A Fiscal Theory of Exchange Rates

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Abstract

Emerging market governments hold large stocks of U.S. dollar-denominated debt, while local-currency bond markets are intermediated by global financiers with limited risk-bearing capacity. I develop a Fiscal Theory of Exchange Rates (FTER) by embedding monetary-fiscal interactions in a small open New-Keynesian economy with this structure. Three results emerge. First, the conditions for monetary and fiscal dominance extend to the open economy, with regime boundaries shifting with the currency composition of debt and market segmentation. Second, under fiscal dominance, the exchange rate acquires a fiscal component: it adjusts to satisfy the government's budget constraint through a valuation channel – revaluing dollar liabilities – and a compensation channel, because global financiers require higher excess returns as sovereign borrowing rises. Contractionary monetary policy therefore generates depreciation and inflation rather than appreciation and disinflation. Third, the welfare cost of fiscal dominance grows convexly with dollar-debt exposure and segmentation, while both are essentially irrelevant under monetary dominance.

JEL codes: E58, E63, F31, F41, G28.

Keywords: fiscal-monetary interactions, exchange rates, small open economy, segmented financial markets.

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1. Introduction

Monetary and fiscal interactions have returned to the forefront of policy debates in both emerging and advanced economies. Rising debt burdens, larger fiscal deficits, and higher interest rates have renewed concerns about fiscal sustainability and about the broader consequences of monetary tightening. These concerns are amplified in open economies, where policy affects not only inflation and output, but also sovereign financing conditions, capital flows, and the exchange rate. The transmission of these policies is further shaped by the growing role of leveraged financial intermediaries in sovereign debt markets: by absorbing public debt and managing currency risk on constrained balance sheets, intermediaries influence how fiscal and monetary shocks are reflected in asset prices and exchange rates. As of 2025, non-bank financial intermediaries hold approximately 55% of sovereign debt across major emerging markets, up from 45% in 2006, and local-currency bonds trade at persistent excess returns of roughly 3% per annum over U.S. Treasuries. At the same time, the expansion of local-currency debt markets has not eliminated external vulnerability, but rather transformed it: part of sovereign risk has shifted onto the investors and intermediaries that hold local-currency claims, creating a new channel through which financial conditions shape exchange rates and fiscal stress—what the recent literature describes as "original sin redux" (Carstens and Shin, 2019). In such an environment, exchange rate movements create a central policy trade-off: a depreciation can facilitate external adjustment, but it also raises the domestic-currency burden of foreign-currency liabilities and may induce capital outflows from constrained financiers, thereby tightening the government's budget constraint.

This paper develops a theory of exchange rate determination in which monetary and fiscal interactions play a central role. I consider a small open New-Keynesian economy whose government issues debt both in local currency and in U.S. dollars. Local currency bond markets are segmented: global financial intermediaries with limited risk-bearing capacity are the marginal investors, and they demand a premium over the U.S. risk-free rate to hold local currency assets. The government follows a tax rule that may or may not respond aggressively enough to stabilise debt. Monetary policy follows a Taylor-type interest rate rule. The interaction of these two rules determines the equilibrium. Throughout this paper, I will often use the taxonomy of active and passive policies in Leeper (1991). In particular, I will refer to a given monetary or fiscal policy as active when the corresponding authority sets its policy instrument as it sees fit, disregarding the state of government debt. However, a passive policy responds to government debt shocks. Alternatively, I also use the terms monetary dominance to refer to a regime in which monetary policy is active and fiscal policy is passive, and fiscal dominance for a regime in which monetary policy is passive and fiscal policy is active.

The central result of the paper is a Fiscal Theory of Exchange Rates (FTER). Under fiscal dominance—when the fiscal authority does not adjust taxes sufficiently to stabilise debt—government debt evolves forward and must equal the present discounted value of future primary surpluses. Since a share of debt is denominated in U.S. dollars, the exchange rate adjusts to ensure that the government budget constraint holds in every period. Simultaneously, the exchange rate also adjusts to clear the segmented local currency debt market: if government debt increases, the local currency component needs to be absorbed by financiers who will demand a higher excess return. Hence, the local currency depreciates today so as to appreciate in the future. I find that a contractionary monetary policy shock, rather than causing the exchange rate to appreciate as standard models predict, leads instead to a depreciation: the higher domestic interest rate increases the value of local-currency liabilities, and despite an initial appreciation that revalues dollar-denominated debt downward, the exchange rate rapidly depreciates for the local currency debt market to clear.

I establish four main results. First, I extend the results in Leeper (1991) to an open economy with government debt denominated in both local and foreign currency. The conditions for active monetary and passive fiscal (AM/PF) and passive monetary and active fiscal (PM/AF) regimes carry over, but the currency composition of debt Ω enters the policy region boundaries. A higher dollar share shifts the boundary in the (ϕ_π, ϕ_τ) plane, reflecting the additional valuation channel through which exchange rate movements revalue outstanding dollar liabilities. Second, financial market segmentation, captured by a steady-state interest rate spread $\Phi > 0$ between local and U.S. rates, tightens the conditions for fiscal dominance. When the demand for local-currency bonds is elastic—because the currency excess return responds to the size of global financier positions—the boundaries of the two policy regions depend on the steady-state size of the spread and the currency composition of debt. This gives rise to an original sin Goldilocks condition: fiscal dominance is feasible only when $\Omega\Phi$ is sufficiently small, that is, when dollar-debt savings are not large enough to make debt self-stabilising. Economies with large foreign-currency exposures and wide local-currency spreads are paradoxically less susceptible to fiscal dominance, not because their fiscal discipline is stronger, but because low dollar borrowing costs keep debt dynamics self-correcting. Third, under fiscal dominance, the exchange rate becomes a valuation and compensation instrument: it, together with inflation, endogenously adjusts so that the market value of the government's total debt portfolio equals the present value of future tax revenues net of spending. The exchange simultaneously ensures the local currency debt market clears, so that global financiers are willing to hold local currency debt. Fourth, these dynamics translate into quantitatively large welfare costs under PM/AF. For each (Ω, Φ) combination I compute the optimal policy within each regime's determinacy region and compare welfare outcomes. Monetary dominance is welfare superior for all parameter combinations considered—the gap reaches nearly 4% of steady-state consumption at high dollar-debt exposure and high financial segmentation—and the welfare cost of fiscal dominance grows convexly with Ω and Φ. Strikingly, under AM/PF the currency composition of sovereign liabilities is essentially irrelevant for household welfare: the fiscal rule anchors debt dynamics through taxation, shutting down both the valuation and compensation channels.

The adjustment of the exchange rate and price level to fiscal imbalances operates through three channels. The first is an inflation channel: an unexpected rise in government debt erodes the real value of outstanding local-currency liabilities through non-tradable price inflation, reducing the debt burden without requiring a change in the nominal exchange rate. This is the standard Fiscal Theory of the Price Level (FTPL) channel. The second is a valuation channel: because a share Ω of government debt is denominated in U.S. dollars, an appreciation of the local currency—a fall in the real exchange rate q_t—directly reduces the domestic-currency value of dollar liabilities, tightening the link between the exchange rate and fiscal solvency. These two channels are substitutes: when the currency composition of debt shifts toward dollars (higher Ω), the valuation channel carries more of the fiscal adjustment and the inflation channel less, and vice versa. The third is a compensation channel, which arises due to the segmented-markets environment. When global financiers hold local-currency bonds subject to a balance-sheet constraint, their required return rises with the stock of government debt outstanding. A monetary tightening that raises domestic interest costs simultaneously raises the intermediation wedge, further amplifying the fiscal burden of tight policy and accelerating the exchange rate response. It is this third channel that generates the transition from FTPL-style price-level adjustment to FTER-style exchange rate adjustment as financial market segmentation intensifies.

The compensation channel implies that the exchange rate is inherently forward-looking under fiscal dominance. Iterating the modified UIP condition forward, today's real exchange rate equals a discounted sum of expected future government debt paths and financial conditions, weighted by $(1 + \Phi)^{-1}$ per period. Deeper segmentation amplifies the exchange rate response to near-term borrowing pressure while making it more front-loaded, so that markets price in future fiscal stress immediately. This mechanism reverses the conventional monetary policy transmission: under PM/AF a rate hike worsens the fiscal position, triggering forward depreciation through the compensation channel that overwhelms the standard interest-rate appreciation effect. The result is a tight money paradox in the open economy: contractionary monetary policy produces a weaker, not a stronger, currency. The variance decomposition confirms the severity of this regime-switch: under PM/AF, fiscal shocks account for 66% of non-tradable inflation variance and 52% of real exchange rate variance, entirely displacing monetary shocks as the principal driver of macroeconomic fluctuations.

Policy implications. These results have a clear message for policy design in emerging market economies. Under fiscal dominance, the standard toolkit of monetary stabilisation becomes counterproductive. Interest rate hikes aimed at containing inflation and defending the currency instead worsen the fiscal position, triggering the very depreciation and inflation dynamics they seek to prevent. The degree of dollarisation of government debt and the depth of financial market segmentation are therefore not merely balance-sheet concerns: they determine the fundamental transmission mechanism of monetary policy. For debt management, the results point to a natural hierarchy of reforms: transitioning to AM/PF (strengthening the fiscal rule) is the first-order intervention, as it eliminates the FTER mechanism entirely and renders the currency composition of debt irrelevant for welfare. Within the PM/AF region, reducing the dollar share Ω lowers welfare costs but does not remove them, since the inflation and compensation channels remain active. Fiscal regime credibility is the more fundamental determinant of welfare, with debt composition playing a quantitatively significant but secondary role conditional on the regime.

Related literature. This paper contributes to three strands of the literature.

Portfolio models and financial market segmentation. Gabaix and Maggiori (2015) introduce global financial intermediaries with limited risk-bearing capacity as the marginal investors in currency markets, generating deviations from uncovered interest parity (UIP). Jiang, Krishnamurthy, and Lustig (2021) study the role of financial intermediaries in pricing U.S. dollar assets. Kekre and Lenel (2024) and Kekre and Lenel (2025) develop multi-country models with intermediary constraints. Alvarez, Atkeson, and Kehoe (2002), Bruno and Shin (2015) also study the implications of segmented financial markets for international prices. This paper adds a new channel through which financial market segmentation matters: by making the demand for local-currency bonds elastic, it links the government's currency composition of debt to the conditions for equilibrium determinacy.

Monetary and fiscal interactions. The seminal contribution of Leeper (1991) characterises the conditions under which monetary and fiscal policies are "active" or "passive." Sargent and Wallace (1981) and Aiyagari and Gertler (1985) study the unpleasant monetarist arithmetic of fiscal dominance. Sims (1994), Woodford (1995), and Cochrane (2001) develop the Fiscal Theory of the Price Level (FTPL) for closed economies. Benigno and Woodford (2003) and Leith and Wren-Lewis (2008) study monetary and fiscal interactions in open economies but without foreign-currency debt. Galí and Monacelli (2008) study optimal monetary policy under fiscal constraints. Kaplan, Nikolakoudis, and Violante (2023) extend the FTPL to economies with heterogeneous agents and incomplete markets. A growing literature extends the FTPL to open economies: Loyo (1999), Dupor (2000), and Daniel (2001) are early contributions; more recently, Bianchi and Mondragon (2022), Witheridge (2024), and Ferrer (2025) study FTPL in open economies with foreign-currency debt. Most closely related is the contemporaneous working paper by Di Iorio and García-Cicco (2026), who study FTPL in a small open economy and show that the classical determinacy conditions extend largely independently of debt composition. This paper departs along two critical dimensions. First, I introduce financial market segmentation through global financiers with limited risk-bearing capacity, which changes the determinacy conditions qualitatively: segmentation forces regime boundaries to depend on both the currency composition and the degree of segmentation (Proposition 2), and generates a critical threshold above which fiscal dominance is infeasible. Second, segmentation governs the nature of fiscal adjustment: as the intermediation wedge Φ rises from zero, the economy transitions from FTPL-style price-level adjustment to FTER-style exchange rate adjustment, with inflation playing a diminishing role. This transition has no counterpart in Di Iorio and García-Cicco (2026), who assume perfect financial integration.

Policy in open economies. A large literature studies optimal monetary and exchange rate policy in open economies (Gali and Monacelli, 2005; Farhi and Werning, 2016, 2017; Jeanne, 2013; Cavallino, 2019; Amador et al., 2020; Fanelli and Straub, 2021; Egorov and Mukhin, 2023; Itskhoki and Mukhin, 2023). Basu et al. (2025) and Kolasa, Vogt, and Zabczyk (2025) study optimal policy in multi-country models with financial frictions. This paper complements this literature by analysing how fiscal constraints interact with monetary policy in open economies, and how financial market segmentation shapes these interactions. The key departure is that fiscal dominance is treated not as an external constraint but as an equilibrium outcome whose conditions depend endogenously on the currency and financial structure of sovereign debt. The "fear of floating" documented by Calvo and Reinhart (2002) — the tendency of emerging market central banks to limit exchange rate flexibility, in part to avoid balance-sheet effects of currency swings on foreign-currency liabilities — has a natural fiscal interpretation in the present framework: resisting exchange rate adjustment under fiscal dominance suppresses the primary mechanism through which the government's intertemporal budget constraint is satisfied, at the cost of delaying, rather than eliminating, the required fiscal correction.

Outline. Section 2 shows some stylised facts on fiscal adjustment and excess returns in small open economies. Section 3 presents a model that analytically characterises the monetary-fiscal interactions and derives the FTER mechanism. Section 4 presents analytical results and the main propositions of the paper. Section 5 calibrates the model and presents the quantitative results. Section 6 presents a welfare analysis and Section 7 concludes.

2. Facts on Public Debt and Excess Returns

The renewed interest in monetary–fiscal interactions is rooted in recent developments in sovereign fiscal positions and debt markets that have revived concerns about fiscal sustainability in emerging economies. Figure 1 plots the evolution of the overall fiscal balance and public debt between 2000 and 2025, together with projections through 2030, for a sample of 97 emerging market economies.[1] Two patterns stand out. First, fiscal deficits widened sharply after the Global Financial Crisis (GFC) and, rather than reverting quickly, have remained persistently elevated. Since 2008, average deficits have hovered around 4% of GDP. Second, the counterpart of these persistent deficits has been a sustained increase in public debt. Average debt rose from about 38% of GDP in the run-up to the GFC to roughly 60% of GDP in the aftermath of the COVID-19 pandemic, and is projected to remain near that level over the medium run.

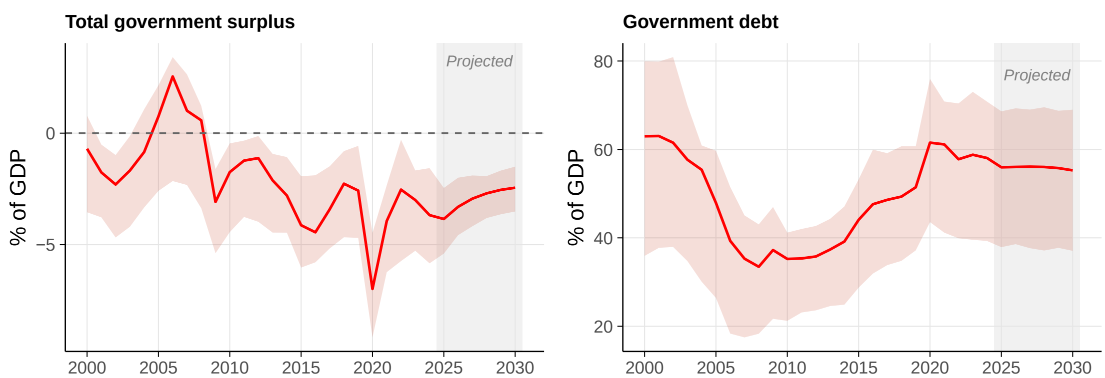

Figure 1: Average fiscal balance and public debt in emerging markets. Sample consists of 97 small open emerging economies included in the IMF WEO database. Shaded area denotes the cross-sectional interquartile range.

These developments have renewed familiar questions about debt sustainability. But the recent evolution of sovereign debt markets suggests that the relevant issue is not only how much governments borrow, but also in what form and from whom. Since the GFC, the composition of public debt in low-income and emerging market economies has changed substantially. Table 1 documents two striking shifts between 2010 and 2023. First, the currency composition of public debt has moved away from U.S.-dollar liabilities and toward local-currency issuance. Second, the creditor base has tilted away from bilateral and multilateral lenders and toward private creditors, particularly bondholders.

These compositional changes are important because they alter the transmission of fiscal and financial shocks. A greater reliance on local-currency debt reduces the sovereign's direct exposure to exchange-rate movements, but it does not eliminate currency risk

[1] See Appendix A for a detailed description of the data.

from the system. Instead, it transfers that risk to investors and intermediaries that hold sovereign claims. At the same time, the growing role of private creditors means that a larger fraction of sovereign debt is now held by investors whose demand is more sensitive to market valuations and global financial conditions. Compared to traditional bank lenders or official creditors, these intermediaries typically operate under tighter risk-bearing and funding constraints. This is the central insight behind the notion of "original sin redux" emphasised by Carstens and Shin (2019): local-currency borrowing mitigates one dimension of sovereign vulnerability while increasing the economy's exposure to fluctuations in intermediary balance-sheet capacity.

	Low Income		Emerging	
	2010	2023	2010	2023
Currency composition of public debt				
Debt in local currency (% GDP)	34%	55%	38%	56%
Debt in foreign currency (% GDP)	66%	45%	62%	44%
Creditor composition of public debt				
Total public debt (% of GDP)	30%	54%	38%	50%
- Bilaterals (% of debt)	36%	30%	20%	12%
- Multilaterals (% of debt)	58%	51%	31%	30%
- Private (% of debt)	6%	19%	49%	58%
– Bondholders (% of debt)	1%	10%	39%	48%
– Non-bondholders (% of debt)	5%	9%	10%	10%

Table 1: Currency and creditor composition of public debt. Source: IMF (2025).

If intermediary balance-sheet capacity has become more relevant for sovereign debt markets, this should be reflected in the pricing of local-currency sovereign bonds. In frictionless international financial markets, uncovered interest parity (UIP) implies that expected returns on comparable domestic and foreign short-term bonds are equalised once exchange rate movements are taken into account. Persistent deviations from UIP therefore point to a wedge in international asset pricing. A natural interpretation, and the one emphasised in this paper, is that this wedge reflects limits to intermediary risk-bearing. When sovereign debt is absorbed by constrained intermediaries, local-currency yields must compensate investors not only for expected depreciation but also for the balance-sheet costs associated with bearing sovereign and currency risk.

Figure 2 presents evidence consistent with this mechanism. The left panel documents the growing role of non-bank financial intermediaries (NBFIs) in emerging market sovereign debt markets. Across 22 emerging economies, the share of sovereign debt held by NBFIs increases from approximately 45% in 2006 to roughly 55% in 2025. The right panel shows that expected excess returns on local-currency sovereign bonds relative to

U.S. Treasury bills have remained persistently positive over the same period. These expected excess returns are measured as the exchange-rate-adjusted return from holding a 3-month local-currency government bond in excess of the return on a 3-month U.S. Treasury bill. Across 29 emerging markets, they average about 3% at annual rates, while average short-rate differentials are approximately 5 percentage points.

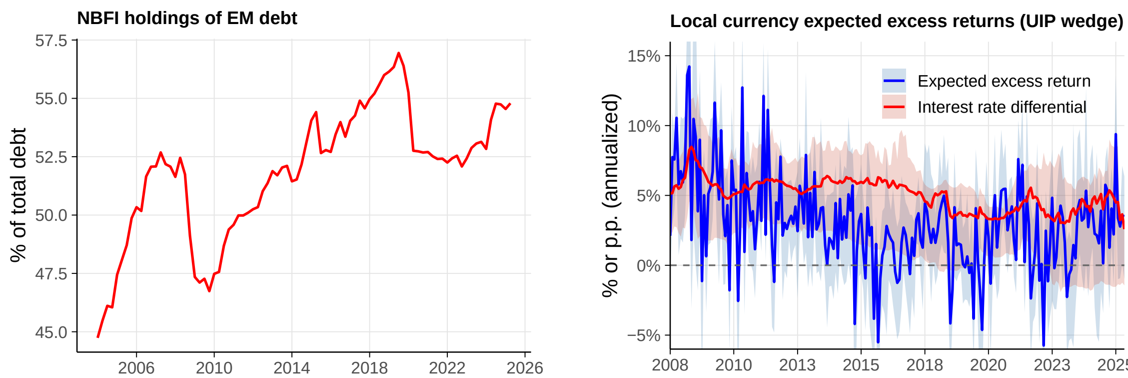

Figure 2: Non-bank financial intermediaries and local-currency expected excess returns. NBFI holdings data across 22 emerging markets are obtained from Arslanalp and Tsuda (2014). Average local-currency expected excess returns r^x_{t+1} across 29 emerging markets are defined as the exchange-rate-adjusted return from holding a 3-month government bond relative to a 3-month U.S. Treasury bond, $\mathbb{E}_t r^x_{t+1} = (1 + i_t)\mathbb{E}_t(\mathcal{E}_t/\mathcal{E}_{t+1}) - (1 + i^{US}_t)$. Exchange-rate expectations are obtained from FX4casts Consensus Economics. The shaded area denotes the cross-sectional interquartile range.

Together, these facts suggest that sovereign risk in emerging markets cannot be understood solely through the traditional lens of debt sustainability. Standard analyses emphasise the joint evolution of debt, interest rates, growth, and fiscal surpluses, and ask whether the government can service its obligations. That perspective is incomplete in an environment where sovereign debt is increasingly held by constrained intermediaries. In such an environment, sovereign borrowing costs may rise not only because expected repayment weakens, but also because the financial system becomes less willing to absorb additional public debt at prevailing prices. The relevant margin is therefore not only the sovereign's solvency, but also the market's risk-bearing capacity.

This observation motivates the framework developed in the remainder of the paper. When local-currency sovereign debt is held by intermediaries with limited balance-sheet capacity, exchange-rate movements affect sovereign borrowing conditions through their effect on intermediary net worth and portfolio demand. A depreciation may facilitate external adjustment, but it can also weaken intermediary balance sheets, induce capital outflows, and increase the compensation required to hold sovereign claims. Sovereign spreads and exchange-rate dynamics therefore become jointly determined. Understanding this interaction is central to the analysis of monetary and fiscal policy in open economies with intermediary frictions.

3. Model

The economy is a small open economy with two goods: an exogenous tradable endowment and a non-tradable sector with monopolistically competitive producers and nominal rigidities. The government issues debt in both local currency and U.S. dollars, and fiscal and monetary policies are specified as simple rules. Local currency credit markets are segmented: a global financier with limited risk-bearing capacity provides local currency financing by taking a short position in U.S. dollar bonds. I use this framework to characterise the conditions for monetary and fiscal dominance, and to derive a Fiscal Theory of Exchange Rates.

3.1. Environment

Setting. The economy operates in discrete time with an infinite horizon, $t = 0, 1, 2, \ldots$. There are four types of agents: a representative household, a continuum $\omega \in [0, 1]$ of non-tradable variety producers, a representative global financial intermediary (the "global financier"), and a government comprising a fiscal authority and a monetary authority.

There are two goods. The tradable good is a homogeneous commodity with an exogenous endowment Y_t^T each period, freely traded on world markets with local-currency price P_t^T. I normalise its U.S. price P_t^* to one, so the law of one price implies $P_t^T = \mathcal{E}_t P_t^* = \mathcal{E}_t$, where $\mathcal{E}_t$ denotes the nominal exchange rate in units of local currency per U.S. dollar. The non-tradable good is a composite of differentiated varieties produced domestically by monopolistically competitive firms subject to nominal rigidities.

Two types of nominal instruments are traded. The fiscal authority issues one-period bonds in local currency, B_t, and in U.S. dollars, $B_t^\$$; it finances an exogenous stream of non-tradable government purchases G_t and raises lump-sum taxes T_t. Separately, households also trade one-period local-currency bonds D_t. Local-currency bonds are traded with the global financier, who takes the other side of this market; let Q_t denote the financier's total local-currency bond position. The domestic nominal interest rate is i_t (set by the monetary authority according to a Taylor rule described below), and the U.S. nominal policy rate $i_t^\$$ is exogenous to the small open economy. Households supply labour N_t to non-tradable producers at nominal wage W_t and receive profits Π_t from those firms.

Household preferences. A representative household has time-separable preferences over a consumption composite C_t and labour N_t

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{C_t^{1-1/\sigma_c} - 1}{1 - 1/\sigma_c} - \chi \frac{N_t^{1+\varphi}}{1+\varphi} \right) \tag{1}$$

where $\beta \in (0,1)$ is the discount factor, $\sigma_c > 0$ is the intertemporal elasticity of substitution, $\varphi > 0$ is the inverse Frisch elasticity of labour supply, and $\chi > 0$ scales the disutility of labour. The consumption composite aggregates non-tradable and tradable goods:

$$C_t \equiv \left[\kappa^{1/\sigma}(C_t^N)^{1-1/\sigma} + (1-\kappa)^{1/\sigma}(C_t^T)^{1-1/\sigma}\right]^{\frac{1}{1-1/\sigma}}, \tag{2}$$

where $\sigma > 0$ is the elasticity of substitution between tradable and non-tradable goods and κ is the expenditure share on non-tradables.

Supply. *Tradable good.* The economy receives an exogenous endowment Y_t^T of the tradable good.

Non-tradable good. A continuum of variety producers $\omega \in [0,1]$ produce non-tradable varieties using labour with decreasing returns:

$$Y_t^N(\omega) = N_t(\omega)^\alpha, \quad \alpha \leq 1. \tag{3}$$

Varieties are aggregated into a final non-tradable good $Y_t^N = \left[\int_0^1 Y_t^N(\omega)^{(\varepsilon-1)/\varepsilon}\, \mathrm{d}\omega\right]^{\varepsilon/(\varepsilon-1)}$, with associated price index $P_t^N = \left[\int_0^1 P_t^N(\omega)^{1-\varepsilon}\, \mathrm{d}\omega\right]^{1/(1-\varepsilon)}$. Each variety producer is a monopolist subject to Calvo (1983) pricing frictions: prices are fixed in a given period with probability δ_N.

Global financiers. Global financiers intermediate funds between the small open and the U.S. by holding a zero-net-worth portfolio: a long position Q_{t+1} in local-currency bonds and a short position $-Q_{t+1}/\mathcal{E}_t$ in U.S.-dollar bonds. The excess return on the local-currency position, in U.S. dollars, is

$$r_{t+1}^x \equiv (1+i_t)\frac{\mathcal{E}_t}{\mathcal{E}_{t+1}} - (1+i_t^\$). \tag{4}$$

Financiers have limited risk-bearing capacity, as in Gabaix and Maggiori (2015): they can divert a share $\Gamma_t|Q_{t+1}/\mathcal{E}_t|$ of their dollar position, which generates a no-stealing constraint. I assume the severity of the constraint Γ_t follows an exogenous first-order autoregressive stochastic process.

Markets. For the non-tradable good, market clearing requires

$$C_t^N + G_t = Y_t^N \tag{5}$$

$$N_t = \int_0^1 N_t(\omega)\mathrm{d}\omega \tag{6}$$

where the first equation clears the non-tradable good market by equating demand from the household and the government to total non-tradable output. The second one clears the labour market.

The market clearing condition for local currency debt reads

$$D_{t+1} + B_{t+1} = Q_{t+1} \tag{7}$$

which equates the total demand for credit in local currency from households and the government to the total supply of local currency credit from the global financiers. I assume that the global financiers are based in the US and rebate their profits to the US.

If we consolidate the budget constraints of the household and government by replacing taxes T_t, and use market clearing for local-currency debt, we have that the net foreign asset position of the country is given by

$$\mathcal{E}_t(C_t^T - Y_t^T) + i_t Q_t + i_t^{\$} \mathcal{E}_t B_t^{\$} = \Delta Q_{t+1} + \Delta B_{t+1}^{\$} \tag{8}$$

where the left-hand side denotes the current account and the right-hand side the capital account.

Government. The government consists of fiscal and monetary authorities, each of which follows specified simple policy rules which I describe below. This paper will focus on the properties of equilibria generated by these rules.

Fiscal authority. The fiscal authority issues debt in local currency B_t and U.S. dollars $B_t^{\$}$, and raises lump-sum taxes T_t to finance an exogenous spending of non-tradable goods G_t. The nominal budget constraint is

$$P_t^N G_t + (1 + i_t) B_t + (1 + i_t^{\$}) \mathcal{E}_t B_t^{\$} = B_{t+1} + \mathcal{E}_t B_{t+1}^{\$} + T_t$$

I define real debt variables $b_t \equiv B_t / P_{t-1}^N$ and $b_t^{\$} \equiv B_t^{\$} / P_{t-1}^{*}$, the relative price of tradable to non-tradable goods $q_t \equiv \mathcal{E}_t / P_t^N$, and real taxes $\tau_t \equiv T_t / P_t^N$. The real budget constraint then reads

$$G_t + \mathcal{A}_t b_t^G = \mathcal{B}_t b_{t+1}^G + \tau_t, \tag{9}$$

where $b_t^G \equiv b_t + \bar{q}\, b_t^{\$}$ is total real debt measured at steady-state prices $\bar{q}$, and the loadings are

$$\mathcal{A}_t \equiv (1 - \Omega) \frac{1 + i_t}{1 + \pi_t^N} + \Omega \, \frac{1 + i_t^{\$}}{1 + \pi_t^{\$}} \, \frac{q_t}{\bar{q}}, \tag{10}$$

$$\mathcal{B}_t \equiv (1 - \Omega) + \Omega \, \frac{q_t}{\bar{q}}. \tag{11}$$

where Ω is the share of U.S. dollar debt in total government debt at steady-state prices.

Currency composition rule. I assume that the fiscal authority follows a constant currency composition rule for government debt, evaluated at steady-state prices, so that

$$1 - \Omega = \frac{b_t}{b_t + \bar{q}b_t^{\$}}, \qquad \Omega = \frac{\bar{q}b_t^{\$}}{b_t + \bar{q}b_t^{\$}}. \tag{12}$$

This can be interpreted as a reduced-form debt-management policy: rather than reoptimising the currency structure of its liabilities every period, the government maintains a stable target share of local- and foreign-currency debt over time. This assumption is both empirically plausible, insofar as debt composition is typically adjusted only gradually, and analytically convenient, because it isolates the macroeconomic consequences of dollar-denominated liabilities without introducing an additional sovereign portfolio choice problem. An important extension for future work would be to endogenise this margin and analyse how the government optimally chooses the currency composition of its liabilities in response to macroeconomic and financial conditions.

Tax revenue rule. I assume that the fiscal authority sets taxes as a function of outstanding total government debt according to the fiscal rule

$$\tau_t = \tau + \phi_\tau \left(\mathcal{A}_t b_t^G - \bar{\mathcal{A}} \bar{b}^G \right) + \nu_t^\tau, \tag{13}$$

where $\phi_\tau \geq 0$ governs the responsiveness of taxes to total outstanding debt (including interest) and ν_t^τ is an AR(1) fiscal disturbance. When ϕ_τ is large, the fiscal authority adjusts taxes aggressively to service debt.

Monetary authority. The monetary authority sets the nominal interest rate according to a Taylor rule

$$\frac{1+i_t}{1+\bar{i}} = \left(\frac{1+\pi_t^N}{1+\bar{\pi}^N} \right)^{\phi_\pi} \nu_t$$

where ϕ_π is the response to non-tradable inflation deviations and ν_t is an AR(1) monetary policy shock.

U.S. monetary policy. I assume that the U.S. nominal policy rate $i_t^{\$}$ follows an exogenous first-order autoregressive stochastic process.

3.2. Optimisation problems

Representative household. The representative household maximises lifetime expected utility subject to its budget constraint. The household's period budget constraint is given by

$$P_t C_t + (1+i_t) D_t + T_t = P_t^T Y_t^T + W_t N_t + D_{t+1} + \Pi_t$$

where P_t is the price of the composite consumption good, D_t is local-currency nominal debt outstanding from period $t-1$, i_t is the nominal interest rate, T_t are lump-sum taxes, W_t is the nominal wage, and Π_t are local-currency profits from non-tradable producers. Y_t^T is an exogenous endowment of tradable good.

The household's optimisation problem is then

$$\max_{C_t, N_t, D_{t+1}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{C_t^{1-1/\sigma_c} - 1}{1 - 1/\sigma_c} - \chi \frac{N_t^{1+\varphi}}{1+\varphi} \right)$$
$$\text{subject to} \quad P_t C_t + (1+i_t) D_t + T_t = P_t^T Y_t^T + W_t N_t + D_{t+1} + \Pi_t.$$

which yields the intratemporal and intertemporal optimality conditions

$$\chi N_t^{\varphi} C_t^{1/\sigma_c} = \frac{W_t}{P_t}, \tag{14}$$

$$\mathbb{E}_t \left[\beta \left(\frac{C_{t+1}}{C_t} \right)^{-1/\sigma_c} \frac{1 + i_{t+1}}{1 + \pi_{t+1}} \right] = 1. \tag{15}$$

For a given level of consumption C_t, the household minimises minimises total expenditure on tradables and non-tradables subject to the consumption aggregator (2). This yields the non-tradable and tradable consumption demands

$$C_t^N = \kappa \left(\frac{P_t^N}{P_t} \right)^{-\sigma} C_t, \tag{16}$$

$$C_t^T = (1-\kappa) \left(\frac{\mathcal{E}_t}{P_t} \right)^{-\sigma} C_t, \tag{17}$$

as well as the price index on the composite consumption good

$$P_t = \left[\kappa (P_t^N)^{1-\sigma} + (1-\kappa)(P_t^T)^{1-\sigma} \right]^{\frac{1}{1-\sigma}}, \tag{18}$$

where P_t^N is the local-currency price of the non-tradable good and P_t^T is the local-currency price of the tradable good.

Non-tradable good sector. The non-tradable sector consists of a final good producer who aggregates varieties produced by a continuum of intermediate varieties producers.

Final good producer. The following cost minimisation problem for the final good producer

$$\min_{Y_t^N(\omega)} \int_0^1 P_t^N(\omega) Y_t^N(\omega) \mathrm{d}\omega \quad \text{subject to} \quad Y_t^N \leq \left[\int_0^1 Y_t^N(\omega)^{(\varepsilon-1)/\varepsilon} \mathrm{d}\omega \right]^{\varepsilon/(\varepsilon-1)}, \tag{19}$$

yields the following factor demands for intermediate varieties $\omega \in [0,1]$:

$$Y_t^N(\omega) = \left(\frac{P_t^N(\omega)}{P_t^N}\right)^{-\varepsilon} Y_t^N \tag{20}$$

where the associated non-tradable good price index is $P_t^N = \left[\int_0^1 P_t^N(\omega)^{1-\varepsilon}\,\mathrm{d}\omega\right]^{1/(1-\varepsilon)}$.

Intermediate varieties producers. A variety producer maximises the expected present value of profits taking into account that it might no be able to reset its price with a probability δ_N each period. It solves the following maximisation problem

$$\max_{P_t^N(\omega)} \sum_{s=0}^{\infty} \Lambda_{t,t+s}\delta_N^s \left(P_t^N(\omega) - W_{t+s}Y_{t+s|t}^N(\omega)^{1/\alpha}\right) Y_{t+s|t}^N(\omega), \tag{21}$$

$$\text{subject to} \quad Y_{t+s|t}^N(\omega) = (P_t^N(\omega)/P_{t+s}^N)^{-\varepsilon} Y_{t+s}^N \tag{22}$$

$$\tag{23}$$

where $\Lambda_{t,t+s} \equiv \beta^s (C_{t+s}/C_t)^{-1/\sigma_c} P_t/P_{t+s}$ is the household's nominal stochastic discount factor. This problem already incorporates the production technology $Y_t^N(\omega) = N_t(\omega)^\alpha$.

The optimal reset price is

$$\widetilde{P}_t^N = \left(\frac{\varepsilon}{\varepsilon-1}\frac{\sum_{s=0}^{\infty}\Lambda_{t,t+s}\delta_N^s\,\alpha^{-1}W_{t+s}(Y_{t+s}^N)^{1/\alpha}(P_{t+s}^N)^{\varepsilon/\alpha}}{\sum_{s=0}^{\infty}\Lambda_{t,t+s}\delta_N^s\,Y_{t+s}^N(P_{t+s}^N)^{\varepsilon}}\right)^{\frac{1}{1+\varepsilon(1-\alpha)/\alpha}}. \tag{24}$$

Since only fraction $1-\delta_N$ of firms reset each period, the non-tradable price index satisfies

$$(P_t^N)^{1-\varepsilon} = (1-\delta_N)(\widetilde{P}_t^N)^{1-\varepsilon} + \delta_N (P_{t-1}^N)^{1-\varepsilon}. \tag{25}$$

After log-linerarising around a symmetric steady state, this problem yields the New Keynesian Philips Curve (NKPC):

$$\hat{\pi}_t^N = \beta \mathbb{E}_t \hat{\pi}_{t+1}^N + \kappa_p\,\widehat{mc}_t^N, \tag{26}$$

where $\hat{\pi}_t^N \equiv \log(P_t^N/P_{t-1}^N) - \log\bar{\pi}^N$ is non-tradable inflation (in deviation from steady state), $\kappa_p \equiv (1-\delta_N)(1-\beta\delta_N)/(\delta_N(1-\varepsilon+\varepsilon/\alpha))$, and $\widehat{mc}_t^N$ is real marginal cost. The derivation, along with the expression for $\widehat{mc}_t^N$, is provided in Appendix B.

Global financiers. Global financiers solve the following maximisation problem subject to the no-stealing constraint

$$\max_{Q_{t+1}} \Pi_{t+1}^{GF} = \beta^f \frac{Q_{t+1}}{\mathcal{E}_t}\mathbb{E}_t[r_{t+1}^x] \quad \text{subject to} \quad \Pi_{t+1}^{GF} \geq \Gamma_t \left(\frac{Q_{t+1}}{\mathcal{E}_t}\right)^2 \tag{27}$$

The constraint always binds, so the optimal position is

$$\frac{Q_{t+1}}{\mathcal{E}_t} = \frac{\beta^f}{\Gamma_t}\,\mathbb{E}_t[r^x_{t+1}]. \tag{28}$$

This equation states that the dollar value of the financier's position is proportional to the expected carry return and inversely proportional to the tightness of the constraint Γ_t. The steady-state spread between local and U.S. rates is $\Phi \equiv \bar{i} - \bar{i}^{\$} = \bar{B}\bar{\Gamma}/(\beta^f\bar{\mathcal{E}}) \geq 0$; it equals zero if markets are perfectly integrated in the steady-state ($\bar{\Gamma} = 0$).[2]

3.3. Equilibrium

Definition 1 (Competitive Equilibrium). *Given exogenous processes* $\{Y^T_t, i^{\$}_t, \Gamma_t, G_t, \nu_t, \nu^\tau_t\}_{t=0}^{\infty}$ *and initial conditions* $\{b^G_0, D_0\}$, *a competitive equilibrium is a sequence of allocations* $\{C_t, C^N_t, C^T_t, D_{t+1}, N_t, Y^N_t(\omega), b^G_{t+1}, Q_{t+1}\}_{t=0}^{\infty}$ *and prices* $\{P_t, \pi^N_t, P^N_t(\omega), P^N_t, i_t, q_t, \mathcal{E}_t\}_{t=0}^{\infty}$ *such that:*

1. Household optimality: *the representative household satisfies the Euler equation* (15), *the intratemporal labour consumption optimality* (14), *the intratemporal demand system between tradable and non-tradable consumption* (16) *and* (17), *and the household's budget constraint;*

2. Non-tradable producers: *each variety producer sets its reset price optimally subject to the Calvo friction, yielding the NKPC* (26)*;*

3. Global financiers: *the financier's optimal position satisfies* (28)*;*

4. Fiscal authority: *government debt satisfies the real budget constraint* (9) *and the tax rule* (13), *with dollar debt maintained at a constant share* Ω *of total debt;*

5. Monetary authority: *the nominal interest rate satisfies the Taylor rule;*

6. Market clearing: *goods, labour and the local-currency bond markets clear.*

4. Analytical Characterisation

In this section, I derive a simple analytical characterisation of the model in order to classify regimes in the taxonomy of Leeper (1991) of active and passive fiscal and monetary policies. I will characterise the equilibrium by log-linearising equilibrium conditions around a zero-inflation steady state. For any variable X_t, let $\hat{X}_t \equiv \log(X_t/\bar{X})$ denote the log-deviation

[2] I will refer the case $\Phi = 0$ as perfectly integrated markets. This is an abuse of terminology since Φ corresponds solely to the steady-state value of the UIP wedge. Then, $\Phi = 0$ should be interpreted as an economy that in steady state does not have a positive currency excess return.

from steady state. The detailed characterisation and derivations are in Appendix B; here I present the key equilibrium relationships.

For the analytical characterisation of policy regimes, it is sufficient to focus on the evolution of 4 key variables: non-tradable inflation π_t^N, the real exchange rate q_t, household aggregate consumption C_t, and aggregate government debt holdings b_{t+1}^G. I now describe how to obtain these equilibrium law of motions.

Non-tradable inflation π_t^N. The evolution of non-tradable inflation is governed by the NKPC which depends next-period inflation and real marginal costs. The NKPC was given by equation (26):

$$\hat{\pi}_t^N = \beta \mathbb{E}_t \hat{\pi}_{t+1}^N + \kappa_p \widehat{mc}_t^N,$$

where real marginal costs are given by

$$\widehat{mc}_t^N = \left(\frac{1}{\sigma_c} + \psi s_N \right) \hat{C}_t + (1 + \psi \sigma s_N) \omega_T \hat{q}_t + \psi (1 - s_N) \hat{G}_t. \tag{29}$$

Real marginal costs are a function of aggregate household consumption and the real exchange rate as well as government expenditures. When aggregate consumption increases, so does non-tradable consumption which pushes up real marginal costs for firms which need to produce more goods and hire extra labour. If the real exchange rate increases, tradable goods become relative more expensive which substitutes consumption to non-tradables, putting upward pressure on domestic firms' marginal costs.

Real exchange rate q_t. The evolution of the real exchange rate follows from its definition $q_t = \mathcal{E}_t / P_t^N$ together with the modified UIP condition that arises from the global financier's problem

$$\hat{i}_t = \hat{i}_t^{\$} + \mathbb{E}_t \left[\hat{q}_{t+1} - \hat{q}_t + \hat{\pi}_{t+1}^N \right] + \Phi \left(\hat{b}_{t+1}^G - \hat{q}_t + \hat{\Gamma}_t \right), \tag{30}$$

where I will use the Taylor rule $\hat{i}_t = \phi_\pi \hat{\pi}_t^N + \hat{v}_t$ to suppress the dependency of the system on $\hat{i}_t$. Moreover, I use the market clearing condition for local currency debt (7) to write the modified UIP in terms of government debt. For tractability, I perform this analytical characterisation around a steady state in which household's steady-state debt is zero $\bar{D} = 0$. This does not significantly alter the results presented in this section and I relax this assumption in Section 5.

Household aggregate consumption C_t. The household block yields a standard Euler equation in log-deviations,

$$\mathbb{E}_t \Delta \hat{C}_{t+1} = \sigma_c \left(\hat{i}_{t+1} - \mathbb{E}_t \hat{\pi}_{t+1} \right). \tag{31}$$

The Taylor rule followed by the monetary authority pins down the nominal interest rate as a function of non-tradable inflation. Aggregate CPI inflation π_t follows from the price index (18). It can be written as the evolution of non-tradable inflation and the real exchange rate $\hat{\pi}_t = \hat{\pi}_t^N + \omega_T \Delta \hat{q}_t$.

Government debt b_t^G. The evolution of government debt follows from government budget constraint and fiscal authority rules. Since local currency debt needs to be absorbed by the global financiers, the evolution of government debt includes the modified UIP condition (30). This makes the evolution of government debt include an additional dependency on the domestic and foreign interest rates as well as the exchange rate, which constitute the excess return demanded by financiers to absorb more debt. In turn, the domestic rate follows from the Taylor rule.

$$\begin{aligned}\hat{b}_{t+1}^G = {} & \bar{\mathcal{A}}(1-\phi_\tau)\hat{b}_t^G + (1-\phi_\tau)\bar{\mathcal{A}}\alpha_1(\phi_\pi - 1)\hat{\pi}_t^N + \left[(1-\phi_\tau)\bar{\mathcal{A}}\alpha_2 - \Omega\right]\hat{q}_t \\ & + \frac{\bar{G}}{\bar{\mathcal{B}}\bar{b}^G}\hat{G}_t - \frac{1}{\bar{b}^G}\hat{v}_t^\tau + (1-\phi_\tau)\bar{\mathcal{A}}\alpha_1\hat{v}_t + (1-\phi_\tau)\bar{\mathcal{A}}\alpha_2(\hat{i}_t^\$ - \hat{\pi}_t^\$),\end{aligned} \tag{32}$$

where $\bar{\mathcal{A}} = 1/\beta - \Omega\Phi$ and $\bar{\mathcal{B}} = \Omega\bar{q}$.

Equilibrium system for $(\hat{\pi}_t^N, \hat{q}_t, \hat{C}_t, \hat{b}_t^G)$. The equilibrium determination of these variables involves combining the Euler equation (31), the NKPC (26), the modified UIP (30), and the linearised government budget constraint (32), the equilibrium can be written as a first-order linear system:

$$\mathbf{A}\mathbb{E}_t \begin{pmatrix} \hat{\pi}_{t+1}^N \\ \hat{q}_{t+1} \\ \hat{C}_{t+1} \\ \hat{b}_{t+1}^G \end{pmatrix} = \mathbf{B} \begin{pmatrix} \hat{\pi}_t^N \\ \hat{q}_t \\ \hat{C}_t \\ \hat{b}_t^G \end{pmatrix} + \mathbf{D}\hat{u}_t, \tag{33}$$

where $\hat{u}_t$ is a vector of exogenous shocks ($\hat{v}_t$, $\hat{G}_t$, $\hat{v}_t^\tau$, $\hat{i}_t^\$$, $\hat{\Gamma}_t$). $\mathbf{A}$ and $\mathbf{B}$ are 4×4 matrices whose entries depend on the structural parameters and policy coefficients (ϕ_π, ϕ_τ). See Appendix C.3 for the derivation and explicit forms of the system. In particular, the complete equilibrium consists of more endogenous variables, but I can solve for the evolution of $(\hat{\pi}_t^N, \hat{q}_t, \hat{C}_t, \hat{b}_t^G)$ independently, which is enough to characterise the equilibrium in terms of the policy parameters (ϕ_π, ϕ_τ).

I am interested in deriving conditions under which a unique equilibrium exists and characterising the evolution of prices and real variables in this equilibrium. In order to do this, I analyse equilibrium determinacy in the sense of Blanchard and Kahn (1980) for the system (33). In particular, we require the number of explosive generalised eigenvalues of $(\mathbf{B}, \mathbf{A})$ to equal the number of non-predetermined (forward-looking) variables. In this case, since $\hat{b}_t^G$ is the only predetermined variable, we need one eigenvalue inside the unit circle and three outside the unit circle. Let

$$p(\lambda) \equiv \det(\mathbf{B} - \lambda\mathbf{A}) \tag{34}$$

be the characteristic polynomial of $(\mathbf{B}, \mathbf{A})$. A necessary condition for a unique stable equilibrium is $p(1) < 0$.[3] Hence, the boundaries of the equilibrium regions will be determined by the values of $p(1)$. In particular, at the unit eigenvalue $\lambda = 1$, we have that the boundaries are given by

$$\phi_\pi = 1 \qquad \text{and} \qquad \phi_\tau = 1 - \beta \cdot \frac{1+\Omega}{1+\Omega-2\beta\Omega\Phi}. \tag{35}$$

The appendix contains the detail derivation of this condition, but condition (35) shows that the boundaries of the system can be written in a simple form that depends on the degree of financial market segmentation and the currency composition of government debt.

4.1. Monetary and Fiscal Interactions

I now expand on condition (35) derived above to characterise policy regimes under different degrees of financial market segmentation Φ. First, I provide a definition for an active or passive policy, following the taxonomy of policy regimes in Leeper (1991). A given monetary or fiscal policy is active when the corresponding authority sets its policy instrument as it sees fit, disregarding the state of government debt. However, a passive policy responds to government debt shocks. Alternatively, I also use the terms monetary dominance to refer to a regime in which monetary policy is active and fiscal policy is passive, and fiscal dominance for a regime in which monetary policy is passive and fiscal policy is active. For example, when monetary policy is active, it means that the nominal interest rate is adjusted to respond to deviations of a policy objective (inflation) from a target. When fiscal policy is passive, tax revenues respond strongly to deviations of government debt from a target in order to stabilise the government's budget.

The case of integrated financial markets ($\Phi \to 0^+$). As the steady-state spread is close to zero, the UIP holds in the limit and the system (33) decouples the evolution of inflation and the exchange rate from the evolution of government debt.[4] That is, the system becomes block-triangular: $(\hat{\pi}_t^N, \hat{q}_t, \hat{C}_t)$ evolve independently of $\hat{b}_t^G$. The economic intuition behind this is that with integrated financial markets, financiers do not demand an excess return on the currency and are willing to provide as much funding as needed as long as the UIP holds (demand for local currency debt is infinitely elastic). In this case, it can be shown from equation (32) that government debt follows a backward-looking law of motion

[3] A necessary and sufficient condition for a unique stable equilibrium is $p(1)p(-1) < 0$. See Appendix C in Woodford (2011).

[4] Setting $\Phi = 0$ would lead to a unit root in the exchange rate. Instead, I take the limit $\Phi \to 0^+$ so that stationarity holds. Another option is to follow Schmitt-Grohé and Uribe (2003) but taking the limit preserves parsimony and clarity.

pinned by the tax rule. This structure recovers the classic Leeper (1991) dichotomy as shown in Proposition 1 below.

Proposition 1 (Policy Regions under Integrated Financial Markets)**.** *If $\Phi \to 0^+$, the following policy configurations each generate a unique stable rational expectations equilibrium:*

1. Active monetary and passive fiscal policies (AM/PF):

$$\phi_\pi > 1 \quad \textit{and} \quad \phi_\tau > 1 - \beta. \tag{36}$$

2. Passive monetary and active fiscal policies (PM/AF):

$$0 \leq \phi_\pi < 1 \quad \textit{and} \quad 0 \leq \phi_\tau < 1 - \beta. \tag{37}$$

Proof. Note that at $\lambda = 1$, the boundary for the tax rule in condition (35) approaches $1 - \beta$ as $\Phi \to 0^+$. ■

Proposition 1 implies that under AM/PF, monetary policy pins down inflation and the exchange rate: the Taylor rule satisfies the Taylor principle ($\phi_\pi > 1$), so any deviation of inflation from target triggers a more-than-proportional local interest rate adjustment. Government debt evolves backward and is stabilised by the aggressive tax response ($\phi_\tau > 1 - \beta$). This is the standard "monetary dominance" regime. Under PM/AF, the roles are reversed: monetary policy is passive, fiscal policy is active, and government debt must be stabilised by revaluations of the debt portfolio rather than by tax adjustments as in the classic fiscal theory of the price level literature (Leeper, 1991; Sims, 1994; Woodford, 1995).

The case of segmented financial markets ($\Phi > 0$). When $\Phi > 0$, the demand for local-currency bonds is elastic: the excess return between local and U.S. bonds depends on the stock of government debt outstanding. This coupling breaks the block-triangular structure of the equilibrium system: $(\hat{\pi}_t^N, \hat{q}_t, \hat{C}_t)$ are no longer independent of $\hat{b}_t^G$, and the policy regions of Proposition 1 depend on fiscal parameters. The economic intuition is that when the government increases its debt, the share of local currency debt of this issuance must be absorbed by global financiers with limited risk-bearing capacity. However, for these financiers to expand their local currency position, they demand positive excess returns, the extent of which is governed by the parameter Φ. Since demand for local currency debt is no longer infinitely elastic, inflation and the exchange rate are jointly determined by the level of government debt. Proposition 2 extends Proposition 1 to the case of segmented financial markets.

Proposition 2 (Policy Regions under Segmented Financial Markets)**.** *If $\Phi > 0$, the AM/PF and PM/AF regions depend on the degree of financial market segmentation and the currency* *composition of government debt. In particular, the following policy configurations each generate a unique stable rational expectations equilibrium:*

1. Active monetary and passive fiscal policies (AM/PF):

$$\phi_\pi > 1 \quad \textit{and} \quad \phi_\tau > 1 - \beta \cdot \frac{1+\Omega}{1+\Omega - 2\beta\Omega\Phi}. \tag{38}$$

2. Passive monetary and active fiscal policies (PM/AF):

$$0 \leq \phi_\pi < 1 \quad \textit{and} \quad 0 \leq \phi_\tau < 1 - \beta \cdot \frac{1+\Omega}{1+\Omega - 2\beta\Omega\Phi}. \tag{39}$$

Proof. Set $\Phi > 0$ in condition (35). ■

This proposition establishes that financial market segmentation alters the conditions under which monetary and fiscal dominance arise, relative to the standard closed-economy results of Leeper (1991). The equilibrium-determinacy boundaries now depend on the currency composition of government debt and the degree of financial market segmentation. The reason for this dependency is the fact that a finite elasticity of demand for local currency debt links the dynamics of the exchange rate and inflation with the stock of government debt.

Figure 3 depicts an stylised representation of the determinacy regions in the $\phi_\pi - \phi_\tau$ plane for the case of $\Phi \to 0^+$ and $\Phi > 0$. Two features merit discussion: (i) financial segmentation shrinks the region of fiscal dominance, and (ii) an original sin Goldilocks condition emerges.

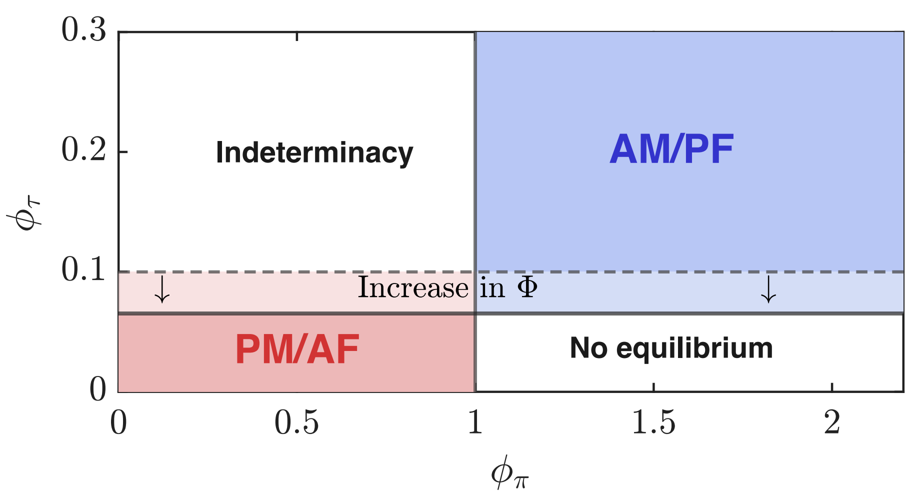

Figure 3: Equilibrium-determinacy regions in as a function of financial market segmentation Φ.

Financial segmentation shrinks the region of fiscal dominance. Define the fiscal policy threshold as

$$\phi_\tau^* \equiv 1 - \beta \cdot \frac{1+\Omega}{1+\Omega-2\beta\Omega\Phi}. \tag{40}$$

As $\Phi \to 0^+$ the threshold approaches $1-\beta$, which is the standard closed-economy or integrated open-economy value (Proposition 1) . As Φ increases, ϕ_τ^* declines and eventually becomes negative, at which point the PM/AF region is empty. The critical value is

$$\Phi^{\text{crit}} = \frac{(1-\beta)(1+\Omega)}{2\beta\Omega}. \tag{41}$$

For $\Phi > \Phi^{\text{crit}}$, no fiscal rule with $\phi_\tau \geq 0$ sustains active fiscal policy. That is, there is no configuration of parameters that allow for fiscal dominance. The economic intuition goes as follows. The steady-state spread $\Phi = \bar{i} - \bar{i}^{\$}$ represents the currency risk premium that the global financial intermediary extracts on local currency bonds. From the government's perspective, the fraction Ω of its portfolio issued in U.S. dollars carries a gross interest rate $R^{\$} \equiv 1/\beta^f = 1/\beta - \Phi$, which decreases in Φ. A higher spread therefore reduces the effective steady-state borrowing cost on the government's debt portfolio, $\bar{\mathcal{A}} = 1/\beta - \Omega\Phi$. When the product $\Omega\Phi$ is sufficiently large, the interest bill on government debt falls, debt dynamics become self-stabilising, and there is no fiscal stress for the exchange rate to resolve. The fiscal theory of exchange rates requires fiscal stress as its driving force; this condition bounds the parameter space in which the mechanism operates.

An original sin Goldilocks condition. The requirement $\Omega\Phi < 1/\beta - 1$ for PM/AF to exist can be interpreted as follows. The term $\Omega\Phi$ measures the government's interest savings from issuing dollar-denominated debt: it is the share of debt in dollars times the per-unit saving from the lower dollar rate. PM/AF requires these savings to be smaller than the steady-state real interest rate $1/\beta - 1$. When $\Omega\Phi$ is large—either because the country has borrowed heavily in dollars or because the currency risk premium is wide—the government's financing cost is too low for an unsustainable fiscal path to emerge.

Economies with large foreign-currency debt shares and wide local-currency spreads (high $\Omega\Phi$) are less susceptible to fiscal dominance, not because their fiscal discipline is strong, but because they can enjoy low borrowing costs in their U.S. dollar-denominated debt. Conversely, economies with moderate dollar debt and thin currency premia sit in the region where the fiscal theory of exchange rates is operative. The model therefore requires a Goldilocks configuration: enough segmentation to anchor the exchange rate ($\Phi > 0$), but not so much that the U.S. dollar debt becomes a free lunch ($\Omega\Phi < 1/\beta - 1$).

The assumption that U.S.-dollar borrowing is cheaper merits further comment. The fiscal threshold ϕ_τ^* and the critical segmentation level Φ^{crit} are derived under the assumption that the government borrows in U.S. dollars at the world risk-free rate. This amounts to full commitment on foreign-currency obligations. In practice, sovereign borrowers face a credit $\bar{\xi}$ on dollar-denominated debt that is increasing in the debt level. The effective borrowing cost becomes $\bar{\mathcal{A}} = 1/\beta - \Omega(\Phi - \bar{\xi})$, and the condition for PM/AF generalises to $\Omega(\Phi - \bar{\xi}) < (1-\beta)/\beta$. When $\bar{\xi} > \Phi$ — the sovereign spread exceeds the currency risk premium — the condition holds for any (Ω, Φ) and fiscal dominance is always feasible.

4.2. A Fiscal Theory of Exchange Rates.

Now I describe the behaviour of the system (33) under PM/AF. In a fiscally dominant regime, the fiscal authority does not adjust taxes sufficiently to stabilise debt. As a result, the government budget constraint becomes an asset-pricing equation: equilibrium requires the market value of outstanding government liabilities to equal the expected present value of future primary surpluses. Iterating (9) forward yields

$$\left[(1-\Omega)\frac{1+i_t}{1+\pi_t^N} + \Omega\,\frac{q_t}{\bar{q}}\,\frac{1+i_t^{\$}}{1+\pi_t^{\$}}\right] b_t^G = \mathbb{E}_t \sum_{j=0}^{\infty} \mathcal{Q}_{t+j}\big(\tau_{t+j} - G_{t+j}\big) + \lim_{T\to\infty} \mathcal{Q}_{t+T}\mathcal{B}_{t+T-1} b_{t+T}^G, \tag{42}$$

where the discount factor is $\mathcal{Q}_{t+j} = \prod_{s=0}^{j-1} \widetilde{\beta}_{t+s}$ for $j \geq 1$, with $\widetilde{\beta}_t = \mathcal{B}_t/\mathcal{A}_{t+1}$, and $\mathcal{Q}_t = 1$. The left-hand side is the market value of total government debt: the first term is the local-currency component, deflated by non-tradable inflation, and the second term is the dollar component, revalued at the current real exchange rate q_t. The right-hand side is the expected present value of future primary surpluses plus a terminal value, or bubble, component. Throughout, I impose a transversality condition so that the terminal term is zero. Brunnermeier, Merkel, and Sannikov (2020) study a version of the FTPL with a positive bubble component; extending the present framework in that direction is left for future research.

To make the adjustment mechanisms transparent, define the market value of debt and fiscal backing as

$$\mathcal{V}_t \equiv \left[(1-\Omega)\frac{1+i_t}{1+\pi_t^N} + \Omega\,\frac{q_t}{\bar{q}}\,\frac{1+i_t^{\$}}{1+\pi_t^{\$}}\right] b_t^G, \qquad \mathcal{S}_t \equiv \mathbb{E}_t \sum_{j=0}^{\infty} \mathcal{Q}_{t+j}\big(\tau_{t+j} - G_{t+j}\big),$$

so that under the no-bubble condition $\mathcal{V}_t = \mathcal{S}_t$. A fiscal deficit shock that is not backed by future taxes lowers $\mathcal{S}_t$. Equilibrium must then be restored through a decline in the market value of debt, $d\mathcal{V}_t = d\mathcal{S}_t < 0$. Totally differentiating $\mathcal{V}_t$ yields

$$\begin{aligned} d\mathcal{V}_t = {} & \left[(1-\Omega)\frac{1+i_t}{1+\pi_t^N} + \Omega\,\frac{q_t}{\bar{q}}\,\frac{1+i_t^{\$}}{1+\pi_t^{\$}}\right] db_t^G + (1-\Omega)\frac{b_t^G}{1+\pi_t^N}\,di_t - (1-\Omega)\frac{(1+i_t)b_t^G}{(1+\pi_t^N)^2}\,d\pi_t^N \\ & + \Omega\,\frac{b_t^G}{\bar{q}}\,\frac{1+i_t^{\$}}{1+\pi_t^{\$}}\,dq_t + \Omega\,\frac{q_t b_t^G}{\bar{q}(1+\pi_t^{\$})}\,di_t^{\$} - \Omega\,\frac{q_t}{\bar{q}}\,\frac{(1+i_t^{\$})b_t^G}{(1+\pi_t^{\$})^2}\,d\pi_t^{\$}. \end{aligned} \tag{43}$$

This decomposition makes clear that three channels can restore the valuation equation.

(i) Inflation channel. An increase in non-tradable inflation reduces the real value of local-currency debt:

$$\frac{\partial \mathcal{V}_t}{\partial \pi_t^N} = -(1-\Omega)\frac{(1+i_t)b_t^G}{(1+\pi_t^N)^2} < 0.$$

This is the standard fiscal-theory mechanism applied to an open economy. When an unbacked deficit shock lowers the present value of future surpluses, the price of non-tradable goods must rise so as to erode the real burden of the $(1-\Omega)$ share of debt issued in local currency.

(ii) Valuation channel. A real appreciation reduces the local-currency value of dollar debt:

$$\frac{\partial \mathcal{V}_t}{\partial q_t} = \Omega\,\frac{1+i_t^{\$}}{1+\pi_t^{\$}}\,\frac{b_t^G}{\bar{q}} > 0.$$

Since a fall in q_t is an appreciation, a decline in q_t lowers the market value of the foreign-currency component of public liabilities. This is the fiscal theory of exchange rates: under PM/AF, the exchange rate becomes an adjustment margin that helps reconcile the outstanding stock of nominal liabilities with a lower level of fiscal backing.

(iii) Compensation channel. The exchange rate is inherently forward-looking: today's real depreciation reflects the entire expected path of future government debt and financial conditions. To see this, log-linearise the financier's optimal condition (28) and the asset-clearing condition (7) around the steady state. Substituting asset clearing into the carry condition yields the modified UIP condition

$$(1+\Phi)\,\hat{q}_t \;=\; \mathbb{E}_t\hat{q}_{t+1} \;+\; \mathbb{E}_t\hat{\pi}_{t+1}^N \;-\; \hat{i}_t \;+\; \hat{i}_t^{\$} \;+\; \Phi\Big(\hat{b}_{t+1}^G + \hat{\Gamma}_t\Big)\,, \tag{44}$$

where $\Phi \equiv \bar{\Gamma}\,\bar{Q}/(\beta^f\bar{\mathcal{E}})$ is the steady-state carry spread and $\hat{\Gamma}_t$ captures time-varying tightness of the financier's constraint. The term $\Phi(\hat{b}_{t+1}^G + \hat{\Gamma}_t)$ is absent from standard UIP: it arises because financiers must be compensated for holding a larger local-currency position whenever government debt rises or their constraint tightens.

The discount factor $\vartheta \equiv (1+\Phi)^{-1} < 1$ governs how rapidly this compensation decays over the horizon: the larger the carry spread Φ, the more the exchange rate is anchored to the near term and the faster future debt paths are discounted. Iterating (44) forward delivers the following result.

Proposition 3 (Forward solution for the real exchange rate)**.** *Under bounded transversality, the real exchange rate satisfies*

$$\hat{q}_t \;=\; \vartheta\sum_{h=0}^{\infty}\vartheta^h\,\mathbb{E}_t\Big[\Phi\Big(\hat{b}_{t+1+h}^G + \hat{\Gamma}_{t+h}\Big) + \hat{i}_{t+h}^{\$} - \hat{i}_{t+h} - \hat{\pi}_{t+1+h}^N\Big]\,, \tag{45}$$

where $\vartheta \equiv (1+\Phi)^{-1}$.

Two immediate corollaries follow from (45). First, an anticipated rise in government debt h periods ahead depreciates the exchange rate today by

$$\frac{\partial \hat{q}_t}{\partial \hat{b}^G_{t+1+h}} \;=\; \Phi\, \vartheta^{h+1} \;>\; 0, \tag{46}$$

so the effect decays geometrically in the forecast horizon at rate ϑ. The sensitivity is proportional to the carry spread Φ: in a frictionless, fully integrated market ($\Phi = 0$), the debt path has no direct effect on the exchange rate, and the compensation channel shuts down entirely.

Second, the impact of a monetary-policy shock on the real exchange rate works through two opposing forces. The direct effect, $-\vartheta\hat{i}_t$, appreciates the exchange rate on impact (the standard interest-rate channel). However, in the PM/AF regime a rise in the nominal rate increases the real debt-service burden, raising future $\hat{b}^G_{t+1+h}$; equation (46) then implies a depreciation through the compensation channel. Whether the net effect is appreciation or depreciation depends on the fiscal response: under AM/PF the tax rule extinguishes the debt build-up quickly, leaving the direct channel dominant, whereas under PM/AF the debt build-up is long-lived and the compensation channel can overturn the conventional sign.

Finally, (46) clarifies the role of financial segmentation. Deeper segmentation (higher Φ, equivalently lower $\bar{x}$ for given Φ) amplifies the exchange-rate response to every unit of government debt along the entire forward path. When markets are nearly integrated ($\Phi \to 0$) the compensation channel vanishes and fiscal shocks transmit only through the inflation and valuation channels discussed above.

Thus, greater segmentation unambiguously amplifies the exchange-rate response to near-term borrowing pressure while also making the compensation channel more front-loaded by reducing the relative importance of equally sized pressures further in the future. The compensation channel is therefore inherently forward-looking: the exchange rate moves today because financiers require compensation today for the rollover pressure they expect tomorrow.

Source of Non-Ricardian Forces. The mechanism described above relies on a force that is non-Ricardian at the level of the sovereign. It is therefore useful to clarify where this departure from Ricardian equivalence comes from in the present environment. Although households are standard infinitely lived Ricardian optimisers, the sovereign is not Ricardian. The source of this departure differs from the usual mechanisms emphasised in the fiscal theory literature—such as overlapping generations (Blanchard, 1985), rule-of-thumb consumers (Galí, Vallés, and Wolman, 2003), or distortionary taxation (Benigno and Woodford, 2003)—which operate by preventing households from fully internalising future tax liabilities. Here, instead, the non-Ricardian force originates in the international financial structure. Global financial intermediaries earn carry profits from intermediating the government's foreign-currency debt, and those profits accrue to the rest of the world rather than being rebated to domestic households. As a result, domestic agents internalise only a fraction of the government's debt-service costs, breaking the closed-economy correspondence between public liabilities and private wealth. The strength of this wedge is summarised by $\Phi = \bar{\Gamma}\bar{Q}/\beta^f$, which depends on both the depth of foreign exchange markets ($\bar{\Gamma}$) and the stock of local-currency debt held through intermediated positions ($\bar{Q}$). When $\Phi = 0$, the standard Ricardian benchmark is restored and the fiscal channel through the exchange rate disappears. When $\Phi > 0$, by contrast, the government's intertemporal budget constraint places an additional restriction on equilibrium prices—most importantly, on the exchange rate—that household saving behaviour alone cannot offset.

5. Quantitative Results

5.1. Solution Method and Calibration

Solution method. The model is solved using a second-order perturbation around the deterministic steady state. This choice is motivated by the presence of non-linear mechanisms that are central to the analysis, in particular the revaluation of foreign-currency liabilities following exchange-rate movements and the endogenous intermediation wedge in local-currency bond markets. Under a first-order approximation, certainty equivalence implies that uncertainty has no effect on average allocations or prices, so the contribution of volatility to debt valuation, spreads, and welfare is shut down by construction. A second-order solution preserves these terms and is therefore better suited to studying the monetary-fiscal transmission mechanism in an economy with segmented financial markets and dollar-denominated debt. In addition, because in Section 6 I compare regimes in terms of welfare, a second-order approximation is appropriate, since welfare depends on both first and second moments of the endogenous variables. The solution is then used to compute impulse responses, variance decompositions, and welfare comparisons across policy regimes.

Calibration. The model is calibrated at a quarterly frequency to represent a standard small open emerging market economy. Table 2 summarises all parameter values.

Preferences. The household discount factor $\beta = 0.97$ corresponds to an annualised value of approximately 0.88, consistent with the moderate impatience conventionally assumed for emerging markets (Kolasa, Vogt, and Zabczyk, 2025). The elasticity of intertemporal substitution $\sigma_c = 0.50$ implies a coefficient of relative risk aversion of 2, and the inverse Frisch elasticity of labour supply is set to $\varphi = 3$, in line with estimates from the macro literature. Non-tradable goods account for a share $\kappa = 0.60$ of the consumption basket, so tradables represent 40% of expenditure—broadly consistent with observed import shares in middle-income economies. The intratemporal elasticity of substitution between tradable and non-tradable consumption is $\sigma = 0.75$, a value within the range commonly used in quantitative small open economy models (Gali and Monacelli, 2005; Gopinath et al., 2020).

Production and nominal rigidities. The returns-to-scale parameter in non-tradable production is $\alpha = 0.95$, close to constant returns. The elasticity of substitution across non-tradable varieties is $\varepsilon = 6$. Nominal price rigidity is governed by the Calvo probability $\delta_N = 0.75$: on average, firms reset their prices once every four quarters, a standard value in sticky-price open-economy models.

Financial structure. The U.S. dollar share of government debt, $\Omega = 0.30$, is calibrated to the median foreign-currency share in emerging market sovereign debt observed over the sample period, 2000–2026. The steady-state local spread $\Phi = 0.05$ is calibrated to the average UIP deviation in the same panel of emerging market currency pairs, consistent with empirical estimates of carry costs in segmented foreign exchange markets.

Shock processes. The persistence parameters for the tradable endowment shock ($\rho_{y^T} = 0.74$), government expenditure shock ($\rho_g = 0.85$), financial intermediation shock ($\rho_\Gamma = 0.73$), and foreign interest rate shock ($\rho_{i^\$} = 0.95$) are estimated from the panel of emerging economies. The high persistence of the foreign interest rate process reflects the well-documented inertia of U.S. monetary policy cycles over this period.

Table 2: Calibration

Parameter	Description	Value	Source
β	Discount factor	0.97	Standard value DSGE-SOE
σ_c	Elasticity of intertemporal substitution	0.50	Standard value DSGE-SOE
φ	Inverse Frisch elasticity	3.00	Standard value DSGE-SOE
κ	Expenditure share on non-tradables	0.60	Standard value DSGE-SOE
σ	Elasticity between C_t^N and C_t^T	0.75	Standard value DSGE-SOE
α	Returns to scale in production	0.95	Standard value DSGE-SOE
ε	Elasticity across non-tradable varieties	6.00	Standard value DSGE-SOE
δ_N	Price rigidity	0.75	Standard value DSGE-SOE
Ω	U.S. dollar share of government debt	0.30	Data
Φ	Steady-state local spread (annualised)	0.05	Data
ρ_{y^T}	Tradable output shock	0.74	Data
ρ_g	Government expenditure shock	0.85	Data
ρ_Γ	Financial intermediation shock	0.73	Data
$\rho_{i^\$}$	Foreign interest rate shock	0.95	Data

5.2. Positive Analysis

Effects of Contractionary Monetary Policy. Figure 4 reports the impulse responses to a one-standard-deviation contractionary monetary policy shock ($\nu_t > 0$) under AM/PF and PM/AF.

Under AM/PF, the nominal interest rate falls on impact due to the deflation induced by the contractionary monetary policy shock. The Taylor rule creates an offsetting feedback: the contractionary shock reduces non-tradable inflation, and this decline counteracts the direct effect of the monetary shock on the policy rate. Under PM/AF, with $\phi_\pi = 0$, the interest rate simply tracks the exogenous process ν_t so that it increases on impact and remains elevated for longer.

Non-tradable inflation falls under AM/PF while it rises under PM/AF. The latter is the fiscal theory mechanism: higher nominal rates increase the government's debt service costs, and since taxes do not adjust, the government's intertemporal budget constraint requires the real value of outstanding debt to fall, which is achieved through a jump in the price level.

Taxes rise on impact under AM/PF. The passive fiscal rule sets $\tau_t = \bar{\tau} + \phi_\tau(\mathcal{A}_t b_t^G - \bar{\mathcal{A}}\bar{b}^G)$, and on impact the debt service burden $\mathcal{A}_t b_t^G$ rises so as to trigger the fiscal adjustment. Under PM/AF, taxes are flat since $\phi_\tau = 0$.

Government debt rises initially under AM/PF. The contractionary shock raises future debt service costs, and since the fiscal response lags, borrowing increases before taxes catch up. Debt then falls as the tax adjustment takes hold. Under PM/AF, debt rises more persistently, as the absence of fiscal adjustment means it is stabilized by inflation eroding its real value rather than by taxation.

The real exchange rate dynamics differ across regimes in both magnitude and pattern. Under AM/PF, q_t appreciates sharply on impact as the interest rate differential attracts financier capital, then gradually depreciates back through zero and returns to steady state. Under PM/AF, the initial appreciation is smaller—consistent with the fact that the interest rate rises by more under PM/AF but the fiscal inflation simultaneously works against the currency. The appreciation is then reversed into a larger and more persistent depreciation as the fiscal inflation channel dominates: the rise in the price level erodes the currency's real value, and financiers unwind their local-currency positions as they realize the inflation more than offsets the nominal rate advantage. This pattern—a muted initial appreciation followed by a pronounced depreciation—is consistent with the negative excess returns observed under PM/AF and captures the idea that under fiscal dominance, interest rate hikes ultimately weaken rather than strengthen the currency.

Consumption falls under AM/PF, as the combination of higher real borrowing costs and delayed fiscal drag compresses household demand. Under PM/AF, consumption rises: the fiscal inflation reduces the household's real debt service burden, and the absence of a tax increase leaves households with more disposable resources. Exports mirror the consumption dynamics—rising under AM/PF as lower domestic absorption frees up tradable goods, and falling under PM/AF.

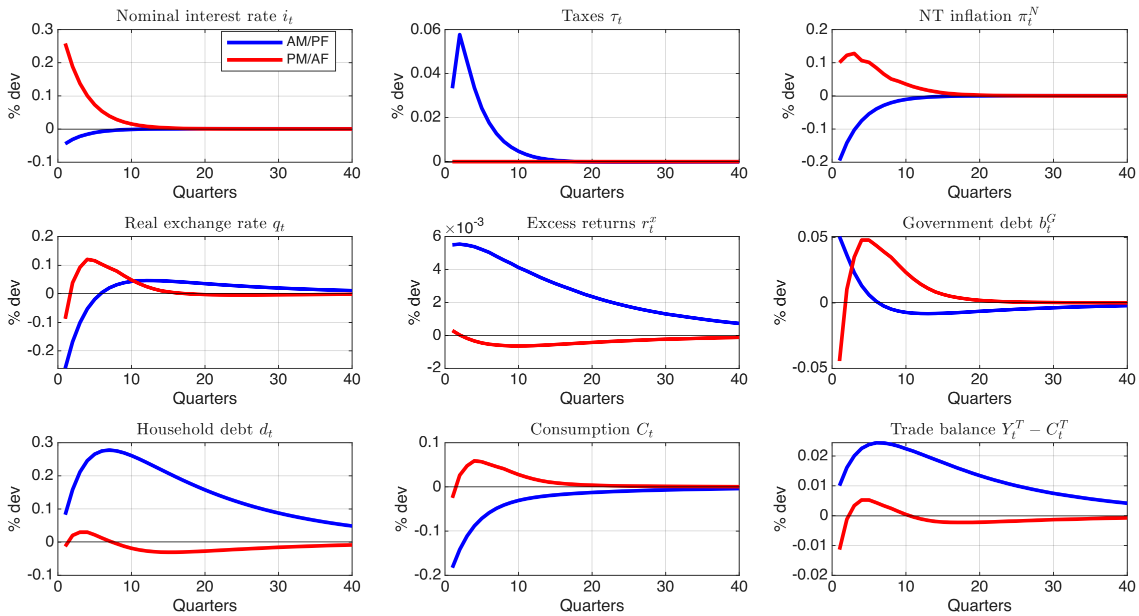

Figure 4: IRFs to a contractionary local monetary policy shock ν_t.

Effects of U.S. Contractionary Monetary Policy. Figure 5 reports the impulse responses to a one-standard-deviation contractionary U.S. monetary policy shock ($\nu_t^\$ > 0$) under AM/PF and PM/AF.

A rise in the U.S. interest rate transmits to the domestic economy through the modified UIP condition, raising the domestic nominal interest rate on impact under AM/PF to offset the rise in inflation due to the depreciation of the currency. The real exchange rate depreciates sharply on impact under both regimes, as the higher U.S. rate induces capital outflows and tightens global financiers' balance sheets, reducing their willingness to hold local-currency bonds. This depreciation is accompanied by a rise in non-tradable inflation, driven by the pass-through from the exchange rate and, under PM/AF, by the fiscal inflation channel: higher debt service costs on dollar liabilities are not met by tax adjustment, so the intertemporal budget constraint must be satisfied through a further rise in the price level.

The responses are broadly similar across regimes on impact, reflecting the fact that the shock enters through global financial conditions rather than the domestic policy rate. The main divergence arises in the medium run: under AM/PF, the fiscal rule stabilises government debt through higher taxes, and the exchange rate gradually returns to steady state. Under PM/AF, the absence of fiscal adjustment generates a more persistent accumulation

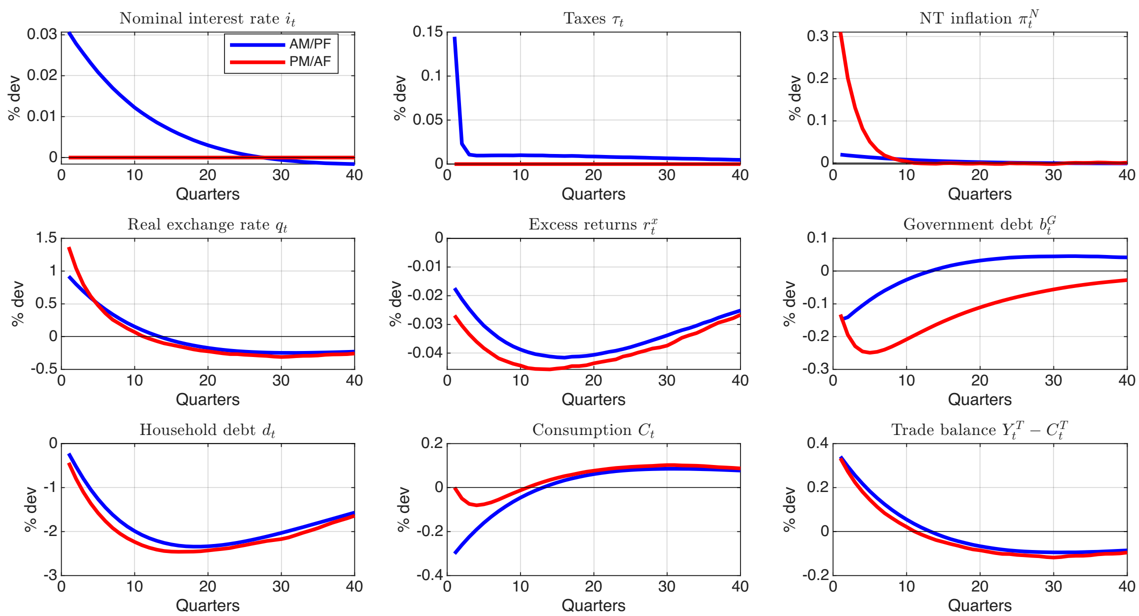

Figure 5: IRFs to a contractionary U.S. monetary policy shock $\nu_t^{\$}$.

of government debt and a slower return of inflation and the exchange rate to steady state. Household debt falls sharply in both regimes as tighter global financial conditions raise borrowing costs and compress domestic credit demand. The trade balance improves on impact as the real depreciation boosts export competitiveness, before deteriorating due to an appreciation of the currency.

Financial Market Segmentation and Fiscal Shocks. Figure 6 traces the on-impact response of the real exchange rate, non-tradable inflation, and excess returns to a government spending shock across values of $\bar{\Gamma}$, holding Φ fixed so that variation in $\bar{\Gamma}$ maps directly into variation in the size of the financier balance sheet $\bar{x} \equiv \bar{Q}/\bar{\mathcal{E}}$.

Three findings stand out. First, the on-impact depreciation under PM/AF is increasing in financial segmentation: moving from near-integrated to highly segmented markets raises the impact response of $\hat{q}_t$ from 1.75% to 2.25% (left panel). Under AM/PF the exchange rate appreciates slightly on impact—the standard response as monetary policy tightens in reaction to a demand shock—and is essentially flat across $\bar{\Gamma}$. The regime contrast is stark: the sign of the exchange rate response reverses entirely depending on whether fiscal or monetary policy is the active instrument. In particular, when monetary policy is active, financial market segmentation does not appear to differentially affect the behaviour of exchange rates. Second, non-tradable inflation under PM/AF is roughly constant at 1.3% across all values of $\bar{\Gamma}$ (centre panel). Greater segmentation raises the exchange rate response without raising inflation: the additional adjustment burden falls entirely on the exchange rate rather than on domestic prices. Third, on-impact excess returns under

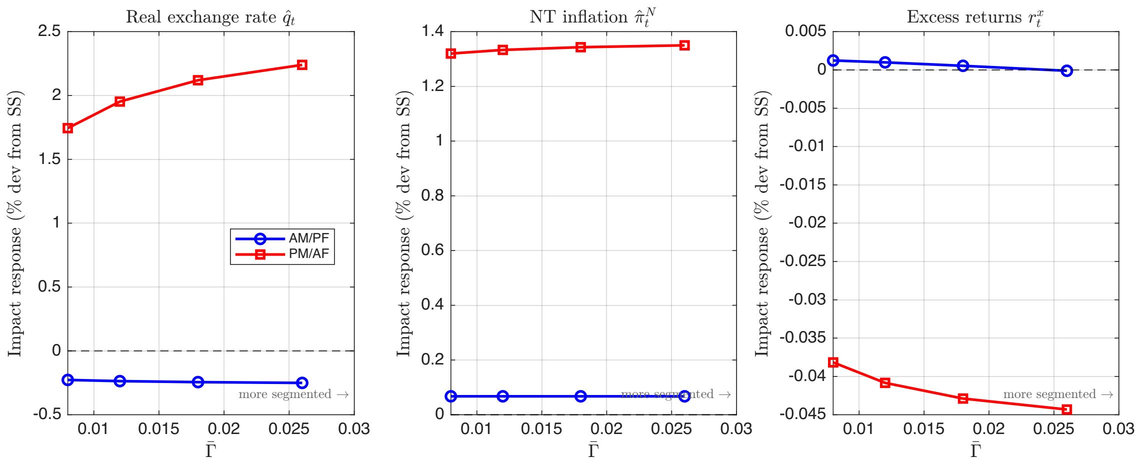

Figure 6: Financial segmentation and the transmission of fiscal shocks. Each panel plots impact response to a government spending shock ($\nu_t^G > 0$) as a function of the financier constraint parameter $\bar{\Gamma}$, holding the steady-state carry spread Φ fixed.

PM/AF are negative and become more negative as segmentation increases (right panel). This reflects the capital loss absorbed by financiers when the currency depreciates on impact: in more segmented markets the depreciation is larger (left panel), so the loss is larger. Under AM/PF excess returns are small and positive, consistent with a modest carry premium earned during a mild appreciation. Together, the three panels illustrate the compensation channel at work: greater segmentation amplifies the exchange rate response to fiscal shocks and concentrates the associated capital loss on the financiers who are the marginal holders of local-currency debt.

Variance Decomposition. Table 3 presents the variance decomposition of some endogenous variables under the present calibration.

Table 3 reveals a stark contrast in the sources of macroeconomic fluctuations across regimes. Under AM/PF, domestic monetary shocks account for the bulk of non-tradable inflation variance (80.7%) and non-tradable consumption variance (45.1%), consistent with the standard view that monetary policy is the primary driver of business cycle fluctuations under monetary dominance. The U.S. interest rate shock is the dominant driver of exchange rate dynamics, accounting for 72.2% of real exchange rate variance and 68.7% of nominal depreciation variance, reflecting the large exposure of the small open economy to global financial conditions. Fiscal shocks account for 81.4% of government debt variance but contribute negligibly to inflation and exchange rate fluctuations, consistent with Ricardian equivalence holding approximately along the fiscal dimension under AM/PF.

Under PM/AF, the picture is reversed. Fiscal shocks dominate the variance of virtually every variable: they account for 66.2% of non-tradable inflation, 52.3% of real exchange

Table 3: Unconditional variance decomposition (% of total variance)

Panel A: AM/PF						
	Monetary (ν_t)	Fiscal (ν_t^τ)	Endowment (Y_t^T)	U.S. rate ($i_t^\$$)	Fin. segm. (ν_t^Γ)	Gov. spending (G_t)
$\hat{\pi}_t^N$	71.7	0.0	0.5	4.0	0.0	23.9
$\hat{q}_t$	3.9	0.0	22.6	71.7	0.1	1.7
$\hat{b}_t^G$	0.3	81.5	1.4	4.4	0.0	12.4
$\hat{\imath}_t$	6.3	0.0	1.6	13.1	0.0	79.0
$\hat{C}_t^N$	67.3	0.0	1.7	7.5	0.0	23.5
$\Delta\hat{\mathcal{E}}_t$	25.1	0.0	8.9	61.3	0.3	4.4
$\hat{\pi}_t$	46.0	0.0	5.4	38.1	0.2	10.2

Panel B: PM/AF						
	Monetary (ν_t)	Fiscal (ν_t^τ)	Endowment (Y_t^T)	U.S. rate ($i_t^\$$)	Fin. segm. (ν_t^Γ)	Gov. spending (G_t)
$\hat{\pi}_t^N$	0.7	66.2	0.0	1.4	0.0	31.6
$\hat{q}_t$	0.2	52.3	4.4	20.6	0.0	22.4
$\hat{b}_t^G$	0.3	40.9	0.1	15.6	0.0	43.1
$\hat{\imath}_t$	100.0	0.0	0.0	0.0	0.0	0.0
$\hat{C}_t^N$	0.2	71.3	0.0	2.2	0.0	26.2
$\Delta\hat{\mathcal{E}}_t$	0.3	63.9	0.4	7.2	0.0	28.1
$\hat{\pi}_t$	0.5	65.3	0.2	4.1	0.0	29.9

rate, 71.3% of non-tradable consumption, 63.9% of nominal depreciation, and 65.3% of CPI inflation. This reflects the fiscal theory mechanism: under fiscal dominance, unbacked deficit shocks propagate directly into prices and the exchange rate as the intertemporal budget constraint adjusts endogenously. The sole exception is the nominal interest rate, whose variance is entirely explained by the monetary shock (100%), since under PM/AF with $\phi_\pi = 0$, the Taylor rule maps one-for-one from the monetary policy shock to the domestic rate with no endogenous feedback from inflation. The U.S. rate shock retains some explanatory power for the real exchange rate (20.6%) but its contribution to inflation and nominal depreciation collapses relative to AM/PF, as the fiscal channel absorbs the dominant share of exchange rate fluctuations. Together, the decomposition illustrates that the regime determines not only the transmission mechanism of shocks but also the composition of macroeconomic risk: fiscal dominance fundamentally reorients the economy's exposure away from monetary and external shocks and toward fiscal ones.

6. Welfare Analysis

This section studies the welfare implications of monetary-fiscal regimes, debt dollarisation, and financial market segmentation. I use the second-order perturbation solution from Section 5 to compute welfare for each policy regime, and examine how welfare costs vary with the foreign-currency share of government debt Ω and the degree of market segmentation Φ.

6.1. Welfare Measure

Let $\mathcal{W}^r$ denote the unconditional expected lifetime utility of the representative household under regime $r \in \{\text{AM/PF, PM/AF}\}$:

$$\mathcal{W}^r = \mathbb{E}\left[\sum_{t=0}^{\infty} \beta^t \left(\frac{C_t^{1-1/\sigma_c} - 1}{1 - 1/\sigma_c} - \chi \frac{N_t^{1+\varphi}}{1+\varphi}\right)\right], \tag{47}$$

where the expectation is taken over the unconditional (ergodic) distribution of the stationary equilibrium. Since the model is solved with a second-order perturbation, $\mathcal{W}^r$ captures the effects of both the mean and the variance of endogenous variables.

I measure welfare costs using a consumption-equivalent metric. Define $\lambda^r \geq 0$ as the fraction of steady-state consumption the representative household would be willing to forgo in every period to live in the deterministic steady state rather than in the stochastic equilibrium under regime r. Formally, λ^r solves

$$\frac{1}{1-\beta}\left(\frac{\left((1-\lambda^r)\bar{C}\right)^{1-1/\sigma_c} - 1}{1 - 1/\sigma_c} - \chi \frac{\bar{N}^{1+\varphi}}{1+\varphi}\right) = \mathcal{W}^r. \tag{48}$$

A value $\lambda^r > 0$ implies that the stochastic equilibrium under regime r is welfare-inferior to the deterministic steady state, with λ^r measuring the severity of this loss in units of consumption. A value $\lambda^r \approx 0$ implies that macroeconomic fluctuations impose negligible welfare costs. Rearranging (48) yields the closed-form expression

$$\lambda^r = 1 - \left[(1-\beta)\left(1 - 1/\sigma_c\right)\left(\mathcal{W}^r + \frac{\chi \bar{N}^{1+\varphi}}{(1+\varphi)(1-\beta)}\right) + 1\right]^{\frac{1}{1-1/\sigma_c}} \bar{C}^{-1}. \tag{49}$$

For each combination of structural parameters, I select the policy coefficients (ϕ_π, ϕ_τ) that minimise the welfare cost λ within each regime's determinacy region. Under AM/PF the optimisation ranges over $\phi_\pi > 1$ and $\phi_\tau > \phi_\tau^*$; under PM/AF it ranges over $\phi_\pi < 1$ and $\phi_\tau < \phi_\tau^*$. Figure 7 plots $\lambda^{*,\text{PM/AF}} - \lambda^{*,\text{AM/PF}}$ across (Ω, Φ): since this difference is everywhere positive, AM/PF welfare-dominates PM/AF for all parameter combinations considered, and the margin widens with both the dollar share of debt and the degree of financial market segmentation.

6.2. Welfare Costs of Fiscal Dominance

The first result of the welfare analysis is a stark contrast between the two policy regimes, illustrated in Figure 7. For each (Ω, Φ) pair, the policy coefficients (ϕ_π, ϕ_τ) are chosen to minimise λ within each regime's determinacy region, so the comparison is between the best attainable outcome under each regime.

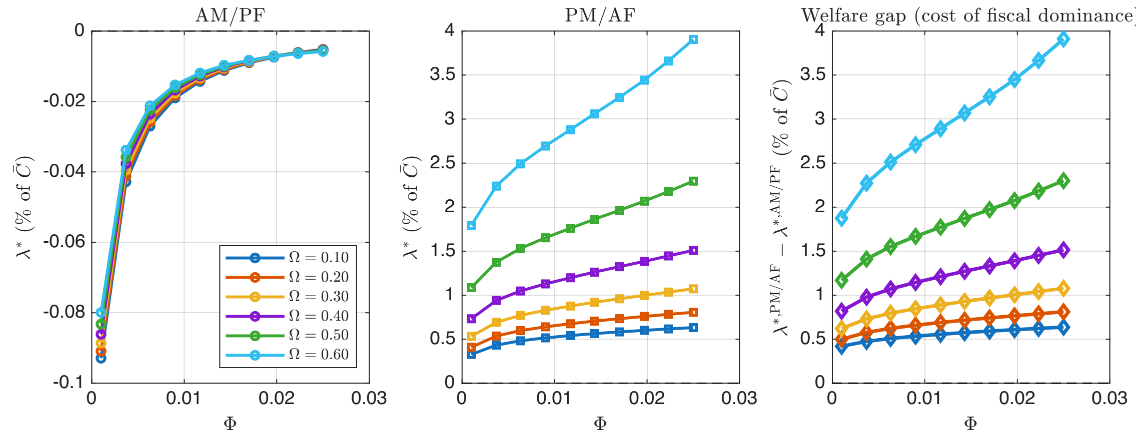

Figure 7: Welfare costs under optimised policy rules. Each panel plots the consumption-equivalent welfare cost λ^* (% of steady-state consumption $\bar{C}$) as a function of the steady-state carry spread Φ, for six values of the dollar debt share Ω. Policy coefficients (ϕ_π, ϕ_τ) are optimised within each regime's determinacy region.

The left panel shows that under AM/PF, $\lambda^{*,\mathrm{AM/PF}}$ is negative throughout, albeit very close to zero, and tightly clustered across values of Ω and Φ. The negative sign reflects a small precautionary-saving gain: with well-anchored monetary policy containing the variance of inflation and the exchange rate, households accumulate a buffer stock of savings that raises expected consumption above its deterministic level, yielding a net welfare gain of at most 0.09% of steady-state consumption. This gain is nearly invariant to the currency composition of debt and decreases with the degree of financial market segmentation. Overall, this indicates that under AM/PF the structural features of the open economy are essentially irrelevant for welfare.

The centre panel tells a sharply different story. Under PM/AF, $\lambda^{*,\mathrm{PM/AF}}$ is large, positive and sensitive to both Φ and Ω. The absence of a binding fiscal response ($\phi_\tau < \phi_\tau^*$) means that fiscal shocks pass through directly to the government's intertemporal budget constraint without being offset by taxation. As established in Section 4.2, equilibrium then requires the market value of government liabilities to equal the present value of future primary surpluses, so unbacked deficit shocks generate large and persistent adjustments in the price level and the real exchange rate through the inflation, valuation, and compensation channels. Table 3 documents the consequences: fiscal shocks account for 66.2% of non-tradable inflation variance, 52.3% of real exchange rate variance, and 71.3% of non-tradable consumption variance. These large fluctuations in the variables that directly enter the household's utility function translate into welfare costs that reach nearly 4% of steady-state consumption at high dollar debt exposure and high segmentation.

The right panel plots the welfare gap $\lambda^{*,\text{PM/AF}} - \lambda^{*,\text{AM/PF}}$, which is the welfare cost of fiscal dominance. Since the AM/PF level is nearly flat, the gap is driven almost entirely by the PM/AF variation: it is increasing in Φ, increasing in Ω, and the lines fan out steeply with the dollar share. This reflects the two amplification mechanisms identified in Section 4.2: greater financial market segmentation strengthens the compensation channel, while a higher dollar debt share amplifies the valuation channel. Both raise the volatility of the variables that matter for welfare, and their interaction makes fiscal dominance increasingly costly as an economy becomes more dollarised and more financially isolated.

6.3. Dollarisation and the Welfare Cost of Fiscal Dominance

The second result of the welfare analysis concerns the role of the foreign-currency share of government debt, Ω. The dollarisation effect is visible in Figure 7: the six lines correspond to values of Ω ranging from 0.10 to 0.60, so the vertical spread between lines at any given Φ measures the welfare cost of dollarisation within each regime.

Two features stand out immediately. Under AM/PF (left panel), the six lines are tightly clustered and nearly indistinguishable: the welfare cost is approximately zero regardless of how much debt is denominated in dollars. Under PM/AF (centre panel), the lines fan out sharply with Ω: at the baseline quarterly spread $\Phi \approx 0.012$, the welfare cost rises from roughly 0.5% of steady-state consumption at $\Omega = 0.10$ to nearly 3% at $\Omega = 0.60$. The right panel confirms that this variation is driven almost entirely by the PM/AF component, since the AM/PF lines contribute negligibly to the gap.

Mechanism under PM/AF. The convexity in Ω of the welfare cost of fiscal dominance can be understood through the two open-economy adjustment channels identified in Section 4.2.

Valuation channel. When a fraction Ω of government debt is dollar-denominated, the real exchange rate q_t directly affects the domestic-currency value of outstanding liabilities. Under PM/AF this valuation channel is one of the mechanisms through which the government's intertemporal budget constraint is satisfied, so a higher Ω places a larger share of fiscal adjustment on the exchange rate. Greater exchange rate volatility disrupts the household's intratemporal allocation between tradable and non-tradable goods and amplifies price-level fluctuations through pass-through, raising welfare costs.

Compensation channel. A higher dollar share also amplifies the compensation channel. When fiscal pressure is elevated and Ω is large, the government's dollar debt-service cost rises with any depreciation, worsening the intertemporal budget imbalance and signalling higher future borrowing needs. Through the modified UIP condition (30), financiers anticipate these pressures and demand a higher excess return, causing the exchange rate to depreciate today. This front-loading of adjustment further amplifies current macroeconomic volatility and its welfare costs.

As Ω rises, a given fiscal expenditure shock, for example, requires a larger exchange rate movement to satisfy the government's budget constraint, but a larger movement also raises the compensation demanded by financiers to hold local-currency bonds, which requires a still larger movement — a feedback that grows more than proportionally with Ω.

Irrelevance of dollarisation under AM/PF. The clustering of the AM/PF lines reflects a simple mechanism. Under monetary dominance, the fiscal rule stabilises government debt through taxation rather than through asset-price adjustment, so the valuation and compensation channels do not operate as shock-absorbers. Whether the government has borrowed in dollars or in local currency, debt dynamics remain anchored by the fiscal response and macroeconomic volatility is determined by monetary shocks alone. The Taylor rule with $\phi_\pi > 1$ then efficiently stabilises inflation, keeping welfare costs near zero for all values of Ω.

Policy implications. The figure delivers a clear quantitative message: in an economy under AM/PF, the currency structure of government liabilities is essentially irrelevant for household welfare. In an economy under PM/AF, dollarisation imposes welfare costs that grow convexly with the dollar share and are amplified further by financial market segmentation. A country operating under PM/AF therefore faces a natural hierarchy of reforms: strengthening the fiscal rule to cross into AM/PF eliminates the fiscal theory mechanism entirely and makes the dollar share irrelevant, whereas reducing Ω alone lowers welfare costs within the PM/AF regime but does not eliminate them, since the inflation and compensation channels remain active. Fiscal regime credibility is the more fundamental determinant of welfare; debt composition plays a quantitatively significant but secondary role conditional on the regime.

7. Conclusion

This paper develops a Fiscal Theory of Exchange Rates for a small open economy whose government issues debt in both local currency and U.S. dollars, with local-currency bond markets intermediated by global financiers with limited risk-bearing capacity. The model delivers three analytical results.

First, the Leeper (1991) characterisation of monetary and fiscal regimes extends to the open economy. The conditions for AM/PF and PM/AF depend on the currency composition of government debt: a larger dollar share shifts the boundary between regimes, reflecting the additional valuation channel through which exchange rate movements revalue the government's dollar liabilities.

Second, financial market segmentation — captured by the global financiers' intermediation wedge — shrinks the region of fiscal dominance. As this wedge increases, the fiscal policy threshold required for AM/PF falls: the carry spread effectively lowers the government's net borrowing cost, making debt easier to stabilise and narrowing the parameter space in which PM/AF is feasible. Beyond a critical level, the PM/AF region vanishes entirely. A novel original sin Goldilocks condition governs this feasibility: fiscal dominance requires that the interest savings from dollar-denominated borrowing must not be large enough to make debt self-stabilising.

Third, and most importantly, under fiscal dominance the exchange rate acquires a fiscal component. It adjusts endogenously to satisfy the government's intertemporal budget constraint through a valuation channel — revaluing dollar liabilities — and a compensation channel, because global financiers require higher excess returns as sovereign borrowing rises. A contractionary monetary policy shock therefore generates depreciation and inflation rather than appreciation and disinflation: higher interest costs worsen the fiscal position, and the budget valuation equation must be satisfied through asset-price adjustment. The currency composition of debt governs the relative weight of the inflation and valuation channels, while financial market segmentation amplifies the exchange rate response by linking the government's debt position to the interest rate premium demanded by global financiers.

These results have implications for monetary policy in emerging market economies. In economies operating near or within the PM/AF region, monetary tightening may be self-defeating: higher interest rates worsen the fiscal position, triggering the exchange rate and inflation dynamics that monetary policy sought to contain. The degree of dollarisation of government debt and the depth of financial market integration are therefore not merely balance-sheet concerns — they determine the fundamental transmission mechanism of monetary policy.

These results connect to the longstanding "fear of floating" phenomenon documented by Calvo and Reinhart (2002), who show that emerging market central banks frequently intervene to limit exchange rate swings despite officially floating regimes. The present framework offers a complementary fiscal rationale: under PM/AF, suppressing exchange rate adjustment prevents the government's intertemporal budget constraint from being satisfied through the valuation channel, trading near-term exchange rate stability for an accumulating fiscal imbalance that must eventually be resolved through larger and more disruptive adjustments.

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A. Data: Definitions, Sources and Sample

A.1 Variable Definitions

Variable	Definition	Source
b_t	Gross government debt, % of GDP	IMF WEO
s_t	Primary balance, % of GDP	IMF WEO
π_t	CPI inflation	IMF WEO
g_t	Real GDP growth	IMF WEO
$\mathcal{E}_t$	Nominal exchange rate	BIS
$\mathcal{E}_t^f$	Forecasts of nominal exchange rate	FX4casts Consensus Economics
Ω_t	Share of government debt in foreign currency	BIS (Onen and von Peter, 2025)
y_t	3-month government bond yields	Finaeon/GFD

A.2 Sample

The decomposition requires complete WEO data in both vintages, BIS foreign-currency debt shares, and FX4casts consensus forecasts. The sample comprises the following 33 emerging market economies: Argentina, Brazil, Bulgaria, Chile, China, Colombia, Croatia, Czechia, Egypt, Hungary, India, Indonesia, Israel, Jamaica, Kazakhstan, Korea, Malaysia, Mexico, Nigeria, Pakistan, Peru, Philippines, Poland, Romania, Russia, Saudi Arabia, Serbia, Singapore, South Africa, Taiwan, Thailand, Türkiye, and Uruguay.

B. Simple Model: Derivations

This appendix provides the derivations underlying the simple model of Section 3. For any variable X_t, $\hat{X}_t \equiv \log(X_t/\bar{X})$ denotes its log-deviation from the non-stochastic steady state, unless otherwise noted.

B.1 Household Optimality

The household solves

$$\max_{C_t, C_t^N, C_t^T, N_t, D_{t+1}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{C_t^{1-1/\sigma_c} - 1}{1 - 1/\sigma_c} - \chi \frac{N_t^{1+\varphi}}{1+\varphi} \right) \tag{50}$$

subject to

$$P_t C_t + (1 + i_{t-1}) D_t + T_t = P_t^T Y_t^T + W_t N_t + D_{t+1} + \Pi_t \tag{51}$$

$$C_t = \mathcal{C}(C_t^N, C_t^T) = \left[\kappa^{1/\sigma} (C_t^N)^{1-1/\sigma} + (1-\kappa)^{1/\sigma} (C_t^T)^{1-1/\sigma} \right]^{\frac{1}{1-1/\sigma}} \tag{52}$$

We can divide the household's problem in two steps. For a given level of total consumption C_t, the household first chooses how to allocate it at the current prices by minimising total expenditure $P_t^N C_t^N + P_t^T C_t^T$ subject to $\mathcal{C}(C_t^N, C_t^T) \leq C_t$. This yields the demands for non-tradable and tradable consumption as a function of aggregate consumption C_t:

$$C_t^N = \kappa \left(\frac{P_t^N}{P_t} \right)^{-\sigma} C_t, \qquad C_t^T = (1-\kappa) \left(\frac{P_t^T}{P_t} \right)^{-\sigma} C_t, \tag{53}$$

$$\hat{C}_t^N = -\sigma(\hat{P}_t^N - \hat{P}_t) + \hat{C}_t, \qquad \hat{C}_t^T = -\sigma(\hat{P}_t^T - \hat{P}_t) + \hat{C}_t. \tag{54}$$

where the price level P_t is given by

$$P_t = \left[\kappa (P_t^N)^{1-\sigma} + (1-\kappa)(P_t^T)^{1-\sigma} \right]^{\frac{1}{1-\sigma}}. \tag{55}$$

These imply $\hat{C}_t^N = \hat{C}_t^T + \sigma \hat{q}_t$, where $\hat{q}_t \equiv \hat{P}_t^T - \hat{P}_t^N$ (log-deviation of the real exchange rate).

We can now solve the households intertemporal problem together with the intratemporal allocation of labour in terms of the single composite good C_t. This yields the following intratemporal optimality condition that relates labour and consumption

$$\chi N_t^{\varphi} C_t^{1/\sigma_c} = \frac{W_t}{P_t}, \tag{56}$$

$$\varphi \hat{N}_t + \frac{1}{\sigma_c} \hat{C}_t = \hat{W}_t - \hat{P}_t. \tag{57}$$

The Euler equation of the household is given by

$$\mathbb{E}_t\left[\beta\left(\frac{C_{t+1}}{C_t}\right)^{-1/\sigma_c}\frac{1+i_{t+1}}{1+\pi_{t+1}}\right]=1, \tag{58}$$

$$\mathbb{E}_t\left[-\frac{1}{\sigma_c}\Delta\hat{C}_{t+1}+\hat{i}_{t+1}-\hat{\pi}_{t+1}\right]=0 \tag{59}$$

where $1+\pi_{t+1}\equiv P_{t+1}/P_t$ is the inflation rate in the home country.

B.2 Non-tradable Sector

Real marginal costs. With the production function $Y_t^N(\omega)=N_t(\omega)^\alpha$ and the labour optimality condition (56), real marginal costs (in units of the non-tradable good) are common across varieties:

$$mc_t^N=\frac{W_t}{\alpha P_t^N}\left(Y_t^N\right)^{\frac{1-\alpha}{\alpha}}=\frac{\chi}{\alpha}\frac{P_t}{P_t^N}C_t^{1/\sigma_c}(C_t^N+G_t)^{\frac{1+\varphi}{\alpha}-1}. \tag{60}$$

To obtain a log-linear approximation to real marginal costs I use that we can write the price level in terms of the relative price of tradables to non-tradables $q_t\equiv P_t^T/P_t^N=\mathcal{E}_t/P_t^N$.

$$\frac{P_t}{P_t^N}=\left[\kappa+(1-\kappa)q_t^{1-\sigma}\right]^{1/1-\sigma} \tag{61}$$

$$\widehat{P}_t-\widehat{P}_t^N=\omega_T\widehat{q}_t \tag{62}$$

where $\omega_T\equiv\frac{(1-\kappa)\bar{q}^{1-\sigma}}{\kappa+(1-\kappa)\bar{q}^{1-\sigma}}$.

Log-linearising (60) and using the CES demand system:

$$\widehat{mc}_t^N=\left(\frac{1}{\sigma_c}+\psi s_N\right)\hat{C}_t+(1+\psi\sigma s_N)\left(\hat{P}_t-\hat{P}_t^N\right)+\psi(1-s_N)\hat{G}_t \tag{63}$$

$$=\left(\frac{1}{\sigma_c}+\psi s_N\right)\hat{C}_t+(1+\psi\sigma s_N)\,\omega_T\hat{q}_t+\psi(1-s_N)\hat{G}_t, \tag{64}$$

where $\psi\equiv\left(\frac{1+\varphi}{\alpha}-1\right)$ and $s_N\equiv\frac{\bar{C}^N}{\bar{C}^N+\bar{G}}$.

Optimal reset price. A firm that resets its price at time t solves

$$\max_{P_t^N(\omega)}\sum_{s=0}^{\infty}\Lambda_{t,t+s}\delta_N^s\left(P_t^N(\omega)-W_{t+s}Y_{t+s|t}^N(\omega)^{1/\alpha}\right)Y_{t+s|t}^N(\omega), \tag{65}$$

subject to demand $Y_{t+s|t}^N(\omega)=(P_t^N(\omega)/P_{t+s}^N)^{-\varepsilon}Y_{t+s}^N$, where $\Lambda_{t,t+s}\equiv\beta^s(C_{t+s}/C_t)^{-1/\sigma_c}P_t/P_{t+s}$.

The optimal reset price is

$$\tilde{P}_t^N = \left(\frac{\varepsilon}{\varepsilon - 1} \frac{\sum_{s=0}^{\infty} \Lambda_{t,t+s} \delta_N^s \alpha^{-1} W_{t+s} (Y_{t+s}^N)^{1/\alpha} (P_{t+s}^N)^{\varepsilon/\alpha}}{\sum_{s=0}^{\infty} \Lambda_{t,t+s} \delta_N^s Y_{t+s}^N (P_{t+s}^N)^{\varepsilon}} \right)^{\frac{1}{1+\varepsilon(1-\alpha)/\alpha}}. \tag{66}$$

New Keynesian Phillips Curve. Since only fraction $1 - \delta_N$ of firms reset each period, the non-tradable price index satisfies

$$(P_t^N)^{1-\varepsilon} = (1 - \delta_N)(\tilde{P}_t^N)^{1-\varepsilon} + \delta_N (P_{t-1}^N)^{1-\varepsilon}. \tag{67}$$

Log-linearising the optimal reset price condition and the price index yields the NKPC:

$$\hat{\pi}_t^N = \beta \mathbb{E}_t \hat{\pi}_{t+1}^N + \kappa_p \widehat{mc}_t^N, \tag{68}$$

where $\kappa_p \equiv \frac{(1-\delta_N)(1-\beta\delta_N)}{\delta_N(1-\varepsilon+\varepsilon/\alpha)}$.

B.3 Fiscal and Monetary Rules: Linearised Government Budget Constraint

Steady state. At a zero-inflation steady state, the household Euler equation implies $1 + \bar{i} = 1/\beta$. The steady-state loading on government debt is $\bar{\mathcal{A}} = 1/\beta - \Omega\Phi$ where $\Phi \equiv \bar{i} - \bar{i}_1 \geq 0$ is the steady-state interest rate spread.

Linearised budget constraint. Log-linearising the government budget constraint (9) yields

$$\hat{b}_{t+1}^G = \bar{\mathcal{A}} \hat{b}_t^G - \frac{\bar{\tau}}{\bar{b}^G} \hat{\tau}_t + \bar{\mathcal{A}} \hat{\mathcal{A}}_t - \hat{\mathcal{B}}_t + \frac{\bar{G}}{\bar{\mathcal{B}} \bar{b}^G} \hat{G}_t, \tag{69}$$

where

$$\bar{\mathcal{A}} \hat{\mathcal{A}}_t = \frac{1 - \Omega}{\beta} (\hat{i}_t - \hat{\pi}_t^N) + \Omega \left(\frac{1}{\beta} - \Phi \right) (\hat{q}_t + \hat{i}_t^{\$} - \hat{\pi}_t^{\$}), \tag{70}$$

$$\hat{\mathcal{B}}_t = \Omega \hat{q}_t. \tag{71}$$

Log-linear fiscal rule. The log-linearisation of (13) is

$$\bar{\tau} \hat{\tau}_t = \phi_\tau \bar{\mathcal{A}} \bar{b}^G (\hat{\mathcal{A}}_t + \hat{b}_t^G) + \hat{v}_t^\tau. \tag{72}$$

Log-linear Taylor rule.

$$\hat{i}_t = \phi_\pi \hat{\pi}_t^N + \hat{v}_t. \tag{73}$$

Law of motion. Substituting (70)–(73) into (69) and collecting terms yields the linearised law of motion of government debt:

$$\hat{b}^G_{t+1} = \bar{\mathcal{A}}(1-\phi_\tau)\hat{b}^G_t + (1-\phi_\tau)\bar{\mathcal{A}}\alpha_1(\phi_\pi - 1)\hat{\pi}^N_t + \left[(1-\phi_\tau)\bar{\mathcal{A}}\alpha_2 - \Omega\right]\hat{q}_t$$
$$+ \frac{\bar{G}}{\bar{\mathcal{B}}\bar{b}^G}\hat{G}_t - \frac{1}{\bar{b}^G}\hat{v}^\tau_t + (1-\phi_\tau)\bar{\mathcal{A}}\alpha_1\hat{v}_t + (1-\phi_\tau)\bar{\mathcal{A}}\alpha_2(\hat{i}^\$_t - \hat{\pi}^\$_t), \tag{74}$$

where $\alpha_1 \equiv (1-\Omega)/(\beta\bar{\mathcal{A}})$ and $\alpha_2 \equiv \Omega(1/\beta - \Phi)/\bar{\mathcal{A}}$. Note that $\alpha_1 + \alpha_2 = 1$.

B.4 Global Financiers: Linearised Demand and Modified UIP

Linearised financier position. Log-linearising the optimal position (28) and using $\bar{\Phi} = \bar{B}\bar{\Gamma}/(\beta\bar{\mathcal{E}})$:

$$\Phi(\hat{Q}_{t+1} - \hat{\mathcal{E}}_t) = \mathbb{E}_t[\hat{i}_t - \hat{i}^\$_t - \Delta\hat{\mathcal{E}}_{t+1}] - \Phi\hat{\Gamma}_t. \tag{75}$$

Modified UIP. Using local-currency debt market clearing (7) with $\bar{D} = 0$, the currency composition rule, and the exchange rate identity $q_t \equiv \mathcal{E}_t/P^N_t$:

$$\hat{i}_t = \hat{i}^\$_t + \mathbb{E}_t[\hat{q}_{t+1} - \hat{q}_t + \hat{\pi}^N_{t+1}] + \Phi(\hat{b}^G_{t+1} - \hat{q}_t + \hat{\Gamma}_t). \tag{76}$$

C. Simple Model: Equilibrium equations

In this section, I summarise the equilibrium characterising equations derived in the previous section for the full model and the first-order approximation.

C.1 Non-linear model

Household.

$$\chi N^\varphi_t C^{1/\sigma_c}_t = \frac{W_t}{P_t} \tag{77}$$

$$\mathbb{E}_t\left[\beta\left(\frac{C_{t+1}}{C_t}\right)^{-1/\sigma_c}\frac{1+i_{t+1}}{1+\pi_{t+1}}\right] = 1 \tag{78}$$

$$C^N_t = \kappa\left(\frac{P^N_t}{P_t}\right)^{-\sigma} C_t \tag{79}$$

$$C^T_t = (1-\kappa)\left(\frac{P^T_t}{P_t}\right)^{-\sigma} C_t \tag{80}$$

$$P_t C_t + (1+i_{t-1})D_t + T_t = P^T_t Y^T_t + W_t N_t + D_{t+1} + \Pi_t \tag{81}$$

Non-tradable sector.

$$\widetilde{P}_t^N = \left(\frac{\varepsilon}{\varepsilon - 1} \frac{\sum_{s=0}^{\infty} \Lambda_{t,t+s} \delta_N^s \, \alpha^{-1} W_{t+s} (Y_{t+s}^N)^{1/\alpha} (P_{t+s}^N)^{\varepsilon/\alpha}}{\sum_{s=0}^{\infty} \Lambda_{t,t+s} \delta_N^s \, Y_{t+s}^N (P_{t+s}^N)^{\varepsilon}} \right)^{\frac{1}{1+\varepsilon(1-\alpha)/\alpha}}, \tag{82}$$

$$(P_t^N)^{1-\varepsilon} = (1-\delta_N)(\widetilde{P}_t^N)^{1-\varepsilon} + \delta_N (P_{t-1}^N)^{1-\varepsilon} \tag{83}$$

$$\Pi_t = P_t^N Y_t^N - W_t N_t \tag{84}$$

$$Y_t^N = N_t^{\alpha} \tag{85}$$

Fiscal and monetary authorities.

$$G_t + \mathcal{A}_t b_t^G = \mathcal{B}_t b_{t+1}^G + \tau_t, \tag{86}$$

$$\mathcal{A}_t = (1-\Omega) \frac{1+i_t}{1+\pi_t^N} + \Omega \, \frac{1+i_t^{\$}}{1+\pi_t^{\$}} \, \frac{q_t}{\bar{q}}, \tag{87}$$

$$\mathcal{B}_t = (1-\Omega) + \Omega \, \frac{q_t}{\bar{q}}, \tag{88}$$

$$\tau_t = \tau + \phi_\tau \left(\mathcal{A}_t b_t^G - \bar{b}^G \right) + \nu_t^\tau, \tag{89}$$

$$\frac{1+i_t}{1+\bar{i}} = \left(\frac{1+\pi_t^N}{1+\bar{\pi}^N} \right)^{\phi_\pi} \nu_t \tag{90}$$

Global financiers.

$$\frac{Q_{t+1}}{\mathcal{E}_t} = \frac{\beta}{\Gamma_t} \, \mathbb{E}_t \left[(1+i_t) \frac{\mathcal{E}_t}{\mathcal{E}_{t+1}} - (1+i_t^{\$}) \right]. \tag{91}$$

Market clearing.

$$C_t^N + G_t = Y_t^N \tag{92}$$

$$D_{t+1} + (1-\Omega) P_t^N b_{t+1}^G = Q_{t+1} \tag{93}$$

Shocks.

$$\log Y_t^T = (1-\rho_T) \bar{Y}^T + \rho_T \log Y_{t-1}^T + \epsilon_t^T \tag{94}$$

$$\log G_t = (1-\rho_G) \bar{G} + \rho_G \log G_{t-1}^G + \epsilon_t^G \tag{95}$$

$$\log \Gamma_t = (1-\rho_\Gamma) \bar{\Gamma} + \rho_\Gamma \log \Gamma_{t-1} + \epsilon_t^\Gamma \tag{96}$$

$$\log\left(1+i_t^{\$}\right) = (1-\rho_{\$}) \log\left(1+\bar{i}^{\$}\right) + \rho_{\$} \log\left(1+i_{t-1}^{\$}\right) + \epsilon_t^{\$} \tag{97}$$

$$\log \nu_t = +\rho_\nu \log \nu_{t-1} + \epsilon_t^\nu \tag{98}$$

$$\log \nu_t^\tau = +\rho_{\nu^\tau} \log \nu_{t-1}^\tau + \epsilon_t^\tau \tag{99}$$

C.2 First-order approximation

This section collects the log-linearised equilibrium conditions of the simple model. For any variable X_t, $\hat{X}_t \equiv \log(X_t/\bar{X})$ denotes its log-deviation from the non-stochastic steady state. Define the composite parameters

$$\omega_T \equiv \frac{(1-\kappa)\bar{q}^{1-\sigma}}{\kappa + (1-\kappa)\bar{q}^{1-\sigma}}, \qquad \psi \equiv \frac{1+\varphi}{\alpha} - 1, \qquad s_N \equiv \frac{\bar{C}^N}{\bar{C}^N + \bar{G}},$$

$$\kappa_p \equiv \frac{(1-\delta_N)(1-\beta\delta_N)}{\delta_N(1+\varepsilon(1/\alpha - 1))}, \qquad \bar{\mathcal{A}} \equiv \frac{1}{\beta} - \Omega\Phi, \qquad \alpha_1 \equiv \frac{1-\Omega}{\beta\bar{\mathcal{A}}}, \qquad \alpha_2 \equiv \frac{\Omega(1/\beta - \Phi)}{\bar{\mathcal{A}}},$$

where $\Phi \equiv \bar{i} - \bar{i}^{\$} \geq 0$ is the steady-state spread and $\alpha_1 + \alpha_2 = 1$.

Household. *Intratemporal optimality (labour supply).*

$$\varphi\hat{N}_t + \frac{1}{\sigma_c}\hat{C}_t = \hat{W}_t - \hat{P}_t. \tag{100}$$

Euler equation. Using $\hat{\pi}_t = \hat{\pi}_t^N + \omega_T \Delta\hat{q}_t$:

$$\hat{C}_t = \mathbb{E}_t\hat{C}_{t+1} - \sigma_c\left(\hat{i}_{t+1} - \mathbb{E}_t\hat{\pi}^N_{t+1} - \omega_T\mathbb{E}_t\Delta\hat{q}_{t+1}\right). \tag{101}$$

Intratemporal demands.

$$\hat{C}_t^N = \sigma\omega_T\hat{q}_t + \hat{C}_t, \tag{102}$$

$$\hat{C}_t^T = -\sigma(1-\omega_T)\hat{q}_t + \hat{C}_t. \tag{103}$$

Non-tradable Sector. *New Keynesian Phillips Curve.*

$$\hat{\pi}_t^N = \beta\,\mathbb{E}_t\hat{\pi}^N_{t+1} + \kappa_p\,\widehat{mc}_t^N. \tag{104}$$

Marginal costs.

$$\widehat{mc}_t^N = \left(\frac{1}{\sigma_c} + \psi s_N\right)\hat{C}_t + (1+\psi\sigma s_N)\,\omega_T\hat{q}_t + \psi(1-s_N)\hat{G}_t. \tag{105}$$

Production.

$$\hat{Y}_t^N = \alpha\hat{N}_t. \tag{106}$$

Fiscal and monetary authorities. *Taylor rule.*

$$\hat{i}_t = \phi_\pi\hat{\pi}_t^N + \hat{v}_t. \tag{107}$$

Fiscal rule.

$$\bar{\tau}\hat{\tau}_t = \phi_\tau \bar{\mathcal{A}}\bar{b}^G(\hat{\mathcal{A}}_t + \hat{b}_t^G) + \hat{v}_t^\tau. \tag{108}$$

Linearised budget constraint.

$$\hat{b}_{t+1}^G = \bar{\mathcal{A}}\hat{b}_t^G - \frac{\bar{\tau}}{\bar{b}^G}\hat{\tau}_t + \bar{\mathcal{A}}\hat{\mathcal{A}}_t - \hat{\mathcal{B}}_t + \frac{\bar{G}}{\bar{\mathcal{B}}\bar{b}^G}\hat{G}_t, \tag{109}$$

where

$$\bar{\mathcal{A}}\hat{\mathcal{A}}_t = \frac{1-\Omega}{\beta}(\hat{i}_t - \hat{\pi}_t^N) + \Omega\left(\frac{1}{\beta} - \Phi\right)(\hat{q}_t + \hat{i}_t^\$ - \hat{\pi}_t^\$), \tag{110}$$

$$\hat{\mathcal{B}}_t = \Omega\hat{q}_t. \tag{111}$$

Law of motion for government debt. Substituting (107)–(111) into (109):

$$\begin{aligned}\hat{b}_{t+1}^G &= \bar{\mathcal{A}}(1-\phi_\tau)\hat{b}_t^G + (1-\phi_\tau)\bar{\mathcal{A}}\alpha_1(\phi_\pi - 1)\hat{\pi}_t^N + \left[(1-\phi_\tau)\bar{\mathcal{A}}\alpha_2 - \Omega\right]\hat{q}_t \\ &+ \frac{\bar{G}}{\bar{\mathcal{B}}\bar{b}^G}\hat{G}_t - \frac{1}{\bar{b}^G}\hat{v}_t^\tau + (1-\phi_\tau)\bar{\mathcal{A}}\alpha_1\hat{v}_t + (1-\phi_\tau)\bar{\mathcal{A}}\alpha_2(\hat{i}_t^\$ - \hat{\pi}_t^\$).\end{aligned} \tag{112}$$

Global financiers. *Linearised optimal position.*

$$\Phi(\hat{Q}_{t+1} - \hat{\mathcal{E}}_t) = \mathbb{E}_t[\hat{i}_t - \hat{i}_t^\$ - \Delta\hat{\mathcal{E}}_{t+1}] - \Phi\hat{\Gamma}_t. \tag{113}$$

Modified UIP. Using debt market clearing with $\bar{D} = 0$, the currency composition rule, and the exchange rate identity $\hat{\mathcal{E}}_t = \hat{q}_t + \hat{P}_t^N$:

$$\hat{i}_t = \hat{i}_t^\$ + \mathbb{E}_t\left[\hat{q}_{t+1} - \hat{q}_t + \hat{\pi}_{t+1}^N - \hat{\pi}_{t+1}^\$\right] + \Phi\left(\hat{b}_{t+1}^G - \hat{q}_t + \hat{P}_t^\$ + \hat{\Gamma}_t\right). \tag{114}$$

Market clearing. *Non-tradable goods market.*

$$s_N\hat{C}_t^N + (1-s_N)\hat{G}_t = \hat{Y}_t^N. \tag{115}$$

Asset market. With $\bar{D} = 0$, the asset market clearing condition determines D_{t+1} residually. The household budget constraint is redundant by Walras's law.

Shocks.

$$\hat{Y}_t^T = \rho_T \hat{Y}_{t-1}^T + \epsilon_t^T, \tag{116}$$
$$\hat{G}_t = \rho_G \hat{G}_{t-1} + \epsilon_t^G, \tag{117}$$
$$\hat{\Gamma}_t = \rho_\Gamma \hat{\Gamma}_{t-1} + \epsilon_t^\Gamma, \tag{118}$$
$$\hat{i}_t^\$ = \rho_\$ \hat{i}_{t-1}^\$ + \epsilon_t^\$, \tag{119}$$
$$\hat{v}_t = \rho_v \hat{v}_{t-1} + \epsilon_t^v, \tag{120}$$
$$\hat{v}_t^\tau = \rho_{v^\tau} \hat{v}_{t-1}^\tau + \epsilon_t^\tau. \tag{121}$$

C.3 Core System

After substituting the Taylor rule (107), the fiscal rule, the marginal cost expression (105), and the non-tradable market clearing condition, the equilibrium reduces to a system in four variables $(\hat{\pi}_t^N, \hat{q}_t, \hat{C}_t, \hat{b}_t^G)$. The predetermined variable is $\hat{b}_t^G$; the three jump variables are $(\hat{\pi}_t^N, \hat{q}_t, \hat{C}_t)$. Determinacy requires exactly three eigenvalues outside the unit circle.

Philips curve.

$$\hat{\pi}_t^N = \beta\,\mathbb{E}_t \hat{\pi}_{t+1}^N + \kappa_p \left[\left(\frac{1}{\sigma_c} + \psi s_N \right) \hat{C}_t + (1 + \psi \sigma s_N)\, \omega_T \hat{q}_t \right] + \kappa_p \psi (1 - s_N) \hat{G}_t. \tag{122}$$

Euler equation.

$$\hat{C}_t = \mathbb{E}_t \hat{C}_{t+1} - \sigma_c \Big(\phi_\pi \hat{\pi}_t^N - \mathbb{E}_t \hat{\pi}_{t+1}^N - \omega_T \mathbb{E}_t \Delta \hat{q}_{t+1} \Big) - \sigma_c \hat{v}_t. \tag{123}$$

Modified UIP.

$$\phi_\pi \hat{\pi}_t^N = \hat{i}_t^\$ + \mathbb{E}_t \Big[\hat{q}_{t+1} - \hat{q}_t + \hat{\pi}_{t+1}^N \Big] + \Phi \Big(\hat{b}_{t+1}^G - \hat{q}_t + \hat{\Gamma}_t \Big) - \hat{v}_t. \tag{124}$$

Debt law of motion.

$$\begin{aligned} \hat{b}_{t+1}^G = {} & \bar{A}(1-\phi_\tau)\hat{b}_t^G + (1-\phi_\tau)\bar{A}\alpha_1(\phi_\pi - 1)\hat{\pi}_t^N + \big[(1-\phi_\tau)\bar{A}\alpha_2 - \Omega\big]\,\hat{q}_t \\ & + \frac{\bar{G}}{\bar{\mathcal{B}}\bar{b}^G}\hat{G}_t - \frac{1}{\bar{b}^G}\hat{v}_t^\tau + (1-\phi_\tau)\bar{A}\alpha_1 \hat{v}_t + (1-\phi_\tau)\bar{A}\alpha_2(\hat{i}_t^\$ - \hat{\pi}_t^\$). \end{aligned} \tag{125}$$

Matrix Form of the Core System Define the state vector $z_t \equiv (\hat{\pi}_t^N,\ \hat{q}_t,\ \hat{C}_t,\ \hat{b}_t^G)'$, where $\hat{b}_t^G$ is predetermined and $(\hat{\pi}_t^N, \hat{q}_t, \hat{C}_t)$ are jump variables. After substituting the Taylor rule, the fiscal rule, the marginal cost expression, and the debt law of motion into the modified UIP, the core system takes the form

$$\mathbf{A}\,\mathbb{E}_t z_{t+1} = \mathbf{B}\,z_t + \mathbf{D}\,u_t, \tag{126}$$

where rows correspond to: (1) NKPC, (2) Euler equation, (3) modified UIP, and (4) debt law of motion.

Coefficients endogenous-variables. Define the following coefficients

$$\lambda_c \equiv \frac{1}{\sigma_c} + \psi s_N, \qquad \lambda_q \equiv (1 + \psi \sigma s_N)\, \omega_T,$$

and the debt-law coefficients

$$\zeta_b \equiv \bar{\mathcal{A}}(1 - \phi_\tau), \qquad \zeta_\pi \equiv \zeta_b\, \alpha_1(\phi_\pi - 1), \qquad \zeta_q \equiv \zeta_b\, \alpha_2 - \Omega.$$

The matrices are

$$\mathbf{A} = \begin{pmatrix} \beta & 0 & 0 & 0 \\ \sigma_c & \sigma_c \omega_T & 1 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}, \tag{127}$$

$$\mathbf{B} = \begin{pmatrix} 1 & -\kappa_p \lambda_q & -\kappa_p \lambda_c & 0 \\ \sigma_c \phi_\pi & \sigma_c \omega_T & 1 & 0 \\ \phi_\pi - \Phi \zeta_\pi & 1 + \Phi - \Phi \zeta_q & 0 & -\Phi \zeta_b \\ \zeta_\pi & \zeta_q & 0 & \zeta_b \end{pmatrix}. \tag{128}$$

Coefficients exogenous-variables. Define the exogenous vector $u_t \equiv (\hat{v}_t,\ \hat{G}_t,\ \hat{v}_t^\tau,\ \hat{i}_t^\$ - \hat{\pi}_t^\$,\ \hat{\Gamma}_t)'$ and the coefficient shorthands

$$g_b \equiv \frac{\bar{G}}{\bar{\mathcal{B}} \bar{b}^G}, \qquad \tau_b \equiv \frac{1}{\bar{b}^G}, \qquad \eta_1 \equiv \zeta_b\, \alpha_1, \qquad \eta_2 \equiv \zeta_b\, \alpha_2.$$

The forcing matrix is

$$\mathbf{D} = \begin{pmatrix} 0 & \kappa_p \psi (1 - s_N) & 0 & 0 & 0 \\ -\sigma_c & 0 & 0 & 0 & 0 \\ -1 - \Phi \eta_1 & -\Phi g_b & \Phi \tau_b & 1 - \Phi \eta_2 & \Phi \\ \eta_1 & g_b & -\tau_b & \eta_2 & 0 \end{pmatrix}. \tag{129}$$

Row 3 of $\mathbf{D}$ reflects the substitution of the debt law of motion into the modified UIP: each exogenous driver of $\hat{b}_{t+1}^G$ enters the UIP equation scaled by $-\Phi$.

Determinacy. The system has one predetermined variable ($\hat{b}^G_t$) and three jump variables ($\hat{\pi}^N_t, \hat{q}_t, \hat{C}_t$). Determinacy requires exactly three generalised eigenvalues of $(\mathbf{B}, \mathbf{A})$ outside the unit circle. The characteristic polynomial evaluated at $\lambda = 1$ is

$$p(1) = \det(\mathbf{B} - \mathbf{A}) = -\kappa_p \lambda_c \, \sigma_c \, \Phi \, (\phi_\pi - 1) \left[\bar{\mathcal{A}}(1 - \phi_\tau)(1 + \alpha_2) - (1 + \Omega)\right], \tag{130}$$

which factors into independent monetary and fiscal terms. When $\Phi > 0$, the determinacy boundary $p(1) = 0$ is the union of

$$\phi_\pi = 1 \qquad \text{and} \qquad \phi_\tau = \phi^*_\tau \equiv 1 - \frac{1 + \Omega}{\bar{\mathcal{A}}(1 + \alpha_2)}. \tag{131}$$

When $\Phi = 0$, we have $p(1) = 0$ for all (ϕ_π, ϕ_τ): the exchange rate has a unit root under standard UIP and the system is not stationary. Financial market segmentation ($\Phi > 0$) is therefore a necessary condition for determinacy.