that resilience insulates individuals from adversities of financial distress. While measuring resilience itself remains challenging, a wide range of studies (see for example, Zhang *et al.,* 2019; Hicks and Conner, 2014) in social psychology recognise that neighbourhood cohesion is strongly associated with emotional resilience. In this context, this section uses social neighbourhood cohesion index available in 3rd and 6th wave of Understanding society survey as a proxy for emotional resilience. This measure of cohesion uses items from the project on Human Development in Chicago Neighbourhoods (PHDCN) where the index ranges from 4 (lowest) to 20 (highest) social cohesion.

Due to limited availability of data, (only in 3rd and 6th waves of Understanding Society survey) this analysis performs a pooled regression where the social neighbourhood cohesion index enters as an interaction terms with different categories of financial distress. Results summarised in **Table 2-11** show that among the individuals reporting same categories of financial distress, increasing neighbourhood social cohesion is associated with higher level of life satisfaction and psychological well-being. These results translate to the findings that higher level of emotional resilience proxied by social cohesion index is associated with the higher reported SWB and that the resilience insulates individuals from the adverse impact of financial distress. These findings, therefore, supports the earlier results obtained from the fixed effect quantile regression, that individuals with higher SWB are less affected by the financial distress due to higher level of resilience.

2.5.8 Discussion of results

The above results indicate an important association between household financial situation and SWB measured through both life satisfaction and psychological well-being. The finding that the negative impact of financial distress is the strongest in the lowest quantile indicates that those who belong to the lowest SWB segment of the society are likely to be the most affected by financial distress. The impact of financial distress tends to be weaker in the upper quantiles. This indicates that high SWB insulates against financial distress, while low SWB intensifies the corrosive impacts of financial distress. The potential explanation for this finding lies in the association between SWB and emotional resilience. The finding indicates that resilient individuals respond to financial distress by avoiding stress. They can do so by rebuilding relationships and restructuring their lifestyles and attitudes in a positive way. This in turn help to improve their coping ability in the face of adverse situations including financial difficulties (Shi *et al.*, 2015). Using neighbourhood social cohesion index as a proxy measure of resilience, section 2.5.8 provides an empirical evidence that individuals with same level of financial distress but with higher social cohesion index are likely to report higher level of SWB. This notion is also supported by the resilience literature (e.g., Fredrickson and Joiner, 2002) which suggest that positive emotions associated with higher SWB help build emotional resilience. Therefore, the above findings indicate that the negative impact of financial distress on SWB is mediated by emotional resilience. The basis of this mediation is further evident in the clinical psychology literature (e.g., Baruffol *et al.*, 1995) which suggests that well-being might be considered as a vulnerability or resistance factor with regard to stress-related disorders.

In addition, the above results indicate that the association between SWB and its predictors across the SWB distribution is in fact heterogeneous. It shows that allowing the coefficient effects to vary across the distribution often reveals interesting relationships. Generally, moving towards the upper quantiles of well-being, the coefficients weaken and vice-versa. This finding is broadly consistent with the existing literatures (Binder, 2016; Binder and Coad, 2015; Fang, 2017) which assert that individuals who have already attained a higher level of SWB are less affected by the life events. Highly satisfied and psychologically well-off individuals appear to be more resilient in the face of adversity than the individuals at the bottom of SWB distribution. It may also be the case that highly satisfied and well-off individuals are less affected by good life events as well; they have high well-being whatever the circumstances are. In the case of this analysis, circumstances include financial problems (or the lack thereof).

The above analysis further reveals that income has a significant but very small positive impact (even, this impact in some cases turns to be negative) on both the measures of well-being. This is potentially because this study controls for overall financial situation, which include household assets and debts. Households with higher income also have a higher amount of debt. The impact of higher amount of debt potentially counteracts the impact of income on well-being. Therefore, the above results point to the importance of considering overall financial distress of a household while considering financial well-being, instead of relying only on deprivation of current income.

In terms of policy implications, this study indicates the need for government interventions at various levels for the vulnerable individuals. Recent evidence from the UK suggests that people with below average 'mental health scores' are over a fifth more likely to have debt, twice as likely to be behind on a household bill, and nearly two thirds more likely to be behind on their Council Tax (Lane, 2016). This evidence allied with the results of this analysis suggest that those reporting low SWB should be the focus of attention at a policy level. In general, policies aimed at improving well-being should prioritise the household financial situations. For example, policies can advise utility companies to provide flexible payment options for the most disadvantaged segment of the society. Bank of England can consider advising bank and mortgage companies to provide mortgage holidays to the most vulnerable debtors. This will allow the most distressed individuals some breathing spaces in the form of interruption in payment obligations. To improve financial well-being of the most vulnerable people, government (or the local government) can introduce intensive financial literacy and counselling services. In a broader note, government needs to revisit universal credit policy as the National Housing Federation, the Scottish Federation of Housing Associations, Community Housing Cymru and the Northern Irish Federation of Housing Associations warn that the Universal Credit system is "flawed" and causing debt, suffering and hardship for the families they house[20]. Tackling financial distress alongside low well-being would help reduce healthcare costs, increase flows into work and promote greater social inclusion.

[20]https://www.housing.org.uk/press/press-releases/flawed-universal-credit-causing-debt-hardship-families-in-social-housing/

2.6 Conclusion

This chapter examined the association between financial distress and two measures of well-being, namely life satisfaction and psychological well-being. The analysis started by distinguishing financial distress from mere income deprivation or poverty and argued that the financial distress was not limited to the low-income households. Financial distress manifested in the inability to meet various payment obligations due to unmanageable debt or poor cash flow management, in addition to income deprivation. Using a fixed effect quantile regression, the analysis explored distributional heterogeneity of the association between financial distress and well-being. It used a combined panel of BHPS and US over 23 years from 1991 to 2012.

First, using a base level linear fixed effect regression, this chapter explored that on an average financial distress had a negative association with life satisfaction and psychological well-being and that the level of distress was inversely associated with the level of well-being. In addition, it showed that home ownership had a significant impact on well-being: mortgagors, on average, were associated with less SWB than were the outright owners. The analysis then went beyond the average regression and examined the impact of financial distress across different quantiles of the SWB distribution. It revealed that individuals who reported lower SWB were more affected by the same level of financial distress than were those who reported higher well-being. The findings from the chapter, thus, indicated that lower SWB might act as a signal of vulnerability or conversely higher SWB might act as an insulator against distressful life events including financial distress.

The findings of this chapter add to the literature related to both financial distress and psychological resilience. It confirms the findings of previous literature (e.g., Brown *et al.*, 2005) that financial distress exerts a negative impact on SWB but adds to this literature by segregating this impact across the SWB distribution. In addition, it contributes to the literature (e.g., Binder and Coad, 2011) which uses quantile regression in the analysis of SWB and explore the distributional heterogeneity in the impact of household financial distress on well-being. The analysis which explores distributional heterogeneity in the SWB is specifically important in the public policy context. When policy implementation involves limited resources (e.g., public funds), it is necessary to prioritise the target groups. The above finding indicates that any policy designed to address financial distress should target the population at the bottom of the SWB distribution where resilience to life events is the lowest. Finally, findings of this chapter confirm the findings of the resilience literature (e.g., Shi *et al.*, 2015; Ong *et al.*, 2006)

which indicates that psychological resilience mediates the association between stress (in this case, financial distress) and well-being.

In general, this chapter addresses the concerns raised by many public policy institutions as well as policy advocates about the household financial distress and its detrimental consequences on mental health and well-being. In the United Kingdom, public policies have long pursued austerity and replaced welfare provisions with household personal finances. This, in turn, has gradually led to evolve a debt culture across the society. The findings that household financial distress severely detriments SWB call for a policy shift to counteract household indebtedness and its underlying factors.

2.7 Chapter 2 Appendix

Table 2-5: Summary Statistics

		Psychological well-being (Mean)			Life satisfaction (Mean)		
		Male	Female	Total	Male	Female	Total
Satisfaction with life overall					5.22	5.20	5.21
GHQ reversed		25.62	24.23	24.88			
Age corrected		45.27	46.33	45.84	45.86	46.75	46.34
Log real equivalised income		9.58	9.51	9.54	9.62	9.55	9.58
Marital Status	Single	0.22	0.19	0.21	0.22	0.19	0.21
	Married	0.57	0.51	0.54	0.57	0.50	0.53
	Living as couple	0.11	0.10	0.11	0.12	0.11	0.11
	Divorced	0.04	0.07	0.06	0.04	0.07	0.06
	Separated	0.01	0.02	0.02	0.01	0.02	0.02
	Widowed	0.04	0.11	0.07	0.04	0.10	0.07
Education	Degree	0.16	0.15	0.15	0.18	0.17	0.17
	A level	0.22	0.17	0.20	0.23	0.18	0.20
	GCSE	0.28	0.31	0.30	0.28	0.30	0.29
	Other qualification	0.08	0.07	0.07	0.08	0.07	0.08
	No qualification	0.26	0.30	0.28	0.24	0.28	0.26
Children	0 child	0.73	0.69	0.71	0.73	0.70	0.71
	1 child	0.11	0.13	0.12	0.11	0.13	0.12
	2 Child	0.12	0.12	0.12	0.11	0.12	0.12
	3 or more Child	0.05	0.05	0.05	0.05	0.05	0.05
Health Status	Excellent				0.23	0.20	0.21
	Very good				0.43	0.42	0.42
	Good				0.23	0.24	0.24
	Fair				0.09	0.11	0.10
	Poor				0.02	0.03	0.03
Job status	Self employed	0.11	0.04	0.07	0.11	0.04	0.07
	Paid employed	0.54	0.48	0.51	0.54	0.48	0.51
	Unemployed	0.05	0.03	0.04	0.04	0.03	0.03
	Retired	0.19	0.23	0.21	0.20	0.24	0.22
	On maternity leave	0.00	0.02	0.01	0.00	0.01	0.00
	Family care	0.01	0.12	0.07	0.00	0.11	0.06
	Ft student	0.05	0.06	0.06	0.05	0.06	0.06
	Sick or disabled	0.04	0.03	0.04	0.04	0.04	0.04
	Tr scheme	0.00	0.00	0.00	0.00	0.00	0.00
	Other	0.00	0.00	0.00	0.00	0.00	0.00
Current Financial Situation	Living comfortably	0.31	0.30	0.30	0.31	0.30	0.31
	Doing alright	0.36	0.37	0.37	0.38	0.38	0.38
	Just about getting by	0.25	0.25	0.25	0.24	0.24	0.24
	Finding it quite difficult	0.05	0.06	0.06	0.05	0.05	0.05
	Finding it very difficult	0.02	0.03	0.02	0.02	0.02	0.02
Future Financial Situation	Better	0.30	0.24	0.27	0.29	0.24	0.26
	Worse	0.12	0.12	0.12	0.12	0.12	0.12
	Same	0.58	0.64	0.61	0.59	0.65	0.62
Homeownership status	Owned outright	0.27	0.28	0.28	0.29	0.29	0.29
	Owned/being bought on mortgage	0.48	0.44	0.46	0.47	0.43	0.45
	Shared ownership (part-owned part-rented)	0.00	0.00	0.00	0.00	0.00	0.00
	Rented	0.22	0.26	0.24	0.22	0.26	0.24
	Rent free	0.01	0.01	0.01	0.01	0.01	0.01
	Other	0.00	0.00	0.00	0.00	0.00	0.00

Table 2-6: Pairwise comparison of mean life satisfaction and psychological well-being

		GHQ	Life satisfaction
1	Doing alright vs living comfortably	-0.788*** (0.027)	-0.313*** (0.007)
2	Just about getting by vs living comfortably	-2.272*** (0.029)	-0.727*** (0.008)
3	Finding it quite difficult vs living comfortably	-4.601*** (0.050)	-1.292*** (0.014)
4	Finding it very difficult vs living comfortably	-7.185*** (0.074)	-1.903*** (0.022)
5	Just about getting by vs doing alright	-1.484*** (0.028)	-0.414*** (0.008)
6	Finding it quite difficult vs doing alright	-3.813*** (0.049)	-0.980*** (0.014)
7	Finding it very difficult vs doing alright	-6.397*** (0.073)	-1.590*** (0.022)
8	Finding it quite difficult vs just about getting by	-2.329*** 9(0.051)	-0.565*** (0.015)
9	Finding it very difficult vs just about getting by	-4.913*** (0.074)	-1.176*** (0.022)
10	Finding it very difficult vs finding it quite difficult	-2.584*** (0.085)	-0.610*** (0.025)

Table 2-7: GHQ12 Questionnaires

"Have you recently:

1. Been able to concentrate on whatever you are doing?
2. Lost much sleep over worry?
3. Felt that you are playing a useful part in things?
4. Felt capable of making decisions about things?
5. Felt constantly under strain?
6. Felt you couldn't overcome your difficulties?
7. Been able to enjoy your normal day-to-day activities?
8. Been able to face up to your problems?
9. Been feeling unhappy and depressed?
10. Been losing confidence in yourself?
11. Been thinking of yourself as a worthless person?
12. Been feeling reasonably happy all things considered?"

Table 2-8: Results of Wald test for coefficients across the quantiles

Psychological well-being (male)	q20 vs q40	q20 vs q60	q20 vs q80	q40 vs q60	q40 vs q80	q60 vs q80
Current financial situation						
Just about getting by	F = 114.36 Prob > F = 0.00	F = 182.93 Prob > F = 0.00	F = 190.80 Prob > F = 0.00	F = 80.02 Prob > F = 0.00	F = 87.67 Prob > F = 0.00	F = 18.34 Prob > F = 0.00
Find it quite difficult	F = 196.69 Prob > F = 0.00	F = 234.31 Prob > F = 0.00	F = 300.51 Prob > F = 0.00	F = 59.69 Prob > F = 0.00	F = 126.35 Prob > F = 0.00	F = 51.11 Prob > F = 0.00
Find it very difficult	F = 174.96 Prob > F = 0.00	F = 257.00 Prob > F = 0.00	F = 274.22 Prob > F = 0.00	F = 56.40 Prob > F = 0.00	F = 111.92 Prob > F = 0.00	F = 25.27 Prob > F = 0.00
Future financial situation						
Worse than now	F = 13.57 Prob > F = 0.00	F = 15.17 Prob > F = 0.00	F = 10.49 Prob > F = 0.00	F = 1.40 Prob > F = 0.24	F = 0.46 Prob > F = 0.50	F = 0.01 Prob > F = 0.91
About the same	F = 9.87 Prob > F = 0.00	F = 32.06 Prob > F = 0.00	F = 57.35 Prob > F = 0.00	F = 29.02 Prob > F = 0.00	F = 50.93 Prob > F = 0.00	F = 21.43 Prob > F = 0.00
Homeownership						
Owned/being bought on mortgage	F = 10.44 Prob > F = 0.00	F = 21.91 Prob > F = 0.00	F = 27.58 Prob > F = 0.00	F = 13.17 Prob > F = 0.00	F = 21.11 Prob > F = 0.00	F = 7.58 Prob > F = 0.01
Shared ownership (part-owned part-rented)	F = 0.55 Prob > F = 0.46	F = 0.43 Prob > F = 0.51	F = 0.00 Prob > F = 0.98	F = 0.00 Prob > F = 0.97	F = 0.89 Prob > F = 0.34	F = 1.48 Prob > F = 0.22
Rented	F = 4.49 Prob > F = 0.03	F = 0.02 Prob > F = 0.88	F = 9.75 Prob > F = 0.00	F = 7.23 Prob > F = 0.01	F = 5.25 Prob > F = 0.03	F = 31.98 Prob > F = 0.00
Rent free	F = 0.56 Prob > F = 0.45	F = 0.78 Prob > F = 0.37	F = 1.52 Prob > F = 0.22	F = 0.18 Prob > F = 0.67	F = 0.86 Prob > F = 0.35	F = 0.59 Prob > F = 0.44
Others	F = 1.94 Prob > F = 0.16	F = 1.15 Prob > F = 0.28	F = 1.58 Prob > F = 0.21	F = 0.10 Prob > F = 0.76	F = 0.16 Prob > F = 0.69	F = 0.63 Prob > F = 0.43
Psychological well-being (female)						
Current financial situation						
Just about getting by	F = 66.07 Prob>F = 0.00	F = 125.54 Prob>F = 0.00	F = 150.07 Prob>F = 0.00	F = 71.88 Prob>F =0.00	F = 79.34 Prob>F = 0.00	F = 20.55 Prob>F = 0.00
Find it quite difficult	F = 200.31 Prob>F = 0.00	F = 264.44 Prob > F = 0.00	F = 377.56 Prob > F = 0.00	F = 104.84 Prob > F = 0.00	F = 196.04 Prob > F = 0.00	F = 57.26 Prob > F = 0.00
Find it very difficult	F = 88.46 Prob > F = 0.00	F = 201.10 Prob > F = 0.00	F = 323.79 Prob > F = 0.00	F = 48.23 Prob > F = 0.00	F = 124.24 Prob > F = 0.00	F = 66.81 Prob > F = 0.00
Future financial situation						
Worse than now	F = 3.71 Prob > F = 0.05	F = 5.69 Prob > F = 0.02	F = 0.68 Prob > F = 0.41	F = 2.30 Prob > F = 0.13	F = 1.42 Prob > F = 0.23	F = 5.86 Prob > F = 0.01
About the same	F = 14.26 Prob > F = 0.00	F = 38.76 Prob > F = 0.00	F = 75.08 Prob > F = 0.00	F = 39.92 Prob > F = 0.00	F = 94.71 Prob > F = 0.00	F = 55.16 Prob > F = 0.00
Homeownership						
Owned/being bought on mortgage	F = 4.86 Prob > F = 0.02	F = 19.64 Prob > F = 0.00	F = 15.65 Prob > F = 0.00	F = 24.32 Prob > F = 0.00	F = 12.94 Prob > F = 0.00	F = 0.15 Prob > F = 0.69
Shared ownership (part-owned part-rented)	F = 2.05 Prob > F = 0.15	F = 2.14 Prob > F = 0.14	F = 3.88 Prob > F = 0.05	F = 0.33 Prob > F = 0.56	F = 1.88 Prob > F = 0.17	F = 1.50 Prob > F = 0.22
Rented	F = 1.81 Prob > F = 0.18	F = 1.32 Prob > F = 0.25	F = 14.12 Prob > F = 0.00	F = 0.01 Prob > F = 0.92	F = 20.73 Prob > F = 0.00	F = 26.59 Prob > F = 0.00
Rent free	F = 1.22 Prob > F = 0.27	F = 1.00 Prob > F = 0.32	F = 1.18 Prob > F = 0.27	F = 0.00 Prob > F = 0.97	F = 0.09 Prob > F = 0.75	F = 0.10 Prob > F = 0.75
Others	F = 1.30 Prob > F = 0.25	F = 1.80 Prob > F = 0.18	F = 0.00 Prob > F = 0.95	F = 0.62 Prob > F = 0.43	F = 0.89 Prob > F = 0.34	F = 2.09 Prob > F = 0.15
Life satisfaction (male)						
Current financial situation						
Just about getting by	F = 19.69 Prob > F = 0.00	F = 86.13 Prob > F = 0.00	F = 96.72 Prob > F = 0.00	F = 77.31 Prob > F = 0.00	F = 67.69 Prob > F = 0.00	F = 10.84 Prob > F = 0.00
Find it quite difficult	F = 13.26 Prob > F = 0.00	F = 32.08 Prob > F = 0.00	F = 48.24 Prob > F = 0.00	F = 21.78 Prob > F = 0.00	F = 42.17 Prob > F = 0.00	F = 13.86 Prob > F = 0.00
Find it very difficult	F = 5.61 Prob > F = 0.01	F = 19.63 Prob > F = 0.00	F = 43.95 Prob > F = 0.00	F = 14.70 Prob > F = 0.00	F = 42.99 Prob > F = 0.00	F = 19.46 Prob > F = 0.00

Future financial situation						
Worse than now	F = 7.14 Prob > F = 0.01	F = 22.81 Prob > F = 0.00	F = 12.71 Prob > F = 0.00	F = 10.93 Prob > F = 0.00	F = 3.29 Prob > F = 0.07	F = 0.12 Prob > F = 0.73
About the same	F = 0.00 Prob > F = 0.97	F = 0.94 Prob > F = 0.33	F = 1.22 Prob > F = 0.26	F = 3.33 Prob > F = 0.06	F = 2.45 Prob > F = 0.11	F = 0.18 Prob > F = 0.66
Homeownership						
Owned/being bought on mortgage	F = 0.25 Prob > F = 0.62	F = 2.61 Prob > F = 0.10	F = 2.42 Prob > F = 0.12	F = 5.10 Prob > F = 0.02	F = 2.95 Prob > F = 0.08	F = 0.00 Prob > F = 0.97
Shared ownership (part-owned part-rented)	F = 0.02 Prob > F = 0.88	F = 0.09 Prob > F = 0.76	F = 0.26 Prob > F = 0.61	F = 0.52 Prob > F = 0.47	F = 0.70 Prob > F = 0.40	F = 0.26 Prob > F = 0.61
Rented	F = 8.68 Prob > F = 0.00	F = 0.81 Prob > F = 0.36	F = 4.16 Prob > F = 0.04	F = 7.86 Prob > F = 0.00	F = 0.08 Prob > F = 0.77	F = 4.89 Prob > F = 0.02
Rent free	F = 0.06 Prob > F = 0.80	F = 0.03 Prob > F = 0.86	F = 0.07 Prob > F = 0.78	F = 0.01 Prob > F = 0.92	F = 0.38 Prob > F = 0.53	F = 0.36 Prob > F = 0.54
Others	F = 0.19 Prob > F = 0.66	F = 0.38 Prob > F = 0.54	F = 0.41 Prob > F = 0.51	F = 0.17 Prob > F = 0.67	F = 0.21 Prob > F = 0.64	F = 0.08 Prob > F = 0.77
Life satisfaction (female)						
Current financial situation						
Just about getting by	F = 22.34 Prob > F = 0.00	F = 44.96 Prob > F = 0.00	F = 66.25 Prob > F = 0.00	F = 26.86 Prob > F = 0.00	F = 43.96 Prob > F = 0.00	F = 11.43 Prob > F = 0.00
Find it quite difficult	F = 29.13 Prob > F = 0.00	F = 57.99 Prob > F = 0.00	F = 75.03 Prob > F = 0.00	F = 23.00 Prob > F = 0.00	F = 38.49 Prob > F = 0.00	F = 12.58 Prob > F = 0.00
Find it very difficult	F = 8.92 Prob > F = 0.00	F = 23.63 Prob > F = 0.00	F = 56.52 Prob > F = 0.00	F = 13.38 Prob > F = 0.00	F = 43.98 Prob > F = 0.00	F = 19.02 Prob > F = 0.00
Future financial situation						
Worse than now	F = 0.25 Prob > F = 0.61	F = 2.28 Prob > F = 0.13	F = 1.49 Prob > F = 0.22	F = 2.96 Prob > F = 0.08	F = 1.30 Prob > F = 0.25	F = 0.00 Prob > F = 0.94
About the same	F = 5.12 Prob > F = 0.02	F = 4.93 Prob > F = 0.02	F = 6.03 Prob > F = 0.01	F = 0.20 Prob > F = 0.65	F = 0.83 Prob > F = 0.36	F = 0.45 Prob > F = 0.50
Homeownership						
Owned/being bought on mortgage	F = 6.64 Prob > F = 0.01	F = 19.93 Prob > F = 0.00	F = 6.88 Prob > F = 0.01	F = 20.03 Prob > F = 0.00	F = 0.72 Prob > F = 0.39	F = 3.67 Prob > F = 0.05
Shared ownership (part-owned part-rented)	F = 0.07 Prob > F = 0.78	F = 0.35 Prob > F = 0.55	F = 0.02 Prob > F = 0.87	F = 0.37 Prob > F = 0.54	F = 0.01 Prob > F = 0.92	F = 0.29 Prob > F = 0.59
Rented	F = 6.60 Prob > F = 0.01	F = 3.47 Prob > F = 0.06	F = 5.08 Prob > F = 0.02	F = 0.43 Prob > F = 0.51	F = 0.40 Prob > F = 0.52	F = 1.89 Prob > F = 0.16
Rent free	F = 1.56 Prob > F = 0.21	F = 4.53 Prob > F = 0.03	F = 2.83 Prob > F = 0.09	F = 3.98 Prob > F = 0.04	F = 0.90 Prob > F = 0.34	F = 0.09 Prob > F = 0.76
Others	F = 0.10 Prob > F = 0.74	F = 0.98 Prob > F = 0.32	F = 0.00 Prob > F = 0.96	F = 1.05 Prob > F = 0.30	F = 0.11 Prob > F = 0.73	F = 1.57 Prob > F = 0.21

Table 2-9: Linear fixed effect regression: Psychological well-being (matching years with life satisfaction panel)

	(1) Male	(2) Female
Age	-0.026	-0.109*
	(0.057)	(0.060)
Age squared	0.124	0.107
	(0.157)	(0.152)
Log real equivalised HH income	-0.095**	-0.078*
	(0.042)	(0.043)
Marital status		
(Base-Single)		
Married	-0.367***	-0.236
	(0.142)	(0.154)
Living as couple	0.038	0.009
	(0.124)	(0.130)
Divorced	-0.258	-0.321
	(0.238)	(0.213)
Separated	-2.090***	-1.224***
	(0.281)	(0.258)
Widowed	-1.429***	-1.145***
	(0.248)	(0.219)
Highest Qualification		
(Base-Degree)		
A level	-0.118	0.101
	(0.154)	(0.145)
GCSE	0.103	0.033
	(0.175)	(0.151)
Other qualification	-0.011	-0.099
	(0.135)	(0.137)
No qualification	0.028	-0.212
	(0.198)	(0.196)
No of Children		
(Base-No child)		
1 Child	-0.232***	0.055
	(0.080)	(0.085)
2 Children	-0.335***	0.242**
	(0.099)	(0.099)
3 or more children	-0.378**	0.094
	(0.152)	(0.153)
Employment Status		
(Base-Self-employed)		
Paid employed	0.009	-0.168
	(0.089)	(0.130)
Unemployed	-1.237***	-1.362***
	(0.150)	(0.193)
Retired	0.168	0.039
	(0.126)	(0.157)
On maternity leave	2.416*	-0.152
	(1.426)	(0.208)
Family care	-0.336	-0.574***
	(0.313)	(0.149)
Full time student	0.293*	0.200
	(0.158)	(0.177)
Sick or disabled	-2.634***	-2.755***
	(0.225)	(0.243)

Training scheme	0.684*	0.555
	(0.363)	(0.680)
Other	-0.329	0.219
	(0.286)	(0.296)
Current Financial Situation		
(Base-Living comfortably and Doing alright)		
Just about getting by	-1.021***	-0.955***
	(0.048)	(0.050)
Finding it quite difficult	-2.655***	-2.457***
	(0.108)	(0.104)
Finding it very difficult	-4.426***	-4.181***
	(0.209)	(0.181)
Future financial situation		
(Base-Better)		
Worse	-0.621***	-0.601***
	(0.067)	(0.071)
Same	-0.241***	-0.126**
	(0.043)	(0.049)
Homeownership status		
(Base-Owned outright)		
Owned/being bought on mortgage	-0.342***	-0.194**
	(0.074)	(0.080)
Shared ownership (part-owned part-rented)	0.157	-0.931***
	(0.261)	(0.348)
Rented	-0.203*	-0.162
	(0.113)	(0.117)
Rent free	-0.371*	-0.296
	(0.224)	(0.215)
Other	-0.552*	-0.429
	(0.326)	(0.372)
Constant	28.075***	30.105***
	(2.193)	(2.358)
N	79990	93048

Note: *, **, *** denotes significance at 1%, 5% and 10% levels. All the regressions, in addition, control for region and year dummies not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity

Table 2-10: Fixed effect quantile regression: Psychological well-being (matching with years of life satisfaction

	Male				Female			
	Q20	Q40	Q60	Q80	Q20	Q40	Q60	Q80
Age	-0.014**	-0.027***	-0.022***	-0.024***	-0.097***	-0.110***	-0.106***	-0.112***
	(0.006)	(0.004)	(0.005)	(0.006)	(0.007)	(0.005)	(0.004)	(0.006)
Age squared	0.068	0.140***	0.065	0.030	0.091	0.125***	0.049	0.019
	(0.064)	(0.042)	(0.044)	(0.061)	(0.060)	(0.043)	(0.042)	(0.058)
Log real equivalised HH income	-0.100***	-0.048**	-0.026	-0.047	-0.142***	-0.102***	-0.038	0.002
	(0.035)	(0.021)	(0.019)	(0.031)	(0.042)	(0.020)	(0.024)	(0.031)
Marital status								
(Base-Single)								
Married	-0.312***	-0.311***	-0.336***	-0.432***	-0.290***	-0.206***	-0.185***	-0.243***
	(0.066)	(0.041)	(0.046)	(0.057)	(0.076)	(0.043)	(0.048)	(0.051)
Living as couple	0.054	0.054	0.038	0.018	-0.053	-0.006	0.062	0.002
	(0.072)	(0.044)	(0.045)	(0.060)	(0.091)	(0.057)	(0.050)	(0.060)
Divorced	-0.512***	-0.277***	-0.132*	-0.092	-0.685***	-0.374***	-0.152**	0.054
	(0.113)	(0.069)	(0.073)	(0.105)	(0.123)	(0.067)	(0.065)	(0.081)
Separated	-3.237***	-2.123***	-1.602***	-1.036***	-2.151***	-1.138***	-0.883***	-0.271**
	(0.320)	(0.150)	(0.106)	(0.198)	(0.192)	(0.112)	(0.112)	(0.124)
Widowed	-1.734***	-1.366***	-1.205***	-1.027***	-1.361***	-1.129***	-0.957***	-0.869***
	(0.101)	(0.066)	(0.071)	(0.100)	(0.101)	(0.057)	(0.059)	(0.066)
Highest Qualification								
(Base-Degree)								
A level	0.049	-0.133***	-0.159***	-0.309***	0.274***	0.108***	0.058	0.046
	(0.065)	(0.037)	(0.035)	(0.049)	(0.084)	(0.040)	(0.046)	(0.052)
GCSE	0.399***	0.118***	0.018	-0.201***	0.286***	0.038	-0.080**	-0.183***
	(0.056)	(0.032)	(0.034)	(0.050)	(0.066)	(0.036)	(0.036)	(0.046)
Other qualification	0.208***	-0.001	-0.065	-0.205***	0.124	-0.103*	-0.183***	-0.283***
	(0.078)	(0.048)	(0.047)	(0.066)	(0.096)	(0.055)	(0.045)	(0.061)
No qualification	0.284***	0.019	-0.069*	-0.337***	0.041	-0.291***	-0.393***	-0.480***
	(0.065)	(0.038)	(0.041)	(0.058)	(0.075)	(0.039)	(0.037)	(0.052)
No of Children								
(Base-No child)								
1 Child	-0.272***	-0.227***	-0.213***	-0.180***	0.041	-0.022	0.063*	0.025
	(0.060)	(0.036)	(0.036)	(0.053)	(0.074)	(0.033)	(0.036)	(0.049)
2 Children	-0.360***	-0.325***	-0.220***	-0.253***	0.266***	0.146***	0.250***	0.200***
	(0.071)	(0.041)	(0.040)	(0.059)	(0.078)	(0.041)	(0.048)	(0.056)

3 or more children	-0.592***	-0.464***	-0.286***	-0.219***	0.054	0.099	0.171***	0.062
	(0.085)	(0.060)	(0.054)	(0.080)	(0.116)	(0.068)	(0.063)	(0.088)
Employment Status								
(Base-Self-employed)								
Paid employed	-0.071	0.005	0.036	0.202***	-0.274**	-0.110*	-0.139**	-0.190**
	(0.048)	(0.035)	(0.030)	(0.042)	(0.117)	(0.060)	(0.069)	(0.083)
Unemployed	-1.606***	-1.146***	-1.083***	-0.609***	-2.038***	-1.191***	-1.061***	-0.821***
	(0.130)	(0.065)	(0.082)	(0.094)	(0.192)	(0.107)	(0.126)	(0.141)
Retired	0.061	0.219***	0.299***	0.454***	-0.128	0.083	0.097	0.122
	(0.078)	(0.050)	(0.046)	(0.067)	(0.122)	(0.063)	(0.073)	(0.087)
On maternity leave	2.680	1.442	2.030	4.931*	-0.634**	-0.137	0.016	-0.113
	(1.832)	(0.897)	(1.842)	(2.781)	(0.262)	(0.148)	(0.146)	(0.160)
Family care	-0.987***	-0.594***	-0.483***	0.112	-0.805***	-0.511***	-0.501***	-0.433***
	(0.280)	(0.223)	(0.148)	(0.285)	(0.137)	(0.062)	(0.067)	(0.089)
Full time student	0.426***	0.447***	0.168**	0.365***	0.118	0.293***	-0.065	-0.089
	(0.095)	(0.053)	(0.074)	(0.090)	(0.154)	(0.087)	(0.089)	(0.103)
Sick or disabled	-3.745***	-2.572***	-2.055***	-1.359***	-4.035***	-2.818***	-2.224***	-1.697***
	(0.141)	(0.072)	(0.080)	(0.119)	(0.210)	(0.139)	(0.127)	(0.128)
Training scheme	0.897***	0.543**	0.313	0.605	0.428	0.501	0.067	0.376
	(0.343)	(0.226)	(0.245)	(0.474)	(0.401)	(0.338)	(0.504)	(0.614)
Other	-0.946***	-0.442**	-0.263	0.298	-0.153	0.385**	0.530***	0.553**
	(0.274)	(0.201)	(0.207)	(0.218)	(0.343)	(0.166)	(0.156)	(0.237)
Current Financial Situation								
(Base-Living comfortably and Doing alright)								
Just about getting by	-1.322***	-0.928***	-0.775***	-0.652***	-1.254***	-0.918***	-0.769***	-0.631***
	(0.048)	(0.027)	(0.026)	(0.036)	(0.047)	(0.027)	(0.028)	(0.040)
Finding it quite difficult	-3.746***	-2.537***	-2.051***	-1.661***	-3.567***	-2.396***	-1.879***	-1.443***
	(0.124)	(0.085)	(0.068)	(0.087)	(0.121)	(0.072)	(0.078)	(0.078)
Finding it very difficult	-6.068***	-4.228***	-3.466***	-2.855***	-5.989***	-4.452***	-3.567***	-2.687***
	(0.254)	(0.088)	(0.152)	(0.168)	(0.227)	(0.200)	(0.136)	(0.168)
Future financial situation								
(Base-Better)								
Worse	-0.646***	-0.518***	-0.499***	-0.510***	-0.543***	-0.438***	-0.391***	-0.482***
	(0.083)	(0.045)	(0.041)	(0.061)	(0.087)	(0.047)	(0.046)	(0.053)
Same	-0.050	-0.181***	-0.287***	-0.423***	0.196***	-0.047	-0.166***	-0.379***
	(0.042)	(0.027)	(0.027)	(0.037)	(0.053)	(0.037)	(0.030)	(0.040)
Homeownership status								
(Base-Owned outright)								
Owned/being bought on mortgage	-0.419***	-0.332***	-0.272***	-0.236***	-0.265***	-0.225***	-0.117***	-0.097**

	(0.042)	(0.032)	(0.032)	(0.039)	(0.063)	(0.033)	(0.033)	(0.044)
Shared ownership (part-owned part-rented)	0.143	0.130	0.295*	0.257	-1.024***	-0.879***	-0.741***	-0.856**
	(0.358)	(0.199)	(0.163)	(0.221)	(0.365)	(0.165)	(0.149)	(0.363)
Rented	-0.242***	-0.198***	-0.263***	-0.134***	-0.239***	-0.243***	-0.224***	-0.014
	(0.046)	(0.037)	(0.038)	(0.048)	(0.064)	(0.035)	(0.038)	(0.041)
Rent free	-0.381***	-0.344***	-0.376***	-0.285**	-0.311	-0.255***	-0.221**	-0.220**
	(0.126)	(0.091)	(0.086)	(0.117)	(0.224)	(0.094)	(0.097)	(0.101)
Other	-0.996**	-0.436**	-0.433**	-0.281	-0.245	-0.763***	-0.724***	-0.509
	(0.410)	(0.209)	(0.182)	(0.311)	(0.370)	(0.223)	(0.261)	(0.569)
Constant	25.614***	27.284***	27.860***	29.889***	27.691***	30.072***	30.416***	32.435***
	(0.382)	(0.234)	(0.221)	(0.339)	(0.452)	(0.242)	(0.266)	(0.371)
N	79990	79990	79990	79990	93048	93048	93048	93048

Note: *, **, *** denotes significance at 1%, 5% and 10% levels. All the regressions, in addition, control for region and year dummies which are not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity

Table 2-11: Testing resilience: interaction between financial distress and neighbourhood social cohesion

	(1) Life satisfaction	(2) Psychological well-being
Current financial situation (Base-living comfortably)		
doing alright	-0.164**	-0.395
	(0.078)	(0.270)
just about getting by	-0.702***	-1.821***
	(0.085)	(0.301)
finding it quite diff	-1.097***	-3.947***
	(0.123)	(0.503)
finding it very diff	-1.528***	-6.403***
	(0.163)	(0.707)
Neighbourhood Social Cohesion	0.035***	0.098***
	(0.004)	(0.013)
Interaction (Base-living comfortably # Neighbourhood Social Cohesion)		
doing alright # Neighbourhood Social Cohesion	-0.000	0.000
	(0.005)	(0.018)
just about getting by # Neighbourhood Social Cohesion	0.016***	0.032
	(0.006)	(0.020)
finding it quite diff # Neighbourhood Social Cohesion	0.015*	0.059*
	(0.009)	(0.035)
finding it very diff # Neighbourhood Social Cohesion	0.021*	0.109**
	(0.012)	(0.051)
Future financial situation (Base-better off)		
worse off than now	-0.203***	-1.155***
	(0.017)	(0.065)
or about the same?	-0.050***	-0.273***
	(0.013)	(0.046)
Home ownership (Base-owned outright)		
owned/being bought on mortgage	-0.039***	-0.159***
	(0.014)	(0.049)
shared ownership (part-owned part-rented)	-0.068	-0.849***
	(0.073)	(0.294)
Rented	-0.024	0.187***
	(0.016)	(0.057)
rent free	0.016	-0.041
	(0.058)	(0.207)
Other	0.190	-0.362
	(0.127)	(0.522)
Health status (Base-Excellent)		
very good	-0.164***	-0.998***
	(0.014)	(0.044)
good	-0.423***	-2.198***
	(0.016)	(0.050)
Fair	-0.782***	-4.283***
	(0.019)	(0.072)
poor	-1.322***	-7.247***

	(0.031)	(0.134)
Job status (Base-self-employed)		
paid employment(ft/pt)	0.042**	-0.042
	(0.020)	(0.063)
unemployed	-0.159***	-1.292***
	(0.033)	(0.124)
retired	0.257***	0.210**
	(0.026)	(0.081)
on maternity leave	0.252***	0.343
	(0.073)	(0.239)
family care or home	0.059*	-0.367***
	(0.031)	(0.109)
full-time student	0.293***	-0.431***
	(0.032)	(0.118)
lt sick or disabled	-0.397***	-2.685***
	(0.040)	(0.171)
govt training scheme	-0.190	-0.116
	(0.252)	(0.777)
unpaid, family business	0.014	-0.478
	(0.222)	(0.646)
on apprenticeship	0.359**	1.490***
	(0.142)	(0.454)
doing something else	0.076	-0.781**
	(0.081)	(0.319)
Age	-0.020***	-0.007
	(0.002)	(0.007)
Age squared	0.000***	0.000***
	(0.000)	(0.000)
Male		
Female	0.038***	-0.992***
	(0.010)	(0.036)
Marital status (Base-Single and never married/in civil partnership)		
Married	0.254***	0.029
	(0.018)	(0.065)
In a registered same-sex civil partnership	0.322***	-1.200***
	(0.074)	(0.315)
Separated but legally married	-0.039	-0.681***
	(0.043)	(0.171)
Divorced	0.049*	-0.127
	(0.026)	(0.098)
Widowed	0.140***	-0.199*
	(0.029)	(0.102)
Separated from civil partner	-0.215	-3.671
	(0.359)	(2.320)
A former civil partner	-0.375	-5.990**
	(0.533)	(2.814)
A surviving civil partner	0.609	-3.624***
	(0.419)	(1.010)
Living as couple	0.206***	-0.136*
	(0.020)	(0.074)
Number of child	0.009	0.059**
	(0.007)	(0.024)
Education (Base-Degree)		
Other higher degree	-0.017	0.134**
	(0.017)	(0.062)

A-level etc	-0.050***	0.314***
	(0.015)	(0.053)
GCSE etc	-0.047***	0.390***
	(0.015)	(0.053)
Other qualification	-0.055***	0.488***
	(0.021)	(0.069)
No qualification	0.018	0.631***
	(0.021)	(0.070)
Constant	5.481***	26.668***
	(0.084)	(0.285)
N	73370	73151

Note: *, **, *** denotes significance at 1%, 5% and 10% levels. This regression, in addition, control for region and year dummies not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity

3 Adaptation to financial distress

3.1 Introduction

The idea of adaptation is prominent in the well-being literature. In psychology, Brickman and Campbell (1971) propose that people adapt to all circumstances, no matter how positive or stressful it is and the subjective well-being (SWB) returns to a stable level after any change due to change in circumstances. This proposition, often known as hedonic treadmill, assumes that any change in people's SWB is transient, i.e., the events causing changes to people's circumstances impact their SWB only temporarily. The impacts of the life events wither away over time by adaptation and SWB ultimately returns to a long-run equilibrium level, referred to as base level. Initial support for this proposition comes from different lines of research. In psychology, Eid and Diener (2004) shows that an individual's level of SWB remains stable over time. Okun and George (1984) find that the objective health conditions on average correlate only 8% with SWB. Suh *et al.* (1996) report that good and bad life events affect SWB only if they occurred in the past two months – more distant past events do not predict SWB significantly. In economics, Easterlin (1974) observes that people's SWB in advanced economies has not increased as much as per capita income. One plausible explanation for this phenomenon would be that people adapt to the changed level of income. SWB returns to a base level after any initial rise in response to the increase in income. Subsequent research accords with the similar notions. For example, income and SWB correlates only 13% in the United States (Diener *et al.*, 1993), individual's job satisfaction completely adapt to a pay rise (Clark, 1999) and people adapt to a rise in income but not to change in occupational status (Di Tella *et al.*, 2010). Graham (2011) argues that the ability to adapt is indeed a good thing from a psychological perspective. But this same human defence mechanism may cause some societies to become stuck in a bad equilibrium—such as high levels of corruption or bad governance for prolonged periods of time.

However, with the emergence of nationally representative longitudinal surveys, a substantial number of empirical studies (see for example, Lucas *et al.*, 2003; Easterlin, 2005; Lucas and Clark, 2006; Zimmermann and Easterlin, 2006; Lucas, 2005; Clark *et al.*, 2008a) indicate that the extent or speed of adaptation depends upon the events and datasets tested as well as the econometric methods used for the analysis. From these studies, it is evident that people do adapt to a greater extent to certain life events (e.g., marriage (Lucas *et al.*, 2003), rise in pay

(Clark, 1999) or having a child (Clark *et al.*, 2008a)) but they too show a little or no adaptation to certain other events (e.g., fall in income (Burchardt, 2004), job loss (Lucas *et al.*, 2004) or poverty (Clark *et al.*, 2016)). It also may be the case that people adapt quickly to good or charming events and slowly to negative or stressful circumstances (Diener *et al.*, 2006).

In this context, this chapter examines whether individuals adapt to being in a state of financial distress. Previous literature consistently find that financial distress negatively affects well-being even after controlling for other distressful life events such as unemployment, divorce or widowhood (e.g., Jenkins *et al.*, 2008; Drentea, 2000; Brown *et al.*, 2005; Sweet *et al.*, 2013; Prentice *et al.*, 2017). Chapter 2 of this thesis explores the distributional heterogeneity in the impact of financial distress on well-being. Specifically, chapter 2 focuses on the inequality in the attained SWB and examines how differently worse-off individuals respond to financial distress as compared to well-off individuals. However, chapter 2 and previous research only explore the contemporary effects of financial distress on well-being. Whether individuals adapt to a long-standing financial distress is a question that remains unexplored. This chapter, therefore, attempts to fill this gap. It builds on the previous chapter by exploring the well-being consequences of being in the state of a persistent financial distress. Instead of merely estimating the SWB at a specific point in time, the chapter estimates the change in reported SWB over the consecutive years when an individual remains exposed to financial distress. Recently, Clark *et al.* (2016) have analysed German data to study adaptation to long-standing poverty. They define poverty as deprivation of current income. This chapter distinguishes financial distress from low income or poverty. One might generally anticipate that financial distress originates from low-income. However, examination of data in the previous chapter (see section 2.3.5) shows that the higher income households too are likely to experience financial distress in certain situations when individuals are obliged to meet numerous debt servicing and payment commitments. Therefore, instead of focusing merely on deprivation of current income, this chapter add to the existing literature by providing a test of adaptation to the overall financial distress.

The analysis below uses a combined panel of 18 waves of the BHPS and 5 waves of US to show that individuals fail to adapt even after living with four consecutive years of financial distress. This implies that financial distress has long-lasting negative effects on SWB. This result is robust to the length of the financial distress spell. However, the extent of adaptation varies with gender – males shows some signs of adaptation after four years while females don't. The following analysis also considers the possibility that financial distress is associated with

other distressful life events, such as unemployment, divorce or separation. This chapter finds that despite there are potential overlaps in the well-being effects of those life events, which could arguably be associated with financial hardship, the incidence of financial distress has an independent negative effect upon well-being. In short, these results show that the individuals exposed to the persistent financial hardship for consecutive years are not likely to psychologically cope with their distress. Therefore, the inability to adapt to the financial distress poses serious well-being concerns.

The chapter is organised as follows. Section 2 summarises the relevant literature, section 3 briefly discusses the data, section 3 outlines the method, section 4 discusses the results and section 5 concludes.

3.2 Theory and review of the literature

The theory of adaptation can be traced back to both economics and psychology disciplines. Economics generally assumes that utility derives from certain objective conditions and is positively associated with attainment of well-being. These objective conditions include income, wealth as well as other financial conditions. The mainstream economics is not very concerned with subjective or emotional aspects of well-being (Easterlin, 2003). Instead, it holds the view that the greater the objective conditions (e.g., income, wealth), the higher the well-being, even if the marginal utility derived from the objective conditions is diminishing. Economists, however, recognise that habit formation can alter the attainment of well-being from a certain level of objective conditions. When individuals get used to a condition, they require more of it to attain the same amount of well-being. In his seminal paper, Easterlin (1974) observes that an increase in income has a temporary positive effect upon well-being. As the time goes by, one becomes used to the increased level of income and finds nothing beneficial about it. As a result, the well-being score gradually returns to the level corresponding to the previous income state. Layard (2011) puts it in a different way – what is regarded as a 'sufficient' amount of income for one's 'required' consumption, continue to increase with income. This implies that one needs to gradually raise the level of income to derive the same level of well-being. The counterpart of economists' habit formation concept in psychology is 'hedonic treadmill' (Brickman and Campbell, 1971). In this view, an individual's level of well-being is set to a long run equilibrium which cannot be permanently altered by circumstances. Any 'disruption' of this equilibrium by a change in life circumstances is only 'temporary'. People always adapt to new circumstances and their well-being ultimately returns to a level largely predetermined by individual's biological characteristics (Lykken and Tellegen, 1996).

3.2.1.1 Early empirical literature on adaptation:

Brickman *et al.* (1978) is one of the most cited early empirical literature which finds evidence of complete adaptation. The authors compare SWB of 22 lottery winners and an equal number of spinal cord accident victims with a control group. The respondents are asked to rate their SWB on a scale where 0 represents the worst well-being status, 5 represents the best status while 2.5 denotes a hypothetical neutral point. On average, the lottery winners rate their SWB as highly positive and the accident victims rate their SWB as highly negative, but neither group rate their well-being 'as extremely as expected'. The lottery winners, on an average, score 3.78 while the accident victims score 1.28. It is interesting to notice that both the groups rate the respective events roughly around the midpoints of both positive and negative ranges. The authors conclude that the lottery winners' do not report 'significantly higher' SWB than the control group and likewise the accident victims' SWB is not as low 'as expected'. While this paper is widely cited as an evidence in favour of adaptation, it suffers from problems of small sampling. It also potentially fails to control for pre-existing differences in SWB of two comparison groups. As Clark *et al.* (2008a) note, it is possible that the accident victims were extrovert in character and had generally higher SWB before the accident. More importantly, Diener *et al.* (2006) re-examines Brickman *et al.* (1978)'s data and find that the accident victims actually do report significantly lower SWB than the control group. They find the difference in the SWB of the two groups to be 0.75 standard deviation, which most researchers would consider large enough to report that the accident victims had significantly lower SWB than the lottery winners.

3.2.1.2 Adaptation to disability:

One of the life events which can be directly associated with financial distress is the disability. Several papers have duly examined people's adaption to the incidentof disability. Silver (1983) demonstrates evidence of adaptation in the victims of spinal cord injuries. The author follows 102 victims, 7 days, 3 weeks and 8 weeks after the sudden traumatic accident. Immediately the week after the accident, negative emotions outweigh the positive emotions as anxiety remains the predominant affect in the victims' responses. After three weeks, positive emotions exceed negative emotions as happiness becomes the predominant affect. Also after 8 weeks, the findings suggest that the positive emotions withstand. The author concludes that adaptation to spinal cord injury occurs in as little as two months. However, the author does not mention whether the overall well-being ever returns to the pre-accident level. Despite this study's attempts to provide longitudinal evidence of adaptation, it captures a time-span (only two

months) which can be considered relatively short for measuring adaptation. The conclusion of this study, therefore, has been challenged by Lucas (2005) who uses two nationally representative panel data to find evidence of a very little adaptation to a long-term disability. In the first data set, the author follows 679 participants for an average of 7 years before and after the onset of disability while in the second data set, he follows 2,272 participants for 3 and 5 years before and after the incidence. The results show, disability is associated with moderate to large drops in happiness – those who are labelled as 100% disabled report 1.27 standard deviation lower SWB than the baseline levels. But the disabled show little evidence of adaptation as their SWB does not revert to the base level.

3.2.1.3 Adaptation to marriage, divorce and widowhood:

More recently, with the availability of large-scale longitudinal data and developed computational techniques, a substantial number of studies examine adaptation to different life events. Marriage is not only a significant life event for an individual, a partnership can often be a direct or indirect determinant of a household financial situation. A significant part of debates on adaptation moves around the emotional well-being associated with marriage. Using German Social Economic Panel, Lucas *et al.* (2003) shows that respondents do not get lasting boosts in SWB after marriage. Instead they report a short-term increase in well-being followed by relatively quick and complete adaptation. The authors, however, find significant individual variations in the extent of adaptation. The extent of adaptation is strongly related to the extent they react to the onset of the event. Those who experience a stronger boost in their SWB at the time of marriage, retain higher SWB years after and take a longer time for their SWB to return to the base level. On the other hand, Easterlin (2005) analyses cohort studies from United States to conclude that formation of marriage has a long-lasting positive impact on well-being. He asserts that life cycle pattern does not indicate that married persons are reverting quickly and completely to their average level of SWB observed before marriage. In particular, even after 35 years of marriage, the SWB of those still in their first marriage remains significantly greater than their unmarried counterparts. Lucas and Clark (2006) revisited German data to examine adaptation to marriage, this time with the consideration of pre-marriage cohabitation. They confirm their earlier results that marriage does not cause a lasting boot in SWB as people adapt completely to being married. Interestingly, Zimmermann and Easterlin (2006) use the data from Lucas *et al.*, (2003) with a longer time span and conclude that adaptation to marriage may be incomplete – life satisfaction drops two years after marriage but it does not return to the base level; one quarter of initial gain in SWB remains in the long run.

Divorce or dissolution of partnership as well as widowhood also potentially influence the household financial situations and constitute significant part of adaptation research. Easterlin (2005), in American cohort data, finds that unmarried women report a significantly lower SWB than their married counterparts. Within the unmarried group, those with broken marriages, i.e., divorced, separated or widowed are significantly less well-off than those who never married. The paper also finds that there is no significant SWB difference between divorced or separated and widowed. Lucas *et al.* (2003) using German data within a multi-level framework, conclude that adaptation to widowhood occurs rather slowly – it takes nearly eight years for SWB to come back completely to the 'base level' after the death of a spouse. In contrast, Clark *et al.* (2008a), using the same data in a fixed effect framework find that adaptation to widowhood occurs within a year. Studies focusing on adaptation to divorce also indicate a similar divergence in results. Lucas (2005), using German data with multi-level modelling, finds that adaptation to divorce may be partial – SWB score drops during the time of divorce and then comes back but does not completely return to the 'base level'. In contrast, Clark *et al.* (2008a) using the same data in a linear fixed effects, find that adaptation to divorce may be complete in four years.

3.2.1.4 Adaptation to unemployment or job loss:

Unemployment or job loss is probably the most important life event which strongly affects household financial situation. Studies on adaptation to unemployment result in rather less divergent conclusions as they agree to a greater extent that unemployment leads to a long-lasting detriment of SWB. Lucas *et al.* (2004) using German data, find that people do not adapt to unemployment or job loss. SWB falls sharply at the onset of unemployment and then gradually comes back but does not return to the base level. The study also finds that the respondents continue to experience a lower level of satisfaction even after re-employment. Furthermore, contrary to the adaptation theories, this paper finds that people do not react less negatively to the shock of second time unemployment than they do to the first time unemployment. Clark (2006) uses three large scale data sets from the UK, Germany and the EU to confirm that people do not adapt to the distress of unemployment across different datasets. In contrast, Georgellis *et al.* (2008) capture the non-linear nature of the adaptation process using an Exponential Smooth Transition Autoregressive (ESTAR) model in German data. They find that speed of adaptation to unemployment is higher in case of high earners and those with high pre-unemployment level of life satisfaction. This paper demonstrates that major proportion of adaptation takes place during the first year of unemployment. The speed of

adaptation decreases with the duration of unemployment, i.e., the adaptation is slower in the longer the spell of unemployment. The findings, thus, suggest presence of a habituation effect.

Clark *et al.* (2008a), with German Socio-Economic Panel data, apply a common methodology to test adaptation to six life circumstances – unemployment, marriage, divorce widowhood, birth of child and layoff, so that the different outcomes cannot be attributed to changes in econometric methods. This study finds that people adapt to all other events except unemployment – even four years after job loss, life satisfaction does not return to the base level. Clark and Georgellis (2013) follow Clark *et al.* (2008a) but use 18 waves of BHPS, instead of German data, to study adaptation to major life events. This paper confirms that adaptation to marriage, divorce, birth of child and widowhood is rapid and complete but finds no evidence of adaptation to unemployment. In addition, their study asserts that the adaptation process is closely similar across different measures of SWB (e.g., life satisfaction or psychological well-being, measured through GHQ-12).

While Clark *et al.* (2008a) focus only on the first spell of unemployment, Booker and Sacker (2012) analyse BHPS to examine the effect of series of unemployment spells. This paper segregates effects of unemployment by respondent's previous employment status and uses psychological well-being derived from GHQ-12 instead of life satisfaction. Results show, previously employed persons have significantly poorer well-being at the first and second spells of unemployment but not at the third spell. On the other hand, previously economically inactive persons have poorer psychological well-being at all unemployment spells, with a significantly poorer score at the third spell. The paper concludes that initially employed persons can psychologically better cope with unemployment. In contrast, those who make several unsuccessful attempts to enter into labour market develop a 'scarring' effect from unemployment.

3.2.1.5 Adaptation to income and pay:

Following Easterlin (1974), who reported strong evidence of adaptation to the rise in average level of income, many researchers have found adaptation to rise in income but a little or no adaptation to occupational status or fall in income. Analysing German data, Di Tella *et al.* (2010) find significant adaptation to rise in income. After four years, SWB completely returns to the state before the rise in income leaving no positive effect upon well-being. The paper simultaneously finds no adaptation to status – even four years after a positive status shock, SWB remains higher than the pre-shock level. Clark (1999) examines adaptation to job

satisfaction in a panel data of 2000 British employees who remain with the same employer and are not promoted from one wave to the next. Overall job satisfaction shows strong and positive correlation with the increase in the pay between waves but not with the current level of pay. The results indicate that individuals become used to any given level of income while the change in pay relative to the past pay determines job satisfaction. Moreover, the effect is greater for pay rises for lower paid, less educated and younger workers. This study is supported by Burchardt (2004) who uses ten years of BHPS to study the process of adaptation based on individuals' own previous experience. The study compares individual's subjective assessment of financial well-being with the level of income over nine years. The result suggests an asymmetric adaptation to changes in income. People's financial well-being adapt to rising income but not so to falling incomes.

3.2.1.6 Adaption to poverty:

More recently, Clark *et al.* (2016) uses German panel data of 45800 individuals from 1992-2011 to test adaptation to poverty. The authors define poverty as fall of income below a designated threshold. To avoid adaptation in subsequent spells, this study examines only the first spell of poverty reported in the data, i.e., they only consider the respondents who report that they are in poverty for the first time in the panel. Therefore, once their income rises above the threshold, the respondents are excluded from the study, even though their income falls again. The study finds no evidence of adaptation even when the respondents are in five consecutive years in poverty. In authors' words, *'in terms of SWB, poverty starts bad and stays bad'*. This result is robust to the length of the poverty spells. The study, however, cannot identify any specific life events, such as disability, unemployment, divorce or widowhood which causes the entry into poverty.

In the light of above discussion, it can be inferred that the proposition that individuals completely adapt to life circumstances and their SWB completely returns to a long run equilibrium after any temporary changes, is not adequately supported by the recent empirics. However, the debate is not whether people adapt to a situation or not, but to what extent and to which life circumstances they adapt (Easterlin, 2003). Diener *et al.* (2006) note that people adapt more readily to positive changes/circumstances than they do to negative changes/circumstances. Therefore, negative events continue to depress well-being for a longer time. In this context, this chapter provides an empirical test of whether individuals adapt to long standing financial distress. Chapter 2 of this thesis shows that financial distress negatively affects two measures of SWB, life satisfaction and psychological well-being and that the

individuals sitting in the bottom of the SWB distribution suffer from the same level of financial distress more than those sitting in the top of the distribution. In addition, previous literature (e.g., Drentea, 2000; Brown *et al.*, 2005; Bridges and Disney, 2010) consistently finds negative impact of financial distress on well-being. For example, in a group of US students, Drentea (2000) finds, debt to income ratio is significantly associated with respondents' higher level of anxiety. In BHPS, Brown *et al.* (2005) find that unsecure debt negatively affects psychological well-being while secure debt has insignificant impact. In FACS (Family and Children Survey), Bridges and Disney (2010) find that a self-reported debt problem negatively impacts respondents' psychological well-being. However, these literatures only investigate the contemporary effect of financial distress upon well-being. Whether people adapt to a long-standing financial distress or their SWB continue to suffer from financial distress with unabated severity, is yet to be explored. This chapter attempts to fill this gap and examines the extent and speed of adaptation to financial distress using two measures of SWB – life satisfaction and psychological well-being (measured through GHQ12). In doing so, it broadly follows the method used in previous adaptation literature (e.g., Lucas *et al.*, 2003; Clark *et al.*, 2008a; Clark *et al.*, 2016).

3.3 Data

This analysis combines eighteen waves (1991-2008) of BHPS and five waves of US (2009-2013) to yield a 23 years of panel data. The data for life satisfaction panel covers seventeen years, from 1996 through 2013, excluding 2001. After discarding missing observations on any relevant variables, it gives a panel with 174,740 (80,852, males and 93,888 females) observations. The psychological well-being panel uses all eighteen waves of BHPS and five waves of US. This gives a twenty-three-year panel covering 1991 till 2013 of 227,098 observations (105,430 males and 121,668 females). Both the life satisfaction and psychological well-being panels are unbalanced, i.e., respondents can leave and re-join the panel at any point of time without any restrictions.

3.3.1 Life satisfaction and psychological well-being

Two dependent variables in this study 'life satisfaction' and 'psychological well-being' are identical to those described in the previous chapter. Therefore, details on these variables may be found in paragraph 2.3.1 of chapter 2.

3.3.2 Financial distress

As in Chapter 2, the main independent variable, financial distress, is captured by responses to the questions in both BHPS and US. The question asks about the respondent's current financial situation, *"How well are you managing financially these days?"*. The responses are recorded on a 1-5 scale from *"living comfortably (1)", "doing alright (2)", "just about getting by (3)", "finding it quite difficult (4)",* to *"finding it very difficult (5)"*. The two upper responses (1 and 2) of this variable express financial wellness while the two lower responses (4 and 5) express financial distress; the middle response (3) may be considered to express average financial situation. For convenience of tracking individuals' responses over the years and for ensuring that adequate number of observations are available for subsequent analysis, the five-point responses are transformed into three points – 'Financial wellness', 'average' and 'financial distresses. *"Living comfortably",* and *"doing alright"*. are considered as expressing 'financial wellness', while "*finding it quite difficult"* and *"finding it very difficult"* are regarded as expressing 'financial distress'. The middle category *"Just about getting by"* is considered as 'average', kept unchanged and used as the base category throughout the analysis. Despite the concern that such transformation will lose some of the information, there are instances in the literature to split variables. For example, Bridges and Disney (2010) transforms the six-point 'financial well-being' variable available in Families and Children Survey (FACS) into dichotomous variable. The 'financial well-being' variable in FACS, in many ways, resembles 'financial distress' variable in BHPS and US. In FACS, respondents are asked, *"Taking everything together, which phrase best describes how you and your family are managing financially these days?"* The responses are measured on a scale ranging from *"are in deep financial trouble (1)"* to *"manage very well (6)"*. The responses *"don't manage very well", "have some financial difficulties"* and *"are in deep financial trouble"*, were collapsed to create one response to express household's financial stress. Similarly, Zumbro (2014) transforms five-point financial burden responses of German Socio Economic Panel (GSOEP) into three-point responses.

3.3.3 Control variables

In addition to financial distress, the study controls for the natural logarithm of real household equivalised income and a number of socio-demographic variables found to influence life satisfaction and psychological well-being significantly in the existing literature (see, Dolan *et al.,* 2008). Real household equivalised income is calculated from net household income by adjusting for household size using the OECD equivalence scale and deflated into January 2010

price by retail price inflation reported by Office of National Statistics, UK. All specifications also include age and age-squared to examine a potential nonlinear relationship following previous works (e.g., Blanchflower and Oswald, 2004; Ferrer-i-Carbonell and Gowdy, 2007). A list of control variables and corresponding summary statistics may be found in appendix.

3.4 Method

The goal of this analysis is to track an individual's reported SWB score corresponding to the reported level of financial distress over the years. It follows SWB responses using standard methods described in the adaptation literature (e.g., Clark *et al.*, 2008a; Clark *et al.*, 2016; Lucas *et al.*, 2003). This analysis tracks those respondents who start the survey with a response other than 'financially distressed' (i.e. the response is either *"finding it quite difficult",* or *"finding it very difficult"*) but subsequently face financial distress during their stay in the survey. This censors those who start out as 'financially distressed'. This is important because there is no information as to how many years these people might have been in financial distress before entering the survey. In addition, this analysis (in line with standard adaptation literature (e.g., Clark *et al.*, 2016b)) only considers the first spell of financial distress – if anyone gets out of the distress during her stay in the panel and re-enter into financial distress after a while, this analysis discards the observations beyond the first spell. This is because, one might have already adapted to financial hardship in the first spell and she would take less time to adapt in the subsequent spells than in the first spell. As per the above criteria, the sample size for final analysis becomes 144,423 (males 67,751 females 76,672) for life satisfaction and 175,820 (males 82,984 females 92,836) for psychological well-being panels respectively.

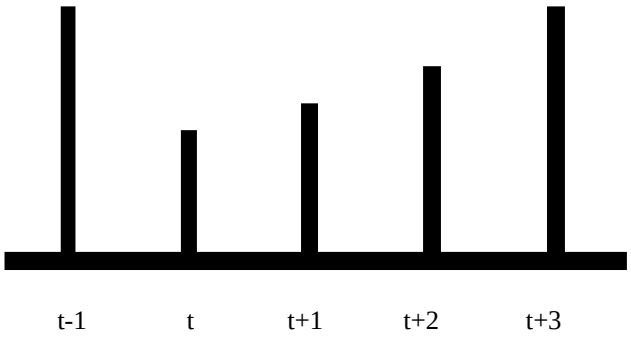
The next step is to create a dummy variable 'y1' to capture the year when an individual first reports financial distress in the panel. For a distressed person, this dummy takes the value=1, otherwise=0. If the person is in financial distress for two and three consecutive years, her second- and third-year response is identified by the dummies y2 and y3 respectively. For paucity of observations, the y4 dummy is created slightly in a different manner, it identifies those who are in financial distress for four or more consecutive years. **Table 3-7*: Number of respondents represented by each financial distress dummy*** indicates the number of respondents represented by each dummy. To compare these dummies with the base category and for that matter to keep the base category as 'average' ('*just about getting by*'), (otherwise the concern may be raised that the financial distress variable is inflated) similar dummies corresponding to financial wellness are created (for those whose response is either *"living comfortably"* or *"doing alright)* and are controlled for during estimation.

Once these dummies are created, the model with a fixed effect (within person) specification is estimated:

$$WB_{it} = \beta_1 X_{it} + \alpha_i + \gamma_t + \theta_s f_{y,i,t} + \varepsilon_{it}$$

Here, WB_{it} is the measure of well-being, α_i and γ_t are fixed effects and β_1 is the set of parameters associated with the vector of control variables X_{it}. The variable $f_{y,i,t}$ is a set of dummies with y = 1-4; if y=1, the dummy takes the value of '1' if an individual reports financial distress in year 1 or 0 otherwise. Similarly, if y=2, the dummy takes the value of '1' if the individual report financial distress on year2 and year1 or '0' otherwise. Likewise, y=3 dummy takes the values '1' or '0'. In our case, for paucity of observations beyond four years, y=4 dummy denotes those who report financial distress for 4 or more consecutive years. A similar set of financial wellness dummies are also created and controlled for during estimation.

Figure 3-1: Potential movement of SWB responses during adaptation process



Previous literature (e.g., Brown *et al.*, 2005) indicates that financial distress is a negative life experience which reduces contemporary SWB scores. Therefore, in the context of adaptation, one should experience the largest drop in SWB in the first year (onset) of financial distress. Afterwards, if adaptation occurs, SWB may gradually recover and return to the base level, notionally representing a long-term equilibrium. This potential movement of SWB score is depicted in figure 1.

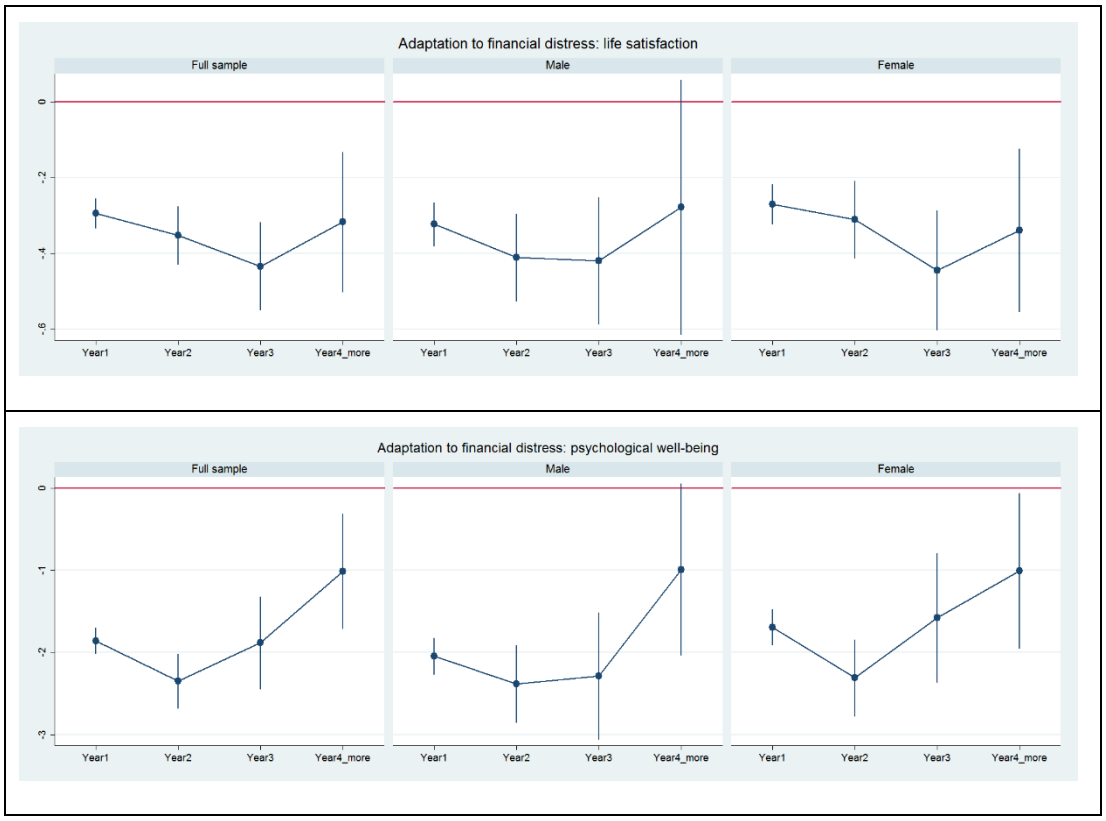
As financial distress is expected to reduce well-being, $\theta_{y=1}$ is expected to be negative. Adaptation is interpreted by the size and sign of the coefficients of the corresponding dummies. If adaptation occurs, the negative values of $\theta_{y=1,..4}$ would diminish progressively. The models control both region and year dummies to control for unobserved heterogeneity at regional and year levels.

3.5 Results

3.5.1 Adaptation to financial distress

The analysis in this section first estimates a full sample and then male and female samples separately for both the life satisfaction and psychological well-being panels. **Table 3-1** summarises the results while **Figure 3-2** shows the pattern of adaptation to financial distress with both the measures of well-being.

Figure 3-2: Adaptation pattern to financial distress



The full sample analysis of the life satisfaction panel reveals that life satisfaction drops significantly (-0.294 units) at the onset (at year1) of financial distress. Those who are reporting financial distress for two, three and four or more consecutive years, continue to report significantly lower life satisfaction (for 'year2', 'year3' and 'year4 or more', -0.352, -0.433 and -0.317 units respectively) than the base level. There is no indication that life satisfaction scores return to somewhere near to the base level even after four years. It is worth underlining that standard F Tests for all the dummies confirm that coefficients are individually and combined significantly different from zero. Therefore, this full sample analysis with life satisfaction does not show any sign of adaptation after four consecutive years of financial distress.

The analysis then moves on to the separate estimations of male and female samples to see if the degree of adaptation differs based on gender. The female sample indicates almost similar adaptation pattern as the full sample. Females continue to report lower life satisfaction than the base level even after four (or more) consecutive years of financial distress. However, in the male sample, 'year4 or more' dummy turns insignificant, which, may be an indication that males' life satisfaction score returns to the base level after four years[21].

Analysis of the full sample with psychological well-being reveals a similar adaptation pattern to what observed in the life satisfaction sample. After four consecutive years of financial distress an individual's psychological well-being remains lower than the base level. F Tests confirms that the coefficients of the financial distress dummies are individually and collectively different from zero. Therefore, like the life satisfaction sample, analysis with full sample of psychological well-being shows no adaptation even after four consecutive years of financial distress. The analysis of female sample informs the similar results to the full sample. However, the male sample indicates that, after four years, males' psychological well-being returns to the base level since the 'four years or more' dummy turns insignificant[22].

It is worth underlining that the male psychological well-being coefficient for the year1 dummy is larger (negative) than the female coefficient. This indicates that the magnitude of the male's negative 'reaction' to the onset of financial distress is larger than female's 'reaction'. This gender difference in 'reaction' to the onset of the financial distress is confirmed through a gender interaction model which (see **Table 3-8**) indicates that male coefficient for year1 dummy in psychological well-being sample (-2.064) is significantly larger (negative) by (0.382) units than the corresponding female coefficient (-1.682). Despite male's 'reaction' (-2.064) to the onset of financial distress is larger than females' (-1.682), males seem to adapt after four years of distress (since male's coefficient for 'year4 or more' turns insignificant). On the contrary, female shows no sign of adaptation. Therefore, the results indicate a gender difference in the extent of adaptation. In short, this analysis concludes that after four years respondents generally do not adapt to financial distress as the psychological well-being scores do not return to the base level. However, males show stronger 'reaction' to the onset of financial distress, but they seem to adapt more than females.

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[21] The insignificant coefficient might also be due to insufficient observations, since in this case, only 80 respondents continue to report financial distress for four or more consecutive years.

[22] The insignificant coefficient might be due to insufficient observations. In this sample, only 137 males continue to report financial distress for four or more consecutive years.

Table 3-1: Adaptation to financial distress

		Life satisfaction			Psychological well-being		
		Full sample b/se	Male b/se	Female b/se	Full sample b/se	Male b/se	Female b/se
log real equivalised household income		0.012*	0.017	0.010	-0.054**	-0.043	-0.063
		(0.01)	(0.01)	(0.01)	(0.03)	(0.04)	(0.04)
age corrected		-0.008	0.019	-0.031*	-0.038	-0.023	-0.050
		(0.01)	(0.02)	(0.02)	(0.04)	(0.05)	(0.06)
age squared		-0.029	-0.056	-0.008	0.167*	0.221	0.152
		(0.03)	(0.05)	(0.04)	(0.10)	(0.14)	(0.13)
Marital Status (Base-Single)	Married	0.085***	0.093**	0.075*	-0.194*	-0.224*	-0.123
		(0.03)	(0.04)	(0.04)	(0.10)	(0.13)	(0.15)
	Living as couple	0.131***	0.141***	0.119***	0.084	0.151	0.045
		(0.02)	(0.03)	(0.03)	(0.09)	(0.12)	(0.13)
	Divorced	-0.062	-0.109*	-0.028	-0.144	-0.358*	0.005
		(0.04)	(0.07)	(0.06)	(0.15)	(0.22)	(0.21)
	Separated	-0.277***	-0.380***	-0.209***	-1.442***	-1.838***	-1.194***
		(0.05)	(0.07)	(0.06)	(0.19)	(0.26)	(0.26)
	Widowed	-0.141***	-0.117	-0.154**	-1.294***	-1.260***	-1.265***
		(0.05)	(0.08)	(0.06)	(0.15)	(0.23)	(0.20)
Education (Base-Degree)	A level	0.014	0.071	-0.011	-0.095	-0.150	0.005
		(0.03)	(0.05)	(0.04)	(0.10)	(0.15)	(0.14)
	GCSE	0.066*	0.189***	-0.015	-0.100	0.015	-0.151
		(0.04)	(0.06)	(0.05)	(0.11)	(0.17)	(0.15)
	Other qualification	-0.063**	-0.009	-0.106**	-0.178*	-0.064	-0.276*
		(0.03)	(0.04)	(0.05)	(0.10)	(0.14)	(0.14)
	No qualification	0.078	0.191***	-0.007	-0.312**	-0.113	-0.475**
		(0.05)	(0.07)	(0.06)	(0.14)	(0.19)	(0.20)
Children (Base-0)	1 child	-0.020	-0.015	-0.031	-0.158***	-0.272***	-0.063
		(0.02)	(0.02)	(0.02)	(0.06)	(0.08)	(0.08)
	2 Child	-0.041**	-0.035	-0.052*	-0.034	-0.203**	0.109
		(0.02)	(0.02)	(0.03)	(0.07)	(0.09)	(0.10)
	3 or more Child	-0.065**	-0.051	-0.086**	-0.106	-0.297**	0.047
		(0.03)	(0.04)	(0.04)	(0.10)	(0.14)	(0.15)
Health Status (Base-excellent)	Very good	-0.121***	-0.124***	-0.118***			
		(0.01)	(0.01)	(0.01)			
	Good	-0.300***	-0.301***	-0.301***			

		(0.01)	(0.02)	(0.02)			
	Fair	-0.539***	-0.554***	-0.529***			
		(0.02)	(0.03)	(0.02)			
	Poor	-0.992***	-1.068***	-0.946***			
		(0.04)	(0.06)	(0.05)			
Job status (Base-Self-employed)	Paid employed	-0.009	-0.029	0.031	-0.156**	-0.120	-0.234*
		(0.02)	(0.03)	(0.04)	(0.07)	(0.09)	(0.13)
	Unemployed	-0.166***	-0.218***	-0.080	-1.236***	-1.274***	-1.186***
		(0.03)	(0.04)	(0.05)	(0.12)	(0.14)	(0.20)
	Retired	0.139***	0.122***	0.179***	0.269***	0.350***	0.164
		(0.03)	(0.04)	(0.04)	(0.09)	(0.12)	(0.15)
	On maternity leave	0.201***	-0.147	0.247***	-0.210	0.719	-0.367**
		(0.05)	(0.62)	(0.05)	(0.14)	(1.26)	(0.17)
	Family care	0.011	-0.099	0.057	-0.370***	-0.970***	-0.433***
		(0.03)	(0.09)	(0.04)	(0.10)	(0.26)	(0.14)
	Ft student	0.106***	0.089**	0.136***	0.135	0.114	0.088
		(0.03)	(0.04)	(0.05)	(0.11)	(0.14)	(0.18)
	Sick or disabled	-0.280***	-0.278***	-0.256***	-2.370***	-2.042***	-2.706***
		(0.04)	(0.06)	(0.06)	(0.17)	(0.23)	(0.26)
	Tr scheme	0.011	-0.021	0.062	0.532*	0.779**	0.135
		(0.09)	(0.11)	(0.14)	(0.31)	(0.34)	(0.56)
	Other	0.018	-0.046	0.088	-0.128	-0.612*	0.135
		(0.05)	(0.09)	(0.07)	(0.21)	(0.32)	(0.29)
Financial distress dummies	Year1	-0.294***	-0.322***	-0.270***	-1.857***	-2.047***	-1.691***
		(0.02)	(0.03)	(0.03)	(0.09)	(0.13)	(0.13)
	Year2	-0.352***	-0.410***	-0.310***	-2.346***	-2.382***	-2.309***
		(0.05)	(0.07)	(0.06)	(0.20)	(0.28)	(0.28)
	Year3	-0.433***	-0.419***	-0.444***	-1.881***	-2.285***	-1.579***
		(0.07)	(0.10)	(0.10)	(0.34)	(0.47)	(0.48)
	Year4&more	-0.317***	-0.278	-0.339***	-1.010**	-0.989	-1.008*
		(0.11)	(0.20)	(0.13)	(0.43)	(0.63)	(0.57)
	Constant	5.495***	4.455***	6.391***	27.710***	27.295***	27.997***
		(0.46)	(0.62)	(0.66)	(1.42)	(1.87)	(2.09)
	R-sqr	0.045	0.050	0.043	0.032	0.039	0.029
	N	144109	67595	76514	175040	82617	92423

Note: *, **, *** denotes significance at 1%, 5% and 10% levels. All the regressions, in addition, control for region and year dummies not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity

Other control variables generally attract expected signs. Unemployment, disability, separation from partner and poor health are significantly and negatively associated with life satisfaction as well as psychological well-being. On the other hand, good health is positively associated with well-being. In this analysis, age is not found to have a significant association with reported well-being.

The above results are broadly in line with the adaptation literature. Financial distress here resembles unemployment or poverty in the sense that, these events continue to negatively affect SWB for a longer period and people do not seem to adapt to these events (for example, Lucas *et al.*, 2004; Clark *et al.*, 2016). The results also conform to the notion that distressful circumstances have a longer lasting impact upon SWB than delightful events such as marriage or birth of a child (see, for example, Lucas *et al.*, 2004; Clark *et al.*, 2008a; Diener *et al.*, 2006). This analysis, however, indicates a gender difference both in the degree of contemporary 'reaction' to financial distress as well as in the extent of adaptation. Similar gender difference is also found in the contemporary effect of unemployment upon well-being. For example, Clark *et al.* (2008a) note that males are more affected by the incidence of unemployment than are females. The above findings indicate that a gender difference exists in the social norms as to how males and females shoulder financial responsibility in the households. Male's stronger reaction to the onset of financial distress potentially reflects their greater concern, but male's speedier adaptation potentially indicates their greater responsibility to cope with the financial shocks in the households[23].

Furthermore, the above findings indicate that both the measures of SWB i.e., life satisfaction and psychological well-being are remarkably similar in the contemporary effects of financial distress as well as in the adaptation patterns. For both the measures, the full sample analysis indicates that individual's SWB score does not return to anywhere near the base level even when the respondents go through four or more consecutive years of financial distress. Clark

[23] The analysis further examines the potential impact of social norms on the reaction to financial distress. Results, reported in the appendix of Chapter 3, indicates that married individuals and couples are more affected by the negative financial shocks than the singles. This is expected since the couples are assumed to bear greater financial responsibilities than singles. However, the analysis finds similar results in both male and female samples, indicating that both male and female partners in a married couple (or living as couples) experience greater psychological shocks at the onset of financial distress than the single males and females.

and Georgellis (2013) also observes this similarity in the impact on different of SWB while studying adaptation in BHPS.

Overall, the results presented in **Table 3-1**, indicates that financial distress continue to have an unabated negative impact on SWB over time. This is consistent with previous studies (e.g., Brown *et al.*, 2005; Jenkins *et al.*, 2008) which find that financial distress is a negative life experience. However, this analysis finds evidence of a persistence effect, with financial distress continuing to lower well-being. The full sample analysis presented here does not find evidence of adaptation even after four years – well-being does not return to the base level even after four consecutive years of financial distress. These findings are consistent with Clark *et al.* (2016) who find individuals' life satisfaction do not adapt to poverty. However, unlike Clark *et al.* (2016) who define poverty by low income and focuses only on the low income households, this analysis considers household overall financial situation and distresses originating from sources including difficulties in various payment obligations and are therefore, relevant to both low and high income households. Arguably, commencement of financial distress is often associated with commencement of other distressful life events, e.g., unemployment, divorce or widowhood etc. This, in turn, entails a question, does the effect of financial distress somehow overlaps with the effects of those distressful events? The later sections of this chapter address this issue in detail.

3.5.2 Adaptation and the length of financial distress

The results presented in **Table 3-1**, are obtained from the fixed effects estimations which control for individual unobserved heterogeneity. Therefore, these results are not affected by the concerns of reverse causality, i.e., the individuals with higher SWB are less likely to stay in financial distress for a longer duration. However, the above estimation may suffer from a selection bias arising from creating the dummies to capture the years and the individuals reporting financial distress. Those who report financial distress in year1 may continue to report financial distress in year 4 or later consecutively. This implies that both year1 dummy and year4 dummies can include the same individuals. Therefore, the dummies presenting longer durations include the individuals also presented in the dummies identifying shorter durations. On the contrary, it is likely that some of the individuals presented by the shorter dummies (say year3, for example) might come out of the distress and won't continue to report financial distress in year4. In this case, the dummies representing longer durations becomes increasingly selective of those people who have already appeared repeatedly in shorter duration dummies. Despite the coefficients in **Table 3-1** come from a within subject analysis, this raises the

Table 3-2: Duration of Financial Distress

		Life satisfaction				Psychological well-being			
		Full sample	Two or more years	Three or more years	Four or more years	Full sample	Two years or more	Three years or more	Four years or more
		b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
Log real equivalised household income		0.012*	0.013*	0.012	0.012	-0.054**	-0.047*	-0.050*	-0.050*
		(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)	(0.03)
Age corrected		-0.008	-0.006	-0.005	-0.003	-0.038	-0.028	-0.026	-0.023
		(0.01)	(0.01)	(0.01)	(0.01)	(0.04)	(0.04)	(0.04)	(0.04)
Age squared		-0.029	-0.041	-0.042	-0.044	0.167*	0.129	0.122	0.106
		(0.03)	(0.03)	(0.03)	(0.03)	(0.10)	(0.10)	(0.10)	(0.10)
Marital Status (Base-Single)	Married	0.085***	0.087***	0.080***	0.080***	-0.194*	-0.218**	-0.202**	-0.188*
		(0.03)	(0.03)	(0.03)	(0.03)	(0.10)	(0.10)	(0.10)	(0.10)
	Living as couple	0.131***	0.130***	0.125***	0.124***	0.084	0.062	0.075	0.088
		(0.02)	(0.02)	(0.02)	(0.02)	(0.09)	(0.09)	(0.09)	(0.09)
	Divorced	-0.062	-0.058	-0.064	-0.071	-0.144	-0.099	-0.114	-0.120
		(0.04)	(0.04)	(0.04)	(0.04)	(0.15)	(0.15)	(0.15)	(0.15)
	Separated	-0.277***	-0.266***	-0.265***	-0.272***	-1.442***	-1.346***	-1.327***	-1.281***
		(0.05)	(0.05)	(0.05)	(0.05)	(0.19)	(0.19)	(0.19)	(0.19)
	Widowed	-0.141***	-0.141***	-0.148***	-0.151***	-1.294***	-1.283***	-1.293***	-1.263***
		(0.05)	(0.05)	(0.05)	(0.05)	(0.15)	(0.15)	(0.15)	(0.15)
Education (Base-Degree)	A level	0.014	0.011	0.011	0.009	-0.095	-0.068	-0.076	-0.085
		(0.03)	(0.03)	(0.03)	(0.03)	(0.10)	(0.11)	(0.11)	(0.11)
	GCSE	0.066*	0.069*	0.070*	0.070*	-0.100	-0.032	-0.023	-0.036
		(0.04)	(0.04)	(0.04)	(0.04)	(0.11)	(0.12)	(0.12)	(0.12)
	Other qualification	-0.063**	-0.068**	-0.063**	-0.066**	-0.178*	-0.178*	-0.159	-0.174*
		(0.03)	(0.03)	(0.03)	(0.03)	(0.10)	(0.10)	(0.10)	(0.10)
	No qualification	0.078	0.084*	0.087*	0.087*	-0.312**	-0.253*	-0.248*	-0.253*
		(0.05)	(0.05)	(0.05)	(0.05)	(0.14)	(0.14)	(0.14)	(0.14)
Children (Base-0)	1 child	-0.020	-0.023	-0.024	-0.024	-0.158***	-0.170***	-0.186***	-0.192***
		(0.02)	(0.02)	(0.02)	(0.02)	(0.06)	(0.06)	(0.06)	(0.06)
	2 Child	-0.041**	-0.048**	-0.048**	-0.050***	-0.034	-0.052	-0.062	-0.073
		(0.02)	(0.02)	(0.02)	(0.02)	(0.07)	(0.07)	(0.07)	(0.07)
	3 or more Child	-0.065**	-0.080***	-0.083***	-0.085***	-0.106	-0.151	-0.187*	-0.181*
		(0.03)	(0.03)	(0.03)	(0.03)	(0.10)	(0.10)	(0.10)	(0.10)
Health Status (Base-excellent)	Very good	-0.121***	-0.116***	-0.116***	-0.116***				
		(0.01)	(0.01)	(0.01)	(0.01)				

	Good	-0.300***	-0.293***	-0.293***	-0.292***				
		(0.01)	(0.01)	(0.01)	(0.01)				
	Fair	-0.539***	-0.528***	-0.525***	-0.523***				
		(0.02)	(0.02)	(0.02)	(0.02)				
	Poor	-0.992***	-0.973***	-0.974***	-0.966***				
		(0.04)	(0.04)	(0.04)	(0.04)				
Job status (Base-Self-employed)	Paid employed	-0.009	-0.003	-0.003	0.001	-0.156**	-0.166**	-0.169**	-0.152**
		(0.02)	(0.02)	(0.02)	(0.02)	(0.07)	(0.07)	(0.07)	(0.07)
	Unemployed	-0.166***	-0.152***	-0.142***	-0.139***	-1.236***	-1.204***	-1.140***	-1.098***
		(0.03)	(0.03)	(0.03)	(0.04)	(0.12)	(0.12)	(0.12)	(0.12)
	Retired	0.139***	0.146***	0.148***	0.150***	0.269***	0.285***	0.303***	0.322***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.09)	(0.09)	(0.09)	(0.09)
	On maternity leave	0.201***	0.192***	0.197***	0.198***	-0.210	-0.215	-0.190	-0.164
		(0.05)	(0.05)	(0.05)	(0.05)	(0.14)	(0.14)	(0.14)	(0.14)
	Family care	0.011	0.020	0.025	0.030	-0.370***	-0.341***	-0.326***	-0.301***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.10)	(0.10)	(0.10)	(0.10)
	Ft student	0.106***	0.112***	0.109***	0.107***	0.135	0.095	0.092	0.128
		(0.03)	(0.03)	(0.03)	(0.03)	(0.11)	(0.11)	(0.11)	(0.11)
	Sick or disabled	-0.280***	-0.276***	-0.269***	-0.263***	-2.370***	-2.258***	-2.162***	-2.109***
		(0.04)	(0.04)	(0.04)	(0.04)	(0.17)	(0.17)	(0.17)	(0.17)
	Tr scheme	0.011	0.083	0.122	0.112	0.532*	0.639**	0.684**	0.646**
		(0.09)	(0.09)	(0.09)	(0.09)	(0.31)	(0.31)	(0.31)	(0.31)
	Other	0.018	0.040	0.061	0.081	-0.128	-0.055	-0.048	-0.005
		(0.05)	(0.06)	(0.06)	(0.06)	(0.21)	(0.21)	(0.21)	(0.20)
Financial distress dummies	Year1	-0.294***	-0.389***	-0.456***	-0.453***	-1.857***	-2.614***	-2.792***	-2.630***
		(0.02)	(0.05)	(0.09)	(0.15)	(0.09)	(0.20)	(0.34)	(0.53)
	Year2	-0.352***	-0.381***	-0.454***	-0.595***	-2.346***	-2.580***	-3.335***	-3.623***
		(0.05)	(0.05)	(0.09)	(0.15)	(0.20)	(0.22)	(0.38)	(0.60)
	Year3	-0.433***	-0.463***	-0.492***	-0.582***	-1.881***	-2.116***	-2.330***	-2.357***
		(0.07)	(0.07)	(0.08)	(0.15)	(0.34)	(0.35)	(0.38)	(0.63)
	Year4&more	-0.317***	-0.347***	-0.378***	-0.419***	-1.010**	-1.258***	-1.480***	-1.511***
		(0.11)	(0.11)	(0.12)	(0.14)	(0.43)	(0.43)	(0.46)	(0.53)
	Constant	5.495***	5.450***	5.409***	5.336***	27.710***	27.249***	27.212***	27.091***
		(0.46)	(0.47)	(0.48)	(0.48)	(1.42)	(1.43)	(1.44)	(1.44)
	R-sqr	0.045	0.041	0.039	0.038	0.032	0.025	0.022	0.020
	N	144109	141288	140173	139649	175040	171528	170123	169476

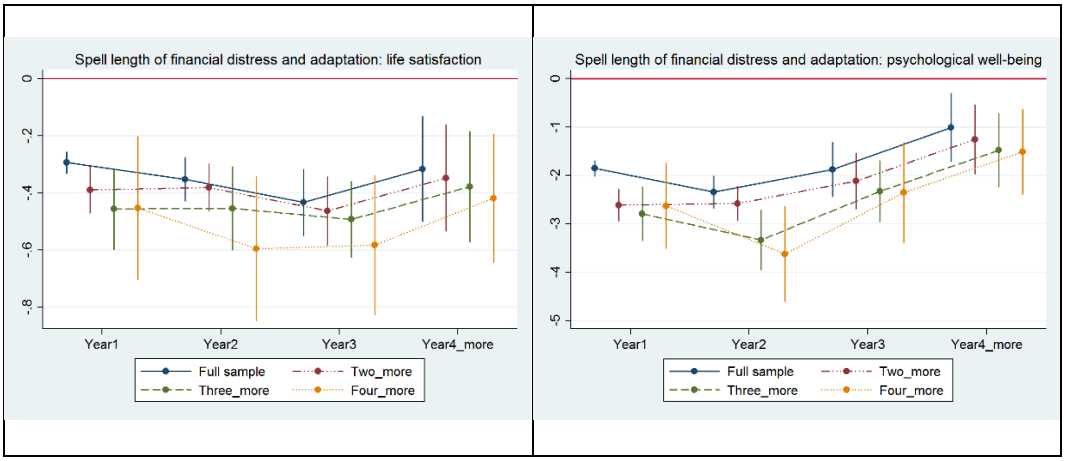
Note: *, **, *** denotes significance at 1%, 5% and 10% levels. All the regressions, in addition, control for region and year dummies not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity

question of a selection bias in favour of the respondents captured in the longer duration dummies.

This section addresses this concern by creating dummies in more homogenous nature in terms of the duration of financial distress. These dummies are created so that each dummy captures the individuals reporting financial distress for equal number of years. The specification used in this section is like the specification presented in **Table 3-1** except that the longer duration dummies progressively drop the respondents who experience financial distress for shorter duration. The results are presented in **Table 3-2** and **Figure 3-3**. The first column of the **Table 3-2** reproduces the overall adaptation estimates using the whole sample from **Table 3-1**. Column 2 then drops information of those who report a financial distress spell of less than two years.

Similarly, columns 3 and 4 reports the estimates by dropping the individuals who are in spells less than three and four years respectively. A series of Wald tests confirms that the coefficients of the financial distress dummies are individually and combined different from zero.

Figure 3-3: Adaptation and length of financial distress



Results from life satisfaction sample indicate that shorter financial distress spells are on average less harmful, in that the coefficients are generally weaker (less negative) in column 1 than in columns 2-4. Analysis with psychological well-being sample informs similar results. Neither life satisfaction nor psychological well-being sample indicates any evidence of adaptation. All these models fail to show that SWB score returns to the base level. These results indicate that duration of financial distress affects neither the extent nor the speed of adaptation. The findings are in line with Clark *et al.* (2016) who find that the extent of adaptation to poverty is not

affected by the length of the spell of poverty. The above findings establish robustness of the original findings summarised in the section 3.5.1.

3.5.3 Commencement of financial distress coupled with other distressful life events

As indicated earlier, financial distress may arise from income deprivation or over-indebtedness and manifests in individual's inability to meet various payment obligations. Over-indebtedness has been a concern in many advanced economies since the financial crisis. 31-41% of European households has reported problems with paying bills and 10% households has reported some sorts of debt problems between 2009 and 2013[24]. In the context of such a long-standing over-indebtedness, it is likely that many households, irrespective of their household income, are living with financial distress in their everyday lives. However, it is often argued that financial distress can be triggered by some other life events such as job loss or separation from partner. In many cases, it is difficult to distinguish the impact of financial distress on well-being from the impacts of those other events. Therefore, the question remains, does financial distress have an independent impact or it is always an event associated with other distressful life events?

This section addresses this question. Specifically, it compares the amount of SWB lost when financial distress commences with and without the incidence of other distressful life events. This analysis focuses on six life events – unemployment, retirement, disability, divorce, separation from partner and widowhood. It identifies the point of an individual's timeline when she first reports financial distress and the point when she reports any of these six life events. Individuals who report financial distress at 't' (which is marked by the year 1 of a financial distress spell) and have entered any of these distressful events during transition from year t-1 to t are identified as group 1. In this process, the group of individuals who report financial distress at 't' but has not entered any such events in t-1 are identified as group 2. Then the analysis estimates SWB responses of these two groups at time 't' with respect to those who has not reported financial distress at the same point in time and compare with each other. For the group 1, we assume that those distressful events trigger financial distress. If financial distress has an independent effect upon well-being, this group would experience a double shock – shock due to financial distress and the shock due to any of those distressful life events. On the contrary, for the group 2, the negative shock on SWB would only be attributed to the independent effect of financial distress. The regression equation, in this case, becomes:

[24] Eurobarometer 2015, Challenges and Priorities for the EU

$$WB_{it} = \beta_1 X_{it} + \alpha_i + \gamma_t + \theta_0 f^0{}_{1,i,t} + \theta_e f^e{}_{1,i,t} + \varepsilon_{it}$$

Where $f^e{}_1$ dummy indicates whether entry into financial distress is coupled with other events while $f^0{}_1$ dummy indicates it is not. In effect, the year 1 dummy of financial distress is split into two dummies - those who have experienced such events in transition from 't-1' into 't' and those who have not.

Figure 3-4, **Table 3-3** and **Table 3-4** summarises the results of this section. Models estimating both life satisfaction and psychological well-being show that financial distress significantly lower SWB at 't' for both groups. The only exception is the case of widowhood in life satisfaction model where the effect on the group 1 is insignificant. The size of the coefficients in the life satisfaction models indicates that group 1, which enter into unemployment, disability, divorce and separation at 't-1' and report the incidence of financial distress at 't', suffers a larger negative shock on life satisfaction than the group 2, which experiences financial distress without the other events. Psychological well-being models also inform the similar results for all events except retirement. It should be noted that, in this analysis, retirement is found to significantly increase psychological well-being. In the retirement model, group 1 suffers a smaller negative shock on their psychological well-being than group 2. This indicates, those who retire at 't-1'and experience financial distress at 't', seem to have a smaller negative impact on psychological well-being than those who does not retire at 't-1' but experience financial distress at 't'. This is potentially because the positive impact of retirement partly offset the negative impact of financial distress. A series of Wald tests confirms that coefficients of group 1 and group 2 dummies are independently and combined different from zero (see ***Table 3-9*** in the appendix of this chapter).

Figure 3-4: Financial distress coupled with other events

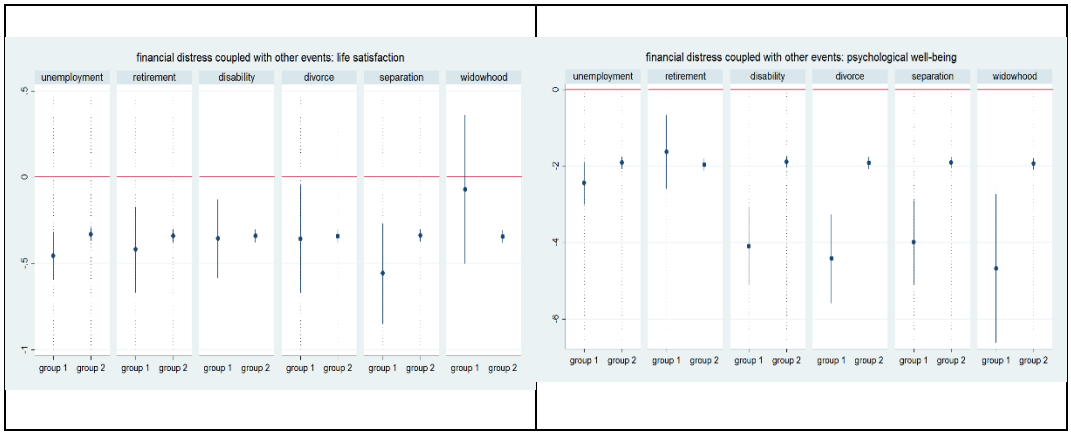


Table 3-3: Financial distress with other life events – life satisfaction

	Life satisfaction	Unemployment b/se	Retirement b/se	Disability b/se	Divorce b/se	Separation b/se	Widowhood b/se
Log real equivalised household income		0.025***	0.025***	0.025***	0.025***	0.025***	0.026***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age corrected		-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age squared		0.007	0.007	0.007	0.007	0.007	0.007
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Marital Status (Base-Single)	Married	0.100***	0.100***	0.100***	0.100***	0.100***	0.100***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	Living as couple	0.138***	0.138***	0.138***	0.138***	0.138***	0.138***
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	Divorced	-0.074*	-0.074*	-0.074*	-0.073*	-0.072*	-0.073*
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
	Separated	-0.297***	-0.296***	-0.297***	-0.297***	-0.284***	-0.296***
		(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
	Widowed	-0.129***	-0.129***	-0.129***	-0.129***	-0.129***	-0.132***
		(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Education (Base-Degree)	A level	0.022	0.022	0.022	0.022	0.022	0.022
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	GCSE	0.067*	0.066*	0.066*	0.066*	0.066*	0.066*
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
	Other qualification	-0.067**	-0.067**	-0.067**	-0.067**	-0.067**	-0.068**
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	No qualification	0.075	0.075	0.075	0.075	0.075	0.075
		(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Children (Base-0)	1 child	-0.021	-0.021	-0.021	-0.021	-0.021	-0.021
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	2 Child	-0.042**	-0.042**	-0.042**	-0.042**	-0.042**	-0.042**
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	3 or more Child	-0.059**	-0.059**	-0.059**	-0.059**	-0.059**	-0.059**
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Health Status (Base-excellent)	Very good	-0.123***	-0.123***	-0.123***	-0.123***	-0.123***	-0.123***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Good	-0.307***	-0.307***	-0.307***	-0.307***	-0.307***	-0.307***
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Fair	-0.552***	-0.552***	-0.552***	-0.552***	-0.552***	-0.552***

		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	Poor	-1.017***	-1.017***	-1.017***	-1.017***	-1.017***	-1.017***
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Job status (Base-Self-employed)	Paid employed	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	Unemployed	-0.193***	-0.205***	-0.205***	-0.204***	-0.204***	-0.204***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	Retired	0.128***	0.128***	0.128***	0.128***	0.127***	0.127***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	On maternity leave	0.198***	0.197***	0.197***	0.197***	0.197***	0.197***
		(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
	Family care	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	Ft student	0.085***	0.085***	0.085***	0.085***	0.086***	0.085***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	Sick or disabled	-0.307***	-0.308***	-0.306***	-0.307***	-0.307***	-0.307***
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
	Tr scheme	-0.021	-0.019	-0.019	-0.019	-0.019	-0.019
		(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
	Other	0.003	0.003	0.003	0.003	0.003	0.003
		(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
	Group 1	-0.455***					
		(0.08)					
	Group 2	-0.331***					
		(0.02)					
	Group 1		-0.420***				
			(0.15)				
	Group 2		-0.340***				
			(0.02)				
	Group 1			-0.356***			
				(0.14)			
	Group 2			-0.341***			
				(0.02)			
	Group 1				-0.357*		
					(0.19)		
	Group 2				-0.341***		
					(0.02)		
	Group 1					-0.557***	
						(0.18)	

	Group 2					-0.337***	
						(0.02)	
	Group 1						-0.070
							(0.26)
	Group 2						-0.343***
							(0.02)
	Constant	5.349***	5.345***	5.348***	5.348***	5.347***	5.349***
		(0.46)	(0.46)	(0.46)	(0.46)	(0.46)	(0.46)
	R-sqr	0.040	0.040	0.040	0.040	0.040	0.040
	N	144109	144109	144109	144109	144109	144109

Note: *, **, *** denotes significance at 1%, 5% and 10% levels. All the regressions, in addition, control for region and year dummies not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity.

Definition of Group 1 and Group 2: Individuals who report financial distress at ‘t’ (which is marked by the year 1 of a financial distress spell) and have entered any of these distressful events (unemployment, retirement, disability, divorce, separation, widowhood) during transition from year t-1 to t are identified as group 1. On the other hand, the group of individuals who report financial distress at ‘t’ but has not entered any such events in t-1 are identified as group 2.

Table 3-4: Financial distress with other life events – psychological well-being

	Psychological well-being	Unemployment b/se	Retirement b/se	Disability b/se	Divorce b/se	Separation b/se	Widowhood b/se
Log real equivalised household income		0.006	0.006	0.006	0.006	0.005	0.005
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Aage corrected		-0.036	-0.036	-0.036	-0.036	-0.036	-0.036
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Age squared		0.291***	0.292***	0.293***	0.291***	0.290***	0.288***
		(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
Marital Status (Base-Single)	Married	-0.128	-0.127	-0.128	-0.128	-0.131	-0.128
		(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
	Living as couple	0.101	0.101	0.100	0.103	0.101	0.102
		(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
	Divorced	-0.204	-0.204	-0.204	-0.132	-0.189	-0.206
		(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
	Separated	-1.530***	-1.531***	-1.534***	-1.537***	-1.397***	-1.533***
		(0.19)	(0.19)	(0.19)	(0.19)	(0.19)	(0.19)
	Widowed	-1.260***	-1.260***	-1.261***	-1.255***	-1.260***	-1.226***
		(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
Education (Base-Degree)	A level	-0.070	-0.070	-0.070	-0.070	-0.070	-0.071
		(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
	GCSE	-0.089	-0.091	-0.089	-0.088	-0.089	-0.091
		(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
	Other qualification	-0.198**	-0.199**	-0.198**	-0.199**	-0.199**	-0.198**
		(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
	No qualification	-0.320**	-0.321**	-0.319**	-0.321**	-0.319**	-0.320**
		(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Children (Base-0)	1 child	-0.172***	-0.172***	-0.174***	-0.173***	-0.172***	-0.173***
		(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
	2 Child	-0.054	-0.054	-0.055	-0.057	-0.054	-0.055
		(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
	3 or more Child	-0.115	-0.114	-0.116	-0.116	-0.116	-0.114
		(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
Job status (Base-Self-employed)	Paid employed	-0.158**	-0.157**	-0.155**	-0.157**	-0.159**	-0.158**
		(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
	Unemployed	-1.364***	-1.411***	-1.417***	-1.409***	-1.413***	-1.414***
		(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
	Retired	0.227**	0.222**	0.237**	0.226**	0.224**	0.227**
		(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
	On maternity leave	-0.228	-0.229*	-0.222	-0.227	-0.232*	-0.232*

	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Family care	-0.430***	-0.432***	-0.427***	-0.432***	-0.432***	-0.431***
	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
Ft student	0.069	0.073	0.071	0.074	0.073	0.073
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
Sick or disabled	-2.505***	-2.503***	-2.387***	-2.504***	-2.508***	-2.505***
	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)
Tr scheme	0.417	0.425	0.423	0.430	0.431	0.423
	(0.31)	(0.31)	(0.31)	(0.31)	(0.31)	(0.31)
Other	-0.182	-0.181	-0.177	-0.179	-0.183	-0.185
	(0.21)	(0.21)	(0.21)	(0.21)	(0.21)	(0.21)
Group 1	-2.442***					
	(0.33)					
Group 2	-1.909***					
	(0.09)					
Group 1		-1.625***				
		(0.58)				
Group 2		-1.962***				
		(0.09)				
Group 1			-4.089***			
			(0.61)			
Group 2			-1.885***			
			(0.09)			
Group 1				-4.415***		
				(0.70)		
Group 2				-1.911***		
				(0.09)		
Group 1					-3.990***	
					(0.66)	
Group 2					-1.905***	
					(0.09)	
Group 1						-4.670***
						(1.18)
Group 2						-1.934***
						(0.09)
Constant	27.176***	27.179***	27.164***	27.156***	27.163***	27.178***
	(1.42)	(1.42)	(1.43)	(1.42)	(1.42)	(1.42)
R-sqr	0.024	0.024	0.024	0.024	0.024	0.024
N	175040	175040	175040	175040	175040	175040

Note: *, **, *** denotes significance at 1%, 5% and 10% levels. All the regressions, in addition, control for region and year dummies not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity

Note: Individuals who report financial distress at 't' (which is marked by the year 1 of a financial distress spell) and have entered any of the distressful events (e.g., unemployment, retirement, disability, divorce, separation, widowhood) during transition from year t-1 to t are identified as group 1. On the other hand, the group of individuals who report financial distress at 't' but has not entered any such events in t-1 are identified as group 2.

The most remarkable result of this analysis is that group 2 experiences consistent loss of their SWB at the time 't', when financial distress commences, even if they do not experience any distressful events at 't-1'. It is plausible that financial distress associated with unemployment, disability, divorce or separation amplifies the negative impacts on well-being. However, the above results clearly demonstrate that financial distress independently (without being associated with other events) account for a separate negative shock upon well-being. Since, all the above regressions control for real household equivalised income, the results also indicate that the impact of financial distress is qualitatively distinct from any income loss in the face of unemployment, separation or widowhood.

Overall, the findings of the above analysis disagree with the propositions of hedonic treadmill theory which indicate that people adapt to any circumstances and their SWB always return to a stable level. Instead, they indicate that like unemployment and poverty, individuals fail to adapt to the persistent detrimental impact of financial distress. These findings, in turn, point towards a substantive well-being cost associated with long term household indebtedness and an obvious need for future policy interventions in this regard. From a macroeconomic point of view, rising level of household debt could be beneficial for maintaining aggregate demand. However, government must consider well-being cost of financial distress at the household level and address the causes of indebtedness.

3.5.4 Conclusion

This chapter exploited a combined panel of 18 waves of BHPS and 5 waves of Understanding Society data to examine adaptation to financial distress. The analysis followed respondent's two SWB scores, life satisfaction and psychological well-being and their associations with the level of financial distress over more than four years. For both life satisfaction and psychological well-being, the analysis found no evidence of adaptation to financial distress. Incidence of financial distress led to a negative shock in respondent's SWB which remained unabated throughout the entire spell of reported financial distress. SWB scores did not return to anywhere near the base level as would have been expected if adaptation had occurred. Therefore, the

analysis concluded that respondents did not adapt to financial distress. However, the analysis found that the degree of the negative shock during the commencement of financial distress and the extent of adaptation varied according to gender. Despite men experienced a larger negative shock at the onset of financial distress, they showed some signs of adaptation after four years while the women didn't. This finding potentially indicates men's higher coping ability developed through shouldering more financial responsibilities in households than females.

The above results were robust to the length of financial distress spells. Respondents reporting shorter and longer spells of financial distress experienced similar detrimental impact throughout the spell. The analysis also examined a potential overlap of the well-being impact of financial distress with the impacts of other distressful life events, such as unemployment, divorce, separation or widowhood, which arguably could give be associated with financial distress. The analysis segregated the impacts of financial distress from the impacts of those distressful life events and found that the incidence of financial distress had an independent impact on both the measures of well-being.

The above analysis was the first attempt to study adaptation to financial distress. It, therefore, contributes to the literature related to adaptation to household financial situation including income, poverty or pay rise/fall. The analysis, however, could be extended to examine adaptation to financial distress across demographic groups in United Kingdom. For example, analysis by income groups or socio-economic backgrounds (as Di Tella *et al.*, 2010; Di Tella and MacCulloch, 2010 investigated in case of income) might inform more insightful differences. One limitation of this analysis was that it excluded the respondents who entered the survey with a financial distress response, since it was impossible to detect when their financial distress had started. Even though the excluded respondents constituted less than ten percent of the overall sample, this could raise the question of a selection bias. The method used in this analysis followed highly acclaimed adaptation literatures (e.g., Clark *et al.*, 2016; Clark *et al.*, 2008; Lucas *et al.*, 2005) which seem to have ignored this issue. Nevertheless, the future adaptation literature can overcome this limitation by using an econometric model which takes initial condition into consideration (for example, one could estimate a probit in the first step and include the mills ratio in the final regression).

The findings from this analysis impart the key message that long-standing financial distress is an event, to which people don't seem to adapt. It persistently detriments SWB as people encounters financial hardship as a renewed negative stimulus in everyday life. Financial distress appears to have a 'scarring effect', like the long-term unemployment where human

natural adaptive capacity cannot ‘heal the wound’ over time. These findings have significant policy implications. For decades, Britain has developed a debt culture in which living with indebtedness has become a household norm. Government policies such as austerity and welfare cuts along with persistent fall of wage together have compelled many households to suffer from financial distress for a long time. The above findings, which demonstrates severe well-being consequences of the long-standing financial distress, suggest a policy shift from an alarming indebtedness to an augmented well-being.

3.6 Appendix

Table 3-5: Summary Statistics (Mean) of dummy variables

		Psychological well-being			Life satisfaction		
Mean		Male	Female	Total	Male	Female	Total
Satisfaction with life overall					5.329	5.330	5.329
GHQ reversed		26.013	24.735	25.338			
Age corrected		45.468	46.701	46.119	46.178	47.235	46.739
Age squared		2.417	2.563	2.494	2.478	2.606	2.546
Log real equivalised income		9.618	9.548	9.581	9.645	9.581	9.611
Marital Status (Base-Single)	Single	0.228	0.192	0.209	0.222	0.187	0.203
	Married	0.587	0.533	0.558	0.581	0.527	0.553
	Living as couple	0.106	0.095	0.100	0.112	0.101	0.106
	Divorced	0.031	0.049	0.041	0.034	0.056	0.045
	Separated	0.010	0.017	0.014	0.011	0.017	0.014
	Widowed	0.039	0.114	0.079	0.040	0.111	0.078
Education (Base-Degree)	Degree	0.166	0.149	0.157	0.179	0.167	0.172
	A level	0.221	0.175	0.197	0.230	0.181	0.204
	GCSE	0.283	0.304	0.294	0.278	0.300	0.290
	Other qualification	0.078	0.070	0.074	0.078	0.073	0.076
	No qualification	0.252	0.302	0.278	0.235	0.279	0.258
Children (Base-0)	0 child	0.742	0.723	0.732	0.740	0.718	0.728
	1 child	0.107	0.121	0.114	0.107	0.121	0.115
	2 Child	0.110	0.113	0.112	0.112	0.116	0.114
	3 or more Child	0.041	0.044	0.042	0.041	0.045	0.043
Health Status (Base-Excellent)	Excellent				0.244	0.209	0.225
	Very good				0.441	0.438	0.440
	Good				0.222	0.236	0.229
	Fair				0.075	0.092	0.084
	Poor				0.018	0.025	0.022
Job status (Base-Self-employed)	Self employed	0.107	0.034	0.068	0.108	0.035	0.069
	Paid employed	0.544	0.477	0.509	0.544	0.482	0.511
	Unemployed	0.037	0.021	0.028	0.034	0.020	0.027
	Retired	0.209	0.247	0.229	0.213	0.252	0.234
	On maternity leave	0.000	0.016	0.009	0.000	0.009	0.005
	Family care	0.005	0.108	0.059	0.004	0.104	0.057
	Ft student	0.064	0.067	0.066	0.060	0.063	0.062
	Sick or disabled	0.028	0.025	0.026	0.032	0.029	0.030
	Tr scheme	0.003	0.002	0.002	0.002	0.001	0.002
	Other	0.003	0.004	0.004	0.004	0.005	0.004
Financial distress dummies	Year1	0.026	0.027	0.026	0.024	0.026	0.025
	Year2	0.006	0.006	0.006	0.005	0.006	0.006
	Year3	0.002	0.002	0.002	0.002	0.002	0.002
	Year4 or more	0.002	0.002	0.002	0.001	0.002	0.001
Financial wellness dummies	Year1	0.183	0.178	0.180	0.193	0.188	0.191
	Year2	0.116	0.115	0.115	0.125	0.125	0.125
	Year3	0.083	0.085	0.084	0.092	0.093	0.092
	Year4 or more	0.364	0.370	0.367	0.342	0.348	0.346

Table 3-6: Life satisfaction response by categories

	Male	Female	Total
Completely dissatisfied	758	1104	1862
Mostly dissatisfied	1719	2068	3787
Somewhat dissatisfied	3394	3996	7390
Neither satisfied nor dissatisfied	7341	9150	16491
Somewhat satisfied	18869	19519	38388
Mostly satisfied	26760	28643	55403
Completely satisfied	8910	12192	21102
Total	67751	76672	144423

Table 3-7: Number of respondents represented by each financial distress dummy

	Life satisfaction			Psychological well-being		
	Male	Female	Total	Male	Female	Total
year1	1653	2013	3666	2129	2481	4610
year2	362	471	833	488	596	1084
year3	110	162	272	155	222	377
Year4_more	80	125	205	137	189	326

Table 3-8: Gender interaction model

		(1) Life satisfaction b/se	(2) Psychological well-being b/se
log real equivalised household income	log real equivalised household income	0.012*	-0.054**
		(0.01)	(0.03)
age corrected	age corrected	-0.008	-0.038
		(0.01)	(0.04)
age squared	age squared	-0.029	0.167*
		(0.03)	(0.10)
Marital Status (Base-Single)	Married	0.085***	-0.192*
		(0.03)	(0.10)
	Living as couple	0.131***	0.085
		(0.02)	(0.09)
	Divorced	-0.063	-0.147
		(0.04)	(0.15)
	Separated	-0.278***	-1.446***
		(0.05)	(0.19)
	Widowed	-0.141***	-1.295***
		(0.05)	(0.15)
Health Status (Base-excellent)	Very good	-0.121***	
		(0.01)	
	Good	-0.300***	
		(0.01)	
	Fair	-0.538***	
		(0.02)	
	Poor	-0.992***	
		(0.04)	
Education (Base-Degree)	A level	0.015	-0.093
		(0.03)	(0.10)
	GCSE	0.066*	-0.098
		(0.04)	(0.11)
	Other qualification	-0.063**	-0.177*
		(0.03)	(0.10)
	No qualification	0.078*	-0.310**
		(0.05)	(0.14)
Children (Base-0)	1 child	-0.021	-0.159***
		(0.02)	(0.06)
	2 Child	-0.041**	-0.034
		(0.02)	(0.07)
	3 or more Child	-0.065**	-0.106
		(0.03)	(0.10)
Job status (Base-Self-employed)	Paid employed	-0.009	-0.156**
		(0.02)	(0.07)
	Unemployed	-0.164***	-1.228***
		(0.03)	(0.12)
	Retired	0.139***	0.269***
		(0.03)	(0.09)
	On maternity leave	0.201***	-0.202
		(0.05)	(0.14)
	Family care	0.011	-0.372***
		(0.03)	(0.10)
	Ft student	0.106***	0.135

		(0.03)	(0.11)
	Sick or disabled	-0.279***	-2.367***
		(0.04)	(0.17)
	Tr scheme	0.010	0.526*
		(0.09)	(0.31)
	Other	0.018	-0.126
		(0.05)	(0.21)
Financial distress dummies	Year1	-0.332***	-2.064***
		(0.03)	(0.13)
	Year2	-0.416***	-2.393***
		(0.07)	(0.28)
	Year3	-0.427***	-2.312***
		(0.10)	(0.47)
	Year4&more	-0.289	-0.996
		(0.20)	(0.63)
Female interaction dummies	FemaleXyear1	0.069	0.382**
		(0.05)	(0.18)
	FemaleXyear2	0.114	0.088
		(0.09)	(0.40)
	FemaleXyear3	-0.008	0.745
		(0.14)	(0.67)
	FemaleXyear4_more	-0.043	-0.017
		(0.24)	(0.85)
	Constant	5.502***	27.724***
		(0.46)	(1.42)
	R-sqr	0.046	0.032
	N	144109	175040

Note: *, **, *** denotes significance at 1%, 5% and 10% levels. All the regressions, in addition, control for region and year dummies not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity

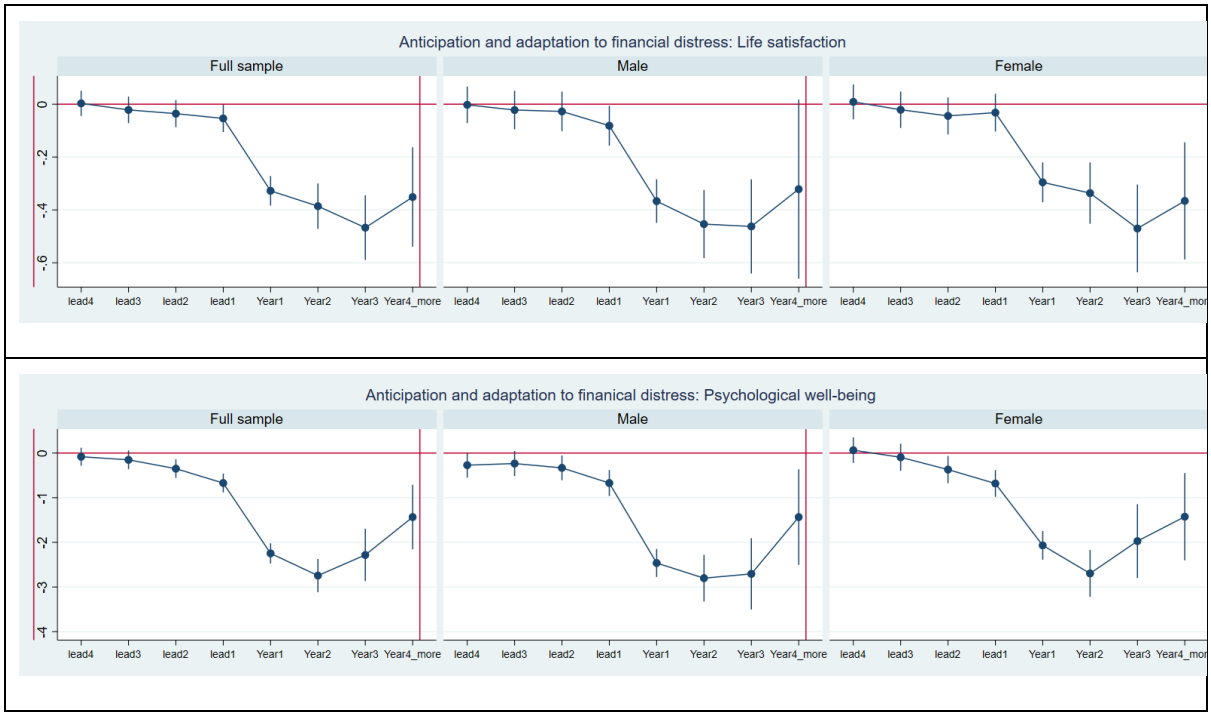
Table 3-9: Wald test for significance of the coefficients in Table 3.3 and 3.4

	Group 1	Group 2		Group 1	Group 2
Unemployment	F = 29.25 Prob > F = 0.00	F = 205.52 Prob > F = 0.00	Unemployment	F = 54.43 Prob > F = 0.00	F = 415.20 Prob > F = 0.00
Retirement	F = 7.73 Prob > F = 0.00	F = 227.11 Prob > F = 0.00	Retirement	F = 7.77 Prob > F = 0.00	F = 463.79 Prob > F = 0.00
Disability	F = 6.73 Prob > F = 0.01	F = 227.67 Prob > F = 0.00	Disability	F = 44.25 Prob > F = 0.00	F = 432.02 Prob > F = 0.00
Divorce	F = 3.53 Prob>F= 0.06	F = 231.18 Prob > F = 0.00	Divorce	F = 39.26 Prob > F = 0.00	F = 444.29 Prob > F = 0.00
Separation	F = 10.00 Prob > F = 0.00	F = 225.25 Prob > F = 0.00	Separation	F = 36.04 Prob > F = 0.00	F = 442.37 Prob > F = 0.00
Widowhood	F = 0.07 Prob > F = 0.78	F = 235.3 Prob > F = 0.00	Widowhood	F = 15.68 Prob > F = 0.00	F = 459.68 Prob > F = 0.00

3.6.1 Anticipation effects

This section extends the main analysis presented in 3.5.1 by adding the estimates of the anticipation effects of financial distress. It uses the same data and methodology used in the main analysis to estimate the adaptation effects. The idea of measuring anticipation effects lies in the assumption that an individual is likely to anticipate financial distress well before she starts to report it (see for example, Clark *et al.*, 2008; Lucas *et al.*, 2003). We therefore hypothesise that the anticipation of financial distress potentially has an adverse impact on reported SWB in the preceding years of the onset of financial distress.

Figure 3-5: Anticipation and adaptation to financial distress



This section examines anticipation effect for four years prior to the onset of financial distress. We create (following the method used in creating dummies for the adaptation analysis) four dummies which identify four years prior to an individual report financial distress (subject to the individual's presence in the panel). Coefficients corresponding to each dummy, therefore, estimate the impact of financial distress on SWB in the corresponding year.

Results are summarised in the

Table *3-10* and in **Figure 3-5**. We find two years of anticipation effects in case of psychological well-being. Respondents, irrespective of gender, start to experience that their psychological well-being is adversely affected from two years before they report financial distress. However, for the life satisfaction, the analysis finds only one year of anticipation effect. This difference in anticipation effects potentially reflects the differences in the measures of life satisfaction and psychological well-being. While life satisfaction measures more stable aspects such as the meaning of life over the specific period, psychological well-being measures more transient aspects of life such as mood, pleasure or anxiety (Helliwell and Putnam, 2004). Therefore, the results indicate, anticipation of financial distress does not affect life satisfaction so much as it affects psychological well-being.

3.6.2 Social norms in tackling financial shocks

This section extends the analysis of adaptation to financial distress by examining if social norms play a role in tackling financial shocks. Specifically, it examines how males and females with different marital status respond to the incidence of financial distress to assess who are more affected by the financial shocks. We create interaction terms between different marital status (single, married, living as couple etc.) and the year1 dummy which identifies the point when an individual first report financial distress. The analysis, then, compares the estimates obtained from male and female sample separately.

Results summarised in **Table 3-11: Incidence of financial distress-interaction with marital status** **Table 3-11**, indicates that males and females, whose marital status are married and living as couple, experience significantly lower psychological well-being than single males and females. The analysis, however, finds no such difference in impact on life satisfaction. This finding indicates that married couples become more anxious and psychologically concerned by the incidence of financial distress than single males and females. This is potentially due to the social norms that married individuals (or couples) share financial responsibilities with their spouses. Since we find the same results in both the male and female samples, it indicates that married individuals, irrespective of gender, experience greater psychological shocks than the single males and females due to financial distress.

Table 3-10: Fixed effect estimation of anticipation effects

	Life satisfaction			Psychological well-being		
	Full	Male	Female	Full	Male	Female
Log real equivalised income	0.012	0.017	0.010	-0.057**	-0.048	-0.064
	(0.01)	(0.01)	(0.01)	(0.03)	(0.04)	(0.04)
Age	-0.007	0.020	-0.030*	-0.032	-0.017	-0.045
	(0.01)	(0.02)	(0.02)	(0.04)	(0.05)	(0.06)
Age squared	-0.033	-0.061	-0.011	0.124	0.176	0.110
	(0.03)	(0.05)	(0.04)	(0.10)	(0.14)	(0.13)
Marital Status (Base-Single)						
Married	0.084***	0.091**	0.074*	-0.203**	-0.236*	-0.129
	(0.03)	(0.04)	(0.04)	(0.10)	(0.13)	(0.15)
Living as couple	0.130***	0.140***	0.119***	0.077	0.145	0.038
	(0.02)	(0.03)	(0.03)	(0.09)	(0.12)	(0.13)
Divorced	-0.061	-0.108*	-0.027	-0.138	-0.362*	0.020
	(0.04)	(0.07)	(0.06)	(0.15)	(0.22)	(0.21)
Separated	-0.276***	-0.379***	-0.208***	-1.435***	-1.836***	-1.178***
	(0.05)	(0.07)	(0.06)	(0.19)	(0.26)	(0.26)
Widowed	-0.141***	-0.118	-0.154**	-1.300***	-1.271***	-1.266***
	(0.05)	(0.08)	(0.06)	(0.15)	(0.23)	(0.20)
Education (Base-Degree)						
A level	0.015	0.073	-0.011	-0.083	-0.134	0.017
	(0.03)	(0.05)	(0.04)	(0.10)	(0.15)	(0.14)
Gcse	0.066*	0.189***	-0.015	-0.100	0.022	-0.153
	(0.04)	(0.06)	(0.05)	(0.11)	(0.17)	(0.15)
Other qualification	-0.063**	-0.009	-0.106**	-0.173*	-0.058	-0.271*
	(0.03)	(0.04)	(0.05)	(0.10)	(0.14)	(0.14)
No qualification	0.078	0.191***	-0.007	-0.312**	-0.112	-0.473**
	(0.05)	(0.07)	(0.06)	(0.14)	(0.19)	(0.20)
No of children (Base-No child)						
1 child	-0.020	-0.014	-0.031	-0.155***	-0.269***	-0.061
	(0.02)	(0.02)	(0.02)	(0.06)	(0.08)	(0.08)
2 child	-0.041**	-0.035	-0.052*	-0.030	-0.195**	0.109
	(0.02)	(0.02)	(0.03)	(0.07)	(0.09)	(0.10)
3 or more child	-0.066**	-0.052	-0.086**	-0.102	-0.290**	0.048
	(0.03)	(0.04)	(0.04)	(0.10)	(0.14)	(0.15)
General Health (Base-Excellent)						
Very good	-0.121***	-0.124***	-0.118***			
	(0.01)	(0.01)	(0.01)			
Good	-0.300***	-0.301***	-0.300***			
	(0.01)	(0.02)	(0.02)			
Fair	-0.538***	-0.553***	-0.529***			
	(0.02)	(0.03)	(0.02)			
Poor	-0.991***	-1.067***	-0.945***			
	(0.04)	(0.06)	(0.05)			
Job Status (Base-Self-employed)						
Paid employed	-0.009	-0.029	0.031	-0.159**	-0.121	-0.239*
	(0.02)	(0.03)	(0.04)	(0.07)	(0.09)	(0.13)
Unemployed	-0.166***	-0.218***	-0.080	-1.240***	-1.279***	-1.191***
	(0.03)	(0.04)	(0.05)	(0.12)	(0.14)	(0.20)
Retired	0.138***	0.122***	0.179***	0.265***	0.347***	0.159
	(0.03)	(0.04)	(0.04)	(0.09)	(0.12)	(0.15)
On maternity leave	0.201***	-0.148	0.247***	-0.213	0.709	-0.371**
	(0.05)	(0.61)	(0.05)	(0.14)	(1.27)	(0.17)
Family care	0.010	-0.100	0.057	-0.373***	-0.982***	-0.436***
	(0.03)	(0.09)	(0.04)	(0.10)	(0.26)	(0.14)
Ft student	0.105***	0.088**	0.136***	0.125	0.104	0.075

	(0.03)	(0.04)	(0.05)	(0.11)	(0.14)	(0.18)
Sick or disabled	-0.280***	-0.278***	-0.256***	-2.371***	-2.042***	-2.707***
	(0.04)	(0.06)	(0.06)	(0.17)	(0.23)	(0.26)
Tr scheme	0.009	-0.023	0.060	0.501	0.756**	0.101
	(0.09)	(0.11)	(0.14)	(0.31)	(0.34)	(0.56)
Other	0.018	-0.047	0.088	-0.135	-0.617*	0.124
	(0.05)	(0.09)	(0.07)	(0.21)	(0.32)	(0.29)
Financial distress						
Lead4	0.003	-0.002	0.009	-0.082	-0.271	0.064
	(0.03)	(0.04)	(0.04)	(0.12)	(0.17)	(0.17)
Lead3	-0.022	-0.022	-0.021	-0.151	-0.235	-0.094
	(0.03)	(0.04)	(0.04)	(0.13)	(0.17)	(0.18)
Lead2	-0.036	-0.027	-0.044	-0.349***	-0.332**	-0.369**
	(0.03)	(0.05)	(0.04)	(0.13)	(0.17)	(0.19)
Lead1	-0.054*	-0.081*	-0.032	-0.671***	-0.672***	-0.681***
	(0.03)	(0.05)	(0.04)	(0.13)	(0.18)	(0.18)
Year1	-0.328***	-0.367***	-0.296***	-2.246***	-2.462***	-2.067***
	(0.03)	(0.05)	(0.05)	(0.14)	(0.19)	(0.20)
Year2	-0.386***	-0.454***	-0.336***	-2.743***	-2.801***	-2.696***
	(0.05)	(0.08)	(0.07)	(0.23)	(0.32)	(0.32)
Year3	-0.467***	-0.462***	-0.470***	-2.282***	-2.705***	-1.972***
	(0.07)	(0.11)	(0.10)	(0.36)	(0.49)	(0.50)
Year4&more	-0.351***	-0.321	-0.366***	-1.434***	-1.434**	-1.425**
	(0.11)	(0.21)	(0.13)	(0.44)	(0.65)	(0.59)
Constant	5.491***	4.456***	6.388***	27.622***	27.225***	27.896***
	(0.46)	(0.62)	(0.66)	(1.41)	(1.86)	(2.09)
N	144109	67595	76514	175040	82617	92423

Note: *, **, *** denotes significance at 1%, 5% and 10% levels. All the regressions, in addition, control for region and year dummies not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity

Table 3-11: Incidence of financial distress-interaction with marital status

	Psychological well being		Life satisfaction	
	Male	Female	Male	Female
Log real equivalised income	0.057*	0.008	0.040***	0.021**
	(0.032)	(0.035)	(0.010)	(0.009)
Age	-0.068***	-0.033***	-0.021***	-0.014***
	(0.010)	(0.010)	(0.003)	(0.003)
Age squared	0.442***	0.213**	0.222***	0.141***
	(0.105)	(0.098)	(0.030)	(0.027)
Education (Base-Degree)				
A level	0.073	-0.191*	0.053**	-0.006
	(0.094)	(0.099)	(0.025)	(0.024)
Gcse	0.302***	-0.135	0.109***	0.023
	(0.094)	(0.093)	(0.025)	(0.023)
Other qualification	0.078	-0.116	-0.002	-0.030
	(0.103)	(0.111)	(0.032)	(0.033)
No qualification	0.130	-0.358***	0.224***	0.124***
	(0.099)	(0.102)	(0.030)	(0.028)
No of children (Base-No child)				
1 child	-0.354***	-0.204***	-0.054***	-0.098***
	(0.069)	(0.071)	(0.019)	(0.019)
2 child	-0.260***	-0.054	-0.081***	-0.123***
	(0.079)	(0.082)	(0.021)	(0.022)
3 or more child	-0.376***	-0.119	-0.102***	-0.157***
	(0.121)	(0.124)	(0.034)	(0.032)
Job status (Base-Self-employed)				
Paid employed	-0.108	-0.223*	-0.039*	0.028
	(0.074)	(0.116)	(0.021)	(0.031)
Unemployed	-1.583***	-1.462***	-0.316***	-0.163***
	(0.130)	(0.182)	(0.038)	(0.048)
Retired	0.129	0.040	0.108***	0.205***
	(0.108)	(0.136)	(0.032)	(0.037)
On maternity leave	0.703	-0.163	-0.254	0.273***
	(1.157)	(0.158)	(0.618)	(0.049)
Family care	-0.865***	-0.594***	-0.152*	0.044
	(0.238)	(0.129)	(0.081)	(0.035)
Ft student	-0.127	-0.173	0.116***	0.140***
	(0.117)	(0.153)	(0.034)	(0.040)
Sick or disabled	-3.068***	-3.681***	-0.454***	-0.386***
	(0.199)	(0.234)	(0.048)	(0.054)
Tr scheme	0.666**	0.290	-0.062	0.095
	(0.289)	(0.507)	(0.103)	(0.130)
Other	-0.776**	-0.027	-0.101	0.068
	(0.303)	(0.274)	(0.088)	(0.063)
Incidence of financial distress				
Year1	-2.096***	-1.900***	-0.425***	-0.454***
	(0.213)	(0.232)	(0.059)	(0.051)
Marital status (Base-single)				
Married	0.001	0.050	0.208***	0.237***
	(0.093)	(0.103)	(0.026)	(0.025)
Living as couple	0.174*	0.033	0.171***	0.180***
	(0.090)	(0.099)	(0.024)	(0.024)
Divorced	-0.284*	-0.137	-0.095**	-0.083**

	(0.172)	(0.158)	(0.047)	(0.040)
Separated	-1.741***	-1.259***	-0.383***	-0.247***
	(0.233)	(0.224)	(0.056)	(0.051)
Widowed	-0.962***	-0.806***	-0.024	-0.009
	(0.177)	(0.141)	(0.052)	(0.039)
Year1#Single				
Year1#Married	-0.628**	-0.546*	-0.074	0.016
	(0.282)	(0.296)	(0.074)	(0.068)
Year1#Living as couple	-0.923**	-1.134**	-0.101	-0.139
	(0.403)	(0.444)	(0.099)	(0.096)
Year1#Divorced	-0.761	-0.648	-0.143	-0.038
	(0.677)	(0.458)	(0.157)	(0.103)
Year1#Separated	-1.587*	-1.571**	-0.083	-0.075
	(0.942)	(0.663)	(0.186)	(0.153)
Year1#Widowed	0.687	0.049	-0.204	0.164
	(0.743)	(0.461)	(0.282)	(0.121)
Health Status (Base-Excellent)				
Very good			-0.195***	-0.186***
			(0.011)	(0.011)
Good			-0.438***	-0.446***
			(0.015)	(0.015)
Fair			-0.785***	-0.764***
			(0.024)	(0.022)
Poor			-1.414***	-1.282***
			(0.051)	(0.043)
Constant	27.404***	25.830***	5.398***	5.448***
	(0.427)	(0.456)	(0.119)	(0.116)
N	82617	92423	67595	76514

Note: *, **, *** denotes significance at 1%, 5% and 10% levels. All the regressions, in addition, control for region and year dummies not shown in the table. Numbers in parenthesis denote standard errors that are robust to heteroscedasticity

4 Financial distress and cognitive function

4.1 Introduction

Cognitive function is an important aspect of decision making and overall well-being (Agarwal and Mazumder, 2013; Llewellyn *et al.*, 2008). Psychologists have shown interest in age-related cognitive impairment and its impact on decision making for a long time (Tymula *et al.*, 2013). Economists, on the other hand, have shown interest in cognitive ability because of its role in the labour market outcomes (Murnane *et al.*, 1995; Judge *et al.*, 2009), financial literacy and decision making (Banks, 2010). Recent works in behavioural economics (e.g., Mani *et al.*, 2013) indicate a potential link between financial distress and cognitive impairment. The 'scarcity hypothesis' (e.g., Mullainathan and Shafir, 2013; Mani *et al.*, 2013) proposes that material scarcity, such as financial distress, leads to scarcity of cognitive resources. This does not mean to say that the individuals facing financial hardship are inherently less intelligent. Instead, the hypothesis assumes that people have a limited 'mental bandwidth' consisting of finite cognitive resources (such as, attention, working memory or self-control). Financially distressed individuals 'use up' their cognitive resources by relentlessly dealing with financial problems and leave inadequate cognitive power or 'bandwidth' to solve problems, reason or retain information related to other tasks. This phenomenon is often referred to as 'cognitive tax'. Research shows, for example, that the 'cognitive tax' due to dealing with financial difficulties is equivalent to a loss of 13 IQ points or losing an entire night's sleep (Shah *et al.*, 2012).

This chapter relies upon this idea of 'scarcity' and seeks to provide empirical evidence that individuals experiencing financial distress are likely to experience a 'cognitive tax'. Previous studies (e.g., Shah *et al.*, 2012; Mani *et al.*, 2013; Mullainathan and Shafir, 2013) have largely resorted to laboratory tests and experimental data to test this hypothesis. Dean *et al.* (2017) suggest that further studies are needed to test the 'scarcity hypothesis' outside the laboratory setup and with data from real world economic behaviour. Besides, the previous studies often suffer from identification problems. For example, Wicherts and Scholten (2013) have shown that the dichotomisation of income in Mani *et al.* (2013) is unnecessary since none of the income interactions are significant. Without dichotomisation, their results do not hold. This, in

turn, suggests that financial worries are not limited to low-income individuals. This entails further studies to confirm that financial distress impairs cognitive function irrespective of individual's current income status.

With this motivation, this chapter exploits the third wave of Understanding Society data (which contains various cognitive measures of over 40000 individuals living in the United Kingdom) to explore the association of financial distress with cognitive ability. While chapter 2 and 3 of this thesis focus on the association of financial distress with two measures of well-being, life satisfaction and psychological well-being, this chapter turns to cognitive function primarily due to its theoretical and empirical relation to well-being. The construal model of happiness (Lyubomirsky and Dickerhoof, 2010) proposes that the amount of happiness one can derive from a specific circumstance is a matter of interpretation of that circumstance. Cognitive functions significantly determine how one can construe (interpret) a circumstance. Therefore, the construal model indicates that cognitive function influences hedonic processes such as social comparison, dissonance function, self-reflection and self-evaluation. Studies have shown happy and unhappy individuals to differ systematically in particular cognitive strategies (Lyubomirsky, 2001). In addition, empirical works have explored dynamic associations between cognitive function and well-being (e.g., Agarwal and Mazumder, 2013; Llewellyn *et al.*, 2008). Against this backdrop, this chapter extends the analyses presented in the previous chapters by examining the impact of financial distress on cognitive ability.

However, major challenges exist in isolating linkages between financial distress and cognitive abilities due to a potential reverse causality bias. Financially distressed individual may experience a 'cognitive tax' while 'impaired cognitive ability' may lead to poor financial decisions, entangling a person in a spiral of financial distress (Carvalho *et al.*, 2016). To address this potential endogeneity, this study deploys a two-stage residual inclusion (2SRI) model (Terza *et al.*, 2008). The first stage of this model estimates endogenous variables (in this case, financial distress and unemployment) from the covariates including instruments using an ordinal logit (in the case of an ordinal financial distress variable) or a logit model (in the case of a binary unemployment variable). The second stage includes the residuals from the first stage and estimate cognitive scores from the covariates in a fractional logit specification. Several recent studies (e.g., Howley *et al.*, 2015) in health econometrics have implemented 2SRI model and reported to reasonably eliminate endogeneity bias. To check the robustness of the obtained results, the analysis then collapses five cognitive scores into a single measure of

latent cognitive ability through a confirmatory factor analysis (CFA) and estimates the effects of financial distress on the latent cognitive ability. The theoretical basis of a single cognitive measure stems from the 'theory of unity' (see for example, de Frias *et al.*, 2006; Jurado and Rosselli, 2007) which proposes that cognition is an integrated task, instead of being divided into different subdomains. Therefore, cognitive ability should be considered as a unitary measure. Moreover, due to the pivotal association of general health with cognitive abilities and financial distress, this chapter performs all the estimations with or without general health variable and compares the results.

Findings from this chapter support the hypothesis that financial distress creates a 'cognitive tax'. The magnitude of this 'cognitive tax' varies with respondents' level of financial difficulties. The higher the level of difficulties, the higher the 'cognitive tax' and the lower the respondents are likely to score in the cognitive tests. For example, those who perceive their financial situation 'quite difficult' and 'very difficult', are likely to score 5.8% and 6.7% less in the verbal declarative memory (VDM) tests respectively, compared to the base category which is, 'living comfortably'. These results broadly hold with or without controlling for general health status of the respondents. Moreover, the analysis with the unified cognitive measure obtained through a confirmatory factor analysis (CFA) confirms the earlier results obtained from separate estimation of five cognitive scores.

Section 2 of the chapter discusses relevant literature, section 3 describes the data, section 4 outlines descriptive statistics and empirical strategy, section 5 discusses main results with robustness tests while section 6 concludes.

4.2 Literature review

An emerging area in behavioural economics considers how financial distress negatively affects cognitive function. Several studies (e.g., Shah *et al.*, 2012; Mullainathan and Shafir, 2013; Mullainathan and Shafir, 2014) put forward a 'scarcity hypothesis' which proposes that financial scarcity leads to a psychological state of 'scarcity'. The hypothesis relies upon the 'limited capacity model' (Kahneman, 1973) in the assumption that cognitive resources (such as, attention, working memory, self-control) are limited and therefore, need to be allocated between competing demands and needs. A person with financial difficulties deploys a disproportionately bigger share of cognitive power or 'bandwidth' to manage financial problems, just like a hungry or thirsty person pays more attention to food or drink related

stimuli (Radel and Clément-Guillotin, 2012; Aarts *et al.,* 2001). Over engagement with financial problems leaves the person with inadequate cognitive power available for other tasks. This, in turn, gives rise to a 'tunnel vision' - where the person engrossed in an immediate task (in this case, managing financial problems) neglect the other tasks at a distance. This may also cause a 'bandwidth tax', which means, the financial problems continue to play in the back of one's attention causing severe distraction for other tasks. In short, the scarcity hypothesis proposes that the financial distress leads to a sub-optimal allocation of cognitive resources which, in turn, impairs (taxes) one's overall cognitive performance.

To test this 'scarcity' hypothesis', Shah *et al.* (2012) conduct a couple of experiments. In the first experiment, they show how 'scarcity' created by budget constraints leads to increased cognitive engagement on a task. The authors ask the participants to play a word puzzle game named *Wheels of Fortune* where they create 'scarcity' by budgeting participants' chances to guess letters. They define 'poor' participants as those with fewer chances than the 'rich' participants. After the game, they measure participant's cognitive fatigue through Dots-Mixed tasks which assess executive functions, such as attention and self-control. Generally, a simple model of effort would suggest that the 'rich' should be more fatigued as they have more chances to play with and spend more time on guessing words. But the results show, 'poor' participants, despite having less time to play, become more fatigued than the 'rich' participants. The authors conclude that scarcity of chances creates greater cognitive engagement, hence, the participants with fewer chances become more fatigued.

In the second experiment, the authors show how increased cognitive engagement in an immediate task leads to neglect in other or distant tasks. Here, they design an Angry Birds type 'shoot and score' game where the 'poor' group is given fewer budget, 30 shots per participant (3 shots per level) than the 'rich' group with 150 shots per participant (15 shots per level). Some participants of the 'poor' group can borrow shots from the next round's budget while the other cannot. The authors measure the length of attention by the time (milliseconds) spent aiming at each shot. Result shows, the 'poor' spend more time aiming at the first shot of each level than the 'rich'. 'Poor' also earn more points per shot than the 'rich'. Despite the 'rich' have five times as many shots as the 'poor', they earn far fewer than 5 times as many points. Authors suggest that the 'poor' remains more engaged than the 'rich'; if the 'rich' were in budgetary scarcity like the 'poor', they would've been as engaged as the 'poor' and performed better. The experiment also suggests that poor borrow proportionately more shots from the

future rounds than the 'rich'. This indicates that poor's extra attention to the current round of play leads to neglect the future round. It seems rational as the 'poor' originally start with fewer shots than the 'rich'. But the performance data suggests that this borrowing does not help them to score higher. Authors conclude that the scarcity of shots increases 'poor's attention, but this also causes budgetary neglect for future rounds of play as they over-borrow in a counterproductive manner.

While the above experiments are conducted fully in the laboratory environment, Mani *et al.* (2013) find evidence of 'cognitive tax' in experimental studies outside the laboratory. In a study with shoppers at a New Jersey shopping mall, they test cognitive scores of participants engaged in solving hypothetical financial problems. They define participants (*N=101*) as 'rich' and 'poor' by dichotomising the 'effective income' through a median split. Participants are given different hypothetical situations of financial problems (for example, their car is broken and need money to repair). For experimental manipulation, they design some hard and some easy problems. The study measures the participants' cognitive scores (via Raven matrices and cognitive control tests[25]) while they can think about how they would solve the financial problems. The test results show, for conditions with easy financial problems, there is no significant difference in the performance of the 'poor' and 'rich' participants. On the contrary, for conditions with harder financial problems, 'poor' participants achieve significantly lower cognitive score than the 'rich' participants. The authors conclude that harder financial problems impose a 'cognitive load' on the 'poor', but not on the 'rich' participants. However, Wicherts and Scholten (2013) notice that these results suffer from identification problems. They reanalyse the data of Mani *et al.* (2013) to demonstrate that the dichotomisation of income in the above study is unnecessary; none of the interactions between income and cognitive scores are statistically significant. Based on their re-analysis, they suggest that the potential negative relationship between financial worries and cognitive scores are not limited only to the poor.

In the next experiment, Mani *et al.* (2013), examine if change in the financial situations of a group of Indian sugarcane farmers before and after the harvest affects their cognitive scores. According to this analysis, these farmers face greater financial pressures in pre-harvest months as compared to post-harvest period. They pawn items at a higher rate and are more likely to

[25] Raven matrices, originally developed by (Raven, 1936), is a nonverbal group test used in measuring abstract reasoning and problem solving (fluid intelligence). Cognitive control test, on the other hand, measures cognitive flexibility – how well the participants' cognitive abilities can switch between tasks.

take loans. On average, they have 1.97 more loans before the harvest than after. They are also more likely to have difficulties with paying ordinary bills during the pre-harvest time. Like the previous study, the authors measure participants' cognitive performances via Raven matrices and cognitive control test before and after the harvest. The results indicate that the same farmer achieves lower cognitive score before the harvest than after. The authors assert that this difference in cognitive performance cannot be explained by time scarcity, nutritional differences or stresses. They conclude that financial distress greatly consumes the participants' cognitive resources leaving less resource available for the cognitive tasks.

Other studies confirm the proposition of scarcity of psychological resources. Vohs (2013) describes self-control as a psychological resource which depletes through constant compromises with desires. The degree of compromises may vary, based on one's circumstances. Individuals constantly exposed to financial distress must make difficult decisions during managing their finances and compromise with their desires (e.g., desires for spending). This leads to a gradual depletion of their self-control (Hofmann *et al.*, 2012). According to Vohs (2013), a vicious cycle exists; overcoming urges and making difficult decisions can deplete mental resources which, in turn, can lead to sub-optimal decisions. Financially distressed individuals make difficult decisions more often than others, so are they more likely to become the victim of this vicious cycle.

This chapter extends the above idea of 'scarcity' in the case of individuals suffering from financial distress. Previous studies have referred to financial distress only in the context of low income or poverty. In contrast, this chapter focuses on respondents' difficulties with managing overall financial situations. Several factors, in addition to low income, contribute to the overall financial distress. For example, over indebtedness can cause cash flow problems even for households with higher income. This, in turn, can lead to the periodic missing of utility bills and rent payments (Cobb-Clark and Ribar, 2009). As indicated earlier, Wicherts and Scholten (2013)'s re-analysis of the data from Mani *et al.*, (2013) duly supports the idea that financial distress can negatively affect cognition irrespective of the respondent's current income status. In addition, Mullainathan and Shafir (2014) recognise that scarcity is not only a phenomenon of poverty defined by low income. They assert that, *'it* (their study) *sidesteps the traditional definition of poverty and defines it broadly by the 'gap between one's need and resources required to fulfil them*. This leaves a wide range of financial situations where individuals are susceptible to develop a state of 'scarcity'. For example, a person entangled with an

overwhelming amount of household debt is likely to put constant effort and therefore deploy disproportionately bigger amounts of cognitive resources into managing debt. This in turn can lead to a psychological state of 'scarcity'.

Moreover, the subjective nature of responses to financial situation in the Understanding Society data also fits into the 'scarcity' hypothesis. As Mullainathan and Shafir (2014) go on to say, *"this definition of scarcity is inherently subjective. This subjective definition of scarcity is essential for understanding the psychology. Of course, the consequences depend on both the psychology and material reality."* No doubt some material realities are objective. A person in financial distress certainly does not have the discretion to psychologically disengage and move away without tackling the financial difficulties. However, some degrees of subjective differences exist in psychological responses to objective financial difficulties. The same amount of financial difficulties might cause varying amounts of psychological engagement depending upon personality and other individual-level characteristics. These differences contribute to determine how an individual's cognition is affected while dealing with financial difficulties. The following analysis, which, to the best of knowledge, is first of its kind, makes that attempt.

4.3 Data:

Empirical analysis offered in this chapter uses the data from the third wave of Understanding Society survey, the UK Household Longitudinal Study (UKHLS) (see Lynn, 2009 for more details). This data, collected between January 2011 and April 2013, contains data and experimentally designed test scores on cognitive ability.

4.3.1 Cognitive measures in Understanding Society survey

Cognitive abilities are measured by designated tests carried out by respondents of age 16 and over. After a pilot of preliminary interviews in different segments of survey population, five measures of cognitive abilities are identified and included in the final tests for assessing different domains of cognitive abilities (Gray *et al.*, 2011). In most cases, tests are carried out face to face, only in 1.5% of cases, where it is not possible, the tests are carried out over phone. In 99% cases, tests are carried out in English, while in only 1% cases, tests are translated into other languages such as Welsh, Urdu, Arabic, Bangla, Gujarati or Punjabi. The following analysis focuses on tests carried out only in English and face to face to avoid any confusion

with regards to comparability of test scores. A brief description of five cognitive tests and the domains of cognitive abilities they are intended to measure are as follows:

Verbal Declarative Memory test (VDM): It is often referred to as the word recall test and is measured using two tests – immediate and delayed word recall. Respondents are first advised to listen to a list of ten words. Words are delivered using a computer so that standardised pitch and frequency is ensured. Immediately after the delivery, the respondents are asked to recall the words and the number of correct responses are recorded. This counts the correct immediate word recall. At a later stage of interview, the respondents are asked to recall the same words without repeating the delivery. This counts the delayed word recall. The number of correct words recalled immediately and at the later stage is summed up for the total word recall score. The correlation coefficient between immediate and delayed word recall in this data is 0.76 and the combined score has a range between 0-20.

This test of immediate and delayed word recall is designed to assess episodic memory, i.e., the memory tied to a specific event or episode (McFall, 2013). The declarative memory system learns, stores, consolidates and retrieves information associated with personal episodes of experiences. The above approach for verbal declarative memory test has been widely used in other studies including the English Longitudinal Study of Ageing (ELSA) (Huppert *et al.*, 2004), the US Health and Retirement Study (HRS) (Ofstedal *et al.*, 2005), the Survey of Health, Ageing and Retirement in Europe (SHARE) (Börsch-Supan *et al.*, 2013), and the National Survey of Health and Development (NSHD) (Hurst *et al.*, 2013). The word lists used here are those developed for the HRS (McFall, 2013).

Subtraction test (ST): This test, also known as seven-sequence test, is designed to assess working memory, often referred to as short-term integration, processing, disposal and retrieval of information (McFall, 2013). Baddeley and Hitch (1974) note that the earlier concept of short-term memory has been replaced by a more integrated approach of working memory in the recent decades. Working memory denotes a person's ability to work with a set of attended information by simultaneously storing and manipulating it. It could be best understood by a computer's random-access-memory in contrast to its long-term storage capacity (Diamond, 2013). In the subtraction test, respondents are advised to subtract 7 from 100 and then subtract 7 for four consecutive times from each corresponding answer. The number of correct responses is recorded. The score of his test ranges from 0 to 5. This test is included in HRS (Ofstedal *et*

al., 2005) and the Cambridge Cognitive Examination (CAMCOG) from the MRC Cognitive Function and Ageing study (CFAS) (Huppert *et al.*, 1995).

Verbal Fluency Test (VFC): This is a test of semantic or category fluency measured through swift pronouncing of unique animal names which the respondent can recall in one minute. Semantic fluency indicates a semantic association of words. When a word or concept is activated in the memory and then spoken, it activates other words or concepts associated with it (Ardila *et al.*, 2006). This semantic association can be disrupted due to mental illness or any sort of neurological disorder. The verbal fluency test measures a final score based on the number of unique correct responses. It requires self-initiated activity, organisation, abstraction and mental flexibility. The score in this sample ranges from 0 to 99. The above measure has also been used in English Longitudinal Study of Aging (Llewellyn *et al.*, 2009), the German Socio-economic Panel Study (SOEP) (Lang *et al.*, 2007), National Survey of Health and Development (NSHD) (Richards *et al.*, 2004) and the Midlife in the United States study (MIDUS) (Lachman *et al.*, 2010).

Numerical Reasoning Test (NRT): This is the test of skills in solving everyday problems related to financial planning and outcomes (McFall, 2013). These problems include simple monetary transactions, calculation of simple or compound interest earning on the bank accounts etc. This test has been used earlier in ELSA (Huppert *et al.*, 2004), HRS (Ofstedal *et al.*, 2005) and SHARE (Banks *et al.*, 2010). Initially, a first set of three problems are given to the respondents. Depending on their performance, a second set of easier or more difficult problems are given. For both sets of problems, the total number of correct responses are recorded. The score of this test ranges between 0 and 5.

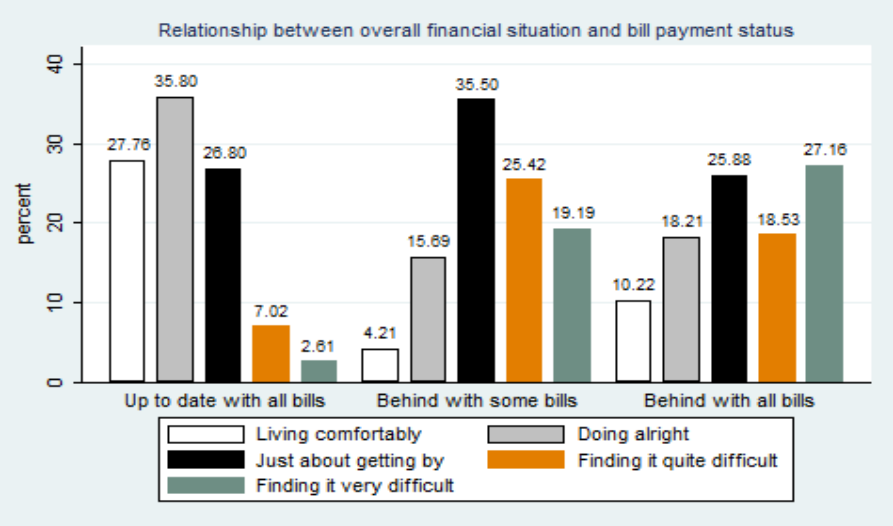
Number Series Test (NST): This test is designed to assess fluid reasoning, i.e., the ability to use abstract thoughts to solve noble problems (McFall, 2013). When one use deductive reasoning, she is considered to deploy fluid reasoning. Researchers believe that fluid intelligence is independent of acquired knowledge and associated with working memory (Cattell, 1963). The number series test adopted in Understanding Society, was originally developed for the HRS (Fisher *et al.*, 2013) which in turn, was based on Woodcock-Johnson tests of cognitive ability (Woodcock, 1989). The test covers a range of difficulties where the respondents are asked to fulfil number sequences. Two number sequences are given to the respondents, difficulties of the second sequence are determined from the performance of the first sequence. Prior to the actual test, participants are given with few examples. As described

by Fisher *et al.* (2013), a final score is derived based on the correct completion of the two sequences. In this sample, the score for the first sequence ranges from 409 to 570 and that for the second sequence ranges from 413 to 584. Therefore, the combined score ranges from 409 to 584.

4.3.2 Financial distress

The main independent variable for this analysis, financial distress, is captured by the responses to two questions in US survey. The first question asks about the respondent's overall current financial situation, *"How well are you managing financially these days?"* The response to this question is recorded on a 1-5 scale from *"living comfortably", "doing alright", "just about getting by", "finding it quite difficult",* to *"finding it very difficult"*. Details on this variable can be found in the 2.3.2 of Chapter 2. The second question asks about respondents' bill payment status, *'up to date with all bills?'* Answers are recorded on a three-point scale - *'up to date with all bills', 'behind with some bills' or 'behind with all bills'*.

Figure 4-1: Overall financial situation and bill payment status



This study uses bill payment status as a proxy of respondent's overall current financial situation. Therefore, it carries out the same analysis with bill payment status as it does with respondent's overall current financial situation. Cross tabulation between these two variables indicates a consistent association. As shown in the **Figure 4-1**, an increasing percentage of respondents generally report their financial situation either 'finding it quite difficult' or 'finding it very difficult' while moving from 'up to date with all bills' to 'behind with all bills' categories. For example, roughly 45% of those who are behind with some or all bills report

their overall financial situation either ‘finding it quite difficult’ or ‘finding it very difficult’, while, only 10% of those who are up to date with all bills falls into these categories of financial situation. On the other hand, 63% of those who are up to date with all bills report their financial situation either ‘living comfortably’ or ‘doing alright’. This association between overall current financial situation and bill payment status matches with other comparable data sets. For example, analysing data from Household Income and Labour Dynamics in Australia (HILDA), Cobb-Clark and Ribar (2009) conclude that financial distress comes from factors including, cash flow problem arising from low income, poor money management and high level of household debt, which also lead to the periodic missing of utility bills and rent payments.

4.3.3 Other control variables

In addition to financial distress, this study controls for general health. In US survey, the general health variable is self-reported. It is captured by the question *"In general would you say your health is ..."* and the responses are recorded on a five-point scale - *excellent, very good, good, fair, or poor*. This measure of self-reported health is a widely used health indicator and has been shown to predict morbidity and mortality (Jylhä, 2009). The study also controls for the natural logarithm of household equivalised income (construct of this variable has been described earlier in the data section of chapter 1 and 2), unemployment, educational qualification, gender and geographical region. It also controls for age and squared age to examine any non-linear relationship among age and the cognitive function. A list of control variables and corresponding summary statistics may be found in **Table 4-10** in appendix of this chapter.

4.4 Descriptive statistics and empirical strategy:

The goal of this analysis is to estimate the effect of financial distress (captured by two variables, current financial situation and bill payment status) on five cognitive measures described in the previous section. The cognitive test scores are considered cardinal and scaled differently in original data. For this analysis, they are normalised into a uniform scale through linear min-max transformation, where, $x' = \frac{x_i - x_{min}}{x_{max} - x_{min}}$. **Table 4-1** shows the range of each variable as well as summary statistics of the normalised scores.

Table 4-1: Summary statistics of normalised test scores

Test Items	Min	Max	Min (normalised)	Max (normalised)	Mean	SD
Verbal Declarative Memory (VDM)	0	20	0	1	0.569	0.181
Subtraction Test (ST)	0	5	0	1	0.878	0.220
Numerical Reasoning Test (NRT)	0	5	0	1	0.705	0.226
Number Series Test (NST)	409	584	0	1	0.686	0.185
Verbal Fluency test (VFC)	0	99	0	1	0.410	0.137

Table 4-2 presents summary statistics of cognitive measures by different categories of responses to individual's overall financial situation. It indicates mean test score for each measure of cognitive function falls as the respondents' financial situation becomes more and more difficult.

Table 4-2: Summary Statistics: Cognitive measures by financial distress categories

	VDM		**ST**		**VFC**		**NRT**		**NST**	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Financial Distress										
Living Comfortably	0.592	0.171	0.917	0.175	0.437	0.128	0.775	0.198	0.719	0.171
Doing alright	0.594	0.168	0.901	0.191	0.427	0.125	0.739	0.201	0.699	0.174
Just about getting by	0.574	0.165	0.874	0.218	0.411	0.126	0.700	0.201	0.667	0.187
Finding it quite difficult	0.571	0.159	0.852	0.242	0.406	0.127	0.675	0.202	0.657	0.188
Finding it very difficult	0.556	0.163	0.837	0.249	0.397	0.129	0.646	0.201	0.625	0.200

At this stage, one-way ANOVA is carried out to test if the mean cognitive test scores corresponding to each category of overall current financial situation is statistically significant. Results of the one-way ANOVA (see **Table 4-3**) confirm that the mean cognitive scores across all the categories of financial distress are statistically different.

Table 4-3: Analysis of Variance (ANOVA)

Item (Cognitive Score)	F (df, N)	Prob > F
VDM	61.52 (4, 44353)	0.000
ST	160.29 (4, 43820)	0.000
NRT	384.18 (4, 44910)	0.000
NST	207.45 (4, 42079)	0.000
VF	127.08 (4, 45030)	0.000

This is further confirmed through a pair-wise Tukey post-hoc test following ANOVA (Results of the Tukey post-hoc tests are outlined in **Table 4-11** in the appendix of this chapter). In short, the one-way ANOVA followed by Tukey post-hoc test indicates respondents with more difficulties in financial situations are likely to have lower mean scores in the cognitive tests. Thus, the above analysis forms the basis for the further regression analysis.

The regression analysis starts with a simple specification:

$$Cog = \beta_1 FD + \beta X + \mu$$

where Cog denotes any of the five cognitive measures namely, Verbal declarative memory (VDM), Subtraction test (ST), Verbal fluency (VFC), Numerical reasoning test (NRT) and Number series test (SRT). FD denotes measures of financial distress, in this case, the overall current financial situation and bill payment status. βX_i denotes a vector of control variables which include age, age square self-reported health as well as other socio demographic variables including a constant. In addition, all models include region dummies. At first, five separate regressions are carried out for five measures of cognitive abilities with each of the two measures of financial distress. Then five cognitive scores are collapsed into one single measure through confirmatory factor analysis (CFA). At this stage, internal consistency of the five cognitive scores are measured with Cronbach α which shows the scale reliability coefficient to be 7.0. This score is regarded as enough for studies in social sciences. The theoretical basis for unification of cognitive domains lies in the proposition (the theory of unity) that cognitive function is integrated, instead of being divided into subdomains (see for example, de Frias *et al.*, 2006; Jurado and Rosselli, 2007). After attaining a unified score through CFA, one regression is carried out for each of the two measures of financial distress to measure the impact of covariates upon single cognitive ability.

The analysis confronts a potential endogeneity problem in the relationship between financial distress and the measures of cognitive ability. On the one hand, financial distress might reduce one's cognitive ability (by depleting cognitive resources available for other tasks), on the other hand, impaired cognitive function may lead to poor economic decisions entangling one in financial distress. The analysis addresses this endogeneity with a nonlinear instrumental variable regression, namely two stage residual inclusion (2SRI) method, proposed by Terza *et al.* (2008). This method assumes that a set of unobserved variables X_u might be correlated with financial distress, FD as well as with cognitive scores, Cog, but not with other covariates, X_0. Therefore, the above equation can be estimated as,

$$Cog = \mu(X;\beta) + e, \ (FD, X_u, X_0 \sim X)$$

As X_u is unobserved, FD can be estimated from the first stage auxiliary equation,

$$FD = \nu(\lambda;\alpha) + X_u,$$

where λ = (X_0, I_0) and I_0 is a vector of identifying instrumental variables. Thus, the above equation can be rewritten as, $X_u = FD - \nu(\lambda; \alpha)$. A consistent estimate of α can be obtained and the residuals are computed as follows (Terza *et al.*, 2008) –

$$\hat{X}_u = FD - \nu(\lambda; \hat{\alpha}),$$

where $\hat{\alpha}$ is the first stage estimate of α. Consequently, in the second stage, β can be consistently estimated through

$$Y = \mu\left(FD, \hat{X}_u, X_0 ; \beta\right) + e^{2SRI}$$

The analysis assumes financial distress to be endogenous as previous literature (e.g., Calvalho *et al.*, 2016) indicates a potential endogeneity between poverty and cognitive ability. Also, since bill payment status is used as a proxy to the financial distress, the analysis treats bill payment status as endogenous in the proxy models. In addition, it takes the reverse causality bias between the cognitive skills and unemployment (e.g., Fryer and Warr, 1984) into consideration and treats the unemployment variable as endogenous. In the first stage regression (see **Table 4-12**), the analysis estimates the five-category financial distress and three-category bill payment status using ordered logit specifications, while it estimates the binary unemployment variable using a logit specification. At this stage, the analysis uses instruments for the endogenous variables, i.e., financial distress, bill payment status and unemployment. For each of these endogenous variables, we use GMM (General Methods of Moment) style instruments i.e., lags of the endogenous variables. A key aspect of using lag dependent variables as instruments is that they are highly correlated to the instrumented variables but not correlated to the composite errors. In addition, the models also use equivalised household income as an instrument in the first stage regression as we consider household income as a significant predictor of current financial situation. For all models, F-tests confirm the validity of the instruments.

In the second stage, the outcome equation is estimated through a fractional logit specification described by Papke and Wooldridge (1996). As the 2SRI method suggests, second stage regressions incorporate residuals from the first stage regressions in addition to the other predictors[26]. Besides, general health status plays critical role in this analysis. On the one hand,

[26] Notes on sign of the residuals in the second stage regressions: Generally, we expect that residuals take similar sign as the instrumented variables in OLS regressions where, residuals are calculated as a difference between

it is one of the significant direct predictors of cognitive ability, on the other hand, general health could be associated with employment status and financial distress (e.g., O'Neill *et al.*, 2005; O'Neill *et al.*, 2006). To address this multicollinearity, the second stage regressions are carried out both with and without general health variable to see the differences in the estimated parameters.

4.5 Empirical Results:

Table 4-4 and **Table 4-5** summarises the marginal effects obtained from the second stage regressions using fractional logit estimation. First stage regression results are reported in **Table 4-12** in the appendix of this chapter.

Table 4-4 indicates, all four categories of overall financial situation have negative marginal effects ($p<0.01$) upon cognitive scores. Therefore, respondents corresponding to any of these four categories has the probability to score lower than those in the base category ('living comfortably'). For example, in the VDM (verbal declarative memory or word recall) test reported in the first column of the table, an individual reporting financial situation as 'just about getting by' has the probability of scoring 1.8% less than the average individual in the base category, which is 'living comfortably'. Further, the (negative) marginal effects are consistently larger at higher levels of financial distress. The respondents finding their financial situation 'quite difficult' have the probability of scoring 5.8% less while those finding their financial situation 'very difficult' have the probability of scoring 6.7% less than the base category in the VDM test. This indicates that there is an inverse relationship between the level of financial difficulties and the probabilities of scores in the cognitive tests. These results are significant at $p<0.01$ for all the five models for five measures of cognitive scores. As five tests are meant to measure five different domains of cognitive ability, the above results indicate that

actual value and predicted value of the dependent variable. However, here we performed an ordinal logit regression in the first stage. Computation and interpretation of residuals in an ordinal probit/logit model should be different from that in an OLS regression. Residuals of ordinal variables (e.g., in ordinal logit or probit models) are complicated. They are calculated from each cuts (categories) and then aggregated as either cumulative or generalised residuals, though, there is still lack of consensus as to how to get a unified residual from all the cuts. In this analysis, we have computed a generalised residual. Second, we have also used household equivalised income as an instrument, in addition to the lags of financial distress. Therefore, it may be a case of overidentification in the first stage regression which causes the opposite sign of residual estimates in the outcome regressions. In any case, this should not substantially alter the estimates in the second stage regression.

irrespective of the domains of cognition measured through the tests, individuals with greater levels of financial distress are likely to perform worse across all the domains of cognition.

The marginal effects obtained from the models with or without general health status remain similar in terms of sign and level of significance. However, the effect sizes corresponding to the respective cognitive tests are found to be larger in the models without the general health. This is expected due to omission of the general health variable in the regressions. Nevertheless, the overall results indicate that the negative effects of financial distress upon cognitive functions remain significant with or without general health variable in all the regressions.

The model with bill payment status (as a proxy for the financial situation) shows similar results (see **Table 4-5**). Respondents who are behind with some bills have the probability to score 6.6% less in VDM test than the base category, i.e., those who are up to date with all bills. However, those who are behind with all bills have the probability to score 6.9% less in the same test than the base category. Therefore, the results in this case, indicate that the worse the bill payment status, the less their probability to score in the cognitive tests. Similar results are noted for the models, with or without the general health status. The marginal effects are all significant at $p<0.01$ and the effect size gets larger in the models without general health than the corresponding models with general health.

Table 4-4: Second stage regression – fractional logit with current financial situation

	(1) VDM	(2) ST	(3) VFC	(4) NRT	(5) NST	(1) VDM	(2) ST	(3) VFC	(4) NRT	(5) NST
Current financial situation (base-living comfortably)										
doing alright	-0.018***	-0.012***	-0.009***	-0.039***	-0.033***	-0.027***	-0.018***	-0.011***	-0.047***	-0.038***
	(0.003)	(0.004)	(0.001)	(0.004)	(0.003)	(0.003)	(0.004)	(0.001)	(0.003)	(0.003)
Just about getting by	-0.034***	-0.040***	-0.015***	-0.070***	-0.057***	-0.050***	-0.051***	-0.019***	-0.084***	-0.065***
	(0.004)	(0.005)	(0.002)	(0.005)	(0.003)	(0.004)	(0.005)	(0.002)	(0.004)	(0.004)
Finding it quite difficult	-0.058***	-0.058***	-0.022***	-0.105***	-0.082***	-0.083***	-0.076***	-0.029***	-0.128***	-0.095***
	(0.005)	(0.007)	(0.002)	(0.006)	(0.005)	(0.006)	(0.006)	(0.002)	(0.007)	(0.005)
Finding it very difficult	-0.067***	-0.064***	-0.028***	-0.134***	-0.107***	-0.100***	-0.087***	-0.038***	-0.165***	-0.125***
	(0.007)	(0.009)	(0.004)	(0.008)	(0.008)	(0.008)	(0.009)	(0.003)	(0.007)	(0.008)
Unemployed	-0.009*	-0.012	-0.007***	-0.022**	-0.021***	-0.007	-0.010	-0.007**	-0.020**	-0.020*
	(0.005)	(0.009)	(0.002)	(0.009)	(0.006)	(0.006)	(0.009)	(0.003)	(0.009)	(0.011)
HH equivalised income	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
General health (base-excellent)										
very good	-0.003	0.004	-0.002**	0.005	0.004					
	(0.003)	(0.004)	(0.001)	(0.004)	(0.003)					
Good	-0.016***	-0.006	-0.005***	-0.014***	-0.007*					
	(0.003)	(0.005)	(0.001)	(0.004)	(0.003)					
Fair	-0.031***	-0.018***	-0.011***	-0.022***	-0.016***					
	(0.004)	(0.005)	(0.002)	(0.005)	(0.004)					
Poor	-0.060***	-0.036***	-0.019***	-0.051***	-0.027***					
	(0.005)	(0.005)	(0.002)	(0.006)	(0.006)					
Highest qualification (base-Degree)										
Other higher degree	-0.034***	-0.043***	-0.011***	-0.076***	-0.047***	-0.034***	-0.043***	-0.012***	-0.076***	-0.048***
	(0.003)	(0.006)	(0.001)	(0.004)	(0.004)	(0.004)	(0.005)	(0.001)	(0.005)	(0.003)
A level etc	-0.041***	-0.044***	-0.011***	-0.083***	-0.056***	-0.043***	-0.045***	-0.011***	-0.084***	-0.056***
	(0.003)	(0.004)	(0.001)	(0.004)	(0.003)	(0.002)	(0.004)	(0.001)	(0.004)	(0.004)
Gcse etc	-0.064***	-0.063***	-0.019***	-0.118***	-0.078***	-0.066***	-0.064***	-0.019***	-0.119***	-0.079***
	(0.003)	(0.005)	(0.001)	(0.004)	(0.003)	(0.003)	(0.004)	(0.001)	(0.004)	(0.003)
Other qualification	-0.088***	-0.095***	-0.032***	-0.161***	-0.119***	-0.090***	-0.097***	-0.033***	-0.164***	-0.120***
	(0.004)	(0.006)	(0.002)	(0.005)	(0.005)	(0.004)	(0.005)	(0.002)	(0.004)	(0.004)

No qualification	-0.130***	-0.135***	-0.052***	-0.225***	-0.171***	-0.135***	-0.138***	-0.054***	-0.230***	-0.174***
	(0.004)	(0.005)	(0.001)	(0.006)	(0.004)	(0.003)	(0.005)	(0.002)	(0.004)	(0.004)
Age	-0.003***	0.000	-0.000***	0.000***	-0.001***	-0.003***	0.000	-0.001***	0.000	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female	0.030***	-0.042***	0.000	-0.082***	-0.036***	0.030***	-0.041***	0.000	-0.081***	-0.035***
	(0.002)	(0.003)	(0.001)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)	(0.002)
$Gres_{finsit}$	0.018***	0.017***	0.007***	0.036***	0.030***	0.030***	0.026***	0.010***	0.047***	0.037***
	(0.003)	(0.004)	(0.001)	(0.004)	(0.002)	(0.003)	(0.004)	(0.001)	(0.004)	(0.003)
Res_{unemp}	0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)	(0.003)	(0.003)
N	27944	27380	28123	28060	26280	27944	27380	28123	28060	26280

Note: Outcome regression table shows average marginal effects with bootstrapped standard error in parentheses. *, **, *** denotes significance at 10%, 5% and 1% level. All regressions control regional dummies not reported in this table.

Table 4-5: Second stage regression– fractional logit with bill payment status

	(1) VDM	(2) ST	(3) VFC	(4) NRT	(5) NST	(1) VDM	(2) ST	(3) VFC	(4) NRT	(5) NST
Bill payment status (base-up to date with all bills)										
Behind with some bills	-0.066***	-0.062***	-0.028***	-0.102***	-0.085***	-0.104***	-0.087***	-0.040***	-0.140***	-0.111***
	(0.010)	(0.010)	(0.004)	(0.011)	(0.010)	(0.009)	(0.011)	(0.004)	(0.010)	(0.010)
Behind with all bills	-0.069***	-0.097***	-0.028***	-0.135***	-0.095***	-0.116***	-0.130***	-0.043***	-0.184***	-0.127***
	(0.015)	(0.012)	(0.006)	(0.016)	(0.016)	(0.014)	(0.019)	(0.007)	(0.015)	(0.015)
Unemployed	-0.013**	-0.014	-0.008***	-0.030***	-0.026***	-0.012**	-0.013	-0.008***	-0.029***	-0.025***
	(0.005)	(0.010)	(0.002)	(0.007)	(0.007)	(0.006)	(0.008)	(0.002)	(0.008)	(0.008)
HH equivalised income	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
General health (base-excellent)										
Very good	-0.004*	0.002	-0.003**	0.002	0.002					
	(0.002)	(0.004)	(0.001)	(0.004)	(0.003)					
Good	-0.019***	-0.010**	-0.006***	-0.021***	-0.012***					
	(0.002)	(0.005)	(0.001)	(0.004)	(0.003)					
Fair	-0.038***	-0.025***	-0.013***	-0.035***	-0.027***					
	(0.003)	(0.004)	(0.001)	(0.005)	(0.003)					
Poor	-0.070***	-0.047***	-0.023***	-0.071***	-0.043***					
	(0.004)	(0.006)	(0.002)	(0.005)	(0.005)					
Highest qualification (base-degree)										
Other higher degree	-0.035***	-0.044***	-0.012***	-0.078***	-0.049***	-0.037***	-0.045***	-0.013***	-0.079***	-0.050***
	(0.003)	(0.005)	(0.001)	(0.005)	(0.003)	(0.003)	(0.004)	(0.001)	(0.005)	(0.003)
A level etc	-0.042***	-0.046***	-0.012***	-0.087***	-0.058***	-0.045***	-0.047***	-0.013***	-0.089***	-0.059***
	(0.003)	(0.004)	(0.001)	(0.004)	(0.003)	(0.003)	(0.005)	(0.001)	(0.004)	(0.003)
Gcse etc	-0.066***	-0.064***	-0.020***	-0.121***	-0.081***	-0.069***	-0.066***	-0.021***	-0.125***	-0.083***
	(0.003)	(0.004)	(0.001)	(0.004)	(0.003)	(0.003)	(0.004)	(0.001)	(0.004)	(0.003)
Other qualification	-0.091***	-0.096***	-0.034***	-0.168***	-0.124***	-0.096***	-0.100***	-0.035***	-0.173***	-0.127***
	(0.003)	(0.004)	(0.002)	(0.005)	(0.004)	(0.003)	(0.004)	(0.002)	(0.004)	(0.005)
No qualification	-0.134***	-0.137***	-0.054***	-0.234***	-0.177***	-0.144***	-0.144***	-0.057***	-0.243***	-0.183***
	(0.003)	(0.005)	(0.001)	(0.005)	(0.004)	(0.003)	(0.004)	(0.001)	(0.003)	(0.004)
Age	-0.003***	0.000***	-0.000***	0.001***	-0.001***	-0.003***	0.000	-0.001***	0.000***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Female	0.030***	-0.041***	0.000	-0.082***	-0.036***	0.031***	-0.041***	0.000	-0.082***	-0.036***
	(0.002)	(0.003)	(0.001)	(0.002)	(0.002)	(0.001)	(0.003)	(0.001)	(0.003)	(0.002)
$Gres_{finsit}$	0.053***	0.049***	0.024***	0.080***	0.058***	0.092***	0.074***	0.037***	0.119***	0.085***
	(0.011)	(0.011)	(0.005)	(0.012)	(0.011)	(0.010)	(0.012)	(0.005)	(0.013)	(0.011)
Res_{unemp}	0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.001)	(0.002)	(0.000)	(0.002)	(0.001)	(0.001)	(0.002)	(0.000)	(0.002)	(0.002)
N	28771	28207	28978	28903	27056	28771	28207	28978	28903	27056

Note: Outcome regression table shows average marginal effects with bootstrapped standard error in parentheses. *, **, *** denotes significance at 10%, 5% and 1% level. All regressions control regional dummies not reported in the table.

The above effects of overall financial distress or difficulties in paying bills upon cognitive scores are found after controlling for the household equivalised income along with several other individual and socio-demographic variables. In this analysis, changes in income are found to have a very small but statistically significant marginal effect upon any of the cognitive scores[27]. This is consistent with Mani *et al.* (2013) which notes that income deprivation negatively impacts cognitive function. However, the impact of income in this analysis is very small compared to that of current financial situation. This is potentially because one's financial situation at any point of time is a result of several variables (e.g., current and past income, accumulated assets and debts). Individuals with higher income are also likely to have a higher amount of debt and various payment obligations. Therefore, it may be the case that the overall financial situation variable counteracts the effect of income leaving only the minuscule effect of income itself.

Unemployment shows significant negative impacts upon cognitive ability as the unemployed individuals are likely to score significantly less than others. The size of the negative effects varies from 0.7% to 2.2% across different cognitive tests. Models with bill payment status as well as with or without general health inform similar marginal effects of unemployment on cognitive function. This finding is consistent with the notion that worklessness is positively associated with cognitive decay. 'Use it or lose it' hypothesis (Rohwedder and Willis, 2010) states that a general cognitive decline is predicted when away from work. On the contrary, overworking might also be associated with cognitive erosion (Virtanen *et al.*, 2009). Moreover, unemployment can have an effect mediated through financial distress; it leads to loss of income and gives rise to financial distress, which in turn, results in poor cognitive performance.

This analysis finds a strong positive association between level of educational and cognitive performance. Individuals with no education are likely to score 5.2% to 22.5% less than those with a university degree while those with GCSE level education are likely to score 1.9% to 11.8% less across all the cognitive tests. Models with bill payment status and the models with or without health status also informs similar results. These findings are consistent with a wide range existing literature (see for example, Deary *et al.*, 2007; Richards and Hatch, 2011) which supports the idea that learning positively impact cognitive abilities. However, poor

[27] Estimated coefficients for current household income are around 0.0000XX ($p<0.01$) which could be interpreted as 1000 units change in income leads to 0.X% change in cognitive score.

performance in cognitive tests could also be attributed to the possibility that lower level of education is associated with higher financial distress which, in turn, leads to poor cognitive performance.

General health is a key variable in this analysis and has significant effects upon cognitive abilities. Individuals reporting 'poor' and 'fair' health conditions are likely to score significantly less across all the cognitive tests than the respondents reporting 'excellent' health condition. This result accords with the earlier findings that self-report health status is positively associated with cognitive function (Kato *et al.*, 2013). Respondent's sex is found to have a mixed effect. In VDM test, females are likely to score more than males while in ST, NRT and FRT males are likely to score better. However, in VFC test, there appears to be no gender difference in performance. These results are consistent across the models concerning financial distress as well as bill payment status and with or without health status. The findings conform to the earlier notion that females are better in verbal cognitive skills while males are better in analytical skills (Hyde, 2016).

The relationship between age and the cognitive abilities is tested using U-test suggested in Lind and Mehlum (2010). This test examines the existence of a non-linear relationship where the null hypothesis assumes that a monotonous or U-shaped relation exists between age and cognitive scores while the alternative hypothesis tests the presence of an inverse U-shaped relationship. The U-tests carried out during the second stage fractional logit regressions reject the null at p>0.01 level for all the models. Therefore, U-tests described in this section (see **Table 4-6**) indicate that inverse U-shaped relationships exist between age and all the measures of cognitive scores.

Table 4-6: Overall test of presence of an Inverse U shape

H_1: Inverse U shape vs. H_0: Monotone or U shape

	VDM	ST	VFC	NRT	NST
Current financial situation	t-value=13.03 P>|t|=0.00	t-value=8.00 P>|t|=0.00	t-value=22.30 P>|t|=0.00	t-value=13.82 P>|t|=0.00	t-value=7.22 P>|t|=0.00
Bill payment status	t-value=11.55 P>|t|=0.00	t-value=5.45 P>|t|=0.00	t-value=17.34 P>|t|=0.00	t-value=13.69 P>|t|=0.00	t-value=3.84 P>|t|=0.00

In short, the above results support the basic hypothesis put forward by Mani *et al.* (2013) and Vohs (2013) that individuals' experiencing financial distress are likely to experience cognitive impairment. The above analysis finds a very small but statistically significant effect of current

household income, but a larger effect of overall current financial situation. Moreover, the above results show the magnitude of this 'cognitive tax', is directly proportional to the level of financial distress; the higher the level of distress, the lower the likelihood to attain cognitive score.

4.5.1 Robustness test 1: Impact on latent cognitive measure

This section provides a robustness test of the results presented in the previous section which presents five different regressions showing the impacts of financial distress on five different cognitive scores. The five cognitive tests described above are considered to measure five domains of cognition. However, the cognitive psychologists often disagree on how to categorize the subdomains of cognitive functions or whether they should even categorize cognitive functions into subdomains (Miyake *et al.*, 2000). A group of cognitive psychologists propose that a unifying mechanism exists behind all the cognitive functions (de Frias *et al.*, 2006; Jurado and Rosselli, 2007), a view often referred to as the theory of unity. In this view, the elements of cognitive functions are so entangled with each other that they are practically inseparable into subdomains.

Table 4-7: Measurement model for cognitive latent

Fit Indices	Modified Model (Cognitive score)
χ^2	278.94***
(N, df)	(40919, 4)
RMSEA	0.041
CFI	0.993
TLI	0.982
CD	0.743

*Note: *p <0.10, **p < 0.05, ***p < 0.01*

In line with the theory of unity, this section collapses five different scores of cognitive tests, e.g., VDM, ST, SVF, NRT and FRT into one single measure of cognitive function through a confirmatory factor analysis (CFA) reported in **Table 4-7**. In this method, cognitive function (Cog) is considered as a single latent construct measured through five indicators, in this case, five cognitive test scores. The analysis first measures the scale reliability coefficient Cronbach α for the five test scores. The α in this case is measured to be 0.728, well above the threshold typically considered enough in the social sciences[28]. Fitness indices for the simple measurement model shows that the likelihood ratio χ^2 statistics is quite high and significant at

[28] In social sciences, 0.70 is considered as adequate (Jum, 1978).

p<0.01, which does not indicate the model is a good fit. However, Schermelleh-Engel *et al.* (2003) and Lance and Vandenberg (2009) note that χ^2 statistic is very sensitive to sample size and may often not be relied upon as a basis for acceptance or rejection of the model. Considering a significantly large sample size, in this case, alternative goodness of fit statistics are investigated. As noticed in **Table 4-7**, all the other four statistics (RMSEA, CFI, TLI and CD) indicates a good fit of the model. After constructing the latent variable, regressions are carried out to measure the effect of financial distress and bill payment status upon the unified cognitive score. These regressions take the similar specifications to those reported in the previous section 4.5.

Results, summarized in **Table 4-9**, indicate a similar effect of the measures of financial distress upon unified cognitive score. Financial distress is likely to reduce the overall cognitive score; the higher the level of financial difficulties, the lower the likelihood of respondents' cognitive scores. For example, individuals finding their financial situation 'difficult' are likely to score 7.8% less than the base category 'living comfortably'. In contrast, individuals belonging to the category 'finding it very difficult' are likely to score 10.0% less than the base category. Bill payment status also shows a similar negative impact; those who are behind with some bills or all, are likely to perform worse in the cognitive tests compared to those who are up to date with all bills. These results are confirmed with or without the general health status incorporated in the models.

Table 4-8: Overall test of presence of an Inverse U shape

H_1: Inverse U shape vs. H_0: Monotone or U shape

	Current financial situation	Bill payment status
Cognitive ability	t-value=13.05 P>|t|=0.00	t-value=14.39 P>|t|=0.00

Moreover, like the results outlined in the previous section, household equivalised income has a very small impact on unified cognitive score and there is an inverse U-shaped relationship between age and unified cognitive score (See **Table 4-8**). These results confirm the results obtained from the previous analysis which estimated five cognitive measures separately and therefore establish the robustness of the results.

Table 4-9: Effect of financial distress upon unified cognitive function

	Cog	Cog	Cog	Cog
Current financial situation (base-living comfortably)				
doing alright	-0.028***	-0.035***		
	(0.002)	(0.002)		
Just about getting by	-0.052***	-0.065***		
	(0.003)	(0.002)		
Finding it quite difficult	-0.078***	-0.098***		
	(0.005)	(0.004)		
Finding it very difficult	-0.100***	-0.126***		
	(0.006)	(0.005)		
Bill payment status (base-up to date with all bills)				
Behind with some bills			-0.080***	-0.109***
			(0.006)	(0.008)
Behind with all bills			-0.102***	-0.139***
			(0.011)	(0.013)
Unemployed	-0.019***	-0.017***	-0.023***	-0.023***
	(0.007)	(0.006)	(0.006)	(0.006)
HH equivalised income	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
General health (base-Excellent)				
Very good	0.002		-0.000	
	(0.002)		(0.002)	
Good	-0.011***		-0.015***	
	(0.002)		(0.002)	
Fair	-0.022***		-0.030***	
	(0.002)		(0.003)	
Poor	-0.044***		-0.051***	
	(0.005)		(0.004)	
highest qualification (base-Degree)				
Other higher degree	-0.049***	-0.050***	-0.048***	-0.049***
	(0.003)	(0.003)	(0.002)	(0.003)
A level etc	-0.055***	-0.056***	-0.055***	-0.057***
	(0.002)	(0.002)	(0.002)	(0.002)
Gcse etc	-0.080***	-0.082***	-0.079***	-0.081***
	(0.002)	(0.002)	(0.002)	(0.002)
Other qualification	-0.118***	-0.120***	-0.116***	-0.120***
	(0.003)	(0.003)	(0.003)	(0.003)
No qualification	-0.170***	-0.175***	-0.169***	-0.177***
	(0.003)	(0.003)	(0.003)	(0.003)
Age	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Female	-0.037***	-0.037***	-0.035***	-0.034***
	(0.002)	(0.002)	(0.001)	(0.001)
$Gres_{finsit}$	0.027***	0.036***	0.061***	0.091***
	(0.002)	(0.002)	(0.006)	(0.009)
Res_{unemp}	-0.000	-0.000	-0.000	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)
N	28463	28463	30902	30902

Note: Outcome regression table shows average marginal effects with bootstrapped standard error in parentheses. *, **, *** denotes significance at 10%, 5% and 1% level. All regressions control regional dummies not reported in this table.

4.5.2 Robustness test 2: Impact on decision making capability

This section provides further robustness test of the results obtained in the section 4.5. Specifically, it examines the association of financial distress with decision making capability. A large body of literature in cognitive psychology (see for example, Gonzalez et al., 2005) indicates a strong positive association between cognitive ability and decision-making capability. This section, therefore, examines this association in a direct way[29]. US data contains the General Health Questionnaire (GHQ-12) and the fourth question of the GHQ-12 module asks, '*Have you recently felt capable of making decisions about things?*' Respondents select one of four answers: *1. More so than usual, 2. As usual, 3. Less than as usual and 4. Much less capable.* Thus, the higher scores correspond to a lower decision-making capability. Due to the ordinal nature of the responses, this section deploys an ordinal probit model to estimate the marginal effects of the financial distress on the decision-making capability.

Results, summarised in **Table 4-14**, indicate that respondents with higher level of financial difficulties have a significantly positive likelihood of reporting 'less than usual' and 'much less capable' with regards to their decision making capabilities. While this analysis cannot comment on the direction of causality, the finding indicates that higher level of financial distress is associated with lower level of decision-making capability. Thus, it supports the earlier finding suggesting that a negative association exists between higher level of financial distress and cognitive ability.

4.6 Discussion of results

Overall, the above results indicate that individuals in financial distress are likely to perform worse across the cognitive tests than those who do not report such distress. This likelihood is similar across the domains of cognitive functions. Therefore, the above results generally conform to the hypothesis that financial distress causes a 'cognitive tax'. The results also

[29] Ideally this analysis would want to explore direct link between financial distress and myopic behaviour such as playing a lottery or taking up short term high interest loan. Due to lack of data on these behaviours in Understanding Society survey, the analysis resorted to GHQ-12 capability of decision variable. However, this analysis is supported by Gathergood and Guttman-Kenney (2016), who, analysing Wealth and Asset survey of the United Kingdom, find that individuals in financial distress are more likely to hold higher cost credit items such as mail order catalogues and payday loans.

indicate that respondent's level of financial difficulties is positively associated with the likelihood of 'cognitive tax'; the more difficult their financial situations are, the more likely are they to experience such cognitive impairment. These results accord with the earlier findings of Mullainathan and Shafir (2014) and their scarcity hypothesis. However, the main contrast between the above findings and the earlier works lie in the definition of financial difficulties. While the earlier literature confined focus on the impact of poverty (or income deprivation), this study uses individual's subjective assessment of overall financial situation.

The findings that current household income has a significant but minuscule effect on cognitive function points toward the fact that individual's subjective responses to overall financial situation are more important than the current income itself. Although current income is an important element of overall financial situation, literature often omits the other components (e.g., accumulated wealth and debt) of one's financial situation which are arguably captured by subjective responses (Cobb-Clark and Ribar, 2009). The above analysis shows that the negative effects of financial distress are found with or without controlling general health status. Studies show physical health (measured through self-rated general health status) and psychological health (such as anxiety, depression) are positively associated with cognitive abilities (see for example, Martin *et al.*, 1996). In addition, negative health effects of financial distress are well-documented (e.g., O'Neill *et al.*, 2005). Despite this triangular association between financial distress, health and cognitive function, the above results confirm that financial distress has a distinct impact and therefore, it is likely to impair cognitive function even when the individuals are otherwise in good health.

The exact mechanism behind this 'cognitive tax' could be diverse. Mani *et al.* (2013) explain that financial difficulties occupy attention, affect memories and cause distraction. This in turn causes impairment of general cognitive abilities. However, there are other explanations to these effects. For example, Vohs (2013) describes that individuals in financial difficulties are likely to make undesirable decisions (such as, not being able to spend for kids or afford to heat homes, or fall behind in paying bills). Constantly making undesirable decisions can cause gradual loss of self-control. In this notion, self-control is a limited resource; by constantly making undesirable decisions while dealing with difficult financial situations, people 'use up' their self-control. This, in turn, leads to impaired cognitive function. A related and complementary view suggests that financial distress creates stress and negative moods like depression, which create distraction, thereby negatively affects optimal economic behaviour (Haushofer and Fehr,

2014). Irrespective of the underlying mechanism, the above results accord with the existing findings that financial distress impairs cognitive abilities.

Implications of the above findings are many. The 'cognitive tax' gives rise to suboptimal economic decisions (Agarwal and Mazumder, 2013). For example, this may cause people to use expensive payday loans (Bertrand and Morse, 2011) and cheque-cashing services (Dobbie and Skiba, 2013), to undertake myopic risky activities (such as, play lotteries (Haisley *et al.*, 2008)) and to borrow repeatedly at high interest rates (Rhine *et al.*, 2006). These suboptimal behaviours in turn can entangle individuals in a cycle of financial distress. Cognitive tax may also lead to significant mental health and well-being concerns. Deteriorating levels of cognitive function leads to lower psychological well-being and higher level of stress, smoking and alcohol consumption. It also reduces emotional ability to cope socially (Llewellyn *et al.*, 2008). Cognitive impairment often leads to suicide, homicide and higher chances of accident (Deary, 2012). Above all, it affects one's everyday life. Even a mild cognitive impairment is likely to reduce functional independence, i.e., the ability to perform activities of daily living and maintain health-related quality of life. This leads to varying degree of social isolation (Johansson *et al.*, 2015). These concerns are particularly important in the economies where population is aging. In the United Kingdom, 18% population is at 64+ and there are 285 people aged 64+ for every 1000 working age (16-64) people (ONS, 2016). Aging of population means there is a structural decline in cognitive ability in the overall population. Normal cognitive aging starts somewhere before the age of 30 and many different domains of cognition start to decline at 60s (Salthouse, 2010). In addition to this aging related cognitive decline, cognitive impairment due to financial distress causes an additional pressure in societal well-being.

Can policy makers help avoid or minimise 'cognitive tax' due to financial distress? Yes, one direct approach would be presenting financial choices in alternative ways. Households are inundated with marketing mails from banks and financial institutions. These communications are full of lucrative credit offers, which frame the cost of borrowing in terms of interest rates. For many borrowers, the actual cost of borrowing is often difficult to comprehend. Bertrand and Morse (2011) show that the borrowing rates significantly falls if credit offers are presented in the form of actual sum of money to be paid in each instalment instead of the interest rates. Reducing number of alternative choices can also be an effective intervention. People are often overwhelmed by the number of alternative offers while making financial decisions. If they had unlimited 'bandwidth' of cognitive resources, they would be better off with processing so many

offers. As their cognitive resources are limited, these situations are often puzzling for them and they eventually might postpone decision making or use simple heuristics rules of thumb (Johnson *et al.*, 2012). In a similar vein, Thaler and Sunstein (2009) argue that since individuals have a limited cognitive capacity, in many situations nudging would help them in taking a decision. Therefore, government should influence people's economic decision simply by using 'nudge' as a policy tool. This view is clearly opposed to the classical view that optimum decision is made from the maximum amount of available information.

In addition, policy makers need to view financial distress as a part of greater structural problem, such as, a persistent decline in real wages associated with rising level of household debt. Reeves *et al.*, (2016) find a positive correlation between financial distress and low wages in the United Kingdom. Within BHPS, they examine two groups of workers, one group is subjected to pay rise due to introduction of national minimum wage while the other group is not. Their results suggest that those who do not have a pay rise, end up in poorer physical and mental health because of higher financial distress. This study is further supported by Barba and Pivetti (2008) who, focusing on US economy, point out that low wage is associated with higher household debt. They argue that in the face of declining real wage, level of consumption and aggregate demand is maintained through high level of household debt. Therefore, policies aimed at preventing a persistent decline of wages and reducing household debt would help lower financial distress and prevent cognitive impairment as well as maintain overall household well-being.

The above analysis has many strengths over previous studies. Previous studies in this area have used data from participants in a controlled experimental condition. In contrast, this study has exploited a large representative sample from the United Kingdom. While experimental data is less noisy, a bigger representative survey data enhances the quality of statistical inference. This study has controlled for a wide range of potential confounders, including household equivalised income and health status within a contemporary statistical model to address endogeneity. More importantly, this study has exploited the measures of cognitive functions designed by wide range validated tests, many of which are identical to those used in other seminal studies. This would facilitate future research attempting to replicate the current findings. However, given the cross-sectional nature of the analysis, it has some limitations. One might argue that other material deprivation could be the reason behind the observed negative impact of financial distress upon cognitive abilities. Financially distressed people may be malnourished or

deprived of good sleeping environment over a long time and that could lead to the reduced cognitive score during the survey. Therefore, it may well be the case that distressed people had a pre-existing poor level of cognitive resources. The above study has tried to address that concern by controlling for health status. All the models have been tested with and without general health status. Above results indicate that effects of financial distress remain qualitatively similar in both cases. This does not mean to deny any limitations of a cross sectional study. In short, this study paves the way for future studies where the above limitations can be addressed with more suitable data-sets.

4.7 Conclusion:

This chapter analysed the third wave of US data to examine the impact of financial distress upon cognitive ability. The data contained cognitive scores related to respondents' episodic memory, working memory, semantic fluency, fluid reasoning and numerical abilities along with self-report financial distress and a wide variety of socio demographic variables. The above analysis took potential endogeneity into consideration – financial distress might impair cognitive ability while the impaired cognitive ability might cause suboptimal economic decision leading to financial distress. To address this endogeneity, the chapter deployed a two-stage residual inclusion (2SRI) method. Moreover, due to the pivotal association of general health with both cognitive abilities and financial distress, the chapter performed all the regressions with or without the general health variable and compared the results.

The results from the analysis indicated that financial distress impaired cognitive abilities. Individuals with varying levels of financial distress were likely to attain lower scores across different cognitive tests. Magnitudes of such cognitive impairments varied with the level of financial difficulties. The analysis suggested that higher levels of financial difficulty were associated with higher degrees of cognitive impairment. The results remained broadly unchanged with or without controls for general health status.

The significance of this study is twofold. First, the study identifies a new channel through which financial distress can have a detrimental impact on well-being. Policy makers often overlook non-tangible areas of deprivation which emanate from psychological or social processes. This study focuses on cognitive deprivations that arise when individuals find themselves in financial distress. Such cognitive deprivations have a self-perpetuating impact on societal well-being. Second, earlier studies in behavioural economics (e.g., Mani *et al.,*

2013) focus only on poverty to show its detrimental impact on cognitive function. While income is a significant component of material deprivation, this study indicates that individuals overall financial distress can have similar negative impact on cognitive function.

Findings of this study call for policy intervention simultaneously for improving cognitive functions of the individuals and tackling financial distress at the household level. While it is evident that a vicious cycle exists between financial distress and its psychological consequences, the above findings allied with the findings in behavioural economics suggest that understanding the psychology of cognitive impact would be an effective tool to counteract self-perpetuating process of financial distress. However, any policy intervention solely aimed at cognitive improvement will not solve the problem since financial distress is primarily an economic issue. Therefore, the core policy intervention must address the economic causes of household financial distress including overwhelming amount of household debt and persistent decline of real wage and identify the victims of such distress.

4.8 Appendix

Table 4-10: Summary Statistics

			VDM	ST	VFC	NRT	NST
	Mean	Std Dev	Mean	Mean	Mean	Mean	Mean
Verbal Declarative Memory (VDM)	11.70	3.35					
Subtraction Test (ST)	4.46	1.01					
Verbal Fluency Test (VFC)	22.00	6.62					
Numerical Reasoning Test (NRT)	3.65	1.02					
Number Series Test (NST)	529.82	31.59					
Household Equivalised Income	1545.70	1117.10					
Current Financial Situation							
Living comfortably	0.27	0.44	11.57	4.53	22.24	3.78	534.28
Doing alright	0.35	0.48	11.57	4.45	21.59	3.58	530.73
Just about getting by	0.27	0.44	11.13	4.29	20.67	3.37	525.06
Finding it quite difficult	0.08	0.27	11.08	4.17	20.34	3.23	523.27
Finding it very difficult	0.03	0.18	10.55	4.05	19.44	3.01	517.04
Bill payment status							
Up to date with all bills	0.95	0.23	11.39	4.41	21.41	3.56	529.68
Behind with some bills	0.05	0.21	11.00	4.08	19.91	3.07	519.22
Behind with all bills	0.01	0.08	11.15	4.06	20.49	3.14	523.33
General Health							
Excellent	0.18	0.38	12.43	4.52	22.89	3.76	535.71
Very good	0.36	0.48	11.95	4.48	22.17	3.68	533.17
Good	0.27	0.45	11.23	4.38	21.16	3.49	527.84
Fair	0.14	0.35	10.08	4.20	19.37	3.22	519.35
Poor	0.05	0.22	9.05	3.97	17.87	2.93	512.84
Current job status							
Self employed	0.07	0.26	12.08	4.55	22.85	3.90	534.93
Paid employment	0.49	0.50	12.32	4.52	22.76	3.73	534.51
Unemployment	0.05	0.22	11.09	4.14	19.80	3.12	520.88
Retired	0.22	0.41	9.20	4.27	18.73	3.32	518.70
On maternity leave	0.01	0.08	12.96	4.52	23.51	3.56	535.48
Looking after family	0.06	0.23	11.31	4.02	19.88	3.03	520.54
Full time student	0.07	0.25	12.86	4.44	22.74	3.57	538.54
Long term sick and disabled	0.03	0.17	9.29	3.97	18.16	2.86	512.28
On a government training	0.00	0.03	10.82	4.25	19.29	2.87	516.49
Family business	0.00	0.02	12.58	4.38	25.19	3.81	543.20
Apprenticeship	0.00	0.02	12.17	4.80	24.10	3.67	534.34
Doing something else	0.00	0.07	11.33	4.44	21.66	3.49	530.30
Highest Qualification							
Degree	0.24	0.42	12.99	4.68	23.98	4.11	543.42
Other higher degree	0.12	0.32	11.92	4.48	22.26	3.70	532.80
A level etc.	0.21	0.41	11.98	4.48	22.26	3.66	533.25
GCSE etc.	0.22	0.41	11.43	4.37	21.35	3.43	527.85
Other qualification	0.09	0.29	9.97	4.19	19.13	3.18	516.23
No qualification	0.12	0.32	8.45	3.84	16.64	2.69	503.22
Sex							
Male	0.45	0.50	11.08	4.51	21.41	3.78	532.90
Female	0.55	0.50	11.60	4.29	21.26	3.33	526.06
Age	47.04	17.99					
Age category							
9-			12.59	4.38	22.31	3.39	535.73
20-			12.58	4.37	22.18	3.49	534.20
30-			12.55	4.44	22.35	3.62	533.80
40-			12.06	4.49	22.49	3.68	532.14
50-			11.40	4.41	21.84	3.63	528.99
60-			10.60	4.42	20.75	3.57	526.43
70-			8.09	4.16	17.19	3.13	512.17

Tukey post-hoc test: The test reveals that almost all the mean cognitive scores corresponding to each financial distress categories are significantly different (at *p=0.05*) from each other. As indicated in Table 10 of Appendix, for each cognitive score, five categories of financial situations give ten tests. Therefore, for five cognitive scores, there are fifty tests. Out of these fifty cases, only three cases indicate that the means are statistically insignificant (at *p=0.05*), which means, in these three cases, the mean cognitive scores are not statistically different. Tukey post-hoc test also indicates, for each cognitive score, the coefficients associated with categories expressing higher level of financial difficulties are negative as compared to their paired categories.

Table 4-11: Comparison of pairwise means of cognitive scores based on financial distress categories

	VDM	ST	NRT	NST	VFC
	Contrast	Contrast	Contrast	Contrast	Contrast
Doing alright vs Living comfortably	0.000 (0.002)	-0.017*** (0.003)	-0.039*** (0.003)	-0.020*** (0.002)	-0.012*** (0.002)
Just about getting by vs Living comfortably	-0.022*** (0.002)	-0.049*** (0.003)	-0.082*** (0.003)	-0.053*** (0.002)	-0.030*** (0.002)
Finding it quite difficult vs Living comfortably	-0.025*** (0.003)	-0.073*** (0.004)	-0.111*** (0.004)	-0.063*** (0.004)	-0.036*** (0.003)
Finding it very difficult vs Living comfortably	-0.051*** (0.005)	-0.097*** (0.006)	-0.155*** (0.006)	-0.098*** (0.005)	-0.053*** (0.004)
Just about getting by vs Doing alright	-0.022*** (0.002)	-0.032*** (0.003)	-0.043*** (0.003)	-0.032*** (0.002)	-0.018*** (0.002)
Find it quite difficult vs Doing alright	-0.025*** (0.003)	-0.056*** (0.004)	-0.072*** (0.004)	-0.043*** (0.004)	-0.024*** (0.003)
Finding it very difficult vs Doing alright	-0.051*** (0.005)	-0.079*** (0.006)	-0.115*** (0.006)	-0.078*** (0.005)	-0.041*** (0.004)
Finding it quite difficult vs Just about getting by	-0.003 (0.003)	-0.024*** (0.004)	-0.029*** (0.004)	-0.010*** (0.004)	-0.006 (0.003)
Finding it very difficult vs Just about getting by	-0.029*** (0.005)	-0.047*** (0.006)	-0.072*** (0.006)	-0.046*** (0.005)	-0.023*** (0.004)
Finding it very difficult vs Finding it quite difficult	-0.026*** (0.005)	-0.023*** (0.007)	-0.043*** (0.007)	-0.036*** (0.006)	-0.017*** (0.004)

Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4-12: First stage regressions

	(1) Current financial situation	(2) Unemployment	(3) Bill payment status
Current financial situation (-2) (base-living comfortably)			
doing alright	0.772***		
	(0.034)		
Just about getting by	1.368***		
	(0.042)		
Finding it quite difficult	1.875***		
	(0.058)		
Finding it very difficult	2.286***		
	(0.081)		
Current financial situation (-1) (base-living comfortably)			
doing alright	1.267***		
	(0.035)		
Just about getting by	2.394***		
	(0.045)		
Finding it quite difficult	3.252***		
	(0.062)		
Finding it very difficult	4.004***		
	(0.087)		
HH equivalised income (-1)	-0.000***		-0.000***
	(0.000)		(0.000)
HH equivalised income (-2)	0.000		-0.000***
	(0.000)		(0.000)
HH equivalised income	-0.000***	-0.001***	-0.000***
	(0.000)	(0.000)	(0.000)
Unemployed (-1)	-0.170**	2.025***	0.188**
	(0.067)	(0.074)	(0.094)
Unemployed (-2)	-0.155**	1.265***	-0.065
	(0.062)	(0.078)	(0.094)
Unemployed	0.780***		0.452***
	(0.067)		(0.091)
General health (base-excellent)			
very good	0.121***	0.140	0.093
	(0.036)	(0.099)	(0.095)
Good	0.302***	0.371***	0.371***
	(0.038)	(0.099)	(0.095)
Fair	0.487***	0.510***	0.650***
	(0.044)	(0.111)	(0.102)
Poor	0.726***	0.221	0.934***
	(0.058)	(0.148)	(0.119)
Highest qualification (base-Degree)			
Other higher degree	0.148***	-0.090	0.308***
	(0.041)	(0.122)	(0.108)
A level etc	0.125***	-0.142	0.301***
	(0.037)	(0.102)	(0.095)
Gcse etc	0.061	0.133	0.238**
	(0.037)	(0.097)	(0.093)
Other qualification	0.181***	0.061	0.361***
	(0.046)	(0.124)	(0.113)
No qualification	0.215***	0.347***	0.398***
	(0.045)	(0.113)	(0.107)
age_cr	0.030***	0.044***	0.044***

	(0.004)	(0.011)	(0.010)
Agesqr	-0.000***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)
sex_cr2	0.042*	-0.375***	0.087
	(0.024)	(0.061)	(0.056)
Bill payment status (-2) (base-up to date with all bills)			
Behind with some bills			1.258***
			(0.072)
Behind with all bills			0.835***
			(0.159)
Bill payment status (-1) (base-up to date with all bills)			
Behind with some bills			1.729***
			(0.070)
Behind with all bills			2.373***
			(0.160)
Cons		-1.843***	
		(0.306)	
N	28463	31144	30902

Note: Standard error in parentheses. *, **, *** denotes significance at 10%, 5% and 1% level. All regressions also control for region dummies.

Table 4-13: F test for instrument validity

Current financial situation	Unemployment
χ^2 (12) =14855.63 Prob > χ^2 = 0.00	χ^2 (2) = 311.77 Prob > χ^2 = 0.00
Bill payment status	Unemployment
χ^2 (12) = 1391.58 Prob > χ^2 = 0.00	χ^2 (2) = 330.08 Prob > χ^2 = 0.00

Table 4-14:Marginal effects of financial distress on decision making capability

Capable of making decisions?	More so than usual	Same as usual	Less so than usual	Much less capable
Current financial situation (Base-living comfortably)				
Doing alright	-0.000	0.000	0.000	0.000
	(0.002)	(0.000)	(0.002)	(0.000)
Just about getting by	-0.009***	-0.000	0.008***	0.002***
	(0.003)	(0.000)	(0.002)	(0.001)
Find it quite difficult	-0.030***	-0.009***	0.032***	0.008***
	(0.004)	(0.002)	(0.004)	(0.001)
Find it very difficult	-0.044***	-0.024***	0.054***	0.014***
	(0.004)	(0.006)	(0.007)	(0.002)
Income	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.003***	-0.000***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Age squared	0.000***	0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Number of Children	-0.001	-0.000	0.001	0.000
	(0.001)	(0.000)	(0.001)	(0.000)
Job status (Base-Self-employed)				
In paid employment	-0.003	-0.000	0.003	0.001
	(0.004)	(0.000)	(0.003)	(0.001)
Unemployed	-0.017***	-0.003*	0.016***	0.004***
	(0.006)	(0.002)	(0.006)	(0.001)
Retired	0.004	-0.000	-0.003	-0.001
	(0.005)	(0.000)	(0.004)	(0.001)
On maternity leave	-0.028***	-0.010	0.031**	0.008*
	(0.011)	(0.008)	(0.015)	(0.004)
Looking after family	-0.004	-0.000	0.003	0.001
	(0.006)	(0.000)	(0.005)	(0.001)
Full time student	-0.004	-0.000	0.004	0.001
	(0.007)	(0.000)	(0.006)	(0.001)
Long term sick or disabled	-0.034***	-0.016***	0.040***	0.010***
	(0.005)	(0.004)	(0.007)	(0.002)
On a government training	0.020	-0.003	-0.014	-0.003
	(0.039)	(0.010)	(0.024)	(0.005)
Unpaid worker in family business	0.047	-0.013	-0.028	-0.005
	(0.057)	(0.028)	(0.025)	(0.004)
In an apprenticeship	-0.022	-0.005	0.022	0.005
	(0.031)	(0.017)	(0.038)	(0.010)
Doing something else	-0.010	-0.001	0.009	0.002
	(0.015)	(0.003)	(0.015)	(0.003)
Health Status (Base-Excellent)				
Very good	-0.009***	0.002***	0.006***	0.001***
	(0.003)	(0.001)	(0.002)	(0.000)
Good	-0.026***	0.002**	0.020***	0.004***
	(0.003)	(0.001)	(0.002)	(0.000)
Fair	-0.043***	-0.006***	0.040***	0.008***
	(0.003)	(0.002)	(0.003)	(0.001)
Poor	-0.066***	-0.040***	0.085***	0.021***
	(0.004)	(0.006)	(0.007)	(0.002)
Marital Status (Base-Single and never married)				
Married	-0.008**	-0.000*	0.007**	0.002**
	(0.004)	(0.000)	(0.003)	(0.001)

Reg Same sex civil partner	-0.010	-0.000	0.008	0.002
	(0.018)	(0.003)	(0.017)	(0.004)
Separated but legally married	-0.006	-0.000	0.005	0.001
	(0.008)	(0.001)	(0.007)	(0.002)
Divorced	-0.008	-0.000	0.006	0.001
	(0.005)	(0.000)	(0.004)	(0.001)
Widowed	-0.010*	-0.000	0.008*	0.002*
	(0.005)	(0.001)	(0.005)	(0.001)
Separated from civil partner	-0.050	-0.036	0.067	0.019
	(0.045)	(0.094)	(0.103)	(0.036)
Former civil partner	-0.086***	-0.536***	0.293***	0.329***
	(0.003)	(0.073)	(0.007)	(0.078)
Surviving civil partner	-0.007	-0.000	0.006	0.001
	(0.010)	(0.001)	(0.009)	(0.002)
Living as couple	-0.006	-0.000	0.005	0.001
	(0.004)	(0.000)	(0.003)	(0.001)
Female	-0.016***	-0.001***	0.014***	0.003***
	(0.002)	(0.000)	(0.002)	(0.000)
Education (Base-Degree)				
Other higher degree	0.002	0.000	-0.001	-0.000
	(0.003)	(0.000)	(0.003)	(0.001)
A level etc.	-0.001	-0.000	0.000	0.000
	(0.003)	(0.000)	(0.003)	(0.001)
GCSE etc.	0.003	0.000	-0.002	-0.001
	(0.003)	(0.000)	(0.003)	(0.001)
Other qualification	0.006	0.000	-0.005	-0.001
	(0.004)	(0.000)	(0.003)	(0.001)
No qualification	0.013***	0.000	-0.011***	-0.002***
	(0.004)	(0.000)	(0.003)	(0.001)
N	40286	40286	40286	40286

Note: Standard error in parentheses. *, **, *** denotes significance at 10%, 5% and 1% level. All regressions also control for Big5 personality variables and region dummies.

5 Conclusion

This thesis examined the impact of financial distress upon well-being. This study became relevant at a time when policy makers in the United Kingdom expressed their concerns about the steady rise in household debt. For a significant number of British households, over-indebtedness reportedly became a problem since the early nineties and especially after 2013[30]. This study broadly defined financial distress as households' difficulties in meeting various payment obligations and their worries in the face of such financial difficulties. By well-being, the thesis focused on a utilitarian measure of subjective well-being. The narrow objective of the thesis was to empirically examine the impact of financial distress on two measures of subjective well-being, life satisfaction and psychological well-being – a measure derived from 12 General Health Questionnaire. In doing so, it analysed two widely acclaimed household panel survey in the United Kingdom, namely BHPS and US over 23 years. However, the broader objective was to contribute to the growing literature on SWB and to the policy debate relating to household indebtedness. The core of the thesis comprised of three empirical chapters which presented three distinct, yet interconnected analyses related to the association of financial distress and well-being. This section now provides a succinct summary of the findings of the thesis along with its policy implications, limitations as well as future research avenues in this area.

Chapter 2 explored the distributional heterogeneity in the association between financial distress and well-being. Specifically, it showed that individuals at the lower end of the SWB distribution were more affected by the same level of financial distress than the individuals at the higher end of the distribution. This implied that already vulnerable individuals were more susceptible to the corrosive impact of financial distress than those who were well-off in SWB terms. While an average impact of financial distress on individual's SWB is of interest, from a policy perspective, it would be often more interesting to understand what happens at different segments of the society. Specifically, it is important for policy makers to examine how an intended policy works for different well-being strata of a society, instead of how it works on

[30] Money Advice Service, Over indebtedness in the UK 2017, September 2017; https://www.moneyadviceservice.org.uk/en/corporate/one-in-six-people-in-the-uk-burdened-with-financial-difficulties

an average. A policy that brings benefit on average but at a cost of certain segments of the society is not ethically acceptable. The analysis presented in this chapter reiterates that financial distress severely impacts well-being; simultaneously, it emphasises that the negative impact is the most acute for those who are already worse off. Therefore, this study suggests that any policy intervention intended to address financial distress should prioritise the individuals who are at the bottom of the SWB distribution where resilience to life events is the lowest.

However, the analysis presented in this chapter has some limitations. While it estimated the effect of financial distress based on respondent's already attained well-being, it ignored the differences in the effects based on household income. It is possible to create interaction terms between financial distress and quantiles of household income and estimate the effects of financial distress in different income quantiles. Moreover, given that both the financial distress and SWB measures are self-reported, interactions with an objective measure of household income would help to eliminate the potential endogeneity bias of these two subjective measures. Future research, given relevant data availability, would incorporate more objective measures of household financial situation, such as accumulated asset and debt holdings, in addition to current income.

Chapter 3 investigated adaptation to long-standing financial distress. The analysis found no evidence of adaptation to financial distress – SWB scores did not return to anywhere near the base level as would be expected if adaptation occurred. Therefore, the analysis indicated that well-being loss at the onset of financial distress was hard to regain. In addition, the analysis was also able to separate the well-being loss at the onset of financial distress from the well-being loss due to other distressful life events, such as job loss, divorce, or widowhood, which could potentially be associated with financial distress. These results impart two key messages for the policy makers. First, the incidence of financial distress has effects distinct from the other life events such as job loss or divorce. Therefore, financial distress demands attention in its own right. Second, like unemployment and poverty, financial distress is an event, to which people do not seem to adapt. Instead, long standing financial distress, like long-term unemployment, appears to have a 'scarring effect', where human natural adaptive capacity is not likely to 'heal the wound' over time. Therefore, the severity of the well-being impact of financial distress might be higher than one would generally think. Any policy aimed at improving people's well-being (e.g., providing counselling to the distressed) should take this severity into consideration and priority to financially distressed individuals.

The estimation strategy used in this chapter had two limitations. First, due to the paucity of observations in the subsequent spells, this chapter only considered the first spell of financial distress of an individual. Therefore, it ignored how individuals adapted to the situation when they re-entered financial distress after an earlier experience. Booker and Sucker (2010) examined adaptation to multiple spells of unemployment and their method could be extended to examine how individuals adapt in subsequent spells of financial distress. Second, the analysis only considered those who started reporting financial distress at some time after entering the survey and not who started the survey with an initial condition of financial distress. While this was exactly how previous literature (e.g., Clark *et al.*, 2016) modelled adaption to various life events, it could potentially raise questions of a selection bias. Future adaptation research, therefore, should deploy an econometric model (for example, one could estimate a probit in the first step and then include the mills ratio in the final regression) which would address this bias.

Chapter 4 examined the impact of financial distress on cognitive ability. It relied on a recently developed 'scarcity hypothesis' which describes how individuals in financial distress use up their cognitive resources in dealing with financial problems, and therefore, leave inadequate resources available for other tasks. This leads to an overall suboptimal cognitive performance, often referred to as a 'cognitive tax'. The results from the analysis confirmed the hypothesis that financial distress created a 'cognitive tax'. Individuals suffering from higher levels of financial distress were likely to attain lower scores across the different cognitive tests. The higher the level of financial difficulties, the higher the magnitude of the 'cognitive tax'. These results remained largely similar when the analysis used respondent's bill payment status as a proxy for financial distress. The results were also confirmed by replacing the five cognitive scores with a single measure of cognitive ability attained through a confirmatory factor analysis. In addition, the results remained broadly unchanged with or without general health status as a predictor of the cognitive ability.

Results obtained in this chapter indicated a new area of deprivations – deprivations of psychological resources due to financial distress. Policy makers often confine their attention to income deprivations. The less tangible components of well-being, such as cognitive abilities, remain elusive in the process of policy formulation. Cognitive impairment has severe repercussion for an individual's life. It not only affects decision making but also impedes the living of a normal everyday life. In turn, it has a long-lasting negative impact on quality of life.

This chapter, therefore, draws policy attention to cognitive impairment caused by financial distress.

Overall, the findings of this thesis call for public policy interventions as they indicate various ways household financial distress affects well-being. Policies may range from providing counselling services to financially distressed individuals to improving household balance sheets. Local governments can design community-based well-being programmes to provide intensive mental health counselling for the financially distressed people. They can also provide financial literacy services to improve household balanced sheets including guidelines for safe borrowing. The other set of policies may operate at the macro-level aiming at easing household financial distress in various capacities. For example, policies can compel utility companies to provide flexible payment options and instruct mortgage lenders to provide 'mortgage holidays'. This will provide the financially vulnerable households with a breathing space amid the burden of repayment. The Bank of England could also consider the well-being impact on heavily indebted households when increasing interest rate in response to higher inflation. Studies (e.g., Boyce and Wood, 2016) quantify that a 1% increase in interest rates is likely to increase mental health cases by 2.6% among the heavily indebted households across the United Kingdom. In a broader perspective, lower wages are often found to be associated with higher household debt (see for example, (Barba and Pivetti, 2008)). Therefore, policies aimed at preventing a persistent decline of wages would help to reduce household debt and financial distress. The United Kingdom has long pursued austerity and replaced welfare provisions with personal finances, (such as, universal credit policy) and ignored well-being costs associated with these policies. This has led to a widespread debt culture throughout the society. Many stakeholders[31] warn that Universal Credit policy is causing debt, sufferings and financial hardship for individuals and families. Findings of thesis suggest that government should re-examine the extent of financial distress associated with the universal credit policy and other policies related to household well-being. Above all, the thesis confirms how priority should be given to alleviating financial distress in advancing well-being in society.

[31] The National Housing Federation, the Scottish Federation of Housing Associations, Community Housing Cymru and the Northern Irish Federation of Housing Associations warn that the Universal Credit system is "flawed" and causing debt, suffering and hardship for the families they house. Source: https://www.housing.org.uk/press/press-releases/flawed-universal-credit-causing-debt-hardship-families-in-social-housing/

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