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The Political Economy of Financial Subordination

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my grandmother,
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A três gerações de mulheres:
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Contents

Part II: The Eurozone Periphery

Introduction

Money and finance play a central role in structuring the geographical unevenness of the world economy. In contemporary capitalism, the growth and depth of international financial markets have historically been intertwined with the monetary hegemony of the United States. Power relations between states are thus imbricated with money and finance, everyday weapons of contemporary imperialism.

Still, mainstream economics typically assumes that money is neutral and confines the role of finance to market imperfections. In this thesis, I rely on a range of plural perspectives in the field of heterodox economics that highlight the centrality of monetary and financial relations in shaping core–periphery dynamics. Specifically, this work bridges different theoretical perspectives, including post-Keynesian approaches, Latin American structuralism, and Marxist political economy. Building on these perspectives, I argue that global and regional asymmetries are fundamentally structured through the interconnections between currency and sovereign debt hierarchies. Specifically, I analyse the cases of the global periphery and the Eurozone periphery.

The understanding of global capitalism as structured around two different poles, a core and a periphery, has its roots in Latin American structuralism and in its critique by dependency theories. Initially focused on the specific historical conditions of Latin American economies, this framework was later extended to analyse the case of other regions, including Asian and African countries, and also to explain divergences within advanced economies in Europe. These approaches highlighted how global and regional

inequalities are grounded in the international division of labour, in differences in productive structures, and in uneven technological progress.

The role of the monetary and financial systems in shaping these inequalities was largely overlooked by early structuralists and *dependentistas*. This can be understood by taking into consideration the historical period when these theories were mainly developed. They were formulated largely in the context of the post-war "golden age" of capitalism, under the Bretton Woods system, when capital flows were subject to tighter regulation, exchange rates were fixed, and financial flows were relatively stable. Still, this perspective is fundamental to the present thesis because it provides the basis for understanding that uneven economic development is not an accident, nor a mere phase. Instead, the capitalist system endogenously reproduces global economic asymmetries, and the core–periphery divide is a structural outcome of this process.

This is why I refer to peripheral countries in this thesis. The global periphery is more widely referred to in the literature as "emerging" and "developing" economies. However, these countries are not on a path towards reaching the same levels of development as advanced economies. For these countries, development has been portrayed as a path along which they are supposedly progressing, but in practice it has functioned more as a mirage that recedes as they walk towards it. On the other hand, asymmetries in the Eurozone are often described as a "North–South" or "Creditor–Debtor" divergence. These terms also do not capture the structural nature of these asymmetries, which are neither based on geographical position nor reducible to who borrows and who lends. Accordingly, I understand both global and Eurozone asymmetries as enduring manifestations of how capitalism operates, not as transient deviations from an underlying tendency to converge.

After the 1970s, the collapse of the Bretton Woods system and the subsequent transformations in the global monetary and financial architecture ushered in a markedly different context, one that made the importance of money and finance for uneven

capitalist development increasingly evident. It was in this historical context that the process commonly described as the financialisation of capitalism took shape and gained momentum. The emergence of the fiduciary dollar as the key world currency, the liberalisation and deregulation of financial markets, and the exponential growth and internationalisation of finance reshaped the mechanisms through which the core–periphery divide is reproduced. In this new context, the power relations embedded in monetary hierarchies, cross-border financial flows, and sovereign debt markets became crucial determinants of economic asymmetries. This has led many scholars to reinterpret uneven development by placing these dynamics at the centre of their analyses, with scholarship on international currency hierarchies and international financial subordination providing key foundations for this reinterpretation.

The disciplinary power of capital exercised through financial markets assumes its more violent form on the global periphery. This was made evident by the debt crises these economies underwent in the 1980s and, since then, by every major economic crisis that has disproportionately penalised them, such as the global financial crisis and the Covid-19 pandemic. Peripheral countries are integrated into the international monetary and financial systems in a subordinate position, issuing currencies that do not function internationally as money and sovereign debts that do not perform the role of globally recognised safe assets. As a consequence, they depend on access to strong currencies and assets, such as the dollar and US Treasury securities, in order to integrate into international markets. They face procyclical capital flows and exchange rate instability, which shape their external vulnerability. Over the past decades, most of these countries have undergone important transformations: deepening domestic financial markets, engaging in financial innovation, accumulating large stocks of foreign reserves, and issuing foreign debt in local currency. Taken together, these transformations also reflect a broader strategy through which peripheral states have intensified their engagement with financial markets in an effort to manage and mitigate financial fragilities. Yet,

despite these changes, international financial subordination remains a persistent reality for these economies.

Monetary and financial relations also shape geographical inequalities at the regional level, taking different forms depending on local specificities. While the Eurozone is part of the global core and its single currency, the euro, is a strong international currency, the disciplinary power of finance within the region is uneven. The outbreak of the global financial crisis, followed by the Eurozone debt crisis, evidenced that sharing a strong currency did not prevent the emergence of financial asymmetries that penalised the most fragile countries. Within this particular institutional configuration, the Eurozone periphery faces a distinctive form of financial subordination to the Eurozone core. This subordination does not take the form of shortages of international reserves and exchange rate instability, as in the case of the global periphery. Instead, it manifests itself in the volatility and procyclicality of capital flows, in sovereign debt spreads, and in the differentiated treatment of member states' sovereign debt by foreign investors. In the euro area, a hierarchy of sovereign debts underpins the periphery's regional financial subordination.

This thesis comprises four essays, unified by a common concern: how monetary and financial relations subordinate global and regional peripheries. The first two essays, which form Part I of this thesis, analyse the international financial subordination of the global periphery; Part II brings together the third and fourth essays, which examine the case of the regional financial subordination of the Eurozone periphery.

The first chapter examines state financialisation, emphasising the central role that sovereign debt plays in shaping it, particularly through its specific characteristics in peripheral economies. While the state actively fosters financial market development and relies on it for economic policy execution, it also empowers these markets in disciplining the state toward neoliberal policies. In peripheral states, financialisation is deeply shaped by currency and sovereign debt international hierarchies. The mutual dependence

between states and financial markets in the periphery creates a contradiction: financial deepening provides risk management tools but simultaneously strengthens global financial hierarchies. The argument is illustrated through the case of Brazil, showing how the Brazilian Central Bank and Treasury became increasingly entangled with financial markets as they sought to manage the additional risks attributed to the country's currency and sovereign debt. At the same time, this pattern of governance facilitated new forms of external vulnerability. Following the reversal of the financial cycle in 2013, it further empowered financial markets to discipline the Brazilian state towards the deepening of the neoliberal agenda.

The second chapter investigates the varying patterns of external financial vulnerabilities in peripheral countries and their interconnection with foreign debt and its currency denomination. It critically engages with debates in the literature on how traditional forms of external vulnerability – linked to the "original sin" – have evolved into new forms, related to the "original sin redux". It is argued that the ability to borrow abroad in local currency does not represent a structural break in the patterns of external financial vulnerability in peripheral economies. These vulnerabilities remain structurally rooted in the monetary and financial hierarchies of the global system, while the interaction between the global financial cycle and domestic characteristics determines the specific forms they take. To analyse these dynamics, a stock–flow consistent model is developed that investigates how shifts in foreign investors' liquidity preferences translate into external financial vulnerabilities, shaped by foreign debt dynamics and by the policy responses of the peripheral country. The model illustrates that increasing reliance on local-currency foreign debt gives rise to new channels of external vulnerability that may not only coexist with, but also feed back into, traditional ones. Results show that capital controls can stabilise investor behaviour and help to shield the domestic economy from foreign liquidity shocks.

The third chapter analyses the regional financial subordination of the Eurozone periphery, arguing that it is based on a regional hierarchy of sovereign debts, shaped by the European Economic and Monetary Union's institutional configuration. It introduces a novel analytical framework centred on the "Eurozone's contradiction", a concept that captures the tension between the disciplinary power of finance and the perpetuation of the monetary union. When this tension increases and systemic risks emerge, institutional and policy interventions become necessary to safeguard the euro area. These measures can temporarily soften market discipline and flatten the regional sovereign debt hierarchy. Once systemic risks recede, discipline is reinforced, paving the way for the re-emergence of financial asymmetries. These developments reshape the regional sovereign debt hierarchy and, through it, the variegated financial subordination of the Eurozone periphery. Policy and institutional developments during the debt crisis, the pandemic, and the post-pandemic period illustrate how this dynamic has operated, influenced by the specific ways systemic risks were triggered in each crisis. The argument is supported by an analysis of balance-of-payments flows, cross-correlations, ECB balance sheet data, government bond spreads, and the evolution of institutional and policy frameworks.

The fourth chapter analyses the role of sovereign investor groups in shaping financial instability and asymmetries within the Eurozone and their interaction with its institutional framework. This chapter has two main goals. First, it investigates how regional asymmetries are reflected and reinforced by these investor groups, from the Eurozone debt crisis to the post-pandemic period, highlighting how their behaviour is interconnected with developments in the regional institutional approach to sovereign debt. This involves a descriptive and statistical analysis of the Eurozone countries' investor base, government bond yields, and monetary policy. The second objective is to assess the potential impacts of QT on financial fragility in the Eurozone by proposing a framework for evaluating its effects under varying scenarios, specifically investigating whether these impacts are likely to differ among member states. The findings indicate

that foreign investors play a potentially asymmetrical role in the Eurozone, exhibiting destabilising behaviour towards peripheral government debt. This uneven role can be exacerbated by a market-based institutional approach to public debt or mitigated by appropriate support for these state liabilities. By combining the impacts of QT with the potential re-emergence of foreign flow asymmetries in sovereign markets, the analysis highlights that such dynamics could further deepen the Eurozone's core–periphery divide.

PART I

The Global Periphery

Chapter 1

Financialisation of the Peripheral State

The Brazilian Case

Abstract

This paper investigates state financialisation, emphasizing the central role that sovereign debt plays in shaping it, mainly through its unique characteristics in peripheral economies. While the state actively fosters financial market development and relies on it for economic policy execution, it also empowers these markets in disciplining the state toward neoliberal policies. In peripheral states, financialisation is deeply shaped by currency and sovereign debt international hierarchies. This mutual dependence creates a contradiction: financial deepening provides risk management tools but simultaneously strengthens global financial hierarchies. The argument is illustrated by analysing the case of Brazil, evidencing how the Brazilian Central Bank and Treasury became entangled with financial markets by managing the additional risks attributed to its currency and sovereign debt. Conversely, this pattern of governance facilitated new forms of external vulnerability. After the reversion of the financial cycle in 2013, it empowered financial markets in disciplining the Brazilian state toward the deepening of the neoliberal agenda.

1.1. Introduction

The end of the Bretton Woods system and the subsequent rise of the floating dollar standard are historical milestones often linked by the literature to the emergence of financialisation (Alami et al., 2023; Fine, 2013; Fine & Saad-Filho, 2017; Ivanova, 2013; Lapavitsas, 2014). Financialisation is deeply tied to U.S. monetary power, with global financial markets structured around a hierarchy of currencies and debts – anchored by the dollar and U.S. Treasury securities. It is also closely linked to the rise of neoliberalism, marked by the ascendancy of Reagan and Thatcher and the global diffusion of economic liberalization policies (Bonizzi, 2013; Fine, 2013; Saad-Filho, 2021; Tridico & Pariboni, 2018). Neoliberal reforms enabled the worldwide expansion of financialisation, enacted through national states according to specific regional and institutional contexts.

This article examines the process of state financialisation, with a focus on its specificities in peripheral economies. It analyses how this phenomenon manifests in practice through a case study of Brazil. Karwowski (2019) defines state financialisation as the growing influence of financial logic, instruments, and accumulation strategies on state activities. Santos (2023) refines this as a mode of governance where financial tools and markets serve as instruments of statecraft, reinforcing the financial sector's power. A deeper understanding of state financialisation requires examining how the state not only empowers financial markets but is also disciplined by them. Building on Sotiropoulos, Milios, and Lapatsioras (2013), Alami (2018), and Vasudevan (2025), this article highlights the central role of sovereign debt as both a means of strengthening financial markets and a channel through which states are constrained by them. It demonstrates that financial market governance largely operates through government debt, serving as a crucial bridge between financial systems and public finance in the execution of monetary and fiscal policies.

Research theorizing state financialisation often lacks a robust analysis of its dynamics

in peripheral countries. A key exception is Santos (2023), who argues that state financialisation in the periphery takes a subordinated form. This paper builds on that perspective by further engaging with the literature on currency hierarchy (Andrade & Prates, 2013; Palludeto & Abouchedid, 2016) and extending it to sovereign debt hierarchies. It underscores the crucial role played by sovereign debt in shaping a subordinated pattern of state financialisation in these countries. By bridging different strands of literature, it is argued that peripheral state financialisation follows a dual process shaped by subordination: while states promote financial market development to mitigate currency and sovereign debt risks, financial markets impose constraints that entrench neoliberal policies, further deepening these states' peripheral position in the global financial system.

The concrete manifestations of state financialisation in the periphery are also underexplored by the literature. Empirical studies on state financialisation focus primarily on European countries – for instance, its interconnections with sovereign debt and asset management in Europe (Schwan, Trampusch, & Fastenrath, 2021; Trampusch, 2019); the relationship between the state, the real estate market, and social housing in Italy (Adisson & Halbert, 2022; Belotti & Arbaci, 2021); and the role of sovereign credit default swaps in the Southern European debt crisis (Massó, Fernández-Casal, & Taboadela, 2022). Research extending this analysis to other regions remains limited, with efforts examining countries such as China (Pan, Zhang, & Wu, 2021; Wang, 2015) and countries in East-Central Europe (Karas, 2022; Mikus, 2019).

The present paper contributes to filling the aforementioned gap through an analysis of the Brazilian case, particularly in the context of the severe crisis the country faced from 2014 to 2016, as well as the state-finance nexus in the years preceding it. Brazil was chosen for two main reasons: first, because of the distinctive nature of Brazilian financial subordination, which persists even after overcoming traditional forms of external vulnerabilities (Kaltenbrunner & Painceira, 2015); and second, due to the even

more pronounced lack of empirical research on state financialisation in Latin American countries.

More precisely, the present article originally contributes to the literature by evidencing how state financialisation has played a key role in shaping new forms of external vulnerability in Brazil. This was expressed more intensely after the 2013 reversion of the financial cycle. In this sense, the paper adds to the broader debate on the factors behind Brazil's economic downturn and the subsequent reinforcement of neoliberalism. While orthodox perspectives attribute the downturn to fiscal mismanagement and correlated inflationary pressures (Barbosa, 2017; Holland, 2019), heterodox interpretations vary. Studies emphasize the role played by the decrease in domestic aggregate demand caused by the government's economic policy choice (Arestis et al., 2022; Serrano and Summa, 2015); the importance of domestic political conflicts, as the existence of a "profit squeeze" in the years preceding the crisis (Martins & Rugitsky, 2021); and others highlight the emergence of new forms of external vulnerability in the years preceding the crisis (Akyuz, 2017; Biancarelli, Rosa, & Vergnhanini, 2017; Kaltenbrunner & Painceira, 2018). This article primarily engages with the latter literature strand, contributing to it by foregrounding the role of the state-finance nexus.

Specifically, this article relies on an empirical descriptive analysis of the Brazilian Treasury and the Brazilian Central Bank (BCB) governance through financial markets, mediated by efforts to shield against domestic currency and sovereign debt fragilities. These efforts included improving public debt composition while accommodating bondholders' interests and hedging financial investors against the risks associated with domestic assets. In turn, this pattern of governance empowered financial markets to discipline the Brazilian state – primarily through assessments of sovereign and exchange rate risks – leading to a deepening of neoliberal policies after 2014.

The article is structured as follows: The second section discusses financialisation as an organic development of capitalism. The third section develops the concept of state financialisation, framing it as a dual process in which states both empower and are disciplined by finance. The fourth section examines the specificities of state financialisation in peripheral economies, emphasizing how it is shaped by international monetary and financial hierarchies. The fifth section analyzes the case of the Brazilian economy. The sixth section concludes.

1.2. Financialisation as an organic development of capitalism

While financialisation is a widely accepted concept linked to both the collapse of Bretton Woods and the emergence of the neoliberal era, significant divergences exist in the literature. A key debate within heterodox studies on financialisation concerns whether finance has a "parasitic" relationship with capital and production or is a fully constitutive element of capitalism. The parasitic view is defended by Carcanholo and Nakatani (2019) and Hudson (2021). Similarly, Magdoff and Sweezy (1987) and Foster and Magdoff (2009) argue that finance operates in opposition to production, leading to stagnation. This paper takes a different approach, asserting that finance is an organic and constitutive dimension of the capitalist economy.

As claimed by Bryan, Martin, and Rafferty (2009), Braga et al. (2017), and Prado (2014), financialisation is an organic development of capitalism rather than an external or parasitic force. Rather than opposing production or representing a capitalist distortion, in financialisation, capital appears as finance. In contemporary capitalism, "finance is the everyday mask of capital", and financial markets play a crucial role[1] in disciplining economic agents to ensure the reproduction of the capitalist system (Sotiropoulos, Milios, & Lapatsioras, 2013, p. 139). This disciplinary mechanism operates

[1]The power of capital is expressed in many other spheres, as the military one. Here, the focus is to examine the specific channel of discipline through finance, which in financialised capitalism gains particular importance.

primarily through the pricing of financial assets and the associated risk assessments embedded within them.

Palludeto and Rossi (2022) explain that the price of financial assets is determined by capitalists' evaluations of the expected income flow these assets may generate, discounted to present value using a risk-adjusted interest rate.[2] Such expectations are not based on neutral interpretations of reality; rather, the valuation process is embedded in power relations. The expansion of financial markets has reinforced financial asset pricing as a key disciplinary mechanism, contributing to the alignment of diverse economic agents with the neoliberal ideology (Alami, 2018; Sotiropoulos, Milios, & Lapatsioras, 2013). In other words, "the valuation process carried out by financial markets has important consequences for the organization of capitalist power relations" (Sotiropoulos, Milios, & Lapatsioras, 2013, p. 2). Since financial asset prices are based on expectations about the future, risk assessment plays a central role in shaping both asset values and their disciplinary function.

As argued by Sotiropoulos, Milios, and Lapatsioras (2013), financialisation is intertwined with the emergence and diffusion of an interpretation of reality from the viewpoint of risk to several economic agents. The development of financial innovations, such as derivative instruments, made it possible to assess and turn different events into risks that can be quantified, priced, and traded. This pricing is based on a particular comprehension of events that is embedded in the capitalist ideology (Sotiropoulos, Milios, & Lapatsioras, 2013, p. 161). Supposing an increase in the perceived risk attributed to a financial asset, it negatively impacts its price by increasing the interest rate which adjusts the expected flow of income associated with that asset. If this asset is a bond issued by an economic agent, for example, it means that the agent will face a

[2]In the Marxist framework, the value of the fictitious capital is determined by bringing to present value the expected future inflow discounted by the risk-adjusted interest rate attributed to it. This process is referred to as capitalization, which coincides with the formation of fictitious capital itself (Marx, 1992).

higher cost of funding, which will discipline the specific agent to act toward improving the risk attributed to its liabilities. In other words, "finance is not so much about forecasting the future but about disciplining the present, even if this passes through the estimation of future outcomes" (Sotiropoulos, Milios, & Lapatsioras, 2013, p. 113).

Since this study focuses on how financial discipline affects a specific economic agent – the state – it is important to clarify the relationship between financialisation and neoliberalism. Fine (2009) argues that financialisation is embedded in neoliberalism, which in turn is rooted in the ideology of non-interventionism and free markets, shaping the "cultural making" of financialisation. This cultural making affects all economic agents, including the state, by fostering a form of self-discipline, conducting them to "voluntarily insure against perceived risks (…) through the mechanisms of the financial markets" (Langley, 2004, p. 552). Despite its ideological emphasis on minimal state intervention, neoliberalism in practice involves strong state intervention "to promote the interests (…) of capital in general and of finance in particular" (Fine, 2013, p. 58).

Neoliberalism is expressed through a set of economic policies that weaken public pension systems, public healthcare, and education, increasing reliance on financial markets to access these services. It also "flexibilizes" labor markets, allowing precarious employment contracts and reducing workers' benefits, imposes rigid controls on public debt and government deficits, leading to austerity and privatization, and promotes financial market liberalization and deregulation, granting finance unprecedented freedom and power (Duménil & Lévy, 2001; Fine, 2009; Fine, 2013). In sum, "neoliberalism is the expression of the new hegemony of finance" (Duménil & Lévy, 2001, p. 601).

By forecasting the future and quantifying risk, the expansion of financial markets has provided a powerful means of imposing capital's discipline across society. The state plays a fundamental role in this process, not only as an agent that suffers the consequences of financial discipline but also as an active promoter and enabler of financial market expansion and dominance.

1.3. State financialisation: empowering and being disciplined by finance

Aiming to reach a more delimited and deeper understanding of state financialisation, this section draws upon several contributions from the literature, integrating different approaches (Alami, 2018; Braun, Gabor, & Hübner, 2018; Santos, 2023; Sotiropoulos, Milios, & Lapatsioras, 2013; Vasudevan, 2025), and emphasizing the centrality of sovereign debt to the phenomenon. State financialisation is understood here as a reciprocal relationship between the state and financial markets: on the one hand, the state supports the development and empowerment of financial markets; on the other hand, financial markets discipline the state toward the reproduction of neoliberal economic policies.

In financialised capitalism, states and financial markets are deeply interdependent: finance relies on the state to sustain its power, while the state depends on financial markets to implement economic policy. The development and empowerment of finance are propelled by how states are directed toward a new mode of governance, increasingly carried out through financial markets (Santos, 2023), acting as financial agents seeking to manage risks (Schwan, Trampusch, & Fastenrath, 2021). Braun (2020) describes this process as "governing through financial markets", where public policy goals are pursued via financial instruments. This dependence empowers finance,[3] as the state becomes invested in financial markets' stability to achieve its policy objectives. Conversely, the empowerment of finance, particularly through the pricing of sovereign risk, disciplines the state toward executing the neoliberal policy agenda.

This interconnection between state and finance is illustrated in how the state sets and pursues economic policy goals, such as fiscal and monetary policy. Fiscal policy has

[3]Braun, Gabor, and Hübner (2018) denominated "infrastructural power" the process that "operates via policymakers' expectation that curtailing markets will curtail the effectiveness of their own, market-based policy instruments".

become increasingly intertwined with financial markets, influenced by the growing importance of risk management related to the state's assets and liabilities. As argued by Streeck (2014), fiscal policy has become dependent on sovereign debt issuance due to decreasing revenues exacerbated by tax cuts and low economic growth in contemporary capitalism. To manage risks and reduce funding costs, it became essential to create and deepen primary and secondary markets for government securities, as well as promote financial innovations. The shift from non-marketable to marketable public debt instruments[4] also empowered the financial sector, as states may[5] become dependent on the continuous market validation of their liabilities to finance expenditures at sustainable costs. By contrast, loan-based or non-marketable debt does not involve the same ongoing market validation, as borrowing conditions are typically negotiated through contracts and not continuously priced in financial markets. Consequently, sovereign debt management is grounded in reducing the cost of the debt portfolio, leading the state toward sophisticated financial techniques and innovations, such as derivative instruments, contributing to the liquidity and depth of these markets (Schwan, Trampusch, & Fastenrath, 2021; Trampusch, 2019). This dependence on modern finance makes the state interested in improving its risk profile, thus shaping fiscal policy toward austerity measures, privatization, and the transformation of public goods into tradable financial assets.[6]

Monetary policy also reflects how state and private finance are intertwined. In contemporary capitalism, Central Banks (CBs) have emerged as key institutions in the financialisation process, with their independence from the government coinciding with

[4]See Fastenrath et al. (2017) for an empirical demonstration of the growing importance of marketable (e.g., treasury bills, notes, and bonds) relative to non-marketable government debt (e.g., loans).

[5]This depends crucially on the institutional arrangement of each country and its position on the monetary and financial international hierarchies. Depending on them, the Central Banks can or cannot be able or willing to contrapose the pressure of financial markets over public securities.

[6]As examples of the turning of public goods into financial assets, Karwowski (2019) evidences the cases of the pension funds and the social and physical states infrastructure.

increasing dependence on financial markets (Lapavitsas, 2014). Over time, the tools used by CBs have evolved from interest rate controls and credit ceilings to indirect instruments relying on financial markets as intermediaries (Braun, Gabor, & Hübner, 2018). Repurchase agreements, where CBs lend to banks against collateral, have become particularly significant (Ban & Gabor, 2016). Government securities, due to their high quality as collateral, play a crucial role in monetary policy, including repos, open market operations, and unconventional monetary policy. The CBs' reliance on the financial system to conduct and transmit monetary policy enhances the power of finance, as disruptions in these markets can undermine policy effectiveness, shaping the action of CBs (Ban & Gabor, 2016). In this process, CBs adopt a risk management perspective, selecting eligible collateral, applying haircuts, and deciding on asset eligibility for unconventional monetary policies (Gabor, 2016). Although legally tasked with price stability, CBs effectively function as financial policymakers, reflecting the broader influence of finance on state governance (Braun, 2020).

The execution of monetary policy – through the importance of government securities as high-quality assets for collateral – and fiscal policy – through financing via debt issuance – evidences the centrality of government securities in the interconnections between the state and private finance. The market for government securities plays a key role in state financialisation since, simultaneously, they are the backbone of the entire financial system, and through the evaluation of solvency, states are disciplined. The public debt market acts as "the anchor and the basis of expansion of the contemporary capitalist financial system", linking not only the state and domestic finance but also connecting the two with international finance (Vasudevan 2025, p. 2). This explains why the public securities market "provides a most likely location for the operation of financial market pressures" (Mosley, 2003, p. 17).

Through the assessment of each state's insolvency risk, financial markets price government securities, potentially impacting their cost of funding. A higher perceived

risk, unless offset by an action from the Central Bank, will result in a decrease in the price of government securities, thus increasing the cost of rolling over or issuing new debt. Regardless of how assertive expectations about the solvency of each government may be, they are potentially powerful enough to discipline the state through impacts on the cost of debt. A rise in borrowing costs can effectively shape state actions by pressuring it to reduce the risk of insolvency, thereby disciplining it to implement neoliberal reforms (Sotiropoulos, Milios, & Lapatsioras, 2013). Another possibility is the default on debt, prompting states to turn to supranational institutions, such as the IMF. In such cases, institutional mechanisms attached to the rescue – the conditionalities – also effectively direct national states toward neoliberal economic policies in favour of financialisation.

The discipline imposed by financial markets on the state is also grounded in an ideological interpretation of reality. When a specific event is translated into higher sovereign risk – such as an increase in a government's social expenditure – it reflects a market's perception shaped by neoliberal principles. Sovereign risk is not based on neutral interpretations of parameters per se, such as a country's deficit or debt-to-GDP ratio. Sotiropoulos, Milios, and Lapatsioras (2013, p. 203) illustrate how, for instance, a fiscal deficit resulting from an increase in social expenditure might not be priced the same way as a similar deficit resulting from a reduction in taxation benefiting financial capitalists.[7] Therefore, what matters most "is not fiscal prudence in general, but a

[7]A reduction in taxes that benefits financial capitalists is not always well received by financial markets. Liz Truss's attempt in the UK to cut taxes for high-income earners, followed by the negative reaction from financial markets, is a good example of how complex these dynamics can be. What's important to note here is that the rationale behind fiscal austerity is ideologically driven to favor financial capitalists.

particular form of fiscal prudence: a prudence appealing to the interest of capitalists" (Sotiropoulos, Milios, & Lapatsioras, 2013), and, particularly, to the interests of finance.

If the state conducts its economic policy in a way that does not align with the demands of the neoliberal agenda at a given point in the financial cycle, markets can raise the perceived solvency risk. The latter may be translated into higher financing costs, forcing governments to revert to or deepen neoliberal policies. This process has a cyclical dimension, and during the downward phase of the financial cycle it is likely that discipline is reinforced. Since government securities are at the core of both fiscal and monetary policy, it impacts the entire economy. Through the assessment of government debt risk, financial markets exercise their power by pressuring governments to implement policies that align with their interests, often at the expense of the broader population, making it a priority for governments to ensure the quality of public credit is deemed adequate by investors (Streeck, 2014). Therefore, the interrelationship between the state and financialisation fundamentally revolves around the issuance and management of public debt.[8]

Figure 1.1 illustrates and summarizes the process of state financialisation. To achieve its economic policy goals, the state engages in financial markets primarily through government debt, fostering liquidity and depth in these markets. The figure shows that this engagement occurs across three main levels: the primary sovereign debt market, where new bonds are sold via auctions to primary dealers; the sovereign derivatives market, where instruments such as interest rate swaps and credit default swaps reprice or hedge the risks embedded in those bonds; and the secondary debt market, where debt circulates as collateral in repos and is traded in open market operations by CBs. While the state pursues fiscal and monetary goals through these markets, their development

[8]To address particularly how government debt management has been shaped by financialisation, the literature also refers to the "financialization of sovereign debt management" and "financialization of government bond market" (Fastenrath, Schwan, & Trampusch, 2017; Hardie, 2012).

and expansion may – depending on institutional factors, financial regulation, and the degree of financial liberalization – transform into a mechanism of discipline over the state via sovereign risk assessment. The result of such discipline is a reshaping of economic policy, either by reducing the state's autonomy or by shifting economic policy goals toward a neoliberal direction. These policy shifts, in turn, reinforce the power of financial markets and, consequently, their disciplinary role.

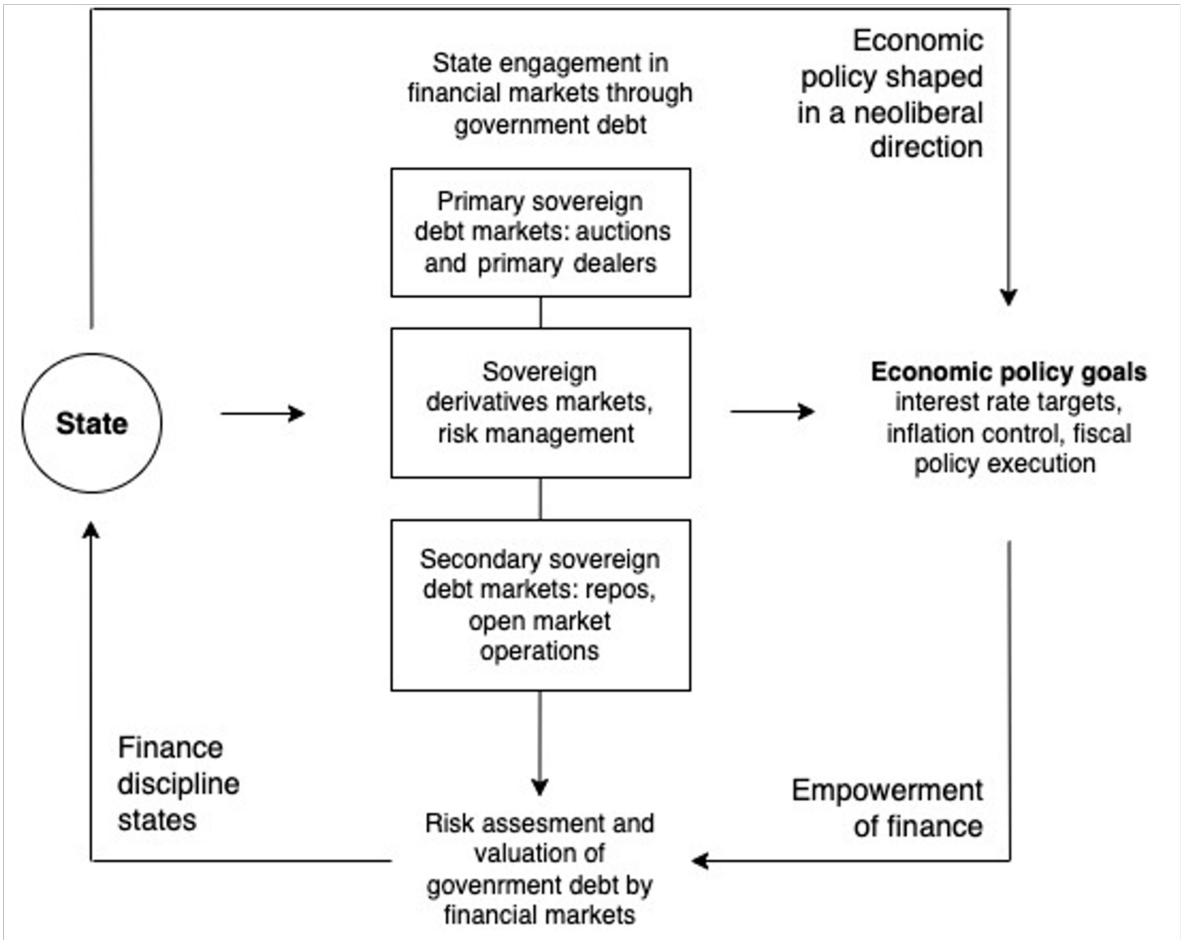

Figure 1.1. State financialisation.

The capacity of financial markets to exert such discipline depends heavily on each country's political and economic context. A state's ability to implement policies that diverge from the neoliberal agenda is not technically determined but fundamentally shaped by power relations. Globally, this capacity is also affected by asymmetries between nations reflected in sovereign debt markets. While U.S. Treasury bonds are considered "risk-free" assets, thereby mitigating capital discipline through sovereign risk,

peripheral government bonds are more heavily exposed to it. The international financial and monetary system is asymmetrical, based on a hierarchy of currencies and debts, which shapes state financialisation unevenly in the core and the periphery.

1.4. Subordinated state financialisation in the periphery

Financialisation is a variegated process that exhibits significant geographical particularities, with a key distinction emerging between core and peripheral countries. Building on the currency hierarchy literature and extending it to encompass sovereign debt, this section examines how state financialisation is shaped by these hierarchies. The mutual relationship between the state and financial markets in the periphery is *sui generis*: on the one hand, the state supports the development and empowerment of financial markets. This support is mediated by the higher risk attributed to its currency and debt, which leads to a state-supported deepening of market liquidity to facilitate trade and protect against such risks. On the other hand, financial markets discipline the state toward the reproduction of neoliberal economic policies, which can reinforce the position of its currencies and debts at the bottom of the international hierarchies.

1.4.1. The international hierarchy of currencies and sovereign debts

International monetary asymmetries are reflected in what is referred to by the literature of Post Keynesian inspiration as currency hierarchy (Andrade & Prates, 2013; Conti, Prates, & Plihon, 2014; Palludeto & Abouchedid, 2016; Prates, 2005). Domestic currencies have different degrees of capacity to perform the functions of money globally,[9] and based on this emerges a hierarchy of currencies among them (Palludeto & Abouchedid, 2016). Since the dollar is the currency that best performs the functions of money globally, the U.S. currency is at the very top of the hierarchy. Core currencies with a limited capacity of functioning internationally as money come right below the

[9]Unit of account, means of payment and store of value.

dollar – the euro comes right after, followed by other strong yet less significant currencies, such as the yen, and the pound – while at the bottom of the hierarchy are the peripheral currencies, with no (or marginal) ability to perform their functions at the international level.

Since peripheral currencies don't function as money at the international level, the demand for financial assets denominated in these currencies depends on expectations regarding their future conversion into the world currency.[10] In other words, the subordinated monetary positions of such currencies allow the formulation of an additional determination of risk, specifically the risk of illiquidity at the international level. The illiquidity risk of peripheral currencies is highly sensitive to the global financial cycle, decreasing during periods of boom and increasing during financial distress.

Monetary asymmetry is closely related to the emergence of financial asymmetry. Andrade and Prates (2013) identify two key aspects of financial asymmetry: First, financial flows to peripheral countries are highly speculative, sensitive to risk aversion, and dependent on the monetary policy of core countries. As a result, the demand for peripheral financial assets assumes a more unstable and procyclical character. Second, peripheral countries' financial assets constitute a small share of the global financial markets. While peripheral assets represent only a small portion of foreign investors' portfolios, even a small reallocation of their assets can have significant consequences for peripheral financial markets due to their relatively small size (Kaltenbrunner & Painceira, 2018). In contrast, during crises, capital flows are redirected to assets

[10]The literature (Andrade & Prates, 2013; Conti, Prates, & Plihon, 2014; Palludeto & Abouchedid, 2016) denominates "international liquidity" the levels on which a currency is able to perform money functions internationally. In this approach, international liquidity corresponds to the structural characteristics of the currencies. Another concept is the "market liquidity", which corresponds to conjectural expectations of the liquidity of such currency. The market liquidity of each currency varies according to the financial cycle, while international liquidity is stable regarding the financial cycle and comprises the more solid characteristics of a currency as its ability to function as world money.

denominated in top currencies, mitigating the impact on prices in core countries' assets. These two aspects imply that a reversion in the financial cycle has a disproportionately disciplinary impact on the periphery (Alami, 2018). Therefore, capital flows become crucial to explaining the volatility of asset prices and the subordination of peripheral countries (Bonizzi, 2013; Bortz & Kaltenbrunner, 2018). The consequences of these financial asymmetries are reflected in higher interest rates and exchange rate volatility in these economies (Conti, Prates, & Plihon, 2014).

An important element of financial asymmetry is highlighted by Alami (2018), who analyses the geographical unevenness in risk assessment. The global financial centers, primarily located in core countries, are "the leading sites of production of financial instruments and knowledge" upon which the risk assessment of assets is based (Alami, 2018). Of particular significance is the highly concentrated market of risk agencies, mainly dominated by the Big Three – Moody's, S&P, and Fitch. Based in the U.S. and London, these agencies rank governments, corporations, and agents worldwide according to their assessments of the risk associated with each asset group. The role played by sovereign ratings is particularly important, as "sovereign credit ratings form a benchmark indicator for the credit risk assessment of many other assets" (Ozturk, Namli, & Erdal, 2016). As noted by Basu and Sun (2022), these institutions wield "enormous influence and power", acting as a reference for guiding the behaviour of investors and institutions globally, triggering the movement of international financial wealth based on their risk ratings. As previously mentioned, the risk assessment is embedded in a capitalist ideology that reflects class interests. Alami (2018) further shows that this process is geographically shaped, mirroring actual geopolitical power relations. The construction of the knowledge underlying risk assessment is permeated by "[w]estern- and capital-centric views of history and imperial/neo-colonial imaginaries" (Alami, 2018, p. 26), which influence the representation of peripheral assets as riskier.

The existence of monetary and financial asymmetries is also manifested in an international hierarchy of government securities. As discussed by Vasudevan (2025, p. 3), the subordinated position of the periphery is "structured by sovereign debt and the interplay of public debt and global finance". I argue that the hierarchy of sovereign debt depends on two main interconnected factors: first, the position of the national currency within the global currency hierarchy; and second, the capacity of national institutions – particularly the relationship between the treasury and the national central bank – to back and support government debt. Since U.S. Treasury securities are denominated in the world currency and the Federal Reserve (Fed) is capable of managing and supporting the market for government securities, they are at the top of this hierarchy. In contrast, the government securities of peripheral countries are at the bottom of the public debt hierarchy, as they are denominated in domestic, weak currencies or foreign currencies that they do not issue. While public bonds from core countries are considered safe havens, the heightened risk attached to peripheral debt becomes a structuring mechanism for their subordination.

1.4.2. Financialisation of the state in the periphery

In peripheral economies' state financialisation, the interconnections between the state and financial markets are shaped by subordination in a dual process. On the one hand, the peripheral state actively fosters the development of financial markets, seeking to mitigate the additional risks associated with its currency and sovereign debt. On the other hand, financial markets exert significant disciplinary pressures on the state, reinforcing neoliberal economic policies that may further entrench the position of its currencies and debts at the lower tiers of the international monetary and financial hierarchy. These dynamics are influenced by the global financial cycle, as the procyclical demand for peripheral countries' currencies and debts intensifies financial discipline during periods of economic distress.

As previously discussed, financial markets rely on the state to sustain their power and expand their influence, while the state depends on these markets to implement its economic policies. The particularity of peripheral state financialisation is evident in the specific nature of the relationship between the state and private finance in executing fiscal, monetary, and exchange rate policies. To achieve its economic policy goals, the peripheral state becomes dependent not only on financial markets but also on external factors, such as its access to international currencies and assets at the top of global hierarchies.

Similar to core countries, peripheral states increasingly depend on sovereign debt issuance to execute fiscal policy, but this process takes on distinct forms. One clear example is when peripheral states rely on external debt to finance their expenditures. This situation represents not only the state's dependence on financial markets but also its reliance on the availability of foreign reserves to service the debt. It constitutes a direct form of external vulnerability, as the inability of these states to issue the currency in which they are indebted undermines their capacity to respond to foreign outflows and exposes them to exchange rate depreciation. In the event of a sudden stop in capital flows, the state may find itself unable to service its debt in foreign currency due to depreciation pressures, and the mechanisms through which the state conducts fiscal policy can be directly undermined by higher funding costs. This constitutes a direct and intense form of state discipline, mediated by financial markets and the supranational institutions that bail out states based on strict conditionalities. The debt crisis in peripheral countries during the 1980s and the subsequent adoption of the Washington Consensus epitomized the strength of this disciplinary mechanism.[11] It remains relevant

[11]In Latin America, the debt crisis in the 80s was of particular importance to turn such countries to the IFM and the World Bank, which came together with the imposition of the Washington Consensus (Lapavitsas, 2014). Even if Asian economies did not suffered a sudden stop, during the 1980s it was also adopted a set of measures promoting financial deregulamentation and liberalization (Cho, 2010), which was deepened by the Asian crisis at the end of the 1990s, making countries turn to the IMF and disciplining the state towards neoliberal reforms. To the

today, as illustrated by the cases of Latin American countries such as Argentina since 2001, Venezuela in 2017, and African and Asian countries such as Ghana and Sri Lanka in 2022.

However, even when peripheral states succeed in issuing debt in their domestic currency, new forms of discipline via financial markets may emerge. If the state issues debt in domestic currency, bondholders' expectations regarding exchange rate risks may also contribute indirectly to an increase in funding costs. The presence of foreign investors as holders of domestic currency assets, including government securities, can create an additional source of vulnerability for these states due to their strong procyclical demand (Arslanalp & Tsuda, 2014; Bortz & Kaltenbrunner, 2018). Exchange rate movements affect the value of financial assets in terms of the foreign investor's currency, which can trigger capital outflows as foreign investors bear the exchange rate risk (Hofmann, Patel, & Wu, 2022). In this scenario, the Treasury could be indirectly affected by an increasing cost of rolling over its debt if currency depreciation, by threatening inflation targets, leads to monetary tightening (De Paula, Fritz, & Prates, 2025), or by the potential impact on medium to long-term government debt yields. Fiscal policy thus reveals a governance pattern that is mediated both by financial markets and global hierarchies, making the discipline imposed by them potentially more pronounced.

Monetary policy also serves as a channel through which the interdependence between peripheral states and financial markets is mediated by the hierarchies of currencies and sovereign debts. As noted by Braun, Gabor, and Hübner (2018), CBs conduct their monetary policy through financial markets, thus empowering finance as it is essential for the state to ensure the liquidity and proper functioning of these markets to meet monetary policy goals. In peripheral countries, monetary policy is closely intertwined

African economies, the debt crisis during the 1980s also impacted the region and redirected countries to conduct the neoliberal reforms imposed by the IMF and the World Bank (Kvangraven et al., 2021).

with exchange rate policy. A relatively higher short-term interest rate compared to core countries is often adopted to attract foreign reserves and, in some cases, to avoid a depreciation of the domestic currency that could undermine efforts to control inflation.[12] Concerns about the evolution of the exchange rate redirect CBs toward operations in spot and future currency markets, which contributes to deepening these markets (Alves, 2017; Kaltenbrunner, 2010). In seeking protection against vulnerabilities stemming from the risks associated with their liabilities, CBs act by accumulating reserves and promoting the liquidity of spot and future currency markets.

Let us better understand the impacts of deepening foreign exchange derivatives markets and the accumulation of reserves, starting with the former. The state's shift toward financial techniques, such as financial derivatives, a key aspect of state financialisation, occurs in a distinct manner here. The state promotes the depth and liquidity of such markets, aiming to mitigate exchange rate volatility by offering a hedge to investors against domestic currency fragility. The ability to hedge foreign exchange exposure helps to boost demand for domestic assets by foreign investors (Kaltenbrunner, 2010), but it also introduces the potential for increased instability, as exchange derivatives markets can be used for speculative purposes.[13]

Regarding foreign reserve accumulation, it is a state strategy to safeguard against foreign outflows and to manage the exchange rate. At the same time, it entails costs of accumulation that can compromise fiscal policy (Akyüz, 2021; Palludeto & Abouchedid, 2016). Since these reserves are often invested in U.S. Treasury securities, they contribute

[12]How the Central Bank conduct its operations in the foreign exchange markets will depend on its objectives and of the financial cycle. During periods of financial inflows, a tendency of domestic currency appreciation can be undesired, and the Central Banks can also act in the direction of avoiding an excessive appreciation of its domestic currency.

[13]Farhi and Borghi (2009), for example, highlight how the foreign exchange derivatives markets contributed to heightened vulnerability by enabling substantial financial leverage during the 2008 crisis in Brazil, Mexico, and South Korea.

to reinforcing the dominant international role played by the dollar as an international reserve currency and U.S. Treasuries as safe havens (Powell, 2013).

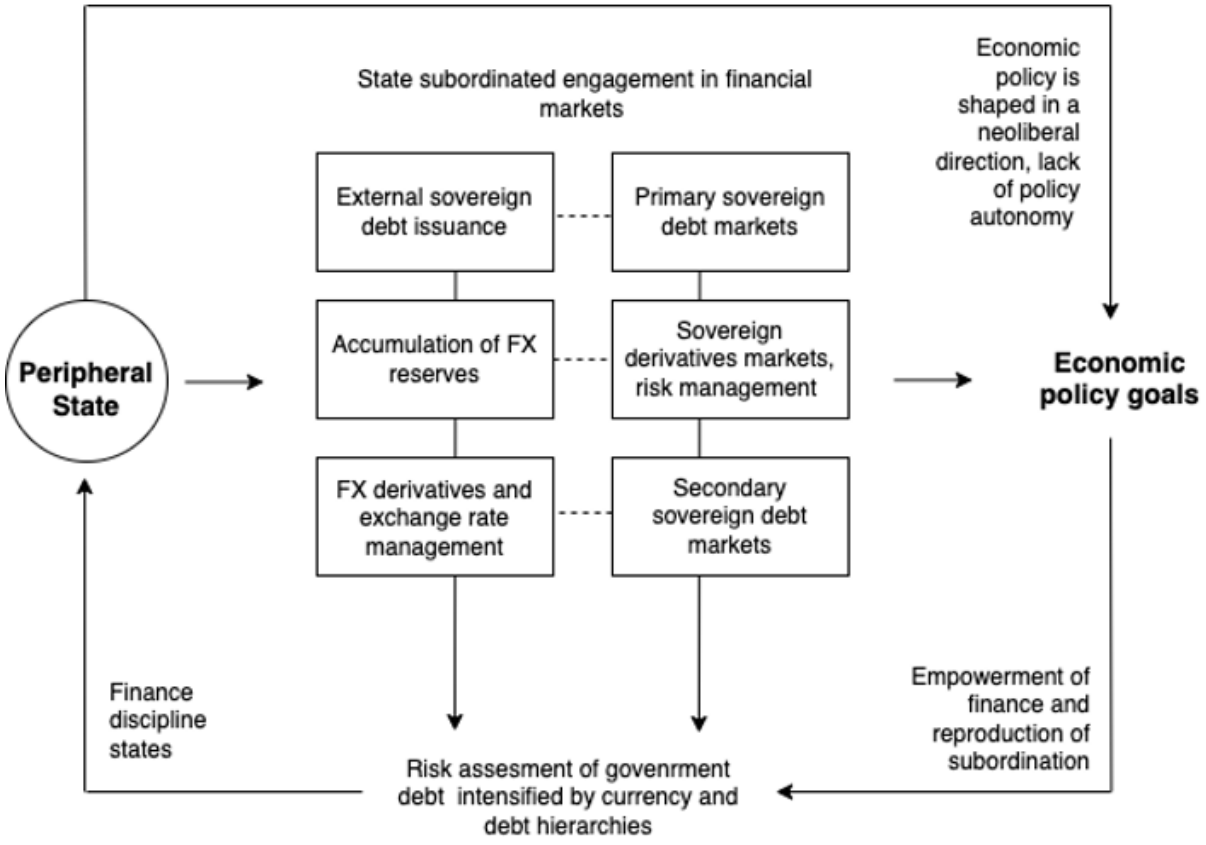

Figure 1.2. Peripheral state financialisation.

Figure 1.2 illustrates the dynamics of state financialisation in peripheral economies, encapsulating the argument presented here. Peripheral states engage with financial markets mainly through government debt to achieve economic policy objectives. This engagement encompasses the three levels outlined earlier (Section 1.3, Figure 1.1) – primary sovereign debt markets, sovereign derivatives markets, and secondary markets. And it also comprises three additional layers of state-finance interactions that are particularly crucial in peripheral countries: external sovereign debt issuance, accumulation of foreign reserves by domestic central banks, and FX derivatives and exchange rate management. This pattern of interaction stems from the state's effort to govern through financial markets given its subordinated position in global hierarchies. Yet, the very tools deployed to hedge currency and sovereign debt risk end up deepening

financial markets and binding the state even more tightly to core currency assets and to foreign investors' demand. Within this mode of governance, the international illiquidity of peripheral currencies and sovereign debts converts into an additional layer of risk, intensifying financial discipline over the state – especially when global financial conditions tighten. Consequently, economic policy in peripheral economies is shaped by a dual process that contributes to reproducing subordination: it is both constrained by the global financial asymmetries and disciplined to follow a neoliberal direction.

Concretely, the manifestation of peripheral state financialisation varies based on the specific characteristics of each economy and its patterns of integration into global finance. Furthermore, fluctuations in the global financial cycle can either intensify or ease financial discipline over these states, given the procyclical and speculative demand for their assets. The following section illustrates these dynamics by analysing the Brazilian case.

1.5. Brazilian state financialisation: governance, financial discipline, and the post-2014 neoliberal deepening

During the 2000s, many peripheral economies benefited from the upward phase of the financial cycle, coupled with a commodities boom. In Brazil, this period brought significant changes in the interconnections between the state and financial markets. With the favourable external environment, the government reconciled two often conflicting goals: managing the additional risks associated with the domestic currency and public debt while accommodating financial investors' interests. As the country accumulated vast foreign reserves and reduced the share of government debt in foreign currency, traditional forms of external vulnerability – such as reserve shortages and fragilities associated with foreign currency debt – seemed to disappear. However, this governance pattern facilitated the emergence of new forms of external vulnerability, which intensified after the U.S. tapering announcements in May 2013.

Following the shift in U.S. monetary policy, the Brazilian economy faced a severe crisis, with unemployment rising from 6.6 to 12.8% between 2014 and 2017, and GDP contracting by 3.5% in 2015. The recession had multiple causes, including a decline in domestic demand linked to government policies (Arestis et al., 2022; Serrano & Summa, 2015), political conflicts, growing distributive tensions (Martins & Rugitsky, 2021; Serrano & Summa, 2022), and the rise of new external vulnerabilities (Akyüz, 2017; Biancarelli, Rosa, & Vergnhanini, 2017; Kaltenbrunner & Painceira, 2018). This section argues that the financialisation of the Brazilian state also underpins this process.

The Brazilian state's connections with financial markets reveal a dual pattern consistent with the mechanism of peripheral state financialisation previously described. On the one hand, the Treasury and the BCB actively promoted the liquidity and depth of financial markets – such as the government debt and foreign exchange markets – to protect against the international illiquidity of the domestic currency and sovereign debt. The Treasury sought to improve the debt profile while adopting an accommodative approach to bondholders' preferences. Similarly, the BCB managed the domestic currency's fragility by hedging investors, accumulating reserves, offering liquid and profitable assets via repurchase agreements with treasury bonds, and assuming exchange rate risks through FX swaps. On the other hand, this financial market governance became a source of power for these markets in disciplining the state – an influence that intensified following the reversal of the financial cycle in 2013. This discipline manifested through sovereign and exchange rate risk assessments, impacting the state's cost of funding and steering economic policy and structural reforms toward a more pronounced neoliberal trajectory post-2014.

1.5.1. The Brazilian Treasury's entanglement with financial markets

In the 2000s, the Brazilian Treasury actively developed domestic government debt markets to manage the additional risks associated with its debt, aiming to improve debt

composition and minimize refinancing risks.[14] This strategy was implemented only to the extent that it complied with bondholders' interests, with the Treasury accommodating their demands throughout the financial cycle. However, the 2013 shift in liquidity conditions exposed the limitations of this governance model, revealing that the growing entanglement of the Brazilian state with finance introduced new vulnerabilities. Specifically, this entanglement empowered financial markets to discipline the Brazilian state through sovereign risk assessments, steering it toward deeper neoliberal reforms post-2014.

Efforts to transform the debt profile focused on enhancing market liquidity and fostering a more resilient debt structure by reducing short-term, FX-linked, and floating-rate sovereign debt. Debt improvements were achieved through financial incentives,[15] such as tax exemptions and assurances of exit options during financial distress. For instance, in 2006, the government exempted foreign investors from income tax on public bonds, aiming to encourage demand for longer maturities and fixed-rate debt (Dornelas & Terra, 2021). The Treasury also offered implicit hedges to investors by committing to regular early purchase and sale auctions for fixed-rate and inflation-indexed bonds, ensuring that investors would have an exit option in case of financial turbulence (Pedras, 2009). These measures, combined with a favourable external environment and alignment with bondholders' interests, improved Brazil's debt structure: the share of government debt in domestic currency rose from 73% in 2002 to 96% in 2012 (IMF, 2023), the average

[14]The development of a domestic government debt market followed fiscal and monetary reforms that assured investors of the government's commitment to maintaining public creditworthiness. Key measures included the adoption of an inflation-targeting regime in 1999, which emphasized the Brazilian Central Bank's (BCB) focus on price stability, and the Fiscal Responsibility Law in 2000, which set debt limits and primary balance targets as key budget anchors (IMF, 2023), thereby reinforcing the primacy of bondholders' interests in the Union's budget.

[15]As part of the financial incentives, the primary dealer system was expanded in 2003 to include a select group of specialists who were required to meet performance criteria in government debt markets. In return, they received privileges such as exclusive access to secondary-round auctions (Amante, Araujo, & Jeanneau, 2007).

life of federal public debt extended from 4.6 years in 2005 to 6.6 years in 2014 (National Treasury Secretariat, 2022), and floating and FX-linked debt shares declined, while fixed-rate debt shares increased (Figure 1.3).

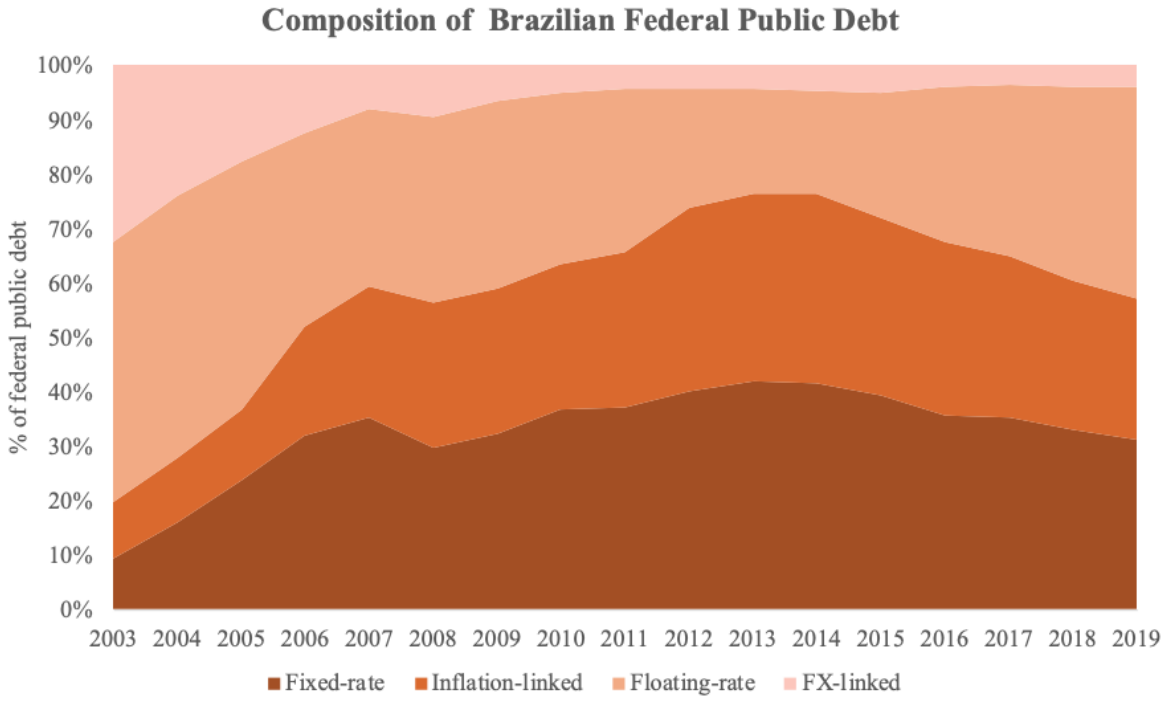

Figure 1.3. Composition of Brazilian federal public debt. Data: Brazilian National Treasury

However, most of these improvements were tied to the financial cycle.[16] Given the international illiquidity of Brazil's currency, the attractiveness of government bonds in domestic currency is sensitive to external conditions. The improvements in debt composition were driven by a rising share of foreign investors as bondholders, a participation that is particularly unstable in peripheral economies and tends to reverse during periods of instability. In fact, foreign investors sharply reduced their participation in Brazilian sovereign debt markets after 2015, amid rising debt-to-GDP ratios driven by economic contraction and increased interest payments (Figure 1.4). Combined with the strong preference of Brazilian domestic investors for short-term liquid assets

[16]A context of expected declining interest rates makes floating-rate debt less appealing, while increasing investors' appetite for fixed-rate debt, which will not incur losses from decreasing interest rates. Additionally, in the context of favourable external conditions and lower domestic interest rates, longer-term debt became a more profitable option due to its higher yields.

(International Monetary Fund, 2018), the reversal of the financial cycle contributed to imbalances in government debt markets and to the deterioration of the debt profile post-2014.

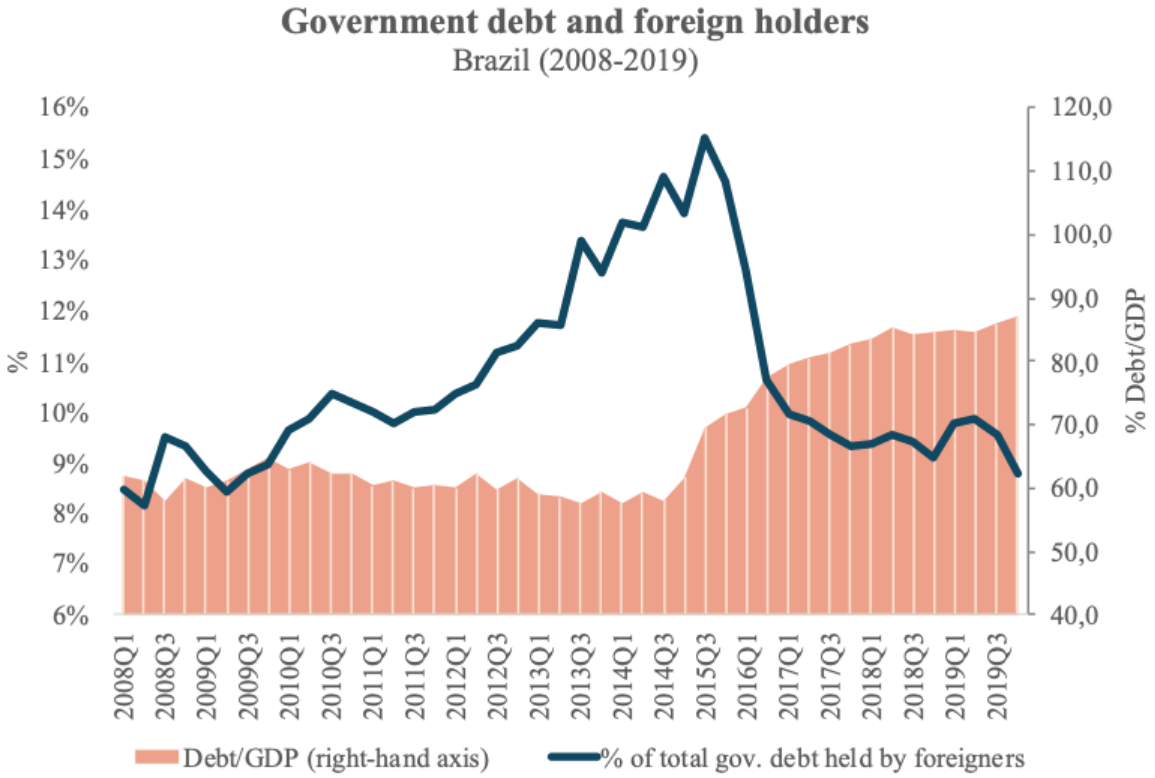

Figure 1.4. Government debt as a share of GDP and foreign investor holdings of total government debt. Data: IMF – Sovereign Debt Investor Base for Emerging Markets and Developing Economies.

Market distortions emerged in the fixed-rate, longer-term debt segment, prompting the Treasury to conduct repurchase auctions to offer investors an exit from these bonds (Dias, Pereira, & Neto, 2022). These purchases aimed to accommodate the market's preference for more liquid domestic assets, shifting the debt profile back toward floating-rate bonds. By 2018, floating-rate bonds had reclaimed the share seen in 2006, reversing previous improvements (Figure 1.3). Similarly, the average life of debt fell from 6.6 years in 2014 to 5.4 years in 2019 (National Treasury Secretariat, 2019), echoing 2007 levels. These shifts, combined with domestic monetary tightening, pushed the average cost of federal public debt from 11.3% in 2013 to 16.1% by late 2015 (National Treasury Secretariat, 2013; 2015). These changes reflected the Treasury's accommodation of its

investor base's liquidity preferences, with worsening liability structures acting as a disciplinary mechanism that made the cost of funding more sensitive to sovereign debt risk assessments.

Rating agencies played a crucial role in intensifying these pressures. The first downgrade of both domestic and foreign Brazilian government debt was issued by Standard and Poor's (S&P) in March 2014.[17] S&P directors linked the downgrade to the need for major reforms, including social security and tax reforms (Cowley, 2014). The country subsequently lost its investment grade and was downgraded to junk status by S&P on September 2015. This was justified by three consecutive years of primary deficits, compounded by a revision of the government's 2016 budget, which shifted from a 0.7% primary surplus to a 0.3% primary deficit (S&P, 2015). The loss of investment grade was described by Finance Minister Joaquim Levy as devastating for the private sector, and he argued it would "raise awareness" in Congress "about the need to meet more ambitious budget targets" (Leahy, 2015). In response, President Dilma Rousseff convened an emergency cabinet meeting to urgently address public spending cuts (Dias, Cruz, & Versiani, 2015). The immediate concern was capital flight, given the significant amount of government debt held by foreign investors (Leahy, 2015). Indeed, it was exactly after losing investment grade that in Q3 2015 the foreign investors started to decrease their participation as holders of the government debt (Figure 1.4). Other agencies, such as Fitch and Moody's, followed with additional downgrades, and further rating cuts continued until 2018.

As shown in Figure 1.5, sovereign risk assessments intensified sharply alongside these downgrades. The EMBI-Br, which measures risk attributed to the Brazilian economy via government bond spreads, spiked from 340 in August 2015 to 523 by December 2015.

[17]"The downgrade reflects the combination of fiscal slippage, the prospect that fiscal execution will remain weak amid subdued growth in the coming years, a constrained ability to adjust policy ahead of the October presidential elections, and some weakening in Brazil's external accounts" (S&P, 2014)

Despite efforts to regain market confidence by cutting public spending, the index continued to rise until the impeachment of centre-left President Rousseff, which began in late 2015 and concluded in August 2016. Her Vice-President, Michel Temer, assumed the presidency for the remainder of the term (2016–2018).

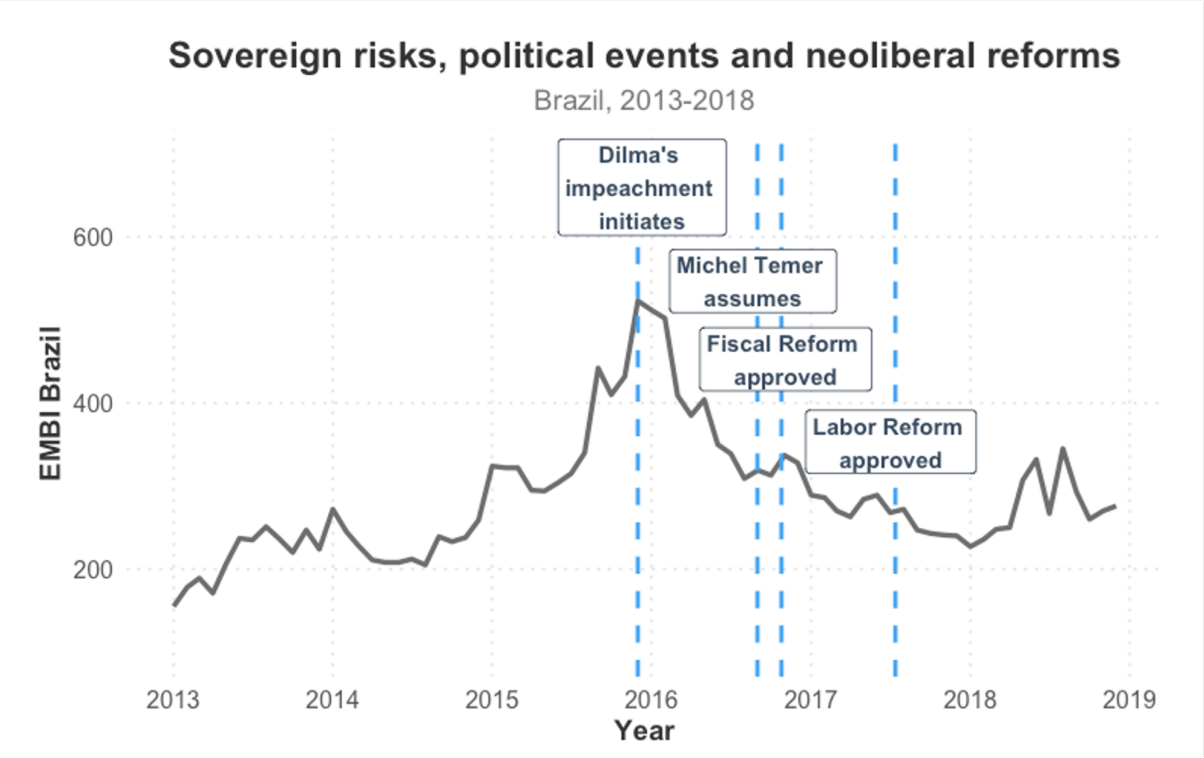

Figure 1.5. Sovereign risks, political events and neoliberal reforms. Data: Ipeadata.

Michel Temer represented the faction of the government allied with the centre-right, which was more inclined toward deeper neoliberal reforms. During his mandate, two important reforms were approved: the New Fiscal Regime and a labour law reform. The New Fiscal Regime amended the constitution to guarantee fiscal consolidation for the next 20 years by "freezing" primary expenditures in real terms.[18] The labour law reform eased the regulation of work contracts, aiming to increase "flexibility" in the labour market, and was presented as a measure to boost employment. These reforms failed to achieve their stated goals of promoting growth and reducing unemployment, and the economy remained trapped in stagnation (Arestis et al., 2022).

[18]Even in the context of growing revenues and GDP growth, government expenditure became limited by the previous year values corrected by inflation.

In conclusion, while the Brazilian Treasury aimed to reduce the vulnerability of its domestic currency and debt by actively developing financial markets, this approach also enhanced the effectiveness of sovereign risk assessments in influencing economic policy. This pressure, in turn, increased the fragility of sovereign debt, reinforcing its lower status in international hierarchies. Ultimately, this governance model facilitated the push for austerity and neoliberal reforms.

1.5.2. The Brazilian Central Bank's role in managing risks and reshaping subordination

The deep entanglement between the Brazilian state and financial markets also manifested itself in the exchange rate and monetary policy. The Brazilian Central Bank (BCB), while formally committed to an inflation target, played a key role in managing the additional risks associated with the domestic currency. During the crisis, the BCB was instrumental in enhancing liquidity in government debt markets, protecting against sudden stops by accumulating foreign reserves, and intervening in FX markets to hedge investors and prevent excessive volatility. The BCB's monetary policy, characterized by traditionally high interest rates, was often procyclical, counterbalancing the impact of exchange rate depreciation on inflation. As will be shown, these measures were closely related to government debt dynamics and contributed to the increasing pressure on the Brazilian state to improve its risk profile.

After 2004, the BCB accumulated huge foreign exchange reserves (Figure 1.6), a key feature of financial subordination, as previously described. This measure, intended to buffer against capital flow reversals, also contributed to a fragile public debt composition. Purchasing foreign currency required sterilization operations to maintain the interest rate target. In Brazil, monetary policy relies heavily on open market operations through repurchase agreements with treasury bonds, which are considered part of the public

debt.[19] Other mechanisms, such as compulsory and voluntary deposits or outright sales, are less significant for draining liquidity (Pellegrini, 2017). Since reserves were driven by short-term capital inflows, repo maturities shortened accordingly, transmitting this short-term orientation to the domestic economy (Painceira, 2010). As Figure 1.6 shows, this drove a significant rise in repurchase operations relative to GDP. The fiscal costs of this process are well-documented, given the interest rate differentials between low-yield reserves and high-yield liabilities (Kaltenbrunner & Painceira, 2018; Kappes, 2023).

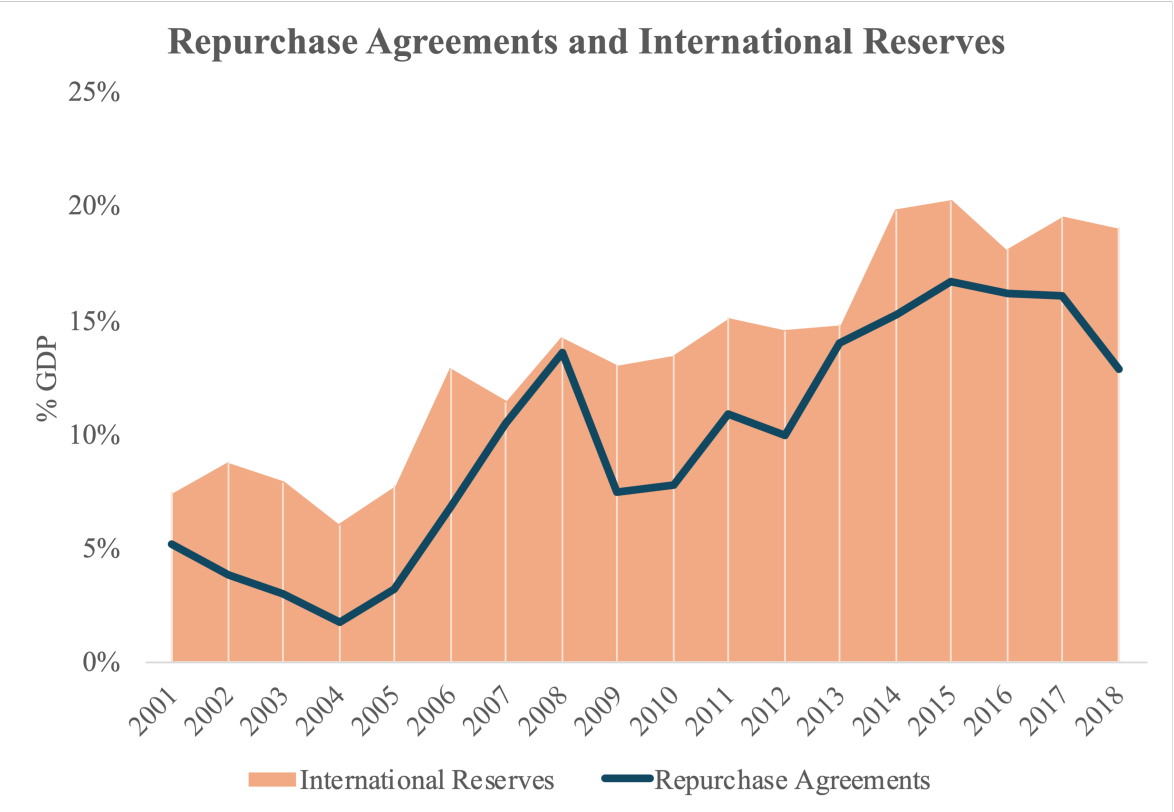

Figure 1.6. Repurchase agreements and international reserves. Data: Brazilian Central Bank.

Repurchase agreements in Brazil provide a safe, liquid, and profitable investment for financial markets, making them not only a monetary policy tool but also an opportunity for portfolio diversification to mitigate risk. These short-term sovereign debt instruments become particularly attractive during financial distress (Lopreato, 2008). It also

[19]It is worth emphasizing that the use of repos is widely conducted by central banks worldwide, but this instrument has acquired unusual importance in the Brazilian economy, even when compared with other emerging economies (Pellegrini, 2017).

contributes to explaining the rise in repos during the 2014–2016 period, showcasing the BCB's accommodative role in the face of increasing liquidity preference. Due to its short-term maturity, these operations worsened the debt composition during the period, adding further pressure on the government.

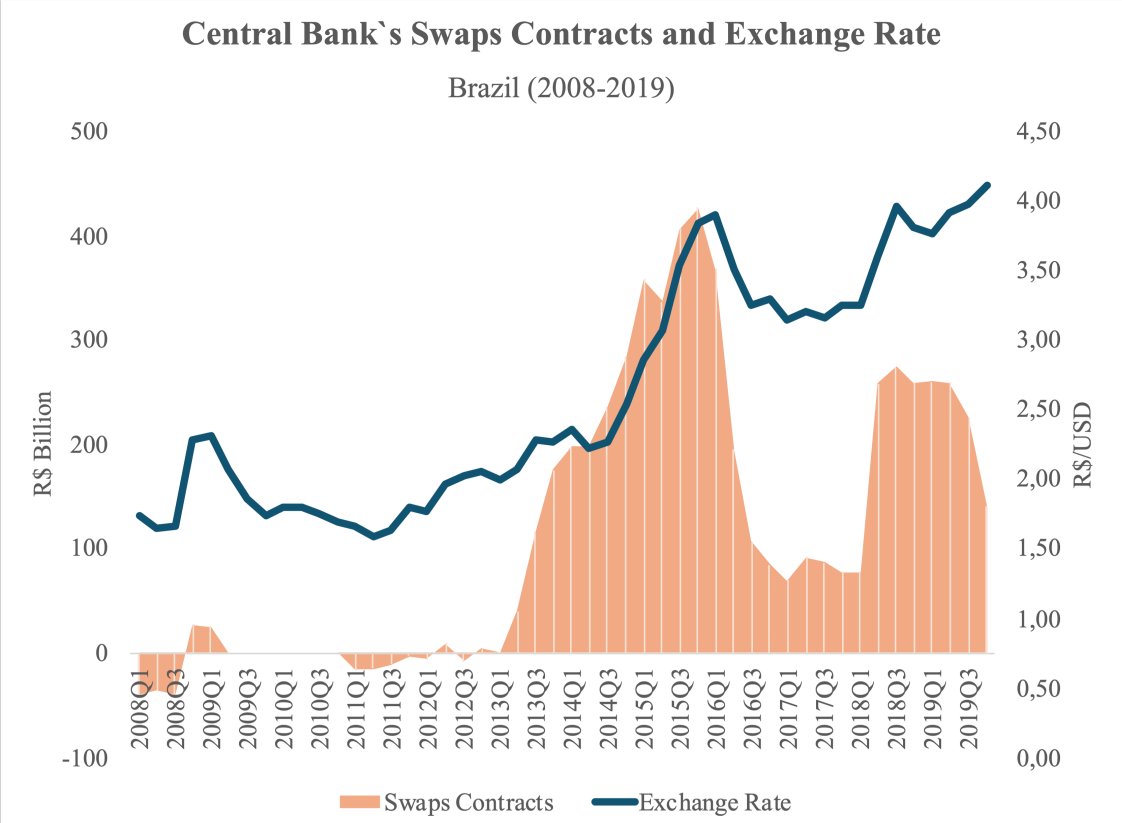

Figure 1.7. Central Bank Swap Contracts and Exchange Rate, Brazil (2008-2009). Data: Brazilian Central Bank.

Given the exchange rate depreciation pressures after 2013, the BCB also acted in FX markets to transfer exchange rate risk from financial markets to the state.[20] The BCB launched a non-deliverable forward FX swap program to hedge private agents against excessive volatility (Macalós, 2023). As shown in Figure 1.7, BCB swap contracts surged

[20]Before 2013, there were other important attempts to mitigate volatility in Brazil's foreign exchange markets. As illustrated by Alami (2019), the instabilities in the foreign exchange markets caused by the Global Financial Crisis led policymakers to become concerned with the potentially negative effects of speculation in FX markets. When there was still pressure for the appreciation of the Brazilian currency, measures such as taxes on the FX market were implemented (Alami, 2019). However, the decrease in capital inflows after 2013 and the attempts to offset it led to the removal of such measures, highlighting the asymmetries in economic policy autonomy along the financial cycle.

between 2013 and 2015, accompanied by sustained currency depreciation. These contracts allowed the BCB to absorb exchange rate risk in exchange for a premium paid by private participants. Settled in domestic currency, the swaps avoided direct foreign reserve depletion but required reserves to backstop potential losses. As illustrated in Figure 1.7, the number of swap contracts surged from 2013 to 2015, while the exchange rate continued to depreciate. Studies suggest these swaps effectively reduced private sector risk exposure (Chamon, Garcia, & Souza, 2017; Macalós, 2023), emphasizing the BCB's important role in managing currency risk.

However, these FX interventions carried underlying fragilities. The BCB incurred losses[21] equivalent to 1.7% of GDP in 2015, which were offset by capital gains on foreign reserves due to currency depreciation (Biancarelli, Rosa, & Vergnhanini, 2017; Macalós, 2023). Macalós (2023) highlights an important consequence of these losses: while reserve gains remained on the BCB's balance sheet, the losses were transmitted to the economy through payments to hedged agents, increasing reserves in commercial banks. To maintain the interest rate target, the BCB intervened once again through repurchase operations. As a result, FX swaps also contributed to inflating gross government debt and nominal deficits, deteriorating the public debt composition. These increases, often misattributed to fiscal laxity, actually stemmed from monetary interventions, yet still triggered market discipline pressures.

Another important consequence of FX swaps is that expanding these derivative markets without complementary regulations or capital controls may inadvertently fuel speculative attacks and increase currency volatility. As Musthaq (2023) notes, such interventions create moral hazard, "paradoxically encouraging investors to take greater risks". Macalós (2023) links Brazil's heightened exchange rate volatility (2012–2020) to

[21]These losses, despite being potentially harmful to the reputation of a peripheral country's central bank and policymakers, are liabilities incurred in domestic currency by the only institution that emits such a currency. Therefore, there are no issues of solvency involved.

this self-defeating feature. Additionally, Painceira (2010) argues that these interventions created incentives for domestic banks to raise funds abroad to engage in arbitrage between lower offshore interest rates and higher onshore U.S. dollar rates. By shielding markets from domestic currency risks, the BCB accommodated speculative demand, favouring arbitrage operations and allowing traders to bet without bearing the risk.

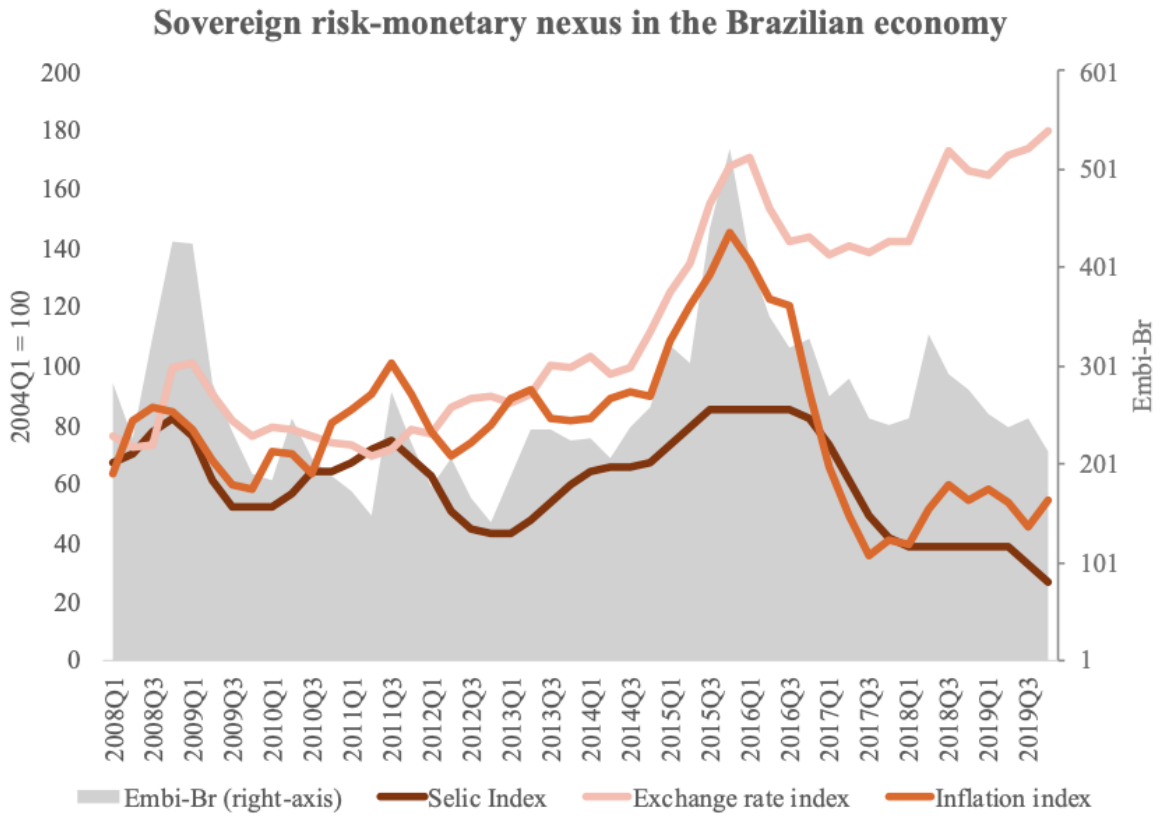

Figure 1.8. Sovereign risk-monetary nexus in the Brazilian economy. Data: Ipeadata and Brazilian Central Bank.

The attempt to offset increased risk assessments on domestic currency and debt, as well as their impact on domestic inflation, also affected conventional monetary policy. The domestic overnight interest rate rose sharply after 2013 (Figure 1.8), reflecting Brazil's financialisation hallmark – persistently high interest rates (Lavinas, Araújo, & Bruno, 2019; Bresser-Pereira, Paula & Bruno, 2020). Sovereign debt risk assessments may indirectly constrain monetary policy by affecting inflation through exchange rate movements. This illustrates the nexus between sovereign risk assessment, monetary policy, and exchange rate during 2014–2016 (Figure 1.8). According to the Brazilian

Central Bank (BCB, 2015), domestic prices evolved in line with risk assessments in 2015, and the exchange rate served as a transmission mechanism. In response, the BCB raised interest rates to mitigate the effects of exchange rate depreciation on domestic prices (BCB, 2015). In the years following the recession's peak, the magnitude of the recession likely explains why further exchange rate depreciation did not trigger inflation. The link between sovereign risk, exchange rate depreciation, and inflation added further pressure on the Treasury, as the higher interest rates increased funding costs due to the large share of interest rate-linked debt.

The BCB's efforts to manage currency risk, such as accumulating foreign reserves and engaging in FX swaps, ultimately created new vulnerabilities in the country's debt structure. The interplay between sovereign debt risk, exchange rate depreciation, and inflation became a key factor in shaping monetary policy. These measures led to higher interest rates and increased fiscal costs, which put further pressure on the government to attempt to improve its risk profile through austerity and structural reforms.

1.6. Conclusion

This article has further developed the concept of state financialisation, highlighting its manifestations in peripheral countries and demonstrating its concrete expressions in the case of the Brazilian economy. It has argued that state financialisation is rooted in a symbiotic relationship between the state and financial markets: while the state actively promotes the expansion and consolidation of financial markets, these markets, in turn, impose discipline on the state, steering it toward the deepening of neoliberal economic policies. In peripheral economies, this process is shaped by their subordinate position within the global hierarchy of currencies and sovereign debts.

The empowerment of financial markets by the state occurs through the latter's dependence on financial markets to achieve economic policy objectives. This article has demonstrated that governance through financial markets primarily operates via

government debt, which serves as a critical link between private and public finance in the implementation of monetary and fiscal policies. Conversely, sovereign risk pricing emerges as a key disciplinary mechanism imposed on states, a process that is influenced by each country's institutional framework – such as the relationship between the Treasury and the Central Bank – as well as its position within international financial and monetary hierarchies.

For peripheral countries, additional layers of risk – such as currency illiquidity in international markets and the solvency risk of external sovereign debt – shape governance through financial markets and amplify their disciplining power over peripheral states. To pursue monetary, fiscal, and exchange rate policy goals, these countries are deeply dependent on access to top-tier international currencies and assets, particularly the U.S. dollar and U.S. Treasury bonds.

This paper has illustrated how these dynamics manifested in the Brazilian economy. During the 2000s and 2010s, the engagement of the Brazilian Central Bank and Treasury with financial markets was shaped by the additional risks associated with the domestic currency and sovereign debt. In an effort to mitigate these vulnerabilities, the Brazilian state accommodated financial market interests, shielding them from those risks. The limitations of this mode of governance became evident following the reversal of the liquidity cycle in 2013. The financialisation of the Brazilian state enhanced the role of sovereign and currency risk assessments as disciplinary mechanisms, further reinforcing the country's neoliberal trajectory.

In summary, peripheral state financialisation reveals a dual dynamic: while accommodative governance through financial markets provides tools to manage the risks associated with domestic currency and debt, it simultaneously facilitates the discipline exerted by financial markets over the state. This discipline often drives countries toward neoliberal reforms, deepening financial fragility and stagnation, as exemplified by the Brazilian case. The findings suggest that overcoming financial subordination requires

peripheral states to move beyond passive and accommodative strategies in their interactions with financial markets. Future research should explore potential strategies that peripheral states could adopt to counteract financial subordination, such as regional monetary integration and capital flow controls.

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Chapter 2

New and Traditional Forms of External Financial Vulnerability

A Stock-Flow Consistent Approach

Abstract

This paper explores the varying patterns of external financial vulnerabilities in peripheral countries and their interconnection with foreign debt and its currency denomination. It critically engages with debates in the literature on how traditional forms of external vulnerability – linked to the 'original sin' – have evolved into new forms, related to the 'original sin redux'. I argue that the ability to borrow abroad in local currency does not represent a structural break in the patterns of external financial vulnerability in peripheral economies. These vulnerabilities remain structurally rooted in the monetary and financial hierarchies of the global system, while the interaction between the global financial cycle and domestic characteristics determines the specific forms they take. To analyse these dynamics, I develop a Stock-Flow Consistent model that investigates how shifts in foreign investors' liquidity preferences translate into external financial vulnerabilities, shaped by foreign debt dynamics and by the policy responses of the peripheral country. The model illustrates that increasing reliance on local-currency foreign debt gives rise to new channels of external vulnerability that may not only coexist with, but also feed back into, traditional ones. The results show that capital controls can stabilise investor behaviour and help to shield the domestic economy from foreign liquidity shocks.

2.1. Introduction

The currency denomination of foreign debt has long been understood in the literature both as a source of, and as a means of overcoming, external vulnerabilities. The inability to issue foreign debt in local currency has been identified as a fundamental source of external vulnerability for peripheral countries, their "original sin" (Eichengreen & Hausmann, 1999). In recent decades, many governments in peripheral economies have increased their foreign liabilities denominated in domestic currency, yet external vulnerability has remained a persistent reality. This issue is described by the literature on international financial subordination as a shift from traditional to new forms of external vulnerability (Kaltenbrunner & Painceira, 2015; Isaacs & Kaltenbrunner, 2018). More recently, the persistence of external vulnerability in cases where countries increasingly rely on foreign borrowing in local currency has been coined by BIS economists as "original sin redux" (Carstens & Shin, 2019; Hofmann, Patel & Wu, 2022).

This paper argues that the ability to borrow abroad in local currency does not represent a structural break in the patterns of external financial vulnerability of peripheral economies. Rather, it constitutes a new channel through which such vulnerabilities may manifest, a channel that may coexist with and feed back into traditional ones. The root cause of external vulnerabilities lies in global monetary and financial asymmetries that, under financial liberalisation, penalise peripheral countries. At the same time, the interplay between the global liquidity cycle and domestic characteristics shapes the specific manifestations of these vulnerabilities, determining whether they materialise predominantly in traditional or new forms. To analyse these dynamics, a Stock–Flow Consistent (SFC) model is developed, exploring the interconnections between the currency composition of foreign debt and the different channels through which changes in global liquidity preferences lead to external financial vulnerability. The model also analyses the impacts of different policy responses to the shock.

This article contributes to the literature in two main directions. First, it critically engages with the original sin and original sin redux debates and reinterprets the transformations underlying the currency composition of external liabilities in peripheral economies. Second, it develops a Stock-Flow Consistent (SFC) model to analyse how shifts in foreign investors' liquidity preferences translate into external financial vulnerabilities shaped by foreign debt dynamics, and how these fragilities interact with alternative policy responses by the peripheral country.

Building on the international financial subordination and currency hierarchy literatures, I reinterpret the persistence of external vulnerability in peripheral economies as a structural outcome of global monetary and financial asymmetries (Prates & Andrade, 2013; Kaltenbrunner & Painceira, 2018; Prates, Fritz & De Paula, 2023; Palludeto & Abouchedid, 2016). I argue that, even when peripheral economies increase the share of local-currency-denominated debt, their position at the bottom of the currency hierarchy persists, as their currencies and the assets denominated in them are demanded primarily as high-yield financial assets rather than for their monetary functions. My argument contrasts with the original sin redux framework and earlier versions of the original sin hypothesis, which emphasise the domestic characteristics of peripheral economies as the root causes of their external vulnerabilities (Eichengreen & Hausmann, 1999; Carstens & Shin, 2019; Hofmann, Patel, & Wu, 2022). Additionally, building on recent empirical work on the determinants of local-currency borrowing (Eichengreen et al., 2022; Devereux & Wu, 2022; Han, Lee, & Oh, 2024; Han, 2025), I argue that the specific forms that external vulnerabilities take depend on the interaction between the global liquidity cycle and domestic conditions.

In the heterodox literature, an attempt to model the consequences of both original sin and original sin redux has been made by Dvoskin and Torchinsky Landau (2024), who propose a Sraffian supermultiplier model to analyse the balance-of-payments constraints on fiscal and monetary policy in a small open economy. Their focus, however,

remains on how external vulnerabilities manifest through real channels, while the financial mechanisms leading to original sin and original sin redux, such as the negative feedback effects of devaluations on capital flows and the balance-sheet effects on the lenders' side, are absent.[22] Another important analytical effort is provided by De Paula et al. (2025), who illustrate the varying vulnerability channels associated with original sin and original sin redux in a schematic balance sheet representation, although the authors do not provide a model to capture their dynamics.

In the SFC modelling tradition, to the best of my knowledge, there are no models directly engaging with the OS-OSR debate. A few SFC models provide a useful foundation for this topic by considering economies that issue liabilities in both foreign and domestic currencies (Nalin et al., 2025; Nalin & Yajima, 2022; Bortz, 2014). However, the implications of foreign debt currency composition are treated only marginally rather than as a central focus of the analysis. A few models analyse the consequences of currency mismatches from the borrower's side in the case of foreign-denominated debt (Nalin et al., 2025; Nalin & Yajima, 2024), while vulnerability emerging from volatile demand for domestic currency assets is less explored. The model here developed builds on the approach of Bortz (2014) by assuming an endogenous currency composition of government debt that adjusts to investors' demand, while adopting more refined portfolio allocations that are substantially interconnected with exchange rate expectations. The latter is done by endogenizing the liquidity preferences of foreign investors regarding the assets issued by the peripheral country. It also contributes to the heterodox literature on exchange rate expectations modelling, adopting the division between chartist and fundamentalist traders (Lavoie & Daigle,

[22]In the model developed by Dvoskin and Torchinsky Landau (2024), a depreciation of the domestic currency has positive effects on reserve accumulation via the trade channel, and when debt is issued in domestic currency there is an additional positive effect of shrinking foreign debt when measured in foreign currency. The negative effects of a depreciation in further boosting capital outflows when foreign investors bear the exchange rate risk are not considered.

2011; De Grauwe & Grimaldi, 2006), and endogenizing the exchange rate target of fundamentalists, mostly considered exogenous in SFC models.

This article has four sections beyond the introduction. Section 2.2 consists of a literature review and some empirical features regarding new and old forms of external vulnerability; Section 2.3 develops the theoretical SFC model and simulation results; and Section 2.4 concludes.

2.2. Metamorphosis and Persistence of External Vulnerabilities

This section revisits the literature and presents empirical evidence on how the currency denomination of foreign debt is related to different manifestations of external vulnerabilities in peripheral economies. I argue that recent transformations, which enable some countries to issue a significant share of foreign debt in domestic currency, do not constitute a structural break in the external vulnerabilities they face. These vulnerabilities remain structurally rooted in the monetary and financial hierarchies of the global system, while the global financial cycle and its interaction with domestic characteristics determine the specific forms they take. As a result, new and traditional forms of external vulnerability not only coexist but the former may also feed back into the latter, depending on the interactions between the global financial cycle and the domestic context.

2.2.1. External Vulnerabilities and the Currency Composition of Foreign Debt

The currency denomination of foreign debt has long been identified in the literature both as a source of, and as a possible means of overcoming, external vulnerabilities and financial fragilities. This relationship was most notably conceptualised through the notion of original sin, coined by Eichengreen and Hausmann (1999, p. 3) to describe countries where "domestic currency cannot be used to borrow abroad or borrow long-term". The concept gained prominence among mainstream economists during the 1990s,

following episodes of financial distress and sovereign defaults in Latin America and other developing economies (Eichengreen, Hausmann & Panizza, 2002; Jeanne & Zettelmeyer, 2002). Financial fragilities emerge from debt denominated in foreign currency because it exposes indebted sectors to currency mismatches, making them susceptible to foreign shocks by increasing the debt stock and interest payments in local-currency terms.

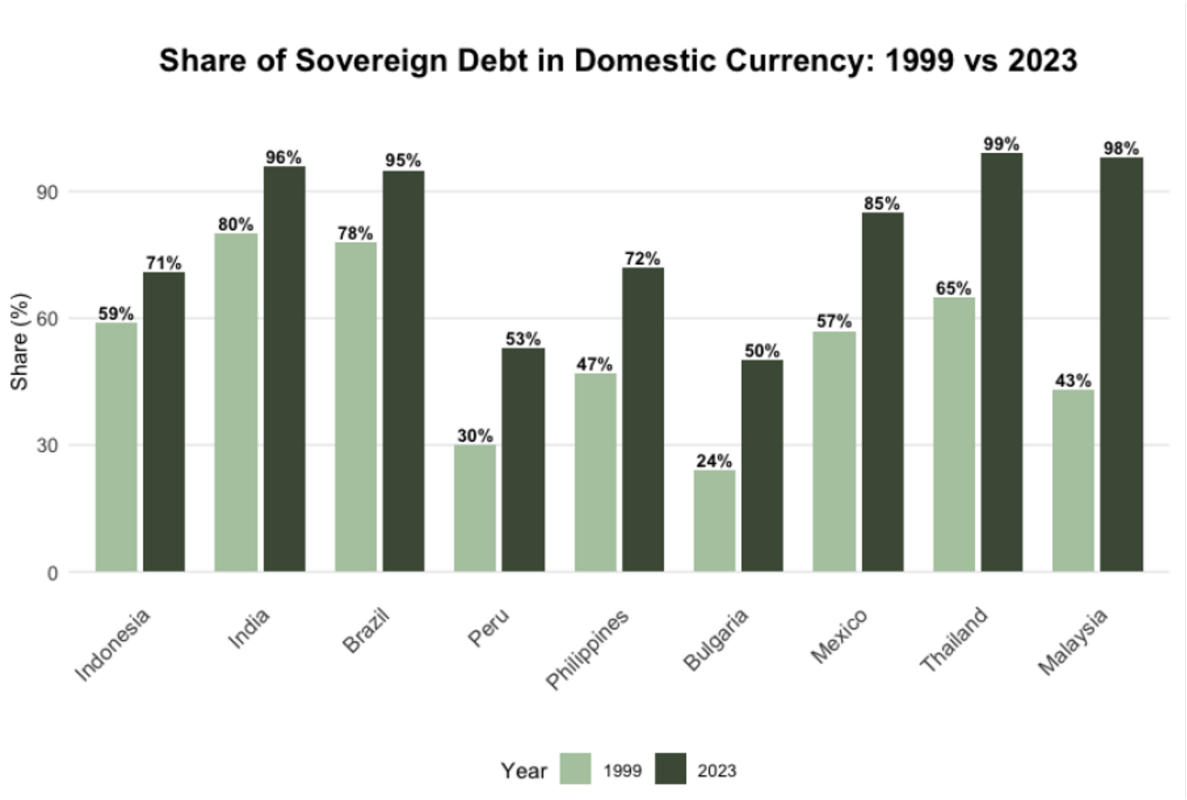

Figure 2.1. Share of sovereign debt in domestic currency, selected countries (1999 vs 2023). Data: IMF, Investor Base for Emerging Economies.

Since the 1990s, most peripheral economies have undergone significant transformations. Many have implemented financial liberalisation measures and privatisation programmes, accumulated foreign reserves, and deepened their domestic financial markets. The following decades were marked by the growing importance of sovereign debt denominated in local currency (Figure 2.1). At the same time, several countries enhanced their capacity to issue domestic-currency debt in foreign markets, particularly in the case of government liabilities (Bertaut, Bruno, & Shin, 2022). Conversely, the corporate sector in these countries has remained predominantly subject

to original sin, retaining a substantial share of foreign debt denominated in foreign currency (Du & Schreger, 2017). This transformation has been far from homogeneous, as some peripheral governments continue to face increasing external vulnerabilities through the original sin channel. Evidence of this process, as well as its heterogeneity across peripheral economies, is illustrated in Figure 2.2.

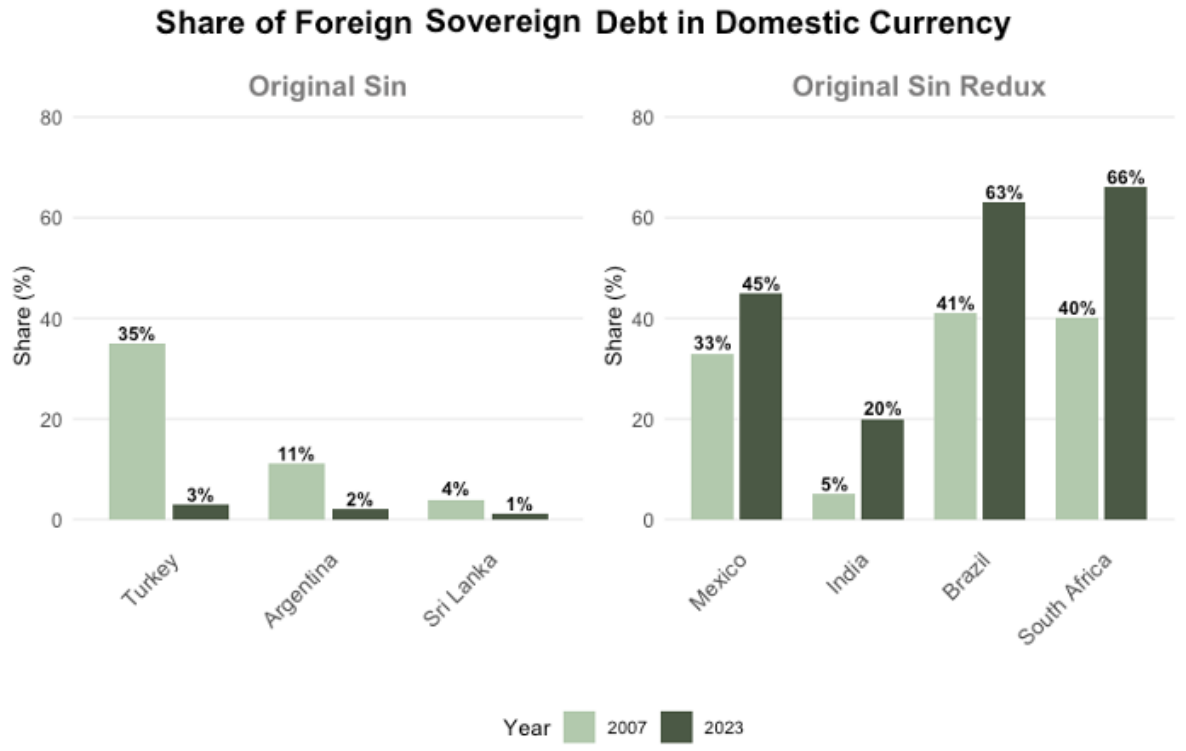

Figure 2.2. Share of foreign sovereign debt in domestic currency, selected countries (2007 and 2023). Data: IMF, Investor Base for Emerging Economies.

Countries whose governments significantly moved away from Original Sin – and thus reduced their exposure to traditional forms of external vulnerability – nonetheless remained vulnerable to foreign financial markets. The first attempts to analyse the persistence of external vulnerabilities in this new context were made by the international financial subordination literature (Kaltenbrunner & Painceira, 2015; Isaacs & Kaltenbrunner, 2018). These authors argue that such vulnerabilities arise from a shift in how developing and emerging countries interact with global financial markets. As foreign investors assume a larger role in domestic asset markets, exchange rate dynamics become

increasingly sensitive to global financial conditions. Because these investors bear exchange rate risk by holding local-currency assets, their portfolio decisions respond strongly to currency movements, creating a destabilising feedback loop between capital flows and exchange rates. Thus, the ability to issue local-currency debt has not eliminated external vulnerability but has introduced new channels of fragility, linked to procyclical capital flows that can lead to abrupt exchange rate depreciation in the presence of foreign shocks – as during the global financial crisis and the pandemic crisis (Figure 2.3). These dynamics undermine long-term expectations given uncertainty regarding the exchange rate path, depress asset prices in periods of capital outflows, and trigger procyclical policy responses, ultimately generating balance-sheet vulnerabilities across agents indebted in both domestic and foreign currency (Kaltenbrunner & Painceira, 2015; De Paula et al., 2025).

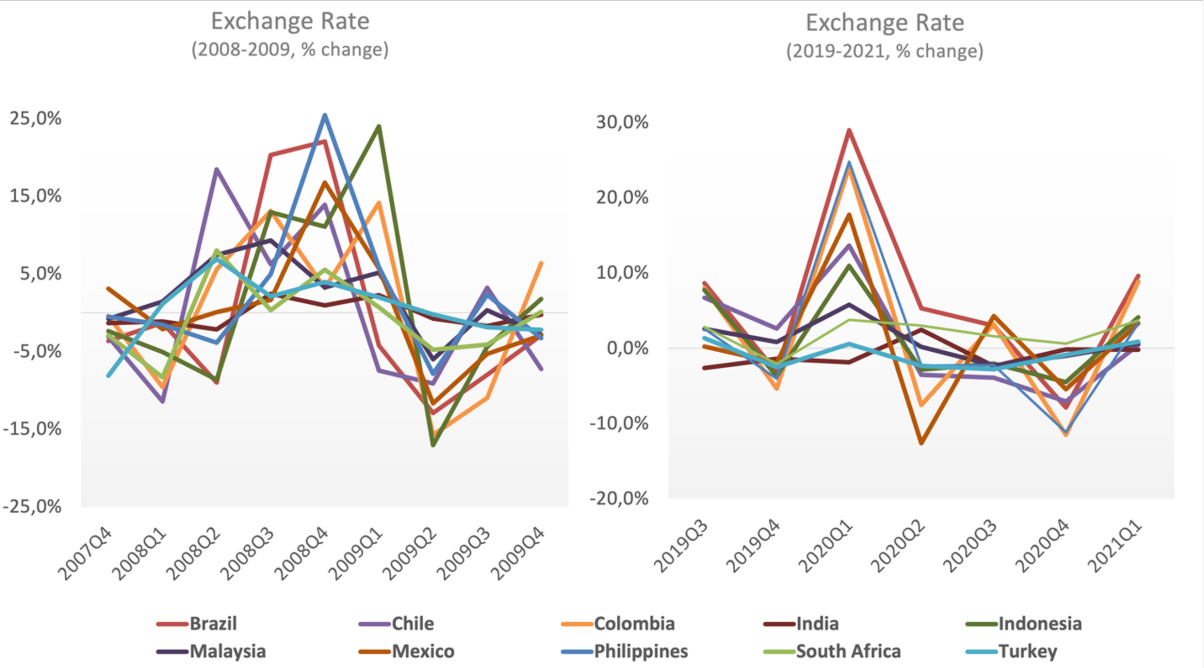

Figure 2.3. Exchange rate variation (%), selected countries (2008-2009 and 2019-2021). Data: IMF.

This phenomenon has recently gained broader recognition and has been labelled original sin redux by BIS economists (Carstens & Shin, 2019). Carstens and Shin (2019) argue that, despite the benefits of reducing foreign-currency debt, emerging economies remain vulnerable to global financial conditions because the currency mismatch has

shifted from borrowers to lenders. When global financial conditions deteriorate, exchange rate depreciation and falling bond prices prompt capital flight in a self-reinforcing cycle. Consistent with this mechanism, Bertaut, Bruno and Shin (2022) find empirical evidence that U.S. investors' holdings of emerging-market (EM) local-currency assets are more sensitive to dollar appreciation than their dollar-denominated positions. Consequently, EM governments issuing dollar-denominated bonds benefit from a more stable investor base, despite bearing exchange rate risk; in contrast, local-currency debt avoids exchange rate risk but faces more volatile capital flows (Bertaut, Bruno & Shin, 2023).

The perspectives of the original sin redux and of the international financial subordination literature describe similar mechanisms allowing external vulnerabilities to manifest in spite of an increasing ability to issue foreign debt denominated in local currency. Other questions on which the literature is less consensual - how far this transformation represents a structural rupture with traditional forms of external vulnerability (original sin), what its root causes are, and what policy responses it calls for - will be critically examined in the following sections.

2.2.2. The Root Causes of External Financial Vulnerabilities

To begin with, it is useful to understand how the mainstream literature has explained these vulnerabilities, starting with the original sin scholarship. Initial analyses by Eichengreen and Hausmann (1999, p. 36) attributed original sin to the "incompleteness of financial markets" and proposed potential solutions, such as dollarisation or the deepening of domestic financial markets. In particular, they suggested policies such as "privatizing social security systems to generate a broad constituency of domestic investors" (Eichengreen & Hausmann, 1999, p. 36). Subsequent empirical research within this strand of the literature marked a significant shift from this initial approach.[23]

[23]This relative shift of the focus on the causes of OS from the domestic economy to the structure of international financial markets generated dissensus in the mainstream, being criticized by authors as Reinhart, Rogoff, and Savastano (2003) and Goldstein and Turner (2003).

Hausmann and Panizza (2002) and Eichengreen et al. (2005a, 2005b, 2007, 2022) found that the absolute size of the economy was the only variable strongly associated with original sin. Other domestic factors, such as the depth of financial markets, the credibility of monetary policy, and fiscal solvency, did not display a robust statistical relationship with the phenomenon. These results suggest that "structural problems in international financial markets" play a role in these vulnerabilities, leading the authors to recommend "systemic solutions, such as ramping up international mechanisms that might enable such countries to better hedge their currency exposures" (Eichengreen et al., 2022, p. 4), including proposals for multilateral institutions to lend in local currencies (Eichengreen & Hausmann, 2005).

It is now relevant to analyse how the original sin redux literature, as another strand of the mainstream approach, examines the root causes of persistent external vulnerabilities, even in contexts where foreign debt is increasingly issued in local currency. Authors in this literature return to the initial explanation offered by Eichengreen and Hausmann (1999), which was later questioned by their more recent research (Eichengreen et al., 2005a, 2005b, 2007, 2022). According to BIS economists, emerging economies can mitigate original sin redux by developing "a large domestic institutional investor base," a goal to which "national pension systems" could contribute, citing the "progress" of the Chilean and Mexican pension systems, privatised in past decades, as successful examples (Carstens & Shin, 2019). This emphasis on expanding domestic financial markets is further reinforced by Hofmann, Patel and Wu (2022, p. 29), who argue that the "root cause" of emerging economies' vulnerability to foreign shocks "is the shallowness of EM financial markets," and therefore call for policies "that promote deep and liquid financial markets". These authors also stress the importance of broader domestic fundamentals, asserting that "developing countries need to build strong economic fundamentals if they are to benefit in a sustainable way from open global capital markets" (Carstens & Shin, 2019).

The conclusions of the original sin redux literature, which locate the root causes of external vulnerabilities within the domestic economy, reflect the theoretical foundations of this approach, grounded in loanable funds theory. This is especially evident in the DSGE model proposed by Hofmann, Patel and Wu (2022). In their framework, vulnerabilities associated with the original sin redux channel arise from the assumption that household deposits cannot exceed a fixed share of domestic banks' total liabilities. As a consequence, domestic financial intermediaries depend on foreign lending to supply credit. A monetary tightening in the advanced economy then leads to an exchange rate depreciation that decreases the net worth of foreign lenders, which reduces their credit supply to emerging market financial intermediaries. Given the shortage of domestic savings, it pushes emerging market borrowing rates up and asset prices down, internalising the shock in the domestic economy. As a consequence of this approach, the role played by the hierarchical structure of the global financial system is set aside, and long-term policy recommendations are restricted to measures that would further enlarge domestic financial markets. Other important economic policies, such as foreign exchange intervention and capital controls, assume only short-term importance in this framework.

The original sin redux argument emerges in a historical moment characterised by decades of reforms in most peripheral countries, driven by policy prescriptions consistent with these recommendations. These reforms included the expansion of domestic financial markets and the diffusion of financial innovations (Hardie & Rethel, 2018; Farhi & Borghi, 2009), as well as the privatisation of pension systems (Bonizzi and Guevara, 2019; Churchill, Bonizzi and Kaltenbrunner, 2021). Instead of overcoming external fragilities, financial innovations – such as the deepening of FX derivatives markets – encouraged speculative positions by domestic actors, generating new forms of financial fragility during episodes of abrupt exchange rate depreciation (Farhi & Borghi, 2009). The emergence of domestic pension funds, rather than helping to build a stable investor base, created a class of domestic institutional investors whose behaviour is also shaped

by the country's subordinated financial integration, often leading them to shift their portfolios towards foreign assets (Churchill, Bonizzi & Kaltenbrunner, 2021). Additionally, contrary to the mainstream diagnosis, pension privatisation also failed to boost domestic savings, and produced negative social effects (Bonizzi & Guevara, 2019).

The core object of the original sin redux literature is precisely the persistence of external vulnerabilities in a context shaped by these transformations, such as the enlargement of local-currency bond markets. Yet its argument suggests that the problem does not lie in the direction or the form taken by these reforms and policies, but rather that they were not implemented deeply enough. This marks an important difference between original sin redux and more recent developments of the original sin hypothesis, and, more fundamentally, from the theoretical explanations advanced in the heterodox literature on the topic. Even so, this distinction has largely been overlooked in recent heterodox engagements with the mainstream debate (De Paula et al., 2025; Dvoskin & Torchinsky Landau, 2024).

The heterodox literature on the currency hierarchy and on international financial subordination argues that external vulnerabilities are a consequence of the subordinated position of peripheral countries in global monetary and financial hierarchies (Prates & Andrade, 2013; Kaltenbrunner & Painceira, 2018; Prates, Fritz & De Paula, 2023; Palludeto & Abouchedid, 2016). Such fragilities are embedded in the historical particularities of contemporary capitalism, marked by the process of financial globalisation that emerged after the collapse of the Bretton Woods regime and the consolidation of the fiduciary dollar as the currency that best fulfils the functions of money internationally (Prates & Andrade, 2013; Palludeto & Abouchedid, 2016; De Conti, 2011). This configuration of the international monetary system – marked by free capital mobility, floating exchange rates and the fiduciary dollar as the key currency – is inherently fragile, and peripheral countries are particularly penalised by it, given the inability of their currencies to perform the functions of money internationally (Prates,

2005). As a consequence, these countries cannot use their currencies to borrow abroad (original sin) or are subject to highly speculative and procyclical foreign demand for their domestic assets (original sin redux).

Since external vulnerabilities are rooted in the currency hierarchy, and since this hierarchy depends on the ability of a currency to perform the functions of money internationally, it is important to clarify what drives currency internationalisation. De Conti, Prates and Philion (2014) argue that currency internationalisation is shaped by three factors: (1) the country's economic size and its degree of global trade and financial integration; (2) its geopolitical power, including its influence in bilateral relations and multilateral institutions; and (3) the state's strategic commitment to promoting the international use of its currency. Given that these determinants are structural and path-dependent, a currency's place in the hierarchy is highly inertial.

This does not mean that domestic factors are unimportant. On the contrary, the argument developed here – and further clarified in the next section – is that the interplay between the global financial cycle and domestic characteristics determines the specific form that external vulnerabilities take in each country. However, these vulnerabilities remain structurally rooted in the currency hierarchy, and its determinants fundamentally operate beyond the domestic economy, as highlighted by De Conti et al. (2014). Thus, there is no automatic, market-led path through which sound fundamentals or larger domestic financial markets translate into reduced external vulnerabilities.

As a consequence of this diagnosis, policy recommendations to overcome or minimise external vulnerabilities in the heterodox literature generally point in two directions. The first involves defensive measures designed to protect peripheral economies from the global financial cycle. The second calls for structural transformations in the domestic and international financial architecture, led by the state and by multilateral institutions. With respect to the first, capital controls and prudential financial regulation assume crucial importance. They should be broadly applied to residents and non-residents, to

financial and non-financial agents, and shaped by the specificities of each country (De Paula et al., 2025; Andrade & Prates, 2013). A further defensive strategy is the accumulation of foreign reserves and the use of foreign exchange interventions, which may reduce perceived exchange rate risk and secure access to foreign-currency liquidity (De Paula et al., 2017; Kaltenbrunner & Painceira, 2017), although they may also narrow the policy space available to pursue domestic macroeconomic objectives (Bonizzi et al., 2024). With respect to the second direction, regarding transformations in the domestic and international financial hierarchy, increasing importance is attributed to South–South financial and monetary cooperation (Mühlich & Fritz, 2021; Fritz et al., 2023), to increasing local-currency lending by multilateral development banks (Bonizzi et al., 2024), and to fostering state-led financial development aimed at building a stable investor base and ensuring the continued provision of credit at affordable rates (Churchill, Bonizzi & Kaltenbrunner, 2021; Fritz et al., 2018).

The emergence of new forms of external vulnerability has not occurred in spite of the expansion of local-currency bond markets, but precisely because this development has taken a specific form in peripheral economies, one shaped by global monetary and financial hierarchies. In the next section, it is further argued that these new forms of vulnerability do not mark a structural break from the periphery's previous patterns of subordination. Instead, they constitute additional channels (original sin redux) through which that subordination is reproduced, which may coexist with, and feed back into, traditional ones (original sin), depending on the interplay between the global financial cycle and domestic characteristics.

2.2.3. The role of the global financial cycle and its interplay with the domestic economy

As discussed in the previous section, external vulnerabilities are rooted in the position of peripheral currencies at the bottom of the currency hierarchy. To clarify why I argue that the new manifestations of external vulnerability do not represent a structural break

with traditional forms, it is necessary to further analyse the theoretical determinants of the currency hierarchy.

The literature on the currency hierarchy is based on the Keynesian approach to the "own rate of interest" (r_a) of an asset, which corresponds to its total expected return:

$$r_a = a + q - c + l$$

Where a represents the expected appreciation or depreciation of the asset, determined by exchange rate and price movements; q denotes the expected yield, derived from interest rates; c refers to the carrying cost, which captures the degree of capital flow regulation; and l stands for the liquidity premium of the asset. At the global level, l depends on the ability of the currency in which the asset is denominated to perform, at the international level, the three functions of money. (De Paula et al., 2017).

Accordingly, liquidity preference reflects a trade-off between the liquidity premium (l) and the monetary return ($a + q - c$) of a given asset (Andrade & Prates, 2013). Peripheral currencies, which can only marginally perform the international functions of money, exhibit a lower liquidity premium. It is precisely this lower liquidity premium that places them at the bottom of the international currency hierarchy. To attract foreign demand for their assets, these countries have to offer higher returns to compensate for their lower liquidity. Conversely, currencies at the top of the hierarchy – such as the U.S. dollar – enjoy a higher liquidity premium because they broadly perform global monetary functions, which sustains demand for assets denominated in them even in the presence of lower yields.

This dynamic is strongly shaped by the global financial cycle. During financial booms, global investors' preference for liquidity declines, and the liquidity premium (l) tends to play a diminished role in portfolio allocation decisions (De Paula et al., 2025). In this context, favourable interest rate differentials and expectations of capital gains increase demand for peripheral assets, leading to currency appreciation (a) that further reinforces

capital inflows. In downturns, however, investors place greater weight on liquidity, triggering a "flight to quality" that causes peripheral currency depreciation, asset price declines, and renewed capital outflows (De Paula et al., 2025).

The growing capacity of many peripheral countries to issue liabilities in local currency can be explained by two mechanisms: an increase in their liquidity premium (l), which would indicate a more structural improvement in a currency's position in the hierarchy; or a greater ability to offset their low liquidity premium by offering higher expected returns $(a + q - c)$.

According to Orsi et al. (2025), foreign demand for assets denominated in peripheral currencies is primarily speculative: it is driven by short-term financial incentives and higher yields, rather than by expectations of long-term monetary stability. This speculative demand reflects, I argue, the growing ability of peripheral currencies to function as money-capital at the global level, that is, their ability to valorise themselves in terms of the international money[24]. In other words, peripheral currencies are not being demanded by foreign investors because of their capacity to perform the traditional functions of money, but as financial assets (De Conti, Biancarelli & Rossi, 2013). Therefore, this growing speculative foreign demand does not break with the structurally low liquidity premia (l) of these currencies that keeps them at the bottom of the currency hierarchy (Orsi et al., 2025). Instead, this demand arises when peripheral countries successfully manage the trade-off between a low liquidity premium and higher expected returns $(a + q - c)$.

Peripheral countries can influence foreign demand for their assets by shaping expected returns through different channels. Especially relevant for foreign demand for local-currency assets is the ability to raise expectations of currency appreciation and to

[24]The argument of Orsi et al. (2025) is different from the one presented here. They argue instead that this speculative demand is based on the partial ability of peripheral currencies in perform money functions, specifically their ability of functioning as a store of value in the short-term.

stabilise expectations against sharp depreciation (a). Although the exchange rate path is largely driven by the global liquidity cycle, foreign investors also evaluate a country's capacity to limit abrupt depreciations, or the possibilities available to hedge exchange rate risk. Peripheral governments attempt to build this credibility by accumulating foreign reserves and by offering risk-sharing mechanisms, such as foreign exchange derivatives, and by committing to inflation-targeting regimes.

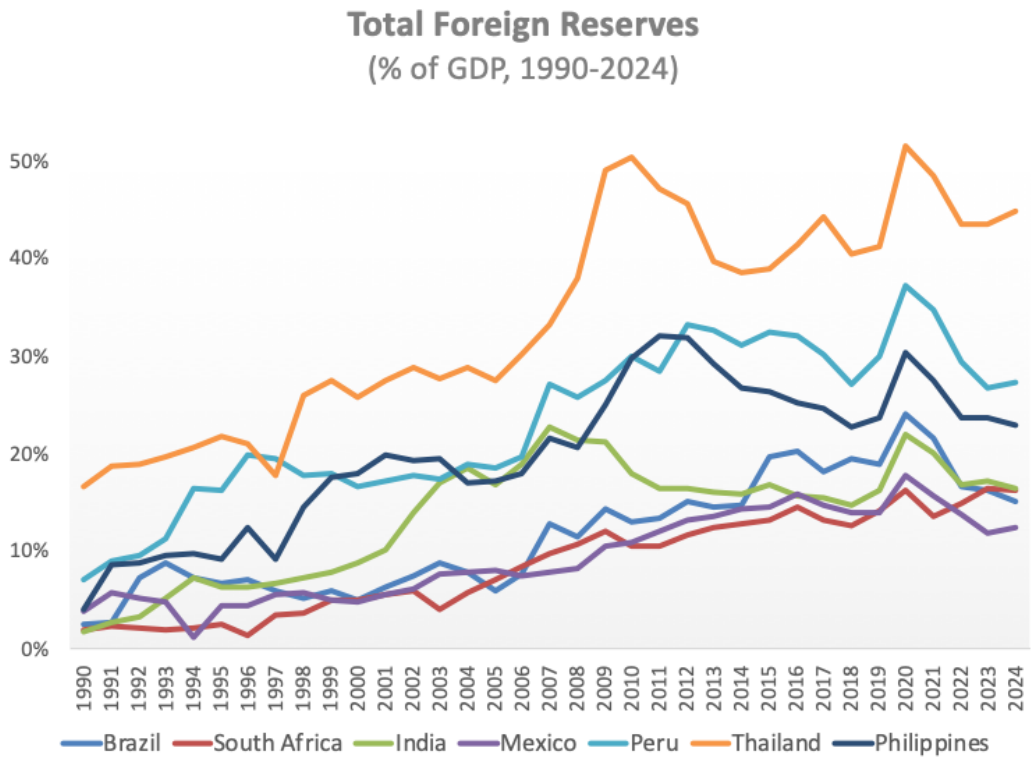

Figure 2.4. Total foreign reserves (% of GDP), selected countries (1990-2024). Data: World Bank.

As illustrated in Figure 2.4, in recent decades many peripheral countries have accumulated vast amounts of foreign reserves. There is significant consensus in the literature that reserve accumulation is an important precondition for foreign investors to demand assets denominated in local currency (Eichengreen et al., 2022; Devereux & Wu, 2022; Han, Lee & Oh, 2024; Han, 2025). Empirical studies link reserves to the rising share of local-currency borrowing by peripheral sovereigns, since reserves signal the ability to smooth abrupt depreciations (Eichengreen et al., 2022; Devereux & Wu, 2022). Therefore, reserve accumulation might contribute to increasing risk-adjusted expected

returns by decreasing perceived exchange rate risk, despite the carrying costs it implies (Akyüz, 2019).

The original sin and original sin redux literatures also highlight other measures that can support foreign demand for local-currency assets by reducing perceived exchange rate risk, including the development of foreign exchange derivatives and inflation-targeting regimes. According to Devereux and Wu (2022), adopting an inflation-targeting framework can help attract foreign investors by mitigating inflation-induced depreciation. Similarly, Eichengreen et al. (2022) suggest that monetary policy credibility – understood as commitment to the inflation target – is a necessary but insufficient condition to minimise original sin. Foreign exchange derivatives can also play a role in attracting foreign demand by offering hedges against currency exposures (Eichengreen et al., 2022).

These mechanisms, however, carry costs that reflect underlying external vulnerabilities. High interest rates and reserve accumulation deteriorate peripheral countries' net income balances, as high-yield liabilities are matched by low-yield assets (Akyüz, 2019). Inflation targeting can also generate vulnerabilities: during periods of rising global liquidity preference, domestic currency depreciation fuels inflation, prompting interest rate hikes that transmit external shocks inward (De Paula et al., 2025). When domestic agents are the counterparties in foreign exchange derivative markets, exchange rate risk is reabsorbed domestically, limiting the benefits of issuing foreign debt in local currency[25] (Eichengreen et al., 2022). In short, policies aimed at attracting foreign demand for local-currency assets involve trade-offs between bearing the currency mismatch and accepting new forms of external vulnerability.

[25]The position of domestic corporations betting on domestic currency appreciation in FX derivatives markets exposed countries like Brazil, Mexico, and South Korea to significant vulnerabilities during the global financial crisis (Farhi and Borghi, 2009).

Additionally, the ability of peripheral countries to attract foreign demand by offering higher risk-adjusted yields is heavily influenced by the global financial cycle. During downturns, rising liquidity preference among foreign investors increases the importance of the liquidity premium in portfolio allocation. As a result, foreign investors tend to shift away from peripheral assets, which offer low liquidity premia, towards safer assets denominated in top currencies, which offer higher liquidity premia. The impact is especially pronounced for local-currency assets, as expectations of depreciation further reduce their expected returns, which can lead to a reversal in the foreign-debt currency composition of peripheral countries. As shown in Figure 2.5, such a reversal occurred during the Covid-19 crisis in many peripheral countries, including Chile and Mexico, two success stories according to the original sin redux literature.

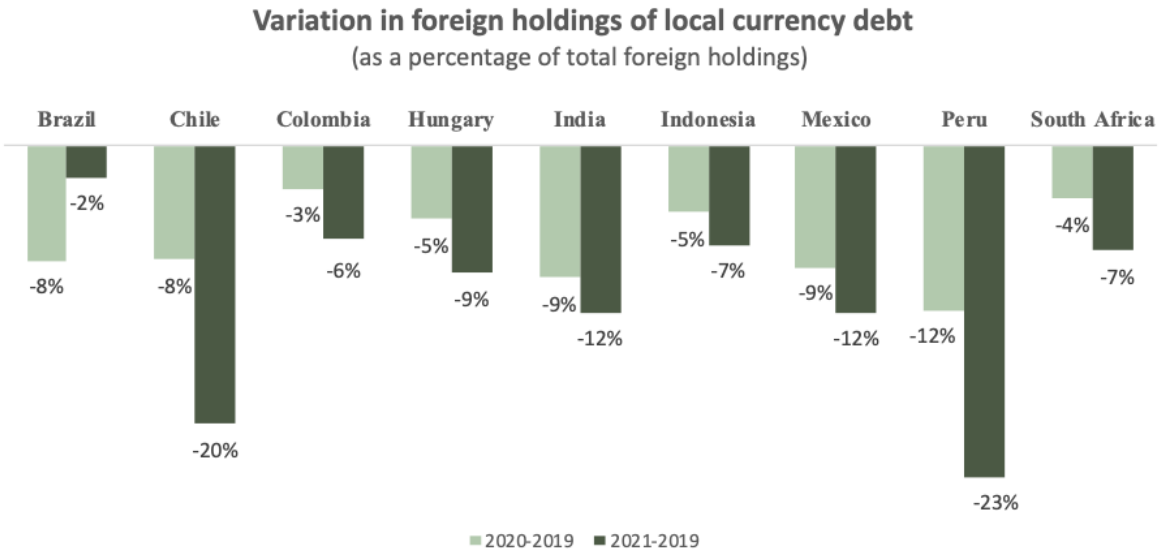

Figure 2.5. Variation in foreign holdings of local currency debt (as a percentage of total foreign debt), selected countries (2020-2019 and 2021-2019).

Therefore, peripheral countries face the greatest difficulty in accessing local-currency financing from foreign investors precisely when they need it most: during external shocks and episodes of currency depreciation. The growing ability to issue foreign debt in local currency, while ex ante reducing exposure to currency mismatches, introduces new forms of external vulnerability. These include, as I have argued, greater volatility in capital

flows and exchange rates, pressure on domestic asset prices, the fiscal cost of holding reserves, the internalisation of foreign shocks via interest rate hikes under inflation-targeting regimes, and the exposure of domestic agents in foreign exchange derivatives markets. Moreover, these vulnerabilities can feed back into and reinforce traditional channels of vulnerability associated with original sin during a reversal in the global liquidity cycle, increasing ex post exposure to currency mismatches. Foreign shocks often reverse the currency composition of external debt, even in governments that had previously relied significantly on local-currency borrowing (Figure 2.5). At the same time, this can worsen the situation for sectors that are structurally exposed to currency mismatches, often the case of the corporate sector (Du & Schreger, 2017), given the intense impact on exchange rate instability.

In sum, while external vulnerabilities are fundamentally rooted in the position of peripheral countries at the bottom of the currency hierarchy, their forms of manifestation vary depending on the interplay between the global financial cycle and the capacity of the peripheral domestic economy to make its currency a high-yielding asset for investors. As a consequence, new and traditional forms of external vulnerability not only coexist, but the former can also feed back into the latter, depending on how the global financial cycle interacts with domestic conditions. In the next sections, these dynamics will be analysed by developing a SFC model.

2.3. The OS-OSR Model

In this section, an SFC model is developed to analyse how shifts in foreign investors' liquidity preferences translate into external financial vulnerabilities, shaped by foreign debt dynamics and, in particular, by its currency composition.

The Original Sin–Original Sin Redux (OS-OSR) model is an SFC growth model of a peripheral open economy. The peripheral economy is composed of five sectors: Households (HH), Firms, Financial Sector (Fin), Government (Gov), and Central Bank

(CB). The RoW comprises two sectors: RoW Non-Financial (RoW N-Fin) and RoW Financial (RoW Fin). The model has a total of eight assets, seven of which are financial. The domestic economy issues government debt in both foreign and domestic currency, and the central bank accumulates international reserves by purchasing the foreign safe asset, while the RoW issues liabilities only in its own currency.

It is worth stating that the focus of the model is on external financial vulnerabilities and, for the sake of simplicity, the 'real-side' variables are modelled in a simplified way. This allows us to reduce the number of equations and to guarantee greater stability of the model, without compromising the analysis of external vulnerabilities that stem from financial channels.

2.3.1. Balance sheet and transaction flow matrices

Table 2.1 illustrates the balance sheet with the assets and liabilities of each sector.

	RoW N-Fin	RoW Fin	HH	Firms	Fin	Gov	CB	$\sum$
K Stock				$+Ka$				Ka
HPM			$+H\_h\_d$	$+H\_a\_d$	$+H\_b\_d$		$-H\_cb\_s$	0
Deposits	$+M\_fd \cdot xr\_p$	$-M\_fs \cdot xr\_p$	$+M\_h\_d$		$-M\_s$			0
Advances					$-A\_b\_d$		$+A\_cb\_s$	0
Bills safe	$-Bf\_s \cdot xr\_p$	$+Bf\_r\_d \cdot xr\_p$			$+Bf\_b\_d$		$+Bf\_cb\_d$	0
G Bills R$		$+GRS\_f\_r\_d \cdot xr\_p$			$+GRS\_b\_d$	$-GRS\_s$	$+GRS\_cb\_d$	0
G Bills $		$+GS\_f\_r\_d \cdot xr\_p$				$-GS\_s \cdot xr\_p$		0
Loans				$-LRS\_d$	$+LRS\_s$			0
Balance	$-V\_fg \cdot xr\_p$	$-V\_fr \cdot xr\_p$	$-V\_h$	$-V\_a$	$-V\_b$	$-V\_g$	$-NW\_cb$	$-Ka$
$\sum$	0	0	0	0	0	0	0	0

Table 2.1. Balance sheet matrix of the OS-OSR Model.

First, the variables that directly capture the new and traditional forms of external vulnerability assessed in the model will be highlighted.

The vulnerability associated with the original sin channel is illustrated in the row "G Bills $", representing peripheral government bills in foreign currency ($). In the case of

a flexible exchange rate regime, the devaluation of the domestic currency is a crucial channel that affects the domestic economy by inflating these liabilities on the balance sheet, since domestic governments bear the exchange rate risk. This reflects the currency mismatch problem, which increases, in domestic-currency terms, the value of total debt and the interest payments made by domestic governments and firms on such debt. In the case of a fixed exchange rate regime, this mechanism can be offset by a loss of international reserves. However, since the model focuses on a small peripheral economy with a fragile domestic currency, the loss of international reserves may itself become a channel of vulnerability, affecting expectations regarding the sustainability of the exchange rate peg.

The original sin redux channel is illustrated in the row "G Bills R$", representing peripheral government bills issued in domestic currency. Specifically, original sin redux arises from foreign investors' holdings of these liabilities ($GRS_f_r_d$). In this case, the currency mismatch caused by a depreciation of the domestic currency is borne by the rest of the world (RoW). The advantage of this local-currency debt is that domestic agents in the periphery do not bear the exchange rate risk on this liability, but fragility may still emerge indirectly due to RoW portfolio reallocation. Expectations of exchange rate depreciation during periods of higher liquidity preference may lead to a more intense reallocation of the RoW private sector portfolio, thereby exacerbating the depreciation of the peripheral currency or further depleting international reserves.

Another source of financial vulnerability explored in the model is captured by domestic demand for the foreign safe asset (Bf_b_d). Expectations of further domestic currency depreciation or an increase in liquidity preference within the domestic financial sector may trigger a reallocation of portfolios towards the foreign safe asset, which can also become a source of vulnerability.

The transaction flow matrix is illustrated in Table 2.2.

Table 2.2. Transaction flow matrix of the OS-OSR Model

	RoW N-Fin	RoW Fin	HH	Firms Cur	Firms Cap	Fin	Gov	CB	Σ
Consumption			$-C$	$+C$					0
Investment				$+I$	$-I$				0
Govt. Expenditures				$+G$			$-G$		0
Exports	$-IM\_f \cdot xr\_p$			$+X$					0
Imports	$+X\_f \cdot xr\_p$			$-IM$					0
Wages			$+WN$	$-WN$					0
Depreciation				$-Dep$	$+Dep$				0
Profits			$+Pi\_b$	$-Pi\_a$	$+Pi\_a$	$-Pi\_b$	$+Pi\_cb$	$-Pi\_cb$	0
Taxes	$+Tp\_f \cdot xr\_p$	$-Tp\_f \cdot xr\_p$	$-Tp\_h$			$-Tp\_b$	$+Tp$		0
Interests Deposits	$+r\_mf_{-1} \cdot M\_fd_{-1} \cdot xr\_p$	$-r\_mf_{-1} \cdot M\_fs_{-1} \cdot xr\_p$	$+r\_ma_{-1} \cdot M\_h\_d_{-1}$			$-r\_ma_{-1} \cdot M\_s_{-1}$			0
Interests Advances						$-r\_a_{-1} \cdot A\_b\_d_{-1}$		$+r\_a_{-1} \cdot A\_cb\_s_{-1}$	0
Interests Safe Asset	$-r\_bf_{-1} \cdot Bf\_s_{-1} \cdot xr\_p$	$+r\_bf_{-1} \cdot Bf\_r\_d_{-1} \cdot xr\_p$				$+r\_bf_{-1} \cdot Bf\_b\_s_{-1} \cdot xr\_p$		$+r\_bf_{-1} \cdot Bf\_cb\_s_{-1} \cdot xr\_p$	0
Interests GRS		$+r\_grs_{-1} \cdot GRS\_f\_r\_s_{-1}$				$+r\_grs_{-1} \cdot GRS\_b\_d_{-1}$	$-r\_grs_{-1} \cdot GRS\_s_{-1}$	$+r\_grs_{-1} \cdot GRS\_cb\_d_{-1}$	0
Interests GS		$+r\_gs_{-1} \cdot GS\_f\_r\_d_{-1} \cdot xr\_p$					$-r\_gs_{-1} \cdot GS\_s_{-1} \cdot xr\_p$		0
Interests Loan				$-r\_l_{-1} \cdot LRS\_d_{-1}$		$+r\_l_{-1} \cdot LRS\_s_{-1}$			0
ChCash			$-(H\_h\_d - H\_h\_d_{-1})$		$-(H\_a\_d - H\_a\_d_{-1})$	$-(H\_b\_d - H\_b\_d_{-1})$		$+(H\_cb\_s - H\_cb\_s_{-1})$	0
ChDep	$-(M\_fd - M\_fd_{-1}) \cdot xr\_p$	$+(M\_fs - M\_fs_{-1}) \cdot xr\_p$	$-(M\_h\_d - M\_h\_d_{-1})$			$+(M\_s - M\_s_{-1})$			0
ChAdv						$+(A\_b\_d - A\_b\_d_{-1})$		$-(A\_cb\_s - A\_cb\_s_{-1})$	0
ChSafeB	$+(Bf\_s - Bf\_s_{-1}) \cdot xr\_p$	$-(Bf\_r\_d - Bf\_r\_d_{-1}) \cdot xr\_p$				$-(Bf\_b\_s - Bf\_b\_s_{-1}) \cdot xr\_p$		$-(Bf\_cb\_s - Bf\_cb\_s_{-1}) \cdot xr\_p$	0
ChGRS		$-(GRS\_f\_r\_s - GRS\_f\_r\_s_{-1})$				$-(GRS\_b\_d - GRS\_b\_d_{-1})$	$+(GRS\_s - GRS\_s_{-1})$	$-(GRS\_cb\_d - GRS\_cb\_d_{-1})$	0
ChGS		$-(GS\_f\_r\_d - GS\_f\_r\_d_{-1}) \cdot xr\_p$					$+(GS\_s - GS\_s_{-1}) \cdot xr\_p$		0
ChLRS					$+(LRS\_d - LRS\_d_{-1})$	$-(LRS\_s - LRS\_s_{-1})$			0
Σ	0	0	0	0	0	0	0	0	0

2.3.2. Behavioural and accounting equations

Income, consumption, and wealth

Nominal disposable income (YD) and taxation (T_h) for households are determined as follows, where W denotes wages, $\mathrm{r}_{d(-1)}M_{h,d(-1)}$ interest income from households' deposits, Π_b the financial sector distributed profits, and θ_1 the tax rate:

$$YD = \left(W + \mathrm{r}_{ma(-1)}M_{h,d(-1)} + \Pi_b\right)(1 - \theta_1) \tag{2.1}$$

$$T_h = \theta_1\left(W + \mathrm{r}_{ma-1}M_{h,d(-1)} + \Pi_b\right) \tag{2.2}$$

Wages are determined by an exogenous wage share (ω_1):

$$W = \omega_1 Y \tag{2.3}$$

Households accumulate their wealth only in the form of deposits and High-Powered Money (HPM), and so their wealth is accumulated as the difference between disposable income (YD) and consumption (C):

$$V_h = V_{h-1} + YD - C \tag{2.4}$$

Households' demand for cash ($H_{h,d}$) evolves in proportion (ω_2) to the variation in net wealth:

$$H_{h,d} = H_{h,d(-1)} + \omega_2(YD - C) \tag{2.5}$$

Then, deposits demanded by households ($M_{h,d}$) can be calculated as a residual:

$$M_{h,d} = V_h - H_{h,d} \tag{2.6}$$

Domestic consumption is determined based on expected disposable income YDe, households' past wealth ($V_{h_{-1}}$), and propensities to consume out of income (α_1) and wealth (α_2):

$$C = \alpha_1 YDe_{-1} + \alpha_2 V_{h_{-1}} \tag{2.7}$$

The expected disposable income YDe is formed by the actual past value and a term that corrects past mistakes (with a speed of adjustment ω_c), as in Bortz (2014). In the model, the variable $risk_p$ (defined in eq. 2.26) is included as a determinant of expected disposable income, a variable that captures the degree of uncertainty about expected demand following past trends.

$$YDe = [YD_{-1} + \omega_c(YD_{-1} - YDe_{-1})].(1 - risk_p) \tag{2.8}$$

Income will be determined by sales minus imports:

$$Y = C + G + I + X - IM \tag{2.9}$$

Balance of payments

For the domestic economy, the current account (CAB), trade balance (TB), income balance (IB) and capital account (KAB) balances will be determined as follows:

$$CAB = TB + IB \tag{2.10}$$

$$TB = X - IM \tag{2.11}$$

$$IB = r_{bf(-1)} Bf_{b,s(-1)}.xr_p + r_{bf(-1)} Bf_{cb,s(-1)}.xr_p - r_{G\$(-1)} G\$_{f(-1)}.xr_p - r_{GR\$(-1)} GR\$_{f(-1)} \tag{2.12}$$

$$KAB = \Delta GR\$_f + \Delta G\$_f.xr_p - \Delta \mathrm{Bf}_{b,s}.xr_p \tag{2.13}$$

$$KABOSA = \Delta GR\$_f + \Delta G\$_f.xr_p - \Delta \mathrm{Bf}_{b,s}.xr_p - \Delta \mathrm{Bf}_{cb}.xr_p \tag{2.14}$$

The capital account $KABOSA$ also comprises central bank reserves, and therefore $KABOSA + CAB = 0$, following Godley and Lavoie (2012).

Trade

International trade is extremely stylized, and both exports and imports will evolve with the growth of the domestic economy (gy), following Singh (2021). While this represents a strong simplification, it allows for the isolation of the purely financial determinants of the exchange rate. A more detailed evaluation of international trade would require endogenizing both prices and the growth of the rest of the world, and show how changes in liquidity preferences interact with these variables. While this would be particularly important for long-term evaluations,[26] in the short term this plays a smaller role given the predominant importance of the financial channel of exchange rates (Carsten & Shin, 2019). Within this simplified framework, the trade balance as a share of GDP is exogenously determined, with imports and exports determined according to the following equations:

$$X = X_{-1}(1 + gy) \tag{2.15}$$

$$IM = IM_{-1}(1 + gy) \tag{2.16}$$

$$IM_f = X.xr_f \tag{2.17}$$

$$X_f = IM.xr_f \tag{2.18}$$

Firms: Investment

Investment will mostly respond to firms' expectations regarding aggregate demand. Equations (2.19)-(2.25) follow in part Carnevali et al. (2023), but while these authors

[26]Including trade into the picture could be important specially to analyse long-term effects in the light of foreign shocks, as a potential channel that in the long run could help to partially offset external financial vulnerabilities through a recovery in the trade balance. In the short run, however, impacts depend fundamentally on the deterioration of commodities prices that compromise trade balance despite of exchange rate devaluation, given the low price elasticity of exports in these countries (Dvoskin & Torchinsky Landau, 2024).

analyse the effects of climate change on investment, the present analysis focuses on the impacts of external financial vulnerability risks. Firms will invest given expected output growth:

$$I = h.E(Y) \tag{2.19}$$

$$h = [1 + h_0.(u - u_n)].h_{-1} \tag{2.20}$$

$$u = \frac{Y}{Ka}.v \tag{2.21}$$

$$Ka = Ka_{-1} + I - DA \tag{2.22}$$

$$DA = \delta.Ka \tag{2.23}$$

The expected outcome will follow a simple accelerator in moments when the variable $risk_p$ is zero, where $risk_p$ is a variable capturing the uncertainty that expected output will reproduce past trends.

$$\Delta Y = Y - Y_{-1} \tag{2.24}$$

$$\mathrm{E(Y)} = (Y_{-1} + \Delta Y_{-1})\big(1 - risk_p\big) \tag{2.25}$$

More specifically, the variable $risk_p$ captures the uncertainty that output will not reproduce past trends given external financial vulnerabilities. $risk_p$ can be affected by three forms of external financial vulnerabilities: one related to the evolution of foreign reserve accumulation (EV_R), a vulnerability that can be triggered by capital outflows from liabilities in both foreign and local currency; the second one has to do with the emergence of vulnerabilities attached to currency mismatch (EV_{CM}), more directly linked to the original sin channel; and the last one (xr_{risk}) captures the impact of past exchange rates instabilities, which is directly linked to both original sin and original sin redux channels. The variable $risk_p$ responds to these measures of external vulnerabilities at a speed β_p:

$$risk_p = risk_{p-1} + \beta_p[\,(\alpha_j . EV_R + \alpha_f . EV_{CM} + \beta_{xr} . xr_{risk}) - risk_{p-1}] \quad (2.26)$$

In equation 2.26, parameters α_j and α_f are dummy variables, while β_{xr} is an exogenous sensitivity parameter. When external vulnerabilities are of a relatively low magnitude, expected output will tend to evolve in line with past trends (α_j and $\alpha_f = 0$) if past exchange rates instability (xr_{risk}) is low, but when external financial conditions are critical, expected output can be substantially negatively affected (α_j and $\alpha_f = 1$) by domestic financial conditions that might also be interconnected with growing exchange rate instabilities. More explicitly, EV_R will affect expected output if the reserves-to-GDP ratio fall below an exogenous threshold j; and EV_{CM} will impact expected output if government debt in foreign currency grows above an exogenous threshold f during moments of significant exchange rate instability ($xr_{risk} > \Omega$):

$$\alpha_j = 1 \text{ if } \frac{Bf_{cb,d-1}}{Y_{-1}} < j \text{ otherwise } \alpha_j = 0 \quad (2.27)$$

$$\alpha_f = 1 \text{ if } \frac{G\$_{f,d(-1)} . xr_p}{Y_{-1}} < f \text{ and } |xr_{risk}| > \Omega \text{ otherwise } \alpha_f = 0 \quad (2.28)$$

External vulnerabilities emerging from the evolution of foreign reserve accumulation (EV_R) will be determined according to eq. 2.29. EV_R will increase when reserves as a share of GDP ($\frac{Bf_{cb,d-1}}{Y_{-1}}$) fall below an exogenous threshold j, with sensitivity determined by parameter β_j:

$$EV_R = \beta_j \frac{\left(j - \frac{Bf_{cb,d-1}}{Y_{-1}}\right)}{j} \quad (2.29)$$

The intuition here is that the loss of foreign reserves as a share of GDP below an exogenous threshold j signals to the private sector that the government may adopt recessionary measures in the future - such as expenditure cuts or interest rate hikes - to offset the loss of foreign reserves. The peripheral state seeks to accumulate foreign

reserves because they serve as insurance for foreign investors, reassuring them of the government's capacity to withstand speculative attacks on the currency, as empirically demonstrated by Devereux and Wu (2022).

External vulnerabilities emerging from currency mismatch will be determined by eq. 2.30. EV_{CM} can increase when foreign debt denominated in foreign currency grows above a threshold f:

$$EV_{CM} = \beta_f \frac{\left(\frac{G\$_{f,d(-1)}.xr_p}{Y_{-1}} - f\right)}{f} \tag{2.30}$$

The intuition regarding eq. 2.30 is similar to the previous case. An increase in foreign debt denominated in foreign currency (as a share of GDP) above a threshold f can signal to the private sector a currency mismatch problem and therefore indicate that the government might pursue recessionary policies aiming to decrease foreign currency debt levels or minimize exchange rate depreciation. Parameter β_f reflects the intensity with which these economic fundamentals translate into uncertainty regarding output growth.

Regarding the third vulnerability channel ($\beta_{xr}.xr_{risk}$), it captures the effect of exchange rate instability on long-term expectation formation, which are particularly harmful to investment decisions in a Keynesian framework, in line with Kaltenbrunner and Painceira (2014). The perceived exchange rate risk has a 'memory' component and evolves as a weighted average of its past value and the most recent variation in the exchange rate ($dxr_{f_{-1}}$), considering a minimal trigger (Ω), with ρ_2 representing the degree of persistence of risk perception:

$$xr_{risk} = \rho_2.xr_{risk_{-1}} - (1-\rho_2).dxr_{f_{-1}}.\alpha_{xr} \tag{2.31}$$

$$\alpha_{xr} = 1 \; if \; \left|dxr_{f_{-1}}\right| > \Omega, \text{otherwise } \alpha_{xr} = 0$$

Firms: other equations

From the transaction flow matrix column, firms' profits (Π_a) will be:

$$\Pi_a = Y - W - Dep - r_{l(-1)} LR\$_{d(-1)} \tag{2.32}$$

Firms' net worth V_a will be equal to accumulated profits:

$$V_a = V_{a(-1)} + \Pi_a \tag{2.33}$$

Firms will rely on domestic loans to cover their financial requirements (principal of loans and investments not covered by past profits and depreciation allowance, similarly to Bortz (2014). When profits and depreciation are higher than financial requirements, firms will increase cash holdings:

$$LR\$_d{}^N = LR\$_{d-1} + I - \Pi_a - Dep \tag{2.34}$$

$$LR\$_d = LR\$_d{}^N . (1 - \alpha_L) \tag{2.35}$$

$$H_{a,d} = H_{a,d-1} - LR\$_d{}^N . \alpha_L \tag{2.36}$$

$$\alpha_L = 0 \; if \; LR\$_d{}^N > 0, otherwise \; \alpha_L = 1$$

Government

Government budget constraint is determined following the transaction flow matrix column. The government issues debt in domestic currency ($GR\$_s$) depending on government expenditures net of taxes ($G - T_p$), interest payments in debt in foreign and domestic currency, central bank's profits ($\prod cb$) that are fully distributed to the government, and the variation in government debt in foreign currency ($\Delta G\$$), similarly to Bortz (2014):

$$GR\$_s = GR\$_{s(-1)} + G - T_p + r_{gR\$(-1)} GR\$_{s(-1)} + r_{g\$(-1)} G\$_{(-1)} . xr_p - \prod cb - \Delta G\$. xr_p \tag{2.37}$$

It is assumed that government expenditure grows at an exogenous rate:

$$G = G_{-1}.(1 + r_g) \tag{2.38}$$

Government net worth V_g will evolve depending on the supply of government debt and also on capital gains cg_g from exchange rate movements:

$$V_g = V_{g_{-1}} - \left(GR\$_s - GR\$_{S_{-1}}\right) - \left(G\$_s - G\$_{S_{-1}}\right).xr_p - cg_g \tag{2.39}$$

$$cg_g = G\$_{S_{-1}}.(xr_p - xr_{p_{-1}}) \tag{2.40}$$

The supply of government bonds to each sector adjusts to demand:

$$GR\$_{b,s} = GR\$_{b,d} \tag{2.41}$$

$$G\$_s = G\$_{f,d} \tag{2.42}$$

$$GR\$_{s,f} = GR\$_{f,d}.xr_p \tag{2.43}$$

Central Bank

CB profits are determined by past interest income on advances A_{cb}, on foreign reserves Bf_{cb} and on domestic government debt $GR\$_{cb}$:

$$\pi_{cb} = r_{a(-1)}A_{cb(-1)} + r_{bf(-1)}Bf_{cb\,(-1)}.xr_p + r_{GR\$(-1)}GR\$_{cb\,(-1)} \tag{2.44}$$

CB provides advances to banks on demand:

$$A_{cb,s} = A_{b,d} \tag{2.45}$$

CB net wealth will evolve according to capital gains resulting from exchange rate movements given reserve accumulation:

$$NW_{CB} = NW_{CB_{-1}} + cg_{CB} \tag{2.46}$$

$$cg_{CB} = Bf_{cb\,(-1)}.(xr_p - xr_{p_{-1}}) \tag{2.47}$$

The domestic central bank cleans the market for the domestic currency government debt, and the money supply adjusts to the demand:

$$GR\$_{cb,d} = GR\$_{s} - GR\$_{b,d} - GR\$_{f,d}.xr_{p} \quad (2.48)$$

$$GR\$_{cb,s} = GR\$_{cb,d} \quad (2.49)$$

$$H_{cb,d} = H_{b,d} + H_{h,d} + H_{a,d} \quad (2.50)$$

$$H_{cb,s} = H_{cb,d} \quad (2.51)$$

At the same time, the CB's demand for $GR\$$ must also meet the condition for the CB's transaction flow matrix to sum to zero:

$$GR\$_{cb,d1} = GR\$_{cb,d_{-1}} + \Delta \mathrm{H}_{\mathrm{cb,s}} - \Delta \mathrm{A}_{\mathrm{cb,s}} - \Delta Bf_{cb,s}.xr_{p} \quad (2.48.1)$$

The above equation is not included in the model, but it must satisfy the equality $GR\$_{cb,d1} = GR\$_{cb,d}$ to guarantee the coherence of the model.

Interest rates

Given that the exogeneity of interest rates is a well-established feature in SFC modelling (Godley & Lavoie, 2012; Bortz, 2014), and that it also contributes to model simplification –enabling the simulation of monetary policy shocks – interest rates are assumed to be fully exogenous in the model. The model has the following exogenous interest rates: r_{bf}, $r_{LR\$}$, $r_{CR\$}$, $r_{C\$}$, $r_{GR\$}$, $r_{G\$}$, r_{a}, r_{ma} (respectively, interest on the safe asset; interest on domestic loans; interest on domestic currency corporate bills; interest on foreign currency corporate bills; interest in domestic currency government debt; interest on foreign currency government debt; interest on CB's advances).

RoW Non-Financial

From the transaction flow matrix, the RoW Non-Financial budget constraint implies that the supply of the Foreign Safe Asset will respect the following identity:

$$Bf_s = Bf_{s(-1)} + IM_f - X_f - \Pi_f + r_{bf(-1)}.Bf_{s(-1)} - r_{mf_{-1}}.M_{fd_{-1}} + \Delta M_{fd} \quad (2.52)$$

From the Balance Sheet column, the RoW Government net worth V_{fg} will be:

$$V_{fg} = -Bf_s + M_{fd} \quad (2.53)$$

It is assumed that RoW deposits will grow at an exogenous rate:

$$M_{fd} = M_{fd_{-1}}.(1 + rg_{mf}) \quad (2.54)$$

$$M_{fs} = M_{fd} \quad (2.55)$$

RoW Financial

The RoW Financial sector profits will evolve with net interest income:

$$\Pi_{fr} = r_{bf_{-1}}.Bf_{f,d_{-1}} + r_{GR\$}.GR\$_{f,s_{-1}}.xr_f + r_{G\$}.G\$_{f,s_{-1}} - r_{mf_{-1}}.M_{fs_{-1}} \quad (2.56)$$

Net wealth will be determined by profits Π_{fr} net of distributed profits Π_f and by capital gains:

$$V_{fr} = V_{fr_{-1}} + \Pi_{fr} - \Pi_f + gr_{fr} \quad (2.57)$$

$$gr_{fr} = GR\$_{f,s_{-1}}.(xr_f - xr_{f_{-1}}) \quad (2.58)$$

Wealth to be invested in the financial assets (V_{fr1}), will be:

$$V_{fr1} = V_{fr} + M_{fs} \quad (2.59)$$

The supply of the safe asset to the RoW Financial sector will accommodate the demand:

$$Bf_{r,s} = Bf_{r,d} \quad (2.60)$$

RoW Financial Portfolio Allocation

Portfolio allocation in SFC models is usually defined by "Tobinesque" principles, which are based on Tobin's contributions to the determinants of portfolio choice (Tobin,

1969). These principles imply that the proportion of wealth held in any particular asset is determined by the rate of return on that asset compared to the return on other assets (Godley & Lavoie, 2012). Building on this tradition, the model incorporates extensions to these equations in order to more accurately capture differences in foreign investor demand between safe and peripheral assets, as well as between peripheral debt denominated in domestic and foreign currency.

The RoW Financial sector can allocate its wealth V_{fr1} to the safe asset ($Bf_{f,d}$), to foreign government debt in the currency of the issuer ($GR\$_{f,d}$) and to peripheral government debt in their own RoW currency ($G\$_{f,d}$).

For the RoW private sector these are the portfolio allocation equations:

$$Bf_{f,d} = V_{fr1}.\left(\lambda_{10} + \lambda_{11}r_{bf} - \lambda_{12}(r_{GR\$} + dxr_f^{\,e}) - \lambda_{13}r_{G\$}\right) \quad (2.61)$$

$$GR\$_{f,d} = V_{fr1}.\left(\lambda_{20} - \lambda_{21}r_{bf} + \lambda_{22}(r_{GR\$} + dxr_f^{\,e}) - \lambda_{23}r_{G\$}\right) \quad (2.62)$$

$$G\$_{f,d} = V_{fr1}.\left(\lambda_{30} - \lambda_{31}r_{bf} - \lambda_{32}(r_{GR\$} + dxr_f^{\,e}) + \lambda_{33}r_{G\$}\right) \quad (2.63)$$

The portfolio allocation will, therefore, depend on all the exogenous interest rates, on the endogenous expectations regarding the exchange rate, and on the parameters λ_{xy} and λ_{x0}. The parameters λ_{xy} must respect logical constraints as described in Godley and Lavoie (2012): they must sum to zero within each row and column of the equations and be symmetric (λ_{xy}= λ_{yx}). The parameters λ_{x0} must sum up to 1 and they capture the liquidity preference, which gives the share of each asset that would be held in case of equal expected returns.

It is worth emphasizing how this portfolio allocation relates to the "own rate of interest" (r_a) of an asset (Section 2.2.3). Parameters λ_{x0} are related to the liquidity premium (l) of each asset, adjusted by the liquidity preference of investors. The expected return of the asset depends on interest rate differentials (q) and expectations on exchange rate variation (a), which are both captured by parameters λ_{xy} in the

interaction with interest rates (e.g., r_{bf}) and exchange rate expectations ($dxr_f{}^e$). Carrying costs are assumed to be zero (c).

Parameters λ_{x0} are assumed to be exogenous in the SFC literature. The model innovates by endogenizing λ_{x0} in the following way. First, the preference for holding the asset Bf will be positively impacted by the risk aversion of foreign investors ($risk_f$), given its higher liquidity premium, and the speed of adjustment of the portfolio is α_{r1}:

$$\lambda_{10} = \lambda_{10(-1)} + \alpha_{r1}\left(risk_f - \lambda_{10(-1)}\right) \tag{2.64}$$

The sum of all λ_{x0}'s must always be equal to 1 (Godley & Lavoie, 2012). Therefore, the following identity must apply:

$$1 = \lambda_{10} + \lambda_{20} + \lambda_{30} \tag{2.65}$$

The preference to hold $GR\$_{r,d}$ (λ_{20}) is determined by a share sp, while the preference for holding $G\$_{r,d}$ (λ_{30}) will be determined by $(1 - sp)$, guaranteeing that the λ_{x0} parameters sum to 1:

$$\lambda_{20} = sp(1 - \lambda_{10}) \tag{2.66}$$

$$\lambda_{30} = (1 - sp)(1 - \lambda_{10}) \tag{2.67}$$

The share sp evolves as the outcome of two components: a gradual adjustment toward an exogenously defined preference, sp_t, and an endogenous term driven by past exchange-rate dynamics (eq. 2.68). The exogenous component captures the influence of exogenous determinants of investor preferences for the currency denomination of debt – e.g. the development of foreign exchange derivatives markets, the depth of domestic currency financial markets, etc. The second component reflects sensitivity to exchange-rate risk, represented by the variable xr_{risk}, already defined previously (eq. 2.31):

$$sp = sp_{-1} + \rho_1(sp_t - sp_{-1}) - \alpha_{xr}.xr_{risk} \tag{2.68}$$

$$xr_{risk} = \rho_2.xr_{risk_{-1}} - (1 - \rho_2).dxr_{f_{-1}} \tag{2.31}$$

$$dxr_f = xr_f - xr_{f_{-1}} \tag{2.69}$$

$$dxr_P = -dxr_f \tag{2.70}$$

Variable xr_{risk} will increase with the past depreciation of the peripheral currency ($dxr_{f_{-1}} < 0$), and therefore decrease the share sp and through it impact the liquidity preferences λ_{20} and λ_{30}. The intuition here is that past exchange rate depreciations make investors less prone to bear currency risk, decreasing the share of their emerging economy portfolio to be denominated in their own currencies. Conversely, xr_{risk} will decrease during moments of past appreciations in the peripheral currency ($dxr_{f_{-1}} > 0$), illustrating that agents are less risk-averse to exchange rate movements during moments of appreciation of the peripheral currency.

This modelling of liquidity preference is in line with evidence showing that external factors (as $risk_f$) are more important in determining the general amount of capital flows directed to emerging economies, while domestic characteristics (as xr_{risk}) are more important in determining the specific allocation of capital flows to these economies (Hannan, 2018).

Domestic financial sector

This sector groups both commercial banks and other financial institutions.

Net worth V_b will evolve with non-distributed financial profits Π_{b1} after taxes T_b:

$$V_b = V_{b-1} + \Pi_{b1} - T_b \tag{2.71}$$

$$\Pi_{b1} = \Pi_b.(1 - dist_b) \tag{2.72}$$

Total profits will depend on interest income received from holding the Safe Asset $Bf_{b,d-1}$, from domestic loans provided to firms $LR\$_{b,-1}$, from domestic government debt $GR\$_{b,-1}$, minus interest paid on households' deposits $M_{s,-1}$ and advances taken from the domestic central bank $A_{b,d-1}$:

$$\Pi_b = r_{bf-1}Bf_{b,s-1}.xr_p + r_{LR\$-1}LR\$_{b,s-1} + r_{GR\$-1}GR\$_{b,s-1} - \mathrm{r}_{ma-1}M_{s,-1} - r_{a-1}A_{b,d-1} \quad (2.73)$$

Taxes will apply to profits and will also eventually be applied as a form of capital control as taxes on the safe asset held by the domestic financial sector (the baseline assumes that there are no capital controls and $\theta_{CC} = 0$).

$$T_b = \theta_b.\Pi_{b1} + \theta_{CC}.Bf_{b,d-1} \quad (2.74)$$

Bank supply of deposits adjusts to demand by households:

$$M_s = M_{h,d} \quad (2.75)$$

Loans adjust to demand by firms:

$$LR\$_s = LR\$_d \quad (2.76)$$

Banks meet reserve requirements by keeping a share (τ_1) of household's deposits as high-powered money (HPM). Advances are determined by the difference between loans demand $LR\$_d$ and a share of deposits $\tau_2 M_{h,d}$, when this difference is positive. When this difference is negative, it will be accumulated as cash holdings:

$$H_{b,d} = \tau_1 M_{h,d} + \left(LR\$_d - \tau_2 M_{h,d}\right).\alpha_h \quad (2.77)$$

$$A_{b,d} = \left(LR\$_d - \tau_2 M_{h,d}\right).(1 - \alpha_h) \quad (2.78)$$

$$\alpha_h = -1 \; if \; \left(LR\$_d - \tau_2 M_{h,d}\right) < 0, \qquad otherwise \qquad \alpha_h = 0$$

The wealth of the domestic financial sector is V_b, and the available wealth to be invested in financial assets is V_{bf}:

$$V_{bf} = V_b - LRS_s - H_{b,d} + A_{b,d} + M_{h,d} \quad (2.79)$$

Consequently, the financial sector wealth (V_{bf}) will be allocated among the safe asset (Bf) and the domestic debt (GR$):

$$Bf_{b,d} = V_{bf}.\left(\lambda_{70} + \lambda_{71}\left(r_{bf} + dxr_p{}^{e} - \theta_{CC}\right) - \lambda_{72} r_{GR\$}\right) \quad (2.80)$$

$$GR\$_{b,d} = V_{bf}.\left(\lambda_{60} - \lambda_{61}\left(r_{bf} + dxr_p{}^{e} - \theta_{CC}\right) + \lambda_{62} r_{GR\$}\right) \quad (2.81)$$

It is assumed that both λ_{x0} and λ_{xy} parameters are exogenously determined in the case of the domestic financial sector. Therefore, there is a conservative assumption that the domestic liquidity preference of the domestic financial system is independent of that of foreign investors. In the portfolio allocation the parameter θ_{CC} is introduced, which captures the possibility of a tax on foreign holdings that would function as a form of capital control, acting through the domestic outflows channel (in the baseline, $\theta_{CC} = 0$). In dialogue with the exposition in Section 2.2.3. regarding the own rate of interest of an asset, parameter θ_{CC} represents the carrying costs (c) of foreign assets.

Exchange rate expectations

Following Lavoie and Daigle (2011) and De Grauwe and Grimaldi (2006), exchange rate expectations are determined by the shares of chartists (χ^{chart}) and fundamentalists (χ^{fun}) in the market. The exchange rate expectation will therefore evolve depend these shares and on the expectations of each group regarding the exchange rate variation (dxr_f^{efun}, dxr_f^{echart}):

$$dxr_f^{e} = \chi^{fun} . dxr_f^{efun} . \chi^{chart} . dxr_f^{echart} \quad (2.82)$$

Chartists are agents that always expect that the exchange rate will reproduce the last period variation, and that short-term trends will persist. Chartists exchange rate expectations are illustrated in eq. (2.83), where ξ is a parameter representing the magnitude of the influence of past trends on those expectations:

$$dxr_f^{echart} = \xi dxr_{f_{-1}} \quad (2.83)$$

Fundamentalists, on the other hand, are agents whose exchange rate expectations are influenced by a "conventional" or "fundamental" exchange rate. In Lavoie and Daigle

(2011), this rate (xr_f^*) is interpreted as the "long-run" value that fundamentalists think that the exchange rate should converge too. Similarly, in Bortz (2014) the fundamental exchange rate is interpreted not as an equilibrium value, but as a determined rule originated from the "market convention". Therefore, fundamentalists expectations regarding the exchange rate variation are illustrated by eq. 2.84:

$$dxr_f^{efun} = \zeta \left(xr_f^* - xr_{f_{-1}} \right) \tag{2.84}$$

According to Lavoie and Daigle (2011, p. 442) this conventional rate might mirror "an assessment of trends in the current account" or beliefs regarding the impact of the "future evolution of capital account on the exchange rate". Although economic "fundamentals" – as the current and capital account – are dynamic, the assessment of them by fundamentalist traders is assumed as static and usually treated as exogenous by most of the SFC literature[27].

In my model, xr_f^* is interpreted as a market convention that reflects how economic fundamentals are expected to impact exchange rate dynamics by a group of traders, as highlighted by Harvey (2009). Following attempts to endogenize the behaviour of fundamentalist traders (Ramos & Prates, 2020), the model introduces the evolution of international reserves and foreign debt indicators as key factors that can endogenously influence exchange rate expectations. Similarly to Giardina and Bouchad (2002) and Bassi, Ramos and Lang (2023), fundamentalist traders also rely on past exchange rate trends. However, when fundamentals reach levels considered unreasonable, their expectations are additionally shaped by these domestic fundamentals.

The exchange rate target of fundamentalists mirrors the asymmetrical dynamics observed in peripheral economies, where exchange rates tend to appreciate gradually but depreciate abruptly. In the model, these agents anticipate stronger depreciations than past trends suggest once fundamentals surpass critical levels, with the magnitude of this

[27]An exception is Nalin et al. (2025).

effect rising as fundamentals move further away from assumed sustainable values. Conversely, improvements in fundamentals reduce devaluation expectations until values are no longer critical, after which fundamentalists focus only on past exchange rates to form their expectations.

As argued by Romer (2000, p. 166), "the central bank is free to pursue policies that create reserve gains, but beyond some point cannot pursue policies that create reserve losses". In a similar vein, there is no policy constraint when an emerging economy's foreign obligations decline, but an increase signals that instabilities due to currency mismatches may emerge during periods of depreciation. These asymmetries are captured in the exchange rate target of fundamentalist traders. When international reserves fall below a critical threshold relative to GDP, fundamentalists expect the domestic currency to depreciate, reflecting a reduced ability of the central bank to resist speculative attacks (or to defend a fixed exchange rate peg, in a fixed exchange rate closure). Likewise, when foreign debt in foreign currency as a share of GDP rises above a threshold, fundamentalists anticipate increasing risks of currency mismatches, which feed back into further depreciation expectations. The equation below formalizes this mechanism.

$$xr_f^* = xr_{(-1)} - \beta_{xr1}\frac{\left(j - \frac{Bf_{cb,d\ -1}}{Y_{-1}}\right)}{j}\alpha_j - \beta_{xr2}\frac{\left(\frac{G\$_{f,d(-1)}.xr_p}{Y_{-1}} - f\right)}{f}\alpha_f \qquad (2.85)$$

Here, α_j and α_f are determined by the already mentioned equations (27) and (28):

$$\alpha_j = 1 \text{ if } \frac{Bf_{cb,d-1}}{Y_{-1}} < j \text{ otherwise } \alpha_j = 0 \qquad (2.27)$$

$$\alpha_f = 1 \text{ if } \frac{G\$_{f,d(-1)}.xr_p}{Y_{-1}} < \text{f and } xr_{risk\ -1} > \Omega \text{ otherwise } \alpha_f = 0 \qquad (2.28)$$

Where xr_f represents the exchange rate in \$/R\$, so a decrease in xr_f represents a devaluation of the fundamentalists' exchange rate target in terms of the peripheral currency R\$. Therefore, when international reserves of the peripheral economy reach a

critical threshold j, or when foreign debt levels rise to excessively high levels during moments of exchange rate instability, there is a downwards shift in the exchange rate target of fundamentalists (expectation of devaluation of the peripheral currency R$), being β_{xr1} and β_{xr2} the parameters that capture the sensitivity of expectations to these fundamentals.

Closure of the model

There are two possible closures, corresponding to a fixed and a flexible exchange rate regime.

Fixed exchange rate closure

Domestic central bank international reserves $Bf_{cb,s}$ are a residual, in order to prevent demand and supply of the safe asset to diverge and therefore to prevent exchange rate variations:

$$Bf_{cb,s} = Bf_s - Bf_{r,s} - Bf_{fcb} - Bf_{b,s} \qquad (2.86FIX)$$

Therefore, the supply of the foreign safe asset to the domestic financial sector will meet demand:

$$Bf_{b,s} = Bf_{b,d}.xr_f \qquad (2.87FIX)$$

And the exchange rate will be exogenously determined.

Flexible exchange rate closure

In Godley and Lavoie (2012), the flexible exchange rate regime assumes that $Bf_{cb,s}$ is exogenous. Bortz (2014), despite modelling a growing economy, also assumes the same, implying that reserves as a share of GDP tend to zero in his model. To circumvent this problem, $Bf_{cb,s}$ will be determined by an exogenous target ($\alpha_{R/Y}$) of reserves as a share of GDP:

$$Bf_{cb,s} = \alpha_{R/Y}.Y_{-1}.xr_f \qquad (2.86FLEX)$$

In this closure, what becomes residual is the supply of foreign safe asset to the domestic financial sector:

$$Bf_{b,s} = Bf_s - Bf_{r,s} - Bf_{fcb} - Bf_{cb,s} \qquad (2.87FLEX)$$

Following Godley and Lavoie (2012), the exchange rate (xr_p, R$/$) is the price that equilibrates the demand and supply of the foreign safe asset for the domestic financial sector:

$$xr_p = \frac{Bf^d_{periphery}}{Bf^s_{periphery}} \qquad (2.88FLEX)$$

2.3.3. Baseline scenario

The model was coded in RStudio using the package "sfcr". Both the balance sheet and the transaction-flow matrices are coherent and consistent with the specified model, and the hidden equation that equates demand and supply of government securities is fulfilled. The model is calibrated using fictitious data, and the focus lies on the comparative analysis of shocks rather than on the absolute levels of variables. The parameter values used in the baseline scenario are reported in Appendix 2.A.

As illustrated in Figure 2.6, the baseline scenario illustrates a growing economy with a GDP growth rate close to 3%. The demand components converge to stable shares of GDP, with household consumption accounting for the largest share (Figure 2.7).

Figure 2.8 shows the baseline for external balances of the domestic economy. The peripheral economy accumulates foreign reserves mostly via the capital account, and by an assumed positive trade balance. Additionally, the net income as a share of GDP is slightly negative, illustrating the impacts of interest rate differentials between the RoW and the peripheral economy.

Figure 2.9 illustrates the government debt as a share of GDP, and its composition between foreign debt in domestic and in foreign currency. Total government debt to

GDP is close to 100%, while the participation of foreign investors slightly increases over time. Foreign debt currency composition is close to 50%.

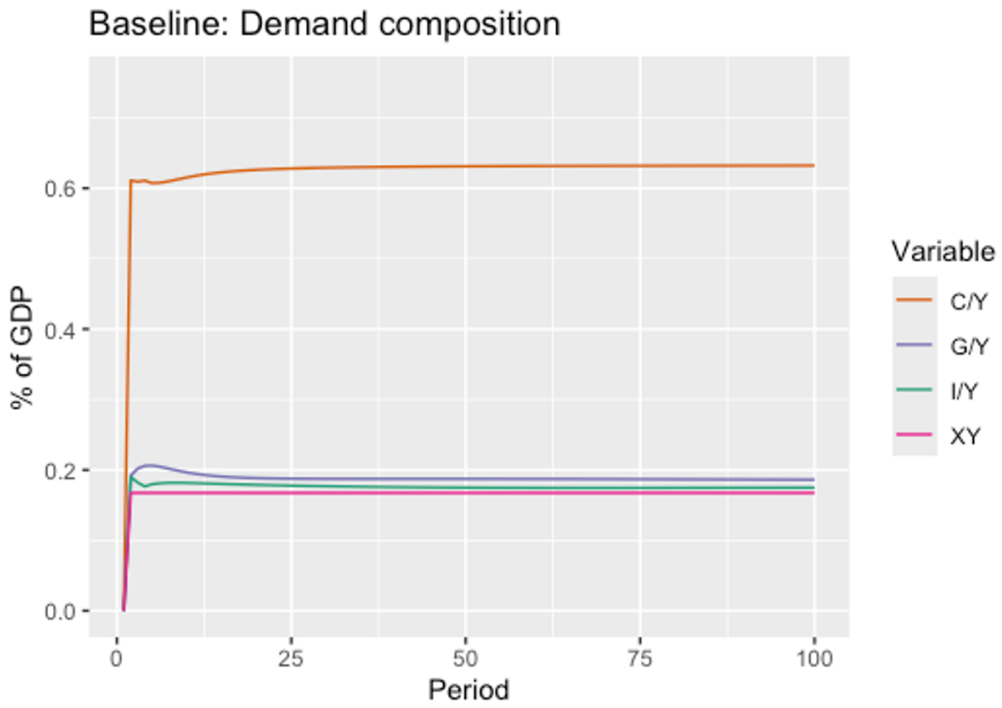

Figure 2.6. Baseline: Consumption, Government Expenditures, Investments and Exports as a share of GDP.

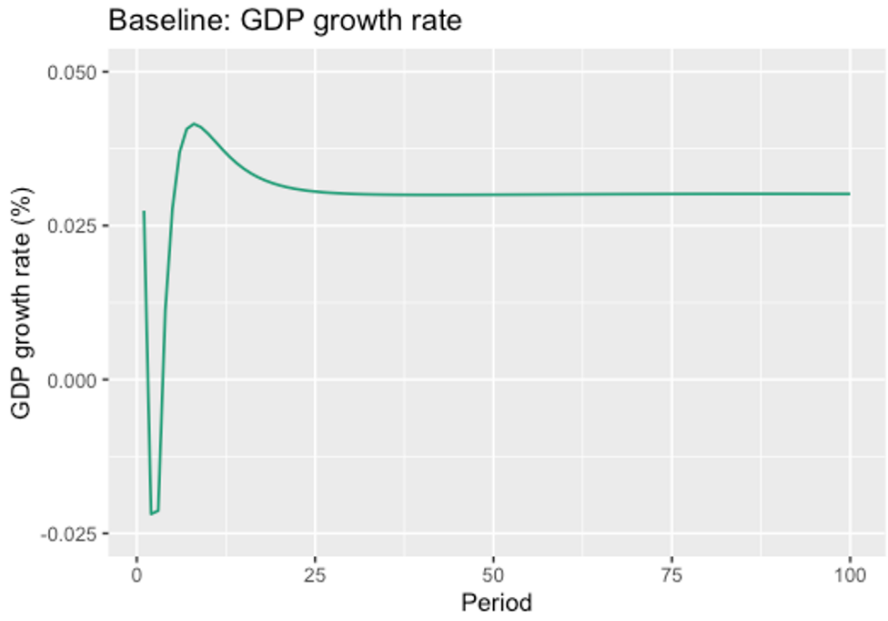

Figure 2.7. Baseline: GDP growth rate.

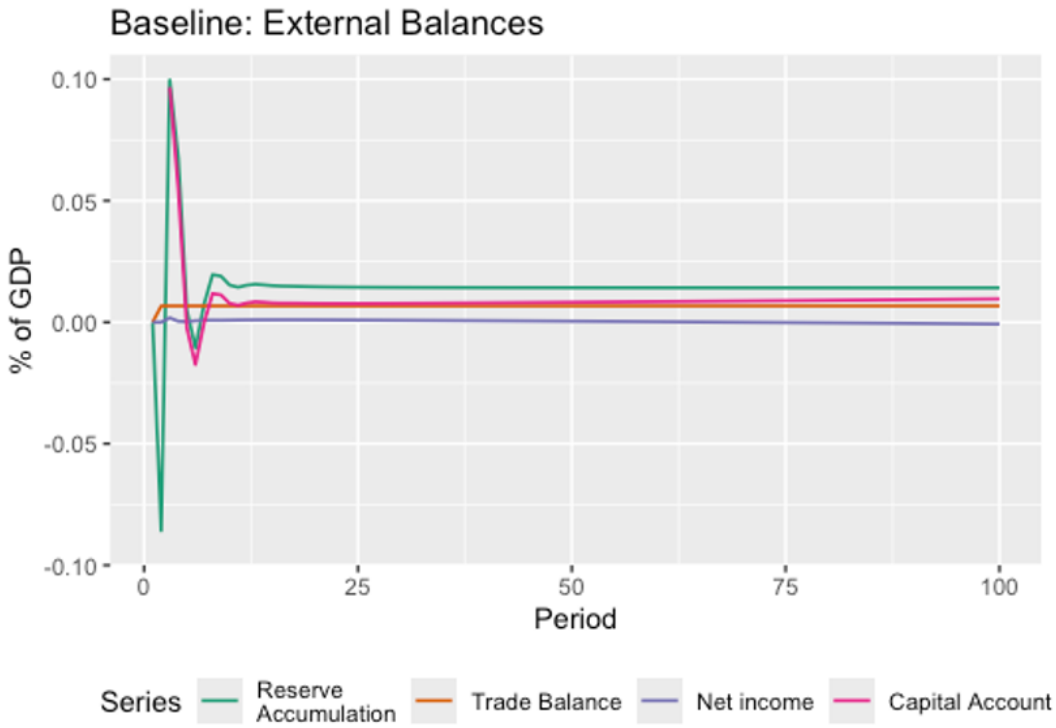

Figure 2.8. Baseline: External balances.

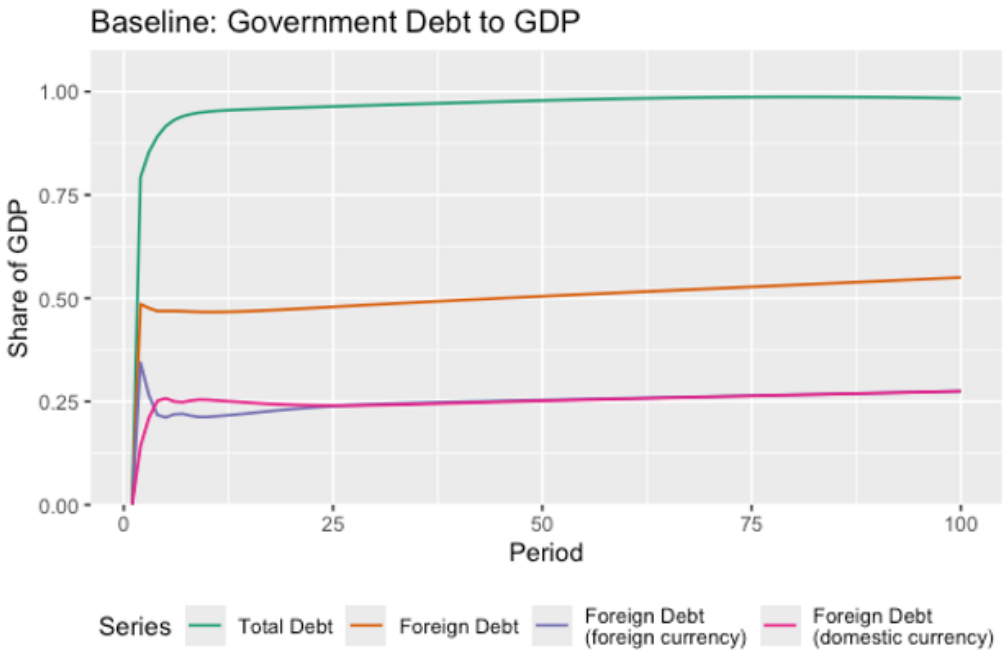

Figure 2.9. Baseline: Government debt to GDP.

2.3.4. Foreign liquidity preference shock

External financial vulnerabilities in peripheral economies are closely tied to the global liquidity cycle and become particularly acute during phases of rising international liquidity preference. In such periods, foreign investors reallocate their portfolios towards safe assets issued by core economies, and peripheral economies typically experience capital outflows.

This scenario is simulated here, introducing a shock into the economy by increasing the risk aversion parameter $risk_f$, which appears in the portfolio allocation of foreign investors. This parameter affects the liquidity preference of foreign investors, as λ_{x0} is affected by $risk_f$. In the simulation, is implemented a shock in which $risk_f$ shifts from 0.2 to 0.5 after period t = 20.

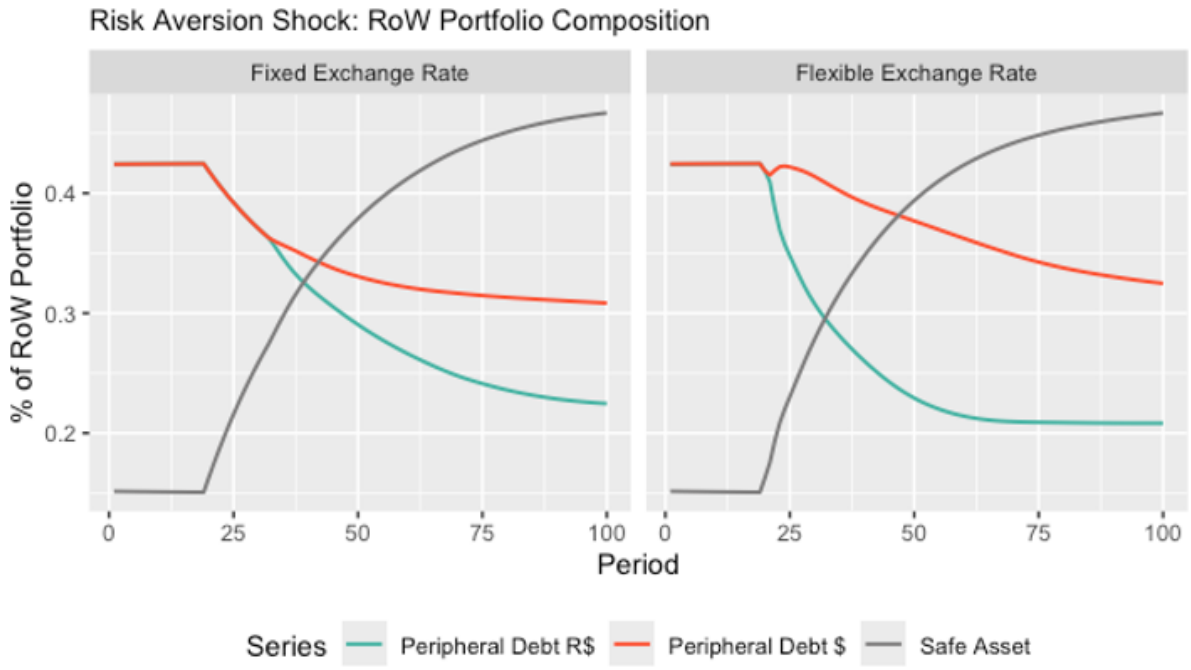

Figure 2.10. Foreign liquidity preference shock: RoW portfolio composition

Figure 2.10 illustrates how the RoW portfolio allocation responds to the increase in risk aversion in both exchange rate closures. In the case of the fixed exchange rate closure, in the initial periods following the shock the rise in risk aversion leads to a higher share of the safe asset in the portfolio of foreign investors and a decrease in the share of peripheral government debt, both in domestic and foreign currency, in similar

proportions. However, as the portfolio allocation towards the safe asset leads to a reduction in the domestic economy's international reserves below the threshold j (see eq. 2.85), foreign investors start to differentiate not only between the safe asset and peripheral debt, but also between peripheral government debt in domestic and foreign currency. The mechanism leading to this differentiation is the change in the fundamentalists' exchange rate target, which impacts the expected returns of local currency government debt. Given the growing expectations by fundamentalists that the domestic central bank will not be able (or willing to) defend the peg as reserve accumulation deteriorates, foreign investors become less willing to hold peripheral government debt in the issuer's currency (R$) than in their own currency ($). As a consequence, the foreign debt currency composition changes, decreasing the share of local currency foreign debt (Figure 2.11). This process results in a deterioration in the capital account of the domestic economy, reinforcing the decrease in foreign reserves as a share of GDP (Figure 2.12).

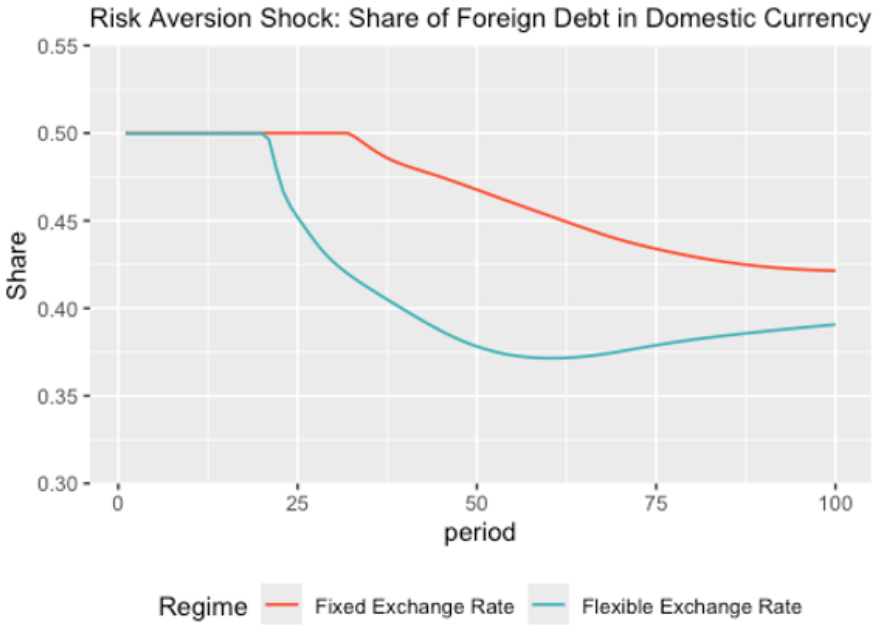

Figure 2.11. Foreign liquidity preference shock: Share of foreign debt in domestic currency.

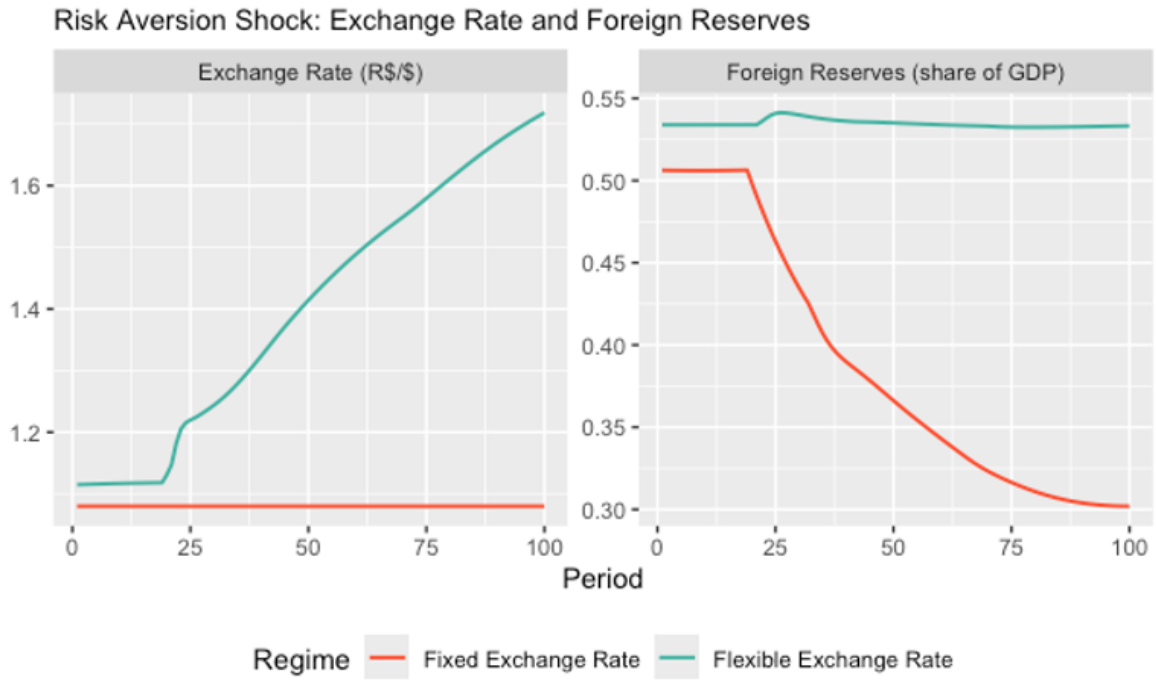

Figure 2.12. Foreign liquidity preference shock: RoW portfolio composition

In the flexible exchange rate closure, there is an even more pronounced differentiation between the demand for assets issued by the peripheral country (Figure 2.10), resulting in a more pronounced deterioration of the foreign debt composition (Figure 2.11). This happens because there are now two mechanisms driving the reallocation of the RoW portfolio. As foreign investors shift their portfolio to the Foreign Safe asset, there is an immediate pressure for the depreciation of the domestic currency (Figure 2.12). This depreciation impacts the exchange rate expectations of chartists, an element that was not present in the fixed exchange rate closure. Additionally, the exchange rate depreciation increases the foreign debt denominated in foreign currency as a share of GDP (Figure 2.13). As the proportion of debt denominated in foreign currency rises above a critical level, fundamentalists revise their expectations toward a higher exchange rate depreciation relative to past trends. Therefore, both expectations of chartists and fundamentalists favours a self-reinforcing mechanism of depreciation of the peripheral currency. These exchange rate dynamics impacts on the RoW portfolio allocation via two channels: a liquidity and an expected return channel. The liquidity channel was described by eqs. 67-69, where past depreciations decrease foreign investors' willingness

to bear exchange rate risk. The expected return channel, on the other hand, is impacted by the exchange rate variation expectation ($dxr_f{}^e$) that enters the RoW portfolio allocation equations (eqs. 62-64).

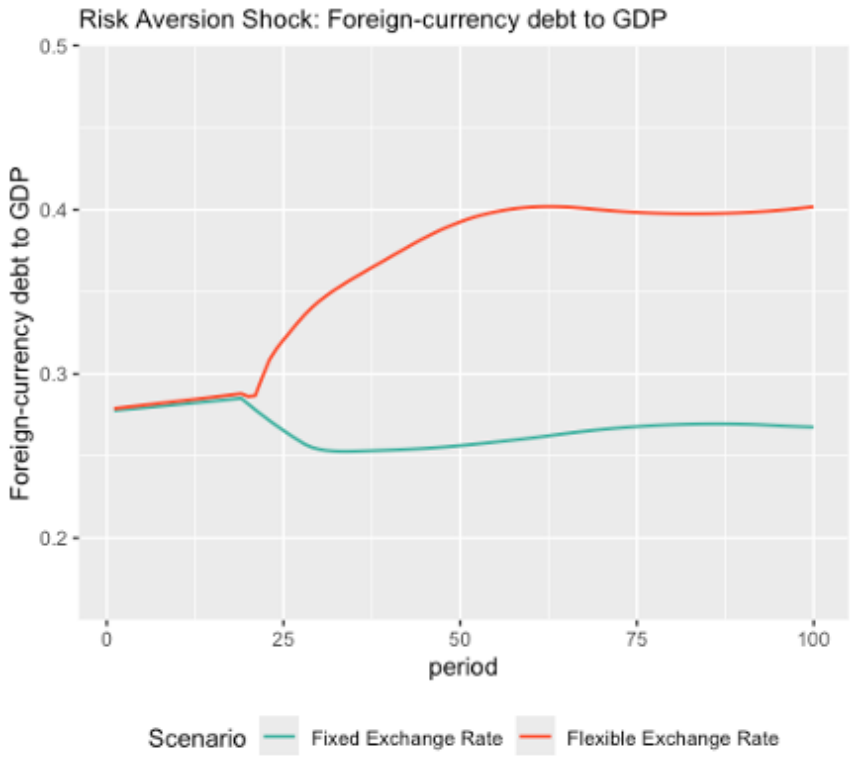

Figure 2.13. Foreign liquidity preference shock: Foreign-currency debt to GDP.

The RoW portfolio allocation after the risk aversion shock illustrates what the literature has described as a relatively "stickier" demand for foreign currency-denominated debt, and a more volatile demand for domestic currency-denominated debt of emerging economies (Bertaut, Bruno & Shin, 2023). As a result of the RoW's portfolio reallocation, the composition of the domestic economy's foreign debt deteriorates in both exchange rate closures, but more intensely in the flexible regime, with an increasing share of foreign currency debt in total foreign debt (Figure 2.10 and 2.11).

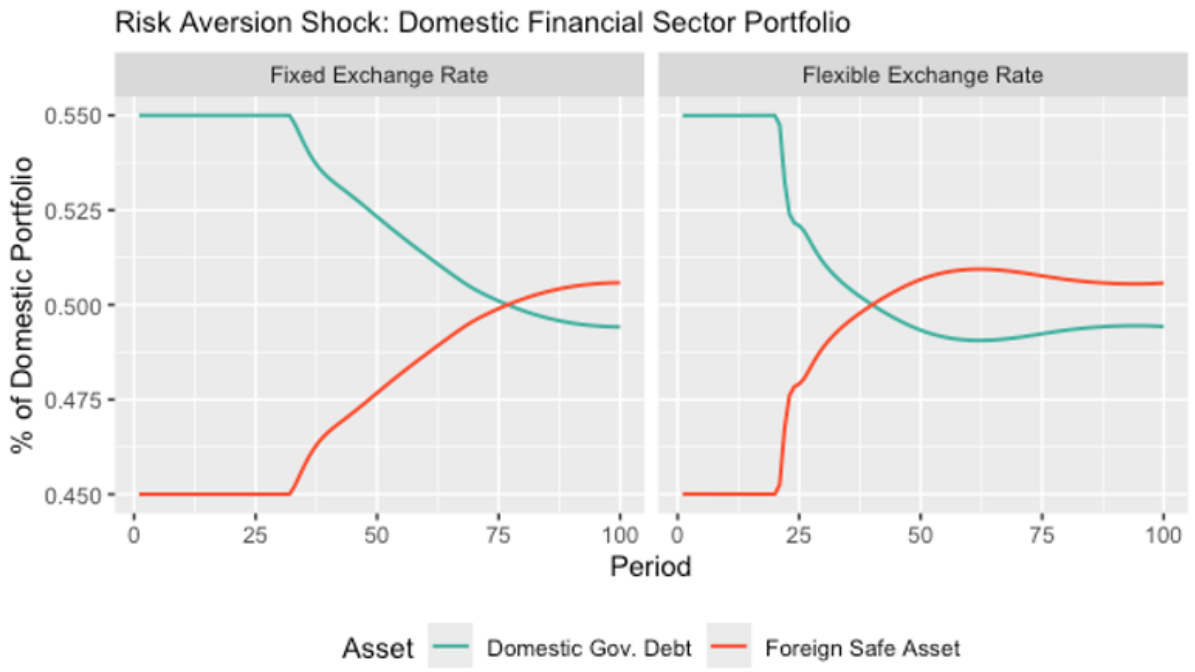

Figure 2.14. Foreign liquidity preference shock: Domestic financial sector portfolio.

It is also important to analyse what happens to the portfolio allocation of the domestic financial sector (Figure 2.14). In the model, the conservative assumption that the risk aversion of foreign investors does not impact the liquidity preference of domestic investors is adopted, treating the latter as an exogenous variable. However, the domestic financial sector is impacted by the expectation of a devaluation of the local currency, boosted by the expectations of fundamentalists in the fixed exchange rate closure, and by both chartists and fundamentalists expectations in the flexible exchange rate closure. As a consequence, the domestic financial sector shifts its portfolio from domestic government debt towards the foreign safe asset in both closures, but more abruptly and intensely in the flexible regime. The domestic financial sector is, therefore, contributing to reinforcing expectations regarding the depreciation/devaluation of the domestic currency. This exercise illustrates that external vulnerability can also manifest itself in the behaviour of the domestic financial sector. These results provide analytical evidence that the hypothesis defended by Hofmann, Patel, and Wu (2022), which claims that the "shallowness" of domestic financial markets is the root cause of external vulnerability, should be taken with caution. The behaviour of the domestic financial sector might also

manifest and reinforce the external vulnerability of the peripheral economy, at least in the absence of other domestic policy responses by the peripheral state, in line with research by Churchill, Bonizzi and Kaltenbrunner (2021).

What happens to the real economy? In the OS-OSR Model, external financial vulnerabilities are transmitted to the real economy via their impacts on expected demand. Specifically, the uncertainty regarding future expected demand, captured by the variable $risk_p$, transmits the shock to investment and consumption, which decrease after the shock in both exchange rate closures (Figure 2.15 and 2.16). This can be interpreted as firms' uncertainty that the past growth trend will persist, given their expectation that the peripheral state might pursue recessionary policies (as a decrease in government expenditures or an increase in interest rates) to offset the loss of foreign reserves, or seek to offset the depreciation pressure and reduce the currency mismatch problem. In the case of the flexible exchange rate, impacts are more intense, mirroring the more pronounced reinforcement mechanisms between capital outflows and currency depreciation. As a consequence of the impact on investment and consumption, the GDP growth rate decreases in both regimes (Figure 2.17), but more abruptly and intensely in the flexible regime. The decrease in GDP growth impacts government debt as a share of GDP, which increases under both closures (Figure 2.18).

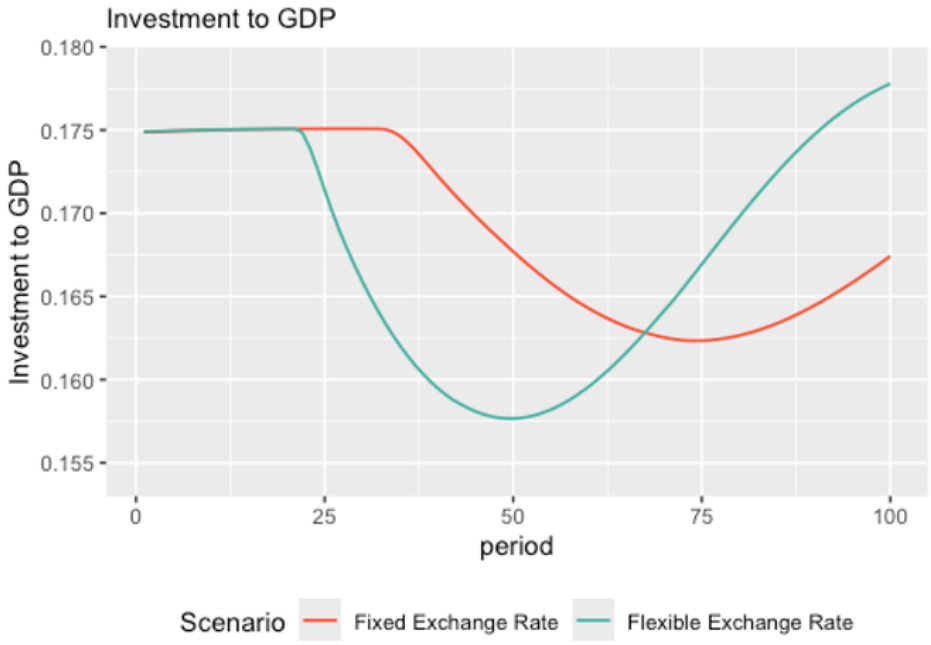

Figure 2.15. Foreign liquidity preference shock: Investment to GDP.

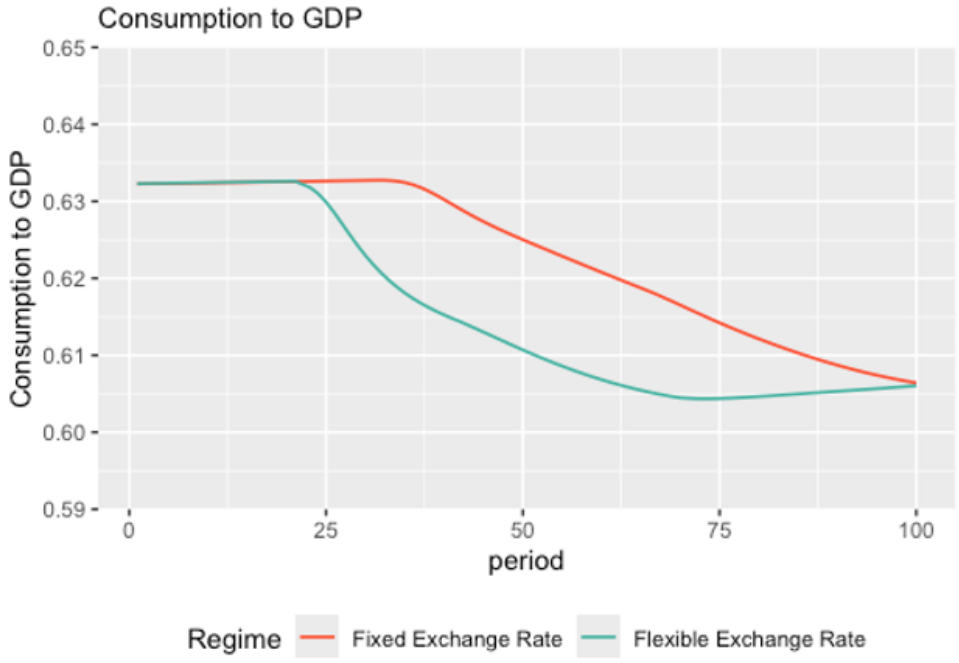

Figure 2.16. Foreign liquidity preference shock: consumption to GDP.

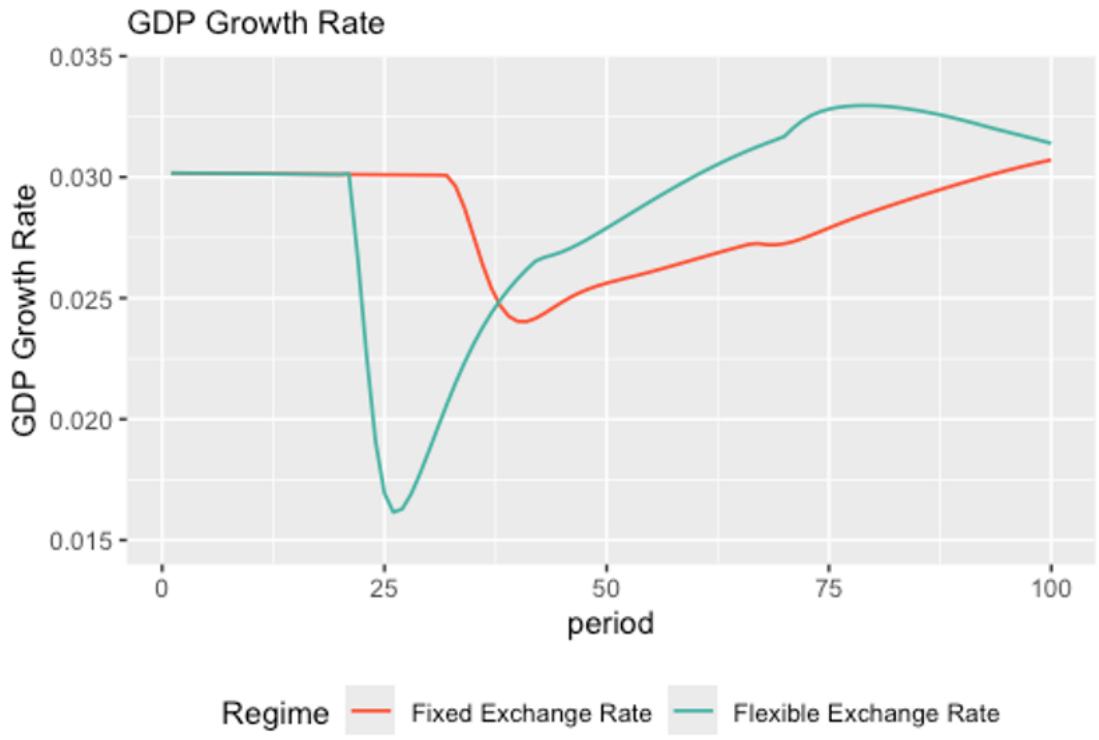

Figure 2.17. Foreign liquidity preference shock: GDP growth rate.

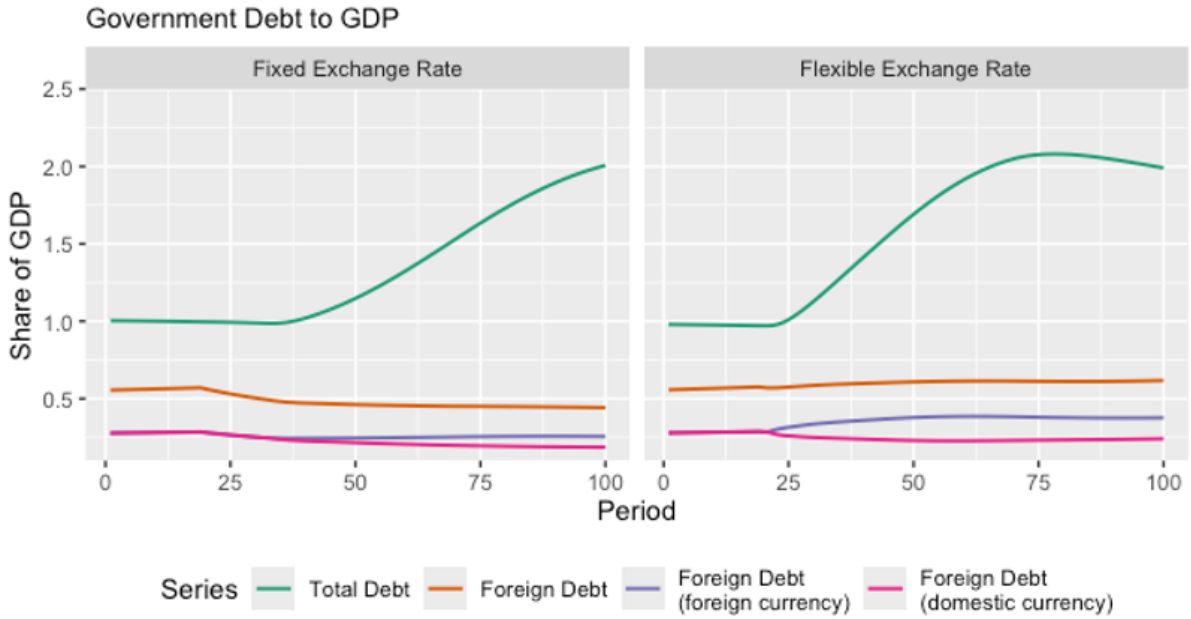

Figure 2.18. Foreign liquidity preference shock: Domestic financial sector portfolio.

To sum up, the foreign liquidity preference shock has a negative impact on the financial variables and also on the real economy. Such impacts were caused by different channels of vulnerability operating jointly: the increase in the currency mismatch,

measured as foreign-currency debt as a share of GDP; the growing exchange-rate instability, which is reinforced mostly by the local-currency-debt outflows, evidencing the original sin redux channel of vulnerabilities; and the loss of foreign reserves, which undermines even more the demand of foreign investors for local-currency debt. These channels are highly interconnected and reinforce each other, evidencing that original sin redux not only coexists with original sin, but that the former feeds back into the latter in the presence of foreign liquidity shocks.

2.3.5. Policy responses to the foreign liquidity preference shock

In this subsection, the foreign liquidity preference shock previously described is combined with different policy responses by the peripheral state. Three possible responses are considered. First, the government might pursue austerity, aiming to improve financial fragility indicators. In particular, it may seek to reduce foreign indebtedness as a share of GDP, limit exchange rate depreciation, and curb the loss of foreign reserves. Second, the government might offer higher interest payments on its debt and therefore try to offset the negative impacts on the capital account. Third, the government might introduce capital controls to shield the domestic economy from the foreign liquidity shock.

Precisely, the policy experiments are the following. In Policy Scenario 1, the growth of government expenditures (r_g) is reduced from 3% to 2.3% after t=20. In Policy Scenario 2, the interest rates on domestic government bonds increase after t=20, such that interest rates on government debt denominated in domestic currency ($r_{GR\$}$) rises from 3 to 3.75%, while rates on government debt denominated in foreign currency ($r_{G\$}$) rises from 3 to 3.25%. The increase in interest rates was implemented gradually, from t=20 to t=30. In Policy Scenario 3, a tax of 0.7% is introduced on domestic holdings of the foreign asset, where $\theta_{CC} = 0$ shifts to $\theta_{CC} = 0.007$ in t = 20.

Policy Scenario 1 – Decrease in the growth rate of government expenditures

The austerity response leads to different impacts depending on the model closure. In the fixed exchange rate closure, the decrease in the growth rate of government expenditures almost totally offsets the impact of risk aversion on foreign debt composition (Figure 2.19). When the foreign reserves to GDP ratio decreases below a threshold, it impacts the exchange rate expectations of fundamentalists and the uncertainty regarding expected demand. This mechanism is here offset by the recessionary impacts caused by reducing the growth of government expenditures, which contribute to further decrease the GDP growth rate (Figure 2.23). In turn, the reduction in GDP growth rate allows to significantly offset the negative impact of the increase in foreign investors' risk aversion on the foreign reserves to GDP ratio, by decreasing the denominator. Therefore, reserves to GDP decreases are mitigated in the shorter term, and afterwards grow sharply (Figure 2.20). Consequently, there are two impacts on expected demand that goes in opposite directions: first, a reduction in government expenditures growth impacts directly and negatively on GDP growth, therefore reducing even more expected demand; but since the policy allowed to offset the loss of foreign reserves as a share to GDP, it also mitigated the negative impact of external financial vulnerability on expected demand. As a result of these two opposite mechanisms, investment to GDP first decreases more slowly with this policy response, but in the longer term further deteriorates (Figure 2.22). Additionally, this policy response aggravated the decrease in the GDP growth ratio, both in the shorter and in the longer run (Figure 2.23).

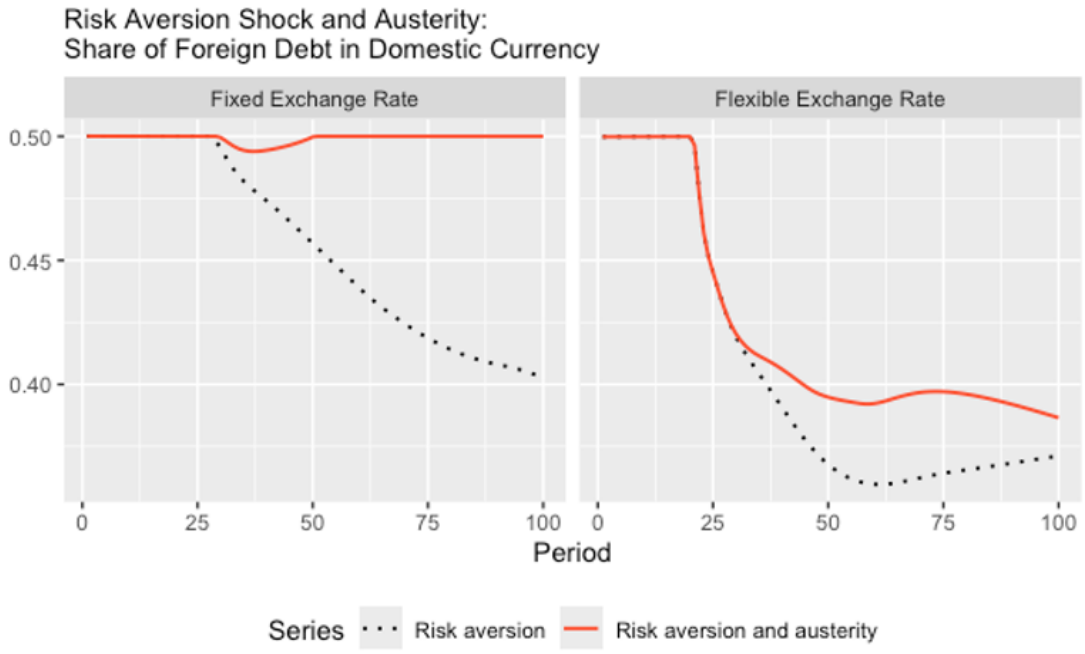

Figure 2.19. Austerity and foreign liquidity preference shock: Share of foreign debt in domestic currency.

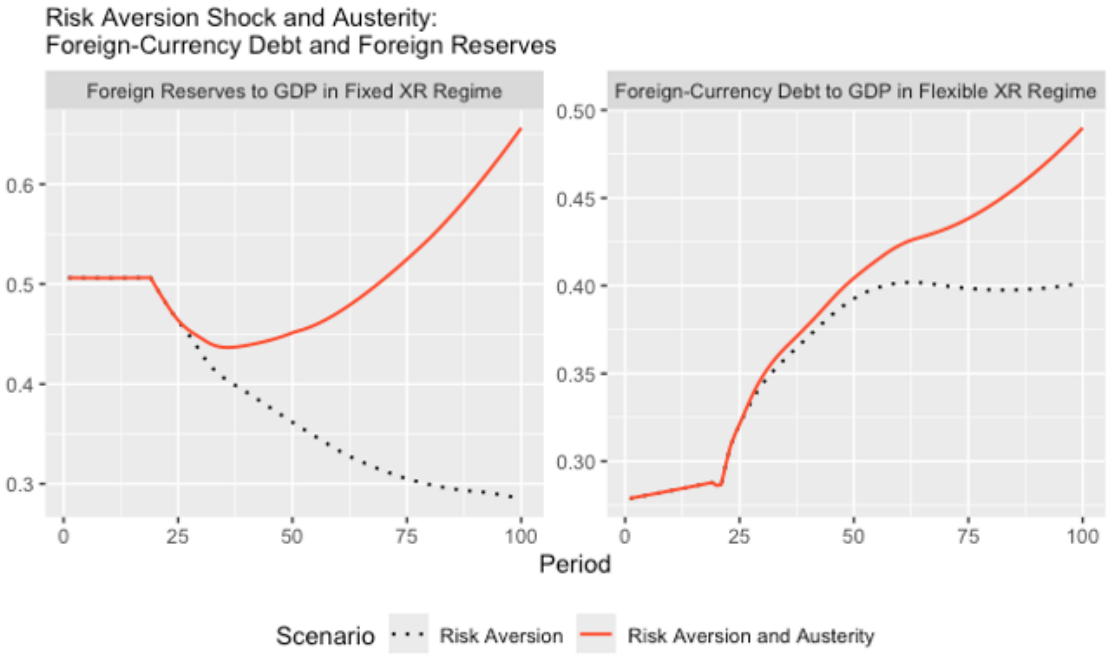

Figure 2.20. Austerity and foreign liquidity preference shock: Foreign currency debt and foreign reserves.

On the other hand, in the flexible exchange rate closure the foreign debt composition is only slightly impacted (Figure 2.19). The mechanism operating in the flexible exchange rate regime is the following. The decrease in GDP growth, intensified by austerity, leads the central bank to sell the foreign safe asset to keep the reserves to GDP ratio close to the target (see eq. 2.87$FLEX$). This results in a softer exchange rate

devaluation path in the context of the foreign risk aversion shock (Figure 2.21). However, while mitigating currency depreciation contributes to reduce the exchange rate instability problem, a decrease in GDP growth rate caused by the recessionary fiscal policy goes in the opposite direction, increasing foreign debt as a share of GDP (Figure 2.20). Therefore, in the flexible exchange rate closure this policy was much less effective in offsetting the financial channels of vulnerability. Additionally, this policy contributed to further aggravate the decrease in GDP growth rate persistently (Figure 2.23).

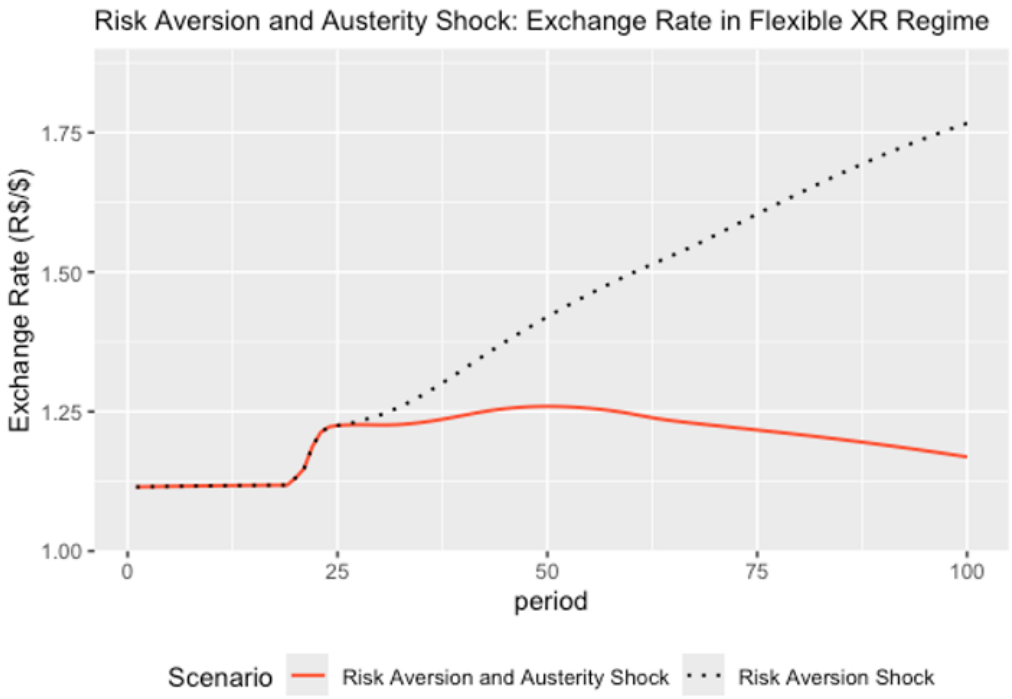

Figure 2.21. Austerity and foreign liquidity preference shock: Exchange rate.

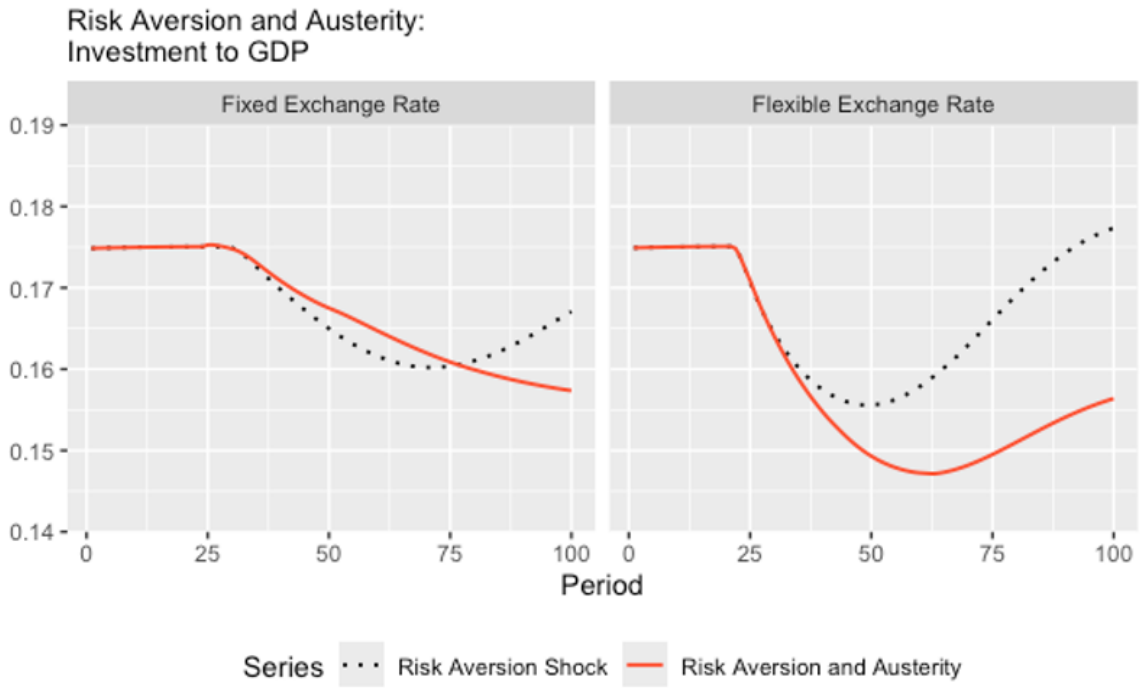

Figure 2.22. Austerity and foreign liquidity preference shock: Investment to GDP.

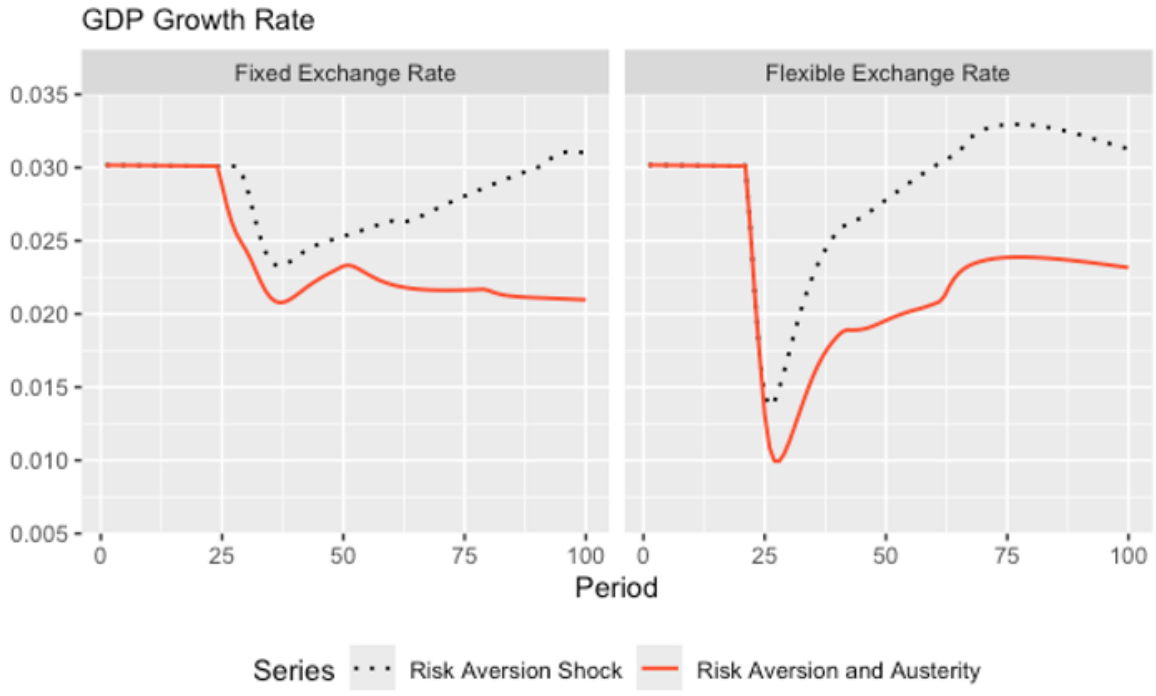

Figure 2.23. Austerity and foreign liquidity preference shock: GDP growth rate.

In short, the austerity policy response aggravates the negative effects on the real economy and leads to ambiguous results in terms of financial fragility. This experiment indicates that, on the one hand, an austerity response can help mitigate vulnerability

channels associated with a loss of foreign reserves, which in the model is evidenced under the fixed exchange rate closure, and by mitigating exchange rate depreciation, as evidenced in the flexible exchange rate regime. On the other hand, however, austerity can intensify financial fragility by worsening solvency indicators, which in the flexible exchange rate closure is illustrated by the increase in total government debt as a share of GDP, and in foreign-currency debt as a share of GDP. This evidences a vulnerability boosted by both original sin and the feedback of original sin redux into original sin (deterioration of foreign debt currency composition).

Policy Scenario 2 – Increase in domestic interest rates

The next experiment captures the government's attempt to offset the foreign liquidity shock on the capital account by raising interest rates. In particular, the increase in interest rates on local-currency debt is larger, in order to compensate foreign investors for exchange rate risk.

This policy response allows for a short-term slight improvement in foreign debt composition levels in both exchange rate closures, while intensifying its longer-term deterioration (Figure 2.24). The increase in domestic interest rates impacts on the portfolio allocation of foreign investors, compensating the impacts of their higher risk aversion. It also impacts the portfolio allocation of the domestic financial sector, by offsetting the negative impacts on expected yields stemming from currency depreciation/devaluation expectations (Figure 2.25). Its impact on portfolio allocation allows it to partially offset the capital account deterioration in the shorter run under both regimes, and therefore slightly minimizes currency depreciation (in the flexible closure) and foreign reserve loss (in the fixed closure), as shown in Figure 2.26. These short-term impacts are also reflected on GDP growth, partially offsetting the fall in GDP growth triggered by the risk aversion shock in the shorter run, with the aid of the flow channel of interest income to households (Figure 2.27).

However, the increase in domestic interest rates also contributes to deteriorating the current account through the worsening of the net income balance (Figure 2.28), evidencing the unsustainability of this measure and its longer-term negative impacts. The increase in spreads leads to a net income transfer from the domestic economy to the RoW, resulting in an unsustainable deterioration in terms of exchange rate depreciation (in the case of the flexible regime) or loss of foreign reserves (in the case of the fixed exchange rate regime) after t=40 (Figure 2.26). This explains the longer-term deterioration of foreign debt composition (Figure 24), which comes together with the reversion of the domestic portfolio allocation towards the safe asset (Figure 2.25). It results in a more persistent decline in GDP growth in both exchange rate closures mostly after t=40 (Figure 2.27), contributing, together with the increase in interest payments, to an increase in government debt to GDP levels (Figure 2.29).

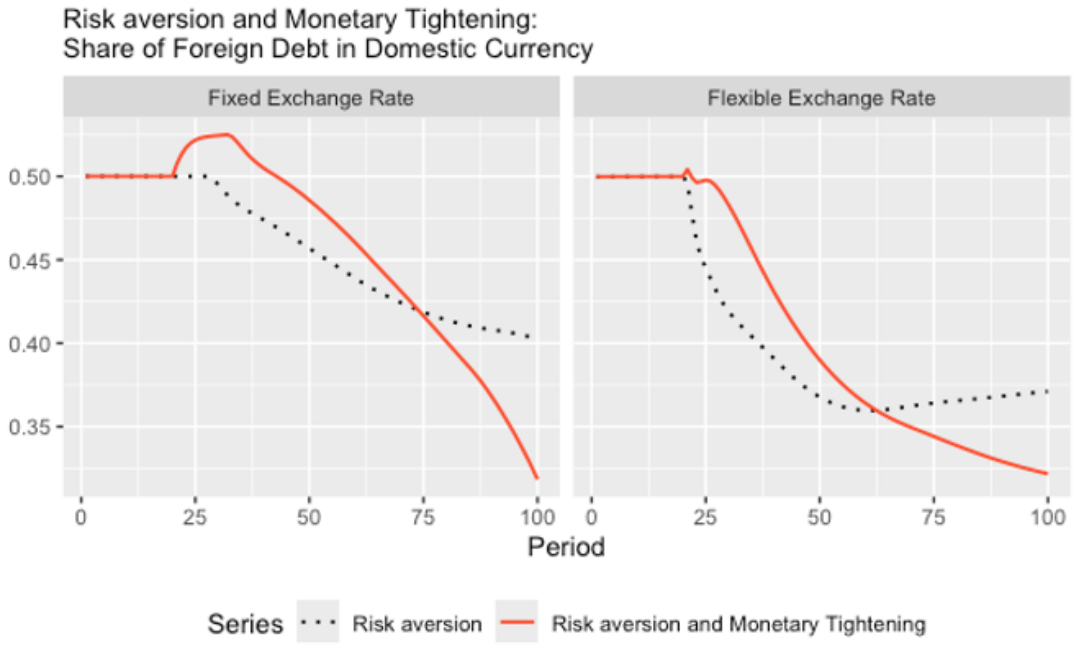

Figure 2.24. Monetary tightening and foreign liquidity preference shock: Share of foreign debt in domestic currency.

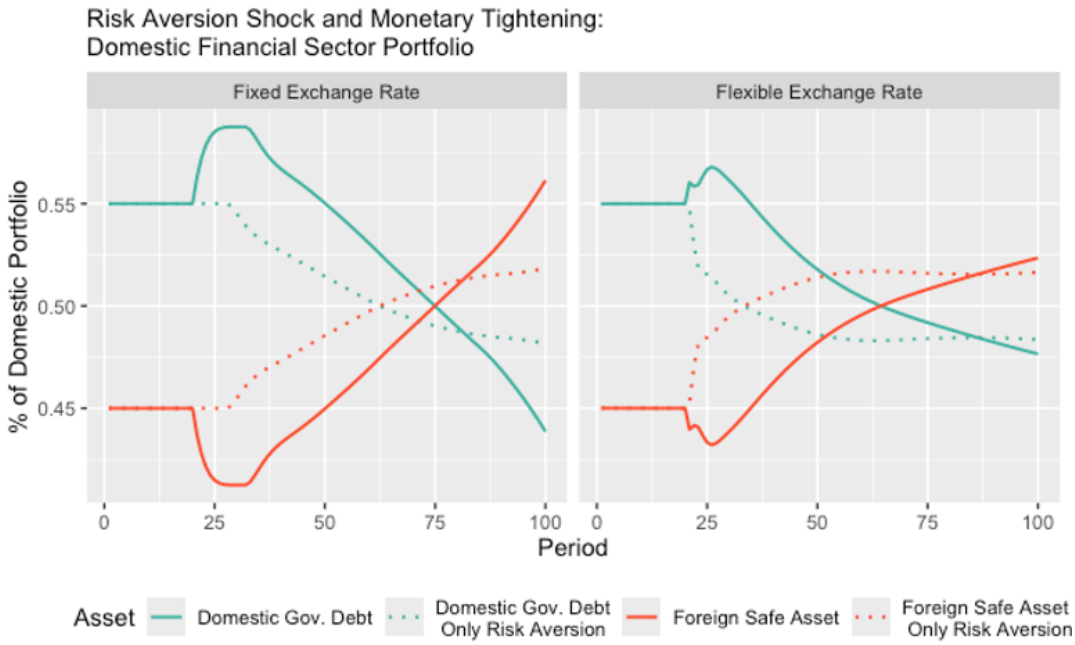

Figure 2.25. Monetary tightening and foreign liquidity preference shock: Domestic financial sector portfolio

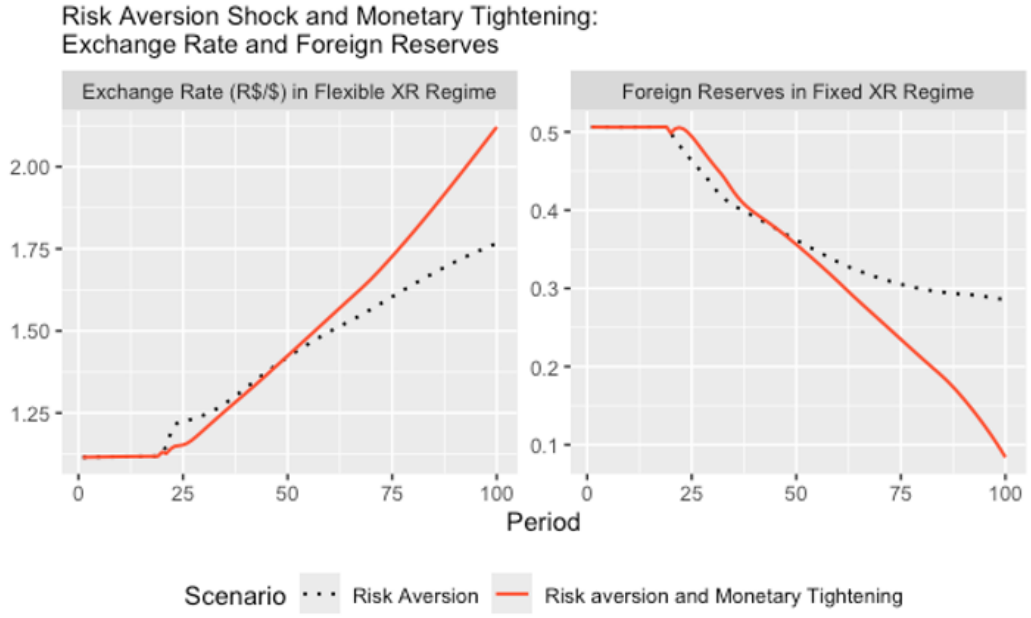

Figure 2.26. Monetary tightening and foreign liquidity preference shock:

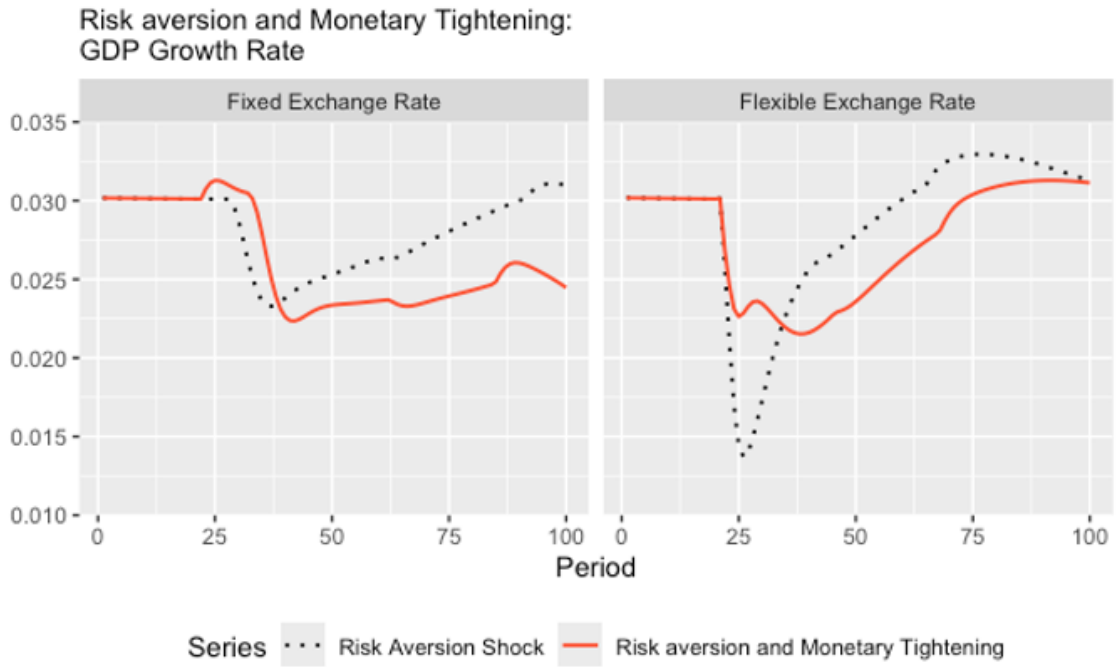

Figure 2.27. Monetary tightening and foreign liquidity preference shock

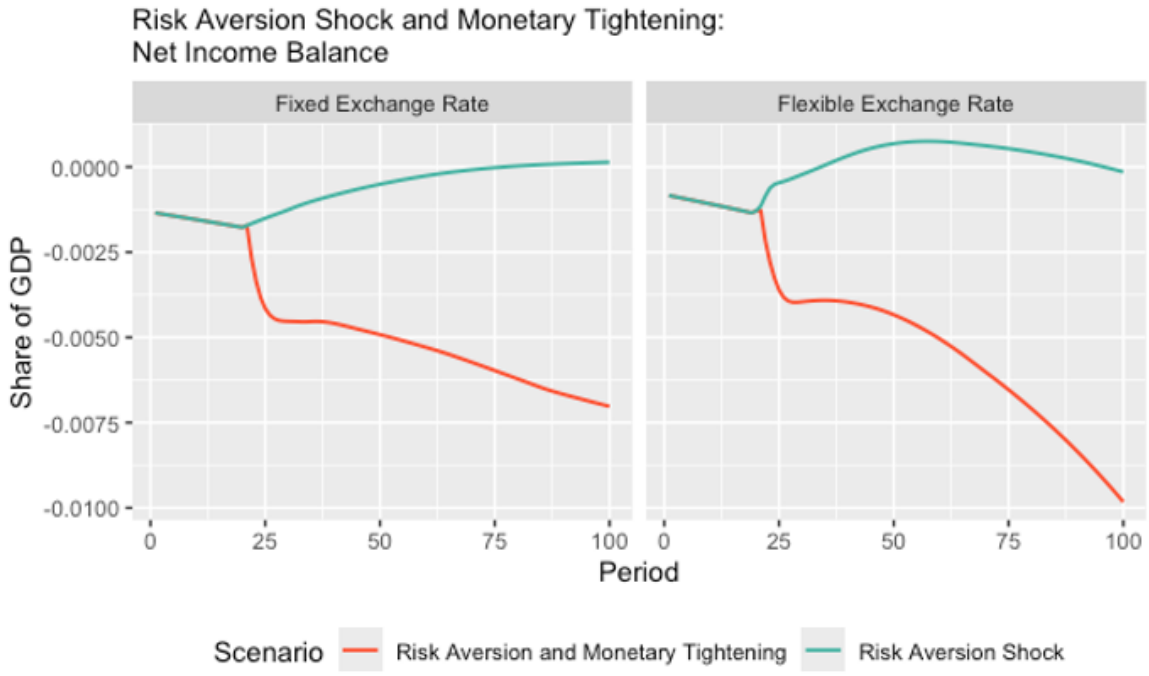

Figure 2.28. Monetary tightening and foreign liquidity preference shock

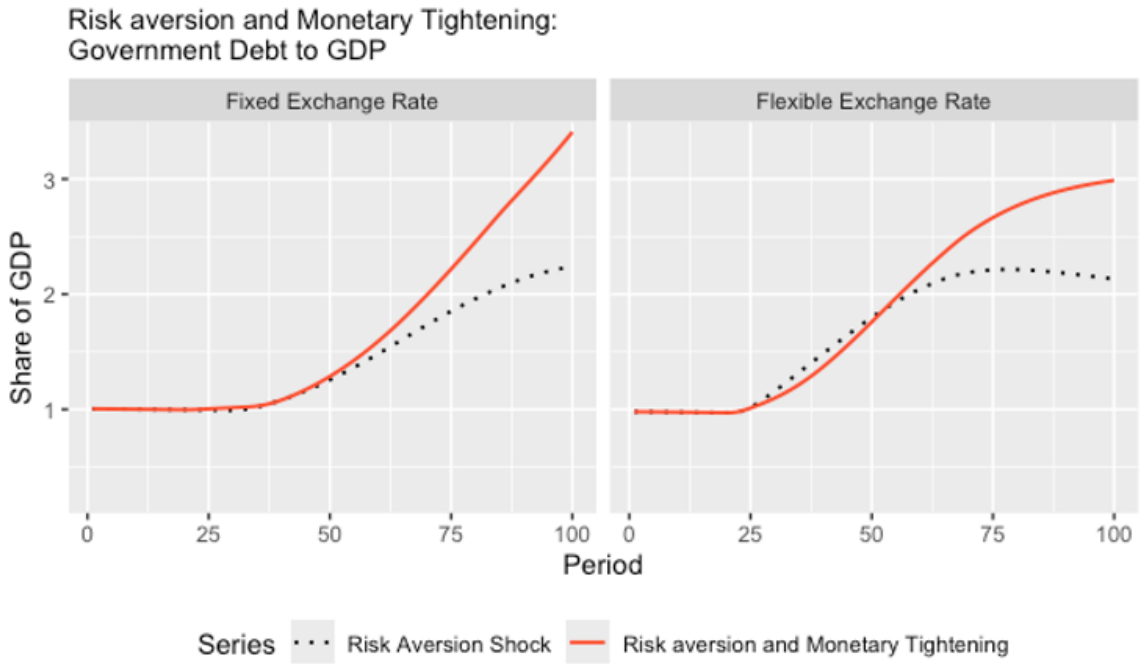

Figure 2.29. Monetary tightening and foreign liquidity preference shock: Government debt to GDP.

In sum, the monetary tightening response helps slightly smooth the direct impacts of external vulnerabilities and minimizes negative impacts in terms of growth, but only in the very short term. The unsustainability of this policy response is evidenced in the progressive deterioration of the current account, caused by the increase in income transfers abroad, which aggravates the peripheral economy external vulnerability channelled through the discrepancy between high-yielding liabilities and low-yielding assets. While both original sin and original sin redux channels of vulnerability are smoothed in the very short run, they are afterwards substantially aggravated.

Policy Scenario 3 – Capital controls on the domestic financial sector

The previous policy experiments show a very limited capacity to offset external vulnerabilities. The austerity scenario implies high costs in terms of growth, while leading to ambiguous results in terms of financial fragility; and the monetary tightening has a very short-term and limited capacity to offset the direct impacts of the foreign shock, while aggravating vulnerabilities in the longer term.

The analysis now turns to a policy scenario involving the introduction of a price-based capital control applied to the domestic financial sector's holdings of the foreign safe asset. The choice of this particular form of capital control is motivated by the dialogue with the original-sin-redux literature's emphasis on broadening the domestic investor base as a way to overcome external fragilities. As illustrated in the previous scenarios, the domestic investors' behaviour in the model contributes to further increasing vulnerabilities, contrary to the original-sin-redux hypothesis. This policy experiment seeks to examine whether capital controls can contribute to the development of a more stable domestic investor base, thereby helping to reduce external financial fragilities.

With the introduction of this capital control measure, it is possible to more than offset the impacts of RoW risk aversion on the domestic portfolio allocation in both exchange rate closures (Figure 2.30). The tax on foreign holdings affects the expected net yields of the Foreign Safe Asset for the domestic financial sector, shaping their behaviour toward increasing the share of government debt in their portfolio (Figure 2.30), despite the negative impacts of the foreign risk-aversion shock. As a consequence, the behaviour of the domestic financial sector actually helps offset the negative effects caused by the shift in risk aversion of foreign investors.

Now, it is important to understand how this policy-induced change in the domestic financial sector behaviour affects other agents and economic variables. Under this policy, the stabilizing behaviour of the domestic financial sector helps mitigate the growth of foreign debt as a share of GDP (in the flexible exchange rate regime) and the reduction of foreign reserves to GDP ratio (in the fixed exchange rate regime), as illustrated in Figure 2.31. This occurs because the domestic financial sector is, in general, contributing to capital inflows that reduce the deterioration of the capital account triggered by the foreign investors' outflows. In turn, this helps minimize the negative feedback loop between foreign investors' capital outflows and the deterioration of domestic conditions,

including a more stable path of exchange rate depreciation in the flexible exchange rate closure (Figure 2.33). These features affect exchange rate expectations and induce changes in the RoW portfolio allocation, mitigating the deterioration of the currency composition of foreign debt (Figure 2.32).

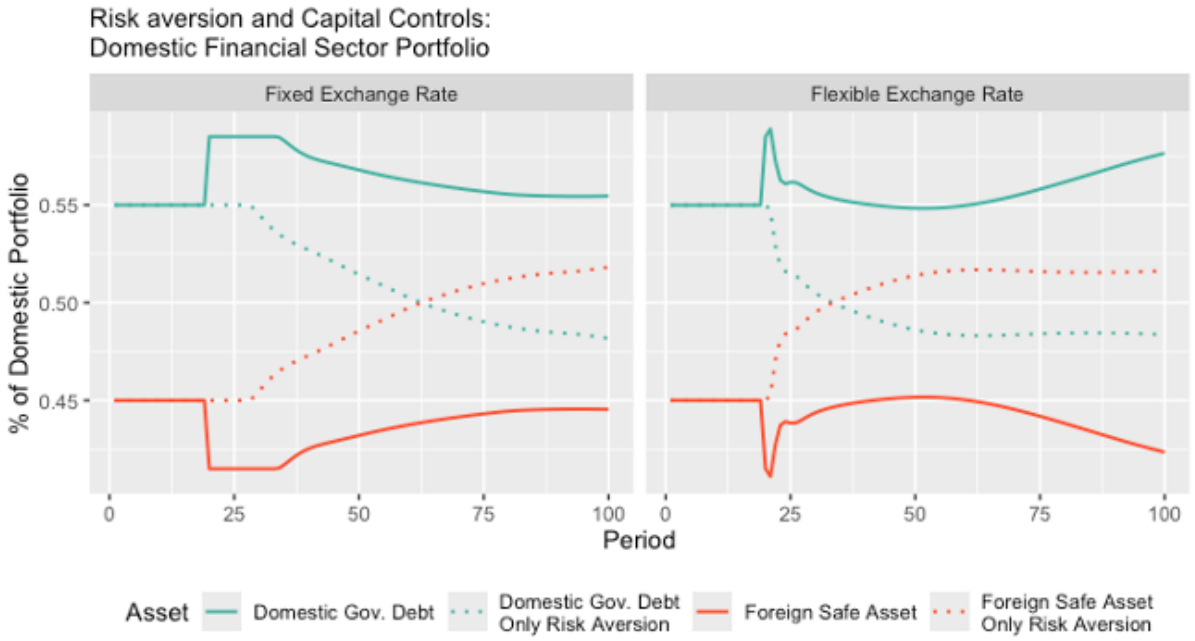

Figure 2.30. Capital controls and foreign liquidity preference shock: Domestic financial sector portfolio

By mitigating the manifestation of external financial vulnerabilities, this policy also allows to reduce the uncertainty regarding expected demand that is caused by the foreign risk aversion shock. As a result, the loss in terms of GDP growth is mitigated (Figure 2.34). As a consequence of the increase in the tax base and of a less intense fall in output growth, the government debt to GDP follows a relatively more stable path (Figure 2.35).

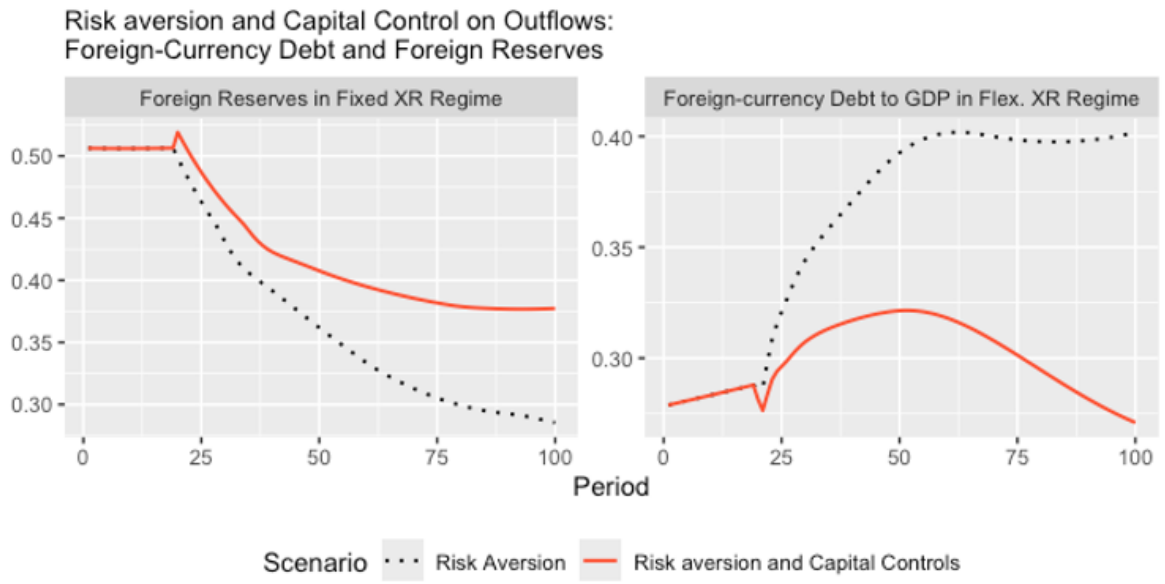

Figure 2.31. Capital controls and foreign liquidity preference shock: Foreign-currency debt and foreign reserves to GDP

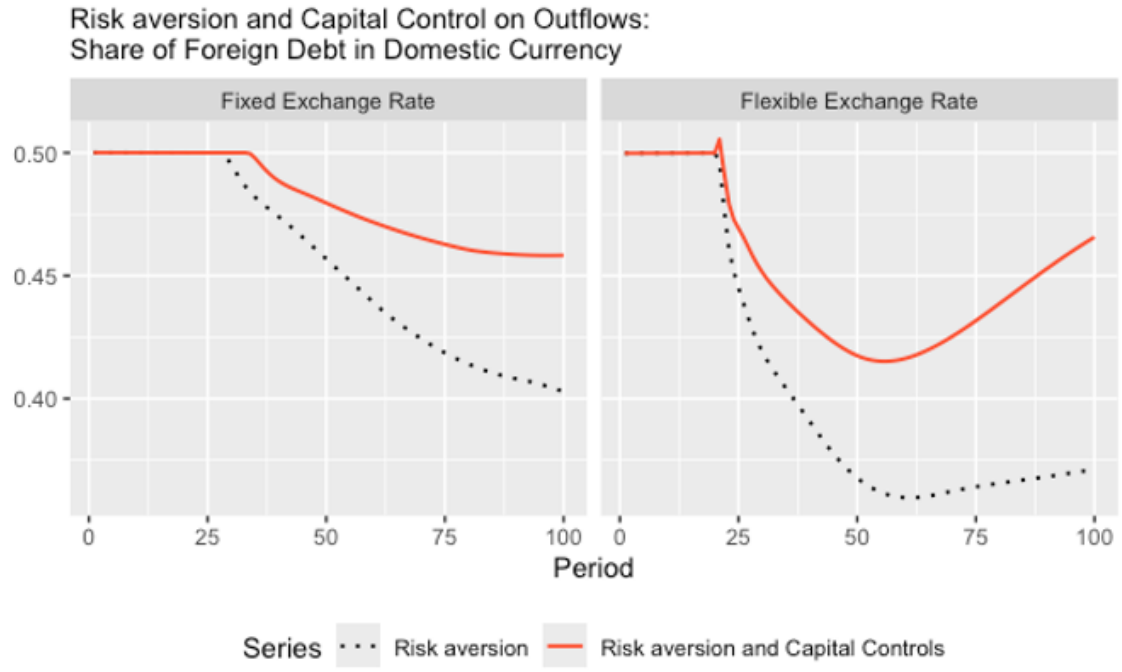

Figure 2.32. Capital controls and foreign liquidity preference shock: Shae of foreign debt in domestic currency.

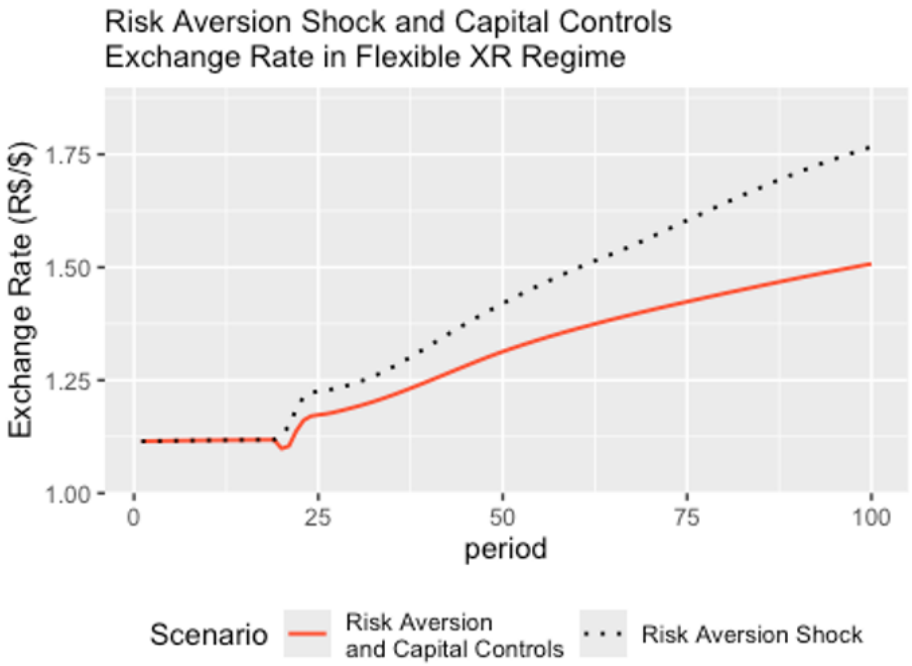

Figure 2.33. Capital controls and foreign liquidity preference shock: Exchange rate.

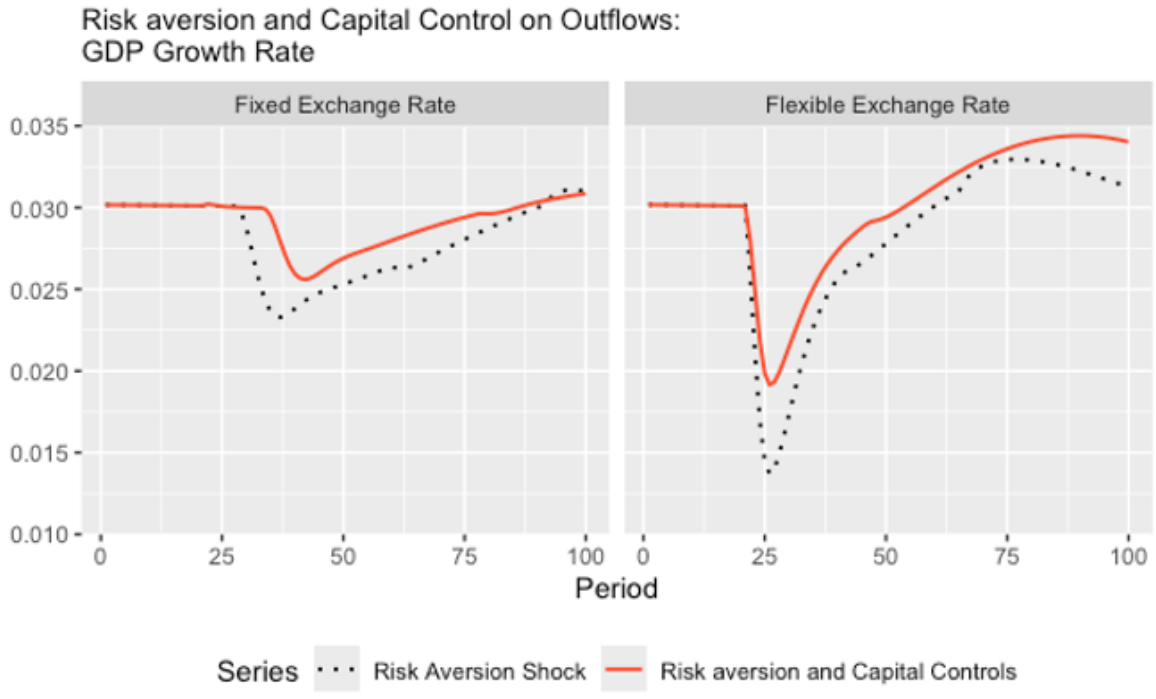

Figure 2.34. Capital controls and foreign liquidity preference shock: GDP growth rate.

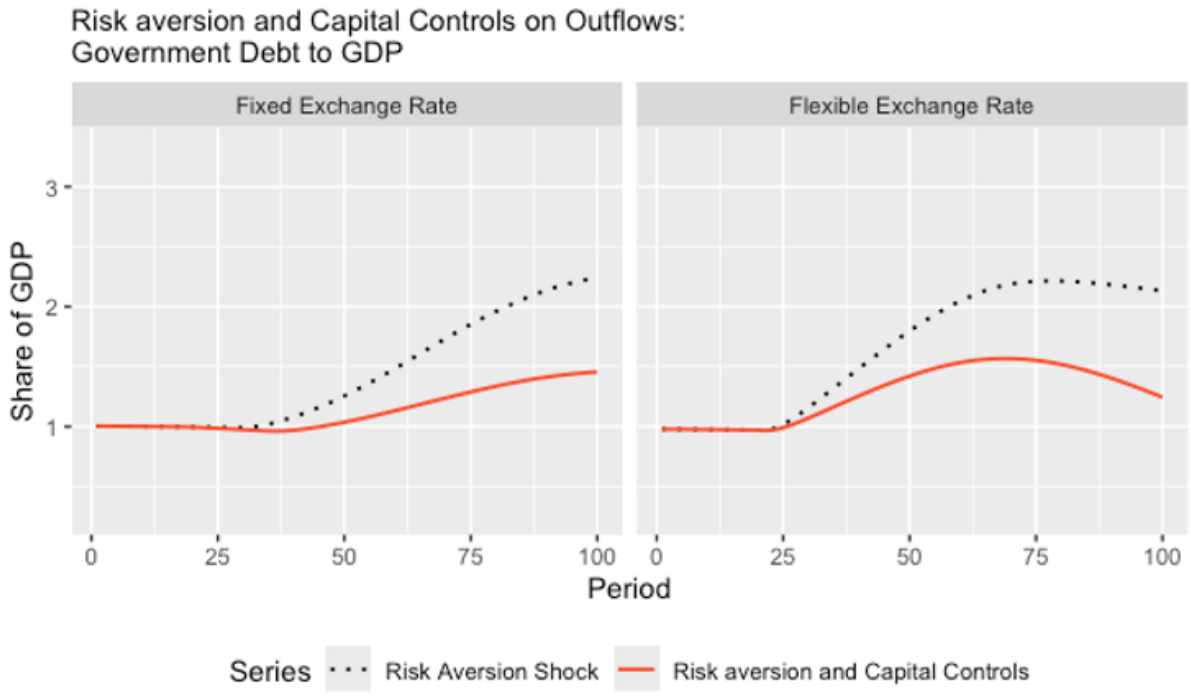

Figure 2.35. Capital controls and foreign liquidity preference shock: Government debt to GDP.

In short, this policy helps minimize external vulnerabilities related both to the original sin and the original sin redux, while also allowing to decrease the negative impacts on the real economy. In line with the currency hierarchy and the international financial subordination literature, the results evidence the importance of capital controls in shielding a peripheral economy from foreign liquidity preference shocks.

2.3.6. Overview of main results

The key results of the experiments on the foreign liquidity preference shock and the three policy responses (austerity, monetary tightening, and capital controls) are summarised in Tables 2.3 and 2.4.

As shown in Table 2.3, the foreign liquidity preference shock generates broadly similar outcomes for most variables under both fixed and flexible exchange-rate closures. It is mainly internalised through a fall in international reserves under the fixed regime and through a depreciation of the domestic currency under the flexible regime. The shock

reduces the share of foreign debt denominated in domestic currency, raises government debt, and lowers GDP growth through declines in investment and consumption. Foreign-currency debt as a share of GDP falls under the fixed regime but rises under the flexible regime because, in the latter, depreciation inflates the numerator.

Foreign Liquidity Preference Shock		
Variables	**Fixed Exchange Rate**	**Flexible Exchange Rate**
International reserves (% of GDP)	Decreases	Stable
Exchange rate	Exogenous	Depreciates
Share of foreign debt in domestic currency (%)	Decreases	Decreases
Foreign currency debt (% of GDP)	Decreases	Increases
Government debt (% of GDP)	Spikes to 200%	Spikes to 200%
Investment (% of GDP)	Decreases in short and medium run	Decreases in short and medium run
Consumption (% of GDP)	Decreases	Decreases
GDP growth rate	Falls in the short and medium run	Falls in the short and medium run

Table 2.3. Main results: foreign liquidity preference shock.

Table 2.4 shows how these variables respond to the three policy interventions. First, austerity generates in the OS-OSR model substantially different outcomes across exchange rate closures. Under the fixed regime, the slowdown in GDP growth induced by lower government expenditure mitigates the main vulnerability channel – reserves to GDP – by shrinking the denominator. Under the flexible regime, by contrast, the slowdown in growth exacerbates the vulnerability channel associated with foreign-currency debt as a share of GDP, as a falling denominator inflates the indicator. As a result, under the flexible regime solvency indicators worsen, with a sharp increase in total government debt and foreign-currency government debt as shares of GDP, alongside a larger fall in investment. Under the fixed regime, the improvement in reserves

as a share of GDP prevents the main vulnerability channels from materialising, but at the cost of a more persistent and intense fall in GDP growth.

Policy Responses to Foreign Liquidity Preference Shock						
Variable	**Austerity**		**Monetary tightening**		**Capital controls**	
	Fixed exchange rate	Flexible exchange rate	Fixed exchange rate	Flexible exchange rate	Fixed exchange rate	Flexible exchange rate
International reserves (% of GDP)	Rise in the medium-long run	Stable	Reserve loss eases in the short run but intensify later	Stable	Reserve loss partially mitigated	Stable
Exchange rate	Exogenous	Milder depreciation	Exogenous	Depreciation ease in the short run but intensify later	Exogenous	Depreciation partially mitigated
Share of foreign debt in local currency (%)	Largely reverts to baseline	Milder decline	Milder decline in the short–medium run, sharper later	Milder decline in the short–medium run, sharper later	Milder decline	Milder decline
Foreign-currency debt (% of GDP)	Little change initially, rises later	Further increase	Milder increase in the short–medium run, sharper later	Milder increase in the short–medium run, sharper later	Decreases	Increase is milder
Government debt (% of GDP)	Rises to around 150%	Spikes to 300%	Exceeds 300%	Spikes to 300%	Peaks around 150%	Peaks around 150%
Investment (% of GDP)	Milder fall in the short–medium run, sharper later	Larger decline	Milder decline in the short–medium run, but aggravated later	Milder decline in the short–medium run, but aggravated later	Decline is milder	Decline is milder
Consumption (% of GDP)	Slightly milder decline	Slightly milder decline	Milder decline in the short–medium run, sharper later	Milder decline in the short–medium run, sharper later	Decline is milder	Decline is milder
GDP growth rate	Falls further and persistently	Falls further and persistently	Improves in the short run, later deteriorates	Improves in the short-term, later deteriorates	Decline is milder	Decline is milder

Table 2.4. Main results: Policy responses and foreign liquidity preference shock.

Second, monetary tightening reduces vulnerabilities in the short run but intensifies them in the long run. The increase in interest rates partially reverses capital outflows initially, but later worsens the income balance due to higher interest rate differentials between foreign and domestic assets. Depreciation (in the flexible regime) or foreign reserve losses (in the fixed regime) are therefore mitigated in the short run but amplified later on. Accordingly, the share of foreign debt in domestic currency decreases less in the short run but deteriorates thereafter. Likewise, foreign-currency-denominated debt as a share of GDP decreases (or increases less, under the flexible closure) initially but worsens in the long run. Government debt to GDP rises further in both regimes, while consumption and investment as shares of GDP, and the GDP growth rate, improve in the short run but deteriorate subsequently.

Finally, the introduction of price-based capital controls in the domestic financial sector improves all of the analysed variables. This policy induces a more stabilizing behaviour of the domestic financial sector, which improves domestic conditions and also affects the portfolio allocation of foreign investors. Foreign reserve losses in the fixed closure and depreciation in the flexible closure are mitigated. As a result, the currency composition of foreign debt improves, while foreign debt as a share of GDP and total government debt to GDP fall. Negative impacts on investment, consumption, and the GDP growth rate are likewise mitigated by this policy response.

2.4. Conclusion

This paper has analysed the interplay of external financial vulnerability with foreign debt and its currency composition in peripheral countries. It has argued that the recent shift towards issuing a significant share of foreign debt in domestic currency – often interpreted as a move beyond original sin – does not represent a structural change in the nature of external financial vulnerabilities. These vulnerabilities remain structurally embedded in the hierarchies of the international monetary and financial system. The turn towards local-currency indebtedness has largely reproduced, rather than overcome, the subordinate status of peripheral currencies and assets in these hierarchies.

Peripheral economies have strengthened their capacity to attract speculative and procyclical foreign demand for their assets, a demand that is highly sensitive to swings in the liquidity preferences of foreign investors. While the structural roots of external vulnerability lie in systemic global asymmetries, their concrete manifestations – whether through traditional channels associated with original sin or new channels linked to original sin redux – depend on the interaction between the global financial cycle and the specific characteristics of the domestic economy. Crucially, because the causes of these fragilities are largely located in the global monetary and financial architecture, they

cannot be resolved simply by achieving sound domestic fundamentals or by deepening domestic financial markets, as is often suggested in mainstream accounts.

To examine these dynamics, an SFC model was developed to analyse external financial vulnerabilities triggered by a foreign liquidity shock and the ways in which different policy responses shape these outcomes. This approach contributes to the SFC literature by placing the currency composition of foreign debt at the centre of the analysis of varying patterns of external vulnerability. More specifically, the model advances the SFC literature by endogenizing the liquidity preferences of foreign investors toward peripheral assets, incorporating an endogenous exchange rate target for fundamentalist traders, and linking expected demand to the emergence of external vulnerabilities.

The foreign liquidity shock in the OS-OSR model leads to external vulnerability through multiple channels, linked to both new and traditional forms of fragility. These channels are highly interconnected, showing that original sin redux not only coexists with original sin, but also that the former tends to feed back into the latter in the presence of foreign liquidity shocks. Specifically, the model shows that reversals in the global liquidity cycle and their interplay with domestic characteristics – such as foreign-reserve accumulation, exchange-rate depreciation and solvency indicators – can undermine the ability of the domestic economy to rely on foreign debt denominated in local currency under both fixed and flexible exchange-rate regimes.

The simulation results also show that the behaviour of the domestic financial sector can itself manifest and amplify external vulnerabilities triggered by foreign liquidity shocks, particularly in the absence of countervailing domestic policy responses. This suggests that the original sin redux hypothesis, which emphasises the expansion of domestic financial markets as a pathway to overcoming external fragilities, should be approached with caution. Without appropriate regulation and capital controls, the domestic financial sector may behave in ways that exacerbate, rather than reduce, vulnerabilities. What is crucial, therefore, is not the mere enlargement of domestic

financial markets, but the design of policies that steer the behaviour of the investor base in a stabilising direction.

The policy experiments further demonstrate that macroeconomic responses significantly shape how these vulnerabilities materialise. Austerity measures internalise fragilities through deeper contractions in output while yielding ambiguous results for financial stability. Monetary tightening temporarily reduces vulnerabilities related to both original sin and original sin redux, but later intensifies them by worsening the net income balance. By contrast, the introduction of capital controls on the domestic financial sector persistently shields the economy from foreign liquidity shocks by reducing exchange-rate depreciation, limiting currency mismatches, and preventing reserve losses.

Overall, the OS–OSR model illustrates that new forms of external vulnerability do not constitute a rupture with traditional ones, and that capital controls play a central role in mitigating these vulnerabilities by steering investor behaviour in a more stabilising direction. Future research could extend the model in several directions – for instance, by analysing more comprehensive forms of capital controls, including those applied to foreign investors; incorporating dirty-floating exchange-rate regimes; examining how financial fragilities feed back into the trade balance; and endogenizing interest rates and prices.

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Appendix

2.A Simulation parameters

Symbol	Description	Value	Remarks/Sources
θ_1	Income tax rate	0.2	Based on Bortz (2014)
h_0	Sensitivity of investment share to utilisation gap	0.05	Based on Centeno (2025)
u_n	Normal rate of capacity utilisation	0.8	Based on Teixeira and Petrini (2023)
v	Capital-to-output ratio	1.8	Taken from a reasonable range (v =1 in Lavoie, v =2.5 in Teixeira and Petrini (2023)
δ	Capital depreciation rate	0.05	Based on Bortz (2014)
ω_1	Wage share	0.825	Calibrated such that the model generates the baseline scenario
ω_2	Households' preference for cash holding	0.3	Calibrated such that the model generates the baseline scenario
j	Threshold of minimum desired reserves to GDP ratio	0.42	Calibrated such that the model generates the baseline scenario
f	Threshold of maximum desired foreign debt to GDP ratio	0.27	Calibrated such that the model generates the baseline scenario
α_1	Propensity to consume out of income	0.9	Based on Carnevali et al. (2024)
α_2	Propensity to consume out of wealth	0.025	Based on Carnevali et al. (2024)
ω_c	Speed of disposable income expectations adjustments	0.2	Based on Bortz (2014)

β_j	Demand uncertainty sensitivity to reserves to GDP ratio	0.25	Calibrated such that the model generates the baseline scenario
β_f	Demand uncertainty to foreign debt to GDP ratio	0.25	Calibrated such that the model generates the baseline scenario
β_{xr}	Demand uncertainty to exchange rate instability	0.75	Calibrated such that the model generates the baseline scenario
β_p	Demand uncertainty speed of adjustment	0.2	Calibrated such that the model generates the baseline scenario
α_{r1}	Exchange rate target of fundamentalists sensitivity to foreign debt to GDP	0.8	Calibrated such that the model generates the baseline scenario
sp_t	Foreign investors exogenous target to bear exchange rate risk	0.5	Calibrated such that the model generates the baseline scenario
α_{xr}	Foreign investors preference sensitivity to exchange rate risk	0.65	Calibrated such that the model generates the baseline scenario
ρ_1	Speed of adjustment of preference to target	0.03	Calibrated such that the model generates the baseline scenario
ρ_2	Exchange rate risk persistence coefficient	0.8	Calibrated such that the model generates the baseline scenario
$dist_b$	Financial sector share of profits distributed to households	0.8	Taken from a reasonable range
θ_{CC}	Capital outflow tax rate	0	Calibrated such that the model generates the baseline scenario

τ_1	Banks deposit share in cash	0.3	Calibrated such that the model generates the baseline scenario
τ_2	Banks deposit share covering loans	0.3	Calibrated such that the model generates the baseline scenario
χ^{fun}	Share of fundamentalists traders	0.5	Lavoie and Daigle (2011)
χ^{chart}	Share of chartists traders	0.5	Lavoie and Daigle (2011)
ξ	Sensitivity parameter of chartists	0.1	Taken from a reasonable range (ξ ranges from 0 to 15 in Dávila-Fernández and Sordi (2025), and is equal to 0.2 in Bortz)
ζ	Sensitivity parameter of fundamentalists	0.1	Taken from a reasonable range ranges from 0 to 15 in Dávila-Fernández and Sordi (2025), and is equal to 0.2 in Bortz)
β_{xr1}	Fundamentalists exchange rate target sensitivity to international reserves to GDP ratio	0.8	Calibrated such that the model generates the baseline scenario
β_{xr2}	Fundamentalists exchange rate target sensitivity to foreign debt to GDP ratio	0.8	Calibrated such that the model generates the baseline scenario
Ω	Exchange rate risk tolerance threshold	0.0001	Calibrated such that the model generates the baseline scenario
r_{ma}	Interests on deposits	0.005	Based on Nalin and Yajima (2022)
r_{bf}	Interests on foreign safe asset	0.02	Calibrated such that the model generates the baseline scenario
$r_{GR\$}$	Interests on domestic currency government debt	0.03	Based on Bortz (2014)

$r_{G\$}$	Interests on foreign currency government debt	0.03	Based on Bortz (2014)
r_l	Interests on loans	0.033	Calibrated such that the model generates the baseline scenario
r_a	Interests on advances	0.02	Calibrated such that the model generates the baseline scenario
r_g	Growth rate of government expenditures	0.03	Based on Bortz (2014)
rg_{mf}	Growth rate of RoW deposits	0.0326	Calibrated such that the model generates the baseline scenario
λ_{11}	Foreign investors portfolio allocation sensitivity to yields	5	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)
λ_{12}	Foreign investors portfolio allocation sensitivity to yields	2.5	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)
λ_{13}	Foreign investors portfolio allocation sensitivity to yields	2.5	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)
λ_{21}	Foreign investors portfolio allocation sensitivity to yields	2.5	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)
λ_{22}	Foreign investors portfolio allocation sensitivity to yields	5	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)
λ_{23}	Foreign investors portfolio allocation sensitivity to yields	2.5	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)
λ_{31}	Foreign investors portfolio allocation sensitivity to yields	2.5	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)

λ_{32}	Foreign investors portfolio allocation sensitivity to yields	2.5	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)
λ_{33}	Foreign investors portfolio allocation sensitivity to yields	5	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)
λ_{70}	Domestic investors liquidity preference	0.5	Calibrated such that the model generates the baseline scenario
λ_{71}	Domestic investors portfolio allocation sensitivity to yields	6	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)
λ_{72}	Domestic investors portfolio allocation sensitivity to yields	6	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)
λ_{60}	Domestic investors liquidity preference	0.5	Calibrated such that the model generates the baseline scenario
λ_{61}	Domestic investors portfolio allocation sensitivity to yields	6	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)
λ_{62}	Domestic investors portfolio allocation sensitivity to yields	6	Taken from a reasonable range λ_{xy} range from 0.06 to 30 in Godley and Lavoie (2012)
$riskf$	Foreign investors exogenous liquidity preference	0.2	Calibrated such that the model generates the baseline scenario

Interlude

The Core-Periphery Framework Goes to Europe

> *"The [European] periphery shows technological, economic and political dependency on the centre of Europe analogous (for example) to that of Canada, Mexico and the Caribbean on the United States, or indeed the periphery of the world economy on the industrial countries that form its core, as in the core-periphery model of Raul Prebisch and other dependency theorists"*
>
> (Seers, 1983, p. ix)

A country's peripheral position is not an intrinsic property but a relational one, defined by its subordination to a core. Within the global capitalist core, economic asymmetries between countries can also be endogenously reproduced. In Europe, these dynamics have been closely intertwined with the process of regional economic integration. The recognition that integration was reshaping inequalities within Europe led strands of economic literature to draw on Latin American structuralism and dependency theories to develop the notion of a European core–periphery divide. Emerging in the 1970s, this debate initially focused on the interaction between productive divergence and regional integration and, in doing so, anticipated a hierarchical structure that would later be increasingly mediated through finance.

European economists that had previously focused on matters of development in Africa, Asia and Latin America, realized that some problems faced by countries in these

continents were, to some extent, similarly faced by other countries in Europe. A key figure among these economists was Dudley Seers, a British economist at the Institute of Development Studies (IDS) at the University of Sussex, who had worked with Raúl Prebisch at the United Nations Economic Commission for Latin America and the Caribbean. In the mid-1970s, Seers began to work at IDS on the problems of a 'periphery' within Europe and,[28] together with the European Association of Development Institutes (EADI), helped to establish the European Periphery Group to deepen research on this topic (Seers, 1983).

A network of institutions and scholars, with Seers as a central exponent, came together in what Weissenbacher (2019) terms the European Dependency School. Their contributions were developed in the wake of the crisis of the "golden age" of capitalism in the 1970s and as a response to the inability of neoclassical economics to account for a reality in which convergence between poor and rich countries was far from being realised. These authors argued that the so-called European periphery was characterised by a shortage of skills, relatively poor social services, productive structures specialised in primary products and tourism, net emigration and weak public authorities (Seers, 1983).

This debate was closely linked to discussions about the consequences of deepening and enlarging regional integration in the European Economic Community (EEC). Seers (1980) argued that, in the absence of redistributive measures, the integration process could entrench an asymmetry between surplus and deficit countries, effectively compelling the latter to adopt deflationary policies.[29] With no institutional mechanisms

[28]These authors define the periphery as including Greece, Italy, Portugal, Spain and Ireland, which contemporary literature often labels the Eurozone periphery. However, they also place Scotland and northern Scandinavia in this category – sometimes referring to them as a 'semi-periphery' – thus describing a configuration that differs markedly from current understandings of the European periphery.

[29]Nowadays, the common currency together with the creation of Target2 and the possibility of accumulating growing trade imbalances gives a different shape to this problem. However, the

to offset these imbalances, deficit countries had few remaining instruments to correct balance-of-payments problems, having already renounced trade restrictions, foreign exchange controls and exchange rate flexibility. This institutional configuration produced an asymmetry that, as Seers (1980, p. 19) warned, could become more serious "the more complete the degree of integration".

Awareness of this asymmetry emerged at a time when the EEC was composed of the founding members – Belgium, France, Germany, Italy, Luxembourg and the Netherlands – and the countries that joined in the first enlargement – Denmark, Ireland and the United Kingdom (the Nine). During the 1970s, the gap between more and less developed countries of the EEC widened, with richer countries, especially West Germany, growing faster than poorer regions, notably Italy, which fell behind in terms of income and technology (Kiljunen, 1980; Seers, 1980). West Germany developed a chronic trade surplus and enjoyed a competitive advantage in most dynamic industries (Seers, 1980).

In the late 1970s and early 1980s, debates intensified around a second enlargement, which aimed to extend EEC membership to Greece, Portugal and Spain (the Three). The prospect of accession generated insecurities in France and Italy about competition from Mediterranean agricultural products (Deubner, 1982). For West Germany, by contrast, the situation was more favourable: it was not a major producer in sectors where the new members were relatively strong and possessed an industrial advantage that could benefit from access to these new markets (Deubner, 1982). The European Dependency School expressed growing concern that existing gaps in development and performance among member states would be amplified by the accession of countries with even more pronounced structural disparities. Seers formulated hypotheses that captured the likely direction of these trends:

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need to adjust towards deflationary policies has remained alive - mostly because it would emerge inside the Eurozone a hierarchy of debts that would allow the financial markets to discipline the States towards deflationary policies, as it will be illustrated in the next chapters.

> One hypothesis is that the three peripheral countries [Portugal, Spain, and Greece] would suffer from chronic deficits in intra-Community trade. On this model, particularly fast inflation among them, and high rates of unemployment exacerbated by particularly strict financial policies, could also be expected (Seers, 1980, p. 20).

In the industrial sector, the most serious deficiencies were found in Portugal and Greece, but all three countries shared a set of structural weaknesses: the very small size of most industrial enterprises, the fact that many large firms were controlled by foreign capital, and a high share of labour-intensive industries in total industrial production (Musto, 1982). This placed the new members, who were about to lose economic policy autonomy, in a difficult position. Joining an area that was "being geared in every way to the needs of highly developed industrial countries" (Musto, 1982, p. 70) would put additional strain on their economies. The second enlargement thus risked damaging the relatively fragile industrial bases of the Three and, in the absence of major reforms, the loss of sovereignty threatened to produce what Seers (1982, p. 11) described as a "serious dualism":

> Yet if there are no major reforms in the Community, there will be, after the enlargement, serious dualism, indeed a sort of colonial system. In the poorer group which already suffers whenever a government of the core adopts financially restrictive policies, the effects could be more severe if they give up the possibility of adopting measures to protect the national economy. Wage levels would stay much lower than in the Nine, and the new members would continue to depend heavily, perhaps increasingly, on tourism and labor migration. (Seers, 1982, p. 11)

Seers (1982) argued that the outcome of European integration could be different if the Community were to evolve into a genuinely integrated region, grounded in reforms of the agricultural and industrial sectors of the new members and supported by a strong fiscal system with redistributive features. Such a transformation, however, would require overturning the very foundations of the European integration project. From its inception, the EEC had adopted an economic liberal paradigm (Weissenbacher, 2019), seeking to function as a laissez-faire system in which competition and free trade were expected to increase industrial efficiency (Seers, 1982). As Musto (1982, p. 70) notes, this arrangement, based on the absence of a common industrial policy and the lack of

adequate regional policy instruments, "tend[s] to stabilize the status quo and hamper the structural reform needed to achieve a new balance," thereby penalising the most fragile economies.

To break with this integration architecture would also mean running counter to the interests of powerful actors in the region. Industrial trade associations, for instance, sought to "insist on open and unhindered access to the Mediterranean markets in the enlargement negotiations" while opposing "any dirigiste measures of industrial policy in the candidate countries" (Deubner, 1982, p. 52). In West Germany, there was a broad consensus against reforms that went beyond stabilisation programmes and implied austerity in Southern Europe (Deubner, 1982, p. 54). Already at this stage, the "solution" to Europe's internal divergence was being framed in terms of austerity. Scholars of the European Dependency School warned that the persistence of this institutional framework would not only reinforce asymmetries, but also create a structural tendency toward disintegration (Seers, 1982, p. 11; Musto, 1982, p. 70).

European integration nevertheless advanced in a direction that combined increasing monetary and economic integration with persistent regional imbalances and systemic fragilities. A crucial milestone was the creation of the monetary union and the introduction of the euro. Seers (1982, p. 12) envisaged a possible arrangement in which "in a more homogeneous Europe, the European Currency Unit could become the strongest of currencies, impervious (which it is not currently) to a dollar that fluctuates violently." Instead, integration followed a trajectory closer to the alternative he also outlined: "the European Monetary System could, like the gold standard, easily increase rather than reduce inequality, in the absence of policies to stop this happening" (Seers, 1982, p. 10).

The consolidation of the monetary union did not break with the earlier logic of integration. The euro did not emerge as the dominant global currency; rather, monetary integration remained relatively passive within an international monetary order still

dominated by the United States. Nonetheless, the euro secured an important place in the international currency hierarchy, positioned just below the dollar.

In the decades following the work of the European Dependency School, capitalism underwent significant transformations, marked by the growth and deepening of financial markets and the emergence of financialisation. In this new historical phase, and with the creation of the Eurozone, the regional core–periphery divide took on a more evident and distinctive financial character. The Eurozone periphery now faces a variegated form of financial subordination to the regional core, shaped by the interplay between the institutional architecture of the monetary union and the hierarchy of euro-denominated sovereign debts.

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PART II

The Eurozone Periphery

Chapter 3

The Eurozone's Contradiction

How the Power of Finance Subordinates the Periphery and Threatens Monetary Integration

Abstract

This article analyses the regional financial subordination of the Eurozone periphery, arguing that it is underpinned by a hierarchy of sovereign debts. It introduces a novel analytical framework centred on the 'Eurozone's contradiction', a concept that captures the tension between the disciplinary power of finance and the perpetuation of the monetary union. When this tension intensifies, institutional changes are required to safeguard the common currency area. These developments reshape the regional sovereign debt hierarchy and, through it, the variegated financial subordination of the periphery. The argument is illustrated through an analysis of how the Eurozone's contradiction was managed during the debt crisis, the pandemic, and its aftermath.

3.1. Introduction

The Eurozone's debt crisis exposed persistent financial asymmetries among member states, ultimately threatening the existence of the monetary union. By contrast, the pandemic crisis prompted major policy shifts and institutional changes that prevented fragmentation from reemerging. These two crises triggered distinct responses from regional institutions, impacting the Eurozone's core and periphery in different ways. With post-pandemic policy normalisation, concerns arise about the possible resurgence of fragmentation (De Grauwe and Ji 2022, Claeys et al. 2022), underscoring the topic's current relevance.

This paper examines the variegated character of financial subordination in the Eurozone periphery within the monetary union. The literature on international financial subordination focuses on the Global South, highlighting the position of these countries' currencies at the bottom of the currency hierarchy as the basis for their financial vulnerability (De Paula et al., 2024; Alami et al., 2023; Bonizzi et al., 2023). According to Alami et al. (2023), such subordination refers to the particularly violent form of expression that the structural power of finance takes in the Global South. Extending this framework, I define regional financial subordination in the Eurozone as the heightened form that the disciplinary power of finance takes in the periphery of the monetary union relative to its core. Unlike economies in the Global South, the periphery of the euro area does not face reserve shortages or volatile exchange rates. Instead, its subordination manifests through government-bond spreads and capital-flow volatility.

The main questions addressed in this paper are the following: Which dynamics allow that in the Eurozone, where all the countries share the same strong currency, financial asymmetries still persist? How is this feature interconnected with the role played by regional institutions and their approach to sovereign debt? And how have these dynamics been shaped by institutional and policy changes introduced during the debt crisis, the pandemic, and its aftermath? To address these questions, the paper focuses on the on

the institutional framework of the Economic and Monetary Union (EMU) and its interplay with sovereign debt, while acknowledging that other factors also contribute to these asymmetries.[30] The countries analysed are Southern Europe (Italy, Portugal, Greece, Spain) and Ireland,[31] nations whose early participation in the EMU similarly shaped their financial integration.

This article argues that financial asymmetries within the Eurozone are based on a regional hierarchy of sovereign debts, shaped by the EMU's institutional configuration. At the centre of this process lies what I term the 'Eurozone's contradiction': the tension between the enforcement of financial discipline, which affects member states unevenly, and the preservation of the monetary union. When this tension intensifies and systemic risks emerge, institutional and policy interventions become necessary to safeguard the euro area. These measures can temporarily soften market discipline and flatten the regional sovereign debt hierarchy. Once systemic risks recede, discipline is reinforced, paving the way for the reemergence of financial asymmetries. Thus, the periphery's regional financial subordination is dynamically shaped by the EMU institutions in their management of the Eurozone's contradiction. Policy and institutional developments during the debt crisis, the pandemic, and the post-pandemic illustrate how this dynamic has operated, influenced by the specific ways systemic risks were triggered in each crisis. The argument is supported by an analysis of balance-of-payments flows, cross-correlations, ECB balance sheet data, government bond spreads, and the evolution of institutional and policy frameworks.

The contributions of this article are threefold. First, it formulates a novel framework centred on the concept of the Eurozone's contradiction to analyse the regional financial subordination of the Eurozone periphery. While the literature on international financial

[30]As the specificities of national financial systems (Santos et al., 2020) and productive divergences (Gambarotto et al., 2019).

[31]These countries are here grouped as the Eurozone periphery, following substantial part of the literature (e.g., Dooley, 2019, Fuller, 2018).

subordination has mainly examined asymmetries stemming from the global currency hierarchy (Alami et al., 2023; Bortz & Kaltenbrunner, 2018; De Paula et al., 2024), this paper addresses a key gap: the persistence of such asymmetries within a single-currency area. The Eurozone's contradiction offers a conceptual lens to extend this literature to the monetary union. This approach foregrounds the role of institutional configurations in structuring financial subordination via sovereign debt hierarchies, an aspect underexplored in this literature.

Second, this framework is applied to examine how institutional developments influenced financial imbalances during the debt crisis, the pandemic, and the post-pandemic period. In doing so, this article dialogues with debates on the 'flaws' of the monetary union (De Grauwe, 2013; Lavoie, 2022; Papadimitriou & Wray, 2012). Building on the political economy tradition (Streeck, 2017; Giordano & Lapavitsas, 2023; Cesaratto, 2020), it is clarified the rationale behind these 'flaws' and their transformations after the debt crisis. The concept of the Eurozone's contradiction helps interpret recent institutional shifts not as ruptures, as some accounts suggest (e.g., Ehnts & Wray, 2023), but as evolving strategies to manage the structural tension embedded within it across different contexts.

Third, this paper explains why crises prompted different institutional and policy responses, leading to varied integration outcomes. It engages with the EU polycrisis literature, particularly on how integration and policymaking respond to successive shocks (Ferrara & Kriesi, 2021; Genschel & Jachtenfuchs, 2021; Biermann et al., 2019; Fabbrini, 2025). It is evidenced that crisis policymaking navigates a tension between safeguarding the euro and preserving the disciplinary power of finance, shaping regional divergence based on how each crisis generates systemic risks. The concept of the Eurozone's contradiction provides an analytic frame to capture the interplay between financial discipline and integration outcomes, an often-overlooked issue in this scholarship.

This article is divided into six sections besides the introduction. The second discusses the main EMU institutional features that underpin the persistence of financial asymmetries. The third illustrates the empirical manifestations of these asymmetries in gross financial inflows, and specifically sovereign debt inflows. The fourth introduces a new framework to analyse Eurozone asymmetries, centred on the 'Eurozone's contradiction'. The fifth, sixth and seventh sections apply this framework to analyse and compare different historical moments: the debt crisis, the pandemic and the post-pandemic. The last section concludes.

3.2. The Eurozone Institutional Framework and the Single-Currency Sovereign Debt Hierarchy

European monetary integration is described in the literature as a process embedded in power asymmetries among states that have reproduced regional disparities (Santos & Teles, 2020; Gambarotto et al. 2019; Streeck, 2017). I argue that the financial dimension played a key role in this process, as the EMU institutions emerged as intermediaries between the power of financial markets and the discipline they exert over member states. The monetary integration was underpinned by asymmetrical power disputes across states, where German influence was crucial in shaping its institutional architecture.[32] This section highlights three fundamental features of the Eurozone institutional framework that, by strengthening financial market discipline, reinforce a hierarchy of sovereign debts denominated in the same currency: the absence of a permanent lender of last resort (LOLR) to governments; a market-based collateral policy; and strict fiscal rules.

[32]During the1980s, monetary union was a key French demand, while German policymakers remained cautious. German consent only came conditionally on the ECB adopting the Bundesbank model of independence and price stability (Szász, 1999).

First, the 1992 Maastricht Treaty established a key feature of the ECB's approach to government debt, given the absence of a LOLR to governments. In the absence of effective institutional counterbalances, private investors' risk assessments of sovereign debt can significantly affect borrowing costs (Sotiropoulos et al., 2013). In the Eurozone, this was cemented by prohibiting the ECB and National Central Banks (NCBs) from directly purchasing government debt. Although secondary-market purchases weren't legally barred, the Eurosystem voluntarily refrained from them until 2014 (Lavoie, 2015), and, afterwards, uncertainty regarding such interventions has persisted. Consequently, member states have "voluntarily placed themselves in a predicament where markets can actually force them into default" (Sotiropoulos et al., 2013, p. 206).

A second key feature concerns the ECB's collateral policy. The ECB adopted, especially after 2005, a market-based framework, setting minimum eligibility criteria, making margin calls, and applying haircuts based on private credit ratings (Gabor and Ban, 2016, Murau et al., 2025). Like other central banks, the ECB lends to banks against collateral, and policy transmission depends on the smooth functioning of the repo market (Braun, 2020). The ECB particularity is its reliance on sovereign debt from multiple jurisdictions, where a market-based collateral policy can amplify fragmentation by undermining the "repo-driven demand" for specific government securities[33] (Gabor and Ban, 2016). Moreover, the relevance of state liabilities in repo markets is uneven: Germany issues the largest share, followed by Italy and France - together representing more than 40% of the market (International Capital Market Association, 2023). While the market-based approach can amplify tensions in specific sovereign debt markets, sovereign debt instabilities in a given country pose varying degrees of threat to the transmission of monetary policy, depending on the importance of that debt within the repo market.

[33]The Emergency Liquidity Assistance allowed for a more flexible collateral policy, but it also had significantly higher interest rates (Hardouvelis & Vayanos, 2023).

The third feature concerns fiscal policy. The reinforcement of financial discipline over sovereign debt through monetary and collateral policy pushes Eurozone countries to seek market confidence through austerity. In normal times, fiscal consolidation is the only embedded mechanism the EMU provides for member states to reassure financial markets of their solvency. Under the Maastricht Treaty and the subsequent Stability and Growth Pact (SGP), fiscal policy was constrained by rigid limits on government deficits (3% of GDP) and public debt (60% of GDP), with non-compliance triggering adjustment paths. Yet in 2003, France and Germany breached the deficit rule without sanctions, exposing the reluctance to enforce rules against powerful members (Tooze, 2018). Countries facing higher borrowing costs can be pressured to cut other expenditures to approach the debt threshold. Such fiscal consolidation has contractionary effects that further weaken public finances, fuelling a self-reinforcing cycle that has the potential to deepen regional imbalances instead of restoring stability (more details in Section 3.5).

This institutional configuration – marked by the absence of permanent LOLR to governments, a market-based collateral framework, and strict fiscal rules – imposes policy constraints on member states that contrast with the freedom of capital mobility. This framework grants finance unprecedented power to unevenly influence sovereign borrowing costs across the Eurozone and favour hierarchical sovereign debt relations. Before the euro, EU financial asymmetries reflected the hierarchies of the international monetary system, which have long been expressed through more traditional monetary fragilities well recognized in the literature[34], such as exchange rate instabilities. The particularity of the EMU is that a sovereign debt hierarchy denominated in the single currency emerged as the very basis of regional financial asymmetries. At the top sits German debt, widely perceived as the region's safest asset due to Germany's economic

[34]An analysis of monetary hierarchies comprising Europe before the introduction of the euro can be found in Cohen (1998).

and political dominance. At the bottom lie the peripheral Member States, whose sovereign bonds fail to perform the role of a regional safe asset.

As is explored further, this institutional framework not only favours financial asymmetries but also carries contradictions that became evident during episodes of economic distress. The next section examines how these dynamics unfolded in capital flows.

3.3. Sovereign Debt Hierarchy and Financial Flows Asymmetries

Regional asymmetries shaped by the EMU's institutional framework are reflected in capital flows. This section shows that gross financial inflows illustrate how these asymmetries deepened during the debt crisis and eased during the pandemic, reflecting the different institutional approaches to government securities in each period. Sovereign debt hierarchies were central to these asymmetries, as state liabilities function as foundations of the contemporary capitalist financial system (Vasudevan, 2025), and sovereign risk serves as a benchmark for assessing private asset creditworthiness (Ozturk et al., 2016).

Building on Alami (2018) and Sotiropoulos et al. (2013), who theorize financial flows as expressions of capital's disciplinary power in constraining state policymaking, I contend that financial flows in the Eurozone reflect the disciplinary power of capital exercised through financial markets in the region. I argue that financial flow asymmetries provide evidence that such power disproportionately affects the Eurozone periphery relative to the core. This article refers to this phenomenon as the uneven disciplinary power of finance, or simply uneven financial discipline.

Before the Global Financial Crisis (GFC), Southern Europe and Ireland experienced substantial gross financial inflows that boosted financial asset prices (Kohler, 2022) and credit demand (Borio & Disyatat, 2015), contributing to lower long-term interest rates,

including those on government securities (Carvalho & Fidora, 2015)[35]. However, a decline in gross financial flows functions as a disciplinary mechanism by adversely affecting domestic asset prices, raising government funding costs and often pushing states towards austerity, worsening the solvency of public and private agents, and creating instability.

The procyclical and volatile demand from foreign investors for the assets of countries in the global periphery is a well-documented manifestation of international financial subordination (Alami et al., 2023, Bonizzi et al., 2023, Bortz & Kaltenbrunner, 2018). As illustrated in Figures 3.1 and 3.2, peripheral Eurozone countries face a similar reality at the regional level, facing more volatile and procyclical gross financial inflows – portfolio and foreign direct investment (FDI) – and general government inflows (mainly government debt inflows) when compared with Germany. Notably, there was a dramatic fall in gross financial inflows and government inflows in peripheral countries starting in 2010, contrasting with an upward trend in the Germany. During the debt crisis and the initial phase of the pandemic, Germany benefitted from increased foreign demand for its government bonds and assets. In the pandemic's wake, financial flows became less unstable than during the previous shock, with the discrepancy between Germany and the periphery less pronounced. Excluding Greece, peripheral countries did not experience significant decreases in gross general government inflows during the pandemic (Figure 3.2), and reductions in gross FDI and portfolio inflows remained moderate (Figure 3.1). These financial flow asymmetries illustrate that the uneven character of the disciplinary power of finance was exacerbated during the debt crisis and significantly reduced during the pandemic.

[35]The emphasis on gross financial flows aligns with a body of literature suggesting that they better reflect financial instabilities than net financial flows, which merely mirror current account balances (Kohler, 2022; Borio & Disyatat, 2015).

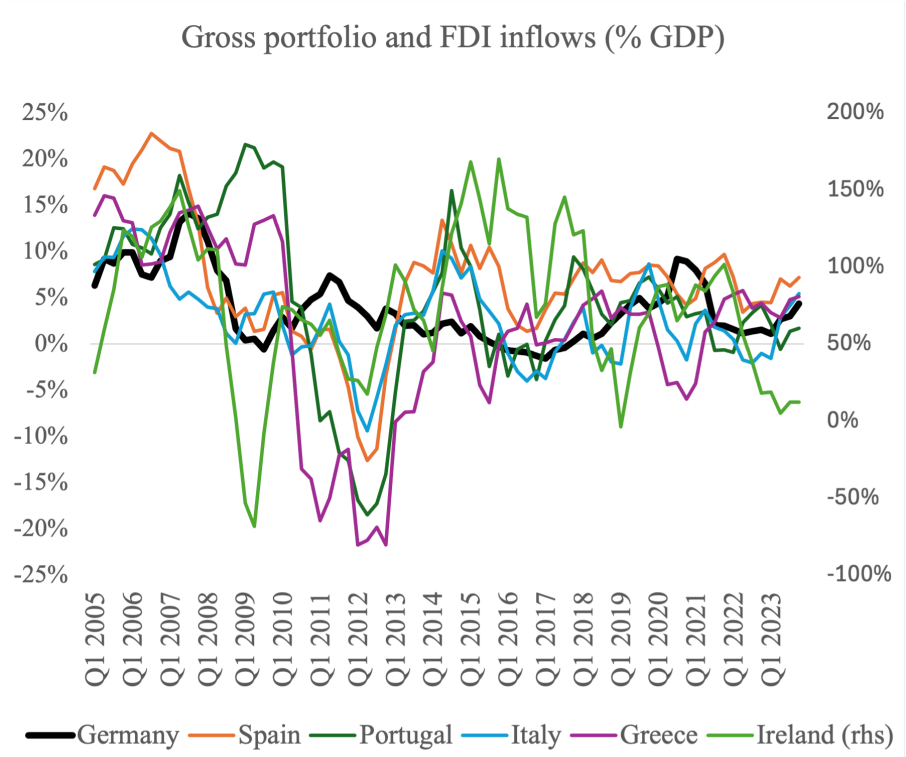

Figure 3.1. Gross portfolio and FDI inflows (% of GDP). Data: IMF/BoP. Gross direct and portfolio inflows comprise the sum of net incurrence of portfolio investment and direct investment liabilities. Values are in four-quarter moving average.

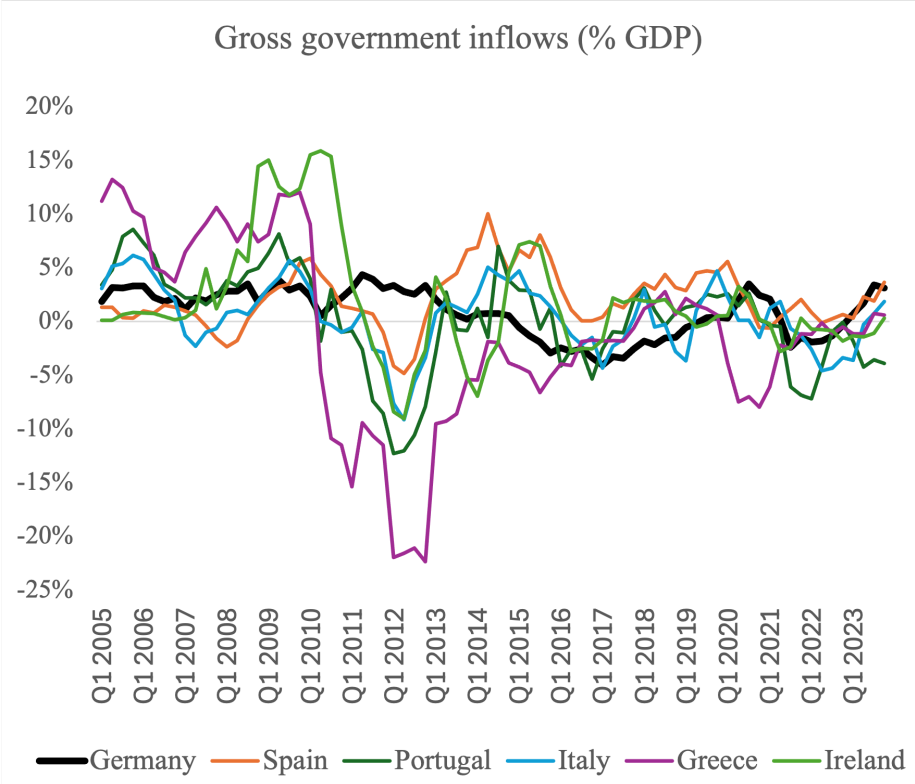

Figure 3.2. Gross government inflows (% of GDP). Data: IMF/BoP. Gross government debt inflows comprise the debt securities issued by the general government (central, state or local government). Values are in four-quarter moving average.

Table 3.1 further illustrates that peripheral countries generally exhibit higher volatility in capital inflows than the Eurozone core. The periphery also demonstrated a strong correlation between gross inflows and general government inflows, particularly during the debt crisis. This is explained by a higher share of government securities in portfolio flows and the interconnectedness of private and public financial flows. Ireland, in particular, experienced large and volatile financial inflows that inversely correlated with government inflows. This reflects the Irish financial system's dependence on the U.S. dollar, the British pound, and the U.S. and UK financial systems (Lane, 2015), creating vulnerabilities tied to these currencies that add to regional imbalances. Southern Europe exhibits both volatile and pro-cyclical gross financial flows, strongly correlated with inflows into government securities, underscoring the latter's importance to financial instability. Thus, government debt flows are a fundamental expression of the uneven disciplinary power of finance in the region.

Standard deviation of capital flows (2008 - 2023)						**Correlation (2008-2023)**	
Gross gen. government inflows (% GDP)		Gross portfolio inflows (% GDP)		Gross FDI and portfolio inflows (% GDP)		Gross inflows and gov. debt inflows (% GDP)	
Greece	7,74%	Ireland	35,60%	Ireland	49,11%	Greece	0,96
Ireland	5,85%	Portugal	9,71%	Netherlands	26,91%	Italy	0,91
Portugal	4,50%	Greece	8,52%	Belgium	13,39%	France	0,90
Finland	3,35%	Netherlands	7,32%	Portugal	9,02%	Portugal	0,90
Italy	3,07%	Finland	4,77%	Greece	8,96%	Spain	0,73
Netherlands	3,02%	Spain	4,72%	Austria	6,02%	Germany	0,65
Spain	2,90%	Belgium	4,51%	Spain	4,97%	Austria	0,37
Belgium	2,69%	France	4,05%	France	3,88%	Finland	0,35
France	2,46%	Italy	3,90%	Finland	3,84%	Belgium	-0,05
Germany	2,32%	Austria	3,83%	Italy	3,83%	Ireland	-0,09
Austria	2,25%	Germany	2,75%	Germany	2,79%	Netherlands	-0,22

Table 3.1. Standard deviation of capital flows and correlation (2008-2023). Own calculations based on IMF/BoP data.

The strict controls imposed by Eurozone institutions on government debt and deficits contrasted with the freedom of international financial flows, intensifying the effects of the reallocation of investors' portfolios from the periphery to the core during periods of

distress. Core countries, epitomised by Germany, benefit from the safe-haven status of their government debt and experience more stable and anticyclical flows. In contrast, the periphery faces procyclical and volatile flows, with government debt flows playing a critical role. This provides empirical evidence of the heightened disciplinary power of finance over the Eurozone periphery relative to the core, a manifestation of their regional financial subordination. The intensification of these asymmetries during the debt crisis, and their easing during the pandemic, reflect the different institutional responses to distinct types of crises, which the next sections examine in detail.

3.4. The Eurozone's Contradiction

The previous section illustrated the manifestation of financial asymmetries in capital flows, showing their intensification during the debt crisis and their softening during the pandemic. This section introduces a new framework linking financial asymmetries and institutional developments in the region. I define the Eurozone's contradiction as the tension between the uneven disciplinary power of finance and the perpetuation of the monetary union. When this tension becomes unsustainable, it triggers institutional adjustments aimed at preserving the single currency area. Such adjustments, in turn, reshape the regional hierarchy of sovereign debts and through it the financial subordination of its periphery.

A broad body of literature highlights the Eurozone's institutional 'flaws', as the absence of a federal government and the ECB's reluctance to purchase public debt, as the root cause of the debt crisis (Lavoie, 2022; Papadimitriou & Wray, 2012; De Grauwe, 2013). The institutional developments that followed the debt crisis and the pandemic were interpreted by Ehnts and Wray (2024) as the resolution of such flaws. Yet the post-pandemic reassertion of market discipline casts doubts on whether these changes marked a structural break.

These ‘flaws’ and their subsequent transformations through institutional developments are not merely technical errors eventually corrected, but instead reflect the dynamics of class and conflicting inter-state interests. For those invested in market discipline, these flaws, in principle, have a functional role. The instabilities and asymmetries they generate are unintended by-products, yet also channels through which financial discipline can operate – e.g. through sovereign spreads. In the absence of alternatives in the EMU, member states in distress are driven into austerity and structural reforms that erode labour and social rights – as in the Eurozone periphery during the debt crisis (see Section 3.5). In this way, the burden of adjustment tends to fall disproportionately on labour, thereby reinforcing capital’s relative dominance. As Cesaratto (2020, p. 188) puts it, as a disciplinary tool, “it is untrue that the euro is a failure; it is a success”. These dynamics are further shaped by the interests of core countries, that benefit from procyclical capital inflows (see Section 3.3) which ease the very constraints imposed by the EMU. As a result, these countries often resist redistributive or risk-sharing measures that could structurally address these instabilities, viewing them as politically or economically costly. However, shifts in the Eurozone’s institutional framework emerged as necessary to preserve the monetary union (Giordano & Lapavitsas, 2023), revealing a problem in its original setup that could jeopardize the broader interests it supports.

The deepening of the debt crisis indeed highlighted a significant problem: the prior institutional incapacity to manage the growing tension between the uneven disciplinary power of finance and the perpetuation of the Eurozone. The tension between these two poles – on one side, financial discipline and its asymmetric impacts, and on the other, the reproduction of the common currency – illustrates the Eurozone’s contradiction. In a single currency area, uneven financial discipline might pose risks to the entire region due to the potential for economic contagion and political resistance from the most affected nations. Ultimately, this contradiction could threaten the very existence of the

monetary union. During moments when such tension became unbearable – such as the debt crisis and the pandemic – the Eurozone's contradiction was managed through institutional developments and shifts in economic policy, shaping the periphery's subordination.

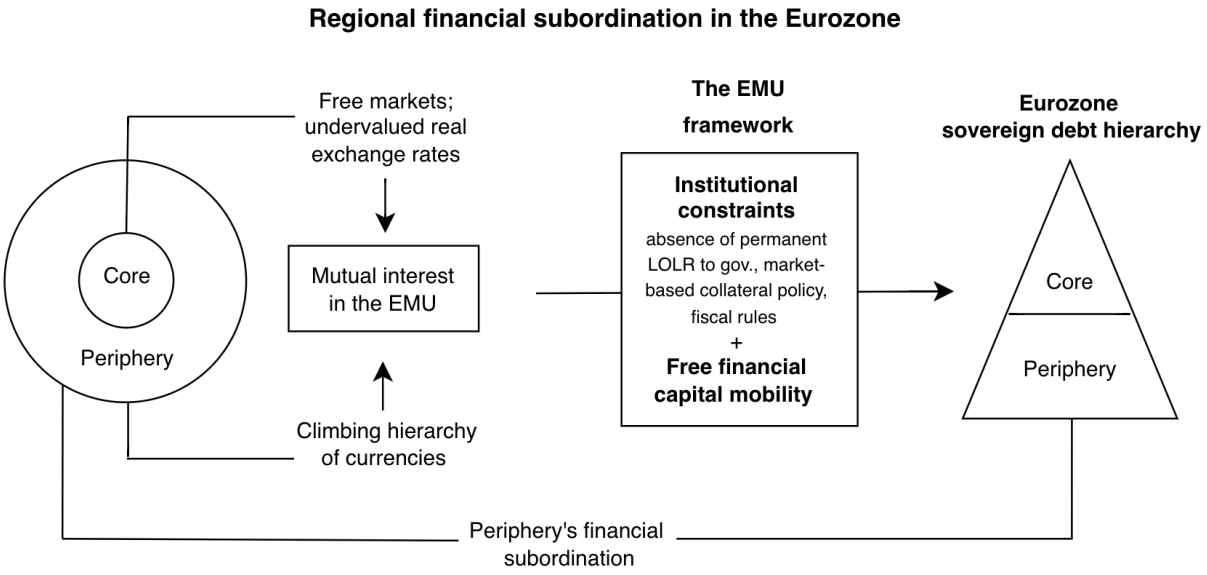

Figure 3.3. Regional financial subordination in the Eurozone.

Figure 3.3 schematizes the conceptual structure of the argument. Both core and peripheral countries benefit from the Eurozone and are, ceteris paribus, invested in the perpetuation of the regional currency. Core countries are committed to the euro perpetuation, as they benefit from an open market and undervalued real exchange rates that support their export-led growth model (Kohler & Stockhammer, 2022). The periphery, meanwhile, benefits relatively more than core countries from moving up the international currency hierarchy through the adoption of the euro, as this reduces exchange-rate volatility and diminishes the need to accumulate foreign reserves. However, the EMU institutional framework – given the absence of a permanent lender of last resort to governments, the market-based collateral policy, and the strict fiscal rules, contrasting with free capital mobility (Section 3.2) – renders member states' liabilities vulnerable to the discipline imposed by financial markets, impacting more peripheral countries that suffer from procyclical capital flows (Section 3.3). This

exacerbates the impacts of sovereign risk assessment and reinforces a regional hierarchy of government securities, in which peripheral countries consistently rank at the bottom. This hierarchy perpetuates their financial subordination within the Eurozone.

Nevertheless, the uneven disciplinary power of finance might impose significant challenges to the entire Eurozone during moments of distress. In such a deeply integrated and interdependent region, the risks of financial contagion and political resistance from the most fragile states might endanger the monetary union survival. When systemic threats arise, the EMU institutions must navigate the tension between financial discipline and the preservation of the euro. Institutional developments and economic policy shifts arise in response to risks affecting the whole euro area, particularly when these risks impact core economies, given their regional power and influence. These institutional and policy changes reshape the hierarchy of sovereign debts, making it sharper or flatter depending on systemic risks, thereby allowing for the Eurozone's perpetuation.

As De Grauwe and Ji (2022, p. 9) argue, no single Eurozone economy can 'force the ECB to provide liquidity in times of crisis', creating uncertainty about future liquidity support. However, the EMU's monetary and fiscal backstop is not only uncertain but also uneven, depending on the political and economic weight of each country. The power asymmetry within the EMU is reflected in decision-making, shaping policies that both express and reinforce disparities (Maris & Sklias, 2020). Additionally, the risk that instability in one country could affect the broader Eurozone is a source of power to the country in distress[36]. Given the different sizes and degrees of interconnectedness between states, countries differ in the extent to which national distress becomes a regional concern. Consequently, the EMU tolerates varying levels of financial instability among its members, depending on the threat each poses to integration outcomes. Some

[36]Empirical evidence of bargaining power arising from contagion risk in the Eurozone is presented by Fotiou, Bonk, and Manalis (2022, p. 6).

peripheral countries – such as Italy – are more "too big to fail" than others – as Greece –, shaping also within-periphery divergences. As a result, insolvency risk's assessments by financial markets reflects not only market fundamentals but also country-specific perceptions of whether the EMU institutions will support a country in crisis[37].

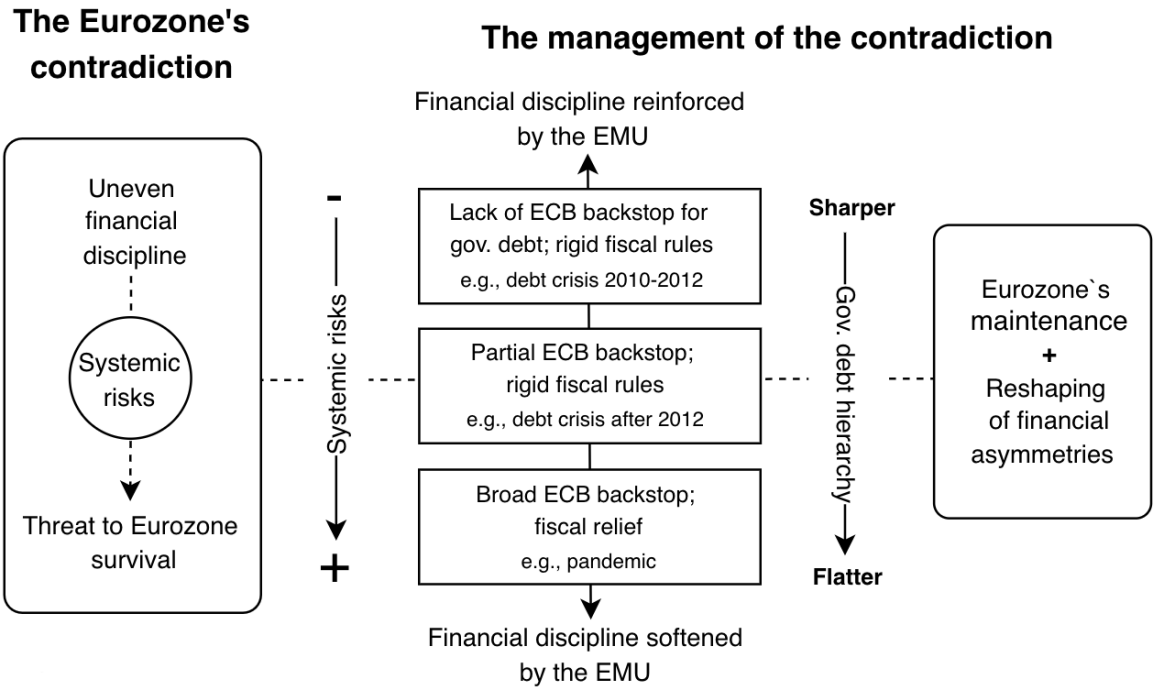

Figure 3.4. The Eurozone's contradiction.

Figure 3.4 schematizes the Eurozone's contradiction and how its management by regional institutions impacts financial asymmetries. The uneven disciplinary power of finance might threat the monetary integration through the emergence of systemic risks, particularly during crisis. When there is low economic or political threat to the Eurozone, policies such as rigid fiscal rules and a market-based approach to government securities favour a sharper regional hierarchy of sovereign debt. When a shock generates an economic or political threat to the Eurozone, the tension between financial discipline and the perpetuation of the euro area must be managed in order to contain systemic risks. The cases of the debt crisis and the pandemic illustrate the different institutional

[37]This new determinant to risk assessment helps to explain why spreads became independent of economic fundamentals, as evidenced by De Grauwe and Ji (2022).

reactions to these varied shocks. Through the institutional enforcement or easing of financial discipline, institutional developments and policy shifts reshaped the regional hierarchy of sovereign debt and financial asymmetries during both crises. When systemic risks are overcome, efforts to reestablish discipline tend to prevail once again, laying the groundwork for future instability.

The debt crisis and the pandemic generated systemic risks in distinct ways, prompting different institutional responses. Two interconnected characteristics are especially relevant: the degree of asymmetry[38] of the shock, higher during the debt crisis, and the bargaining power of the most fragile nations – also reflected in their ability to counter the 'moral hazard' discourse – which was stronger during the pandemic (Ferrara & Kriesi, 2021; Biermann et al., 2019; Genschel & Jachtenfuchs 2021; Tesche, 2022; Fabbrini, 2025). These differences made systemic risks appear direct and immediate in the pandemic, whereas during the debt crisis they emerged indirectly and progressively, through contagion. The following sections examine these dynamics in each crisis.

3.5. The Management of the Eurozone's Contradiction in the Debt Crisis

The debt crisis unfolded gradually across the Eurozone, posing increasing - though not immediate - systemic risks to the region. A key feature was the highly asymmetric exposure of member states to the crisis, which generated disagreement over policy responses (Ferrara & Kriesi, 2021, Fabbrini, 2025). Since core countries were less exposed to the shock and faced lower costs of non-agreement, they held greater bargaining power in shaping coordinated solutions (Biermann et al., 2019), which until 2012 largely reinforced financial discipline. As the crisis spread via contagion and systemic risks rose, peripheral states gained - albeit unevenly – a source of leverage, as distress threatened

[38]Similarly to Ferrara and Kriesi (2021), symmetry refers to the *ex ante* symmetry of exposure to a shock, which differ from the *ex post* symmetry of its consequences.

the EMU's continuity. As regional threats emerged, policymaking and institutional developments navigated a balance between safeguarding the euro and maintaining the disciplining power of finance.

The institutional response unfolded gradually, in step with escalating systemic risks, and focused primarily on containing contagion while protecting the interests of major Eurozone peripheral bondholders and bank creditors. As the crisis deepened and systemic risks increased, more significant shifts in monetary and fiscal policies were required to sustain the EMU. As shown in Table 3.2, these policy shifts and institutional developments were mixed: measures enforcing financial discipline predominated until 2012, after which measures supporting a flatter regional sovereign debt hierarchy became predominant.

		Sovereign debt hierarchy	
Economic policies		**Flatter**	**Sharper**
Monetary policy	Market-based collateral policy		Reinforcing the impacts of rating downgrades
	Security Market Program (SMP)	Outright purchases of government securities	Limited purchases
	Outright Monetary Transactions (OMT)	Outright purchases of government securities	Conditionalities, never activated
	Asset Purchase Programme (APP)	Outright purchases of government securities	Exclusion of Greece
Fiscal measures	Fiscal rescue packages	Avoiding sovereign default	Conditionalities
	Six-pack, the Fiscal Compact, Two-pack		Reinforcing discipline over public finances

Table 3.2. Economic policy responses to the debt crisis and their impact on the sovereign debt hierarchy.

3.5.1. The Financial Rescue Programmes

The first supranational response came through financial rescue programmes, initially led by the Troika[39] and institutionalised in 2012 through the European Stability Mechanism (ESM)[40]. These programmes avoided a total sovereign default but reinforced the hierarchy of government debt through conditionalities (Table 2), illustrating a balance between minimizing contagion, protecting regional creditor interests, and maintaining financial discipline.

The conditionalities comprised austerity and structural reforms, varying in emphasis and intensity. In Greece and Portugal, the focus was on fiscal consolidation and labour/pension reforms (EC, 2023; 2016a), while in Ireland and Spain, the emphasis was on banking reforms (IMF, 2015; EC, 2016b). Although Italy did not enter a rescue program, it nonetheless faced pressure from the ECB to implement structural reforms (Agostini et al., 2015). These programmes triggered deeper-than-expected recessions (IMF, 2016), with Greece being the most extreme case. These reforms reshaped the capital–labour conflict in favour of the former, weakening collective bargaining and reducing employment protections and wage levels (Currie & Teague, 2017). The European Commission (EC) and IMF acknowledged the significant negative economic and social impacts, despite reducing spillover to the rest of the Eurozone (Commission, 2023; IMF, 2013). Additionally, spreads continued to rise sharply after the rescues (Figure 3.5).

Financial assistance reflected core Eurozone creditors' exposure and contagion risks. In Greece, where French and German banks were key lenders, the ECB and EC initially opposed debt restructuring, fearing it would aggravate contagion (Kalaitzake, 2017). This process was influenced by core countries' interests in delaying debt restructuring

[39]Formed by the European Commission (EC), the ECB, and the International Monetary Fund (IMF).

[40]Two temporary funds preceded it: the European Financial Stabilisation Mechanism (EFSM) and the European Financial Stability Facility (EFSF), in 2010.

to give their banks time to reduce exposure to peripheral debt (Thomson, 2015). Institutions and creditors only agreed on private sector involvement in 2012, as the crisis deepened, and default loomed. Also, the ECB denied Ireland's proposal for a haircut on its bank's senior bondholders due to significant Irish liabilities held by core creditors (Breen, 2012). By contrast, a bail-in was approved for Cyprus banks, partly because their liabilities were largely owned by Russian residents (Papadimitriou & Pegasiou, 2023). In Spain, losses were shared with the private sector, but haircuts mainly impacted domestic households and pensioners (EC, 2016b), preserving the interests of non-resident and institutional creditors.

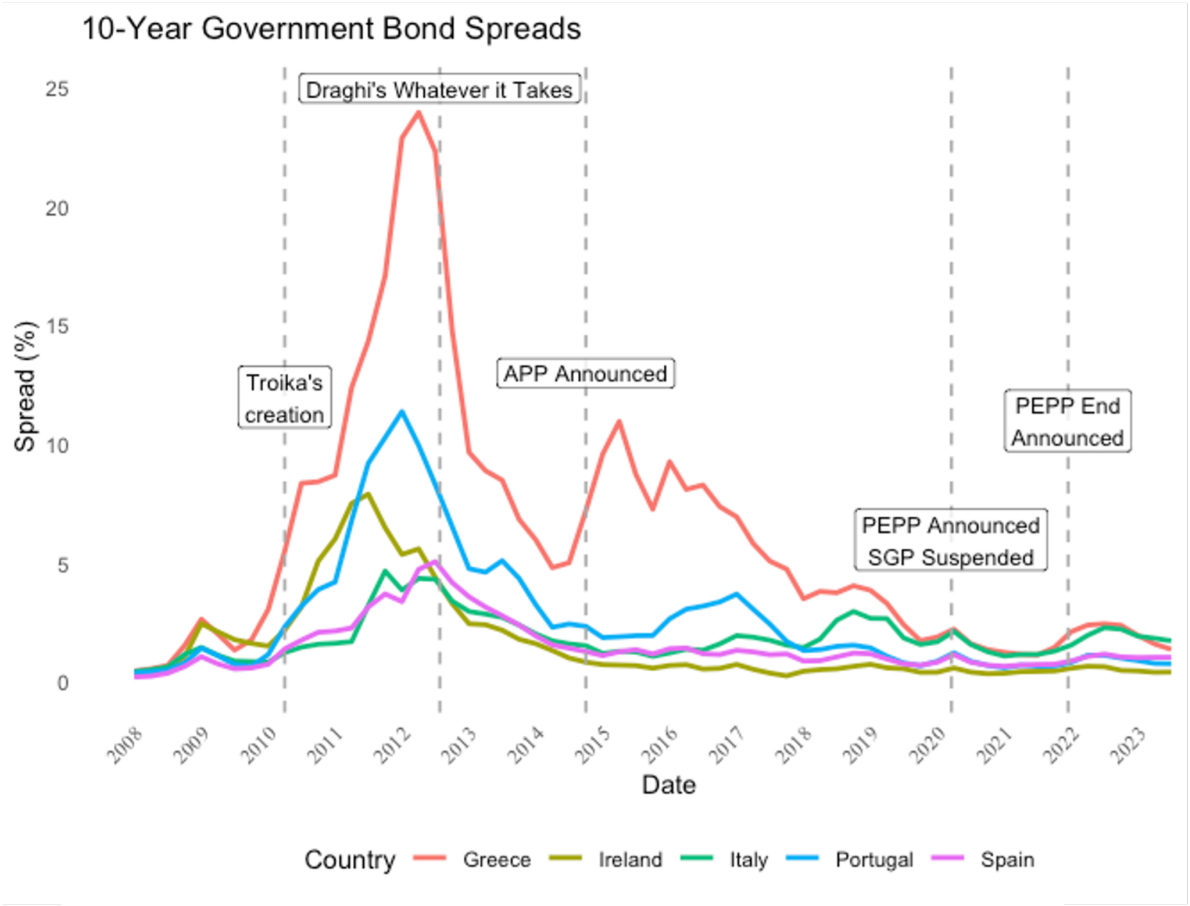

Figure 3.5. 10-year government bond spreads relative to Germany. Data: FRED.

The asymmetric exposure to the crisis and core economies' stronger bargaining power steered the rescues toward placing a disproportionate adjustment burden on the periphery. Having one of the world's leading currencies did not spare the Eurozone

periphery from strict adjustment paths, partly echoing the experience of developing economies under IMF programmes. Unlike in the Global South, however, Eurozone surveillance institutions were primarily regional and directly invested in the perpetuation of the common currency. This shaped the rescues towards containing contagion while protecting the interests of major Eurozone creditors.

3.5.2. Monetary Policy Shifts and Strict Fiscal Policy

The fiscal rescue programmes could not address the increasing regional threats, making further policy shifts and institutional developments essential. As the crisis spread and regional integration was at stake, peripheral countries gained leverage from the shared interest in preserving the monetary union. While the fiscal framework continued to reinforce financial discipline, shifts in monetary policy transitioned from reinforcing it to gradually becoming the primary mechanism for easing the Eurozone's contradiction. These changes influenced the regional hierarchy of sovereign debt, eventually favouring its flattening as systemic risks increased (Table 2).

In the early years of the crisis (2010-2012), monetary policy mainly relied on liquidity provided against eligible collateral. The ECB, through its collateral policy, imposed additional haircuts on downgraded government securities (Adler et al., 2023), made margin calls when bond prices fell (Gabor & Ban, 2016), and temporarily declared specific government bonds ineligible as collateral (ECB, 2012). [41] The ECB justified this as portfolio risk management, presenting itself as merely mirroring rather than shaping market views of credit quality (Gabor & Ban, 2016). Yet, as a unique liquidity provider, it can reinforce or smooth private investors' risk assessments, and thus the risk of its own portfolio, in a way other market participants cannot. As a result, its collateral policy contributed to sharpening regional hierarchies. However, as the crisis intensified in Italy

[41] As in the cases of Greece (ECB, 2012) and Cyprus (Riecher, 2013).

and Spain - whose assets were central to the repo market - the ECB partially mitigated pressures by lowering collateral thresholds in 2012 (Murau et al., 2025).

The ECB's unique role as a financial market maker, capable of reinforcing or softening the uneven financial discipline, became evident when it began purchasing government securities to safeguard the EMU. These monetary policy shifts were contested by important institutions such as the Bundesbank (Thompson, 2015), but their bargaining power waned as systemic risks escalated. The ECB's purchases were gradual, reflecting the rising risks. In early 2010, limited government purchases were made through the Securities Market Programme (SMP), which failed to contain widening bond spreads until mid-2012 (Figure 3.5). Spreads only narrowed after Draghi's statement that the ECB would do 'whatever it takes' to save the euro, underscoring the institution's power to restore market confidence in the currency and in member states' solvency (Figure 3.5).

Following Draghi's statement, the ECB introduced Outright Monetary Transactions (OMT), committing to unlimited purchases of government securities, contingent upon participation in an ESM programme. The OMT was never activated, and the recession's effects prompted the launch of the Asset Purchase Programmes (APP) by mid-2014. The first quantitative easing (QE) came alongside the introduction of stricter European fiscal rules – the Six-pack, Fiscal Compact, and Two-pack,[42] combining strict fiscal control with monetary assistance. Within this framework, the Eurozone's contradictions were managed under the primacy of finance: access to financial backstops required compliance with neoliberal rules, yet these were bypassed at the balance sheet level to preserve the EMU viability (Guter-Sandu & Murau, 2022).

[42]The Six-pack, introduced in December 2011, aimed to enhance macroeconomic surveillance. The Fiscal Compact, enacted in March 2012, set a structural deficit limit of 0.5% of GDP for countries with public debt over 60% of GDP, and 1% for those with higher ratios. The Two-pack, introduced in 2013, strengthened budgetary supervision for financially distressed member states (Pappa, 2020).

The APP enabled large-scale, unconditional asset purchases, primarily government securities under the Public Sector Purchase Programme (PSPP), resulting in further yield convergence (Figure 3.5). However, Greece and Cyprus[43] were excluded from the PSPP as they did not meet the necessary criteria[44]. After the Greek EU/IMF programme ended and with Greece still excluded from the PSPP, the ECB's Executive Board warned, in a context of intense government securities purchases from the remaining countries, that the 'burden of gaining the trust of markets and depositors has now fully shifted to the Greek government' (Cœuré, 2018). This illustrates how the EMU institutions manage the disciplinary power of financial markets and, through it, end up reshaping financial asymmetries, including at the intra-periphery level.

Shifts in monetary and fiscal policy resulted in the dynamic reproduction of financial imbalances among member states, shaped by the gradual emergence of systemic risks and the asymmetric character of the crisis. This allowed the power of finance to remain aligned with the euro's maintenance – occasionally relieving, unevenly, the burden on peripheral countries.

3.6. Further Managing the Eurozone's Contradiction in the Pandemic

The pandemic, a symmetric shock exposure with possible unequal consequences, shifted the balance of power among member states and posed immediate systemic risks to the EMU. This symmetric joint exposure fostered consensus among member states (Ferrara & Kriesi, 2021; Fabbrini, 2025), as the crisis threatened not only fragile economies but, given the recessive impacts on global demand, also the Eurozone core's export-led model (Genschel & Jachtenfuchs, 2021). This symmetry strengthened cohesion among the

[43]Cyprus was later included in the PSPP but received minimal purchases until September 2018.
[44]Eligibility required a minimum credit rating, with purchases limited to 33% of an issuer's outstanding debt and 25% of any individual security.

countries that were more affected by the disciplinary power of finance, also aligning peripheral demands with those of highly indebted core economies. Their bargaining power was further enhanced by the crisis's nature as a global health emergency, which weakened the "moral hazard" argument (Tesche, 2022, Genschel & Jachtenfuchs, 2021). From the outset, disintegration risks involved key peripheral economies such as Italy (Baccaro et al., 2023), posing a political threat to regional cohesion. Confronted with these immediate systemic threats, institutional response was faster and more assertive in easing financial discipline than during the previous sovereign debt crisis.

This section argues that during the pandemic the institutional and policy changes once again represented the management of the Eurozone's contradiction, this time in an extreme scenario: a health emergency posing an economic and political threat to the region's cohesion. This prompted robust and temporary changes in monetary and fiscal policies, temporarily bypassing the three mechanisms identified in Section 3.2 - absence of a LOLR to governments, market-based collateral, and strict fiscal rules. Therefore, these measures contributed to flattening the sovereign debts hierarchy (Table 3.3) and mitigate financial asymmetries.

		Sovereign debt hierarchy	
Economic policies		**Flatter**	**Sharper**
Monetary policy	Collateral easing	Softening the impacts of rating downgrades	Temporary measures, restricted to the pandemic.
	Pandemic Emergency Purchase Programme (PEPP) APP	Outright purchases of government securities	
Fiscal policy	SGP suspension	Suspending institutional discipline over public finances	
	NextGenerationEU	Debt mutualization; risk sharing	

Table 3.3. Economic policy responses to the pandemic crisis and their impact on the sovereign debt hierarchy.

3.6.1. Monetary Policy

The Eurosystem's monetary policy response to the pandemic comprised the flexibilization of collateral policy and substantial purchases of government debt securities.

The collateral easing measures aimed to support credit through a temporary increase in the Eurosystem's risk tolerance. These measures directly influenced the use of government securities – especially those with lower ratings – as collateral, helping to mitigate the impacts of rating downgrades on demand and overall liquidity (Bakker et al., 2022). By relaxing institutional discipline around risk assessments, lifting limits on credit requirements, and reducing haircuts, these measures contributed to reducing financial asymmetries by flattening the regional sovereign debt hierarchy (Table 3.3).

Regarding unconventional monetary policy, the launch of the Pandemic Emergency Purchase Programme (PEPP) evidenced the ECB was committed to flexibility, stating it was 'fully prepared to increase the size of its asset purchases (…) for as long as needed' and was willing to revise any self-imposed limits that could hinder the programme's goals (ECB, 2020a). The focus was on government securities, which accounted for about 90% of total purchases, with the PEPP designed as a 'response to a specific, extraordinary, and acute economic crisis' (ECB, 2020b, p. 1).

The short-lived upward trend in spreads at the beginning of 2020 was reversed following the launch of the PEPP and the introduction of measures to enhance bank liquidity (Figure 3.5). These measures allowed the Eurosystem to effectively support the government securities of each country, preventing the pandemic crisis from leading to important fragmentation in the region's government bond markets (De Grauwe & Ji, 2022). The ECB acted swiftly, making liquidity unconditional on economic reforms and circumventing the limitations that, while presented as 'technical,' were in fact political, and had previously excluded Greece and Cyprus from participation.

The ECB's approach to the pandemic crisis illustrates how '[t]he nature of the pandemic shock relegated moral hazard concerns to the back of the queue' (Tesche, 2022, p. 486). The symmetric exposure to the crisis, combined with the solidarity unblocked by "the fusion of debt and disease" (Genschel & Jachtenfuchs, 2021, p. 365), made it untenable to oppose ECB support for government securities. A notable example is Bundesbank President Jens Weidmann, who had previously severely criticised the ECB's sovereign bond purchase programmes, arguing that it undermined market discipline over government securities (Bundesbank, 2017). During the pandemic, his rhetoric softened, and he acknowledged that monetary policy steps taken were necessary and justified (Bundesbank, 2020). However, he insisted that these measures should end as soon as the emergency passed (Bundesbank, 2021).

The shifts in monetary policy during the pandemic reflect how calls for stricter market discipline became politically indefensible and economically undesired in the context of the COVID-19 crisis. The robustness and exceptional nature of monetary policy during this period represent both the ECB's commitment to combating systemic risk and its limitation to emergency situations.

3.6.2. Fiscal Policy

The Eurozone's response to the pandemic crisis included shifts in fiscal policy, primarily through the exceptional conditions permitted under the Stability and Growth Pact (SGP) and the creation of the Next Generation EU (NGEU). Both measures were innovative. For the first time, the SGP's flexibility clauses for exceptional circumstances were activated, and the NGEU represented a pioneering, albeit provisional, move towards debt mutualisation.

The SGP contains a 'general escape clause' that allows for budgetary flexibility during exceptional circumstances, which was activated during the COVID-19 crisis. Consequently, governments could diverge from their fiscal adjustment paths in response to increased debt and expenditure ratios, allowing more flexibility to mitigate the

pandemic's negative impacts[45]. However, important questions persisted, such as the future burden of these deficits and the insufficiency of national fiscal stimuli within the EU context.

In the early months of the pandemic, political disputes arose among Member States regarding the establishment of a common recovery plan to complement national fiscal stimuli. Peripheral countries and higher-indebted core nations called for European solidarity,[46] advocating for a common debt instrument issued by the EU to address the pandemic's effects. This idea faced initial opposition from other core countries,[47] which relied on the conventional 'moral hazard' argument (Baccaro et al., 2023). Regional tensions were evident in the comments of the Dutch finance minister, who suggested 'investigating' countries like Spain that lacked the budgetary margin to respond effectively, sparking outrage from Southern European nations like Portugal (Donn, 2020). Political resistance also surfaced in the Eurozone periphery, evidenced by declining support for euro membership in Italy (Baccaro et al., 2023). However, Italian Prime Minister's assertion that 'the European Union risks failing as a project in the coronavirus crisis' (Lowen, 2020) turned into a regional concern, shaping the consensus around risk-sharing. This illustrates the increased bargaining power of peripheral economies, supported by the symmetric exposure to the crisis, which fostered cohesion, and by its health dimension, which weakened the moral hazard argument.

Solidarity became a matter of self-interest for all countries concerned with the Eurozone's cohesion and survival, and a "sense of mutual dependence" prevailed (Genschel & Jachtenfuchs, 2021, p. 365), enabling significant yet temporary fiscal policy changes. In this context, a Franco-German initiative proposed the creation of a recovery

[45]According to Eurostat, the general government deficit in the euro area was 7% in 2020, remaining above the 3% limit until 2023. Under the general escape clause, Member States were not subject to an excessive deficit procedure, which would have required adjustments for the entire region.

[46]Belgium, France, Greece, Ireland, Italy, Luxemburg, Portugal, Slovenia and Spain.

[47]Germany, Austria, Denmark, Netherlands and Sweden.

fund on 18 May 2020, marking a significant shift in Germany's stance on debt mutualisation and fiscal transfers. Angela Merkel, who previously stated that debt-sharing would not occur during her lifetime, defended the proposal as an 'unprecedented one-off effort,' justified by a moment that could, in her words, 'endanger the European Union's cohesion' (Bundesbank, 2021; Mallet et al. 2020). Nonetheless, leaders from Austria, Denmark, Sweden, and the Netherlands contested the plan, arguing it could set a concerning precedent (Hill, 2020). This shift in Germany's position reflects the country's willingness to act towards stabilisation 'when the European project is faced with an existential shock' (Tesche, 2022, p. 488). The consensus culminated in the EC's proposal for the NGEU, comprising loans and grants backed by Eurobonds to address the crisis's impacts, particularly focusing on the most affected countries. In line with Franco-German arguments, the NGEU is characterised as 'an exceptional response to those temporary but extreme circumstances' (Council, 2020, p. 3).

The approval of the NGEU and the associated fiscal relief emerged from political disputes among member states, given the extraordinary circumstances of the pandemic crisis. However, the strength of these changes is constrained by their temporary and exceptional nature. The absence of permanent fiscal mechanisms suggests that future collective fiscal efforts will once again depend on shocks that systematically affect the region and of the bargaining power of the most affected member states. Future crises may not offer similar opportunities, as it is '[i]t is hard to imagine a shock better suited to elicit European fiscal solidarity than a deathly pandemic' (Tesche, 2022, p. 493). While some may interpret it as a 'first step towards a budgetary union' (De Grauwe & Ji, 2022, p. 9), it also highlights the limitations of a fiscal union if such mechanisms are activated only in response to systemic threats to the region.

3.7. The Post-Pandemic: Reinforcing Financial Discipline

Recent moves towards monetary and fiscal normalisation in the Eurozone illustrate that, as systemic risks from the pandemic have receded, there is now room to reinforce the disciplinary power of finance. This process is characterised by the reversal of collateral easing measures, the implementation of Quantitative Tightening (QT), and the reform of the SGP. Additionally, a new instrument, the Transmission Protection Instrument (TPI), was created to minimise fragmentation risks.

The reversal of collateral easing and the shift towards QT signal the ECB's transition from combating systemic risk to focusing on market-based risk management. The ECB announced a gradual phasing-out of collateral easing, re-establishing haircuts and credit requirements to return to pre-pandemic risk tolerance (Bakker et al., 2022). The shift towards QT was presented as a necessary tool to combat inflation and reduce the Eurosystem's balance sheet. Following the announcement of QT, spreads increased, particularly in Italy and Greece (Figure 3.5). To address fragmentation risks, the ECB Governing Council decided to rely on two mechanisms: reinvestment flexibility under the PEPP and the TPI.

The PEPP was designed to allow flexibility in purchases and disinvestments, serving as the first line of the ECB's strategy to counter fragmentation risks in the government bond markets (ECB, 2022). From June 2022 to March 2024, this led to an increase of €9.9 billion in public sector holdings from Italy and €5.3 billion from Spain, while holdings of German public securities decreased by €19.3 billion. This illustrates the ECB's efforts to mitigate fragmentation risks, particularly in Italy and Spain, which are central countries to contagion concerns.

The second mechanism aimed at offsetting fragmentation, the TPI, was introduced by the ECB to ‘ensure that the monetary policy stance is transmitted smoothly’, particularly during the ongoing QT (ECB, 2022). The TPI is a conditional instrument that targets countries experiencing a ‘deterioration in financing conditions not warranted

by country-specific fundamentals' (ECB, 2022). However, since purchases will cease if 'persistent tensions are due to country fundamentals' (ECB, 2022), it remains unclear how the ECB will differentiate between deteriorations based on country-specific fundamentals. Consequently, uncertainty and asymmetries surrounding the ECB's role as the purchaser of last resort are likely to persist, continuing to shape the Eurozone's hierarchy of government securities.

Finally, the reversal of fiscal relief was enacted through the reform of fiscal rules approved by the European Council and Parliament on 10 February 2024. The arbitrary limits on government debt (60% of GDP) and government deficits (3% of GDP) remain central to this reform. Flexibility is cited as a virtue of the reform, as adjustment plans are country-specific and may be conditionally extended from four to seven years. Yet it is contested, since flexibility is "inherently limited by quantitative safeguards" (Fitch Ratings, 2024), which were a key German demand (Strupczewski, 2023). These safeguards include: (i) a debt reduction of at least 1% of GDP annually when debt exceeds 90% of GDP, or 0.5% when between 60–90%; and (ii) a "deficit resilience safeguard," setting a structural margin of 1.5% of GDP below the 3% deficit ceiling (Council, 2024). The recessionary impacts of the new SGP are likely to be more pronounced in highly indebted economies, such as Italy and Spain (Heimberger et al., 2024).

As the pandemic's systemic risks vanished, the EMU gradually restored the conditions for the uneven disciplinary power of finance to operate. Fiscal and monetary policies gravitated back toward the mechanisms outlined in Section 3.2 - uncertainty regarding a LOLR to governments, market-based collateral, and strict fiscal rules. This contributes to reinforce sovereign debt hierarchies, paving the way for asymmetries to reemerge in the future. It underscores that the regional financial subordination of the Eurozone periphery remains a structural feature of the monetary union.

3.8. Conclusion

This article demonstrates that a hierarchy of government securities, shaped by the Eurozone's institutional framework and power relations among member states, underpins the regional financial subordination of the Eurozone periphery. The framework centred on the Eurozone's contradiction captures the dynamics of this process by evidencing the tension between the uneven disciplinary power of finance and the Eurozone's perpetuation. The periphery's subordination is dynamically shaped by the EMU institutions in their management of this contradiction. Institutional developments and shifts in monetary and fiscal policy during the debt crisis and the pandemic illustrate this process. Rather than structurally dismantling mechanisms that generate unevenness, easing the periphery's burden has been largely conditional on the emergence of systemic risks. More than paving the way for a more solidary and equitable Europe, it illustrates the periphery's subordination to core interests in the reproduction of the monetary union. As systemic threats posed by individual countries are not homogeneous, institutional support remains discretionary, shaping varying degrees of fragility among member states and also within the periphery.

Dismantling the mechanisms that lead to financial unevenness in the Eurozone requires deeper, more structural transformations. Relying on conditional backstops for government securities – as suggested by the newly created TPI – or moving towards a fiscal union that activates only in response to systemic threats, as seen with the NGEU, may restore short-term financial stability. Yet once systemic risks recede, the conditions for financial asymmetries to re-emerge are restored. Could the situation be different? Recent developments in economic policy indicate that there are no technical constraints to achieving this goal, only political ones. Since the Eurozone maintenance is a crucial interest shared across the region, peripheral nations can leverage this bargaining power, building on what was established during the pandemic to create a more solid alliance among the most fragile member states.

The present paper demonstrates that the pattern of financial subordination within the region differs significantly from that observed in the Global South. The ECB, by issuing a strong currency, plays a fundamental role in distinguishing the Eurozone periphery from economies in the Global South that rely on fragile currencies and central banks with limited capacity to withstand speculative attacks. Although the EMU institutions have the economic capacity to guarantee financial stability, peripheral member states depend on their political will to do so, a reliance that entails both strengths and weaknesses. The relative institutional tolerance for addressing financial distress in the Eurozone periphery, which depends on the emergence of systemic risks, means that this room for manoeuvre can operate in both directions: sometimes to their advantage, and at other times to their detriment. While the existence of a hierarchy of sovereign debts facilitates the uneven disciplinary power of finance over member states, the willingness and ability of regional institutions to sustain the euro reveals the sui generis character of the Eurozone periphery's financial subordination.

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Chapter 4

Sovereign Bondholders and the Eurozone Core-Periphery Divide

From the Debt Crisis to the Quantitative Tightening

Abstract

This paper analyses the role of sovereign investor groups in shaping financial instability and asymmetries within the Eurozone and their interaction with its institutional framework. It proposes a framework to assess the impacts of government debt outflows on countries' financial fragility under varying scenarios, including different paces of Quantitative Tightening (QT) and evolving investor group dynamics. The findings indicate that foreign investors play a potential asymmetrical role in the Eurozone, exhibiting destabilising behaviour towards peripheral government debt. This uneven role can be exacerbated by a market-based institutional approach to public debt or mitigated by appropriate support for these state liabilities. By combining the impacts of QT with the potential reemergence of foreign flow asymmetries in sovereign markets, the results highlight that such dynamics could further deepen the Eurozone's core-periphery divide.

4.1. Introduction

The absence of a common "safe asset" in the Eurozone – akin to US Treasury bonds – is often linked to regional fragilities and fragmentation (Bibow, 2016; Brunnermeier et al., 2017). While European Central Bank (ECB) members today view this absence[48] as "problematic" (Bletzinger, Grief, & Schwaab, 2023), any alternative must ensure that "the disciplining effect of financial markets is not undermined" (Schnabel, 2024). This institutional backdrop places public debt in a contradictory position: it must be safe, as it is "vital to the functioning of the financial system," yet not "too safe, since that would eliminate the role of market discipline" (Cœuré, 2016).

During the Eurozone debt crisis, private bondholders' risk assessments heavily influenced member states' funding costs, primarily due to the lack of a lender of last resort in the government debt market (De Grauwe, 2013; Lavoie, 2022a, 2022b; Papadimitriou & Wray, 2012). To mitigate bondholders' "too risky" perception, the Eurozone enacted significant policy changes during the debt crisis and COVID-19 pandemic. Central to countering fragmentation was the Eurosystem's emerging role as a major holder of government securities, mirroring the ECB effectively supporting member states' liabilities (De Grauwe & Ji, 2022; Ehnts & Wray, 2024). However, the post-pandemic shift toward reinforcing market discipline highlights that "too safe" remains undesirable to Eurozone institutions. As part of this shift, the move to Quantitative Tightening (QT) reintroduces concerns about fragmentation (Claeys, 2023; De Grauwe & Ji, 2022), potentially enhancing bondholders' influence in shaping regional disparities. This context motivates the present article's investigation into how investor groups interact with the ECB's stance on government securities, and its implications for core-periphery divergence within the Eurozone.

[48]Recent developments on Eurobonds with the Next Generation EU were exceptional, strictly related to the pandemic, not breaking with the structural lack of a European safe asset (van Riet, 2024; Claeys, 2023; Waibel & Grund, 2023).

This paper analyses the role of sovereign investor groups in shaping financial instability and asymmetries in the European Monetary Union (EMU) and their interplay with its institutional framework. This article has two main goals. First, it aims to investigate how regional asymmetries are reflected and reinforced by these investor groups, from the Eurozone debt crisis to the post-pandemic period, highlighting how their behaviour is interconnected with developments in the regional institutional approach to sovereign debt. This involves a descriptive and statistical analysis of the Eurozone countries' investor base, of government bond yields and of the monetary policy. The second objective of this article is to assess the potential impacts of QT on financial fragility in the Eurozone by proposing a framework for evaluating its potential effects under varying scenarios, specifically investigating whether impacts are likely to differ among Member States. The analysis focuses on Austria, Belgium, Germany, Finland, France, the Netherlands, Ireland, Italy, Portugal, Greece, and Spain[49], the last five representing the Eurozone periphery.

This article draws on and contributes to several literature streams. Studies on EMU government bondholders have mainly focused on the debt crisis, not fully exploring their connection to the institutional approach to government debt (Dell'Erba, Hausmann & Panizza, 2013; Arslanalp & Tsuda, 2012; Merler & Pisani-Ferry, 2012; Farhi & Tirole, 2018; Arslanalp & Poghosyan, 2016; Andritzky, 2012). While much research highlights the ECB's role as a lender of last resort in preventing fragmentation (De Grauwe & Ji, 2015; Febrero & Xuo, 2023; Filoso et al., 2021; Lavoie, 2022a), the interaction between private investor groups and institutional changes remains underexplored. In this article, fragmentation is understood as the expression of the in the EMU core-periphery divide in sovereign debt markets, manifesting in sovereign bond spreads and in the asymmetrical behaviour of bondholder groups toward government securities from

[49] These countries are covered by the quarterly data from the IMF Sovereign Debt Investor Base and were part of the EMU from its early years.

different Eurozone jurisdictions. This paper shows that while domestic banks tend to exhibit more homogeneous behaviour towards sovereign debt, foreign investors play an asymmetrical role in the EMU. I argue that the institutional approach to government debt – whether by strengthening market discipline through uncertainty about the ECB's support for government securities, or by explicitly backing these assets – is key in amplifying or mitigating foreign investors' asymmetrical role.

Additionally, studies in political economy often emphasise the influence of bondholders on economic policy (Rommerskirchen, 2019) and distributional outcomes (Arbogast, 2020; Hager, 2014). This article contributes to this field by demonstrating that, in the EMU, bondholder empowerment is institutionally shaped and not only affects economic policy but also reinforces regional asymmetries.

Since the risk of fragmentation resurfaces with post-pandemic "normalisation," understanding investor base behaviour and its link to institutional changes becomes crucial. An important determination of this risk is the ECB's turn towards QT, given that attempts to reduce QE measures by Central Banks have been related with the emergence of panic in financial markets (Toporowski, 2020). By analysing the potential impacts of QT in the Eurozone under various scenarios, this paper contributes to the emerging literature on QT's effects (Du, Forbes & Luzzetti, 2024; Shchapov, 2024; Claeys, 2023). To assess financial fragility in these scenarios, the framework proposed here also innovates methodologically, adapting Arslanalp and Tsuda's (2012; 2014) model on homogeneous foreign outflows to include central banks outflows and refining it to allow for uneven foreign investor flows in sovereign markets. I highlight the likely uneven impacts of QT progression in the EMU, exploring the possibility that its impacts could be exacerbated by the re-emergence of foreign investors' asymmetric flows.

The paper is organised as follows. Section 4.2 reviews relevant literature. Section 4.3 discusses historical shifts in the Eurozone bondholder structure and compares it across member states. Section 4.4 examines net purchases by investor groups during the debt

crisis and pandemic, assessing asymmetric patterns. Section 4.5 performs a cross-correlation analysis between net purchases and government bond yields, approaching differences regarding the risk-return sensitivity of each investor group. Section 4.6 proposes a framework for evaluating vulnerability to government debt outflows, in line with the QT. The last section concludes.

4.2. The power of sovereign bondholders in the Eurozone

The political economy literature explores how the disciplinary power of finance over states is channelled through ownership of government securities (Hager, 2014; Streeck, 2014; Sotiropoulos et al., 2013; Mosley, 2003). Streeck (2014) characterises this as a shift towards a "consolidation state", where the entanglement between states and financial markets forces governments to prioritise investor confidence in public debt solvency over public welfare. Financial markets – and government bondholders, more directly – affect a state's funding costs based on solvency risk assessments, depending on the capacity of (supra)national institutions to counteract such pressures. In the absence of institutional support, higher borrowing costs enforce neoliberal policies, aligning economic strategies with bondholders' interests (Sotiropoulos et al., 2013).

Bondholder influence varies depending on investor composition and debtor country. Countries with weaker currencies and less resilient institutions are more vulnerable to bondholders' pressure, especially developing economies (Mosley, 2003; Hardie, 2012; Brooks, Cunha & Mosley, 2015). Conversely, advanced economies typically retain more "room to move" from financial market pressures (Mosley, 2000). At the same time, certain investor groups wield more influence due to their higher exit potential (Cohen, 2003). Foreign investors, given their higher exit capacity, can be particularly destabilising for emerging economies (Hardie, 2012), while domestic banks often display greater "loyalty" during market stress (Rommerskirchen, 2019).

The Eurozone presents a unique case where the "room to move" for advanced economies is constrained by EMU institutional constraints. The primacy of creditors is reinforced through regional integration, shaping the EMU into an "asymmetrical fiscal stabilization regime" (Streeck, 2017, p.27). This internalisation of bondholders' interests is illustrated in strict government spending limits and public debt thresholds[50], which compel governments to adopt austerity and privatization measures (Pataccini, 2017). Market discipline has also been bolstered by price mechanisms, notably through the ECB's prohibition on direct purchases of government securities under the Maastricht Treaty and persistent uncertainty around secondary market interventions, thereby amplifying private bondholders' power to discipline states. By ceding monetary sovereignty to market discipline, Eurozone nations have "placed themselves in a predicament where markets can actually force them into default" (Sotiropoulos et al., 2013, p. 206).

Under an institutional framework combining strict economic policy constraints, free capital mobility, and the absence of a common safe asset as the cornerstone of the financial system, government bondholders play a crucial role in driving fragmentation in the EMU. Germany benefits from its status as a regional safe haven, while peripheral Eurozone nations face speculative and pro-cyclical debt demand (Gourinchas & Rey, 2016; van Riet, 2017; Gabor and Vestergaard, 2018). Asymmetries are reinforced by risk perceptions that reflect not just economic fundamentals but also investor practices of grouping countries into categories such as core and peripheral Eurozone (Brooks, Cunha, and Mosley, 2015).

The literature highlights how different investor groups contributed to financial fragility and asymmetries in the Eurozone, especially during the debt crisis. The role of

[50]Fiscal consolidation is an interest of creditors since it relies on austerity measures and the primacy of debt service over public services. As Streeck (2017) notes, this creates a contradiction as creditors seek both fiscal consolidation and economic growth – objectives that often conflict – to safeguard their investments.

foreign investors is ambiguous: while linked to lower yields in the EMU (Arslanalp & Poghosyan, 2016; Andritzky, 2012), they also introduce volatility due to their “less sticky” nature (Andritzky, 2012). Evidence suggests foreign investors played an asymmetrical role during the debt crisis, reducing exposure to peripheral countries (Arslanalp & Tsuda, 2014; Arbogast, 2020), which raised yields and volatility in the periphery while lowering yields in Germany (Arslanalp & Poghosyan, 2016; Ferreira, 2022). However, some argue that global investment funds helped stabilise the region by offsetting spreads (Longaric, Cera, Georgiadis & Kaufmann, 2023).

Regarding domestic bondholders, research suggests that domestic banks’ holdings of national government securities can exacerbate distress, forming a "doom loop" between banks and governments (Merler & Pisani-Ferry, 2012; Farhi & Tirole, 2018). This feature prompted calls for regulations comprising domestic banks’ holdings of public debt (Brunnermeier et al., 2017; Cooper & Nikolov, 2018). However, the role played by domestic banks is ambiguous since they are shock absorbers, having a stabiliser behaviour by acting as net buyers during crises (Tabellini, 2018; Saka, 2020; Merler & Pisani-Ferry, 2012). Additionally, ECB purchases have been shown to reduce yields, especially in peripheral nations, narrowing spreads (Krishnamurthy, Nagel & Vissing-Jorgensen, 2018; Eijffinger & Pieterse-Bloem, 2023).

4.3. Sovereign investor base in the Eurozone

This section provides an overview of the Eurozone government debt investor base, outlining how it evolved from 2008Q1 to 2023Q4 (Figure 4.1) in the context of crisis and regional institutional developments.

Figure 4.1. Government bondholder composition in selected Eurozone countries (2008Q1–2023Q4). Data: IMF/Sovereign Debt Investor Base for Advanced Economies.

4.3.1. Foreign banks and non-banks

The ECB's market-based approach to government debt post-euro launch fostered positive expectations of investors, leading them to treat member states' securities as

nearly equivalent (Gabor, 2016; Gabor & Ban, 2016). This drove rising foreign ownership across EMU countries until the GFC (Arbogast, 2020; Merler & Pisani-Ferry, 2012). The subsequent debt crisis exposed the ECB's pro-cyclicality and lack of a lender of last resort consequences, leading to fragmentation in the sovereign market (De Grauwe, 2013; Gabor & Ban, 2016). As illustrated in Figure 4.1, foreign banks and non-banks reduced peripheral holdings sharply from 2008 to 2012, while core country declines were milder. Germany, notably, saw increased foreign holdings during the same period. This asymmetrical investor behaviour aligns with previous literature (Arslanalp & Tsuda, 2014; Arbogast, 2020; Merler & Pisani-Ferry, 2012). Arbogast (2020, p. 9) characterizes increased foreign demand for German debt during the crisis as a "classic flight to safety." Moreover, banks differentiated between high and low-spread Eurozone countries earlier than non-banks (Arslanalp & Tsuda, 2014).

The escalating eurozone debt crisis demanded institutional and policy shifts. Draghi's 2012 "whatever it takes" pledge and later ECB interventions is related to stable or increasing[51] foreign investor shares in the periphery from 2012 until the 2020 pandemic. Conversely, core countries like Germany, the Netherlands, and Finland saw reduced foreign non-bank holdings during the same period (Figure 4.1), driven by a decline in holdings from non-Euro area investors (Longaric, Cera, Georgiadis, & Kaufmann, 2023). Between 2020–2023, during Quantitative Easing's (QE) second phase and early QT, foreign ownership remained stable in most core countries, with a more moderate decline in the periphery than in the debt crisis.

[51]The exception is Greece, where foreign investors decreased their share until late 2023.

4.3.2. Foreign official holders and domestic central banks

Core-periphery differences in foreign official holdings[52] reflect institutional responses to the debt crisis. From 2010 to 2012, these holdings increased in peripheral countries under Securities Markets Program (SMP) or Troika programmes, notably Greece and Portugal. In core countries, they stemmed mainly from foreign central banks' foreign exchange reserves.

The rise of National Central Banks (NCBs) as major government debt holders marked a shift in the ECB's approach (Figure 4.1). This followed the 2014 Asset Purchase Programme (APP) and the Pandemic Emergency Purchase Programme (PEPP). Greece, which was excluded from the Public Sector Purchase Programme (PSPP) under the APP, saw significant NCB holdings only in 2020. With QT beginning in 2023, ECB and NCB debt holdings have since declined.

4.3.3. Domestic banks and domestic non-banks

Domestic banks in peripheral countries increased their government debt holdings during the debt crisis, reinforcing the 'doom loop' between banks and sovereigns. The literature cites several drivers: government pressure on banks via ownership links (Becker & Ivashina, 2018); carry trade incentives offering higher returns with limited risk (Acharya, Drechsler & Schnabl, 2014; Andreeva & Vlassopoulos, 2016; Cesaratto, 2020; Arbogast, 2020); and banks' preference for domestic debt to hedge euro break-up risk by aligning assets and liabilities (Battistini, Pagano & Simonelli, 2014). After 2012, peripheral domestic bank participation changed less significantly.

Domestic non-bank investors – insurance companies, pension funds, investment funds, households, and non-financial firms – generally reduced their peripheral holdings.

[52]Foreign official holdings consist of i) government securities held by foreign central banks as foreign exchange reserves; ii) government securities held by foreign central banks within the Eurosystem as part of the SMP; and (iii) foreign official loans.

In contrast, core countries saw a steady decline in domestic bank holdings from 2008–2021, while domestic non-banks maintained a stable share.

4.4. Bondholders' role in shaping asymmetries and ECB's approach to government securities

This section shifts focus from investor groups' relative participation as holders to their net government debt acquisitions during the EMU's two major crises: the debt crisis and the pandemic.

Figure 4.2 shows the accumulated net government debt purchases during the debt crisis (2010Q1–2012Q2) and the first year of the pandemic (2020Q1–2020Q4), while Figure 4.3 shows the cross-country coefficient of variation of those purchases and a χ^2 test to assess divergence between core and peripheral Eurozone in net purchases. In both crises, domestic banks in core and peripheral countries similarly increased their acquisition of national government debt in most countries. Domestic non-banks played a significant role as net buyers in specific cases, such as Ireland. As illustrated in Figure 4.3, for both domestic bank and non-bank investors, the difference in the direction of net purchases (if purchases or sales) between core and peripheral countries was not statistically significant – as shown in Figure 4.3 by the absence of significance (*) to the χ^2 test[53]. Additionally, net purchases by domestic banks presented a lower cross-country coefficient of variation than domestic non-banks – the latter presenting a particularly high coefficient during the pandemic crisis (Figure 4.3). This highlights the more uniform behaviour of domestic investors as net purchasers during both crises, specially of domestic banks.

[53]Detailed results of the present χ^2 test can be found in Appendix 4.A.

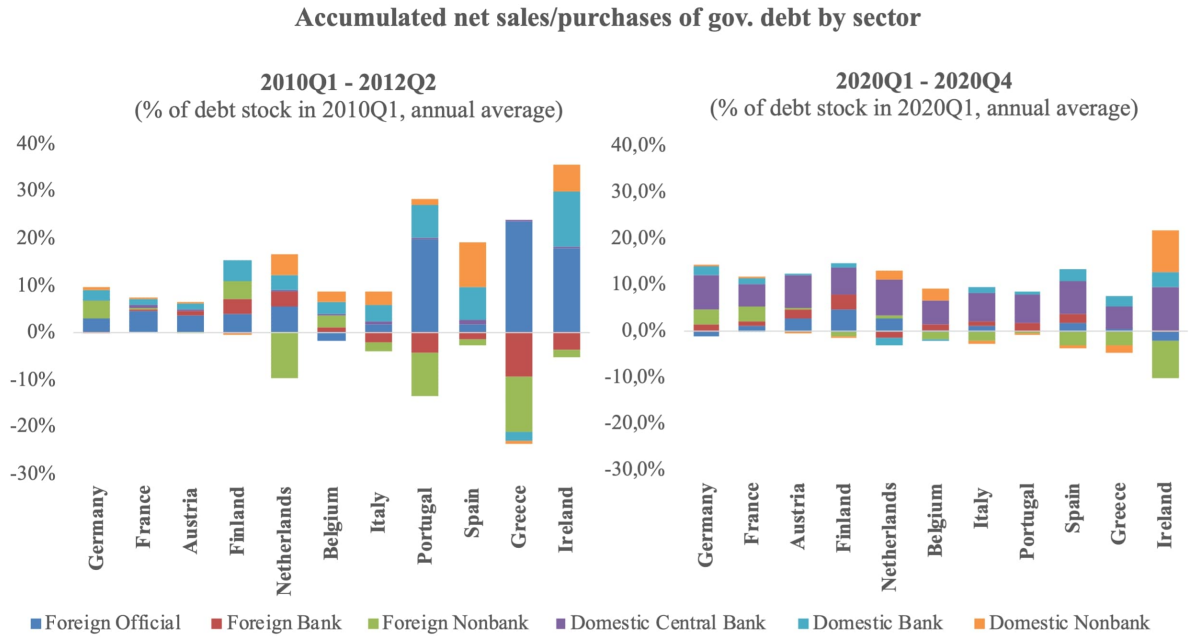

Figure 4.2. Accumulated net sales/purchases of government debt by sector, annual average (2010Q1-2012Q2 and 2020Q1-2020Q4). Data: IMF/Sovereign Debt Investor Base for Advanced Economies.

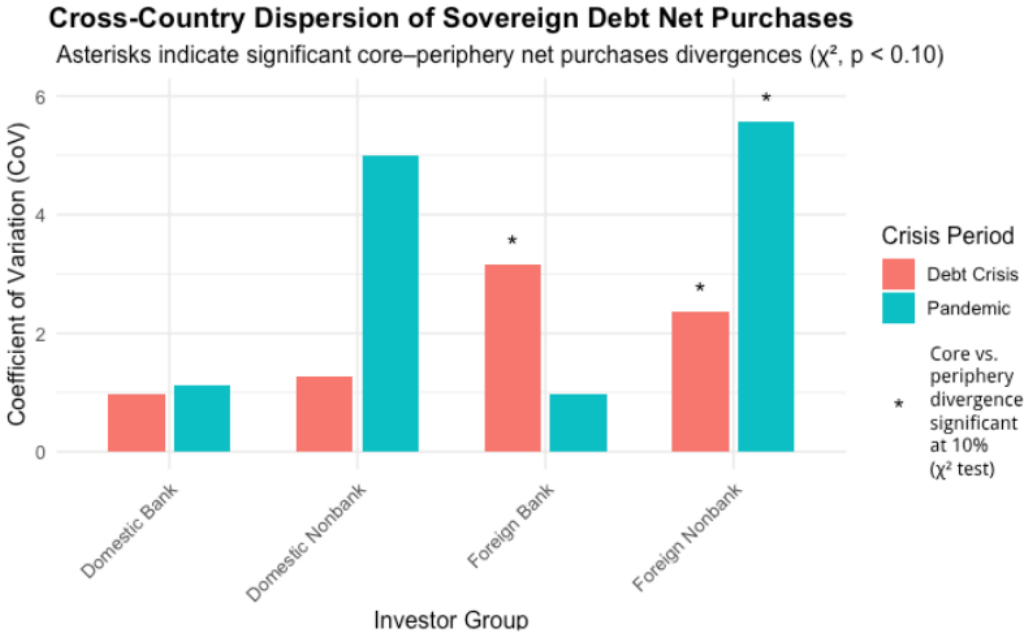

Figure 4.3. Coefficient of Variation (CoV) of sovereign debt net purchases and χ^2 test. Bars show the cross-country CoV of quarterly net purchases in 2010Q1-2012Q2 (debt crisis) and 2020Q1-2020Q4 (pandemic). Asterisks indicate χ^2 tests where core and periphery countries differ significantly ($p<0.10$) in the share of net purchase increases within each investor group, with net purchases as a binary variables (purchase vs. sale) for the test.

The primary divergence lies in foreign investors' behaviour. They were net sellers in the periphery but net buyers in core countries during both crisis (Figure 4.2). During the debt crisis, foreign outflows, from banks and non-banks, hit Greece and Portugal hardest. In the pandemic, foreign outflows in the periphery were smaller and mainly from non-banks. Meanwhile, core countries – especially Germany – benefited from foreign purchases, reinforcing debt hierarchies and Germany's safe-haven status (Gourinchas & Rey, 2016). The heterogeneous behaviour of foreign investors is also illustrated in Figure 4.3, where foreign banks and non-banks presented a higher cross-country coefficient of variation of net purchases during the debt crisis than domestic investors. During the pandemic, foreign non-bank purchases of sovereign debt presented the highest cross-country divergence. This heterogeneity was also evident between core and peripheral Eurozone countries. In the debt crisis, both foreign banks and foreign non-banks displayed a significant ($p < 0.10$) core–periphery divergence in their net-purchase direction (purchases or sales) – indicated in Figure 4.3 by an asterisk (*) for the χ^2 test. Only foreign non-banks' net purchases remained significantly divergent between core and peripheral Eurozone countries during the pandemic.

The empirical evidence found above aligns with the literature on foreign investors' destabilising role in the Eurozone periphery and domestic banks' stabilising role (Arbogast, 2020; Arslanalp & Tsuda, 2014; Ferreira, 2022). However, the Eurozone's institutional role in shaping these trends remains underexplored by the literature.

Figure 4.4 illustrates the net purchase of government securities (as four-quarter moving average values) by private foreign investors as z-scores, indicating how foreign purchases in a given period and country diverged from their average in standard deviations. Arslanalp and Tsuda (2014) provided a similar analysis from 2008 to 2011 for advanced economies, underlying that foreign investors started to differentiate among the advanced countries with the emergence of the debt crisis. Arslanalp and Tsuda (2014) found that, from 2008–2011, foreign investors increasingly differentiated between

advanced economies due to credit risk, sovereign downgrades, and yield volatility. A key omission in their analysis is the ECB's role in reinforcing this divide. This becomes clearer when examining a broader period encompassing various ECB monetary policy phases (Figure 4.4).

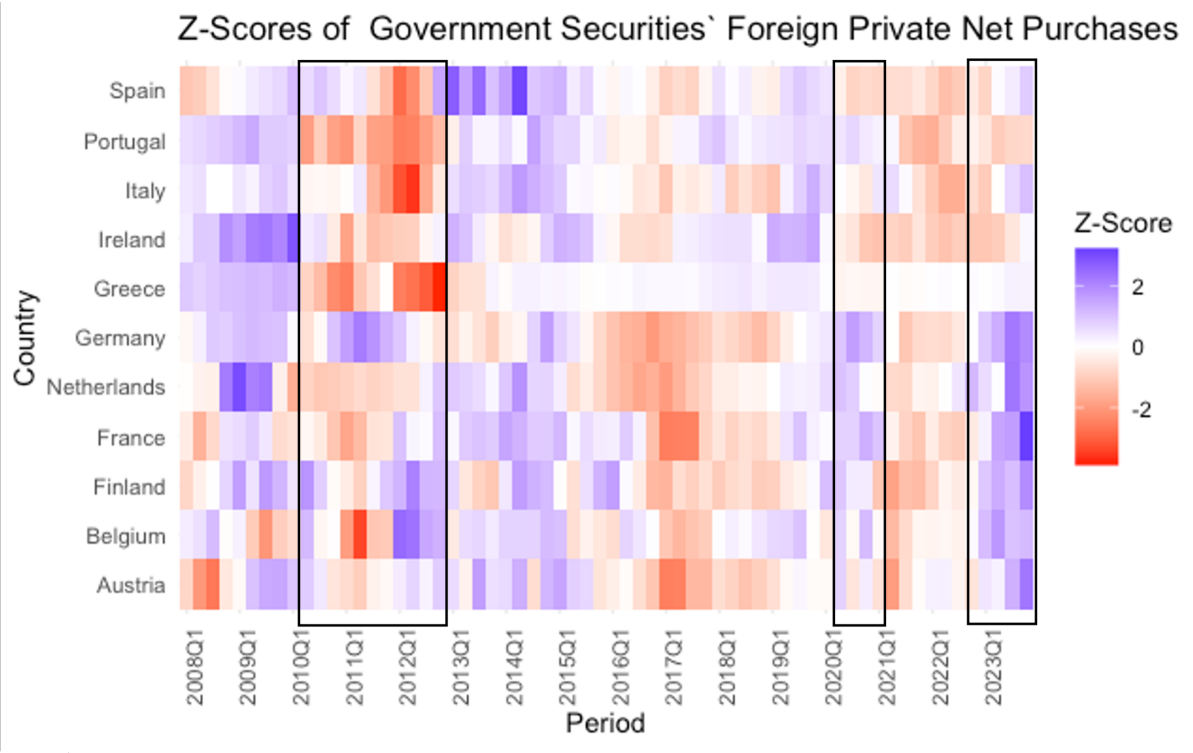

Figure 4.4. Z-Scores of government securities' foreign private net purchases. The figure shows the foreign private (banks and non-banks) net purchases of government debt as four-quarter moving averages normalised as z-scores from 2008Q1 to 2023Q4. Z-scores are obtained by subtracting the foreign net purchases from the average values of each country and dividing it by its standard deviation of the whole time-spam data available.

By not acting as a purchaser of last resort and adopting a market-based approach to government debt as collateral during the debt crisis, the ECB reinforced the perception that peripheral government securities were risky (Gabor & Ban, 2016; Van't Klooster, 2023; Lavoie, 2022a; De Grauwe, 2013). Foreign investors saw this risk as not worth taking and began selling (or buying at below-average levels) peripheral bonds while purchasing core securities from 2010 to 2012, illustrated by the red values in Figure 4.4. These sales peaked in early 2012 as the crisis escalated in Italy and Spain. Greece was most affected by foreign investor discrimination, reflecting the severe impact of the debt crisis. In contrast, core countries saw less intense net sales. Germany's bonds benefited

from their safe-haven status during most of the debt crisis, as shown by net foreign purchases (blue values).

After Draghi's "Whatever it takes" speech in 2012Q3, foreign investors ceased discriminating against peripheral bonds, reflected by the shift from dark red to blue in Figure 4.4. This shift in the ECB's approach to government securities can be understood in light of the impacts of excessive fragmentation to the execution of monetary policy and to the stability of regional financial markets (Schairer, 2024). Draghi's speech favoured a softening in the foreign investor's asymmetrical role, by alleviating fears of government insolvency. It also came together with a reversal of the foreign investor's purchases of the German government securities. As a result, the distinction between core and peripheral countries in terms of the role played by foreign investors as government debt holders became more uniform from 2013 to 2015. The APP's initiation in 2014Q4 led to foreign investors shifting from net buyers to net sellers in some countries, primarily core ones. This active monetary policy, involving large-scale government securities purchases, reduced foreign investor discrimination to the benefit of the periphery, demonstrating that the institutional approach to public debt is crucial in shaping whether and how the asymmetric role played by bondholders manifests.

In the pandemic's early stages, Lagarde's initial statement that the ECB did not see closing spreads as part of its role, followed by the launch of the PEPP in 2020Q2, caused a brief asymmetry in foreign purchases. However, this asymmetry was less pronounced than during the debt crisis and quickly dissipated. Unlike in the debt crisis, the ECB acted as a purchaser of last resort from the outset (De Grauwe & Ji, 2022; Ehnts & Wray, 2024), mitigating the asymmetrical role of foreign investors. Therefore, this temporary shift in the institutional approach contributed to explaining the easing in foreign purchases asymmetries.

Since QT began in 2023, foreign investors have become a significant group purchasing securities in the Eurozone (Ferrara et al., 2024). According to Schnabel (2024) purchases

by foreign investors have been crucial in preventing "bottlenecks" in bond absorption. However, foreign purchases also exhibited some asymmetry: core countries experienced significant net purchases, while the periphery initially faced net sales, followed by modest net purchases, reflected in z-scores (Figure 4.4). The possibility that this asymmetrical role may be exacerbated in the future – whether due to the next stages of QT or external shocks – could prove fundamental in impacting regional fragmentation, given the turn towards a more passive approach to government securities.

These features underscore the unique dynamics of the EMU within the broader context of financial discipline over states, enforced through the ownership of government securities (Hager, 2014; Streeck, 2014; Sotiropoulos et al., 2013; Mosley, 2003). In the EMU, bondholders' power to discipline states is amplified by the persistent uncertainty surrounding the ECB's role in safeguarding the safe-asset status of individual national debts. This shapes hierarchies within the government securities market, most prominently reflected in foreign investor flows. The absence of a purchaser of last resort historically intensified discrimination against the periphery, underscoring the ECB's central role in either mitigating or exacerbating financial asymmetries.

4.5. Investor groups' risk-return sensitivity

Previous sections showed that relative participation and net acquisition of government securities by investor groups reflect regional asymmetries linked to the institutional approach to sovereign debt. This section examines the role of different investor groups by analysing their net purchases in relation to the risk-return trade-off in sovereign debt. A cross-correlation analysis is conducted between 10-year government yields and net purchases by private investor groups as a share of total debt across different periods. Assuming that these yields reflect the risk-return trade-off, the correlations are proxies for each group's risk aversion. Selling a country's government securities amid rising yields may indicate an unattractive risk-return profile for that investor group, and the role

played by different investors regarding the same asset can signal which groups act as stabilisers or destabilisers during rate hikes. This analysis aims to uncover correlation patterns between core and peripheral Eurozone countries, tracing changes alongside shifts in the ECB's monetary policy.

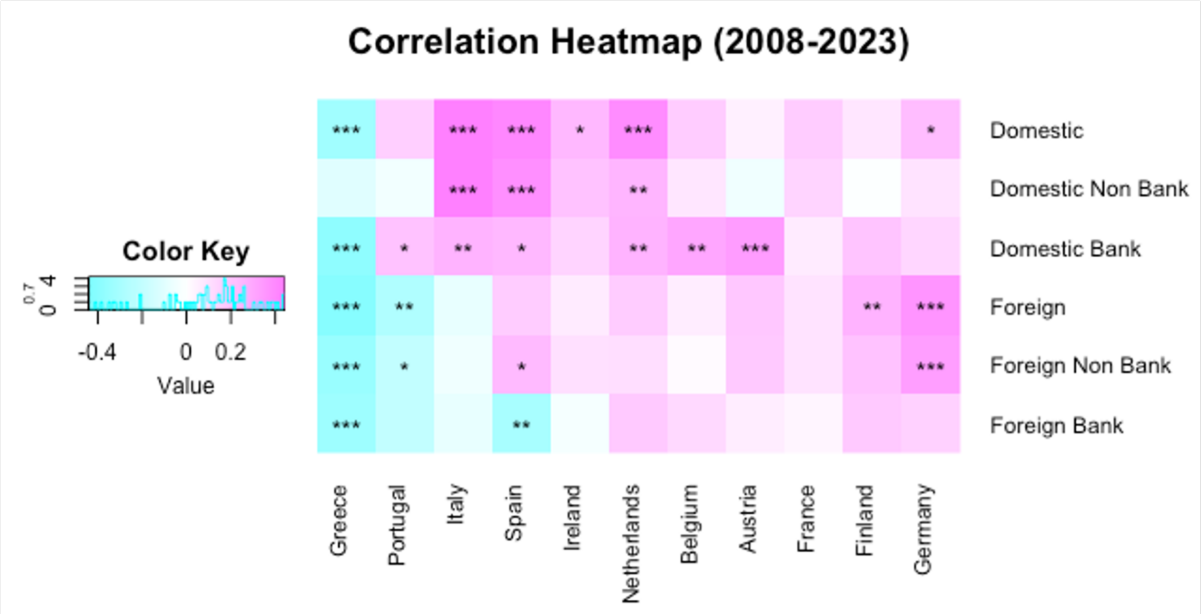

Figure 4.5. Correlation heatmap (2008-2023) between the net purchases relative to the total government securities of each investor group and the 10-year government bond yields. Data: FRED and IMF/Sovereign debt investor base for advanced economies.

Figure 4.5 presents the cross-correlation between 10-year bond yields and net purchases by investor groups (2008–2023, quarterly).[54] Strong blue values indicate a higher negative correlation, implying greater risk aversion by the investor group toward the respective government bond; pink values suggest the opposite. In most countries – except Greece – domestic banks have acted as stabilisers, with net purchases (sales) of government bonds linked to rising (falling) interest rates. The domestic bank sector may interpret an increase in yields as an opportunity for higher returns. Risks reflected in higher yields for their domestic government securities are worth taking for such investors.

[54]Although debt maturity structures vary across Eurozone countries, the 10-year yield is widely regarded by investors, analysts, and policymakers as a key reference rate for sovereign risk and borrowing costs (e.g., Andrade et al., 2016).

Domestic non-banks also show a stabilising influence in some countries, albeit less uniformly, especially in Spain, Italy, and the Netherlands.

Foreign investors play an asymmetric role, generally acting as destabilisers in the periphery and stabilisers in the core. Greece, Portugal, Spain, Italy, and Ireland display negative correlations for at least one group of foreign investors, particularly pronounced in Greece and Portugal. Meanwhile, core countries display mild positive correlations, strongest in Germany and Finland, indicating that foreign investors are less deterred by rising yields in core nations. This suggests that foreign investors could view most peripheral countries as inherently riskier during periods of rising yields, making such investments less appealing. In contrast, rising yields in Germany are seen as opportunities for higher returns, given the safe-haven status of its securities. Decreasing yields tends to improve perceptions of peripheral government bonds while reducing the appeal of core securities.

Figures 4.6, 4.7, and 4.8 present sub-period analyses addressing shifts in investors' risk-return sensitivities during times of financial distress and changes in ECB policy. Figure 4.6 covers 2008–2012Q2, from the GFC until Draghi's "whatever it takes" speech, when the ECB maintained a passive stance on government securities. During this period, the destabilising role played by foreign investors, especially foreign non-banks, was stronger and statistically significant in all peripheral countries. The analysis below gives evidence that, in the absence of robust action from the ECB, the asymmetrical role played by foreign investors during moments of distress is expected to be substantial. In the absence of the ECB acting as a purchaser of last resort, the increase in yields is interpreted by foreign investors as a risk that is not worth taking in the periphery. In core countries, the correlations were very weak and not statistically significant, indicating that other elements – such as the structural safe-haven status of their government securities – guided foreign investors' purchases rather than yields. Domestic

groups generally showed low correlations, except in Greece, where rising yields negatively impacted even domestic banks.

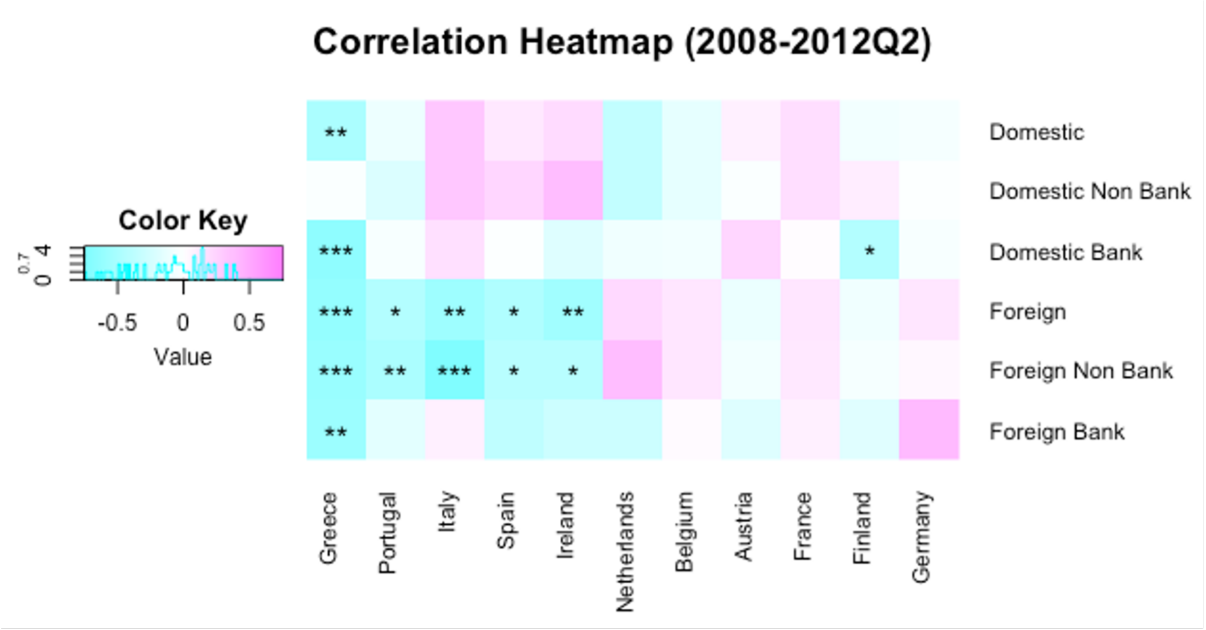

Figure 4.6. Correlation heatmap (2008-2012Q2) between the net purchases relative to the total government securities of each investor group and the 10-year government bond yields. Data: FRED and IMF/Sovereign debt investor base for advanced economies.

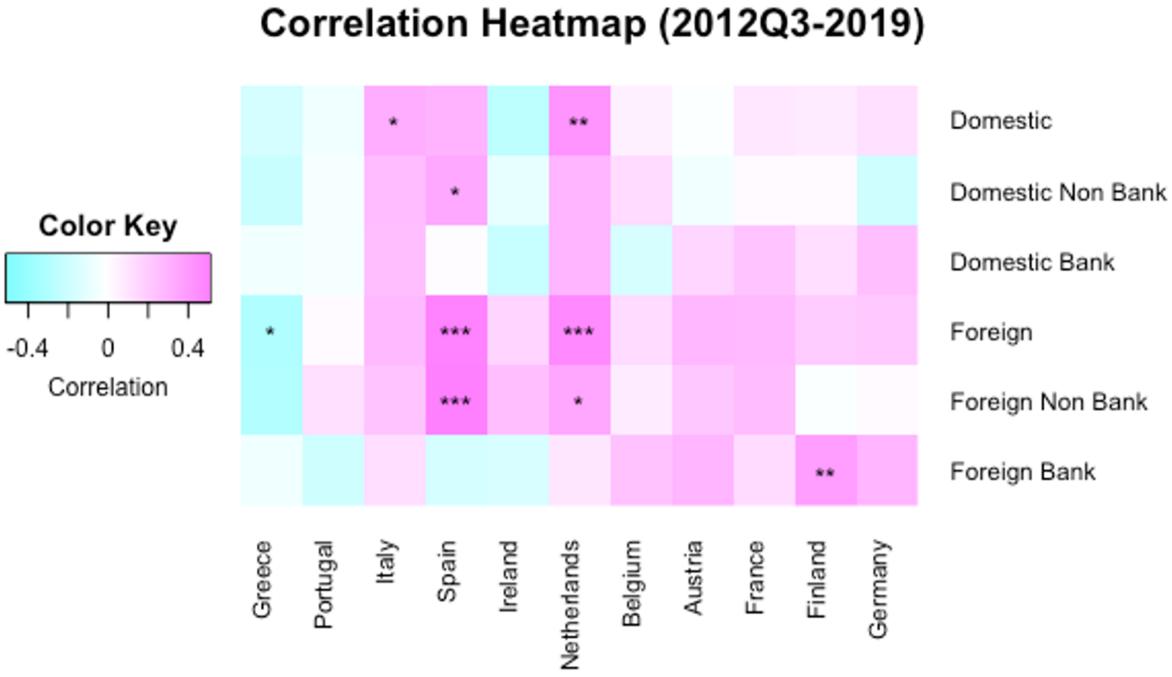

Figure 4.7. Correlation heatmap (2012Q3-2019) between the net purchases relative to the total government securities of each investor group and the 10-year government bond yields. Data: FRED and IMF/Sovereign debt investor base for advanced economies.

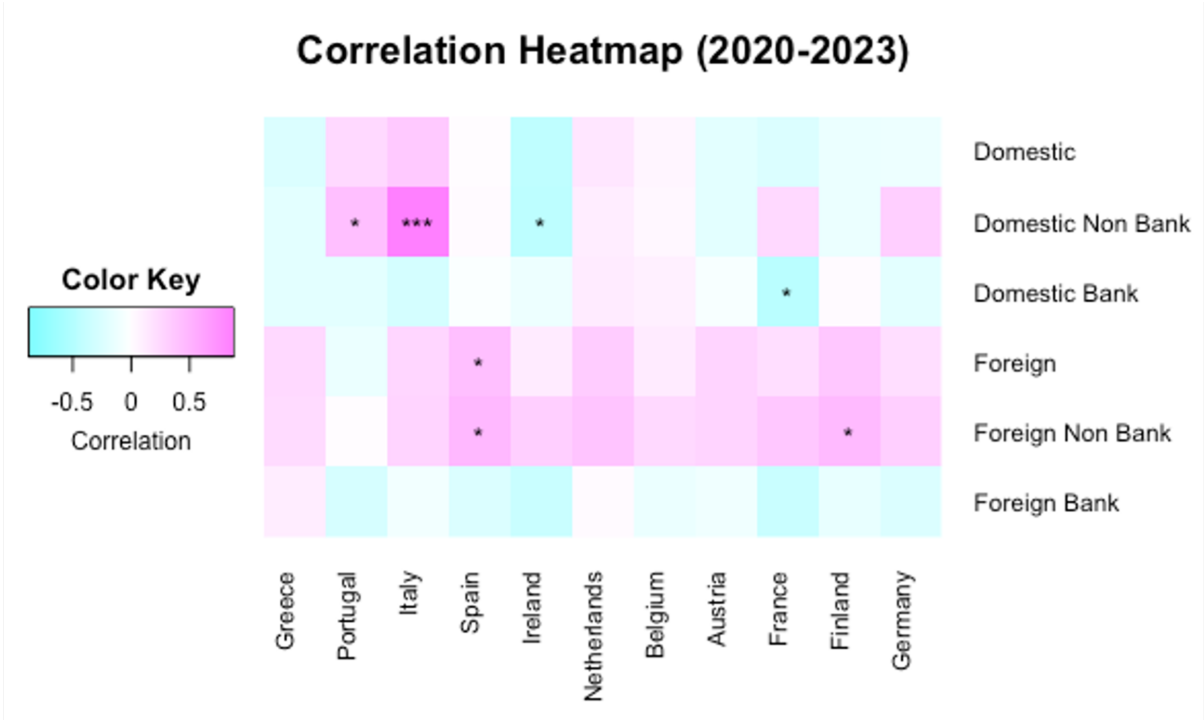

Figure 4.8. Correlation heatmap (2012Q3-2019) between the net purchases relative to the total government securities of each investor group and the 10-year government bond yields. Data: FRED and IMF/Sovereign debt investor base for advanced economies.

Figures 4.7 and 4.8 show cross-correlation results for 2012–2019 and 2020–2023. In both periods, the ECB's more active role as a purchaser of last resort reduced foreign investors' asymmetrical behaviour. From 2012Q3 to 2019, with the implementation of Outright Monetary Transactions (OMT) and, subsequently, the APP, foreign investor correlations were generally lower. Foreign investors' correlations remained, in general, lower, with Spain and the Netherlands presenting positive and significant correlations (Figure 4.7). After the debt crisis, Greece, the only country excluded from government securities purchases under the PSPP/APP, was also the only one with a significant negative correlation. Therefore, countries being supported by the ECB showed soft or positive correlations of foreign net purchases and yields, indicating that risk perception regarding interests shifted to the relative benefit of the periphery. Domestic investors presented, in general, low correlations.

During the pandemic, the launch of the PEPP and temporary fiscal relief led to further correlation softening across all countries, resulting in greater homogeneity among

both foreign and domestic investor groups (Figure 4.8). Domestic investors also showed lower correlations, with exceptions like Portuguese and Italian domestic non-banks. This softening mirrored the unprecedented fiscal and monetary support provided by European institutions during this period (De Grauwe & Ji, 2022).

In conclusion, the analysis underscores four main points: (1) throughout the period, the domestic banking sector consistently acted as a stabilizer, potentially offsetting outflows (or complementing foreign inflows) during higher risk-return scenarios; (2) foreign investors display a potential asymmetrical role in the Eurozone, to the detriment of peripheral countries; (3) such asymmetry is likely to become substantial during distresses that are matched by the institutional reinforcement of market discipline, particularly when the ECB does not act as a purchaser of last resort; (4) proper ECB support for government securities can offset these asymmetries, to the relative benefit of the periphery.

The possibility that foreign investors might once again play an asymmetrical role in the Eurozone is particularly relevant as the ECB shifts towards QT, raising concerns about fragmentation. Future outcomes will depend on the pace of QT and the role private investors will play as market discipline strengthens.

4.6. Central bank outflows and foreign shocks on government debt holdings

The previous sections illustrated, first, the role of bondholders in regional asymmetries and, second, their connections with the peculiarities of the Eurozone's institutional structure. This section combines these two aspects to explore how they might interact in the future, proposing a framework to assess scenarios involving central bank outflows and varying investor group behaviour. This exercise is motivated by the ECB's shift towards QT and its future reinforcement that is planned with the end of reinvestments

under the PEPP, also covering the possibility of reemergence in foreign investor asymmetries.

The ECB can conduct further QT's steps at diverse paces of balance sheet reduction, with different investor groups behaving in diverse ways. They could either step in to support the government securities market or be negatively affected by the policy change or external shocks. Given prior evidence that a passive stance on government securities exacerbates foreign investor asymmetries, this risk warrants attention. Examining various combinations of central bank outflows and bondholder responses highlights the delicate balance needed to mitigate financial instability and fragmentation.

4.6.1. The quantitative tightening: political and economic rationality

In early 2023, the ECB shifted from QE to QT, framing it as a tool to combat inflation and reduce the Eurosystem balance sheet. However, Lagarde (ECB, 2022a) described QT as merely "complementary," with "no element of monetary policy stance." In a study commissioned by the European Parliament, Claeys (2023) stated that "the most compelling reasons to do QT in the euro area are political and legal," as it reinforces that QE was intended as a temporary policy, thereby complying with EU Treaties.

Schnabel (2023) later outlined three QT motivations: first, to "regain policy space"; second, to "mitigate the negative side effects associated with a large central bank balance sheet"; and third, to "withdraw policy accommodation to support our intended monetary policy stance." Regarding the first reason, the ECB has not adequately explained why or how the absence of QT would limit policy space. For example, the ECB's expanded balance sheet from 2014 to 2018 did not impede its ability to implement significant QT in 2020. The third reason was previously described as a limited and complementary function of QT, with only a "limited impact on the inflation outlook" (ECB, 2023).

Elucidative of the political and economic importance of the QT is the second reason addressed by Schnabel, regarding the negative effects of large balance sheets. Two

negative effects are mentioned: one, ‘it could jeopardise central bank's credibility by giving rise to accusations of financial and fiscal dominance’; and second, a scarcity of high-quality assets, in the sense that QT will be ‘efficient in alleviating general asset scarcity’. By defending its policies during the QE, the ECB repeatedly stated that there was no fiscal or financial dominance and that the “disciplinary function of the markets has not been lost” (Schnabel, 2020). Now, with a sleight of hand, the ECB uses the same argument it deemed wrong for a time. The second concern addresses the importance of government securities to liquid financial markets. The increase in high-quality asset availability is done by transferring from the ECB to the financial markets a big power in impacting the state's cost of funding. Still, the availability of such assets is constrained by the several limitations on fiscal policy reinforced by the EMU institutions. These contradictions underscore that QT's rationale reflects the reinforcement of the Eurozone towards an asymmetric fiscal stabilisation regime, in line with the Streeck's (2017) EMU consolidation state.

Fears about potential negative impacts from fragmentation have shaped the cautious initial approach to QT. On 16 December 2021, the Governing Council decided to end net purchases under the PEPP in March 2022, fully reinvesting maturing assets until mid-2024, and gradually reducing reinvestments by €7.5 billion per month until their cessation at the end of 2024. The APP ended net asset purchases in July 2022, with full reinvestments until March 2023, followed by a €15 billion monthly reduction until July 2023. The APP reinvestments were discontinued in July 2023, while the PEPP reinvestments have been the ECB's primary tool against fragmentation risks in the region.

According to the ECB (2023), there were differing opinions within the Governing Council about the appropriate pace for QT. Some of its members “expressed a preference for reducing the APP portfolio at a faster pace or for terminating reinvestments altogether (ECB, 2023). However, the fear that a faster pace of reduction “could lead to

the re-emergence of bond market fragmentation which could make further interest rate increases more difficult to pursue" (ECB, 2023) determined the adoption of a moderate pace of balance sheet reduction. The flexibility of PEPP reinvestments and the introduction of the Transmission Protection Instrument (TPI) have helped prevent significant fragmentation in the government debt market.

With the end of PEPP reinvestments scheduled for early 2025 (Schnabel, 2024) and uncertainty regarding the ECB's support for government securities, the situation may change. PEPP reinvestments have been the ECB's primary defence against fragmentation (ECB, 2022a), and their cessation would remove a key mechanism. The newly established TPI will remain the ECB's only tool to counteract fragmentation. Unlike QE, the TPI is conditional, targeting countries with deteriorating financing conditions 'not warranted by country-specific fundamentals', with eligibility criteria including compliance with the EU fiscal framework (ECB, 2022b). These conditionalities and constraints add uncertainty about the ECB's commitment to supporting government securities markets, which may affect bondholders' risk-return perceptions.

It is also unclear whether the end of reinvestments will be a permanent and final measure or if the ECB intends to pursue more aggressive QT steps in the future. Key market participants, such as S&P Global Ratings, predicted a potential shift from passive to active QT, contingent on inflation trends.[55] This would mean the ECB might begin selling assets from its balance sheet rather than simply refraining from reinvesting maturing securities (Charnay, Hollegien, Broyer, & Guez, 2023).

Given these uncertainties, it will be explored the impacts of various combinations of different QT speeds and diverse investor group responses on financial fragility and fragmentation in the Eurozone.

[55]The inflation has declined at a faster pace than it was expected by the ECB, achieving in March 2024 a projection of 2,3% to 2024 (Lane, 2024), but its future path remains uncertain. Adrian (2024) argues that there is evidence that disinflation may have stalled in some Eurozone countries in the beginning of 2024.

4.6.2. Framework and Scenarios

The framework proposed here extends and refines the methodology developed by Arslanap and Tsuda (2012; 2014) for homogeneous foreign private outflows in the government securities market. The methodology is extended to cover the case of outflows in sovereign markets by the domestic central banks, it is refined by allowing for asymmetrical behaviour by different investor groups, such as the uneven role that can be played by foreign investors. The proposed framework allows to assess the possible impacts of market discipline reinforcement via QT in the Eurozone, and to consider that bondholders' asymmetries might be boosted by increasing uncertainty regarding the ECB's role as a purchaser of last resort.

In line with the empirical evidence that the domestic bank sector is the most stabilizing sector among the government securities holders in the Eurozone, the goal will be to determine the amount of additional debt that this sector would have to assume to offset outflows. Following Arslanap and Tsuda (2014; 2012), two indexes of financial fragility are used to assess vulnerability to government debt outflows. The first one (4.1) is the total additional debt $(\Delta \text{DebtDB}_{i,t+1})$ that the domestic banking sector would need to step in to offset such outflows as a share of its assets $(\text{AssetsDB}_{i,t})$.[56] Countries with a higher share of additional debt to bank assets might experience a situation in which banks could face difficulties in absorbing the remaining debt, possibly leading to an increase in bond yields. The second one (4.2) is the total debt $(\Delta \text{Debt} DB_{t+1} + DB_t)$ that would be held by domestic banks after absorbing such government securities as a share of its assets, which is a proxy to a possible doom loop between government and domestic banks. Throughout the equations, the subscript t refers to the previous year latest available data, while $t+1$ refers to the forecast year, for each country i. A detailed

[56]Domestic bank assets are on 2022 values according to IMF/International Financial Statistics Data.

systematization of all data sources and their corresponding time periods is provided in Appendix 4.B.

$$\frac{\Delta \text{DebtDB}_{i,t+1}}{\text{AssetsDB}_{i,t}} \tag{4.1}$$

$$\frac{(\Delta \text{Debt}DB_{t+1} + DB_{t})}{\text{AssetsDB}_{i,t}} \tag{4.2}$$

The scenarios considered assume that outflows can be conducted by the Eurosystem ($EuroOutflow_{i,t+1}$) and by foreign investors ($FOutflow_{i,t+1}$). The Eurosystem will reinvest ω under both APP and PEPP of maturing securities ($EuroM_{i,t+1}$) and sell a share equal to λ of the remaining government debt, where $PS_{i,t}$ is the total public sector securities held under both programmes. Outflows by the Eurosystem will be:

$$EuroOutflow_{i,t+1} = (1-\omega)EuroM_{i,t+1} + \lambda\left(PS_{i,t} - EuroM_{i,t+1}\right) \tag{4.3}$$

The foreign investors' outflows (Foutflowi, t+1) will be determined by equation 4.4. β_i represents the share of maturing debt held by foreign investors that is rolled of maturing securities under their portfolio ($FM_{i,t+1}$) and γ_i is the share that is sold of the total foreign securities holdings ($FS_{i,t}$) after subtracting maturing securities.

$$FOutflow_{i,t+1} = (1-\beta_i)FM_{i,t+1} + \gamma_i\left(FS_{i,t} - FM_{i,t+1}\right) \tag{4.4}$$

The additional debt to be held by the domestic banks will be determined by equation 4.5. Domestic banks will finance the deficit ($D_{i,t+1}$) in proportion to the total domestic government debt holdings ($DB_{i,t}$) as a share of total private holdings of national public debt ($TP_{i,t}$). The domestic nonbank sector will absorb the total amount of additional debt by an additional percentage of φ_i over the share of government securities holdings of the domestic nonbank ($\frac{DNB_{i,t}}{TD_{i,t}}$) in each country. Foreign investors will finance the deficit proportionally to their participation in debt held by private agents if $a_i = 0$ and

will stop financing the deficit if $a = 1$. Therefore, the additional debt to be held by the domestic banks in each country is:

$$\Delta DebtDB_{i,t+1} = \left(D_{i,t+1}\frac{DB_{i,t}}{TP_{i,t}}\right) + \left[\left(FPoutflow_{i,t+1} + EuroOutflow_{i,t+1} + a_i(D_{i,t+1}\frac{F_{i,t}}{TP_{i,t}}\right)\right].\left[1 - \left(\varphi_i + \frac{DNB_{i,t}}{TD_{i,t}}\right)\right] \quad (4.5)$$

To determine each of the variables and equations outlined above, a set of assumptions is adopted.[57] The Eurosystem will not finance the deficit, in line with its legal framework; it is assumed that foreign official holdings will remain constant; due to the lack of data on debt maturity by investor group, it is assumed that each private investor's maturing debt over the next year[58] will be proportional to their share in total debt; maturing debt under the Eurosystem portfolio for each country is not available, and it will be stipulated based on the Weighted Average Maturity (WAM) of PEPP and APP securities for each country as published by the ECB;[59] the overall deficit will be assumed to evolve as IMF/WEO database projections[60] – a conservative assumption, given that Eurosystem or foreign outflows might worsen the deficit via impacts on the interest rate.

A set of scenarios is constructed to determine the additional and total debt that the domestic bank ($\Delta DebtDB_{i,t+1}$) would need to take to counterbalance the outflows under varying conditions. These scenarios involve setting different shares of reinvestments and

[57]It is not considered the potential impacts of sovereign outflows on the private sector, taking a conservative approach as these impacts may be self-reinforcing and asymmetrical (van Riet, 2022). Additionally, QT is being implemented alongside other economic policy shifts with potential self-reinforcing effects, not covered here, as the recent reform of the Stability and Growth Pact which is likely to exacerbate asymmetries (Heimberger et al., 2024; Heimberger, 2025), adding to those analysed.

[58]Data on short-term debt in 2023, the last available data, is from the Eurostat and ECB Data on government debt residual maturity (less than 1 year), with data for Greece obtained from its public debt management agency (Hellenic Republic Ministry of Finance, 2024).

[59]More details in Appendix A.

[60]Scenarios are using the deficit projected by the IMF for 2025.

sales of government securities by the foreign investors (β and γ, respectively) and the Eurosystem (ω and λ, respectively), and also the share of outflows that would be absorbed by the domestic non-banking system over the share of government securities held by this sector (φ). The parameters β, γ, α and φ are also allowed to vary across countries, based on the empirical evidence found in the previous sections. Four scenarios are considered, named A, B, C, and D. Further details on the equations used in each scenario are provided in Appendix 4.B.

Scenario A assumes that the ECB will continue with the policy of not reinvesting the maturing securities for the APP, and will stop reinvesting also for the PEPP, in line with what the Governing Council intends to do at the end of 2024 (Schnabel, 2024). It supposes there are no foreign investors' outflows.

The Eurosystem will not reinvest maturing securities for APP nor for PEPP and will not sell remaining government securities. Parameters will be $\omega = 0$ and $\lambda = 0$. Foreign investors will finance their share of the deficit, not sell any debt, and roll over all the maturing debt. Parameters will be $\alpha = 0,\ \beta = 1$ and $\gamma = 0$. The domestic non-banks will buy the additional debt in proportion to their share of total debt, and so $\varphi = 0$.

Scenario B mimics a possible evolution of events if a more severe stance prevails within the ECB, in line with important financial market agent expectations of a shift from a passive to an active QT by the ECB (Charnay et al., 2023). Here, it is assumed that the ECB will not reinvest securities of both programs, and it will additionally sell 10% of its portfolio's government securities yearly, resulting in a QT approximately twice as fast as scenario A in terms of balance sheet reduction. Foreign investors and domestic nonbanks are assumed to behave in the same way as in scenario A. The only change comparatively to Scenario A is that $\gamma = 0{,}1$.

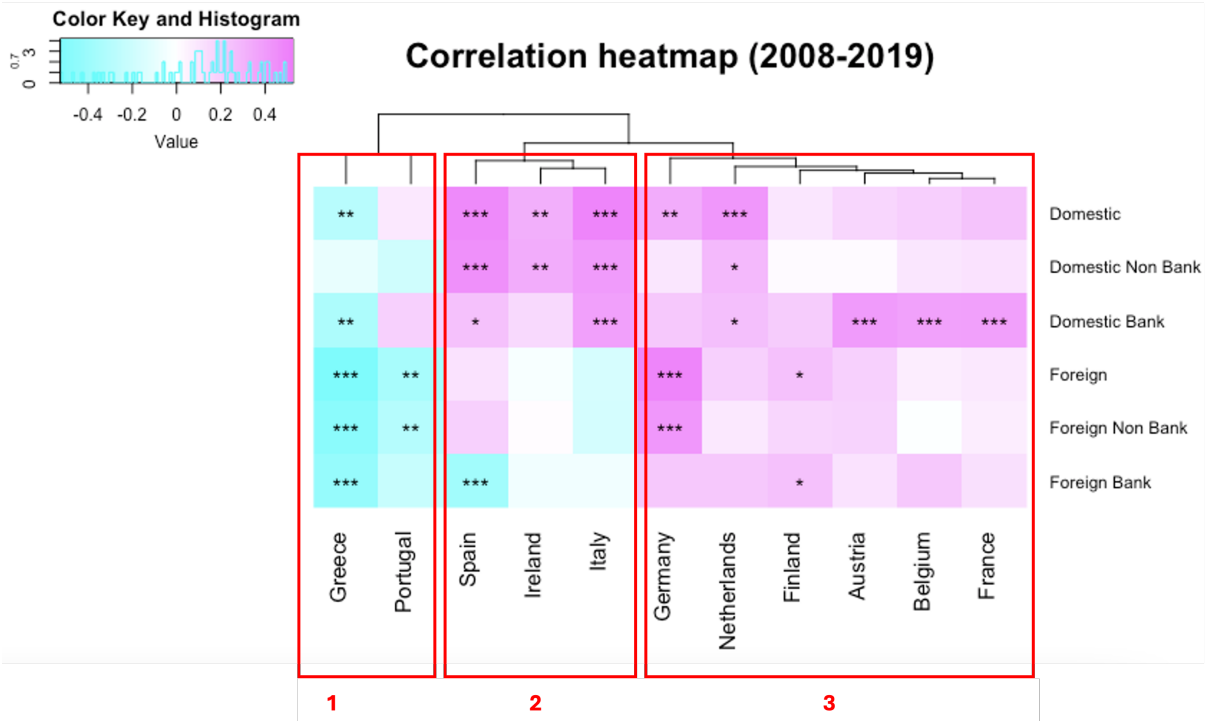

Figure 4.9. Hierarchical clustering with complete linkage and correlation heatmap (2008-2019) between the net purchases relative to the total government securities of each investor group and the 10-year government bond yields. Data: FRED and IMF/Sovereign debt investor base for advanced economies.

Under Scenarios C and D, it is assumed that foreign investors will reallocate – as a response to the shift in monetary policy or to an external factor – a share of their portfolio from countries they perceive as riskier to the ones they perceive as safer. The findings in the previous sections indicate that during moments of distress and mostly when there is uncertainty regarding the ECB's role as a purchaser of last resort, foreign investors tend to play an asymmetrical role in the Eurozone. Countries will be grouped in clusters given their similarities regarding each investor's group risk aversion, measured as its correlations between net purchases and yields based on the hierarchical clustering with complete linkage[61]. Figure 4.9 shows evidence that there are three clusters at closer levels of similarity from 2008-2019, given by the vertical distance of the lines grouping the countries. The pandemic period was excluded due to unprecedented temporary risk-sharing efforts. Cluster 1 comprises Greece and Portugal, with negative and significant

[61]Complete linkage is a hierarchical clustering in which the distance between two groups is determined by the largest distance overall possible pairs. It tends to create more compact and spherical clusters by minimizing the worst-case distance within a cluster.

correlations for foreign investors, while a negative but less significant correlation to the domestic groups. Spain, Ireland and Italy are part of Cluster 2, with negative but in general non-significant correlations for foreign investors, while strong and positive correlations for domestic investors, both banks and non-banks. In cluster 3 core countries were grouped, having, in general, soft positive correlations to foreign investors and strong positive correlations to domestic banks.

In Scenario C it is assumed that the ECB adopts a moderate QT, equal to the one conducted under Scenario A, and investor groups will behave asymmetrically, according to the cluster they belong.

In Scenario C, the yearly share of government securities net sales in the foreign investor's portfolio that will be sold/purchased (γ_1, γ_2 and γ_3) will be equal to the average value of such shares during the pandemic and the debt crisis for each of the specific clusters of countries. For example, cluster 1 has $\gamma_1 = 0{,}2345$ because it faced an annual average net sale of 23% of government securities held by foreign investors during the most intense periods of the debt crisis and the pandemic (2010Q2-2012Q3; 2020Q1-2020Q4). The foreign investors will stop financing the deficit and stop rolling over maturing debt to the countries that they are selling the debt (groups 1 and 2). Parameters for foreign investors will be:

$$a_1 = a_2 = 1; \quad a_3 = 0;$$
$$\beta_1 = \beta_2 = 0; \quad \beta_3 = 1$$
$$\gamma_1 = 0{,}235; \qquad \gamma_2 = 0{,}057; \qquad \gamma_3 = -0{,}079$$

Additionally, domestic non-banks will absorb more than their participation in total debt for cluster 2, given that the sector has a particularly stronger stabilizer role in such countries. Given that 7,6% beyond their share in total debt was the average value of the

contribution to absorb debt during both crises in Cluster 2[62], this value is used as a reference to φ_2. Therefore:

$$\varphi_1 = \varphi_3 = 0; \qquad \varphi_2 = 0{,}076$$

In Scenario D the ECB adopts an active QT, equal to the one conducted under scenario B, and investor groups will behave asymmetrically according to the cluster they belong. This scenario represents the case of an aggressive quantitative tightening that comes together with an intense differentiation of investors' behaviour across the clusters. The only difference with respect to Scenario C, is that $\lambda = 0{,}1$.

Parameters to private agents in the three clusters $(a_i, \beta_i, \gamma_i, \varphi_i)$ to Scenario D remains the same than Scenario C.

4.7. Results

The two indexes of financial fragility in the three proposed scenarios are illustrated in Table 4.1 and 4.2. More details can be found in Appendix 4.B.

The additional sovereign debt that the domestic banks would need to absorb as a share of total domestic bank assets in each scenario is illustrated in Table 4.1, where higher values signalize more financial fragility. Results under Scenario A capture the possible direct impacts of ending PEPP reinvestments, which are the ECB's first line of defence against fragmentation. It evidences that the direct impact of not reinvesting securities under both the APP and PEPP is, per se, limited: the maximum value is for Spain, where the additional debt to be held by the domestic bank would be 1,6% of its assets. Even though the impact on financial fragility is limited, there is some

[62] 7,6% was the average value in Cluster 2 of annual net purchases by domestic non-banks as a percentage of total securities variation, subtracted from the share of domestic non-banks in the country's total debt during 2010Q2-2012Q3 and 2020Q1-2020Q4. The value is the average of the share of the increase in total debt that was absorbed by the domestic non-bank beyond their share in total debt.

heterogeneity among the analysed countries, and the most affected countries would be Spain, Italy, Belgium and Portugal.

Additional gov. debt to be held by domestic banks (% bank assets)				
Country	**Scenario A**	**Scenario B**	**Scenario C**	**Scenario D**
Spain	1,6%	3,0%	4,7%	5,9%
Italy	1,6%	2,8%	4,4%	5,5%
Portugal	1,2%	2,6%	3,9%	5,3%
Greece	1,2%	2,3%	2,6%	3,7%
Belgium	1,2%	2,1%	-0,1%	0,8%
Austria	1,0%	2,0%	-0,3%	0,7%
Finland	1,0%	1,8%	0,4%	1,2%
Germany	0,9%	1,6%	0,6%	1,3%
France	0,6%	1,1%	0,0%	0,6%
the Netherlands	0,6%	1,1%	0,4%	1,0%
Ireland	0,2%	0,5%	0,7%	1,0%

Table 4.1. Additional government debt to be held by domestic banks in scenarios A, B, C and D.

Scenario B captures the case of an aggressive QT and implies a more pronounced and also more asymmetrical increase in the financial fragility of the analysed countries. In scenario B the countries with a higher share of additional debt that would need to be held by the domestic bank are Spain (3,0%), Italy (2,8%), Portugal (2,6%) and Greece (2,3%). From Scenario A to Scenario B, the gap in financial fragility indexes of these four most affected countries relative to Germany increases: while under scenario A such a gap was of 0,8%, 0,7%, 0,3% and 0,3% to Spain, Italy, Portugal and Greece, respectively, these values increase to 1,3%, 1,2%, 1,0% and 0,6% under scenario B. Belgium might also be more impacted by the direct impacts of a more intense QT than other core countries, a result that was boosted by the high projected deficits and relatively smaller domestic bank sector.

Scenarios C and D examine the impacts of a QT that comes together with an asymmetrical role played by investor groups. Both scenarios rely on previous sections' empirical evidence that foreign investors play an asymmetrical role in the Eurozone that

is stronger in cases of distress combined with a more passive and market-based ECB's approach to government securities.

Scenario C evidence the possible impacts of a moderate pace of QT that is matched by a partial reallocation of foreign investors' portfolios from countries perceived as riskier to safer. The scenario evidence that even in the case of a moderate QT, if such a shift or external shock triggers financial investors to play an asymmetrical role in the Eurozone in line with past trends, the impacts in terms of financial fragility will be substantial to most of the peripheral Eurozone. The most fragile countries are, once again, Spain (4,7%), Italy (4,4%), Portugal (3,9%), and Greece (2,6%), and the scenario further evidences a significant fragmentation in the region.

Scenario D represents the most adverse scenario in terms of fragmentation, with an aggressive QT matched by foreign investors' reallocations of government securities. Once again, the most fragile countries are Spain (5,9%), Italy (5,5%), Portugal (5,3%) and Greece (3,7%). Under this scenario, the negative impacts of QT on core countries are partially offset by foreign inflows into these government securities markets, while they are amplified by outflows from peripheral countries. Even though an aggressive QT is likely to negatively affect financial stability across the region, these foreign flows might allow the burden of monetary policy adjustments to shift to the periphery.

Table 4.2 illustrates which would be the total bank debt as a share of assets in each scenario, index that serves as a proxy to assess vulnerability to a doom loop between domestic banks and governments. In all analysed scenarios, Italy, Spain, Greece, and Portugal exhibit the highest total bank debt as a share of assets, further confirming the higher fragility of these economies.

In summary, the results indicate that Southern Europe would be the most affected by the combination of QT and potential foreign investors' portfolio reallocations. Both financial fragility indicators consistently show Italy and Spain as the most fragile countries across all scenarios. These findings align with the ECB's concerns about

preventing shocks in these two economies, as they have been the primary beneficiaries of reinvestment flexibility under the PEPP.[63]

Total gov. debt to be held by domestic banks (% bank assets)				
Country	**Scenario A**	**Scenario B**	**Scenario C**	**Scenario D**
Italy	18,0%	19,2%	20,8%	21,9%
Spain	11,6%	13,0%	14,6%	15,9%
Greece	11,6%	12,7%	13,0%	14,1%
Portugal	7,8%	9,3%	10,6%	12,0%
Finland	6,1%	6,9%	5,5%	6,3%
Belgium	6,3%	7,2%	4,9%	5,8%
Germany	5,2%	6,0%	4,9%	5,7%
Austria	4,2%	5,2%	2,9%	3,9%
the Netherlands	2,4%	3,0%	2,3%	2,8%
France	2,8%	3,3%	2,2%	2,7%
Ireland	0,9%	1,2%	1,4%	1,7%

Table 4.2. total government debt to be held by domestic banks in scenarios A, B, C and D.

The results derived from this framework should be interpreted with their limitations in mind. The cases of Greece, Ireland, and Germany warrant additional discussion to better contextualise the findings.

Given the severity and persistence of the debt crisis in Greece, the share of foreign investor holdings and total securities relative to total debt remained low (3% and 25% in 2023, respectively). Thus, foreign outflows have a relatively small impact, but this reflects the financial fragility of the economy. Furthermore, the cross-correlation analysis from the previous section showed that Greece is the only country where domestic banks' net purchases are significantly and negatively correlated with government bond yields. This suggests that the domestic banking sector does not stabilize the economy – nor

[63]From June 2022 to March 2024, PEPP flexibility has allowed to a cumulative purchase of 9,9 EUR billion and 5,3 EUR billion of Italian and Spanish public securities, while a sale of 19,3 EUR billion of German public securities.

does any investment group. Therefore, this approach might underestimate Greece's financial fragility.

Ireland's surprisingly low financial fragility indicators are driven by the large government surplus projected for the coming years by the IMF (10.7 billion euros in 2025) and the small size of government debt relative to domestic bank assets (total public debt represented just 14% of domestic bank assets in 2024). Ireland relies heavily on portfolio and direct gross inflows, with government securities comprising a small portion of these total inflows. Moreover, Ireland's strong financial ties with the UK and the US (Lane, 2015) distinguish it from other Eurozone peripheral countries. Thus, Ireland's financial fragility appears to be more influenced by private finance and factors outside the Eurozone, which are not covered in this framework.

The safe-haven status of the German government's securities might provide a higher degree of accommodation to Germany relative to the other core countries than reflected in the results. The framework here developed treats all the core countries homogeneously under scenarios C and D since they were identified in the same cluster, which might also underestimate the financial fragility of other core countries relative to Germany.

Empirical evidence from the analysis across various scenarios suggests that a ECB shift towards a more aggressive QT – by non-reinvesting securities, or by selling them – would have a harsher impact on most Eurozone peripheral countries. Such negative impact would be amplified if the ECB eventually adopts a faster balance sheet reduction, or if it is accompanied by a reemergence of asymmetrical foreign flows in the government securities market.

4.8. Conclusion

This article argued that the interaction between sovereign bondholder groups and the EMU institutional arrangement shapes Eurozone regional asymmetries. The findings suggest that foreign investors play a potentially destabilising role in sovereign debt

markets during periods of distress, disproportionately affecting peripheral Eurozone countries. Conversely, domestic banks have consistently acted as a more uniform stabilising force across the region. The uneven influence of foreign investors can be mitigated by the ECB's support for these states' liabilities or exacerbated by uncertainty surrounding such support. While the EMU policy constraints can be alleviated in the core Eurozone by the foreign investors' stabilising role, their effects may be amplified in the periphery. Depending on the ECB's approach to government debt, foreign flows in sovereign debt markets might become a mechanism for shifting the burden of adjustment from the core to the peripheral Eurozone.

In view of the post-pandemic institutional shift towards reinforcing market discipline, it is proposed a framework to assess the potential consequences of central bank outflows combined with diverse private investor groups' behaviour. This analysis highlighted the likely asymmetrical impacts of QT progression, which nowadays remains in its early stages and is gradually being intensified. According to the financial fragility indexes built in the scenarios under the framework here developed, Southern European countries would be hardest hit by the QT evolvement. These countries could be even worse off, and asymmetries would be further exacerbated in the case of a faster QT pace or if it were accompanied by a reemergence of foreign investor asymmetries. Albeit the actual emergence of such an uneven role to be played by foreign investors is highly unpredictable, the shift towards reinforcing market discipline makes the environment open and favourable for such a role to perform.

By preventing public debt from attaining a supposed "too safe" status, the Eurozone's contradictory approach to government debt operates as a mechanism that reinforces regional imbalances. It places government debt precariously on the edge of a knife, perpetuating hierarchical perceptions of debt safety among sovereign bondholders while risking financial instability. Addressing this delicate balance requires substantial institutional reform, which depends on resolving geopolitical disputes within the

Eurozone. Key steps include defining a permanent and explicit role for the ECB in supporting government securities and establishing enduring risk-sharing measures, such as a broader role for regional safe assets.

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Appendix

4.A Chi-square test

Figure 10 illustrates the detailed results of the Chi-square test conducted in Section 4. Data come from the IMF/Sovereign Debt Investor Base for Advanced Economies. For each country and each crisis, it is first computed the average net-purchase across all quarters in that window. Then, it is assigned a binary net purchase variable to each country: "Positive", if its average net purchase over the crisis period is > 0 (net-buyer); or "Negative", if its average net purchase over the crisis period is < 0 (net-seller). The null hypothesis of the test is that the proportion of countries with positive and negative net sales by investor group is the same in core and peripheral Eurozone. As evidenced in Figure 10, the null hypothesis is rejected at a 10% significance level to Foreign Banks

and Foreign Non-Banks during the debt crisis and rejected to Foreign Non-Banks during the pandemic.

Chi-Square Test: Net Purchases vs. Region

Statistic and p-value, by Investor Group and Crisis

Investor Group	Crisis	χ^2 Statistic	p-value
Domestic Bank	Debt Crisis	1.320	0.452
Domestic Bank	Pandemic	0.917	1.000
Domestic Nonbank	Debt Crisis	0.000	1.000
Domestic Nonbank	Pandemic	0.160	0.689
Foreign Bank	Debt Crisis	7.639	0.017
Foreign Bank	Pandemic	0.917	1.000
Foreign Nonbank	Debt Crisis	5.238	0.056
Foreign Nonbank	Pandemic	5.238	0.059

Figure 4.A.1 χ^2 tests for direction of net purchases divergence in core and peripheral Eurozone. Net purchases are treated as a binary variable (purchase, positive; or sale, negative) for the test. The null hypothesis is that the proportion of countries registering positive and negative net purchases is the same in Eurozone core and periphery.

4.B Further Details on Framework and Scenarios

The framework and scenarios developed to assess financial fragility to domestic central banks and foreign investors' outflows are defined in more detail in this appendix. This framework is based on Alsalsp and Tsuda (2014), incorporating outflows by the Eurosystem and refining it to allow for asymmetrical investor groups' behaviour.

The Gross Financing Needs for each country is defined as follows:

$$GFN_{i,t} = D_{i,t} + M_{i,t} = FD_{i,t} + DBD_{i,t} + DNBD_{i,t} + FM_{i,t} + DBM_{i,t} + DNBM_{i,t} + EuroM_{i,t} \quad (4.B.1)$$

Where, at time t and country i, $GFN_{i,t}$= Gross Financing Needs; $D_{i,t}$= overall fiscal deficit; $M_{i,t}$=maturing debt; $FD_{i,t}$= fiscal deficit financed by foreign private; $DBD_{i,t}$ = Fiscal deficit financed by domestic banks; $DNBD_{i,t}$= Fiscal deficit financed by domestic

non-banks; $FM_{i,t}$= Maturing debt held by foreign private; $DBM_{i,t}$ = Maturing debt held by domestic banks; $DNBM_{i,t}$= Maturing debt held by domestic non-banks; $EuroM_{i,t}$ = Maturing debt held by the Eurosystem.

It is assumed that the domestic central banks - in line with the Eurosystem framework – and foreign official sector and do not finance the deficit. Due to the lack of access to data on debt maturity by investor group, it is supposed that each investor's contribution to finance short term debt over the next year will be proportional to their share in total debt:

$$FM_{i,t} = M_{i,t}\frac{F_{i,t}}{TD_{i,t}}\ ;\ DBM_{i,t} = M_{i,t}\frac{DB_{i,t}}{TP_{i,t}};\qquad DNBM_{i,t+1} = M_{i,t+1}\frac{DNB_{i,t}}{TP_{i,t}} \qquad (4.\mathrm{B}.2)$$

Where, at time t and country i, $F_{i,t}$ = total debt held by foreigners; $DB_{i,t}$= total debt held by domestic banks; $DNB_{i,t}$= total debt held by domestic non-banks; $TD_{i,t}$ = total government securities.

In the case of official holdings by the Eurosystem, data on the amount of debt maturing over the next year is not available. However, information is available on the Weighted Average Maturity (WAM) of each country and its evolution over time. It is therefore assumed that yearly redemptions are evenly distributed and inversely related to the WAM, where $PS_{i,t}$ are the accumulated net purchases of government securities by the PEPP and the APP:

$$EuroM_{i,t+1} = \left[\frac{1}{2WAM_{i,t}-1}\right]PS_{i,t}\ = \left[\frac{1}{2WAM_{i,t}^{PEPP}-1}\right]PS_{i,t}^{PEPP}\ + \left[\frac{1}{2WAM_{i,t}^{APP}-1}\right]PS_{i,t}^{APP} \qquad (4.B.3)$$

Additionally, each private investor group will finance the deficit in the following way. Foreign investors will be able to finance the deficit in the same share of their participation in total debt held by private investors, but they can also stop financing the deficit. Therefore, a is a binary variable indicating if foreign investors finance (a_i =

0) or not ($a_i = 1$) their share in the debt. Domestic banks and non-banks will finance their share in the deficit and, if $a_i = 1$, a share of the deficit that is not financed by foreign investors. The deficit will be financed by each investor group as it follows:

$$FD_{i,t+1} = (1 - a_i)\left(D_{i,t+1}\frac{F_{i,t}}{TP_{i,t}}\right) \quad (4.B.4)$$

$$DBD_{i,t+1} = \left(D_{i,t+1}\frac{DB_{i,t}}{TP_{i,t}}\right) + a_i\left(D_{i,t+1}\frac{F_{i,t}}{TP_{i,t}}\right)\left[1 - \left(\varphi_i + \frac{DNB_{i,t}}{TD_{i,t}}\right)\right] \quad (4.B.5)$$

$$DNBD_{i,t+1} = \left(D_{i,t+1}\frac{DNB_{i,t}}{TP_{i,t}}\right) + a_i\left(D_{i,t+1}\frac{F_{i,t}}{TP_{i,t}}\right)\left[\left(\varphi_i + \frac{DNB_{i,t}}{TD_{i,t}}\right)\right] \quad (4.B.6)$$

Therefore, Eurosystem outflows, foreign investors outflows and total additional debt to be held by the domestic banks will be determined by the following equations:

$$EuroOutflow_{i,t+1} = (1 - \omega)EuroM_{i,t+1} + \lambda\left(PS_{i,t} - EuroM_{i,t+1}\right) \quad (4.B.7)$$

$$FOutflow_{i,t+1} = (1 - \beta_i)FM_{i,t+1} + \gamma_i[FS_{i,t} - (1 - \beta_i)FM_{i,t+1}] \quad (4.B.8)$$

$$\Delta\text{DebtDB}_{i,t+1} = (D_{i,t+1}\frac{DB_{i,t}}{TP_{i,t}}) + \left[\left(FOutflow_{i,t+1} + EuroOutflow_{i,t+1} + a_i(D_{i,t+1}\frac{F_{i,t}}{TP_{i,t}})\right)\right].\left[1 - \left(\varphi_i + \frac{DNB_{i,t}}{TD_{i,t}}\right)\right] \quad (4.B.9)$$

The four scenarios here analysed, scenarios A, B, C, and D, are based on different values for the different parameters $\beta, \gamma, a, \omega, \lambda, \varphi$. Such parameters comprises different shares of reinvestments and sales of government securities by the foreign investors (β and γ, respectively) and the Eurosystem (ω and λ, respectively), to the role played by foreign investors in financing ($a = 0$) or not ($a = 1$) the deficit, and also the share of outflows that would be absorbed by the domestic non-banking system over the share of government securities held by this sector (φ).

While all these parameters are constant across the analysed countries in scenarios A and B, the parameters β, γ, a, φ were allowed to vary in scenarios C and D across the three clusters of countries that were identified in the empirical analysis (Figure 8), their values being based on the historical trends of each cluster as described in section 5. Therefore, under scenarios C and D the foreign outflows and the additional debt to be held by domestic banks have both three different equations, one for each of the three clusters. Cluster 1 comprises Greece and Portugal, Cluster 2, Spain, Ireland and Italy, and Cluster 3 the remaining countries.

Data sources to every variable are summarized in Table 4.B.1. The equations adopted in each analysed scenario are detailed in the Table 4B.2. Equations on the total government debt to be held by domestic banks in each of the scenarios are illustrated in Table 4.B.3. Empirical data on outflows and additional debt to be held by domestic banks in each country are illustrated in Table 4.B.4, 4.B.5, 4.B.6 and 4.B.7.

Variable	**Source**	**Period**
Domestic Bank Total Assets ($\mathsf{AssetsDB}_{i,t}$)	IMF/International Financial Statistics Data	2022
Government's Deficit Forecast ($D_{i,t+1}$)	IMF/World Economic Outlook	2025
Debt Shares and Total Debt ($F_{i,t}, DB_{i,t}, DNB_{i,t}, TD_{i,t}, Tf_{i,t}$)	IMF/Sovereign Debt Investor Base for Advanced Economies	2023
Maturing Debt (maturity: less than 1 year) ($M_{i,t}$)	Eurostat, ECB Data, Hellenic Republic Ministry of Finance (2024)	2023
Weighted Average Maturity of Public Securities of PEPP and APP Portfolio Holdings ($WAM_{i,t}^{PEPP}$, $WAM_{i,t}^{APP}$)	ECB	2024
Total ECB's Public Securities PEPP and APP holdings ($PS_{i,t}^{PEPP}$, $PS_{i,t}^{APP}$)	ECB	2024

Table 4.B.1. Data sources

Scenario	Parameters	Eurosystem outflows	Foreign Outflows
A	$\omega = \lambda = a = 0$ $\beta = 1$ $\gamma = \varphi = 0$	$\boldsymbol{EuroOutflow_{i,t+1}}$ $= EuroM_{i,t+1}$	$\mathbf{Foutflow_{i,t+1}} = 0$
B	$\omega = a = 0$ $\lambda = 0{,}1$ $\beta = 1$ $\gamma = \varphi = 0$	$\boldsymbol{EuroOutflow_{i,t+1}} =$ $EuroM_{i,t+1} +$ $0{,}1(PS_{i,t} - EuroM_{i,t+1})$	$\mathbf{Foutflow_{i,t+1}} = 0$
C	$\omega = \lambda = 0$ $a_1 = a_2 = 1$ $a_3 = 0$ $\beta_1 = \beta_2 = 0$ $\beta_3 = 1$ $\gamma_1 = 0{,}235$ $\gamma_2 = 0{,}057$ $\gamma_3 = -0{,}079$ $\varphi_1 = \varphi_3 = 0$ $\varphi_2 = 0{,}076$	$\boldsymbol{EuroOutflow_{i,t+1}}$ $= EuroM_{i,t+1}$	$\mathbf{Foutflow^1_{i,t+1}}$ $= FM_{i,t+1}$ $+ 0{,}235(FS_{i,t} - FM_{i,t+1})$ $\mathbf{Foutflow^2_{i,t+1}}$ $= FM_{i,t+1}$ $+ 0{,}057(FS_{i,t} - FM_{i,t+1})$ $\mathbf{Foutflow^3_{i,t+1}}$ $= - 0{,}079FS_{i,t}$
D	$\omega = 0$ $\lambda = 0{,}1$ $a_1 = a_2 = 1$ $a_3 = 0$ $\beta_1 = \beta_2 = 0$ $\beta_3 = 1$ $\gamma_1 = 0{,}235$ $\gamma_2 = 0{,}057$ $\gamma_3 = -0{,}079$ $\varphi_1 = \varphi_3 = 0$ $\varphi_2 = 0{,}076$	$\boldsymbol{EuroOutflow_{i,t+1}} =$ $EuroM_{i,t+1} +$ $0{,}1(PS_{i,t} - EuroM_{i,t+1})$	$\mathbf{Foutflow^1_{i,t+1}}$ $= FM_{i,t+1}$ $+ 0{,}235(FS_{i,t} - FM_{i,t+1})$ $\mathbf{Foutflow^2_{i,t+1}}$ $= FM_{i,t+1}$ $+ 0{,}057(FS_{i,t} - FM_{i,t+1})$ $\mathbf{Foutflow^3_{i,t+1}}$ $= - 0{,}079FS_{i,t}$

Table 4.B.2. Scenarios, parameters and outflows in the government debt market.

Scenario	Additional debt to be held by the domestic bank
A	$\Delta\mathbf{DebtDB}_{\boldsymbol{i,t+1}} = D_{i,t+1}\frac{DB_{i,t}}{TP_{i,t}} + EuroM_{i,t+1}(1 - \frac{DNB_{i,t}}{TD_{i,t}})$
B	$\Delta\mathbf{DebtDB}_{\boldsymbol{i,t+1}} = D_{i,t+1}\frac{DB_{i,t}}{TP_{i,t}} + [(EuroM_{i,t+1} + 0{,}1(PS_{i,t} - EuroM_{i,t+1})](1 - \frac{DNB_{i,t}}{TD_{i,t}})$
C	$\Delta\mathbf{DebtDB}^{\mathbf{1}}_{\boldsymbol{i,t+1}} = D_{i,t+1}\frac{DB_{i,t}}{TP_{i,t}} + [EuroM_{i,t+1} + FM_{i,t+1} + 0{,}235(FS_{i,t} - FM_{i,t+1}) + D_{i,t+1} * \frac{F_{i,t}}{TP_{i,t}}](1 - \frac{DNB_{i,t}}{TD_{i,t}})]$ $\Delta\mathbf{DebtDB}^{\mathbf{2}}_{\boldsymbol{i,t+1}} = D_{i,t+1}\frac{DB_{i,t}}{TP_{i,t}} + [EuroM_{i,t+1} + FM_{i,t+1} + 0{,}057(FS_{i,t} - FM_{i,t+1}) + D_{i,t+1} * \frac{F_{i,t}}{TP_{i,t}}](1 - \frac{DNB_{i,t}}{TD_{i,t}} - 0{,}076)]$ $\Delta\mathbf{DebtDB}^{\mathbf{3}}_{\boldsymbol{i,t+1}} = D_{i,t+1}\frac{DB_{i,t}}{TP_{i,t}} + [EuroM_{i,t+1} - 0{,}079FS_{i,t})(1 - \frac{DNB_{i,t}}{TD_{i,t}})]$
D	$\Delta\mathbf{DebtDB}^{\mathbf{1}}_{\boldsymbol{i,t+1}} = D_{i,t+1}\frac{DB_{i,t}}{TP_{i,t}} + [EuroM_{i,t+1} + 0{,}1(PS_{i,t} - EuroM_{i,t+1}) + FM_{i,t+1} + 0{,}235(FS_{i,t} - FM_{i,t+1}) + D_{i,t+1} * \frac{F_{i,t}}{TP_{i,t}}](1 - \frac{DNB_{i,t}}{TD_{i,t}})]$ $\Delta\mathbf{DebtDB}^{\mathbf{2}}_{\boldsymbol{i,t+1}} = D_{i,t+1}\frac{DB_{i,t}}{TP_{i,t}} + [EuroM_{i,t+1} + 0{,}1(PS_{i,t} - EuroM_{i,t+1}) + FM_{i,t+1} + 0{,}057\big(FS_{i,t} - FM_{i,t+1}\big) + D_{i,t+1} * \frac{F_{i,t}}{TP_{i,t}}](1 - \frac{DNB_{i,t}}{TD_{i,t}} - 0{,}076)]$ $\Delta\mathbf{DebtDB}^{\mathbf{3}}_{\boldsymbol{i,t+1}} = D_{i,t+1}\frac{DB_{i,t}}{TP_{i,t}} + [EuroM_{i,t+1} + 0{,}1(PS_{i,t} - EuroM_{i,t+1}) - 0{,}079FS_{i,t})(1 - \frac{DNB_{i,t}}{TD_{i,t}})]$

Table 4.B.3. Additional government debt to be held by domestic banks in each scenario.

Scenario A (EUR Billion)			
Country	**Foreign Outflows**	**Eurozone Outflows**	**Additional debt to be held by domestic bank**
Austria	0	8,54	9,67
Belgium	0	12,65	15,61
Germany	0	82,04	89,85
Spain	0	36,21	48,37
Finland	0	5,04	7,94
France	0	66,85	69,75
Greece	0	2,53	3,80
Ireland	0	4,43	2,50
Italy	0	52,65	62,89
the Netherlands	0	14,41	16,92
Portugal	0	6,23	5,08

Table 4.B.4. Outflows in the government debt market to each country in Scenario A.

Scenario B (EUR Billion)			
Country	**Foreign Outflows**	**Eurozone Outflows**	**Additional debt to be held by domestic bank**
Austria	0	19,05	19,86
Belgium	0	26,13	27,07
Germany	0	173,95	171,92
Spain	0	81,55	88,17
Finland	0	11,45	14,09
France	0	140,65	129,16
Greece	0	6,21	7,39
Ireland	0	10,72	7,86
Italy	0	116,90	110,80
the Netherlands	0	33,28	32,00
Portugal	0	14,06	11,27

Table 4.B.5. Outflows in the government debt market to each country in Scenario B.

Scenario C (EUR Billion)			
Country	**Foreign Outflows**	**Eurozone Outflows**	**Additional debt to be held by domestic bank**
Austria	-13,57536	8,54	-3,49
Belgium	-20,266976	12,65	-1,62
Germany	-35,711713	82,04	57,96
Spain	88,58357305	36,21	138,28
Finland	-4,663686	5,04	3,46
France	-80,441276	66,85	5,00
Greece	4,278520625	2,53	8,38
Ireland	11,3416977	4,43	10,95
Italy	154,6015247	52,65	176,53
the Netherlands	-5,558835	14,41	12,47
Portugal	14,73632293	6,23	16,88

Table 4.B.6. Outflows in the government debt market to each country in Scenario C.

Scenario D (EUR Billion)			
Country	**Foreign Outflows**	**Eurozone Outflows**	**Additional debt to be held by domestic bank**
Austria	-13,57536	19,05	6,70
Belgium	-20,266976	26,13	9,84
Germany	-35,711713	173,95	140,04
Spain	88,58357305	81,55	174,64
Finland	-4,663686	11,45	9,61
France	-80,441276	140,65	64,41
Greece	4,278520625	6,21	11,97
Ireland	11,3416977	10,72	15,82
Italy	154,6015247	116,90	219,56
the Netherlands	-5,558835	33,28	27,56
Portugal	14,73632293	14,06	23,07

Table 4.B.7. Outflows in the government debt market to each country in Scenario D.