Essays on Macroeconomics: Sovereign Risk, US Monetary Policy Shock, and Economic Growth

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Abstract

This PhD thesis comprises three essays. Chapters 1 and 2 examine sovereign risk and the effects of US monetary policy spillovers in Latin America, while Chapter 3 analyses the relationship between sovereign debt and economic growth in Latin America, Central America, and the Caribbean. Chapters 1 and 3 provide empirical analyses, whereas Chapter 2 develops a theoretical sovereign debt model.

Chapter 1 investigates how unexpected US monetary policy shocks affect sovereign risk and macroeconomic conditions in Latin America. A contractionary US monetary policy shock increases sovereign bond yield spreads, reduces government bond market values, raises domestic lending rates, lowers bank lending to the corporate sector, and contributes to exchange rate depreciation, ultimately reducing industrial production. These transmission mechanisms are analysed using a panel vector autoregressive (PVAR) model with an external exogenous instrument that incorporates the orthogonalised US monetary policy surprise ($mps^{\perp}$). The results show that contractionary US monetary policy shocks increase sovereign risk and deteriorate domestic financial and macroeconomic conditions.

Chapter 2 develops a two-period sovereign default model to analyse how unexpected contractionary US monetary policy shocks influence sovereign risk in emerging markets. The model incorporates domestic households, sovereign bond issuance, and endogenous government default decisions under financial constraints. It extends the existing literature by introducing a dual liquidity structure and linking sovereign default probabilities to international interest rates.

Chapter 3 examines whether a sovereign debt threshold exists in the debt–growth relationship for Latin America, Central America, and the Caribbean. Motivated by the growing debate on whether public debt has nonlinear effects on economic growth, the chapter applies threshold models to assess the existence of debt thresholds across countries in the region. The empirical results provide no evidence of a statistically significant debt threshold beyond which economic growth systematically declines. Instead, the findings suggest that the effects of sovereign debt on growth depend on country-specific structural and institutional characteristics rather than on a universal numerical threshold.

Author's Declaration

I declare that this thesis is a presentation of original work and that I am the sole author. I have made a substantial and independent contribution to every stage of the research process, including the conceptualisation of the research questions, the development of the theoretical framework, data collection, empirical analysis, and interpretation of results. This thesis has not previously been submitted for any degree, diploma, or other qualification at this, or any other University. All sources of information and data used in this work have been properly acknowledged and are fully referenced in accordance with academic standards.

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Introduction

Over the past decades, emerging economies have become increasingly integrated into global financial markets, heightening their exposure to external monetary and financial shocks. Among these, United States monetary policy plays a particularly influential role. Changes in US monetary conditions shape global liquidity, risk premia, and capital flows, with especially pronounced effects on emerging sovereign bond markets. Latin American economies, characterised by historically volatile capital flows, significant sovereign borrowing, and banking systems heavily exposed to government debt, are particularly sensitive to these spillovers.

A growing empirical literature documents that US monetary policy shocks generate substantial international spillovers affecting output, inflation, exchange rates, and financial conditions in emerging economies. Early contributions such as Canova (2005) highlight the role of financial linkages in transmitting US monetary shocks to Latin America, while more recent studies provide refined evidence using high frequency identification techniques. Dedola et al. (2017) show that surprise US monetary tightenings lead to output contractions and currency depreciations across a wide range of economies, and Degasperi et al. (2021) document that US monetary tightenings induce global recessions through both financial and commodity price channels. Importantly, Camara (2025) distinguish between pure monetary policy shocks and information effects, demonstrating that only the former generate global financial tightening and recessionary dynamics.

Despite this growing body of work, important gaps remain. First, relatively little empirical evidence directly links exogenous US monetary policy shocks to sovereign risk dynamics in Latin America using state of the art monetary policy identification. Second, the theoretical sovereign default literature has largely abstracted from the role of external monetary shocks as a driver of sovereign risk and domestic investment dynamics. Third, while the relationship between public debt and economic growth has been widely studied, the existence of universal debt thresholds remains contentious, particularly in developing regions where institutional heterogeneity is substantial.

This PhD thesis addresses these gaps by examining the interaction between US monetary policy, sovereign risk, financial intermediation, and economic growth in Latin America. The central argument of the thesis is that US monetary policy shocks propagate to emerging economies through sovereign risk channels, affecting government bond val-

uations, banks' balance sheets, credit conditions, and ultimately real economic activity. By combining empirical and theoretical approaches, the thesis provides a comprehensive assessment of how external monetary conditions shape macroeconomic outcomes in emerging markets.

The first chapter empirically investigates the effects of exogenous US monetary policy shocks on sovereign risk and macroeconomic dynamics in Latin America. Using the orthogonalised monetary policy surprise proposed by Bauer & Swanson (2023), the chapter identifies unexpected changes in US monetary policy that are purged of information effects. These shocks are incorporated as exogenous variables in a panel vector autoregression framework following Paul (2020). The empirical analysis focuses on Brazil, Chile, and Colombia, three financially integrated Latin American economies with substantial domestic banking exposure to sovereign debt and sensitivity to external financial conditions.

The chapter advances the literature in several dimensions. First, it provides novel evidence that contractionary US monetary policy shocks significantly increase sovereign risk in Latin America, as reflected in higher long-term government bond yield spreads. Second, it documents a financial transmission mechanism operating through banks' balance sheets and exchange rate adjustments. As sovereign bond prices decline following US monetary tightening, banks' net worth deteriorates, leading to tighter credit conditions, higher lending rates, lower bank lending, and exchange rate depreciation. These financial effects contribute to a decline in industrial production by amplifying domestic financial constraints. This mechanism is consistent with the liquidity and risk channels emphasised in the financial frictions literature, including Gertler & Kiyotaki (2010), Gertler & Karadi (2011), and Bocola (2016). By explicitly linking sovereign risk, exchange rate dynamics, and domestic financial conditions to US monetary policy shocks, Chapter 1 contributes new empirical insights into the international transmission of monetary policy through emerging market financial systems.

The second chapter complements this empirical analysis by developing a theoretical framework that explains how external monetary shocks affect sovereign risk and investment decisions in emerging economies. Building on the sovereign default literature initiated by Eaton & Gersovitz (1981), the chapter departs from purely reputational models of sovereign borrowing by incorporating financial frictions and dual liquidity constraints, following the insights of Caballero & Krishnamurthy (2002). The model features a two-period economy in which sovereign default risk, household investment, and bond prices are jointly determined under the influence of external shocks.

The theoretical contribution of Chapter 2 lies in its explicit modelling of the interaction between sovereign risk and domestic investment in the presence of external monetary tightening. A contractionary US monetary policy shock raises international borrowing costs and lowers the market value of sovereign bonds, increasing default risk. This,

in turn, tightens domestic liquidity constraints, discouraging household investment and amplifying the real effects of external shocks. By linking sovereign bond pricing to investment decisions, the model provides a macro founded explanation for the empirical patterns documented in Chapter 1. Moreover, the chapter bridges the gap between the sovereign default literature and recent empirical work using high frequency monetary policy identification, grounding the analysis in the orthogonalised US monetary policy surprise of Bauer & Swanson (2023).

The third chapter shifts focus to the medium-run relationship between sovereign debt and economic growth in Latin America, Central America, and the Caribbean. While influential studies such as Reinhart & Rogoff (2009) and Aguiar & Amador (2021) document a negative association between high public debt and growth, subsequent research questions the existence of universal debt thresholds. Historical and cross country evidence suggests that the growth effects of debt depend critically on institutional quality, development level, and the allocation of investment across sectors (Panizza & Presbitero 2013, Salmon 2021).

Using panel data and penalised linear regression technique, Chapter 3 tests for the presence of threshold effects in the debt growth relationship across the region. Contrary to the notion of a critical debt to GDP ratio beyond which growth systematically deteriorates, the empirical results reveal no robust evidence of nonlinearity or structural breaks. These findings are consistent with studies such as Panizza & Presbitero (2014), Kourtellos et al. (2013), and De Soyres et al. (2022), and suggest that the macroeconomic consequences of sovereign debt are highly context dependent.

Chapter 1

Sovereign Risk and US Monetary Policy Spillover Effects

Abstract

This chapter studies how US monetary policy shocks affect Latin American countries' sovereign risk and macroeconomic conditions. The US tightening monetary policy affects the Latin American sovereign risk by increasing the sovereign bond yield spread and reducing the government bond market value. In turn, the contractionary monetary policy shock in the US raises the lending rate and decreases the level of bank loans to the corporate sector. As a result, industrial production declines. I interpret the data using a panel VAR with an external exogenous instrument, which integrates the orthogonalised US monetary policy surprise measure $mps^{\perp}$ as an exogenous variable directly into a panel vector autoregression methodology. I found that a contractionary monetary policy raises sovereign risk and affects macroeconomic fundamentals and financial variables in Latin America.

1.1 Introduction

There is growing interest in the effects of US monetary policy on emerging economies' sovereign bonds. Bowman et al. (2015) find that shifts in US monetary policy significantly influence government bond markets in emerging economies. Similarly, Cavaca & Meurer (2021) document strong spillover effects on sovereign bonds in Brazil, Chile, Colombia, and Peru. Akinci & Queralto (2024) and Almahadin (2022) further emphasize the substantial impact of US monetary policy on less developed economies, highlighting its broader global reach.

I hypothesise that an unexpected US contractionary monetary policy shock increases sovereign risk in Latin American countries. This heightened risk reduces the market value of long-term sovereign bonds, significantly impacting local banks due to their substantial exposure to these assets. As bond values decline, banks' net worth erodes, limiting their capacity to finance projects in the productive sector. Consequently, capital accumulation and industrial production decline. This mechanism aligns with the liquidity channel in the economic literature, where disruptions in financial intermediation negatively affect broader economic activity.

Recent research has provided extensive evidence on the global transmission of United States monetary policy. Camara (2025) disentangle pure policy shocks from information effects, showing that only the former generate global recessions and financial tightening, while the latter are associated with expansionary responses. Consistently, Degasperi et al. (2021) document that United States monetary tightenings induce worldwide recessions through both financial and commodity price channels, constraining foreign central banks' policy autonomy. Earlier evidence by Canova (2005) highlights that United States monetary shocks drive significant macroeconomic fluctuations across Latin America, mainly through financial linkages. Dedola et al. (2017) confirm that surprise United States tightenings lead to currency depreciations, output declines, and lower inflation across 36 economies, though with substantial heterogeneity related to country characteristics. Vicondoa (2019) show that both anticipated and unanticipated United States interest rate shocks exert quantitatively similar effects on emerging economies, amplified by tighter financial conditions. Together, these studies underscore the pervasive and multifaceted nature of United States monetary spillovers and the central role of financial channels in transmitting them globally.

Other empirical studies, such as Borrallo et al. (2016), examine the effects of US unconventional monetary policy on Latin America. Similarly, Lastauskas & Nguyen (2024) analyse the monetary policy impact on emerging economies. However, these studies do not specifically estimate the relationship between US monetary policy spillovers and sovereign risk in Latin America using Bauer & Swanson (2023)'s refined exogenous monetary policy shock. This chapter addresses this gap by incorporating US monetary policy surprises $mps^{\perp}$ as an exogenous shock within a panel vector autoregressive model (Paul 2020). Furthermore, it leverages a recently developed, more robust *mps* dataset by Swanson & Jayawickrema (2023), enhancing the precision and reliability of this monetary policy shock.

This study contributes to the literature on the relationship between local banks and sovereign risk, as examined by Brunnermeier et al. (2016) and Palmén (2020), among others. It also aligns with research on the macroeconomic effects of shocks on banks' balance sheets. In particular, it builds on the frameworks of Gertler & Kiyotaki (2010) and Gertler & Karadi (2011), which highlight how debt contract enforcement limitations

constrain banks' funding capacities, and Bocola (2016), which emphasises the role of the risk channel in these dynamics. However, this chapter extends the literature by linking sovereign risk directly to tightening US monetary policy. The analysis through the PVARX demonstrates that unexpectedly tighter US monetary policy lowers the market value of long-term sovereign bonds, weakening banks' financial positions due to their significant exposure to these assets. This monetary policy shock increases local lending rates, erodes net worth, and ultimately suppresses industrial production. These findings reveal a critical pathway through which US monetary policy spillovers affect Latin American economies. The initial panel regressions did not find evidence of this monetary policy shock effect.

A related study by Di Giovanni et al. (2022) examines how the global financial cycle transmits to local credit markets. They find that easing global financial conditions lowers borrowing costs, with banks more integrated into international capital markets effectively transmitting these conditions domestically. However, their analysis relies on the VIX forward looking volatility index from the Chicago Board Options Exchange as a proxy for global financial conditions, rather than employing the orthogonalised US monetary policy surprise $mps^{\perp}$ as the transmission mechanism. While the VIX is indirectly influenced by US monetary policy, it primarily reflects global market volatility rather than direct US monetary policy shocks.

This study employs a panel vector autoregression (PVAR) approach, incorporating the $mps^{\perp}$ from Bauer & Swanson (2023) as an external exogenous variable, following the specification of Paul (2020). After estimating the PVAR model, impulse response functions are derived to assess the effects of the orthogonalised US *mps* on key variables, including long-term government bond yield spreads, bank loan volumes, lending rates, and industrial production. To the best of my knowledge, this is the first study to apply a PVAR with an exogenous variable (VARX) approach (Paul 2020) using the refined *mps* from Bauer & Swanson (2023) in the context of Latin America. By explicitly linking sovereign risk to US monetary policy shocks, this approach provides novel insights into how these shocks propagate through sovereign risk channels, influencing macroeconomic and financial variables in emerging economies.

Following Primiceri (2005) and Ramey (2016), this study examines the impact of the nonsystematic component of US Federal Reserve monetary policy surprises on three Latin American economies: Brazil, Chile, and Colombia. The analysis explores how unexpected changes in US monetary policy affect macroeconomic and financial conditions in these countries. The chapter is structured as follows: Section 1.2 reviews the relevant literature. Section 1.3 details the data sources and methodology. Section 1.4 outlines the econometric specification. Section 1.5 presents the empirical findings, and Section 1.6 concludes.

1.2 Literature Review

This chapter contributes to several strands of literature. First, it advances research on the international transmission of shocks, particularly the cross-border spillover effects of monetary policy. While numerous studies have examined the spillovers of both conventional and unconventional monetary policy, e.g., Borrallo et al. (2016) and Lastauskas & Nguyen (2024), a key concern has been the exogeneity and validity of monetary policy shock (*mps*) measures (Bauer & Swanson 2023).

Borrallo et al. (2016) provide an empirical assessment of the transmission of United States unconventional monetary policy to emerging market economies, with particular emphasis on Latin America. They first examine the immediate financial market effects of major policy announcements, including the quantitative easing measures implemented in 2008 and 2009 and the communication surrounding prospective policy normalisation in 2013. Their results indicate that these episodes generated substantial movements in sovereign bond yields, exchange rates, and equity indices across emerging markets. Although Latin American asset prices initially appear to display an amplified reaction, this excess sensitivity largely vanishes once country specific macroeconomic characteristics are incorporated into the analysis. In a second stage, the authors estimate a parsimonious empirical model linking the magnitude of spillovers to domestic fundamentals, including inflation, credit default swap spreads, official reserve holdings, and market capitalisation. The findings suggest that differences in these macroeconomic indicators account for a significant share of the cross country heterogeneity in responses to United States monetary shocks, and imply that the effects of policy normalisation are likely to be comparatively stronger in Latin America than in other emerging regions.

Lastauskas & Nguyen (2024) investigate the international transmission of United States monetary policy by distinguishing between direct and indirect spillover channels within a global vector autoregression framework with stochastic volatility covering thirty two economies. Their empirical results indicate that an increase in the United States policy rate generates a statistically and economically significant contraction in output across emerging markets, with effects that are larger in magnitude and more persistent than those observed in advanced economies. The analysis further shows that deeper integration into global trade networks amplifies the adverse impact, producing a sharper initial decline in output followed by a somewhat faster recovery. In addition, spillovers are markedly stronger when monetary tightening coincides with heightened policy uncertainty in the United States, underscoring the role of expectations and financial conditions in the transmission mechanism. The findings also reveal substantial cross country heterogeneity among emerging markets, suggesting that structural characteristics and external exposures critically shape the domestic consequences of United States monetary shocks.

Nakamura & Steinsson (2018) investigate about the monetary non neutralities using evidence from high frequency responses of real interest rates, expected output growth and inflation. Their identification strategy assumes that unexpected changes in interest rates within a thirty minute window surrounding scheduled Federal Reserve announcements reflect news about monetary policy. In response to an interest rate increase, real and nominal interest rates rise roughly one for one across several years of the term structure, while the response of inflation is limited. Forecasts related to output growth increase, contrary to the predictions of standard models regarding a contractionary monetary policy. To account for these observations, they develop a model in which Federal Reserve announcements influence beliefs not only about monetary policy but also about other economic fundamentals. Their model suggests that such information effects are an important component of the overall causal impact of monetary policy shocks on GDP.

Bauer & Swanson (2023) reassess the macroeconomic and financial effects of United States monetary policy by constructing a novel measure of unexpected policy shocks based on high frequency responses of asset prices around Federal Open Market Committee announcements. By isolating monetary policy surprises that are orthogonal to information effects, the authors show that unexpected United States monetary tightening leads to pronounced and persistent contractions in United States output, investment, and employment, alongside significant adjustments in financial variables such as equity prices, and Treasury yields. Their results provide clear evidence of real effects of monetary policy shocks, showing that properly identified unexpected policy actions have substantial macroeconomic consequences. These findings underscore the central role of identification in monetary policy analysis and reaffirm the potency of United States monetary policy in shaping domestic macro financial conditions. By employing the refined $mps^{\perp}$ measure proposed by Bauer & Swanson (2023), this study mitigates bias and improves the accuracy of monetary policy spillover estimates. The work of Di Giovanni et al. (2022) is also related to spillover effects, though it uses the VIX index from the Chicago Board Options Exchange instead of the $mps^{\perp}$.

Di Giovanni et al. (2022) investigate how the Global Financial Cycle affects domestic credit market conditions in Turkey between 2003 and 2013. Drawing on administrative data covering all corporate credit transactions linked to bank balance sheets, they identify four main patterns. First, periods of easier global financial conditions are associated with lower borrowing costs and increased local lending. Second, domestic banks with higher exposure to international capital markets act as conduits for transmitting the Global Financial Cycle within the country. Third, reductions in borrowing costs are more pronounced for local currency loans than for foreign currency loans, reflecting the co movement of the uncovered interest rate parity premium with global financial conditions over time. Finally, data on collateral posted for new loans suggest that collateral constraints remain largely unchanged during the boom phases of the Global Financial

Cycle.

The second strand of literature examines the impact of high frequency monetary policy surprises on asset prices, e.g., Kuttner (2001); Cochrane & Piazzesi (2002); Bernanke & Kuttner (2005); Gurkaynak et al. (2005); Swanson (2021); Bauer & Swanson (2023). These studies investigate the impact of US monetary policy shocks on asset prices using different measures, analysing the orthogonalised measure from Bauer & Swanson (2023) in Latin America might be relevant for the region.

Kuttner (2001) provides one of the earliest and most influential empirical frameworks for identifying monetary policy shocks using high frequency financial market data. The study exploits changes in Federal Funds futures prices around Federal Open Market Committee announcements to separate anticipated policy actions from unanticipated monetary surprises. Kuttner shows that unexpected changes in the target Federal Funds rate generate immediate and economically significant movements in short and long term interest rates, as well as pronounced responses in equity prices, with contractionary surprises leading to declines in stock market valuations. A key contribution of the chapter is to demonstrate that conventional low frequency measures of monetary policy shocks substantially understate the effects of policy actions because they fail to account for changes in expectations embedded in financial prices. This insight laid the methodological foundation for subsequent high frequency identification approaches and remains central to the empirical literature on monetary policy transmission.

Cochrane & Piazzesi (2002) examines monetary policy shocks defined as unexpected movements in the federal funds target rate measured relative to daily interest rate data. By exploiting high frequency financial market information, the chapter constructs shocks that closely approximate unanticipated changes in policy. This approach rests on the premise that market expectations efficiently aggregate the extensive information set available both to the Federal Reserve and to private sector observers, thereby mitigating the omitted variables problem that often affects estimated policy reaction functions. Moreover, interest rate based forecasts are able to adjust to shifts in the central bank's implicit objectives over time. For example, if the Federal Reserve alters the relative weight it assigns to inflation and unemployment, financial market expectations will incorporate this change promptly. In contrast, standard vector autoregressions with fixed parameters may fail to capture such evolving behaviour, leading to a misclassification of anticipated policy adjustments as exogenous shocks. The methodology therefore offers a conceptually appealing and empirically robust means of identifying monetary policy innovations.

Recent research on the effects of United States monetary policy on financial markets has shown that Federal Reserve actions and expectations about future policy affect asset prices in different ways. Gurkaynak et al. (2005) find that changes in the federal funds rate alone do not fully capture these reactions; instead, two structural factors are required: one associated with the current level of the federal funds rate and another with the future path

of policy, the latter being closely linked to Federal Open Market Committee statements. Their estimates, based on intraday data since 1990, indicate that both policy actions and statements have significant effects on bond yields and stock prices, with statements having a particularly strong influence on long term Treasury yields. Similarly, Bernanke & Kuttner (2005) quantify the average effect of unanticipated monetary policy actions on equity prices, concluding that a hypothetical 25 basis point cut in the federal funds rate is associated, on average, with an increase of approximately one percent in broad stock indices, primarily through its impact on expected returns. Together, these studies demonstrate that both immediate changes in monetary policy and signals regarding its future trajectory are key determinants of financial asset valuation.

Swanson (2021) extend the high frequency identification approach of Gurkaynak et al. (2005) to disentangle distinct monetary policy surprises associated with changes in the federal funds rate, forward guidance, and large scale asset purchases for each meeting of the Federal Open Market Committee between July 1991 and June 2019. By constructing separate measures of unexpected movements in these instruments, the chapter provides a unified framework for comparing conventional and unconventional policy actions over an extended sample that spans both normal and effective lower bound periods. The empirical evidence shows that forward guidance and large scale asset purchases exert substantial and statistically significant effects on Treasury yields across maturities, corporate bond yields, equity prices, and exchange rates. The magnitude of these effects is broadly comparable to that of unexpected changes in the policy rate during periods in which the latter was unconstrained. Moreover, the responses of financial variables are generally highly persistent, indicating that markets interpret these policy innovations as signalling durable shifts in the expected path of monetary conditions, with the notable exception of the particularly large March 2009 announcement associated with the first round of quantitative easing.

A third relevant strand focuses on the effects of high frequency monetary policy surprises on macroeconomic variables. Key theoretical and empirical contributions include Gertler & Kiyotaki (2010), Faust & Rogers (2003), Gertler & Karadi (2015), Ramey (2016), Brunnermeier et al. (2016), Bocola (2016), Stock & Watson (2018), and Palmén (2020), among others. Among these effects, the impact of monetary policy shocks on long-term government bonds is particularly relevant.

Gertler & Kiyotaki (2010) develop a canonical macroeconomic framework that integrates credit market frictions into the analysis of aggregate economic activity, with particular reference to the dynamics observed during the global financial crisis. Building on earlier contributions in the literature, the authors construct a model in which disruptions to financial intermediation impair the flow of credit, amplify balance sheet constraints, and transmit financial distress to the real economy. Within this structure, adverse shocks to intermediary net worth raise external finance premia, restrict lend-

ing, and generate pronounced contractions in investment and output. The framework therefore provides a coherent mechanism through which financial sector disturbances can evolve into systemic crises with substantial macroeconomic consequences. The authors also use the model to evaluate the effectiveness of credit market interventions undertaken by central banks and fiscal authorities, including liquidity provision and asset purchases. These policies operate by stabilising intermediary balance sheets, compressing risk premia, and restoring the supply of credit, thereby attenuating the decline in real activity. In doing so, the chapter offers a structured interpretation of both the origins of the crisis and the channels through which policy interventions can mitigate its effects.

Gertler & Karadi (2015) analyse the transmission of monetary policy shocks within a vector autoregression that jointly incorporates macroeconomic and financial variables. Using high frequency surprises around policy announcements as external instruments, they identify exogenous shifts in monetary policy and show that the resulting responses of output and inflation are consistent with those typically obtained in standard monetary VAR frameworks. However, they document a marked asymmetry between movements in short term policy rates and broader financial conditions. Relatively modest changes in short rates are associated with pronounced increases in borrowing costs, reflecting substantial adjustments in both term premia and credit spreads. This evidence highlights the central role of financial intermediation and risk pricing in amplifying the real effects of policy shocks. The authors further demonstrate that forward guidance materially strengthens the transmission mechanism, as expectations regarding the future path of policy contribute significantly to the observed adjustments in financial markets and, ultimately, to macroeconomic outcomes.

Ramey (2016) review and synthesise the current understanding of the shocks that drive economic fluctuations. Her work first illustrates the challenge of identifying macroeconomic shocks and subsequently provides an overview of recent methodological innovations for their identification. It proceeds to examine in detail three main types of shocks: monetary, fiscal, and technology shocks. The author conclude that, compared with twenty years ago, our understanding of the shocks that drive economic fluctuations has improved substantially. Bocola (2016) and Palmén (2020) emphasise the role of sovereign default risk in shaping macroeconomic outcomes. Empirical evidence highlights the significant influence of US monetary policy on Latin American economies. For example, Coronado et al. (2020) show that macroeconomic variables in Brazil, Chile, Colombia, and Mexico strongly respond to positive US economic policy shocks. Additionally, Kalemli-Özcan (2019) find that US monetary policy has a larger effect on emerging economies than on developed ones, primarily through increased credit costs that constrain corporate funding, a critical factor for firms in Latin America.

Faust & Rogers (2003) examine the contribution of monetary policy shocks to exchange rate dynamics by employing an inference framework that relaxes conventional

and potentially restrictive identifying assumptions in structural vector autoregressions. Their approach allows for a broader set of admissible models and therefore a more cautious interpretation of the role of policy innovations. The authors show that the peak response of the exchange rate to a monetary policy shock may occur either almost immediately or with a delay, indicating that the timing of adjustment is not tightly constrained by the data. They further find that, under all otherwise reasonable identification schemes, monetary policy shocks generate substantial deviations from uncovered interest rate parity, suggesting that exchange rate movements are not easily reconciled with standard arbitrage conditions. At the same time, the proportion of exchange rate variance attributable to monetary policy shocks appears smaller than previously reported in the literature. Taken together, these results are consistent with exchange rate overshooting in a broad sense, yet they imply that the classic Dornbusch mechanism cannot fully account for the observed dynamics and cast doubt on the view that monetary policy shocks constitute the primary driver of exchange rate volatility.

Spillover effects from US monetary policy are especially pronounced in Latin America due to the region's integration into global financial markets. Hofmann & Takáts (2015) identify substantial spillovers in both small industrialised and emerging economies, while Albagli et al. (2019) document strong impacts on bond markets, particularly after the 2008 financial crisis. Their findings suggest distinct transmission mechanisms: developed economies primarily respond to changes in term premia, while emerging economies react to shifts in expected monetary policy rates. However, further analysis is often constrained by limited data availability in less developed countries, especially regarding comprehensive long-term yield curve datasets (Albagli et al. 2019).

Among key studies close to this work are find: Camara (2025) who provides a key reinterpretation of the international spillovers of United States monetary policy by decomposing monetary policy surprises into two components: a pure monetary policy shock and a "Fed Response to News" component. Following the identification strategy of Bauer & Swanson (2023), the author shows that a United States monetary tightening driven by a pure policy shock leads to global recessions, exchange rate depreciation, and tighter financial conditions, whereas a tightening driven by the Fed's response to news results instead in economic expansion, exchange rate appreciation, and looser financial conditions. This distinction reconciles traditional and more recent findings on the spillovers of United States monetary policy, highlighting the importance of disentangling information effects from pure policy shocks to better understand the international transmission of Federal Reserve decisions.

Degasperi et al. (2021) found new evidence on the global transmission of United States monetary policy, employing a modern identification strategy and a comprehensive dataset of 30 advanced and emerging economies. Their results confirm that United States monetary tightening generate global recessions, reinforcing the view that United States

policy shocks exert pervasive macroeconomic effects worldwide. Importantly, the authors uncover a novel transmission channel operating through commodity and oil prices, whereby tighter United States monetary policy exerts downward pressure on global inflation. In addition, they show that financial channels play a key role in propagating United States shocks to real variables, as tighter conditions in global financial markets limit foreign central banks' ability to stabilise domestic economies by weakening the transmission of countercyclical monetary policy along the medium to long term segments of the yield curve. These findings highlight the multi-faceted nature of United States monetary spillovers and the constraints they impose on monetary autonomy abroad.

Canova (2005) examines how United States shocks are transmitted to eight Latin American economies, identifying United States disturbances through sign restrictions and treating them as exogenous to the region. The study finds that United States monetary policy shocks generate significant macroeconomic fluctuations across Latin America, while United States real demand and supply shocks have limited effects. Notably, financial linkages play a crucial role in the transmission mechanism, as both floating and currency board regimes exhibit similar output responses but differ markedly in inflation and interest rate dynamics. United States shocks also account for a substantial share of the variability in Latin American macroeconomic variables, leading to continent wide cyclical movements and, in some cases, destabilising nominal exchange rate effects. These findings underscore the systemic importance of United States monetary policy in shaping macro financial conditions across emerging economies in the region.

Dedola et al. (2017) investigate the international spillovers of United States monetary policy shocks across 36 advanced and emerging economies, analysing their effects on both macroeconomic and financial variables. They find that a surprise United States monetary tightening typically triggers currency depreciation against the United States dollar, declines in industrial production and real GDP, higher unemployment, and lower inflation, particularly in advanced economies. The authors also document significant heterogeneity in asset price movements and cross border portfolio and banking flows, yet they find no systematic relationship between the magnitude of country responses and structural characteristics such as income level, exchange rate flexibility, financial openness, trade integration with the United States, dollar exposure, or commodity dependence. These results highlight the broad and asymmetric transmission of United States monetary policy and the difficulty of predicting the intensity of spillovers based on observable country fundamentals alone.

Vicondoa (2019) distinguishes between anticipated ("news") and unanticipated ("surprise") United States monetary policy shocks, identified through Fed Funds futures contracts. Anticipated shocks are defined as the expected change in the policy rate orthogonal to expected United States business cycle conditions, while unanticipated shocks correspond to the one step ahead forecast error. Using a Panel VAR for a group of emerging

economies, the author finds that both types of shocks exert significant and quantitatively similar effects on real activity. In particular, an anticipated 25 basis point contractionary United States interest rate shock leads to a 0.5 per cent decline in GDP relative to trend two quarters before the shock materialises. Moreover, the increase in the United States BAA corporate spread in response to both types of shocks amplifies the downturn in emerging economies, underscoring the role of financial conditions in the transmission mechanism. After accounting for anticipation effects, United States interest rate shocks are found to explain around 14 per cent of business cycle fluctuations in emerging markets, highlighting the pervasive influence of United States monetary policy on global economic dynamics.

Despite these contributions, prior studies do not explicitly examine the relationship between US monetary policy spillovers and sovereign risk in Latin America using refined monetary policy shock measures. To address this gap, this study incorporates orthogonalised US monetary policy surprises ($mps^{\perp}$) from Bauer & Swanson (2023) as exogenous shocks in a panel vector autoregressive (PVAR) framework, following the VARX specification proposed by Paul (2020). To enhance precision and robustness, it uses the advanced *mps* dataset developed by Swanson & Jayawickrema (2023), which spans 1988–2019 and includes 880 Federal Reserve Chair speeches and 322 Federal Open Market Committee (FOMC) announcements.

This study addresses a critical gap in the literature by examining how refined orthogonalised $mps^{\perp}$ shocks affect sovereign risk in Latin America. It extends the work of Paul (2020) by broadening the analysis to include not only macroeconomic variables like industrial production but also key financial indicators such as bank loan volumes, lending rates, and sovereign bond yield spreads.

This comprehensive approach is essential for understanding Latin America's historical economic crises, often rooted in poorly designed fiscal and monetary policies (Kehoe et al. 2020). The study emphasizes the nonsystematic component of US monetary policy shocks, as advocated by Primiceri (2005) and Ramey (2016), who stress the importance of isolating these elements to accurately assess causal effects. While systematic components often follow Taylor rule behavior, it is the unexpected deviations, that is, nonsystematic shocks, that provide deeper insights into the real effects of monetary policy. This research builds on those insights by focusing on the nonsystematic $mps^{\perp}$ component as a key driver of macroeconomic and financial fluctuations in Latin America.

By leveraging orthogonalised $mps^{\perp}$ shocks, applying an advanced PVAR (VARX) methodology, and integrating a broad set of macroeconomic and financial variables, this study contributes to a deeper understanding of how US monetary policy affects economic outcomes in Latin America. While the preceding literature establishes the importance of international monetary spillovers and sovereign risk dynamics, it does not explicitly articulate the mechanisms through which orthogonalised US monetary policy shocks are

expected to affect sovereign default risk, nor why these effects may vary with the ownership structure of sovereign debt. The following section develops the conceptual framework underpinning the empirical analysis and derives the research hypotheses tested in this chapter.

1.3 Conceptual Framework and Hypotheses

The literature reviewed in the previous section provides extensive evidence that United States monetary policy exerts important spillover effects on emerging market economies through a combination of financial and macroeconomic transmission channels. While previous studies have documented substantial effects on exchange rates, capital flows, domestic credit conditions, sovereign bond yields, and economic activity (Canova 2005, Hofmann & Takáts 2015, Dedola et al. 2017, Degasperi et al. 2021, Camara 2025), relatively little attention has been devoted to understanding how these external monetary disturbances influence sovereign default risk in Latin America. Moreover, existing evidence has largely relied on conventional measures of monetary policy surprises, which are potentially contaminated by central bank information effects. By employing the orthogonalised monetary policy shocks proposed by Bauer & Swanson (2023), this chapter isolates the exogenous component of unexpected monetary policy changes and provides a cleaner identification of their causal effects on sovereign risk.

This section develops the conceptual framework underpinning the empirical analysis and derives the hypotheses investigated throughout the chapter. Two central propositions emerge from the literature. First, contractionary United States monetary policy shocks are expected to increase sovereign default risk in Latin American economies through a sequence of interconnected financial and macroeconomic channels. Second, the magnitude of this transmission is unlikely to be homogeneous across countries. Instead, it is expected to depend on the composition of sovereign debt ownership, with the degree of domestic investor participation (home bias) moderating the response of sovereign risk to external monetary tightening.

1.3.1 External Monetary Shocks and Sovereign Default Risk

The international transmission of United States monetary policy is fundamentally rooted in the central role of the US dollar within the global financial system. Because the United States issues the world's dominant reserve currency and hosts the largest financial markets, changes in Federal Reserve policy alter global financial conditions well beyond US borders. Unexpected increases in US interest rates raise the relative attractiveness of dollar-denominated assets, triggering an international portfolio reallocation toward safer US securities and away from riskier emerging market assets. Consequently, countries that

rely more heavily on external financing become particularly vulnerable to sudden shifts in international investor sentiment.

This transmission mechanism can be understood as operating through several mutually reinforcing channels. The first is the portfolio rebalancing channel. Following an unexpected monetary tightening, the increase in yields on US Treasury securities raises the risk-adjusted return available in advanced economies. International investors consequently reduce their exposure to emerging market assets and reallocate capital towards US financial markets. This adjustment generates capital outflows, declining asset prices, and upward pressure on sovereign bond yields across emerging economies. Numerous empirical studies have documented this mechanism, showing that US monetary tightening is consistently associated with weaker financial conditions, lower capital inflows, and higher sovereign financing costs in emerging markets (Borrallo et al. 2016, Dedola et al. 2017, Camara 2025).

A second mechanism operates through the exchange rate channel. Capital outflows generated by portfolio rebalancing place downward pressure on domestic currencies, increasing exchange rate volatility and raising the domestic currency value of foreign-currency liabilities. For governments with substantial external debt exposure, currency depreciation directly increases debt servicing obligations measured in domestic currency. Simultaneously, depreciation may fuel imported inflation, forcing domestic monetary authorities to tighten policy despite weakening economic activity. These dynamics amplify financial stress and further increase sovereign borrowing costs.

The third transmission mechanism concerns the domestic financial channel. A contractionary US monetary policy shock tightens global financial conditions, increasing borrowing costs faced by domestic banks and firms. Financial intermediaries experience tighter balance sheet constraints, credit becomes more expensive, and lending activity slows considerably. As emphasised by Gertler & Kiyotaki (2010) and Gertler & Karadi (2015), deteriorating financial conditions amplify macroeconomic fluctuations because increases in external finance premia restrict investment and reduce aggregate demand. Consequently, lower private investment and weaker credit growth contribute to slower economic growth and declining fiscal revenues.

The fourth channel operates through the macroeconomic and fiscal transmission mechanism. Lower investment, weaker domestic demand, tighter financial conditions, and declining exports jointly reduce economic activity. The resulting slowdown weakens tax revenues precisely when governments face higher interest payments on newly issued debt. This combination deteriorates fiscal balances and increases debt servicing burdens, thereby reducing fiscal sustainability. As sovereign debt dynamics worsen, investors require larger risk premia to compensate for the increased probability of future fiscal distress or sovereign default.

These mechanisms should not be interpreted as independent processes but rather as

mutually reinforcing components of a broader financial amplification mechanism. Rising sovereign bond yields increase governments' refinancing costs, which further deteriorate debt sustainability. Simultaneously, weaker macroeconomic conditions reduce fiscal capacity, reinforcing investors' concerns regarding sovereign solvency. This interaction generates a feedback loop between sovereign risk and domestic financial conditions similar to the sovereign-bank nexus described by Brunnermeier et al. (2016) and Bocola (2016). Consequently, even relatively modest external monetary shocks may produce disproportionately large changes in sovereign risk when financial vulnerabilities are already elevated.

Recent advances in the identification of monetary policy shocks support the theoretical motivation underlying this chapter. Earlier measures of monetary policy surprises frequently conflated genuine policy innovations with information revealed by Federal Reserve announcements regarding future macroeconomic conditions. As demonstrated by Bauer & Swanson (2023), conventional high-frequency surprises partly reflect changes in market expectations about economic fundamentals rather than exogenous monetary policy actions. This distinction is particularly important when analysing international spillovers because foreign investors respond differently to pure policy shocks than to information about future US economic prospects. By orthogonalising monetary policy surprises with respect to information effects, the $mps^{\perp}$ measure isolates the unexpected component of monetary policy decisions that is truly exogenous to contemporaneous macroeconomic news.

Using this refined identification strategy substantially improves the interpretation of spillover effects. As shown by Camara (2025), a pure contractionary monetary policy shock generates markedly different international responses from those associated with the Federal Reserve's endogenous reaction to favourable economic news. While the latter may coincide with stronger global economic activity, an orthogonalised monetary tightening unambiguously deteriorates international financial conditions, increases borrowing costs, and reduces economic activity across emerging markets. Consequently, employing orthogonalised monetary policy surprises provides a more reliable framework for evaluating whether external monetary tightening directly affects sovereign default risk.

Latin American economies are expected to be particularly sensitive to these external financial disturbances. Compared with advanced economies, many countries in the region exhibit greater dependence on international capital markets, shallower domestic financial systems, relatively volatile capital flows, and a historical reliance on external borrowing to finance fiscal deficits. These structural characteristics increase exposure to fluctuations in global liquidity and international investor sentiment. Empirical evidence consistently shows that United States monetary policy shocks exert stronger macroeconomic effects in emerging economies than in advanced countries, primarily through tighter financial conditions and higher sovereign borrowing costs (Kalemli-Özcan 2019, Degasperi et al. 2021,

Camara 2025). Therefore, Latin America provides an appropriate setting for examining the relationship between external monetary shocks and sovereign default risk.

Considering this, the theoretical arguments and empirical evidence reviewed above suggest that contractionary US monetary policy shocks should systematically increase sovereign default risk through their effects on capital flows, exchange rates, domestic credit conditions, fiscal sustainability, and government borrowing costs. This leads to the first hypothesis examined in this chapter.

Hypothesis 1. *Positive orthogonalised United States monetary policy shocks increase sovereign default risk in Latin American economies.*

1.3.2 Home Bias as a Conditioning Factor

Although external monetary shocks affect global financial conditions, the transmission of these shocks is unlikely to be uniform across emerging economies. A growing body of literature argues that domestic structural characteristics shape countries' exposure to international financial disturbances. Differences in financial openness, exchange rate regimes, fiscal credibility, external indebtedness, and institutional quality have all been identified as potential sources of heterogeneity in the international transmission of monetary policy. However, one characteristic that has received comparatively little attention in the literature on monetary spillovers is the ownership structure of sovereign debt.

In particular, the degree of *home bias* in sovereign bond markets may substantially influence the sensitivity of sovereign risk to external financial shocks. Home bias refers to the tendency of domestic investors to hold a large share of their own government's debt relative to what would be predicted by internationally diversified portfolios. Although standard portfolio theory suggests that investors should diversify internationally, sovereign bond holdings remain strongly concentrated within national borders. This persistent home bias has been documented across both advanced and emerging economies and reflects a combination of information advantages, regulatory incentives, transaction costs, currency considerations, and institutional preferences.

From a theoretical perspective, domestic investors differ fundamentally from foreign investors in their behaviour during periods of financial stress. Foreign institutional investors typically manage globally diversified portfolios and continuously rebalance their asset allocations in response to changes in relative returns and global risk conditions. Consequently, unexpected increases in US interest rates generate an incentive to reduce exposure to emerging market assets and increase holdings of relatively safer US securities. This process of portfolio reallocation may trigger sudden capital outflows, sharp increases in sovereign bond yields, and declining liquidity in domestic government debt markets.

Domestic investors, by contrast, generally exhibit longer investment horizons and

possess superior information regarding domestic macroeconomic conditions, fiscal institutions, and political developments. Their investment decisions are therefore less sensitive to temporary changes in international financial conditions. Furthermore, domestic financial institutions frequently hold sovereign bonds for prudential, liquidity management, or regulatory purposes rather than purely speculative motives. Commercial banks, pension funds, insurance companies, and other institutional investors often maintain relatively stable government bond portfolios even during periods of heightened global uncertainty. Consequently, domestic ownership may provide an important stabilising force that partially offsets fluctuations in foreign capital flows.

This distinction becomes particularly relevant following contractionary US monetary policy shocks. When sovereign debt is predominantly held by foreign investors, portfolio rebalancing generates larger capital outflows, lower demand for government securities, and more pronounced increases in sovereign yields. Governments facing large refinancing needs must therefore issue debt at considerably higher interest rates, increasing debt servicing costs and worsening fiscal sustainability. Financial markets internalise these deteriorating fundamentals by demanding higher sovereign risk premia, thereby increasing perceived default probabilities.

Conversely, when a larger share of government debt is held domestically, the transmission of external financial shocks may become considerably weaker. Stable demand from resident investors reduces the need for governments to compete aggressively for international capital during periods of global financial tightening. Then, sovereign bond prices become less sensitive to fluctuations in international portfolio flows, mitigating increases in sovereign yields and preserving more favourable financing conditions. In this sense, home bias acts as a financial buffer that dampens the pass-through of global monetary shocks into domestic sovereign risk.

The stabilising role of home bias may also operate through several complementary mechanisms. First, stronger domestic demand for government securities reduces rollover risk by providing governments with a more reliable investor base during periods of financial turbulence. Second, lower dependence on foreign financing reduces exposure to sudden stops and reversals in international capital flows, phenomena that have historically characterised many financial crises in emerging economies. Third, more stable sovereign bond markets contribute to financial stability by reducing valuation losses on bank balance sheets, thereby weakening the adverse feedback loop between sovereign distress and domestic financial institutions. Lastly, lower sovereign borrowing costs improve fiscal sustainability by limiting increases in interest expenditures during periods of external monetary tightening.

Nevertheless, the relationship between home bias and sovereign risk is not entirely unambiguous. A growing literature on the sovereign-bank nexus argues that excessive domestic holdings of government debt may increase the exposure of domestic financial

institutions to sovereign distress. Under this view, large domestic sovereign portfolios may amplify rather than mitigate financial crises because deteriorating sovereign creditworthiness directly weakens bank balance sheets, reducing credit supply and further worsening macroeconomic conditions. Such feedback mechanisms have been extensively documented during the European sovereign debt crisis and highlight the possibility that home bias simultaneously acts as both a source of resilience and a potential source of financial fragility.

Despite these competing theoretical arguments, several considerations suggest that the stabilising effects of home bias are likely to dominate within the context examined in this chapter. Firstly, the empirical analysis focuses on the immediate transmission of exogenous external monetary shocks rather than on the endogenous evolution of domestic banking crises. Secondly, the principal mechanism under investigation concerns the response of international investors to changes in US monetary policy. Since orthogonalised monetary policy shocks primarily affect global portfolio allocation decisions, countries that rely less heavily on foreign investors should experience smaller financial disruptions following external monetary tightening. Thirdly, Latin American sovereign debt markets remain considerably more exposed to fluctuations in international capital flows than many advanced economies, making the composition of debt ownership particularly relevant for understanding differences in sovereign risk dynamics across countries.

This argument is also consistent with the broader literature on the Global Financial Cycle. As international financial conditions tighten, global investors reduce risk exposure across emerging markets, generating synchronised movements in capital flows, exchange rates, and sovereign yields. However, countries exhibiting stronger domestic investor participation may be better positioned to absorb these external disturbances because resident investors provide an alternative source of demand for government securities. Consequently, home bias moderates the transmission of external financial shocks by reducing governments' dependence on internationally mobile capital.

Taken together, these theoretical considerations imply that the ownership structure of sovereign debt constitutes an important conditioning factor in the transmission of external monetary policy shocks. Rather than affecting sovereign risk directly, home bias is expected to alter the magnitude of the relationship between US monetary policy shocks and sovereign default risk. Specifically, greater domestic ownership of government debt should reduce the sensitivity of sovereign borrowing costs to changes in global financial conditions. This reasoning leads to the second hypothesis examined in this chapter.

Hypothesis 2. *The effect of orthogonalised United States monetary policy shocks on sovereign default risk is weaker in countries exhibiting a higher degree of home bias in sovereign debt holdings.*

1.3.3 From the Conceptual Framework to the Empirical Analysis

The conceptual framework developed above highlights that the transmission of United States monetary policy shocks to sovereign default risk is inherently dynamic. Changes in global financial conditions do not affect sovereign risk instantaneously through a single channel. Instead, external monetary tightening initiates a sequence of mutually reinforcing adjustments involving capital flows, exchange rates, domestic financial conditions, economic activity, fiscal sustainability, and sovereign borrowing costs. These interactions generate feedback mechanisms that evolve over time and are likely to differ across countries depending on their financial structure and exposure to international capital markets.

Importantly, the existence of these multiple transmission channels implies that the overall effect of external monetary shocks cannot be inferred from any single macroeconomic or financial variable in isolation. For example, higher sovereign yields may simultaneously reflect tighter global financial conditions, deteriorating fiscal expectations, weaker economic activity, or changes in investors' risk appetite. Similarly, exchange rate depreciation may either amplify sovereign vulnerabilities by increasing the domestic currency value of external debt or partially offset adverse effects through improvements in external competitiveness. The impact therefore depends on the interaction among several endogenous variables operating simultaneously within the economy.

These considerations motivate the adoption of a multivariate dynamic framework capable of capturing the joint evolution of macroeconomic and financial variables following exogenous monetary policy shocks. Rather than estimating separate reduced-form relationships, this chapter employs a Panel Vector Autoregressive model with exogenous variable (PVARX), following the approach proposed by Paul (2020). This framework explicitly recognises that sovereign risk, economic activity, domestic credit, lending rates, and other macro-financial indicators evolve jointly through endogenous feedback mechanisms while allowing orthogonalised United States monetary policy surprises to enter as an exogenous source of international financial disturbances.

The use of orthogonalised monetary policy shocks represents a key methodological contribution of this chapter. Conventional measures of monetary policy surprises may capture not only unexpected policy actions but also information released by the Federal Reserve regarding future macroeconomic conditions. Consequently, empirical estimates based on traditional high-frequency surprises may confound the effects of genuine monetary policy innovations with changes in market expectations about future economic fundamentals. Following Bauer & Swanson (2023), this study instead employs the orthogonalised monetary policy shock ($mps^{\perp}$), which removes the information component embedded in Federal Reserve announcements and therefore provides a cleaner measure of exogenous monetary policy innovations.

Using $mps^{\perp}$ is particularly important when analysing international spillovers because foreign investors react differently to pure monetary policy shocks than to revisions in expectations regarding future United States economic conditions. As demonstrated by Camara (2025), these two types of announcements generate markedly different responses in global financial markets. By isolating the exogenous component of Federal Reserve decisions, this chapter identifies the causal effect of unexpected monetary tightening on sovereign default risk rather than the broader consequences of changing macroeconomic expectations.

The conceptual framework also provides a clear rationale for investigating heterogeneity across countries. While the first hypothesis concerns the average effect of external monetary shocks on sovereign default risk, the second hypothesis recognises that this relationship is likely to depend on structural characteristics of domestic financial markets. In particular, the ownership composition of sovereign debt determines the extent to which governments rely on internationally mobile capital for debt financing. Countries with relatively low levels of home bias are expected to experience stronger capital flow reversals during periods of global monetary tightening, leading to larger increases in sovereign borrowing costs and higher perceived default risk. Conversely, greater participation by domestic investors should provide a more stable funding base capable of partially insulating sovereign debt markets from temporary fluctuations in global investor sentiment.

Nevertheless, the moderating role of home bias remains an empirical question. Although theory suggests that domestic ownership may stabilise sovereign debt markets by reducing dependence on foreign investors, excessive domestic holdings may simultaneously strengthen the sovereign-bank nexus and increase the vulnerability of domestic financial institutions to sovereign distress in Brazil, Chile, and Colombia. The overall effect therefore depends on the relative strength of these opposing mechanisms and cannot be determined a priori. Examining this relationship empirically constitutes one of the principal contributions of this chapter.

Accordingly, the empirical analysis is designed to evaluate both dimensions of the conceptual framework. First, it estimates the average dynamic response of sovereign default risk and other macro-financial variables to orthogonalised US monetary policy shocks. Second, it investigates whether these responses differ systematically according to the degree of home bias observed across Latin American sovereign debt markets. By combining recent advances in the identification of monetary policy shocks with a dynamic panel framework, the chapter contributes new evidence on how external financial conditions shape sovereign risk in emerging economies and whether domestic sovereign debt ownership can mitigate these international spillover effects.

Taken together, the conceptual framework presented in this section establishes the theoretical foundations for the empirical analysis that follows. It links recent developments in the literature on international monetary spillovers, sovereign risk, and portfolio

allocation while providing clear, testable hypotheses regarding both the average effects of external monetary policy shocks and the moderating role of home bias. The following sections describe the data, variables, and econometric methodology employed to evaluate these hypotheses.

The empirical analysis focuses on Brazil, Chile, and Colombia because these economies provide an informative setting for examining the proposed transmission mechanisms while exhibiting meaningful variation in sovereign risk outcomes. All three countries are major Latin American emerging economies with substantial exposure to international capital markets and documented sensitivity to global financial conditions. At the same time, they differ in their fiscal institutions, sovereign debt structures, and historical responses to episodes of external financial stress. Although restricting the analysis to Brazil, Chile, and Colombia may be viewed as a limitation, this choice is largely dictated by data availability. Specifically, long-term government bond yield spread data, the dependent variable employed in this study, were unavailable for other major Latin American economies, such as Mexico, Peru, and Argentina.

Chile has maintained a long-standing reputation for fiscal discipline and stable access to international capital markets, whereas Brazil has experienced repeated episodes of refinancing pressures and heightened sovereign risk despite avoiding outright default during the sample period. Colombia represents an intermediate case, combining sustained market access with occasional episodes of domestic fiscal stress. This cross-country heterogeneity provides useful variation for evaluating both the average effect of orthogonalised US monetary policy shocks on sovereign default risk and the extent to which domestic sovereign debt ownership moderates these effects.

Moreover, since none of the three countries experienced a formal sovereign default during the sample period, sovereign risk is primarily reflected in changes in sovereign spreads and financing conditions rather than discrete default events, making them particularly suitable for analysing sovereign vulnerability within a modern market-based framework of sovereign risk. Moving now to the data and measurement section.

1.4 Data and Measurement

The monthly monetary policy surprise measure proposed by Bauer & Swanson (2023) is used to assess its impact on financial and macroeconomic variables in Latin America. Key variables include industrial production, bank loan volumes, lending rates, and sovereign bond yield spreads. The sovereign debt yield spread variable measures outstanding long-term central government debt denominated in billions of local currency. The measure therefore captures the stock of government liabilities independently of the ownership structure, which is analysed separately through the domestic debt ownership variable.

1.4.1 Panel Data Properties

Before proceeding with the estimations presented in this chapter, Fisher-type panel unit root tests based on the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) statistics were conducted. Since the industrial production and bank lending variables enter the model as cyclical components extracted using the Christiano–Fitzgerald filter, the stationarity tests were performed on the filtered series. The results indicate that lending rates, industrial production cycles, exchange rate, and bank lending cycles are stationary in levels according to both tests. Sovereign yield spreads also display evidence of stationarity, although the results are somewhat weaker under the ADF specification. Overall, the findings support estimating the PVAR model in levels. Since none of the variables is integrated of order one, panel cointegration tests are not required. See Table 1.1.

Table 1.1: Fisher-Type Panel Unit Root Tests

Variable	ADF (Z-stat, p-value)	PP (Z-stat, p-value)
Spread	-1.311 (0.096)	-1.844 (0.033)
LR	-1.947 (0.026)	-1.786 (0.037)
IP Cycle	-2.367 (0.009)	-3.420 (0.000)
Loans Cycle	-2.287 (0.011)	-3.788 (0.000)
Exchange Rate	-5.115 (0.000)	-13.724 (0.000)

Notes: Fisher-type panel unit root tests based on Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) procedures following Maddala & Wu (1999) and Choi (2001). The null hypothesis is that all panels contain a unit root. Reported values are inverse normal (Z) statistics with p-values in parentheses. Spread denotes sovereign yield spreads, LR lending rates, IP Cycle, the cyclical component of industrial production, and Loans Cycle the cyclical component of bank lending constructed using the Christiano–Fitzgerald filter.

1.4.2 Cross-Sectional Dependence

Given the common exposure of Latin American economies to global financial conditions and U.S. monetary policy, cross-sectional dependence is formally assessed using the Pesaran (2015) cross-sectional dependence test applied to the residuals of fixed-effects panel regressions for each endogenous variable. The results strongly reject the null hypothesis of cross-sectional independence across all variables, including sovereign yield spreads, lending rates, industrial production, and bank lending. This evidence confirms the presence of substantial global co-movement across countries in the sample.

Such dependence is consistent with the existence of unobserved global factors, particularly U.S. monetary policy shocks and international financial cycles. To address this issue, the empirical specification explicitly includes orthogonalised U.S. monetary policy surprises and U.S. sovereign yields as exogenous regressors in the PVAR framework. These variables capture a major source of common variation across countries and miti-

gate concerns that the estimated dynamics are driven by omitted global factors rather than country-specific responses. See Table 1.2.

Data for these variables are sourced from Latin American central banks, fiscal authorities, national statistics offices, and the FRED St. Louis database[1]. The industrial production index is a seasonally adjusted series, combining real total production, real total sales, and total employment. Bank loan volumes represent the total gross loan portfolio, measured in billions of domestic currency. Lending rates reflect the weighted average of consumer, preferential, ordinary, and treasury credit rates.

Table 1.2: Cross-Sectional Dependence Test (Pesaran CD)

Variable	CD statistic	p-value
Spread	5.030	0.0000
LR	6.573	0.0000
IP Cycle	10.360	0.0000
Loans Cycle	-3.892	0.0001
Exchange Rate	13.255	0.0000

Notes: The table reports Pesaran (2015) cross-sectional dependence (CD) tests applied to residuals from fixed-effects panel regressions for each endogenous variable. The null hypothesis is cross-sectional independence. Spread denotes sovereign yield spreads, LR lending rates, IP Cycle the cyclical component of industrial production, and Loans Cycle the cyclical component of bank lending. The results indicate strong and statistically significant cross-sectional dependence across all variables.

Because the home bias variable was unavailable, an approximation was used. For Brazil and Colombia, this proxy is represented by the share of total long-term sovereign bonds held by domestic banks, measured monthly in billions of local currency. For Chile in USD. The period from January 2003 to December 2018 was selected for five key reasons. First, many Latin American countries experienced relatively stable economic conditions and monetary policy frameworks during this period, providing a conducive environment for meaningful analysis. Second, the 2008 global financial crisis is included, a critical event for understanding the effects of monetary policy shocks. Third, the consistency and availability of data ensure a robust and reliable analysis. Fourth, this period allows for the integration of refined monetary policy shock measures from Swanson & Jayawickrema (2023).

Finally, the ongoing process of financial and economic globalisation during these years makes it possible to analyse the international spillover effects of US monetary policy. Table A.3 presents the summary statistics for Latin American long-term sovereign bond yield spreads and ten year US government bond returns. The government bond yield spread reflects the sovereign bond returns for Brazil, Chile, and Colombia over the US government bond returns for the sample period. Column (1) shows the sample average

[1]Considering data limitation in the 10-year sovereign yield variable, I could not include important countries such as Mexico, Peru, and Argentina in this study

government bond yield spread of 5.93 percent for the three South American countries, while columns (2)-(4) present the statistics for each nation, revealing considerable differences among the countries. Brazil exhibits the highest overall government bond yield spread at 9.44 percent, with this higher volatility associated with greater risk. Chile has the lowest and safest sovereign bond yield spread at 2.36 percent, while Colombia shows a relatively moderate government bond yield spread of 6.07 percent. Column (5) displays the long-term US sovereign bond returns, with an average of 3.17 percent.

Table A.5 shows the home bias ratio. It represents an approximation of local banks holding total long-term sovereign debt because the available information does not discriminate between local and international banks holding long-term government debt. However, the branches of foreign banks in those countries lend and invest domestically, so they have a similar operating pattern to domestic banks. Table A.5 describes summary statistics and annual information on the monthly share of total long-term sovereign bonds held by local banks from January 2003 to December 2018 in terms of total debt share for (1) all banks, (2) Brazilian banks, (3) Chilean banks, and (4) Colombian banks. The summary statistics show on average that 68.3 percent of banks in the three Latin American nations held long-term sovereign bonds during the period, which is considered a significant proportion of total sovereign debt in banks' balance sheets. Furthermore, there is a clear upward trend in home bias, from 42.7 percent in 2003 to 61.8 percent in 2018, which might suggest that over the sample period, there has been a drying up of international capital markets.

Table A.4 describes the summary statistics of macroeconomic and financial variables. In the top panel, bank loans show the financial resources available for the corporate sector. Column (1) presents the relevant sample average value of 1.4 billion local currency units of bank loans for Brazil, Chile, and Colombia, while columns (2)-(4) display the statistics for each nation, which implies heterogeneity across these three countries. Even though bank loans are expressed in local currencies and might not be directly comparable, Brazilian banks provide approximately 20 times more resources to their corporate sector than Colombian banks and 45 times more than Chilean banks.

In the middle panel, the lending rate presents the interest rate paid by the corporate sector to financial institutions. Column (1) displays the sample average interest rate of 13.55 percent for Brazil, Chile, and Colombia, while columns (2)-(4) display the statistics for each nation, which shows that Chile has the most competitive overall lending rate of 8.19 percent. Brazil has the highest interest rate, 19.33 percent, while Colombia has a relatively average medium lending rate of 13.13 percent. In the bottom panel, the industrial production index shows the dynamics of the economy. Column (1) displays the overall industrial production index of 94.55 percent for Brazil, Chile, and Colombia, while columns (2)-(4) describe the statistics for each country, which shows that Colombia has the highest overall production index of 95.74. Brazil and Chile have the lowest

and medium ones, respectively. However, on average, this index shows a good sample performance for these countries.

1.4.3 Characteristics of Sovereign Debt Markets in Brazil, Chile, and Colombia

Since sovereign bond yields constitute one of the key variables in the empirical analysis, it is important to describe the main characteristics of the sovereign debt markets considered in this chapter. The sample comprises Brazil, Chile and Colombia, three Latin American inflation-targeting economies that have developed relatively deep domestic government bond markets over the past two decades. Although these countries differ in their fiscal histories and financial structures, they share several institutional features that make them particularly suitable for analysing the transmission of external monetary policy shocks.

The sovereign bond yield employed in this chapter corresponds to the market yield on benchmark government bonds denominated in local currency with a maturity of ten years (Table A.2). Consequently, the analysis focuses on the long-term segment of domestic sovereign debt markets rather than on short-term Treasury bills or external sovereign borrowing. Long-term government bond yields represent the primary benchmark for sovereign financing conditions because they incorporate investors' expectations regarding future interest rates, inflation, fiscal sustainability and sovereign credit risk. They also provide an important reference for the pricing of private sector borrowing, influencing lending rates faced by firms and households.

Focusing on ten-year government bonds is particularly appropriate for analysing the international transmission of United States monetary policy. Previous research has shown that external monetary shocks affect long-term interest rates through changes in global financial conditions, portfolio rebalancing and sovereign risk premia. Compared with short-term interest rates, long-term government bond yields capture more persistent changes in investors' expectations and therefore provide a more comprehensive measure of sovereign financing conditions following unexpected monetary policy announcements.

The ownership structure of these domestic sovereign bond markets constitutes another important feature of the analysis. In addition to sovereign bond yields, this chapter employs measures of Home Bias and Foreign Bias to capture the distribution of sovereign bond holdings across domestic and foreign investors. Home Bias is measured as the share of sovereign bonds held by domestic banks, while Foreign Bias reflects the corresponding participation of foreign investors in domestic sovereign debt markets. These measures allow the empirical analysis to examine whether the transmission of external monetary shocks depends on the composition of the investor base rather than solely on changes in international interest rates.

The distinction between sovereign bond yields and Home Bias is conceptually impor-

tant. Sovereign bond yields measure the cost at which governments borrow in domestic financial markets, whereas Home Bias characterises who holds outstanding government securities. Consequently, two countries may exhibit similar sovereign borrowing costs while differing substantially in the composition of investors holding government debt. This distinction is central to the empirical analysis because the chapter hypothesises that domestic investor participation moderates the transmission of external monetary shocks to sovereign default risk.

Another important characteristic of the sovereign debt analysed in this chapter is its long-term maturity. By focusing on benchmark ten-year government bonds, the analysis abstracts from temporary fluctuations in money market conditions and instead captures investors' assessment of longer-term sovereign risk. Long-term bond yields incorporate expectations regarding future macroeconomic conditions, fiscal policy credibility and the government's ability to meet future debt obligations. As a result, they provide a more informative indicator of sovereign risk than short-term financing rates, which are more directly influenced by domestic monetary policy operations.

Although Brazil, Chile and Colombia all issue long-term sovereign bonds in domestic financial markets, their historical experiences with sovereign debt differ considerably. Brazil experienced severe sovereign debt difficulties during the Latin American debt crisis of the 1980s and subsequently participated in the Brady Plan debt restructuring during the early 1990s. These episodes highlighted the importance of maintaining credible fiscal institutions and contributed to the subsequent development of deeper domestic government bond markets. In contrast, Chile has maintained one of the strongest sovereign credit records in Latin America, with no modern sovereign default and a long history of prudent fiscal management supported by structural fiscal rules. Colombia has likewise avoided modern sovereign default despite periods of fiscal and macroeconomic stress, maintaining continuous access to domestic and international capital markets throughout the sample period.

These different historical experiences are relevant because sovereign risk reflects not only current macroeconomic conditions but also investors' perceptions of fiscal credibility developed over time. Countries with stronger fiscal reputations generally experience lower sovereign risk premia and more stable government bond markets during periods of global financial volatility. Nevertheless, all three countries remain exposed to changes in international financial conditions owing to their integration into global capital markets and the important role played by international investors in domestic sovereign bond markets.

Figure 1.1 shows the reduction of the share of total long-term sovereign bonds held by foreign investors over the sample period 2003-2018. Table B.1 shows the foreign bias ratio. It represents an approximation of long-term sovereign debt held by foreigners. Table B.1 describes summary statistics and annual information on the monthly share

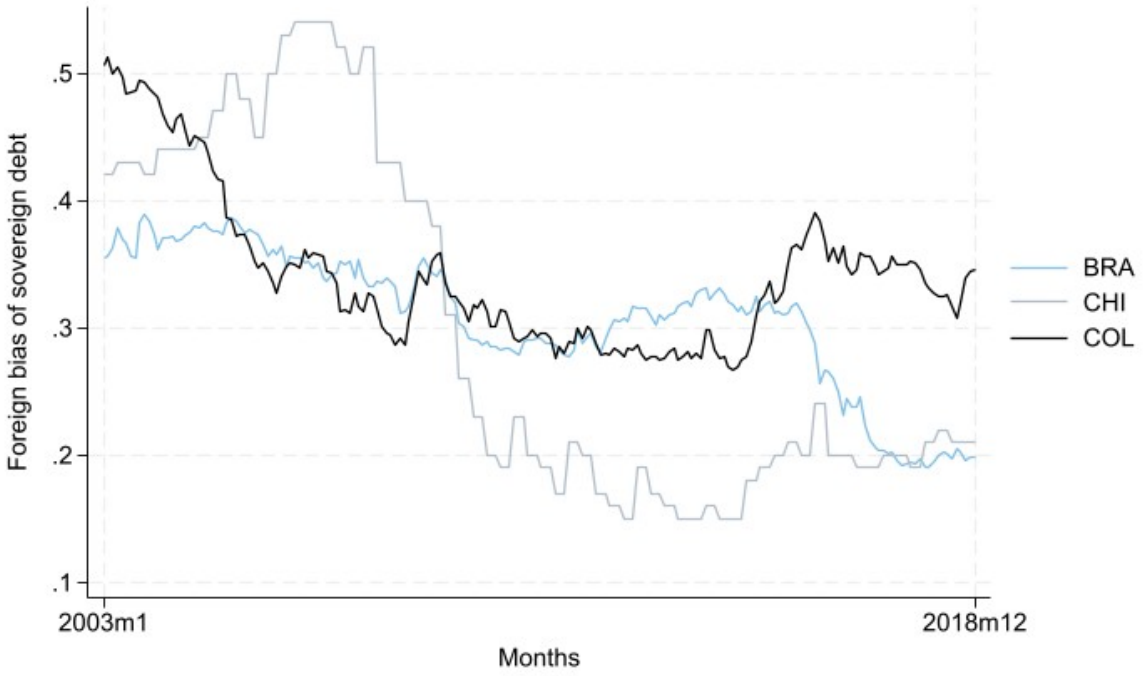

Figure 1.1: Share of total long-term sovereign bonds held by foreigners, 2003-18. Source: Author's own elaboration.

of total long-term sovereign bonds held by internationals investors from January 2003 to December 2018, in terms of total debt share for Latin American bonds column (1), Brazilian bonds column (2), Chilean bonds column (3), and Colombian bonds column (4).

The summary statistics show on average that 31.6 percent of bonds in the three Latin American nations are held by foreigners during the period, which is considered a significant proportion of total sovereign debt in foreign hands. In addition, there is a clear downward trend in foreign bias, from 42.9 percent in 2003 to 24.6 percent in 2018, which might suggest that over the sample period, there has been a precautionary motive from foreign sovereign investors in the region.

Taken together, these institutional characteristics provide the motivation for the empirical analysis undertaken in this chapter. By concentrating on long-term sovereign bond yields denominated in local currency and combining these with information on the ownership structure of sovereign debt, the analysis examines not only whether unexpected United States monetary policy shocks increase sovereign borrowing costs, but also whether the response of sovereign risk depends on the relative participation of domestic and foreign investors in government bond markets. This institutional setting provides an appropriate framework for evaluating the role of Home Bias as a conditioning factor in the international transmission of monetary policy shocks.

1.4.4 Latin American Business Cycle Characteristics. The Christiano–Fitzgerald band-pass time-series filter

Economic variables are typically nonstationary, requiring careful preparation for analysis. To address this, I proceed with the data as follows: I apply the Christiano & Fitzgerald (2003) band pass time series filter to separate industrial production and bank loans into trend and cyclical components. This filter extracts components influenced by stochastic cycles within a specified range of periods while removing unwanted features such as seasonal patterns and trends. Given the monthly frequency of the data, the filter estimates the stationary cyclical component for these variables.

The range of periods for capturing the business cycle component is set between a minimum of 12 months and a maximum of 48 months, aligning with the standard definition of a business cycle and allowing for the analysis of dynamic responses between one and five year horizons. However, 5 year horizon corresponds to a 60 months, but I finally set ut a maximum of 48 months because it was more suitable for Latin America data. This approach ensures a clear focus on cyclical fluctuations in industrial production and bank loans while maintaining analytical rigor. Equation 1.1 shows how a time series y_t can be separated into trend and cyclical components:

$$y_t = \tau_t + c_t \tag{1.1}$$

where τ_t and c_t depict the trend and cyclical components of the time series, respectively. The trend component τ_t might be stationary or not and can contain a stochastic or deterministic trend. The Christiano & Fitzgerald (2003) filter estimates a stationary cyclical component c_t that is driven by stochastic cycles within a specific time range. This τ_t trend component is estimated by taking the difference of the time series y_t and the cyclical component c_t.

Time series filters are used for different reasons. One filter can be implemented to minimise the coefficient errors. The Christiano & Fitzgerald (2003) filter helps to minimise the mean square error between the true and estimated components. This filter assumes that a random walk process is followed by the raw time series. Christiano and Fitzgerald consider three relevant reasons to use their filter: i) the filter's optimality is affected by the true data dependence structure, ii) many economic time series can be effectively represented by random walk processes, and iii) their filter effectively transmits stochastic cycles at desired frequencies while blocking those at unwanted frequencies across a variety of processes that closely resemble a random walk. This random walk process is related to a first order integrated process, in which to become a stationary process, the first difference has to be applied.

$$y_t = y_{t-1} - \epsilon_t \tag{1.2}$$

Equation 1.2 formally shows a random walk process, where ϵ_t is identically distributed and independent with zero mean. Christiano & Fitzgerald (2003) conclude that, for daily, weekly, monthly, and annual frequencies, the band-pass filter performs better than the Hodrick–Prescott filter. The findings of this study support this conclusion. It means it is possible to consider and rely on these frequency measures using a monthly dataset.

Latin American countries are classified as emerging or less developed economies, indicating significant potential for economic advancement in the region. Figure A.2 illustrates the ten year long-term sovereign bond returns of Brazil, Chile, and Colombia, adjusted by the corresponding risk free US long-term sovereign bond return. On average, these three nations exhibited a long-term sovereign yield spread of 5.96 percent, with a standard deviation of 3.82 percent. The minimum and maximum values observed were 0.58 percent and 24.88 percent, respectively. As shown in the graph, the yield spread tends to increase markedly during periods of heightened economic uncertainty, such as the 2008–2009 global financial crisis.

The same top panel on the right of Figure A.2 presents the level of credit extended by the financial sector to the corporate sector in Brazil, Chile, and Colombia. On average, the bank loans growth rate was approximately 0.97 percent, with a standard deviation of 1.10 percent. The minimum and maximum observed values were -4.41 percent and 4.62 percent, respectively, reflecting variability in credit provision across the three countries.

The bottom panel on the left of Figure A.2 illustrates the financial sector lending rate, representing the commercial interest rate charged to the corporate sector for credit in Brazil, Chile, and Colombia. On average, this rate was approximately 13.55 percent, with a standard deviation of 5.55 percent. The observed minimum and maximum values were 4.73 percent and 33.89 percent, respectively, highlighting significant variability in lending conditions across the region.

The same bottom panel on the right of Figure A.2 presents the industrial production index illustrating its performance from January 2003 to December 2018. As described below, industrial production and bank loans are filtered with the Christiano & Fitzgerald (2003) filter. On average, the index for the three nations stood at approximately 4.54, with a standard deviation of 0.09. The minimum and maximum observed values were 4.25 and 4.72, respectively. This average value reveals a positive trend, indicating a steady increase in production levels over time, which suggests an overall improvement in industrial activity throughout the analysed period.

The global financial crisis led to a substantial decline in production levels worldwide, and Latin American economies were no exception. As depicted in Figure A.2, industrial production experienced a sharp downturn during the 2008-2009 period, highlighting the significant impact of the crisis on the region. In addition, Figure A.3 shows during the 2008-2009 global financial crisis periods of high volatility for the Chicago forward looking volatility index VIX, long-term Brazilian, Chilean, and Colombian government bond yield

spreads. We can now move on to the next subsection related to the exogenous monetary policy shocks.

1.4.5 Measuring exogenous United States monetary policy shocks

This subsection presents the construction and interpretation of exogenous United States monetary policy shocks by Bauer & Swanson (2023). The identification of monetary policy shocks is a central element of the empirical strategy developed in this thesis, as it underpins the causal interpretation of domestic and international macro financial responses. The discussion synthesises the conceptual and empirical contributions of Bauer & Swanson (2023), with particular emphasis on the correction of endogeneity in conventional high frequency monetary policy surprises.

Background and motivation

High frequency identification has become a standard approach for measuring monetary policy shocks in empirical macroeconomics. The core idea is that financial markets react immediately to new information about monetary policy, allowing unexpected policy innovations to be identified from asset price movements observed in narrow windows around policy announcements. Seminal contributions such as Kuttner (2001) and Gurkaynak et al. (2005) established that changes in interest rate futures around Federal Open Market Committee announcements contain information about both current policy decisions and revisions to the expected future policy path. Nakamura & Steinsson (2018) formalised this insight and demonstrated how high frequency surprises could be used as external instruments in structural vector autoregressions frameworks.

The validity of this approach relies on a strong identifying assumption: within the event window, asset price movements must reflect only newly revealed monetary policy information and be orthogonal to other macroeconomic shocks. If this assumption fails, the resulting surprise measures cannot be treated as exogenous. A growing literature has shown that conventional monetary policy surprises are systematically predictable using information that is publicly available before policy announcements, casting doubt on their suitability for causal inference. Bauer & Swanson (2023) provide a comprehensive reassessment of this issue and propose a correction that restores exogeneity.

Data and scope of monetary policy communications

A key contribution of Bauer & Swanson (2023) is the use of a comprehensive dataset of United States monetary policy communications constructed by Swanson & Jayawickrema (2023). The dataset spans the period from 1988 to 2019 and includes 322 Federal Open Market Committee announcements, covering both scheduled and unscheduled meetings.

In addition, it contains 880 public communications by the Federal Reserve Chair, including speeches, testimonies, and press conferences, of which 295 speeches are classified as containing substantive monetary policy news.

The inclusion of Chair communications is quantitatively and conceptually important. Over time, central bank communication has become an integral policy instrument, with forward guidance and qualitative statements often shaping expectations independently of changes in the policy rate. By incorporating these events, the dataset substantially increases the number of monetary policy observations and enhances statistical power, allowing for a more precise assessment of predictability and market responses.

Construction of the unadjusted monetary policy surprise

The baseline monetary policy surprise, denoted mps_t, is constructed following Nakamura & Steinsson (2018). It is based on intraday changes in the first four quarterly Eurodollar futures contracts, ED1 through ED4, which reflect market expectations of short term interest rates from the current quarter up to approximately one year ahead. These contracts jointly capture unexpected changes in the current policy stance and revisions to the expected path of monetary policy.

To obtain a single summary measure of monetary policy news, the first principal component of the changes in these four futures rates is extracted within each event window. Principal component analysis isolates the common movement attributable to monetary policy information and filters out idiosyncratic contract specific noise. The resulting factor is rescaled so that a unit change corresponds to a one percentage point change in the ED4 rate, ensuring interpretability and comparability across studies.

The definition of the event window is critical. For Federal Open Market Committee announcements, Bauer & Swanson (2023) measure surprises over a clearly defined 30 minute window that runs from ten minutes before to twenty minutes after the announcement time. This window is designed to capture all relevant market reactions while minimising contamination from unrelated news. The inclusion of a short pre announcement interval allows for limited information leakage or anticipatory trading, while the post announcement interval accommodates immediate market processing of the policy information. For each FOMC announcement, the surprise is measured as the change in futures rates over a 30 minute window:

$$[t - 10 \text{ minutes},\ t + 20 \text{ minutes}],$$

where t denotes the exact timestamp of the announcement. The start of the window is placed 10 minutes before the announcement to capture any market anticipation or information leakage, while still keeping the window sufficiently tight to exclude other events. The end of the window extends 20 minutes after the announcement to allow for

the immediate absorption and processing of the information by financial markets.

Before 1994, when the Federal Open Market Committee did not issue explicit post meeting statements, policy decisions were inferred from open market operations. Swanson & Jayawickrema (2023) carefully reconstruct the timing of these implicit announcements, sometimes identifying multiple informational windows across consecutive days. These classifications are retained by Bauer & Swanson (2023) to ensure consistency across the full sample.

For Federal Reserve Chair speeches and congressional testimonies, information is released more gradually. Accordingly, longer windows are employed, approximately 90 minutes for speeches and up to 210 minutes for testimonies. When these windows overlap with scheduled macroeconomic data releases, they are trimmed or split to avoid conflating monetary policy news with other information.

Predictability and endogeneity of conventional surprises

A central empirical result of Bauer & Swanson (2023) is that the unadjusted monetary policy surprise exhibits substantial predictability with respect to publicly available information known before policy events. Specifically, mps_t is regressed on six pre announcement variables that capture key aspects of the macro financial environment: nonfarm payroll surprises, employment growth, the level of the S&P 500 index, the slope of the yield curve, commodity prices, and Treasury yield skewness.

These variables summarise labour market conditions, financial market performance, inflationary pressures, expectations of future economic activity, and perceived tail risks. Importantly, all are observed prior to the policy event. The regression results show that they jointly explain a significant share of the variation in mps_t, implying that conventional monetary policy surprises partly reflect the systematic response of the Federal Reserve to economic conditions. This predictability can be formalised as

$$mps_t = \alpha + \beta' X_{t-} + \epsilon_t, \tag{1.3}$$

where X_{t-} denotes the vector of pre announcement macro financial variables. The fitted component represents the predictable part of policy actions, while the residual captures the truly unexpected innovation. Because the predictable component is correlated with other macroeconomic shocks, using mps_t as an instrument violates the exogeneity requirement for causal identification.

Orthogonalised monetary policy surprise

To address this endogeneity problem, Bauer & Swanson (2023) construct an orthogonalised monetary policy surprise, denoted $mps_t^{\perp}$. The adjusted measure is obtained by

subtracting the fitted component of the regression from the unadjusted surprise:

$$mps_t^{\perp} = mps_t - \hat{\alpha} - \hat{\beta}' X_{t-}. \tag{1.4}$$

By construction, $mps_t^{\perp}$ is orthogonal to publicly observable macro financial conditions and therefore satisfies the exogeneity requirement. The orthogonalisation removes only the predictable component of policy actions while preserving the high frequency nature of the shock.

Event study evidence shows that asset price reactions to monetary policy announcements are nearly identical when using mps_t or $mps_t^{\perp}$. Financial markets respond to the full content of policy announcements, including both unexpected innovations and systematic policy responses. In contrast, macroeconomic estimates differ sharply. When the orthogonalised surprise is used in structural vector autoregressions, contractionary monetary policy shocks generate declines in output, tightening of financial conditions, and reductions in inflation, consistent with standard macroeconomic theory. These results contrast with the muted or counterintuitive responses often obtained using unadjusted surprises.

Interpretation and implications

Bauer & Swanson (2023) argue that the predictability of conventional monetary policy surprises does not reflect an information effect whereby the Federal Reserve reveals private information about the economy. Instead, it arises because market participants have an imperfect understanding of the Federal Reserve reaction function and systematically underestimate how strongly policy responds to incoming macroeconomic news. The predictable component of mps_t therefore reflects endogenous policy behaviour rather than the revelation of new information.

The orthogonalised surprise isolates genuinely exogenous monetary policy innovations and provides a more credible basis for causal analysis. This refinement is particularly important for international applications, where United States monetary policy shocks are often treated as external drivers of global financial conditions. In the context of this thesis, the use of $mps_t^{\perp}$ ensures that estimated spillovers reflect the causal impact of United States monetary policy rather than correlated responses to global macroeconomic conditions.

Time-series properties of the Bauer & Swanson (2023) unadjusted mps_t and orthogonalised monetary policy shocks and $mps_t^{\perp}$

Figures 1.2 and 1.3 presents the monthly series of the Bauer and Swanson (2023) monetary policy shocks. The top panel reports the unadjusted monetary policy surprises,

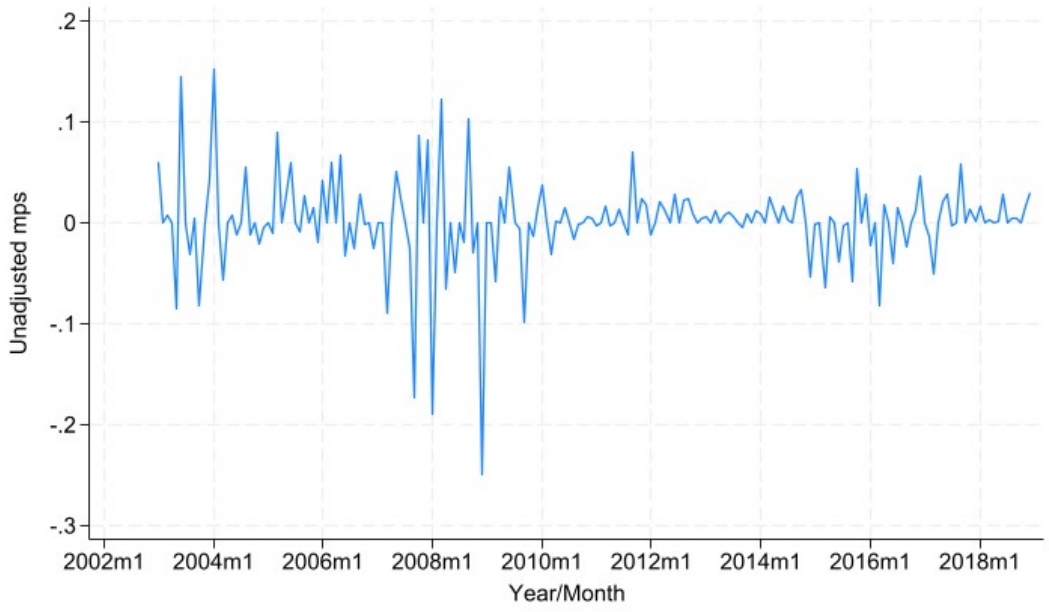

Figure 1.2: Conventional or traditional monetary policy surprise measure from Bauer & Swanson (2023) sample period 2003:1-2018:12.

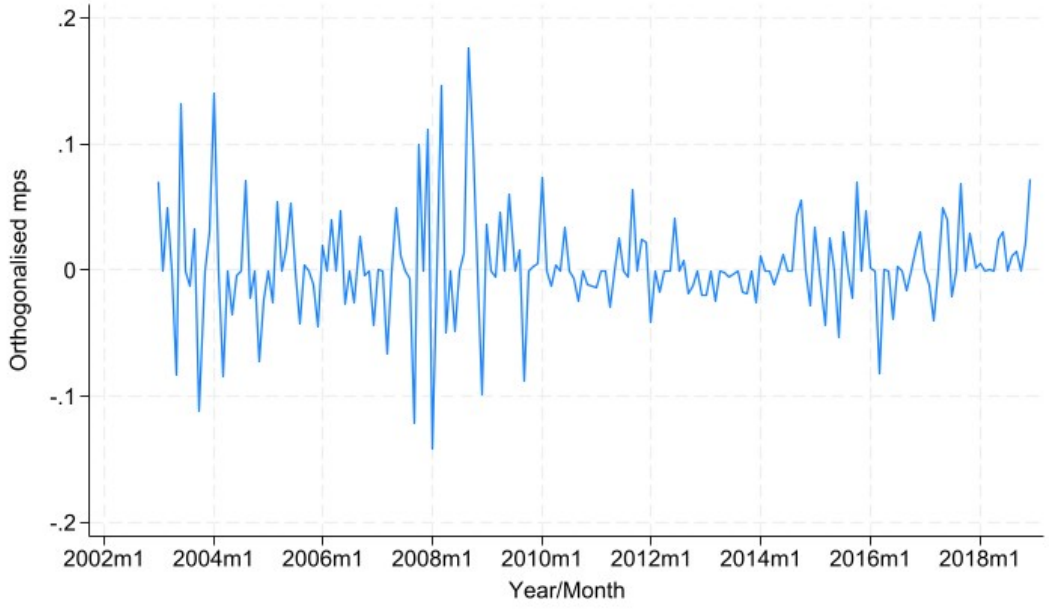

Figure 1.3: Orthogonalised monetary policy surprise measure from Bauer & Swanson (2023) sample period 2003:1-2018:12.

while the bottom panel shows the orthogonalised monetary policy surprises.

The two series exhibit several common characteristics. First, both fluctuate around a mean close to zero and do not display any obvious deterministic trend over the sample period. This behaviour is consistent with the interpretation of monetary policy shocks as unexpected innovations rather than persistent changes in the stance of monetary policy.

Second, both series are characterised by short-lived spikes and rapid mean reversion.

Large positive and negative surprises are concentrated around episodes of heightened financial market uncertainty, particularly during the Global Financial Crisis of 2007–2009. For example, the orthogonalised series records substantial positive and negative innovations during 2008–2009, while the unadjusted series displays even larger negative observations during the same period.

Third, volatility appears time varying. The magnitude of shocks is considerably larger during the mid-2000s and the Global Financial Crisis than during the period from approximately 2011 to 2014, when observations cluster more closely around zero. A moderate increase in volatility is again observed after 2015. Such volatility clustering is common in high-frequency monetary policy surprise measures because market reactions tend to be larger during periods of economic and financial stress.

The orthogonalised series exhibits a noticeably smaller variance than the unadjusted series. Extreme observations are attenuated after orthogonalisation, suggesting that the procedure removes information correlated with central bank information effects and other systematic components embedded in financial market responses. Consequently, the orthogonalised measure is closer to a pure exogenous monetary policy shock, which is the preferred measure in the empirical analysis.

While the two series move similarly over time, the unadjusted shocks contain several larger outliers, particularly during 2008–2009. This pattern is consistent with Bauer and Swanson's (2023) argument that conventional high-frequency surprises may partly reflect the imperfect information private sector has regarding Federal Reserve's monetary policy rule.

The visual evidence suggests that both series are stationary. Neither series exhibits a trend, a unit-root-like behaviour, nor long periods of persistence. Instead, shocks fluctuate around zero with relatively rapid reversion following large movements. This is precisely the behaviour expected of an exogenous innovation process.

The apparent stationarity of the monetary policy shock series is important for the Panel VAR framework employed in this Chapter. Since the shocks do not exhibit persistent dynamics, estimated impulse responses can be interpreted as the effects of unexpected monetary policy innovations rather than responses to a trending or highly persistent explanatory variable.

1.5 Econometric Specification

I adopt the framework introduced by Paul (2020) to identify the impact of monetary policy shocks in a Panel VAR model. He employs high frequency monetary policy surprises as a proxy to identify the structural monetary policy shocks. This is accomplished by incorporating the surprises as an exogenous variable within a vector autoregressive model. It is possible with this new methodology to research the impact of monetary

policy on macroeconomic and financial variables. The macroeconomic literature does not recommend including directly the monetary policy surprises observations because of the predictability of *mps* Romer & Romer (2004); Ramey (2016); Melosi (2017); Nakamura & Steinsson (2018); Bauer & Swanson (2023). In this context, the impulse response functions obtained through this *mps* will be biased. Paul (2020) uses surprises related to short-term rates and regular FOMC by excluding unscheduled FOMC meetings to avoid bias.

However, the use of such a short-term rate does not guarantee that the identified shock and *mps* are not correlated. Paul (2020) states that even though the effect of monetary policy is measured in a small window after the FOMC announcement, it might contain trading noise and news different from monetary policy, which may imply measurement error. The monthly *mps* time series includes random zero observations because there are some months of the year when FOMC meetings do not take place. Finally, during the month, various other forms of monetary policy information are released, such as speeches by FOMC members, which are not considered in Paul (2020) analysis.

The $mps^{\perp}$ measure of Bauer & Swanson (2023) has an advantage because they use the Swanson & Jayawickrema (2023) dataset that includes speeches delivered by FOMC members. For that reason, Paul (2020) does not use the federal funds rate but a proxy for the structural monetary policy shocks. I use the orthogonalised US monetary policy instrument of Bauer & Swanson (2023). Such structural monetary policy shocks are obtained by incorporating the monetary policy proxy directly into a panel vector autoregression model as an exogenous variable. Paul (2020) calls this the exogenous variable approach (VARX).

This new (VARX) methodology of Paul (2020) allows us to get the true relative impulse response functions based on time varying parameters by following Primiceri (2005), who developed a time varying structural vector autoregressive methodology. The variance covariance matrix of the model's errors and the coefficients are allowed to change over time to try to model changes in monetary policy, its structure, and its interaction. Primiceri (2005) found that i) both systematic and non-systematic monetary policy have evolved over the past forty years, specifically, the systematic response of interest rates to inflation and unemployment has generally become more aggressive, though with notable fluctuations; ii) this shift has had minimal impact on the broader economy. On the contrary, external, non policy shocks appear to have played a more significant role than interest rate policies in driving episodes of high inflation and unemployment in recent US economic history. Paul (2020) found that prior to the 2007–2009 financial crisis, the response of stock and house prices to monetary policy shocks was notably weaker compared to the reaction of output. Paul (2020) analytically demonstrates that the exogenous variable framework provides evidence of true relative impulse responses through consistent estimates. Moving on now to consider the empirical results.

1.6 Empirical Findings

I begin with panel regressions for the ten year government bond yield *Spread* to empirically show the Bauer & Swanson (2023) orthogonalised monetary policy surprise $mps^{\perp}$ impact on Latin American countries' sovereign risk. The dynamic panel specification based on the Arellano and Bond (1991) difference GMM estimator was removed from Chapter 1 because the estimator is derived under a large-N, fixed-T asymptotic framework, whereas the present study employs a relatively small number of countries observed over a long time horizon. Specifically, the sample consists of three countries observed monthly from 2003 to 2018, implying a large time dimension relative to the cross-sectional dimension. Under these conditions, the assumptions underpinning the consistency and finite sample performance of the Arellano–Bond estimator are not satisfied, and the procedure becomes particularly vulnerable to instrument proliferation and weak inference. Consequently, the empirical analysis relies on estimation methods that are more appropriate for panels with a large time dimension and strong cross-sectional interdependence.

1.6.1 Panel Regressions

Panel regressions are estimated using country fixed effects and robust standard errors. I initially estimate the model

$$Spread_{it} = \alpha + \gamma_i + \beta_1 \sum_{s=1}^{s=12} Spread_{it-s} + \beta_2 mps_t^{\perp} + \beta_3 (hb_{it} - \bar{hb}_{it}) * mps^{\perp} + \beta_4 hb_{it} + \beta_5 Fedfunds_t + \epsilon \tag{1.5}$$

where *Spread* is the monthly long-term sovereign bond yield spread for Brazil, Chile, and Colombia, α is a constant term, γ_i is a country fixed effects, $Spread_{t-12}$ depicts the twelve lags of *Spread*, $mps^{\perp}$ is the Bauer & Swanson (2023) orthogonalised monetary policy surprise, $hb \times mps^{\perp}$ is the home bias-$mps^{\perp}$ interaction, which measures the impact of contractionary US monetary policy shocks on the share of total long-term government bonds held by Latin American banks, it is measured through each country *hb* value minus the average value of *hb* multiplied by the $mps^{\perp}$. $FEDFUNDS_t$ is the Taylor rule US monetary policy federal funds rate, and ϵ is the error term.

Table 1.3 reports the results of the panel regressions based on equation 1.5. Columns (1) and (2) examine the relationship between the orthogonalised monetary policy shock, ($mps^{\perp}$), and Latin American sovereign bond yield spreads under alternative specifications. Following a one-standard-deviation U.S. monetary policy shock, In column (1), the estimated coefficient on ($mps^{\perp}$) is positive (0.035), suggesting that tighter US monetary policy is associated on average with a higher sovereign risk, around 0.035 percentage

points. The coefficient on home bias is negative (-0.631), indicating that a larger domestic absorption of government bonds is associated with lower sovereign spreads. However, neither coefficient is statistically significant at conventional levels.

Column (2) augments the specification by including the US federal funds rate and the interaction between ($mps^{\perp}$) and home bias. Following a one-standard-deviation U.S. monetary policy shock, the estimated coefficient on ($mps^{\perp}$) remains positive and of similar magnitude (0.041), while the coefficients on home bias and the federal funds rate remain negative. The interaction term has an impact on spread of (0.244). As in column (1), none of these coefficients are statistically significant.

These findings do not provide strong statistical support for the main hypothesis that US monetary policy shocks directly increase sovereign risk through the sovereign-bank nexus. In particular, the coefficient on ($mps^{\perp}$) is not statistically significant in any specification, and the expected positive relationship between home bias and sovereign spreads is not observed.

Nevertheless, the negative coefficient on home bias is not unprecedented in the literature. Palmén (2020) report a negative response of home bias in Ireland, while obtaining positive responses for Spain, Portugal, and Italy. The Latin American evidence therefore suggests that the relationship between domestic sovereign bond holdings and sovereign risk may depend on country-specific institutional and financial market characteristics. One possible interpretation is that domestic banks may act as stabilising investors during periods of external financial tightening, absorbing government debt when foreign investors withdraw from domestic bond markets. Under this mechanism, greater home bias may contribute to reducing sovereign spreads rather than amplifying them.

Accordingly, the results in Table 1.3 should be interpreted as suggestive evidence regarding the role of domestic sovereign bond holdings in shaping sovereign risk rather than as definitive statistical confirmation of the proposed transmission mechanism in this thesis. The panel vector autoregressive analysis presented in the following section provides additional evidence on the dynamic interactions between US monetary policy shocks, sovereign risk, and domestic financial variables.

Table 1.4 reports the results from estimating the effect of orthogonalised U.S. monetary policy shocks on Latin American long-term sovereign bond yield spreads when controlling for foreign bias. The coefficient associated with $mps^{\perp}$ remains positive across specifications, suggesting that contractionary U.S. monetary policy shocks are associated with increases in sovereign spreads, although the estimated effect is not statistically significant. The inclusion of the foreign bias measure does not substantially alter the magnitude of the monetary policy shock coefficient, indicating that differences in the degree of foreign investor participation do not fully explain the transmission of U.S. monetary conditions to sovereign bond markets. The coefficient on foreign bias is positive but statistically insignificant, suggesting that economies with greater reliance on foreign investors

Table 1.3: Monetary Policy Shock on Latin American Long-term Sovereign Bond Yield Spread, 2003–18

	(1) Spread	(2) Spread
$mps^{\perp}$	0.035	0.041
	(0.024)	(0.034)
Home Bias	-0.631	-0.732
	(0.527)	(0.625)
Federal funds rate		-0.013
		(0.011)
Interaction home bias × $mps^{\perp}$		0.244
		(0.266)
Observations	540	540
R-squared	0.930	0.930
Country fixed effects	Yes	Yes

Notes: This table reports panel regression estimates of Equation 1.5. All specifications include twelve lags of the dependent variable (not reported). Country fixed effects and robust standard errors are used throughout.

do not exhibit systematically higher sovereign spreads after controlling for country fixed effects and lagged dynamics. Such result does not support the second hypothesis of this chapter. In column (2), the interaction between foreign bias and $mps^{\perp}$ is negative and statistically insignificant, providing no evidence that foreign bias amplifies the sensitivity of sovereign spreads to U.S. monetary policy shocks. Overall, these results indicate that foreign investor exposure does not appear to be a significant determinant of the heterogeneous response of Latin American sovereign bond spreads to external monetary policy disturbances during the sample period.

1.6.2 PVARX

The panel vector autoregressive estimations were performed across the three Latin American nations, Brazil, Chile, and Colombia over the sample period from January 2003 to December 2018. PVAR is an econometric blueprint in which K variables are specified as linear functions of p of the past values (own lags), the p lags of other $K - 1$ variables, and exogenous variables. As mentioned earlier, this latter variable approximates the structural monetary policy shocks which follow the framework outlined by Paul (2020).

Due to the nature of time series data considered in this study, it may be appropriate to integrate the vector autoregressive approach with the panel data model to look at the US monetary policy impact on endogenous variables in Latin American nations. Such integration helps minimise the issues associated with long-run series of VAR and specific

Table 1.4: Monetary Policy Shock on Latin American Long-term Sovereign Bond Yield Spread, 2003–18

	(1) Spread	(2) Spread
$mps^{\perp}$	0.035	0.046
	(0.024)	(0.028)
Foreign Bias	0.274	0.473
	(0.436)	(0.633)
Federal funds rate		-0.018
		(0.025)
Interaction foreign bias × $mps^{\perp}$		-0.317
		(0.287)
Observations	540	540
R-squared	0.930	0.930
Country fixed effects	Yes	Yes

Notes: This table reports panel regression estimates of Equation 1.5. All specifications include twelve lags of the dependent variable (not reported), and instead home bias this table includes a proxy of foreign bias. Country fixed effects and robust standard errors are used throughout.

heterogeneity of panel models (Yang & Lee 2021). Following the logic of the VAR model, except for the exogenous orthogonalised $mps^{\perp}$, unadjusted *mps* Bauer & Swanson (2023) US monetary policy surprise measures, and $USSovereignyield$, this panel VAR analysis considered all variables as endogenous (Sims 1980). Formally, for the panel VAR model, we know that given N countries (three Latin American) $c = 1, \ldots, N$ and $t = 1, \ldots, T$, where t is the period from January 2003 to December 2018, the model is specified as follows:

Panel VAR Model. A panel vector autoregressive model of order p with an exogenous variable is set up in equation 1.6 as follows:

$$y_{it} = v_i + \gamma_i + A_1 \sum_{s=1}^{s=3} y_{it-s} + \beta_1 mps_t^{\perp} + \beta_2 mps + \beta_3 USSovereignyield + \beta_4 ExcRate_t + u_t \tag{1.6}$$

y_{it} is a K X 1 random vector of endogenous variables: industrial production, bank loans, lending rate, and sovereign bond yield spread, y_{t-s} is the lag of endogenous variables, A_1 is a K X K matrices of parameters, γ_i is a fixed effect capturing unobserved heterogeneity across Latin American countries, β_n is a K X M matrix of coefficients, v is a K X 1 constant term, and u_t is white noise, $E(u_t) = 0$, $E(u_t u_t') = \Sigma$, $E(u_t u_s') = 0$ for $t \neq s$, the Bauer & Swanson (2023) $mps^{\perp}$ orthogonalised and unadjusted *mps* exogenous US

monetary policy surprise measures, *exchange rate*, and the $USSovereignyield$ are control variables (Paul 2020) VAR approach.

To formally establish the transmission mechanism, this study further explores the role of sovereign risk as the key channel through which US monetary policy shocks affect real activity in Latin America. Specifically, the analysis extends the baseline PVARX framework by examining the dynamic interlinkages between sovereign spreads, bank lending, and industrial production following an exogenous monetary policy tightening. To account for cross country heterogeneity, the analysis acknowledges that the transmission of US monetary policy shocks is not uniform across Latin American economies. Differences in financial depth, exchange rate regimes, and sovereign debt structures might mitigate or amplify the impact of external shocks on domestic activity in Brazil, Chile, and Colombia.

Now, I show the results of the Panel VAR using the Bauer & Swanson (2023) orthogonalised $mps^{\perp}$ measure. The model specification uses three lags according to information criterion tests. The impulse response functions are reported using 68 per cent confidence intervals, taking into account the relatively medium monthly dataset. The impulse response functions, which are estimated for the sample period from January 2003 to December 2018, show the dynamic response of long-term sovereign yield spread, bank loans, lending rate, and industrial production to a one percent $mps_t^{\perp}$ deviation shock. Such responses are shown in Figure 1.4.

Figure 1.4 shows the impact of an unexpected US contractionary monetary policy shock on the endogenous variables. This tightening of the monetary policy impacts Latin American macroeconomic and financial variables. Following a one-standard-deviation contractionary U.S. monetary policy shock, the exchange rate depreciates immediately, increasing by approximately 1.25 per cent in the first month after the shock. This response highlights the rapid transmission of U.S. monetary policy to emerging market economies through the exchange rate channel. A tightening of U.S. monetary conditions increases the relative attractiveness of dollar-denominated assets, generating capital outflows and downward pressure on domestic currencies. The immediate depreciation is consistent with the expected response of emerging market exchange rates to an exogenous increase in U.S. interest rates.

Following a one-standard-deviation U.S. monetary policy shock, industrial production declines by approximately 0.13 index points at its trough, while bank lending falls by around 0.07 per cent after eight months. At the same time, lending rates increase by roughly 0.06 percentage points, reflecting tighter domestic credit conditions. Sovereign bond yield spreads also rise by approximately 0.12 percentage points on impact and remain elevated throughout the horizon, suggesting an increase in sovereign risk premia. Overall, the results support the existence of a financial transmission channel through which U.S. monetary policy shocks affect real and financial conditions in Latin American economies.

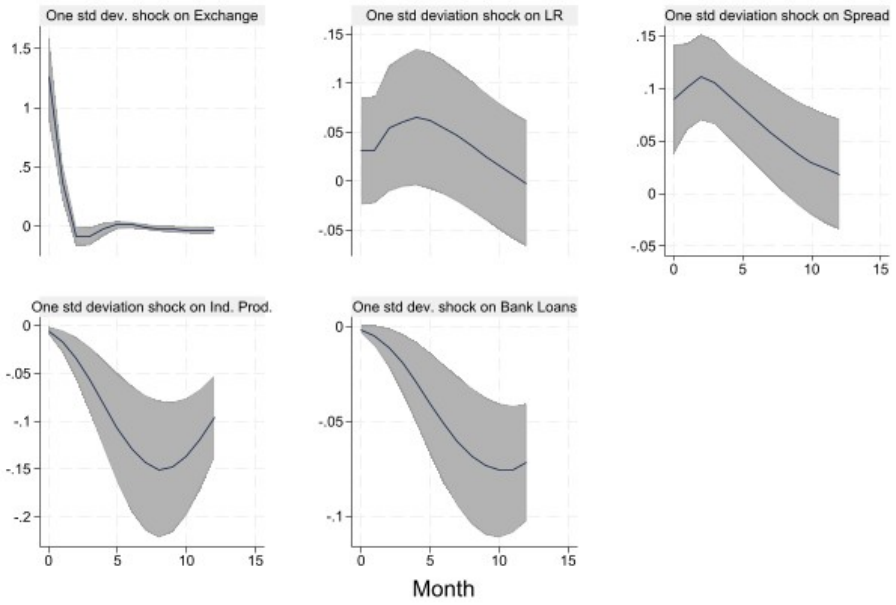

Figure 1.4: Impulse responses of Latin American macroeconomic and financial variables to a one-standard-deviation orthogonalised U.S. monetary policy shock following Bauer & Swanson (2023). Industrial production and bank loans are reported as cyclical components extracted using the Christiano–Fitzgerald filter. The upper panels display the responses of exchange rate, lending rates and sovereign bond yield spreads, while the lower panels display the responses of industrial production and bank loans. Shaded areas indicate 68 per cent confidence intervals. The panel VAR is estimated with three lags and includes the unadjusted monetary policy surprise mps_t and U.S. sovereign yield as an exogenous variables. Sample period: 2003:1–2018:12.

The exchange rate channel provides an additional mechanism through which U.S. monetary policy shocks influence domestic financial conditions. Currency depreciation can increase sovereign vulnerability by raising the domestic currency value of external liabilities and amplifying investors' concerns about repayment capacity. Moreover, exchange rate depreciation may generate inflationary pressures through higher import prices, potentially affecting the future response of domestic monetary authorities. Therefore, the exchange rate response complements the effects observed in sovereign spreads, bank lending, lending rates, and industrial production, demonstrating the multiple channels through which U.S. monetary policy shocks spill over to emerging market economies.

Many studies investigate the impact of monetary policy by analysing high frequency changes in the interest rate related to FOMC announcements (Romer & Romer 2004); (Coibion 2012); (Ramey 2016); (Paul 2020); and (Bauer & Swanson 2023) among others. Theoretically, tightening monetary policy is associated with a decline in output. Results are consistent with this evidence. After an unexpected contractionary monetary policy change of a one-standard-deviation shock in the US, I found that the expected response of industrial production was a reduction of 0.13 index points. This result is consistent with the evidence of Bauer & Swanson (2023) who found a negative impact of monetary policy shock on real activity for the U.S and (Paul 2020) and Bauer & Swanson (2023)

on asset prices, among others.

Regarding the effect of unexpected changes in monetary policy $mps^{\perp}$ on financial variables, I also found consistent results according to the literature. A contractionary monetary policy is linked to a rise in lending rate and long-term sovereign bond yield spread. On the one hand, higher levels of interest rates decrease the level of bank loans, in turn, there is a reduction of capital accumulation. On the other hand, tightening US monetary policy is related to an increase in the probability of sovereign default, which is evidenced by a higher level of long-term sovereign bond yield spread. As a result, a decline in industrial production is expected. These results are also consistent with the literature Kuttner (2001), Bernanke & Kuttner (2005); Gurkaynak et al. (2005); Swanson (2021); Bauer & Swanson (2023).

The impulse response functions are reported with 68 per cent confidence intervals rather than the more conventional 90 or 95 per cent bands. This choice reflects both the relatively small sample size and the resulting limited statistical power of the estimation. The analysis relies on monthly data spanning from 2003 to December 2018, which, despite its relatively high frequency, yields a time dimension that is modest for estimating dynamic multivariate models. In such settings, wider confidence intervals tend to obscure economically meaningful dynamics and may lead to an overly conservative interpretation of the results. Reporting 68 per cent confidence intervals therefore provides a more informative depiction of the central tendency and uncertainty surrounding the estimated responses, while remaining transparent about the degree of statistical imprecision. This practice is well established in the empirical macroeconomic literature when samples are small or identification is demanding, and has been adopted, for example, by Canova (2005) and more recently by Palmén (2020), among others. Finally, the sample period from January 2003 to December 2018 includes the period during which United States monetary policy was constrained by the zero lower bound, which may affect the variation of the instrument employed.

1.7 Conclusions

This chapter investigates the international spillover effects of US orthogonalised monetary policy surprises, $mps^{\perp}$, on sovereign risk and the transmission mechanisms through domestic financial markets and the real economy in Latin America. Using a PVAR exogenous variable approach following Paul (2020), I identify the effects of an unexpected tightening in US monetary policy based on the orthogonalised monetary policy surprise proposed by Bauer & Swanson (2023). The results provide evidence that a one-standard-deviation contractionary US monetary policy shock increases sovereign risk and affects domestic financial conditions through interconnected sovereign, banking, and exchange rate channels.

A potential limitation of the panel estimations is the presence of cross-sectional dependence across countries and the limited statistical power associated with a small number of cross-sectional units. The Pesaran (2004) cross-sectional dependence tests reject the null hypothesis of cross-sectional independence for the main variables included in the analysis, suggesting that common factors and regional shocks influence sovereign risk, financial conditions, and macroeconomic dynamics across Brazil, Chile, and Colombia. Moreover, given that the empirical analysis is based on three countries, conventional panel regressions may have limited ability to identify heterogeneous responses and precisely estimate dynamic effects.

To address these limitations, the main empirical specification relies on a panel vector autoregressive model with an exogenous variable (PVARX), which is better suited to analyse the transmission of external monetary policy shocks in a small panel setting. The PVARX framework allows for the joint modelling of endogenous variables, controls for the dynamic interactions among sovereign risk, financial conditions, exchange rates, and real activity, and incorporates the orthogonalised US monetary policy surprise as an external shock. Therefore, rather than relying exclusively on contemporaneous panel relationships, the PVARX approach captures the temporal propagation of US monetary policy shocks through the sovereign financial nexus. The stronger statistical significance and economically consistent impulse response functions obtained from the PVARX specification provide additional support for the identified transmission mechanisms.

The empirical findings support the hypothesis that external monetary policy shocks influence sovereign risk in financially integrated emerging economies. Following a one-standard-deviation contractionary US monetary policy shock, sovereign bond yield spreads increase by approximately 0.12 percentage points on impact, indicating a deterioration in perceived sovereign credit conditions. This response is consistent with the view that tighter global financial conditions increase sovereign borrowing costs through higher risk premia. Moreover, the magnitude of the spread response is comparable with the evidence documented in the international spillover literature, which shows that emerging economies are particularly sensitive to unexpected changes in US monetary policy conditions.

The chapter also provides evidence of a financial transmission mechanism associated with domestic banks' exposure to sovereign debt holdings; however, the estimated effect is not statistically significant. Countries with higher domestic financial exposure to government securities may experience stronger amplification effects because sovereign stress deteriorates banks' balance sheets, reducing their capacity to extend credit to the private sector. Consistent with this mechanism, the contractionary US monetary policy shock increases lending rates by approximately 0.06 percentage points and reduces bank lending by around 0.07 percent after eight months. These results support the home bias hypothesis by highlighting the role of domestic sovereign debt holdings in transmitting external financial shocks to domestic credit conditions. The mechanism can be sum-

marised as follows: domestic banks' holdings of sovereign debt increase their exposure to sovereign stress; losses on sovereign assets weaken bank balance sheets; weaker balance sheets reduce credit supply; and tighter credit conditions negatively affect real economic activity.

In addition to the sovereign and banking channels, the results highlight the importance of exchange rate adjustments in the transmission of US monetary policy shocks. A contractionary US monetary policy surprise generates exchange rate depreciation in Latin American economies, increasing external financial pressures and potentially affecting domestic borrowing conditions and firms' balance sheets. The exchange rate channel complements the sovereign risk and banking channels by explaining how external monetary shocks propagate into domestic macroeconomic outcomes. As a consequence of these combined financial effects, industrial production declines by approximately 0.13 index points at its trough, confirming that US monetary policy spillovers affect real economic activity through multiple interconnected mechanisms.

The results remain robust when alternative measures of the cyclical component of industrial production and bank lending are considered. In particular, responses obtained using the Hodrick–Prescott filter are qualitatively similar to those obtained using the Christiano–Fitzgerald filter, supporting the stability of the estimated transmission mechanisms. Furthermore, the inclusion of exchange rate dynamics provides additional evidence that external monetary shocks affect emerging economies not only through sovereign risk premia but also through broader financial conditions.

The results further indicate that foreign investor exposure does not significantly explain the transmission of U.S. monetary policy shocks to Latin American sovereign bond spreads. The inclusion of a foreign bias measure does not alter the estimated effect of orthogonalised monetary policy shocks, and the interaction between foreign bias and $mps^{\perp}$ provides no evidence that greater reliance on foreign investors amplifies the sensitivity of sovereign spreads to external monetary conditions.

Several avenues remain for future research. First, incorporating secondary sovereign bond market data could provide further evidence on the interaction between sovereign bond liquidity, market prices, and banking sector exposure following external monetary shocks. This extension would allow a more detailed analysis of how changes in sovereign bond valuations affect financial intermediaries' balance sheets.

Second, future research could investigate the role of macroprudential policies in reducing the amplification of sovereign financial linkages. Policies that limit excessive domestic bank exposure to sovereign debt or diversify sovereign bond holdings across domestic and international investors could potentially reduce the transmission of sovereign stress to credit supply and economic activity.

Finally, counterfactual exercises and variance decomposition analyses could quantify the relative contribution of US monetary policy shocks, sovereign risk, exchange rate

movements, and domestic financial factors to fluctuations in credit and output. Such analysis would provide further evidence on the quantitative importance of the sovereign risk channel and its interaction with other transmission mechanisms in emerging economies.

Chapter 2

A Sovereign Default Model

Abstract

This chapter develops a two period sovereign default model to examine how unexpected contractionary US monetary policy shocks influence sovereign risk in emerging markets. The model incorporates domestic households, sovereign bond issuance, foreign investors, and government default decisions under financial constraints, extending existing frameworks by integrating a dual liquidity structure and endogenously determined default probabilities linked to international interest rates. This basic model provides the theoretical foundation for the empirical analysis developed in Chapter 1.

2.1 Introduction

Sovereign default remains a central issue in macroeconomics, particularly for emerging economies facing recurrent financial crises. Traditional models, such as Eaton & Gersovitz (1981), emphasise the role of reputation in maintaining access to international credit markets. These models assert that countries repay their debts to avoid exclusion from future borrowing. However, subsequent work by Bulow & Rogoff (1988) and Jeremy & Rogoff (1989) highlights critical limitations to this framework. They argue that sovereigns may circumvent punishment mechanisms through alternative strategies, such as foreign asset accumulation, and that enforceability of debt contracts requires more than just reputational concerns.

In response to these limitations, a new strand of the literature has emerged, focusing on the presence of financial frictions and dual liquidity constraints in emerging economies. Notably, Caballero & Krishnamurthy (2002) propose a dual liquidity model that integrates domestic and international financial environments. This framework provides a

more realistic depiction of credit constraints and the transmission of external shocks, particularly for economies like Brazil, Chile, and Colombia.

This chapter is related to the following literature. First, it builds upon foundational models of sovereign borrowing, including those of Eaton & Gersovitz (1981), Hellwig (1977), and Grossman & Van Huyck (1985), by incorporating a richer set of intertemporal and cross border financial frictions. Second, it introduces a theoretical model in which sovereign default risk, household investment, and bond prices are jointly determined in a two period setting. This model accounts for the strategic interaction between domestic households and governments under the threat of external shocks. Third, the model is linked to the empirical literature of sovereign bond spreads Easton & Rockerbie (1999), and internal rate of return Eichengreen & Portes (1986), but using recent innovations in high frequency monetary policy identification, notably the orthogonalised US monetary policy surprise of Bauer & Swanson (2023) in Chapter 1. Fourth, the chapter explores how external monetary shocks affect sovereign risk and investment in emerging economies, highlighting the feedback loop between US policy actions and Latin American bond markets.

This study aims to explain the rise in sovereign risk in Latin America following contractionary US monetary policy shocks, using the Bauer & Swanson (2023) measure. By bridging theoretical and empirical gaps in the sovereign default literature, it examines how tighter international financial conditions propagate through emerging economies, shaping sovereign risk and macroeconomic stability. The chapter is structured as follows: Section 2.2 literature review. Section 2.3 details the theoretical model, and Section 2.4 concludes.

2.2 Literature Review

This chapter is associated with the following areas of the sovereign literature. First, it extends research on traditional models of sovereign borrowing, such as those proposed by Hellwig (1977), Feder & Just (1977*a*), Grossman & Van Huyck (1985), and particularly Eaton & Gersovitz (1981), who argue that countries repay their debts to preserve future access to international credit markets.

Early theoretical contributions to the study of sovereign default risk lay the foundations of the modern literature by emphasising the role of incentives, information and enforcement constraints in debt sustainability. Hellwig (1977) shows that, under imperfect information and incomplete markets, default risk directly affects asset prices and intertemporal allocation decisions, giving rise to endogenous risk premia. In a complementary contribution, Feder & Just (1977*a*) provides empirical evidence that higher sovereign default risk increases external borrowing costs and constrains access to international credit markets, thereby depressing investment and economic growth. Finally,

Grossman & Van Huyck (1985) formalises sovereign default as a problem of contract enforcement in the absence of supranational legal mechanisms, concluding that debt repayment is sustained primarily through reputational considerations and the threat of exclusion from international capital markets. Taken together, these studies establish that sovereign default risk is not exogenous, but instead emerges endogenously from informational frictions, institutional limitations and incentive compatibility constraints that jointly shape sovereign borrowing conditions and macroeconomic outcomes.

A second strand of the literature focuses on the behaviour and strategic incentives of borrower countries in the presence of sovereign default risk. Jeremy & Rogoff (1989) challenge the standard view that exclusion from international credit markets constitutes a sufficient enforcement mechanism to sustain sovereign debt repayment. They argue that borrower countries can partially circumvent financial autarky by accumulating assets abroad or engaging in alternative financial arrangements, thereby smoothing consumption and investment even after default. As a result, the threat of permanent exclusion from capital markets may lack credibility, weakening the disciplinary role traditionally attributed to reputational sanctions. This insight has important implications for theoretical models of sovereign debt, as it highlights the need to account for borrowers ability to self insure and access non conventional financial instruments when assessing default incentives. Complementing this perspective, Bulow & Rogoff (1988) emphasise the role of legal and institutional mechanisms in sustaining sovereign lending relationships. They argue that lending to less developed countries can be both extended and repaid only if international creditors possess effective legal instruments to influence outcomes following default, such as renegotiation frameworks or leverage over future trade and financial relations. In their view, purely reputational considerations are insufficient to guarantee repayment in the absence of enforceable sanctions. Together, these contributions underscore that sovereign borrowing outcomes depend critically on the interaction between borrower strategic behaviour, available outside options and the institutional environment governing debt enforcement, thereby motivating models in which default risk arises endogenously from incentive compatibility constraints rather than from exogenous repayment costs.

A third relevant strand of the literature focuses on the dual liquidity framework developed by Caballero & Krishnamurthy (2002). Building on earlier contributions by Caballero & Krishnamurthy (2001) and Caballero & Krishnamurthy (2003), this approach introduces financial constraints that simultaneously affect borrowers and lenders in a less developed economy within a two country setting. The model explicitly distinguishes between domestic and foreign liquidity and analyses their interaction in the context of an emerging and a developed economy. In the empirical motivation of the model, Argentina and Belgium are used as representative cases of an emerging and a developed economy, respectively, which trade domestic and international liquidity under conditions of financial

stress. A key contribution of this framework is its emphasis on the endogenous determination of asset prices, liquidity premia and capital flows during periods of financial crises, taking into account the strategic behaviour of governments and firms as well as the structure of domestic financial markets. Unlike standard open economy models, the dual liquidity framework captures the asymmetry between domestic and international financial markets faced by emerging economies, where access to foreign liquidity is limited and subject to sudden reversals. While the model retains the analytical structure of the Mundell Fleming framework, it provides a more appropriate representation of emerging market dynamics by explicitly incorporating financial frictions, balance sheet effects and segmented liquidity markets. This represents a significant improvement over earlier studies that relied on adaptations of developed economy Mundell Fleming models to analyse less developed economies, as it offers a more realistic characterisation of the vulnerabilities and crisis dynamics associated with emerging market financial integration.

A fourth strand of the literature develops quantitative models aimed at explaining the dynamics of sovereign debt crises and the behaviour of sovereign bond spreads. Aguiar et al. (2016) document substantial cross country heterogeneity in average sovereign bond spreads, their volatility and the frequency of debt crises among developing economies. A central finding of their analysis is that standard macroeconomic fundamentals explain only a limited share of observed spread fluctuations, suggesting that sovereign risk premia are driven by factors beyond traditional indicators of fiscal sustainability and output dynamics.

Although spreads exhibit co movement across countries, the authors show that these common components are weakly related to conventional measures of global risk pricing, uncertainty or movements in the risk free interest rate. This evidence poses a challenge for structural models of sovereign debt, highlighting the importance of incorporating additional mechanisms such as financial frictions, endogenous risk premia and belief driven fluctuations. Complementing this macro quantitative perspective, Easton & Rockerbie (1999) estimate optimal lending spreads over LIBOR by modelling default probabilities using logistic and Tobit regressions. Their results emphasise that sovereign default should be treated as a continuous outcome rather than a binary event, an insight that is particularly relevant for quantitative models seeking to match observed spread behaviour in less developed countries.

Furthermore, their findings indicate that domestic policy choices matter for default risk, as economic liberalisation is associated with a lower probability of default. Finally, Hernández-Trillo (1995) highlight the role of external factors in triggering sovereign debt crises, arguing that adverse international financial conditions can significantly amplify domestic vulnerabilities. Taken together, these contributions underscore the need for theoretical sovereign debt models that combine country specific fundamentals with global financial conditions in order to account for the observed dynamics of spreads and crisis

episodes.

In the context of developed economies[1], recent contributions have employed quantitative sovereign debt models to assess the macroeconomic consequences of heightened sovereign risk. Arellano et al. (2017) estimate and calibrate a structural model for Italy, showing that increases in sovereign risk during the Italian sovereign debt crisis were associated with a substantial contraction in economic activity, with output declining by approximately one third relative to its pre crisis level. Their results highlight the importance of endogenous feedback effects between sovereign risk, borrowing costs and real economic activity, even in advanced economies with relatively deep financial markets. This finding challenges the view that sovereign risk is primarily a concern of emerging markets, and instead demonstrates its relevance for developed economies during periods of fiscal and financial stress.

Complementary evidence from the emerging market literature further reinforces these mechanisms. Arellano (2008) show that sovereign default risk has significant adverse effects on income levels, as higher borrowing costs tighten external financing conditions and amplify business cycle fluctuations. In a related contribution, Mendoza & Yue (2012) document that sovereign default episodes are typically associated with deep and persistent recessions, driven by sharp contractions in consumption, investment and external borrowing. Moreover, empirical studies by Neumeyer & Perri (2005) and Uribe & Yue (2006) establish a robust negative correlation between sovereign interest rate spreads and output, indicating that increases in sovereign risk premia are systematically linked to declines in economic activity.

In an earlier contribution, Feder & Just (1977*b*) develop a quantitative framework to evaluate the debt servicing capacity of developing countries, with the explicit aim of identifying the economic determinants of sovereign repayment performance. Their model isolates six key variables with strong explanatory power, namely the imports to reserves ratio, the amortisation to debt ratio, the debt to service ratio, export growth, income per capita and the capital inflows to debt service ratio. These indicators capture both internal macroeconomic conditions and external sector vulnerabilities, reflecting liquidity constraints, repayment burdens and the capacity to generate foreign exchange. The empirical results show that all six variables are statistically significant in explaining cross country variation in repayment outcomes, underscoring the central role of structural economic characteristics in sovereign risk assessments. Importantly, the first three indicators were previously identified by Frank Jr & Cline (1971), highlighting continuity in the early empirical literature on sovereign creditworthiness. By formalising these relationships within a quantitative setting, Feder & Just (1977*b*) provide one of the earliest systematic attempts to move beyond purely descriptive analyses of sovereign debt, laying the groundwork for subsequent empirical and structural models that incorporate external

[1]For a comprehensive account of sovereign defaults during the 1930s, see Eichengreen & Portes (1986).

balance indicators and liquidity measures as core determinants of default risk.

In these quantitative models we find the literature that studies the effects of high-frequency monetary policy surprises on macroeconomic variables Cochrane & Piazzesi (2002), Gertler & Kiyotaki (2010), Faust & Rogers (2003), Gertler & Karadi (2015), Ramey (2016), Brunnermeier et al. (2016), Bocola (2016), Stock & Watson (2018), and Palmén (2020) and in asset prices Kuttner (2001); Bernanke & Kuttner (2005); Gurkaynak et al. (2005); Swanson (2021); Bauer & Swanson (2023).

Within the class of quantitative macroeconomic models, a related body of literature examines the effects of high frequency monetary policy surprises on macroeconomic outcomes and financial variables. Early contributions by Cochrane & Piazzesi (2002) and Faust & Rogers (2003) establish identification strategies that exploit unexpected policy announcements to isolate exogenous monetary shocks. Building on this approach, Gertler & Kiyotaki (2010) and Gertler & Karadi (2015) show that monetary policy surprises propagate through financial markets by affecting credit conditions and balance sheets, thereby amplifying real economic responses. Ramey (2016) further emphasise the importance of shock identification in distinguishing monetary policy effects from endogenous policy reactions. More recent studies extend this framework to the sovereign risk context.

A closely related quantitative literature analyses the macroeconomic consequences of sovereign risk through its interaction with the banking sector. Bocola (2016) examine the effects of sovereign risk in a model in which banks hold domestic government debt and show that news about a future sovereign default weakens financial intermediation. In their framework, sovereign risk operates through two main channels. First, it tightens banks funding constraints, reducing the resources available to finance firms, a liquidity channel. Second, it induces precautionary deleveraging by banks, a risk channel. Estimating the model using Italian data, he finds that heightened sovereign risk was recessionary and that the risk channel played a quantitatively important role. He also uses the model to evaluate subsidised long term loans to banks, showing that precautionary motives during the crisis substantially dampened the response of bank lending to these interventions of the European Central Bank. Similarly, In a closely related contribution, Palmén (2020) analyse how credit supply is affected by a higher level of sovereign risk. Complementing this analysis, Brunnermeier et al. (2016) document the sovereign bank nexus that characterised the euro area debt crisis between 2009 and 2012. They describe how deteriorations in sovereign creditworthiness reduced the market value of banks holdings of domestic government debt, weakened bank solvency and curtailed lending activity. This, in turn, increased the likelihood of government bailouts of distressed banks, further aggravating sovereign distress through a bailout loop. At the same time, the recessionary effects of the credit crunch reduced tax revenues, weakening government solvency through a real economy loop. Together, these studies highlight the presence of powerful feedback

mechanisms between sovereign risk, bank balance sheets and macroeconomic outcomes.

Complementing the macroeconomic evidence, a parallel strand of the literature studies the impact of monetary policy surprises on asset prices. Seminal works by Kuttner (2001), Bernanke & Kuttner (2005) and Gurkaynak et al. (2005) document immediate and persistent responses of interest rates and asset valuations to unexpected policy announcements. More recent reassessments by Swanson (2021) and Bauer & Swanson (2023) refine the measurement of monetary policy surprises and reassess their effects across the yield curve. Taken together, this literature provides the empirical and methodological foundations for incorporating high frequency monetary policy shocks into quantitative models of sovereign risk and macroeconomic dynamics.

Finally, the strand of literature most directly relevant to the theoretical model focuses on the consequences of limited fiscal and policy commitment, which generate state dependent capital taxation, investment debt cycles, debt overhang and persistently low levels of private capital (Aguiar et al. 2009). In this framework, standard debt relief measures are unable to improve long run outcomes, as the lack of commitment links sovereign borrowing to private investment decisions. Aguiar et al. (2009) show that applying an appropriate fiscal policy rule can mitigate these cyclical distortions by stabilising investment incentives and smoothing capital accumulation over time. Empirical evidence further supports these mechanisms. Kalemli-Özcan et al. (2022) document that high pre crisis leverage substantially depressed firms post crisis investment, particularly in contexts where banks were weakened by sovereign stress.

In addition, Aguiar & Amador (2021) emphasise that sovereign debt overhang depresses investment and growth by constraining private sector activity: limited commitment implies that higher public debt reduces private investment, while political frictions further distort fiscal policy, generating persistent effects on long run growth dynamics. These channels are particularly relevant for Latin American countries, where repeated default episodes and binding fiscal constraints reflect the prevalence of "impatient governments" and the associated commitment problems. In such settings, household investment in the first period is constrained by the value of long term sovereign bonds, so that credible government commitment fails, producing a negative correlation between investment and public debt levels consistent with the canonical "debt overhang" mechanism described by Aguiar et al. (2009).

Aguiar & Amador (2021) provide a comprehensive analytical and quantitative treatment of the fundamental frictions that shape sovereign debt markets. The central friction emphasised throughout their book is limited commitment, which reflects the absence of a supranational legal authority capable of enforcing repayment or administering an orderly bankruptcy procedure for sovereign states. Within this environment, debt contracts are sustained not by formal enforcement but by the threat of exclusion from international capital markets or by other forms of punishment and sanctions. Early chapters develop

tractable models that isolate this friction and analyse its implications for risk sharing between governments and external creditors. A key insight is that, in the presence of limited commitment, a sufficiently patient government finds it optimal to reduce indebtedness or accumulate reserves in order to mitigate the risk of default and the associated penalties.

The framework also clarifies that some form of punishment or reputational cost is required to sustain any positive level of borrowing in equilibrium, a result that extends quantitatively to richer environments with incomplete markets. Yet, despite the theoretical prediction that limited commitment discourages excessive borrowing, the empirical record indicates that emerging market economies frequently accumulate substantial external liabilities and experience recurrent debt crises. This apparent tension motivates a deeper investigation into the political economy and preference heterogeneity mechanisms that may generate high equilibrium debt levels, such as government impatience or domestic distortions. Their work therefore situates sovereign default not as an anomaly but as an endogenous outcome of optimal decisions under commitment constraints, providing a coherent explanation for both recurrent indebtedness and costly default episodes in emerging economies. Taken together, these studies provide strong evidence that sovereign risk plays a central role in shaping macroeconomic outcomes across both developed and emerging economies, thereby motivating the use of quantitative models that explicitly account for the interaction between sovereign risk, financial conditions and the business cycle.

The theoretical framework developed in this chapter builds on the extensive literature on sovereign debt and default models, which has traditionally analysed the incentives of sovereign borrowers to repay or default on external obligations. Early contributions, such as Eaton & Gersovitz (1981), Bulow & Rogoff (1988), and Bulow & Rogoff (1989), established the foundations of sovereign default models by framing default as an optimal decision arising from the trade-off between the benefits of debt relief and the costs associated with exclusion from international capital markets. Subsequent two-period models, including Arellano (2008) and related contributions, have extended this framework by incorporating uncertainty, borrowing constraints, and the interaction between sovereign debt decisions and macroeconomic conditions.

The model developed here follows this tradition by considering a two-period environment in which a sovereign chooses borrowing and repayment decisions while facing constraints determined by external financing conditions. However, it differs from standard formulations by emphasising the role of collateral values and liquidity conditions as transmission mechanisms linking sovereign risk to domestic investment dynamics. In this sense, the framework provides a theoretical representation of how deteriorating sovereign fundamentals can tighten borrowing conditions and generate a contraction in economic activity through financial constraints. This mechanism complements the existing sovereign

default literature by highlighting the interaction between sovereign risk, credit availability, and real economic outcomes. Additionally, this literature provides the conceptual foundation for the subsequent theoretical sovereign debt model, which formalises the interactions between household investment, government borrowing, and endogenous default risk.

2.3 The Model

In this simple static two period model, households and the government inhabit the economy. Each household has two kinds of members: consumers and producers. The basic model includes the following constraints: limited commitment and political economy frictions, which may entail impatient governments and debt overhang. The government imposes taxes on household income and issues long-term sovereign bonds to cover public spending. These long-term government bonds are mostly acquired by local and foreign households that invest in those assets in period one, and the government might face a sovereign default in period two. If the government defaults, it will lose a fraction α of its income y for not honouring the debt of foreign households.

Agents

1. Households

The value of long-term sovereign bonds held by domestic households in emerging markets is denoted by V_b. This value reflects the market price of the bond and the quantity held. Specifically, the bond value in period one is given by the product of the bond price Q and the quantity of sovereign bonds acquired by households, b_1. This relationship is expressed in Equation (2.1)

$$V_b = Q \cdot b_1 \tag{2.1}$$

The bond price Q captures the perceived risk of sovereign default when there is an unexpected foreign monetary tightening condition and the time value of money, while b_1 reflects the household's investment decision in sovereign debt. Hence, V_b serves as a measure of the household's wealth derived from holding government bonds, which in turn affects their investment and consumption decisions in the subsequent period.

Household investment in period one, denoted by I_1, is determined by the market value of long-term sovereign bonds, V_b, and a proportionality parameter λ. The parameter $\lambda > 0$ captures the efficiency or fraction of bond wealth that is transformed into productive investment. Accordingly, some households act as domestic financial intermediaries, and they allocate part of their balance sheets to sovereign bonds.

Sovereign bonds held by domestic financial institutions serve as collateral supporting the supply of credit to the private sector. Consequently, private investment depends

on the market value of sovereign bond holdings rather than solely on their quantity. Since the value of sovereign bonds is given by $V_b = Qb_1$, a decline in the bond price (Q) reduces the value of collateral even if the stock of sovereign bonds (b_1) remains unchanged. The resulting contraction in bank credit lowers private investment, providing a simple microfoundation for the bank balance sheet channel through which adverse sovereign shocks are transmitted to the real economy. This mechanism is consistent with the empirical evidence presented in Chapter 1, where contractionary US monetary policy shocks reduce sovereign bond market value, weaken bank lending, and subsequently lower economic activity. The investment undertaken by households in the first period is given by Equation (2.2)

$$I_1 = \lambda \cdot V_b \tag{2.2}$$

This specification reflects the idea that households channel a portion of their sovereign bond wealth into productive capital, which ultimately determines income in the second period. The greater the bond value V_b, the higher the level of period one investment I_1, assuming a constant λ. This relationship establishes a direct link between financial wealth and real economic activity in the model.

Household preferences are captured by a simple utility function where utility, denoted by u, is derived solely from consumption in the second period, C_2. This formulation assumes that households do not consume in the first period and instead allocate their resources to maximise future consumption. Note that if the utility function is linear in consumption, I assume that the agent is indifferent to smoothing consumption across time, this helps to simplify the analysis. The utility maximisation problem can therefore be expressed as:

$$u = C_2 \tag{2.3}$$

This linear utility function implies risk neutrality and preferences fully concentrated on period two outcomes. There is no intertemporal substitution motive, that is, what matter it is that utility is increasing in consumption. It reflects the assumption that households seek to maximise their final consumption, which depends on income from production, tax obligations, investment costs, and returns from sovereign bonds.

Household consumption in period two, depicted by C_2, is determined by the net resources available after accounting for income, taxes, and investment-related costs. Specifically, period-two consumption depends positively on income in that period, y_2, and on the sovereign bonds, b_1, acquired by households in period one. It is negatively affected by the total tax burden, T, and the repayment of the initial investment, I_1, where the relevant interest rate is the international risk-free rate, r^*. This relationship is formalised in Equation (2.4)

$$C_2 = y_2 - T - (1 + r^*) \cdot I_1 + b_1 \tag{2.4}$$

This expression illustrates the intertemporal trade-off faced by households, while investment in the first period leads to higher income in the second, it also incurs a repayment cost. The presence of b_1 captures the additional financial return from sovereign bond holdings, contributing positively to consumption.

Household income in period two, denoted by y_2, is endogenously determined by the investment undertaken in the first period, I_1, and a productivity shock, A. The shock A reflects the efficiency or return on investment and can be interpreted as a measure of the economy's technological or institutional quality. The higher the value of A, the greater the output generated from a given level of investment. This relationship is captured in the following equation:

$$y_2 = A \cdot I_1 \tag{2.5}$$

This specification highlights the forward looking behaviour of households and the economy's dependence on investment productivity. It also links financial decisions in period one directly to real economic outcomes in period two.

A key condition in this two-period economic model is that the productivity shock, denoted by A, must exceed the sum of one and the international risk-free interest rate, r^*. This inequality ensures that investment undertaken by households in the first period yields a return higher than the opportunity cost of capital in international financial markets. Formally, this condition is represented by

$$A > 1 + r^* \tag{2.6}$$

This requirement guarantees that the investment is profitable in net present value terms and provides an incentive for households to allocate resources toward production rather than simply investing in foreign risk-free assets. It also underpins the model's internal consistency by ensuring that economic activity generates sufficient output to justify the initial investment.

At the beginning of period 1, the government issues long-term sovereign bonds in international capital markets to finance expenditures that cannot be covered by current fiscal revenues. Borrowing allows the government to smooth fiscal resources intertemporally by bringing future income forward to support productive public expenditure and maintain macroeconomic stability. In return, the government commits to repay its external obligations in period 2. However, repayment is contingent upon future economic conditions, giving rise to the possibility of sovereign default if output is insufficient to meet debt obligations. This intertemporal borrowing decision captures the central trade-

off faced by emerging market governments such as Brazil, Chile, and Colombia: access to external finance relaxes current budget constraints but increases future repayment obligations and exposure to changes in international financial conditions.

The government is required to repay the outstanding long-term sovereign debt accumulated in period one. This debt consists of bonds held both by domestic households, denoted by b_1, and by foreign investors, denoted by b_1^*. To meet these obligations, the government imposes taxes in period two, T_2, equal to the total amount of debt service due. This relationship is formalised in the following equation:

$$T_2 = b_1 + b_1^* \tag{2.7}$$

This formulation highlights the fiscal burden associated with sovereign borrowing and illustrates how both domestic and external debt contribute to the future tax obligations of households. It also implies that increased reliance on sovereign debt issuance in period one leads to higher tax liabilities in period two, potentially affecting household welfare and investment decisions. Nevertheless, the government tries to improve households' well-being.

2. Government

The government plays a central role in shaping household welfare by seeking to maximize household consumption in period two, C_2. However, the government also faces an intertemporal trade-off regarding its debt obligations. Specifically, it must decide whether to honour its outstanding foreign debt, b_1^*, or to default. The decision rule is characterised by a binary outcome based on the comparison between the repayment burden and the benefits of defaulting. If the government chooses not to default, it must repay its obligations in full, thereby reducing the resources available for household consumption. In contrast, if the government defaults, it avoids full repayment but incurs an output loss equal to a fraction α of income y_2. This decision framework is formally represented as

$$\max C_2 = \begin{cases} \text{if no default: } y_2 - b_1^* - (1 + r^*)I, \\ \text{if default: } (1 - \alpha)y_2 - (1 + r^*)I. \end{cases} \tag{2.8}$$

This specification captures the government's strategic consideration of the costs and benefits of default, with implications for sovereign risk, household welfare, and access to future international capital markets.

The price of long-term sovereign bonds, Q, reflects the perceived risk of government default. This risk is evaluated by the probability that the government's period-two income, y_2, net of the foreign-held debt b_1^*, exceeds the threshold below which default becomes optimal. Specifically, the government will choose not to default if the income net of foreign obligations exceeds the value of output lost in the case of default, given by $(1 - \alpha)y_2$, where α is the proportion of output lost under default. This relationship

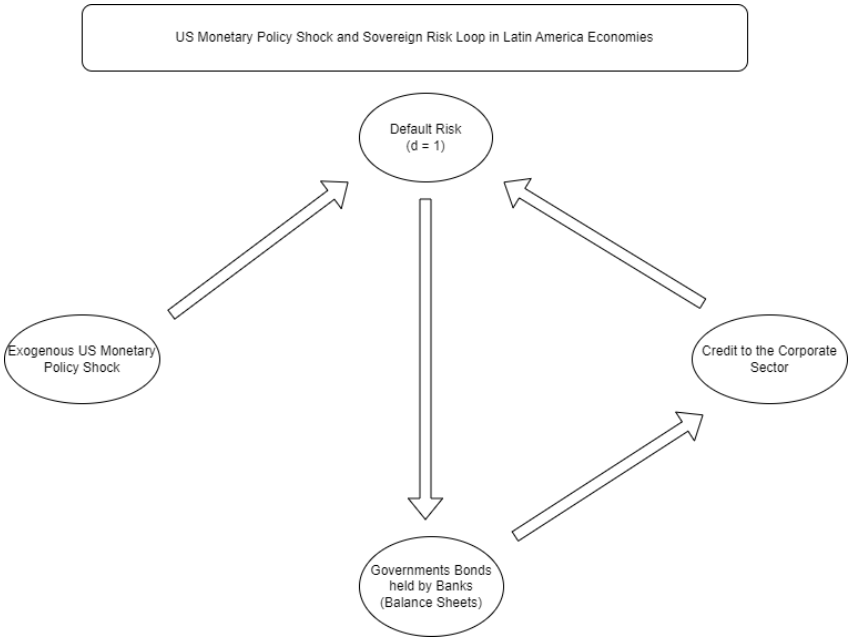

Figure 2.1: Feedback Loop of US Monetary Policy Tightening. Source: Author's own elaboration

determines the bond price through the following equation

$$Q = \frac{\text{Prob}(y_2 - b_1^* > (1-\alpha)y_2)}{1 + r^*} \tag{2.9}$$

Here, r^* denotes the international risk free interest rate. The denominator discounts the expected payoff of the bond, while the numerator reflects the likelihood that the government honours its debt. Hence, the bond price incorporates both the return required by international investors and their assessment of sovereign risk.

Figure 2.1 shows the feedback loop associated with the US monetary policy shock on emerging economies. The feedback starts with an unexpected contractionary monetary policy shock, which raises the emerging market borrowing interest rates and the sovereign bond returns. The former entails a reduction of the financial resources to the corporate sector, while the latter implies a decline in the long-term government bond price. Such a decline in the long-term sovereign bonds values, Q, reflects a higher government default risk as depicted by equation 2.9. In turn, capital accumulation and industrial production levels in emerging markets are contracted.

2.3.1 Equilibrium

The equilibrium of the model is characterised by the interaction between household investment decisions, sovereign bond prices, and the government's default decision. Households invest in sovereign bonds during period one, while the government decides in period two whether to honour its external debt obligations. Since investment depends on the value of sovereign bonds, any change in sovereign risk feeds back into real economic activity. The

government compares household consumption under repayment and default. Repayment is preferred whenever

$$y_2 - b_1^* > (1 - \alpha)y_2, \tag{2.10}$$

which can be rearranged as

$$\alpha y_2 > b_1^*. \tag{2.11}$$

Substituting the household production technology,

$$y_2 = AI_1, \tag{2.12}$$

the repayment condition becomes

$$\alpha A I_1 > b_1^*. \tag{2.13}$$

Using the household investment decision

$$I_1 = \lambda V_b, \tag{2.14}$$

and the value of sovereign bonds

$$V_b = Q b_1, \tag{2.15}$$

yields

$$\alpha A \lambda Q b_1 > b_1^*. \tag{2.16}$$

Equation (2.16) represents the central equilibrium condition of the model. Repayment is more likely when productivity is high, domestic investment is stronger, or sovereign bond prices remain elevated. Conversely, larger external debt obligations increase the likelihood of sovereign default. Solving for the critical bond price gives

$$Q > \frac{b_1^*}{\alpha A \lambda b_1}. \tag{2.17}$$

Equation (2.17) shows that the minimum bond price required to sustain repayment increases with the stock of external debt and decreases with productivity, investment efficiency and domestic bond holdings.

2.3.2 Comparative Statics

The sovereign bond price is given by

$$Q = \frac{\Pr(\text{Repayment})}{1 + r^*}, \tag{2.18}$$

where the repayment probability satisfies

$$\Pr(\text{Repayment}) = \Pr\left(\alpha A \lambda Q b_1 > b_1^*\right). \tag{2.19}$$

Hence, sovereign bond prices depend on investors' expectations regarding future repayment, while those expectations themselves depend on the bond price through investment and output. The model therefore exhibits a fixed point equilibrium similar to Eaton & Gersovitz (1981). Now, I differentiate Equation (2.18) with respect to the international interest rate, which gives

$$\frac{\partial Q}{\partial r^*} = -\frac{\Pr(\text{Repayment})}{(1 + r^*)^2} < 0. \tag{2.20}$$

A contractionary monetary policy shock in the US reduces the market value of sovereign bonds issued by the emerging economies of Brazil, Chile, and Colombia. Because household investment is proportional to sovereign bond wealth,

$$I_1 = \lambda Q b_1, \tag{2.21}$$

it follows that

$$\frac{\partial I_1}{\partial r^*} = \lambda b_1 \frac{\partial Q}{\partial r^*} < 0. \tag{2.22}$$

Higher international interest rates reduce sovereign bond prices, lowering household wealth and productive investment. Since output is determined by

$$y_2 = A I_1, \tag{2.23}$$

its response to international interest rates is

$$\frac{\partial y_2}{\partial r^*} = A \frac{\partial I_1}{\partial r^*} < 0. \tag{2.24}$$

Consequently, tighter external financial conditions related to a monetary policy shock in the US, reduce future economic activity through lower domestic investment. Finally, the probability of sovereign default is

$$P_D = \Pr\left(y_2 < \frac{b_1^*}{\alpha}\right). \tag{2.25}$$

Since

$$\frac{\partial y_2}{\partial r^*} < 0, \tag{2.26}$$

it immediately follows that

$$\frac{\partial P_D}{\partial r^*} > 0. \tag{2.27}$$

An increase in international interest rates therefore raises sovereign default risk by reducing investment, lowering future output, and weakening the government's repayment capacity.

2.3.3 Theoretical Implications

The model delivers five theoretical propositions that motivate the empirical analysis developed in Chapter one.

Proposition 1. An increase in the international interest rate reduces the market value of long-term sovereign bonds. This result is directly associated with Equation (2.20).

Proposition 2. Lower sovereign bond prices reduce domestic investment. This proposition follows from Equation (2.22), investment is proportional to the market value of sovereign bonds.

Proposition 3. Lower investment reduces future economic output. Equation (2.24) shows that output is proportional to the investment level of the economy.

Proposition 4. Lower output increases the probability of sovereign default. The result follows directly from Equation (2.27).

Proposition 5. A contractionary US monetary policy shock increases sovereign risk through its effects on bond prices, investment, and output.

These five theoretical propositions establish the transmission mechanism investigated empirically in Chapter 1 using a Panel Vector Autoregressive framework. In particular, the model predicts that tighter US monetary policy raises sovereign risk by reducing sovereign bond prices, discouraging domestic investment, lowering future output, and increasing the probability of sovereign default.

This chapter has developed a theoretical framework to analyse the relationship between sovereign default risk, international financial conditions, and domestic economic activity. By incorporating the interaction between sovereign borrowing constraints, collateral values, and liquidity conditions, the model provides a mechanism through which changes in external financing conditions can affect investment and output dynamics. In

particular, the framework highlights the role of sovereign debt as both a source of financing and a potential constraint when deteriorating fundamentals weaken access to credit markets. The model establishes the theoretical foundations for understanding sovereign risk transmission and motivates the empirical investigation developed in the subsequent chapters of this thesis. Moving now to the conclusions.

2.4 Conclusions

This chapter has developed a theoretical framework to analyse the relationship between sovereign default risk, international financial conditions, and domestic economic activity. By incorporating the interaction between sovereign borrowing constraints, collateral values, and liquidity conditions, the model provides a mechanism through which changes in external financing conditions can affect investment and output dynamics. In particular, the framework highlights the role of sovereign debt as both a source of financing and a potential constraint when deteriorating fundamentals weaken access to credit markets. The model establishes the theoretical foundations for understanding sovereign risk transmission and motivates the empirical investigation developed in the previous chapter of this thesis.

Building on foundational models of sovereign borrowing such as Eaton & Gersovitz (1981) and Grossman & Van Huyck (1985), the model enriches the theoretical framework by integrating financial frictions, dual liquidity constraints, and endogenous sovereign default risk that responds to international interest rate fluctuations. By incorporating elements of the dual liquidity model of Caballero & Krishnamurthy (2002), the model captures the interaction between domestic investment decisions and international financial conditions. A key theoretical contribution is the derivation of sovereign bond prices as a function of the probability of default, which is itself endogenously linked to the international risk free interest rate, thereby providing a basic but formal mechanism through which US monetary policy affects emerging market vulnerabilities.

Chapter 3

Sovereign Debt Growth Relationship

Abstract

This chapter examines whether a threshold effect characterises the relationship between sovereign debt and economic growth in Latin and Central America, and the Caribbean. While traditional literature associates high public debt with low growth, recent work highlights substantial heterogeneity across countries and institutional settings. Building on these insights, the analysis tests for nonlinearities and structural breaks in the debt growth nexus using regional data, panel regressions, and LASSO methodologies. The results provide no evidence of a distinct threshold beyond which debt becomes systematically harmful. Instead, the relationship appears continuous and context dependent, aligning with findings that debt thresholds are neither universal nor robust across samples, methodologies, or levels of institutional quality. These conclusions reinforce the view that country specific factors shape the growth implications of public debt.

3.1 Introduction

Sovereign debt is traditionally associated with low economic growth Reinhart & Rogoff (2009), Aguiar & Amador (2021). However, Ventura & Voth (2015) argue that the high level of Britain's public debt in the eighteenth century coincided with a sustained path of positive economic growth. They emphasise that debt episodes differ across contexts, considering the British case a special one in which debt accumulation functioned as a store of value, facilitating the transfer of financial resources from less to more productive sectors of the economy.

Along similar lines, Song et al. (2011) suggest that China's rapid economic growth has been driven by reallocating investment from low productivity state owned enterprises

to highly productive private firms. Korea provides another example where debt accumulation was accompanied by robust economic growth (Song et al. 2011). The negative relationship between economic growth and public debt documented by Reinhart & Rogoff (2009) and Aguiar & Amador (2021), in the Latin American context, may be linked to the region's limited investment in highly productive sectors.

Recent research conducted since the Global Financial Crisis generally supports the view that high public debt tends to hinder economic growth. While empirical studies point to the possibility of nonlinear debt growth thresholds, the evidence indicates that such thresholds are not universal but instead vary depending on factors such as a country's stage of development and the strength of its institutions (Salmon 2021).

In the same vein, Panizza & Presbitero (2013) state that the argument for a universal debt threshold remains unproven. The supposed negative link between debt and growth, as well as the well-known 90 percent threshold, does not hold consistently when tested across different samples, model specifications, or estimation methods. Evidence instead suggests that the impact of debt is shaped by institutional quality, with its adverse effects largely limited to non democratic developing countries (Kourtellos et al. 2013). This aligns with research showing no causal relationship between debt and growth in OECD countries Panizza & Presbitero (2014). Furthermore, De Soyres et al. (2022) concluded that it is also necessary to consider country specific characteristics to fully evaluate the effect of rising public debt on real GDP.

Recent research has increasingly shifted the focus from identifying universal sovereign debt thresholds towards the concept of maximum sustainable debt, emphasising that debt sustainability is inherently conditional on country-specific macroeconomic and fiscal characteristics. Rather than assuming that a common debt-to-GDP ratio triggers adverse economic outcomes, this literature argues that the sustainability of public debt depends on factors such as fiscal capacity, expected primary surpluses, economic growth, borrowing costs, and institutional credibility (Collard et al. (2015); IMF, 2023). This perspective motivates the present study, which examines whether a common debt threshold exists across countries or whether the debt-growth relationship is better characterised by heterogeneous and conditional effects.

This chapter investigates whether a threshold effect exists in the relationship between sovereign debt and economic growth in Latin America, Central America, and the Caribbean. Contrary to the notion of a debt threshold beyond which growth systematically deteriorates, the empirical evidence reveals no distinct nonlinearity or structural break in the debt growth relationship. These findings are consistent with previous empirical studies that also find no evidence of a universal debt threshold, including Panizza & Presbitero (2013), Kourtellos et al. (2013), Panizza & Presbitero (2014), Égert (2015) and De Soyres et al. (2022).

The sample of eighteen Latin American, Central American, and Caribbean economies

provides a particularly suitable setting for testing the debt-threshold hypothesis for several reasons. First, it exhibits substantial cross-country variation in public debt ratios, ranging from relatively low levels to well above 300 percent of GDP, thereby offering sufficient variation to identify potential nonlinearities. Second, unlike global datasets that combine advanced and developing economies with markedly different institutional and macroeconomic environments, this regional sample focuses on countries that share many structural features characteristic of emerging economies, including greater exposure to external financing conditions, commodity-price fluctuations, and sovereign borrowing constraints. Finally, the sample spans more than four decades and encompasses major episodes of debt accumulation, fiscal adjustment, financial crises, and economic reforms, providing a rich environment in which to assess whether a common debt threshold emerges across countries facing similar development challenges. Consequently, the analysis contributes to the literature by evaluating the external validity of the debt-threshold hypothesis within a relatively homogeneous group of emerging economies rather than relying on highly heterogeneous global samples. The chapter is structured as follows: Section 3.2 literature review. Section 3.3 details the data and measurement. Section 3.4 outlines the econometric specification. Section 3.5 presents the empirical findings, and Section 3.6 concludes.

3.2 Literature Review

The relationship between sovereign debt and economic growth has been extensively studied in the academic literature, combining both theoretical and empirical perspectives. Early contributions often emphasised the potentially adverse consequences of high public debt for macroeconomic performance. In their widely cited study, Reinhart & Rogoff (2009) document that episodes of elevated public debt are frequently associated with prolonged periods of low economic growth. Their analysis, covering a broad range of countries over several decades, highlights that this pattern is particularly pronounced in emerging and developing economies, suggesting that debt accumulation may exacerbate macroeconomic vulnerabilities in contexts where fiscal institutions and financial markets are less developed. The study systematically links periods of high debt with extended slowdowns in economic activity, demonstrating that these associations are not limited to a single region or historical period. By providing a long term perspective, Reinhart & Rogoff (2009) have shaped subsequent discussions regarding debt sustainability, fiscal consolidation strategies, and the potential risks associated with high levels of government borrowing.

Following this work, Reinhart & Rogoff (2010) employ a large historical dataset to examine the existence of nonlinear effects in the debt growth relationship. They find that countries with public debt levels exceeding 90 percent of GDP tend to experience

significant reductions in growth. The study emphasises that these high debt levels are often associated with protracted economic slowdowns and that the relationship between debt and growth is not linear, suggesting the presence of thresholds beyond which the negative effects of debt become more pronounced. This finding has become a focal point in debates regarding fiscal prudence, with the so called 90 percent threshold frequently cited in policy discussions. However, Égert (2015) formally test the robustness of this threshold using nonlinear econometric models and find that evidence for a negative nonlinear effect is extremely weak. Their analysis demonstrates that any identifiable threshold appears at substantially lower debt ratios than the oft cited 90 percent benchmark and is highly sensitive to model specification and sample selection. This highlights the importance of carefully considering econometric methodology when interpreting empirical evidence on the debt growth nexus.

More recent contributions reinforce the conditional nature of the debt growth relationship. For example, Aguiar & Amador (2021) show that sovereign debt can exacerbate macroeconomic volatility and depress long term growth by constraining fiscal space, raising borrowing costs, and increasing the likelihood of crises. The authors argue that the impact of debt is mediated by both institutional quality and the credibility of fiscal frameworks, implying that high debt levels alone are insufficient to determine economic outcomes. This perspective underscores the need for empirical analyses to incorporate broader macroeconomic and institutional contexts rather than relying solely on debt to GDP ratios.

Historical cases further illustrate the context specific nature of the debt growth relationship. Ventura & Voth (2015) examine eighteenth century Britain and find that exceptionally high levels of public debt coincided with sustained economic expansion. They attribute this to the structure of Britain's fiscal and financial institutions, which allowed government liabilities to function as a safe store of value and promoted financial deepening. The efficient allocation of capital, supported by institutional frameworks, facilitated the transfer of resources from less productive sectors to more productive ones, mitigating the negative effects often associated with high debt levels. Similarly, Song et al. (2011) present evidence from China, where rapid economic growth has been accompanied by rising levels of debt. The study shows that credit allocation shifted from inefficient state owned enterprises towards more productive private firms, thereby supporting sustained investment and growth. Comparable patterns are observed in Korea, suggesting that debt accumulation may be growth enhancing when combined with effective institutions and sound resource allocation. These historical and contemporary examples reinforce the notion that the consequences of public debt are highly contingent on the institutional and economic context in which borrowing occurs.

Given this heterogeneity, scholars have increasingly questioned whether a universal debt threshold exists. Following the Global Financial Crisis, numerous studies at-

tempted to identify critical levels of debt beyond which economic growth sharply declines. Some analyses propose the existence of tipping points, yet these thresholds differ significantly depending on the sample, the estimation strategy, and institutional characteristics. Salmon (2021) review the post crisis literature and conclude that while nonlinearities in the debt growth relationship may arise under particular conditions, no robust global threshold can be inferred. Their review emphasises that the observed effects are sensitive to country specific factors, including development level, institutional quality, and fiscal policy credibility.

In line with these observations, Panizza & Presbitero (2013) demonstrate that the widely cited 90 percent debt threshold lacks empirical robustness once alternative specifications, samples, or corrected datasets are considered. Similarly, Kourtellos et al. (2013) use endogenous regime switching models to show that the negative association between debt and growth is primarily observed in non democratic developing economies, whereas it is considerably weaker, or even absent, in countries with stronger institutions. Complementing this work, Panizza & Presbitero (2014) find no causal link between debt and growth in OECD countries, suggesting that previously observed correlations may reflect reverse causality or omitted variable bias rather than the direct effect of high debt. More recently, De Soyres et al. (2022) emphasise the importance of incorporating country specific factors into empirical models to accurately assess the implications of rising public debt for economic activity. Their findings highlight that a nuanced, context specific approach is necessary to understand the complex interactions between debt accumulation, fiscal policy, and macroeconomic performance.

The recent sovereign debt literature has increasingly challenged the notion of a universal debt threshold by introducing the concept of maximum sustainable debt, whereby the level of debt that a country can sustain depends on its macroeconomic fundamentals rather than on a common numerical benchmark. Collard et al. (2015) develop a measure framework in which sustainable debt is determined by lenders' willingness to finance governments, showing that maximum sustainable debt depends on expected primary surpluses, the level and volatility of economic growth, borrowing conditions, and the government's repayment credibility. Their analysis demonstrates that countries with stronger fiscal capacity and more stable growth can sustain substantially higher debt ratios while maintaining relatively low default probabilities. More broadly, recent IMF research similarly argues that debt sustainability should be assessed within a conditional framework that accounts for country specific institutional quality, fiscal credibility, financing conditions, interest growth differentials, and the composition and maturity structure of public debt rather than relying on fixed debt thresholds (International Monetary Fund 2023). This emerging literature therefore suggests that identical debt-to-GDP ratios may imply very different fiscal risks across countries and over time. The present study is closely related to this perspective. Rather than imposing an ex ante threshold, it employs a data-

driven LASSO approach to investigate whether robust debt thresholds emerge empirically across a heterogeneous panel of 18 emerging economies over 1978–2023. The absence of a stable threshold identified in the empirical analysis is therefore consistent with the view that the relationship between sovereign debt and economic performance is fundamentally conditional and depends on country-specific economic and fiscal characteristics rather than a universal level of indebtedness.

Collectively, these studies demonstrate that the effect of public debt on economic growth is far from uniform. Although some evidence points to negative correlations at high levels of indebtedness, these effects are substantially attenuated when institutional quality, model uncertainty, and endogeneity are accounted for. Cross country variation further suggests that public debt may support economic growth in environments characterised by credible fiscal institutions, strong governance, and efficient financial intermediation. Against this backdrop, this chapter contributes to the literature by examining whether a threshold effect exists in the relationship between sovereign debt and economic growth in Latin America, Central America, and the Caribbean. These regions are particularly relevant for study, given their histories of macroeconomic volatility, recurrent debt crises, and binding institutional constraints. Despite the prominence of nonlinear threshold models in the broader literature, the empirical findings presented here show no evidence of a distinct structural break or universal threshold. Instead, the results align with the body of work that rejects a one size fits all debt threshold, including Panizza & Presbitero (2013), Kourtellos et al. (2013), Panizza & Presbitero (2014), and De Soyres et al. (2022). The findings underscore the importance of country specific characteristics and institutional quality, suggesting that policy prescriptions based on universal thresholds may be inappropriate in the context of Latin America and the wider region. The next section presents the data and outlines the empirical methodology.

3.3 Data and Methodology

The annual real per capita GDP expressed in constant 2015 USD, central government debt to GDP ratio, and some controls such as population and gross capital formation from 1978 to 2023 are used to assess the relationship between per capita GDP growth and sovereign debt level in Latin America, Central America, and the Caribbean. Data for these variables are sourced from the World Development Indicators of The World Bank and the International Monetary Fund, see Table C.1 in Appendix C for details. The eighteen countries included in the sample are Argentina, Bolivia, Brazil, Colombia, Costa Rica, Belize, Chile, Dominica, Guatemala, Guyana, Honduras, Haiti, Jamaica, Mexico, Paraguay, El Salvador, Uruguay, and Saint Vincent and the Grenadines.

Table 3.1 presents descriptive statistics for annual real per capita GDP growth and the debt to GDP ratio across 18 countries in Latin America, Central America, and the

Table 3.1: Descriptive Statistics for Real Per Capita GDP Growth and Debt to GDP Ratios, 1978–2023

Country	Mean growth	Std. dev.	Mean debt/GDP	Std. dev.
Argentina	0.854	5.741	58.15	33.27
Belize	1.961	5.462	54.25	19.37
Bolivia	0.929	3.203	76.20	39.62
Brazil	1.095	3.269	63.54	17.50
Chile	2.922	4.264	27.45	20.97
Colombia	1.777	2.919	24.77	12.93
Costa Rica	1.926	3.177	35.86	12.36
Dominica	2.240	5.641	66.03	25.49
Guatemala	0.783	2.235	27.95	11.10
Guyana	5.032	12.56	128.5	89.86
Honduras	0.880	3.446	53.20	19.02
Haiti	-0.943	3.842	36.09	24.44
Jamaica	0.575	3.340	127.4	42.55
Mexico	0.821	3.673	27.95	8.799
Paraguay	1.754	3.532	24.44	11.68
El Salvador	0.628	4.295	50.22	21.24
Uruguay	2.010	4.691	35.99	19.43
St. Vincent and the Grenadines	3.029	3.005	42.04	86.30

Notes: This table reports country-level descriptive statistics for real per capita GDP growth and the Debt to GDP ratio over the period 1978–2023. Author's own elaboration.

Caribbean over the period 1978–2023. The data reveal substantial heterogeneity in economic performance across the region. Countries such as Guyana, St. Vincent and the Grenadines, and Chile record the highest average growth rates, 5.03, 3.02, and 2.92 percent, respectively, while others, including Haiti, Jamaica, and El Salvador exhibit persistently weak or even negative growth. Growth volatility is also pronounced, with Guyana showing a particularly large standard deviation of 12.56 percent, reflecting episodes of both rapid expansion and sharp contraction. In contrast, economies such as Colombia and Guatemala experience more stable growth patterns, with relatively low year-to-year variability.

According to the Bank of Canada–Bank of England Sovereign Debt Database (2025), all countries in the sample experienced at least one episode of sovereign debt in default or restructuring during the sample period, although these episodes differed substantially in duration, creditor composition, and underlying resolution mechanisms. Table 3.2 summarises the characteristics of the 18 countries included in this study, including information on sovereign default and debt restructuring episodes.

Debt levels display similarly wide variation. Jamaica and Guyana stand out as the most indebted countries in the sample, each with average debt ratios exceeding 127 percent of GDP and substantial volatility, indicative of recurring fiscal pressures. At the

Table 3.2: Sovereign Debt Default and Restructuring Episodes in the Sample Countries (1978–2023)

Country	Years of Default	Main debt categories involved
Argentina	1982–1997; 2000–2023	Paris Club, private creditors, foreign bank loans, foreign bonds, local currency debt
Belize	1981–1997; 2001–2023	Private creditors, foreign bonds
Bolivia	1978–2009; 2014–2015; 2017; 2020–2023	Paris Club, private creditors, foreign bank loans, foreign bonds, local currency debt
Brazil	1978–2000; 2003–2023	Paris Club, private creditors, foreign bank loans, local currency debt
Chile	1983–1990	Paris Club, foreign bank loans
Colombia	1980–2003; 2017	Private creditors
Costa Rica	1978–2004; 2006–2014	Paris Club, private creditors, foreign bank loans, foreign bonds
Dominica	1981–1982; 1987–2023	Private creditors, foreign bank loans, foreign bonds
Guatemala	1983–2007; 2013; 2020; 2022	Paris Club, private creditors, foreign bank loans, foreign bonds
Guyana	1978–2023	Paris Club, private creditors, foreign bank loans
Honduras	1978–2023	Paris Club, private creditors, foreign bank loans
Haiti	1981–2023	Paris Club, private creditors
Jamaica	1978–2023	Paris Club, private creditors, foreign bank loans, foreign bonds, local currency debt
Mexico	1978–1979; 1981–1990; 2013–2014; 2016; 2018–2023	Paris Club, private creditors, foreign bank loans
Paraguay	1978–2023	Private creditors, foreign bank loans, foreign bonds, local currency debt
El Salvador	1979; 1981–2000; 2008; 2017; 2022–2023	Paris Club, private creditors, foreign bonds
Uruguay	1983–1986; 1988; 1990–1991; 2003	Foreign bank loans, foreign bonds
St. Vincent and the Grenadines	1983–2023	Private creditors

Notes: The table reports sovereign debt default or restructuring episodes recorded in the Bank of Canada–Bank of England Sovereign Debt Database (2025) for the countries included in the sample. The reported years correspond to periods during which sovereign debt remained in default or restructuring according to the database methodology, and therefore do not necessarily indicate the year in which the default or restructuring was initiated. Debt categories refer to the creditor groups or debt instruments affected during each episode.

other end of the spectrum, countries such as Colombia, Paraguay, and Mexico maintain comparatively moderate debt burdens, averaging between 24 percent and 30 percent of GDP. Some cases, such as St. Vincent and the Grenadines, exhibit exceptionally high dis-

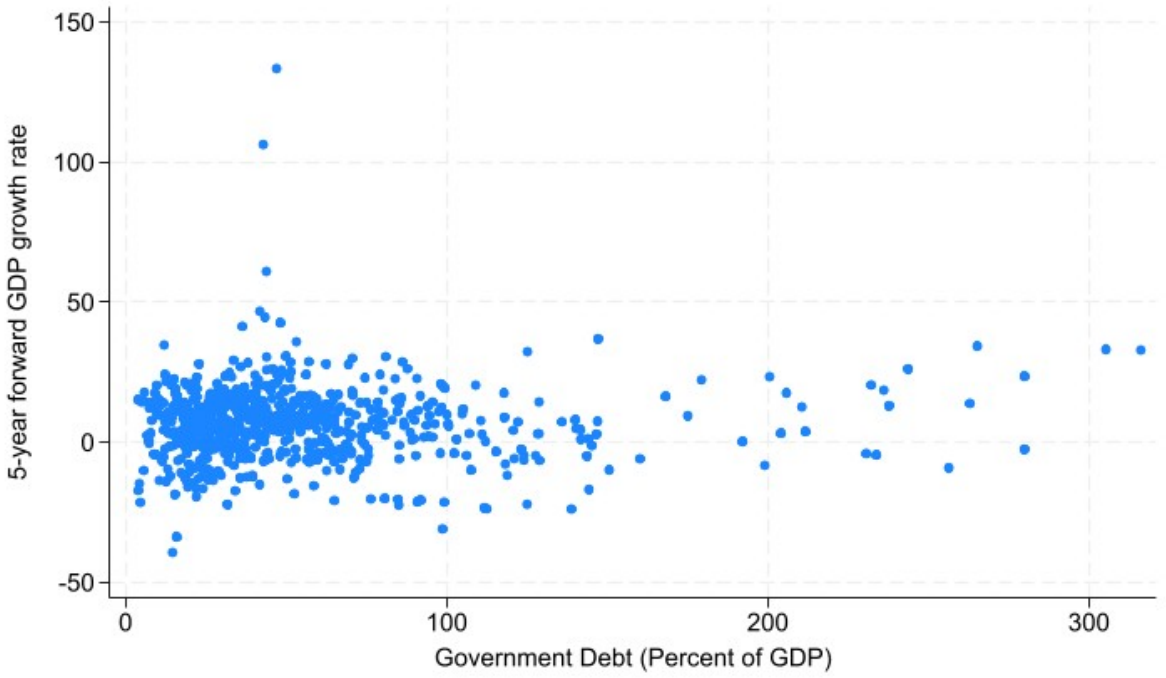

Figure 3.1: The figure shows the five-year ahead real per capita GDP (in constant 2015 US dollars) and public debt as a percentage of GDP for the eighteen countries over the sample period 1980–2023. Source: Author's own elaboration based on The World Bank's World Development Indicators.

persion, its standard deviation of 86.30 percent suggests the presence of significant fiscal shocks or structural breaks. Overall, the descriptive statistics highlight the considerable diversity of the region in both economic performance and fiscal positions, underscoring the importance of examining potential nonlinearities in the relationship between debt and medium-term growth. Figures C.1–C.5 illustrates the evolution of real GDP per capita and public Debt to GDP ratio for the eighteen nations. The three countries that exhibited the highest sovereign Debt to GDP ratio were Guyana, Bolivia, and Argentina with values of 316.15, 192.10, and 155.41 per cent, respectively. The three nations that exhibited the lowest sovereign Debt to GDP ratio were Chile, Uruguay, and Colombia with values of 3.90, 3.97, and 6.74 per cent, respectively.

Figure 3.1 plots the five year forward GDP growth rate against the ratio of central government debt to GDP. The scatter plot reveals no apparent nonlinear pattern or discrete break in the relationship between public debt and subsequent growth. Most observations cluster within moderate debt levels (below 50 percent of GDP), with growth rates varying widely across this range. Beyond that point, higher debt ratios do not systematically correspond to lower or higher growth outcomes. This visual inspection suggests the absence of a clear debt threshold effect. This support the hypotheses that higher or lower levels of debt do not affect the economic growth in Latin America, Central America, and the Caribbean.

Nevertheless, an important consideration in analysing the relationship between sovereign

debt and economic growth is the potential endogeneity of debt variables. The observed level of public debt may not only influence economic performance but may also be shaped by previous macroeconomic developments. For instance, a lower debt-to-GDP ratio can be the consequence of debt restructuring or default episodes, see table Table 3.2, in which outstanding liabilities are reduced following periods of severe economic distress. In this case, low observed debt levels may reflect the aftermath of a growth collapse rather than a sustainable fiscal position. Similarly, weak economic growth can increase debt ratios through lower denominators and reduced fiscal revenues, creating a reverse causality mechanism between debt accumulation and economic performance.

While this study acknowledges these potential sources of endogeneity, the empirical strategy focuses on identifying whether a robust nonlinear relationship between debt and growth can be detected within the available panel framework. The use of country fixed effects helps control for time-invariant country-specific characteristics, while the LASSO approach is employed as a variable-selection method to assess the stability of debt-growth relationships across specifications. Nevertheless, the results should not be interpreted as establishing a causal effect of debt on growth, but rather as providing evidence on the conditional association between sovereign debt levels and economic performance. Moving now to the methodology section.

3.4 Econometric Specification

To examine the relationship between public debt and economic growth, I first estimate panel regressions using country and time fixed effects, following the empirical growth literature of Sala-i Martin et al. (2004) and the public debt-growth studies of Kumar & Woo (2010), Cechetti et al. (2011), Checherita-Westphal & Rother (2012), and Panizza & Presbitero (2013). In addition to sovereign debt measures, the specification includes a set of standard growth determinants to reduce omitted-variable bias and isolate the effect of public indebtedness on economic performance. These controls capture differences in human capital, fiscal policy, trade intensity, financial development, and other macroeconomic characteristics that have been shown to influence long-run economic growth. However, table 3.8 is estimated without considering the controls to avoid the data limitation.

$$\begin{aligned} Growth_{i,t-(t-n)} = \alpha \ln(GDP_{i,t-n}) + \beta_1 Debt_{i,t-n} + \beta_2 HighDebt_{i,t-n} \\ + \beta_3 (HighDebt \times Debt)_{i,t-n} + \delta_1 PopGrowth_{i,t-n} \\ + \delta_2 GrossCap_{i,t-n} + \tau_t + \eta_i + \epsilon_{i,t}, \end{aligned} \tag{3.1}$$

In Equation 3.1, the dependent variable is the five-year growth rate of real GDP per capita ($Growth$) for country i. The explanatory variables include the initial level of real

GDP per capita, ln(GDP), the public debt-to-GDP ratio ($Debt$), a high-debt dummy ($HighDebt$), and the interaction between the debt ratio and the high-debt indicator. Consistent with the empirical growth literature, the model also controls for human capital, proxied by the Human Capital Index, which combines information on educational attainment and the returns to education to capture differences in labour quality and worker productivity; fiscal policy, proxied by government final consumption expenditure as a share of GDP; the model also controls for export intensity, measured as exports of goods and services expressed as a percentage of GDP; and financial development, proxied by domestic credit to the private sector as a percentage of GDP. The vector Z contains the remaining macroeconomic controls included in the baseline specification, namely population growth and gross capital formation. Time fixed effects (τ_t) account for common global shocks, while country fixed effects (η_i) capture time-invariant country-specific heterogeneity. Following Barro (1996) and Sala-i Martin et al. (2004), the forecasting horizon is set to $n = 5$ years to examine how current debt levels and other growth determinants affect medium-term economic growth.

Table 3.3 shows that the high-debt indicator is not confined to only one or two countries such as Jamaica or Guyana. While Jamaica is classified as a high-debt economy throughout the sample period, several other countries, including Brazil, Dominica, Bolivia, Guyana, Belize, Honduras, and Argentina, also record a substantial proportion of observations above the high-debt threshold. Conversely, countries such as Colombia, Mexico, Guatemala, and Paraguay rarely exceed the threshold. This distribution indicates that the high-debt indicator exhibits meaningful cross-country variation rather than being driven exclusively by a small number of persistently indebted economies.

The variable $High$ is generated as a binary indicator that takes the value 1 for country annual observations in which the public debt to GDP ratio exceeds the sample mean of the debt variable across the eighteen Latin American, Central American, and Caribbean countries. Observations with debt levels at or below this mean are coded as 0. This classification allows the analysis to distinguish between countries with comparatively high debt burdens and those with lower or average levels of indebtedness. The variable $DebtHigh$ is created as the interaction term between Debt to GDP ratio and High Debt level. This interaction captures the marginal effect of the debt to GDP ratio specifically for countries classified as having high debt levels, allowing the model to test whether the impact of debt differs between high debt and lower debt country groups.

3.5 Empirical Findings

Table 3.4 presents the results of panel regressions for the 18 countries based on equation 3.1. Column (1) reports the effect of the log of per capita GDP constant 2015 USD, sovereign debt to GDP ratio, high debt level, interaction between high debt level and

Table 3.3: Distribution of the High-Debt Indicator Across Countries

Country	**High**	**Obs.**	**% High**
Argentina	20	46	43.48
Belize	23	46	50.00
Bolivia	32	46	69.57
Brazil	35	46	76.09
Chile	5	46	10.87
Colombia	0	46	0.00
Costa Rica	5	46	10.87
Dominica	34	46	73.91
Guatemala	1	46	2.17
Guyana	29	46	63.04
Honduras	23	46	50.00
Haiti	7	46	15.22
Jamaica	46	46	100.00
Mexico	1	46	2.17
Paraguay	2	46	4.35
El Salvador	13	46	28.26
Uruguay	9	46	19.57
St. Vincent and the Grenadines	14	46	30.43

Notes: The table reports the distribution of the binary high-debt indicator (*HIGH*) across the 18 countries in the sample. *High* denotes the number of annual observations for which *HIGH*=1, *Obs.* is the total number of observations per country, and *% High* reports the percentage of observations classified as high debt. The indicator equals one when the public debt-to-GDP ratio exceeds the sample mean and zero otherwise. The sample covers the period 1978–2023.

Table 3.4: Sovereign Debt, Income Levels, and Macroeconomic Controls: Effects on Per Capita GDP Growth, 1978–2023

	(1)	(2)	(3)
	Dependent variable: Per Capita GDP Growth		
Log per capita GDP (constant 2015 USD)	-24.72***	-26.45***	-32.14***
	(2.661)	(2.629)	(2.728)
Sovereign debt to GDP ratio	0.085*	0.086*	0.122***
	(0.049)	(0.048)	(0.040)
High-debt indicator	-0.700	-2.862	-2.466
	(2.472)	(2.48)	(2.112)
High-debt × debt to GDP ratio	-0.130***	-0.111**	-0.085**
	(0.050)	(0.049)	(0.042)
Population growth		5.941***	0.309
		(1.123)	(1.152)
Gross capital formation			0.006
			(0.090)
Observations	733	733	628
R-squared	0.340	0.370	0.535
Country fixed effects	Yes	Yes	Yes

Notes: This table reports panel regression estimates of Equation 3.1 using five year averages. All specifications include country and time fixed effects. Robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

debt to GDP ratio on per capita GDP growth. Column (2) includes the same variables but control for population growth. Column (3) includes the same variables but account for population growth and gross capital formation.

Column (1) in Table 3.4 indicates that the coefficient for the logarithm of per capita GDP (in constant 2015 USD) is negative and statistically significant, suggesting a convergence effect among the economies analysed: higher initial income levels are associated with lower per capita GDP growth rates. The coefficient of 24.72 implies that, holding other variables constant, an increase in the initial income level leads to a reduction in growth rates, consistent with the idea that poorer countries tend to grow faster. The sovereign Debt to GDP ratio shows a positive association with per capita GDP growth, with a coefficient of 0.085, indicating that, at moderate debt levels, additional debt may support growth, potentially reflecting productive public investment or countercyclical fiscal policy effects.

Column (2) introduces population growth as a control variable. The convergence pattern remains strong, as the coefficient for the logarithm of per capita GDP remains negative and statistically significant at 26.45. The coefficient on the sovereign debt to GDP ratio remains positive (0.086), reinforcing the positive association between sovereign debt and per capita GDP growth. Population growth displays a positive and significant

Table 3.5: Sovereign Debt, Income Levels, and Macroeconomic Controls: Effects on Per Capita GDP Growth, 1978–2023

	(1)	(2)	(3)
	Dependent variable: Per Capita GDP Growth		
Log per capita GDP (constant 2015 USD)	-26.45***	-26.61**	-66.20***
	(7.719)	(10.31)	(9.519)
Sovereign debt to GDP ratio	0.086	0.079	0.090
	(0.075)	(0.145)	(0.134)
High-debt indicator	-2.862	-2.232	-2.770
	(6.030)	(8.965)	(8.682)
High-debt × debt to GDP ratio	-0.111	-0.113	-0.135
	(0.084)	(0.161)	(0.173)
Population growth	5.941	7.638	5.024**
	(6.447)	(7.422)	(2.118)
Financial Development		-0.101	-0.118**
		(0.066)	(0.043)
Gross capital formation		0.006	0.249
		(0.150)	(0.299)
Export Intensity			-0.116
			(0.153)
Government Expenditure %GDP			-1.179***
			(0.149)
Human Capital			-0.904
			(6.399)
Observations	733	589	380
R-squared	0.374	0.358	0.655
Country fixed effects	Yes	Yes	Yes

Notes: This table reports panel regression estimates of Equation 3.1 using five year averages. All specifications include country and time fixed effects. Cluster standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

coefficient of 5.941, suggesting that demographic expansion may contribute positively to economic performance across the region during the period. Column (3) incorporates gross capital formation, providing a more comprehensive specification. The convergence effect becomes even stronger, with the coefficient of 32.14, while the sovereign debt to GDP ratio continues to exert a positive and statistically significant effect on growth (0.122).

However, the interaction term between high debt and the debt ratio remains negative and significant across all specifications, indicating that the growth-enhancing effect of debt diminishes when debt levels are elevated. Population growth loses statistical significance once investment is included, suggesting that its effect operates partly through capital accumulation. Gross capital formation, while positive, is not statistically significant, implying that variations in investment alone may not fully explain per capita growth dynamics in the sample. Overall, the results in Table 3.4 suggest that while

moderate sovereign borrowing can support growth in Latin America, Central America, and the Caribbean, excessive debt accumulation may undermine this relationship. The consistent convergence pattern across specifications highlights the presence of catch up dynamics within the region.

To account for serial correlation and heteroskedasticity within countries, all fixed-effects regressions are estimated using standard errors clustered at the country level. Clustering by country allows the error terms to be arbitrarily correlated over time within each country while remaining independent across countries. This adjustment provides more conservative statistical inference than conventional heteroskedasticity-robust standard errors and is particularly appropriate in panels where countries are observed repeatedly over long time periods.

Table 3.5 shows the results of panel regressions but for the 7 countries with highest debt levels based on equation 3.1 and clustering standard errors. Table 3.6 shows the results of panel regressions but for the 7 countries with highest debt levels based on equation 3.1 and clustering standard errors. Column (1) reports the effect of the log of per capita GDP constant 2015 USD, sovereign debt to GDP ratio, high debt level, interaction between high debt level and debt to GDP ratio on per capita GDP growth. Column (2) includes the same variables but control for population growth. Column (3) includes the same variables but account for population growth and gross capital formation. Table 3.7 shows the results of panel regressions but for the 6 countries with highest debt levels based on equation 3.1, excluding Jamaica and clustering standard errors.

The panel regression results reported in Tables 3.4, 3.5, 3.6, and 3.7 indicate substantial heterogeneity in the relationship between sovereign debt and per capita GDP growth across country groups. The specifications progressively incorporate a broader set of growth determinants, including financial development, export intensity, government expenditure, human capital, population growth, and gross capital formation, alongside country and time fixed effects. For the full sample of eighteen countries, the interaction between the high-debt indicator and the debt-to-GDP ratio remains negative across specifications but is not statistically significant once country-clustered standard errors are employed, suggesting that the estimated relationship is sensitive to within-country error correlation. When the analysis is restricted to the seven most highly indebted countries, the interaction coefficient becomes positive and statistically significant, indicating that the debt-growth relationship differs within this subgroup. This result remains after excluding Jamaica, the only country classified as a high-debt economy throughout the entire sample period, although the magnitude of the interaction effect is somewhat reduced. Overall, these findings suggest that the relationship between sovereign debt and economic growth depends on country-specific characteristics and remains sensitive to both the method of statistical inference and the composition of the sample, even after controlling for a comprehensive set of standard growth determinants. It is important

Table 3.6: Sovereign Debt, Income Levels, and Macroeconomic Controls: Effects on Per Capita GDP Growth, 1978–2023

	(1)	(2)	(3)
	Dependent variable: Per Capita GDP Growth		
Log per capita GDP (constant 2015 USD)	-30.39	-73.74***	-64.40***
	(18.94)	(15.33)	(14.38)
Sovereign debt to GDP ratio	-0.234**	-0.269*	-0.192**
	(0.095)	(0.120)	(0.087)
High-debt indicator	-22.55	-26.99**	-20.72**
	(13.38)	(10.33)	(7.123)
High-debt × debt to GDP ratio	0.207	0.263**	0.233**
	(0.107)	(0.106)	(0.074)
Population growth		24.59**	8.601*
		(7.783)	(3.866)
Gross capital formation			-0.179
			(0.187)
Observations	286	286	271
R-squared	0.343	0.566	0.614
Country fixed effects	Yes	Yes	Yes

Notes: This table reports panel regression estimates of Equation 3.1 using five year averages of the 7 countries with highest debt levels Argentina, Belize, Bolivia, Brazil, Guyana, Honduras, and Jamaica. All specifications include country and time fixed effects. Cluster standard errors by country are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

to note that the availability of some control variables is limited for several countries in the sample, particularly Guyana, Jamaica, and Saint Vincent and the Grenadines. This constraint is especially relevant for the trade openness measure, for which data are incomplete. Consequently, export intensity, measured as exports of goods and services as a percentage of GDP, is used as a proxy to capture the degree of external economic integration while maximising country coverage. Now, in the next section, I complement the analysis with a more sophisticated regularisation approach using the Least Absolute Shrinkage and Selection Operator (LASSO).

3.6 LASSO Estimation

This additional technique serves as a robustness check that complements the baseline panel regressions. In particular, it allows me to assess whether the core relationship between the government debt to GDP ratio and economic performance remains stable when the set of controls is selected by a data driven algorithm rather than imposed a priori. This is especially relevant in macro panel settings where many covariates are strongly correlated, including fiscal variables, demographic indicators, and external sector mea-

Table 3.7: Sovereign Debt, Income Levels, and Macroeconomic Controls: Effects on Per Capita GDP Growth, 1978–2023

	(1)	(2)	(3)
	Dependent variable: Per Capita GDP Growth		
Log per capita GDP (constant 2015 USD)	-38.02*	-87.73***	-78.18***
	(17.24)	(7.536)	(7.141)
Sovereign debt to GDP ratio	-0.237**	-0.277	-0.201*
	(0.097)	(0.144)	(0.087)
High-debt indicator	-17.51	-22.57	-16.20**
	(15.99)	(12.09)	(5.576)
High-debt × debt to GDP ratio	0.164	0.237	0.206**
	(0.125)	(0.142)	(0.071)
Population growth		25.64**	9.954***
		(7.435)	(2.395)
Gross capital formation			-0.037
			(0.307)
Observations	246	246	231
R-squared	0.381	0.615	0.668
Country fixed effects	Yes	Yes	Yes

Notes: This table reports panel regression estimates of Equation 3.1 using five year averages of the 6 countries with highest debt levels Argentina, Belize, Bolivia, Brazil, Guyana, Honduras, excluding Jamaica. All specifications include country and time fixed effects. Cluster standard errors by country are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

sures. In such contexts, conventional regression estimates may suffer from multicollinearity and overfitting, obscuring the underlying signal. By implementing the Least Absolute Shrinkage and Selection Operator, I explicitly address these concerns within a principled regularisation framework.

Formally, consider a linear model in which economic performance is regressed on the government debt to GDP ratio and a potentially large set of control variables. Ordinary least squares minimises the residual sum of squares without imposing any constraint on model complexity. By contrast, LASSO solves a penalised optimisation problem in which the residual sum of squares is augmented by a penalty term proportional to the sum of the absolute values of the coefficients. Specifically, the estimator minimises the in sample prediction error subject to an L_1 penalty on the parameter vector. The tuning parameter governs the relative weight placed on goodness of fit and parsimony, thereby determining the degree of shrinkage applied to the coefficients.

A distinctive feature of the L_1 penalty is the presence of non differentiable points at zero. These kinks imply that, for sufficiently large values of the tuning parameter, some coefficients are set exactly equal to zero rather than merely shrunk towards it. As shown by Tibshirani (1996), this property allows LASSO to perform variable selection

and coefficient estimation simultaneously. In contrast to ridge regression, which relies on an L_2 penalty and therefore retains all regressors in the model, LASSO yields sparse specifications that are easier to interpret and less prone to overfitting. At the same time, relative to traditional subset selection procedures, it provides greater numerical stability and improved predictive performance.

The choice of the tuning parameter is central to the empirical implementation. In practice, it is selected using data driven criteria such as cross validation or information criteria, which approximate the out of sample prediction error. This approach aligns the estimation procedure with the objective of identifying a specification that generalises beyond the estimation sample. In the present context, the selected model indicates which macroeconomic controls are most strongly associated with growth outcomes once the complexity of the specification is penalised. Consequently, the analysis does not rely exclusively on subjective model selection but instead incorporates an algorithmic assessment of variable relevance.

Importantly, the use of LASSO here is not intended to replace the structural interpretation provided by the baseline panel regressions. Rather, it functions as a robustness device that tests whether the relationship between public debt and economic performance is sensitive to the inclusion of a high dimensional set of controls initially for 18 countries and then for the seven more indebted nations. By examining whether the debt variable remains selected and retains a stable sign and magnitude across penalised specifications, I can evaluate the strength of the empirical association under alternative modelling assumptions. Furthermore, the procedure allows for the exploration of potential nonlinearities or threshold effects, for instance by including transformations or interaction terms among the candidate regressors and allowing the algorithm to determine their relevance. In this way, the LASSO framework provides a systematic and transparent method for assessing the robustness of the debt growth relationship in a high dimensional empirical environment.

Even though the eighteen Latin American, Central American, and the Caribbean countries have in total 828 observations, the sovereign debt economic growth literature observe that such relationship might be shaped by multiple factors, such as a negative relationship, where high debt level (e.g., 90 per cent threshold) reduce economic growth, institutional quality, country specific characteristics, and development stage among others Reinhart & Rogoff (2009), (Song et al. 2011), (Kourtellos et al. 2013), (Panizza & Presbitero 2013), (Panizza & Presbitero 2014), Ventura & Voth (2015), Aguiar & Amador (2021), and (De Soyres et al. 2022). However, due to the sparsity assumption, I assume the unknown true model has few variables compare to the variables included in the LASSO estimation that in total account for 828 observations for the entire sample of 18 nations and 321 observations for the seven countries with highest debt levels. The LASSO estimator that minimises the penalised sum of squared residuals is formalised as

follows:

3.6.1 LASSO Model Specification

The LASSO model estimated in this study can be written as

$$\begin{aligned}\hat{\boldsymbol{\beta}}^{\text{lasso}} = \arg\min_{\boldsymbol{\beta}} \Bigg\{ \sum_{i=1}^{N} \Big(& g_{i,5} - \beta_0 - \sum_t \gamma_t \, \text{Year}_{i,t} - \sum_c \eta_c \, \text{Code}_{i,c} \\ & - \beta_1 \, \text{GDP}_i - \beta_2 \, \text{Debt}_i - \sum_k \delta_k D_{i,k} - \sum_k \theta_k (\text{Debt}_i \times D_{i,k}) \\ & - \beta_3 \, \text{PopGrowth}_i - \beta_4 \, \text{GrossCapFor}_i - \beta_5 \, \text{FinanDevel}_i \\ & - \beta_6 \, \text{ExporInten}_i - \beta_7 \, \text{GovCons}_i - \beta_8 \, \text{HumCap}_i \Big)^2 \\ & + \lambda \sum_j |\beta_j| \Bigg\}. \end{aligned} \tag{3.2}$$

where $g_{i,5}$ denotes the five year ahead real GDP growth rate for country i. The terms $\text{Year}_{i,t}$ and $\text{Code}_{i,c}$ represent time and country fixed effects, respectively, capturing common global shocks and time invariant structural heterogeneity. The variable GDP_i is the initial (log) GDP per capita, included to account for convergence dynamics. The term Debt_i denotes the public debt to GDP ratio. To allow for nonlinearities in the debt growth relationship, the model includes a set of threshold indicators

$$D_{i,k} \in \{D50_i, D75_i, D90_i, D110_i, D200_i\},$$

where each indicator equals 1 when public debt is above 50%, 75%, 90%, 110%, or 200% of GDP, respectively, and 0 otherwise. The coefficients δ_k capture discrete shifts in average growth once a country crosses a given debt threshold. In addition, interaction terms between the debt ratio and the threshold dummies, $\text{Debt}_i \times D_{i,k}$, are included to allow the marginal effect of public debt on growth to vary across regimes. The associated coefficients θ_k therefore measure changes in the slope of the debt growth relationship conditional on being above each threshold.

Finally, the LASSO penalty term $\lambda \sum_j |\beta_j|$ performs variable selection and regularisation. By shrinking some coefficients exactly to zero, the estimator identifies which thresholds and interactions are relevant for explaining medium term economic growth, while mitigating overfitting in the presence of a high dimensional set of potential nonlinearities.

LASSO-Selected Predictors of Five-Year Forward Per Capita GDP Growth,
1978–2023 Eighteen (18) Countries
Table 3.8:

	(1)
	Dependent variable: 5-Year Forward Per Capita GDP Growth
Log per capita GDP (2015 USD)	-24.43
Debt to GDP ratio	0.027
Debt threshold 50% (D50)	11.47
Debt threshold 75% (D75)	-16.62
Debt threshold 90% (D90)	-6.28
Debt threshold 110% (D110)	-3.78
Debt threshold 200% (D200)	-1.94
Debt × D50 interaction	0.329
Debt × D75 interaction	-0.234
Constant	211.59
Observations	733
Out-of-sample R^2	0.342
Nonzero coefficients	66
Country fixed effects	Yes
Time fixed effects	Yes

Notes: This table reports predictors selected by a LASSO regression minimising cross-validated prediction error. Reported coefficients are penalised estimates from the model with $\lambda = 0.00236$. All specifications include country and time fixed effects.

3.6.2 Absence of Debt Threshold Effects

Table 3.8 reports the LASSO selected predictors of five-year forward per capita GDP growth (g_5) for the period 1978–2023. The model includes country and time fixed effects, and the penalty parameter ($\lambda = 0.00236$) minimises the cross validated prediction error, ensuring parsimonious selection of relevant variables. The out of sample R^2 of 0.342 indicates a relatively strong predictive capacity given the macroeconomic and regional heterogeneity of the sample. The logarithm of per capita GDP (in constant 2015 USD) exhibits a large negative coefficient of -24.43, reaffirming the convergence hypothesis observed in previous specifications, countries with higher initial income levels tend to experience slower growth over the subsequent five years. The sovereign debt to GDP ratio displays a modest positive association (0.027), consistent with the notion that moderate borrowing may support medium-term growth through fiscal stabilisation or investment channels.

The LASSO estimation results support the graphical evidence shows in Figure 3.1. Although the model includes a comprehensive set of threshold indicators (50, 75, 90, 110, and 200 percent of GDP) and their interactions with the continuous debt variable, the cross validated LASSO retained few of these terms with non zero coefficients, and their estimated magnitudes were economically small. The optimal penalty parameter ($\lambda =$

Table 3.9: LASSO-Selected Predictors of Five-Year Forward Per Capita GDP Growth, 1978–2023: Full Sample and Restricted Sample

	(1) Full Sample 18 Countries	(2) Restricted Sample Most Indebted Countries
Log per capita GDP (2015 USD)	-64.924	-85.124
Debt to GDP ratio	-0.139	-0.124
Debt threshold 50% (D50)	7.963	13.096
Debt threshold 75% (D75)	4.291	-5.656
Debt threshold 90% (D90)	1.290	5.302
Debt threshold 110% (D110)	1.971	-1.349
Debt threshold 200% (D200)	–	–
Debt × D50 interaction	0.223	0.336
Debt × D75 interaction	–	-0.124
Debt × D90 interaction	–	–
Debt × D110 interaction	–	–
Debt × D200 interaction	–	–
Population growth	4.522	6.464
Gross capital formation	0.257	0.584
Financial development	-0.127	-0.124
Export intensity	-0.098	0.369
Government expenditure/GDP	-1.127	-0.781
Years of schooling return	–	12.205
Constant	580.283	724.011
Observations	380	170
Out-of-sample R^2	0.514	0.324
Nonzero coefficients	64	58
Selected λ	0.00605	0.00295
Country fixed effects	Yes	Yes
Time fixed effects	Yes	Yes

Notes: This table reports predictors selected by LASSO regressions using ten-fold cross-validation to minimise out-of-sample prediction error. Column (1) presents results for the full sample of 18 countries, while Column (2) reports estimates for the restricted sample comprising the seven most highly indebted countries. The candidate set includes debt levels, debt threshold indicators, debt interaction terms, and macroeconomic controls. Reported coefficients are penalised estimates evaluated at the cross-validated optimal value of λ. Both specifications include country and time fixed effects. "–" indicates that the corresponding variable was not selected by the LASSO algorithm.

0.00236) yielded 66 active predictors, but the main linear term in debt remained modest and stable across alternative specifications, indicating that the inclusion of nonlinear terms does not materially improve predictive performance.

The absence of a significant threshold pattern implies that the relationship between debt and medium-term growth is largely linear or weakly nonlinear over the observed range. In other words, increases in the debt to GDP ratio are not associated with abrupt declines in future growth beyond specific levels, contrary to the notion of a universal

debt limit. This finding is consistent with recent empirical evidence suggesting that the growth effects of public debt depend more on institutional quality, fiscal credibility, and macroeconomic context than on arbitrary numerical thresholds.

Taken together, the graphical and penalised regression evidence point to the conclusion that there is no robust threshold effect in the debt growth relationship within the sample in Latin America, Central America, and the Caribbean. While some minor nonlinearities are captured by the LASSO procedure, these do not translate into economically meaningful or statistically stable shifts in the slope of the relationship. Therefore, the data provide little support for the hypothesis of a critical debt level beyond which growth systematically deteriorates.

While the panel regression results in Table 3.4 offer useful initial insights into the association between sovereign debt and economic growth in the region, these estimates may be sensitive to the presence of outliers in the dependent variable *Growth* g_5. Several country year observations display unusually large fluctuations in five year per capita GDP growth, often driven by episodes of sharp macroeconomic adjustment, political instability, or post crisis recoveries.

Such extreme values can exert disproportionate influence on coefficient estimates in linear panel models, potentially overstating or distorting the apparent effects of debt dynamics. This concern is reinforced by the LASSO analysis, which, by penalising instability and reducing the influence of atypical observations, detects no robust nonlinear or threshold effects in the debt–growth relationship. Taken together, the sensitivity of the panel regressions to outliers and the greater stability of the penalised estimates suggest that the baseline results should be interpreted with caution, as they may partially reflect the influence of extreme growth episodes rather than systematic structural patterns.

Although the restricted sample of highly indebted countries yields a lower out-of-sample predictive performance than the full sample, the purpose of the LASSO exercise is not to maximise predictive accuracy but to identify robust predictors of future economic growth. Importantly, the variable-selection results remain remarkably consistent across both samples. In particular, public debt and the lower debt threshold (D50) are retained, whereas most debt-threshold interaction terms are discarded in the restricted sample. This suggests that the evidence for nonlinear debt thresholds becomes weaker when the analysis focuses exclusively on highly indebted economies.

Table 3.9 reports the variables selected by the LASSO procedure after augmenting the specification with macroeconomic controls. In the full sample of 18 countries, the algorithm retains the debt-to-GDP ratio, debt threshold indicators at 50%, 75%, 90%, and 110%, the debt interaction with the 50% threshold, and five control variables: population growth, gross capital formation, financial development, export intensity, and government expenditure. In the restricted sample of the seven most highly indebted countries, LASSO selects a similar set of debt variables, additionally retaining the interaction between debt

and the 75% threshold and the return to years of schooling. The inclusion of macroeconomic controls substantially improves predictive performance, with the out-of-sample R^2 increasing to 0.514 for the full sample and 0.324 for the restricted sample, while debt-related variables continue to be selected alongside the controls. Overall, the results suggest that sovereign debt contains predictive information for medium-term economic growth beyond that captured by standard macroeconomic fundamentals, although no single debt threshold emerges as consistently dominant across specifications.

3.7 Conclusion

Although Reinhart & Rogoff (2010) suggest a marked decline in economic growth once public debt exceeds 90 percent of GDP, the present results provide no comparable evidence of a nonlinear threshold for Latin American, Central American, and Caribbean economies, indicating that their proposed threshold is not generalisable to this regional context. Although the LASSO procedure consistently retains the 90 percent debt indicator (D90) in both the full and restricted samples, it does not select the corresponding interaction between public debt and the 90 percent threshold. This distinction is economically important. While the D90 indicator suggests that economies above this debt level differ systematically from those below it, the absence of the interaction term implies that the marginal effect of public debt on subsequent economic growth does not change discretely once the threshold is crossed. Consequently, the penalised regression results do not support the existence of the universal 90 percent tipping point proposed by Reinhart & Rogoff (2010). More broadly, the penalised regression results and the graphical evidence lead to a consistent conclusion: there is no robust empirical support for a threshold effect in the debt–growth relationship within the sample of Latin American, Central American, and Caribbean economies. Although the LASSO procedure evaluates a rich set of potential nonlinearities through multiple debt thresholds and their interactions, the optimal models selected by cross-validation retain only a limited subset of these variables, while the threshold interaction terms are largely discarded. The dominant pattern is instead a modest and stable linear association between the sovereign debt-to-GDP ratio and five-year forward per capita GDP growth. This outcome suggests that incorporating higher-order or discontinuous terms does not materially improve predictive performance, nor does it reveal abrupt changes in the slope of the debt–growth relationship.

These findings are consistent with Égert (2015), who demonstrates that debt thresholds are neither robust nor stable across alternative specifications, reinforcing the view that the debt–growth relationship does not hinge on a universal turning point. The evidence indicates that medium-term growth dynamics in the region are not characterised by a common debt limit beyond which economic performance systematically deteriorates. Rather, the growth effects of public debt appear to evolve gradually and continuously over

the observed range of debt ratios. This interpretation is broadly consistent with recent empirical research emphasising that the macroeconomic consequences of public debt may depend more on institutional quality, fiscal credibility, debt composition, and broader macroeconomic conditions than on crossing specific numerical benchmarks. However, these mechanisms are not directly examined in the present analysis. Although the empirical specifications include country fixed effects that absorb time-invariant cross-country heterogeneity, they do not identify the independent contribution of institutional quality, fiscal credibility, or other structural characteristics. Consequently, the present findings should not be interpreted as direct evidence that these factors drive the debt–growth relationship. Future research incorporating explicit measures of institutional quality, fiscal governance, and debt composition would provide a more rigorous assessment of the channels through which public debt influences medium-term economic growth.

Consequently, while some nonlinear components are retained by the penalised procedure, they do not translate into economically meaningful changes in the marginal effect of debt on growth. The results therefore underscore the importance of country specific fiscal and institutional characteristics, rather than rigid debt thresholds, in shaping the medium-term growth prospects of highly heterogeneous emerging economies. Although the panel regressions provide an informative starting point for understanding the relationship between sovereign debt and economic growth, the reliability of these estimates is limited by the presence of outliers in the five-year forward growth measure. Several observations exhibit unusually large expansions or contractions in per capita GDP, typically associated with episodes of macroeconomic instability, political disruption, or post-crisis recoveries. Such extreme observations may exert disproportionate influence on conventional regression estimates, potentially overstating or distorting the underlying debt–growth relationship. The LASSO results reinforce this concern. By penalising model complexity and retaining only variables that improve out-of-sample prediction, the evidence for nonlinearities and threshold effects becomes substantially weaker.

Overall, the contrast between the sensitivity of the conventional panel regressions and the stability of the penalised specifications suggests that the panel estimates should be interpreted with caution, as part of their apparent nonlinear effects may reflect the influence of outlier driven observations rather than genuine structural features of the debt–growth relationship in the region. Furthermore, augmenting the LASSO specification with standard macroeconomic controls, including population growth, gross capital formation, financial development, export intensity, government expenditure, and human capital, improves out-of-sample predictive performance, while debt-related variables continue to be retained in the optimal models. This finding suggests that sovereign debt contains predictive information beyond that captured by conventional macroeconomic fundamentals, although these controls account for an important share of cross-country variation in medium-term economic growth.

Conclusion

This thesis has examined the role of external monetary conditions, particularly US monetary policy, in shaping sovereign risk, financial intermediation, and economic performance in Latin America. Motivated by the increasing financial integration of emerging economies and their heightened exposure to global liquidity conditions, the thesis combines empirical and theoretical approaches to study how unexpected US monetary policy shocks propagate through sovereign bond markets, domestic financial systems, and real economic activity.

A central contribution of the thesis is to show that sovereign risk constitutes a key transmission channel through which global monetary tightening affects emerging market economies. Across chapters 1 and 2, the analysis demonstrates that changes in US monetary policy influence sovereign bond yield spreads, banks' balance sheets, investment decisions, and growth outcomes in Brazil, Chile, and Colombia. Chapter 3 finds no robust empirical evidence supporting the presence of a threshold effect in the relationship between government debt and economic growth over the sample period for Latin American, Central American, and Caribbean economies.

Chapter 1 provides empirical evidence on the spillover effects of exogenous US monetary policy shocks on sovereign risk and macroeconomic dynamics in Latin America. Using the orthogonalised US monetary policy surprise developed by Bauer & Swanson (2023) and a panel VAR with exogenous variables following Paul (2020), the chapter identifies unexpected monetary policy tightenings that are purged of information effects. The findings of the PVARX support the hypothesis that contractionary US monetary policy shocks increase sovereign risk in financially integrated emerging economies and that these effects are amplified through domestic financial systems characterised by substantial bank holdings of long-term government debt.

The analysis further shows that sovereign risk is transmitted to the real economy through interconnected banking and exchange rate channels. As sovereign bond prices decline following US monetary tightening, banks' balance sheets weaken, leading to tighter credit conditions, while exchange rate depreciation reinforces adverse domestic financial conditions. Together, these mechanisms contribute to weaker economic activity, highlighting the importance of sovereign financial linkages in the international transmission of monetary policy. The results are robust across alternative time series filters and provide

new empirical evidence that sovereign risk, domestic bank balance sheet exposure, and exchange rate adjustments constitute important channels through which US monetary policy spillovers propagate to emerging market economies.

The results of Chapter 1 further indicate that foreign investor exposure does not significantly explain the transmission of U.S. monetary policy shocks to Latin American sovereign bond spreads. The inclusion of a foreign bias measure does not alter the estimated effect of orthogonalised monetary policy shocks, and the interaction between foreign bias and $mps^{\perp}$ provides no evidence that greater reliance on foreign investors amplifies the sensitivity of sovereign spreads to external monetary conditions.

Chapter 2 complements this empirical analysis by developing a theoretical framework that formalises the link between external monetary shocks, sovereign risk, and domestic investment. Building on the sovereign default literature and incorporating financial frictions and dual liquidity constraints, the model shows how increases in the international risk free rate, driven by contractionary US monetary policy, raise the probability of sovereign default by reducing sovereign bond prices. This increase in default risk feeds back into higher sovereign spreads and tighter domestic liquidity conditions, depressing investment and output. A key theoretical contribution of Chapter 2 is the endogenous determination of sovereign bond prices as a function of default probabilities that respond directly to international interest rate movements. This mechanism provides a clear and tractable channel through which US monetary policy affects emerging market vulnerabilities.

Chapter 3 shifts the focus to the medium term relationship between sovereign debt and economic growth in Latin America, Central America, and the Caribbean. Contrary to influential claims of universal debt thresholds beyond which growth deteriorates sharply, the empirical evidence finds no robust support for nonlinearities or structural breaks in the debt growth relationship. Using penalised regression techniques that allow for multiple potential thresholds and interactions, the analysis shows that any nonlinear effects are economically small and highly sensitive to outliers in the growth data.

The dominant pattern emerging from Chapter 3 is a modest and stable linear association between public debt and medium term growth. These findings are consistent with a growing literature emphasising that the growth effects of debt depend more on institutional quality, fiscal credibility, and macroeconomic stability than on crossing specific numerical debt thresholds. In the context of this thesis, the results suggest that elevated sovereign risk driven by external financial conditions, rather than high debt levels per se, is more relevant for understanding macroeconomic vulnerability in emerging economies.

Taken together, the three chapters offer a unified perspective on sovereign risk in emerging markets. The empirical results of Chapter 1 establish that US monetary policy shocks materially affect sovereign risk and real activity through financial channels. Chapter 2 provides a theoretical framework that rationalises these findings by linking

external monetary conditions to sovereign default risk and domestic investment under financial frictions. Chapter 3 places these dynamics in a broader growth context, showing that sovereign debt does not mechanically constrain growth in the absence of adverse institutional and financial conditions.

The thesis has several implications for policy. First, it underscores the vulnerability of emerging economies to external monetary tightening, even when domestic macroeconomic fundamentals remain relatively stable. Policymakers should therefore closely monitor global financial conditions and incorporate external monetary shocks into macroprudential and debt management frameworks. Second, the findings highlight the risks associated with concentrated domestic bank exposure to sovereign debt. Limiting excessive sovereign bank linkages and promoting diversified investor bases may help reduce the amplification of external shocks. Third, the absence of robust debt thresholds cautions against rigid fiscal rules based on arbitrary numerical benchmarks, suggesting instead that fiscal sustainability assessments should account for country specific institutional and financial factors.

The thesis also points to several avenues for future research. Further work could examine the resale capacity and liquidity of sovereign bonds during periods of external monetary tightening, particularly in emerging markets where secondary markets are thin. Incorporating such mechanisms into VAR or structural models could improve understanding of how market liquidity interacts with sovereign risk. Another promising direction involves counterfactual policy analysis and variance decompositions to quantify the relative importance of sovereign risk channels compared with other transmission mechanisms. Finally, extending the analysis to include additional regions or longer historical samples could shed light on how structural characteristics shape the international transmission of monetary policy. This is particularly relevant given the longer sample period of the Swanson & Jayawickrema (2023) $mps^{\perp}$ (1988–2019).

In conclusion, this thesis contributes to the literature on international monetary spillovers, sovereign risk, and development macroeconomics by providing new empirical evidence, a coherent theoretical framework, and a nuanced assessment of the debt growth relationship in emerging economies. It highlights that sovereign risk is not merely a domestic phenomenon but is deeply influenced by global monetary conditions, financial structure, and institutional context. Understanding these interactions is essential for designing resilient macroeconomic policies for Latin America, Central America, and the Caribbean in an increasingly interconnected global financial system.

Appendices

Appendix A

Appendix to Chapter 1

Table A.2 describe and define the variables included in this thesis. Industrial production, bank loan volumes, lending rate, sovereign bond yield, home bias, and foreign bias.

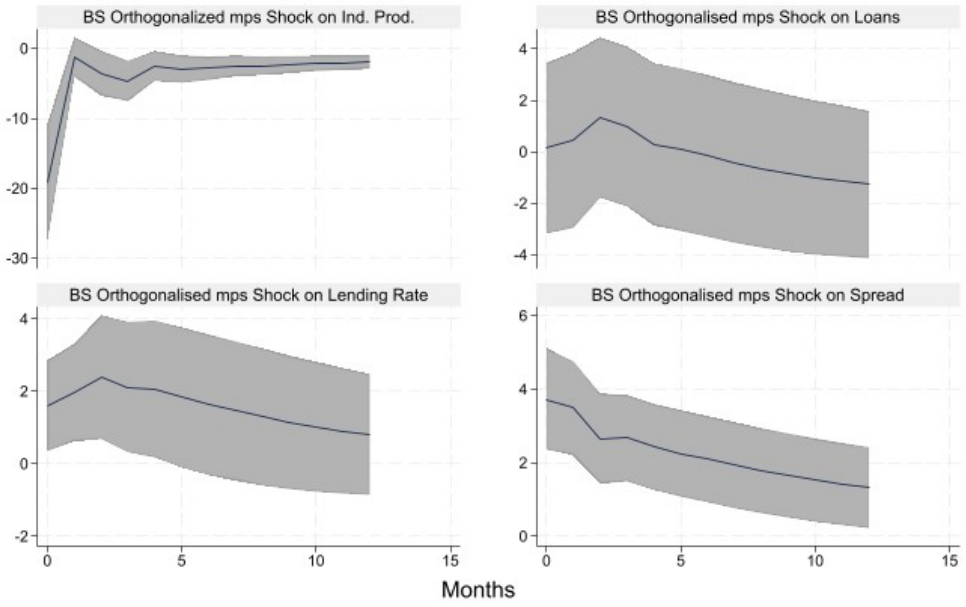

Figure A.1: Expected response of Latin American macroeconomic and financial variables to a 1 percent shock of the $mps^{\perp}$ using the Hodrick–Prescott time-series filter. Panel A first row, industrial production and bank loans. Panel B second row, lending rate and long-term government bond yield spread, through panel VAR method. The shaded area corresponds to two standard deviation confidence bands using heteroscedasticity robust standard error. 3 lags according to information criterion tests are used. The impulse response are reported using 68 percent confidence intervals. Full sample 2003:1-2018:12.

The impulse response functions estimated using the Hodrick–Prescott filter for the sample period from January 2003 to December 2018 illustrate the dynamic responses of the long term sovereign yield spread, bank loans, lending rates, and industrial production to a one per cent deviation shock in $mps_t^{\perp}$. These responses are presented in Figure A.1. Consistent with the results obtained using the Christiano Fitzgerald time series filter, an unexpected tightening of US monetary policy leads to a persistent increase in the

Table A.1: Monetary Policy Shock on Latin American Long-term Sovereign Bond Yield Spread, 2003–18, with Normal Standard Errors.

	(1) Spread	(2) Spread	(3) Spread
$mps^{\perp}$	0.843	0.846	1.007
	(0.594)	(0.595)	
Home Bias	-0.631	-0.719	-0.754
	(0.320)	(0.335)	(0.339)
Federal funds rate		-0.012	-0.013
		(0.014)	(0.014)
Interaction home bias × $mps^{\perp}$			5.867
			(7.714)
Observations	540	540	537
R-squared	0.930	0.930	N/A
Country fixed effects	Yes	Yes	Yes

Notes: This table reports panel regression estimates of Equation **??**. All specifications include twelve lags of the dependent variable (not reported). Country fixed effects and normal standard errors are used throughout.

sovereign yield spread and lending rates, with an effect that is even larger than that estimated with the Christiano Fitzgerald filter, alongside declines in bank lending and industrial production. Overall, these findings confirm that contractionary US monetary policy shocks raise sovereign risk and borrowing costs while dampening real economic activity across the region.

Nevertheless, the slope and magnitude of the industrial production response differ from those obtained using the Christiano–Fitzgerald filter, with the estimated impact appearing excessively large. Moreover, bank loans exhibit a positive response during the first three months following the shock before turning negative thereafter. These patterns suggest that the responses of these variables may not be precisely estimated when using the Hodrick Prescott filter. We now turn to the conclusions and avenues for future research.

Table A.1 shows that the estimates obtained using robust and conventional (normal) standard errors indicates that the results are highly similar across specifications. In particular, coefficient magnitudes, signs, and overall economic interpretations remain virtually unchanged, suggesting that the core findings are not sensitive to the choice of variance covariance estimator. The main difference lies in the estimated precision of the coefficients, with conventional standard errors being in general modestly smaller than their robust counterparts with the exception of foreign bias, which standard errors being around 50 per cent smaller. This reduction in estimated uncertainty reflects the lower

finite sample variability associated with classical standard errors in panels with a limited cross sectional dimension and extensive lag structures. Importantly, the use of normal standard errors therefore sharpens inference without altering the substantive conclusions of the analysis, reinforcing the robustness of the empirical results.

Table A.2: Data description and list of variables

Variable name	**Description**	**Unit**	**Frequency**	**Source**
Industrial production	Volume of production	Index	Monthly	Latin American Central Banks and Statistics Offices
Loan volumes	Log of non-financial corporations' loan value	Billion (local currencies)	Monthly	Latin American Central Banks, Fiscal and Statistics Authorities
Lending rate	Interest rate for non-financial corporations	Percent	Monthly	Latin American Central Banks and Statistics Offices
Sovereign bond yield	Market yield on Latin American bonds in local currency at 10-year maturity	Percent	Monthly	Latin American Central Banks and Statistics Offices
Swap rate	Market yield on United States Treasury securities at 10-year maturity	Percent	Monthly	Federal Reserve Bank of St Louis (FRED)
Home Bias	Share of sovereign bonds held by local banks (billions of local currency; Chile in USD)	Percent	Monthly	Latin American Central Banks
Foreign Bias	Share of sovereign bonds held by local banks	Percent	Monthly	Federal Reserve Bank of St Louis (FRED)
Exchange Rate	USD for Colombian Peso	Currency Conversions	Monthly	Federal Reserve Bank of St Louis (FRED)

Table A.3: Latin American Sovereign Bond Yield Spread and US Bond Return, 2003–2018

Year	Latin American	Brazil	Chile	Colombia	US
2003	10.13	17.04	2.19	11.17	4.01
2004	8.38	13.15	1.92	10.06	4.27
2005	7.75	14.24	1.75	7.26	4.29
2006	4.99	9.27	1.35	4.36	4.79
2007	4.59	6.90	1.48	5.41	4.62
2008	7.14	9.92	3.27	8.22	3.66
2009	5.00	6.37	2.40	6.21	3.25
2010	5.38	7.86	3.03	5.25	3.21
2011	5.70	8.64	3.18	5.30	2.78
2012	4.89	6.05	3.62	5.01	1.80
2013	4.70	7.01	2.95	4.14	2.35
2014	5.25	9.06	2.19	4.51	2.54
2015	6.74	12.18	2.34	5.71	2.13
2016	6.64	11.29	2.56	6.06	1.84
2017	4.32	6.60	1.91	4.44	2.33
2018	3.22	3.98	1.58	4.08	2.91
Mean	5.93	9.35	2.36	6.07	3.17
Std. Dev.	3.79	3.67	0.73	2.16	1.01
Min.	0.58	1.50	0.58	2.69	1.50
Max.	24.73	24.73	3.99	12.22	5.11
Obs.	576	192	192	192	192

Notes: This table presents summary statistics of the ten-year government bond yield spread over the 2003–2018 period. Column (1) reports the average for three Latin American countries, while columns (2)–(5) show individual countries and the US. Spread is calculated as the difference between each Latin American country's bond return and the US risk free government bond return.

Table A.4: Macroeconomic and Financial Variables, 2003–2018

	(1)	(2)	(3)	(4)
	Dependent variable: Average values per country group			
Bank loans volume				
Mean	1,432,063	4,002,386	89,208	204,594
Std. Dev.	2,182,530	2,086,949	41,234	121,312
Min.	30,787	1,427,372	30,787	49,645
Max.	7,763,603	7,763,603	168,548	434,913
Lending rate				
Mean	13.55	19.33	8.19	13.13
Std. Dev.	5.55	4.65	1.92	2.20
Min.	4.73	12.78	4.73	8.69
Max.	33.89	33.89	15.14	17.77
Industrial production				
Mean	94.55	93.19	94.71	95.74
Std. Dev.	8.56	7.29	8.39	9.68
Min.	70.52	77.68	71.84	70.52
Max.	112.64	104.99	112.64	110.80
Obs.	576	192	192	192

Notes: Summary statistics of bank loan volumes, lending rates, and industrial production index over 2003–2018. Column (1) reports overall values for the three Latin American countries; columns (2)–(4) show averages for Brazil, Chile, and Colombia individually.

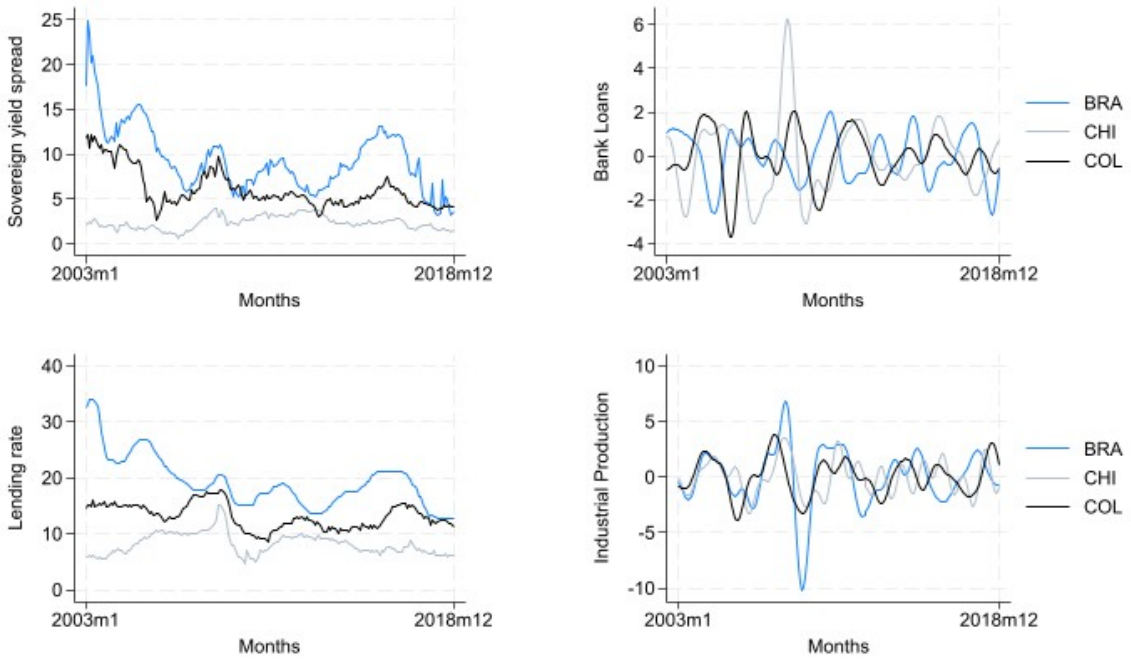

Figure A.2: Latin American financial and macroeconomic variables. Author's own elaboration based on FRED St. Louis and Latin American Central Banks.

Table A.5: Share of Total Long-Term Government Bonds Held by Local Banks, 2003–2018

Year	All banks	Brazilian banks	Chilean banks	Colombian banks
2003	0.570	0.631	0.575	0.505
2004	0.576	0.626	0.557	0.544
2005	0.589	0.623	0.525	0.620
2006	0.590	0.645	0.472	0.651
2007	0.603	0.657	0.480	0.672
2008	0.647	0.666	0.585	0.690
2009	0.687	0.685	0.705	0.670
2010	0.736	0.713	0.795	0.706
2011	0.743	0.712	0.807	0.709
2012	0.749	0.696	0.832	0.718
2013	0.749	0.684	0.842	0.722
2014	0.745	0.679	0.840	0.717
2015	0.600	0.714	0.800	0.654
2016	0.609	0.727	0.792	0.639
2017	0.628	0.752	0.805	0.650
2018	0.618	0.753	0.787	0.671
Mean	0.683	0.691	0.700	0.659
Std. Dev.	0.093	0.054	0.137	0.061
Min.	0.460	0.611	0.460	0.487
Max.	0.850	0.808	0.850	0.783

Notes: Annual summary statistics of the percentage of total government bonds held by local banks (Home Bias), 2003–2018. Column (1) shows the overall share for Brazil, Chile, and Colombia, while columns (2)–(4) show each country individually.

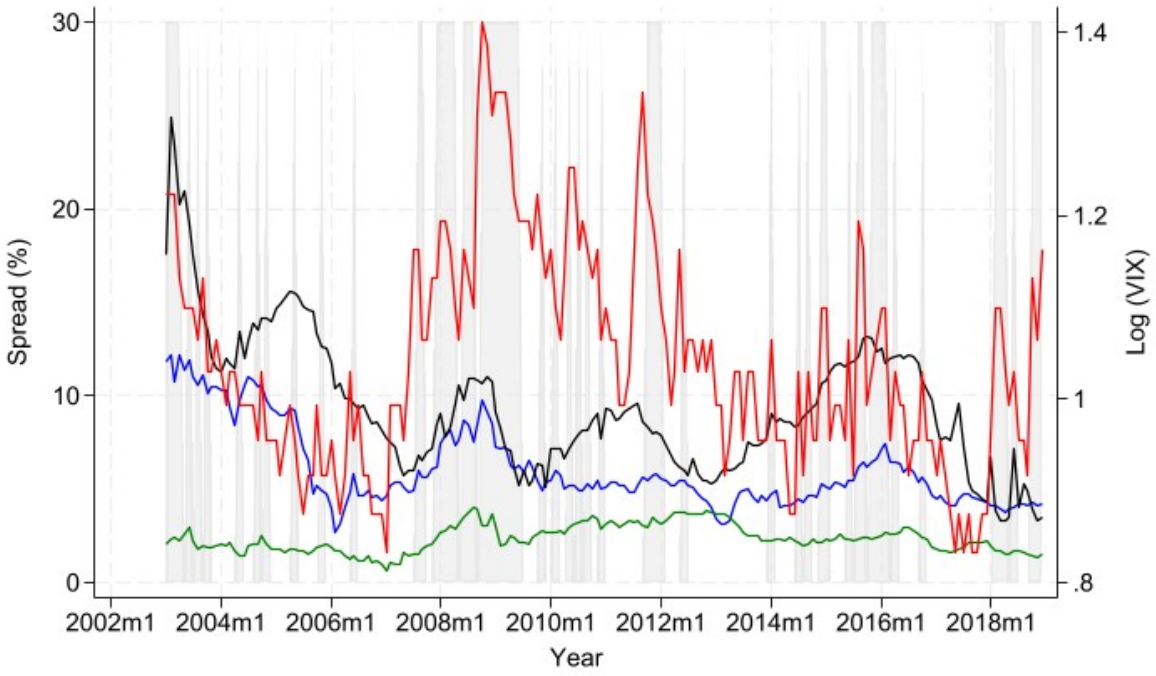

Figure A.3: The figure presents the evolution of VIX Index, (red line, right axis) it is the forward-looking volatility index of the Chicago Board Options Exchange. Brazilian, Colombian, and Chilean Government Bond Yield Spread, (blue line Colombia, green line Chile, and black line Brazil, left axis) over the period from January 2003 to December 2018. Source: Author's own elaboration based on FRED St. Louis and Latin American Central Banks.

Appendix B

Appendix to Chapter 2

Table B.1: Share of Total Long-term Government Bonds Held by Foreigners, 2003–18

	(1) All bonds	(2) Brazil	(3) Chile	(4) Colombia
2003	0.429	0.368	0.425	0.494
2004	0.423	0.373	0.442	0.455
2005	0.410	0.376	0.475	0.379
2006	0.409	0.354	0.527	0.348
2007	0.396	0.342	0.520	0.327
2008	0.352	0.333	0.415	0.309
2009	0.312	0.314	0.295	0.329
2010	0.263	0.286	0.205	0.300
2011	0.256	0.287	0.192	0.290
2012	0.250	0.303	0.167	0.281
2013	0.250	0.315	0.157	0.277
2014	0.254	0.320	0.160	0.282
2015	0.285	0.312	0.200	0.345
2016	0.272	0.250	0.207	0.360
2017	0.247	0.199	0.195	0.349
2018	0.246	0.198	0.212	0.328
Mean	0.316	0.308	0.300	0.341
Std. Dev.	0.093	0.054	0.137	0.060
Min.	0.150	0.191	0.150	0.266
Max.	0.540	0.388	0.540	0.512

Notes: This table reports annual summary statistics of the share of total long-term government bonds held by foreigners (Foreign Bias) over the 2003–2018 period, constructed from monthly data. Column (1) reports the aggregate share for Brazil, Chile, and Colombia, while columns (2)–(4) present country-specific figures. Summary statistics are computed using the full sample of monthly observations.

Appendix C

Appendix to Chapter 3

Table C.1: Data description and list of variables

Variable name	Description	Unit	Frequency	Source
GDP per capita	Total income divided by general population	Constant 2015 USD	Annual	The World Bank: World Development Indicators
Population growth	Population growth rate for year t is the exponential rate of growth of midyear population from year t-1 to t	Percent	Annual	The World Bank: World Development Indicators
Gross capital formation	Acquisitions less disposals of produced assets for purposes of fixed capital formation, inventories or valuables	Percent of GDP	Annual	The World Bank
Government Debt	Total debt of the central government	Percent of GDP	Annual	International Monetary Fund
Financial Development	Domestic credit to private sector	Percent of GDP	Annual	International Monetary Fund, The World Bank, and OECD
Export Intensity	Exports of goods and services	Percent of GDP	Annual	National Statistical Offices, The World Bank, and Central Banks
Government Expenditure	Public Expenditure	Percent of GDP	Annual	The World Bank
Human Capital	Human Capital per Person	Index	Annual	Universities of Groningen and California, Davis, Index of Human Capital per Person for the 18 nations via Federal Reserve Bank of St. Louis

Across the four panels, distinct macroeconomic dynamics emerge. In Argentina, both GDP per capita and public debt exhibit high volatility, reflecting recurrent economic crises and fiscal imbalances. Periods of rising debt often coincide with downturns in output, notably during the late 1980s and early 2000s. In Bolivia, the early 1980s were characterised by elevated debt levels and depressed income per capita, followed by a period of fiscal consolidation and gradual income recovery. From the mid-2000s onwards, GDP per capita shows sustained growth, while public debt remains relatively contained.

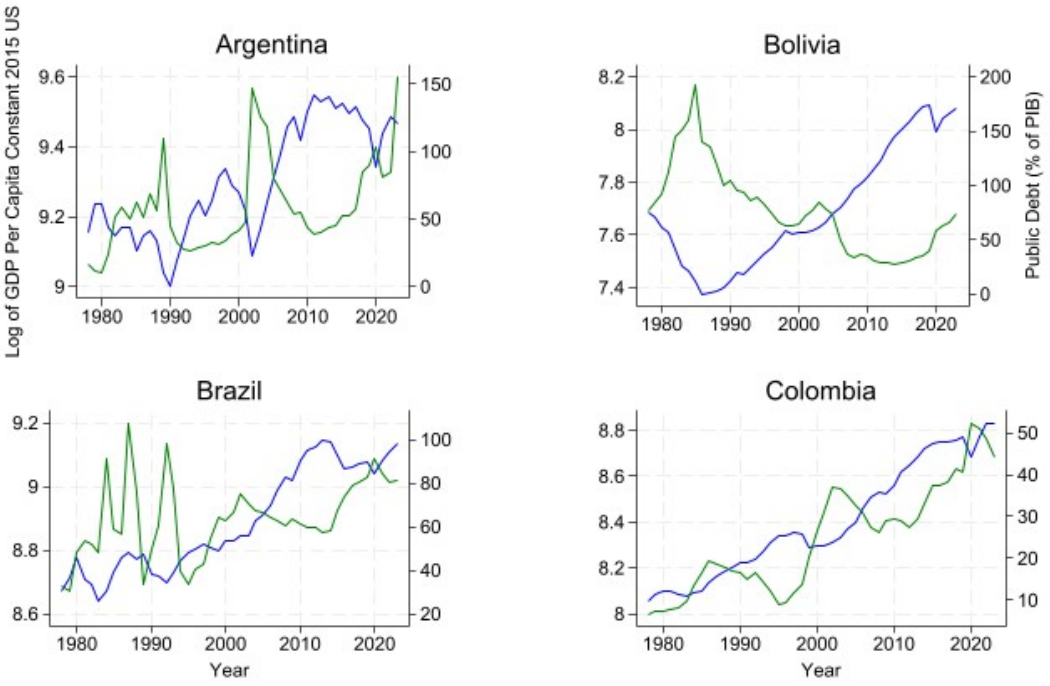

Figure C.1: The figure presents the evolution of real GDP per capita (in constant 2015 US dollars, blue line, left axis) and public debt as a percentage of GDP (green line, right axis) for Argentina, Bolivia, Brazil, and Colombia over the period 1980–2023. Source: The World Bank: World Development Indicators.

Brazil displays steadier growth in GDP per capita, with moderate debt fluctuations until the early 2000s. Debt levels increased substantially after 2014, coinciding with economic stagnation, suggesting a deterioration in fiscal and macroeconomic conditions. Colombia exhibits a consistent upward trend in GDP per capita with comparatively moderate volatility. Public debt rose during the late 1990s and again after 2010, yet without major reversals in income growth, indicating relatively resilient macroeconomic performance.

For Costa Rica the real GDP per capita shows a steady upward trajectory over the entire period, indicating sustained economic growth. Public debt initially declined during the 1980s but began to rise from the early 1990s until mid-2000s. From late 2009, the

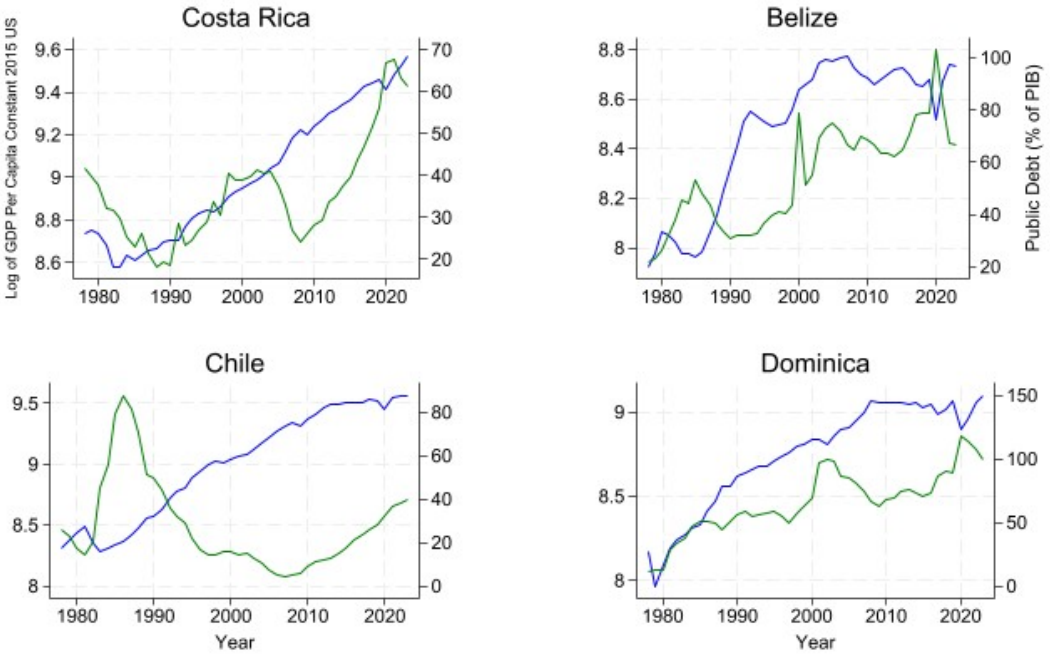

Figure C.2: The figure depicts the trajectories of real GDP per capita (in constant 2015 US dollars, blue line, left axis) and public debt as a percentage of GDP (green line, right axis) for Costa Rica, Belize, Chile, and Dominica between 1980 and 2023. Source: The World Bank: World Development Indicators.

public debt has steady increase from around 25 per cent to approximately 70 per cent in 2020, suggesting increasing fiscal pressures despite continued output expansion. Belize displays more pronounced fluctuations. GDP per capita grew strongly between the mid-1980s and 2008, followed by periods of stagnation. Public debt surged in the early 2000s and again after 2015, reflecting recurring fiscal imbalances and episodes of debt distress.

The GDP per capita in Chile increased consistently from the mid-1980s onwards, reflecting stable macroeconomic conditions and structural reforms. Public debt, which was elevated in the early 1980s, declined sharply thereafter and remained low for most of the sample period, indicating prudent fiscal management. Dominica exhibits a general upward trend in income per capita, though with intermittent slowdowns associated with external shocks and natural disasters. Public debt increased substantially from the late 1990s, peaking around 2004 and again after 2020, suggesting persistent fiscal vulnerabilities in small island economies.

For Guatemala, the GDP per capita displays a gradual but sustained upward trend, with moderate volatility compared to other Latin American economies. Public debt peaked in the mid-1980s, declined markedly throughout the 1990s, and has remained relatively stable since, indicating cautious fiscal management alongside steady income growth. Guyana exhibits pronounced fluctuations in both variables. Public debt rose

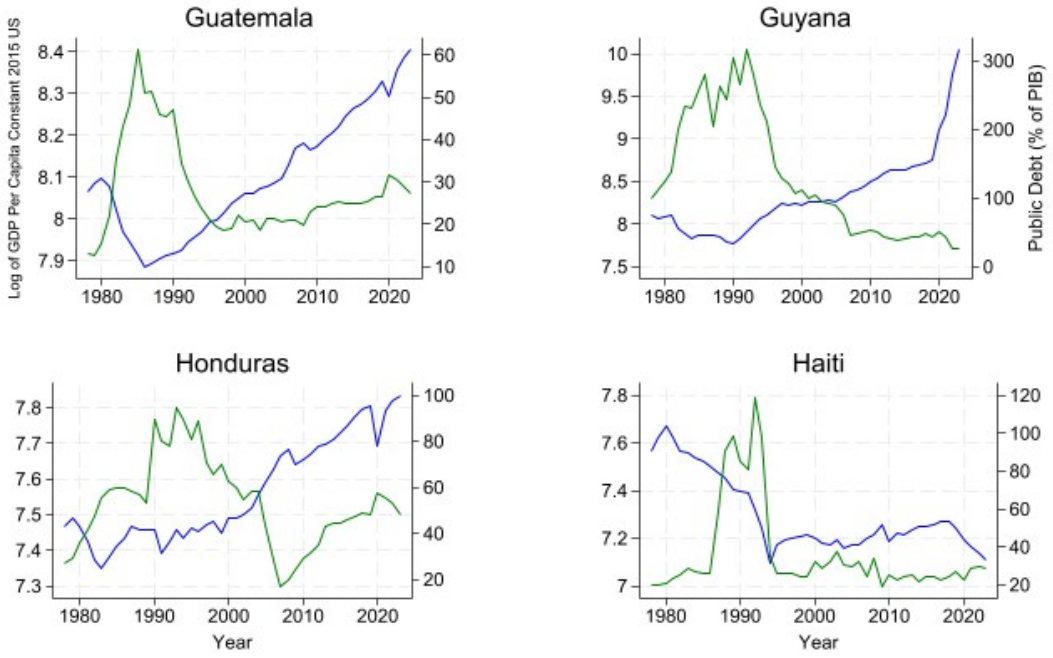

Figure C.3: The figure describes the evolution of real GDP per capita (in constant 2015 US dollars, blue line, left axis) and public debt as a percentage of GDP (green line, right axis) for Guatemala, Guyana, Honduras, and Haiti over the period 1980–2023. Source: The World Bank: World Development Indicators.

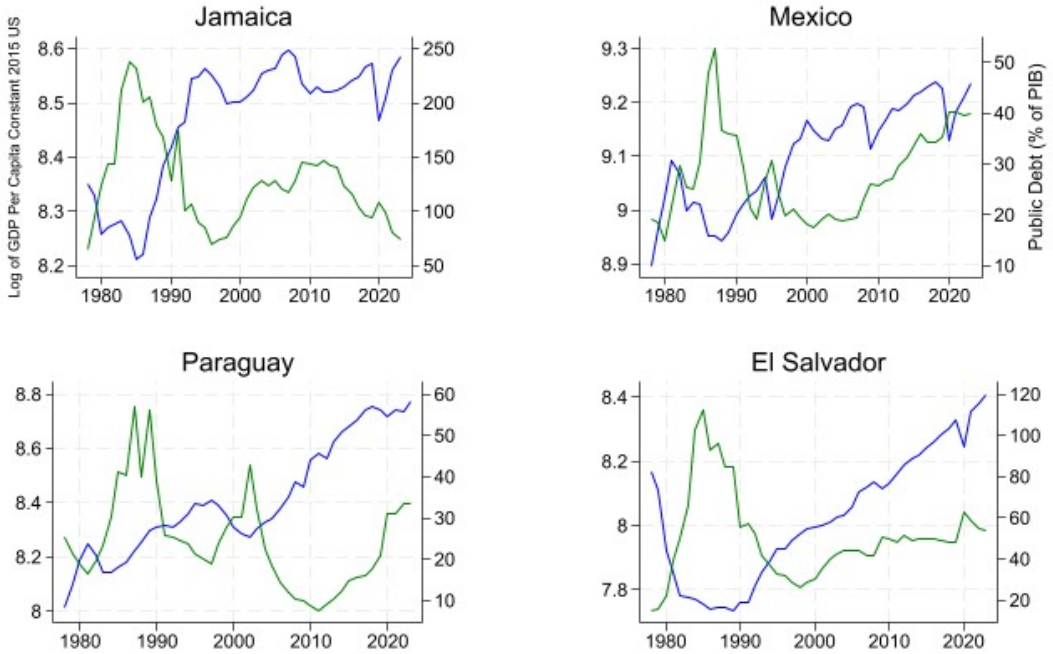

Figure C.4: The figure illustrates the evolution of real GDP per capita (in constant 2015 US dollars, blue line, left axis) and public debt as a percentage of GDP (green line, right axis) for Jamaica, Mexico, Paraguay, and El Salvador over the period 1980–2023. Source: The World Bank: World Development Indicators.

sharply in the 1980s, exceeding 300 per cent of GDP, before undergoing a dramatic consolidation in the 1990s and early 2000s. Real GDP per capita remained stagnant for much of the period but surged after 2005, reflecting the onset of oil production and rapid economic expansion.

The real GDP per capita of Honduras exhibits a modest upward trend, interrupted by temporary contractions in the early 1990s and late 2000s. Public debt fluctuated considerably, peaking in the early 1990s and again after 2010, suggesting episodes of fiscal stress in response to external and domestic shocks. Haiti shows persistently low and volatile levels of GDP per capita, reflecting recurrent economic instability and the adverse effects of natural disasters and political crises. Public debt spiked in the late 1980s but declined thereafter, remaining relatively low in recent decades, partly due to debt relief initiatives.

In Jamaica, GDP per capita follows a modest upward trend from the mid-1980s to 2023, with moderate volatility compared to other countries in the region. Public debt peaked in the mid-1980s, fell sharply throughout the 1990s, and rose again in the late 1990s, but has remained relatively stable since then, indicating prudent fiscal management and sustained income growth. Mexico displays a general upward trend in income per capita, though with periodic declines associated with external shocks. Public debt rose substantially from the late 1970s, peaking around 1988 and again after 2000, but has remained at a relatively manageable level in recent years.

In Paraguay, GDP per capita exhibits a moderate upward trend between 1978 and 2023, with a pronounced slowdown in the late 1990s. Public debt peaked in the mid-1980s, declined substantially throughout the 1990s, and rose again in the late 1990s, but has remained relatively stable since then. This pattern suggests prudent fiscal management and sustained income growth from the early 2000s onwards. The real GDP per capita in El Salvador followed a downward trajectory from 1978 to 1990, before beginning a steady recovery in the early 1990s that continued through 2023, interrupted only by the downturn in 2009 and 2020 associated with the global financial crisis and the pandemic, respectively. Public debt increased between 1978 and the mid-1980s, then fell sharply until the late 1990s. Since 2000, sovereign debt has risen moderately, indicating a relatively manageable debt position.

Uruguay displays a GDP per capita that increased steadily since the mid-1980s, reflecting a period of stable macroeconomic conditions and structural reforms, albeit with occasional slowdowns linked to global shocks. Public debt, which had risen sharply in the early 1980s, declined substantially until the late 1990s, then surged again in the mid-2000s before falling and remaining relatively low in recent years. Finally, Saint Vincent

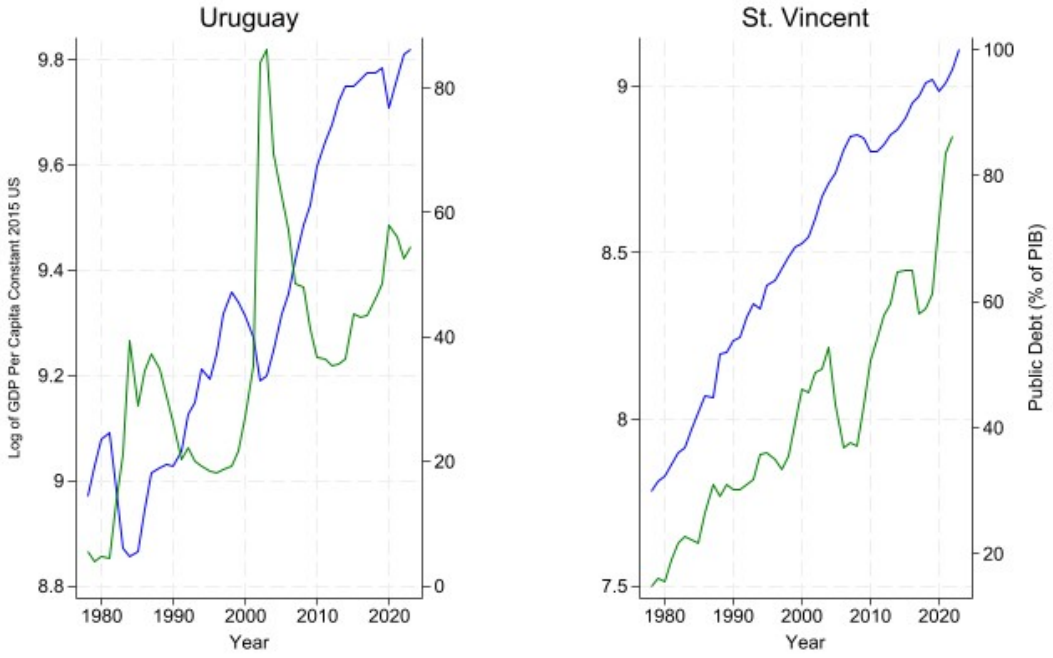

Figure C.5: The figure shows the evolution of real GDP per capita (in constant 2015 US dollars, blue line, left axis) and public debt as a percentage of GDP (green line, right axis) for Uruguay and St. Vincent and the Grenadines over the period 1980–2023. Source: The World Bank: World Development Indicators.

and the Grenadines displays a generally stable upward trend in income per capita, though punctuated by intermittent slowdowns associated with external shocks. Public debt rose steadily throughout the sample period, with a brief decline in the mid-2000s, followed by a renewed and stable upward trend in recent years.

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