Optimal Sovereign Debt Structure: Evidence and Theory*

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Abstract

We document that emerging market sovereigns have increased leverage while shifting toward local-currency borrowing, alongside a pronounced shortening of maturities. In contrast, advanced economies exhibit neither trend and fund almost exclusively in local currency. We rationalize these patterns with a model in which a sovereign without commitment jointly chooses debt currency and maturity, trading off inflation distortions, rollover risk, and currency mismatch. Higher leverage, weaker institutions, and greater foreign participation in local-currency markets tilt sovereigns toward shorter maturities, heightening exposure to self-fulfilling rollover crises. When commitment frictions are severe, sovereigns switch to foreign-currency debt. Using novel granular bond-level data and plausibly exogenous capital flow shocks, we find strong empirical support.

Keywords: sovereign debt, maturity structure, rollover risk.
JEL Classification: F34, G12, G15.

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1. Introduction

Historically, emerging-market sovereign debt has been issued predominantly in foreign currency (FC), such as the U.S. dollar. In recent years, however, an increasing share has been denominated in local currency (LC) (Du and Schreger, 2022; Onen, Shin, and Von Peter, 2023; Bertaut, Bruno, and Shin, 2025). While this development mitigates traditional currency mismatch, which Eichengreen and Hausmann (1999) famously termed the *original sin*, it raises a number of fundamental questions about sovereign debt choices in emerging economies (EM). What drives the choice between FC- and LC debt? How do currency denomination and maturity interact? And what new risks arise when sovereigns borrow in their own currency?

This paper addresses these questions. We first document a set of stylized facts on the evolution of sovereign leverage in emerging markets. To this end, we construct a novel, granular dataset of 7,243 LC sovereign bond issuances across 23 emerging markets from 2013 to 2024. Using detailed information on issuance amounts, coupon frequencies, and maturity dates, we build each country's sovereign debt maturity structure. First, we show that emerging market sovereign leverage has expanded, driven almost entirely by LC issuance, with average LC debt-to-GDP surging from 21.9% to 36.1% over our sample. Second, we document a pronounced shortening of LC maturities: from 9.06 years in 2013 to 6.98 years in 2024, a decline of 22.96%. By contrast, FC maturities have remained broadly stable over the same period: from 9.19 years in 2013 to 10.39 years in 2024. Third, we observe that several countries have experienced rising rollover risk: average bond maturities have declined and this has coincided with an increase in the fraction of bonds maturing. For example, in Chile the average bond maturities fell from 12.74 years in 2013 to 9.88 years in 2024, while the share of bonds maturing within one year rose from 0.62% to 3.47%.

To interpret the patterns, we develop a model in which a sovereign lacking commitment jointly chooses the currency denomination and maturity of its debt. At the core of the model is a trilemma. LC debt avoids exchange-rate risk but creates an ex-post incentive to dilute nominal liabilities through inflation. FC debt eliminates this inflation problem but exposes the sovereign to default risk when the domestic currency depreciates. Maturity choice provides a third margin: issuing short-term debt disciplines inflation, by forcing the sovereign to return to the market frequently, but introduces exposure to self-fulfilling rollover crises. The sovereign's optimal debt structure therefore reflects a tradeoff between inflation distortions, rollover risk, and currency mismatch.

The key insight of the model is that maturity can act as an endogenous commitment device. When institutional credibility is weak or when a large share of LC debt is held by foreign investors, the sovereign has strong ex-post incentives to inflate. In such environments, long-term LC debt becomes difficult to sustain because investors anticipate future dilution. Short-term LC debt partially mitigates this problem by limiting the horizon over which inflation can be applied to dilute the debt claims, thereby reducing the equilibrium distortion. However, this comes at the cost of exposing the sovereign to refinancing risk at an interim date. As a result, highly leveraged and low-credibility sovereigns are endogenously pushed toward short maturities.

This mechanism generates a maturity pecking order. Sovereigns with strong institutions optimally issue long-term LC debt, as inflation incentives are weak. As institutional quality deteriorates or leverage increases, sovereigns shorten maturities to discipline inflation. When commitment frictions become sufficiently severe, the LC equilibrium unravels altogether, and sovereigns switch to FC debt as a hard commitment device. The model therefore provides the first unified framework linking institutional quality, leverage, currency denomination, and maturity structure.

The model delivers several sharp theoretical predictions. First, higher leverage and weaker institutions lead to shorter LC maturities and to less reliance on LC borrowing. Second, greater foreign participation in LC debt amplifies inflation incentives and further compresses maturities. Third, while short-term debt mitigates inflation distortions, it endogenously increases exposure to rollover crises. Fourth, this exposure is priced in equilibrium, leading to wider short-maturity CDS spreads in countries with greater refinancing needs. Finally, exogenous shocks to capital flows have amplified real and financial effects in countries with high rollover risk, with these effects concentrated at the short end of the yield curve.

The intuition for this last result is straightforward. When a large share of debt must be refinanced in the near term, a negative capital flow shock tightens the sovereign's funding constraint precisely when it needs to roll over its obligations. This raises refinancing costs, increases default risk, and triggers exchange rate depreciation. Because the refinancing constraint binds at short horizons, these effects are most pronounced for short-maturity instruments.

Bringing the predictions of the model to the data, we first investigate the baseline determinants of sovereign debt composition. To measure institutional quality (IQ), we utilize the first principal component of the six World Bank Worldwide Governance Indicators—Control of Corruption, Government Effectiveness, Political Stability, Regulatory Quality, Rule of Law, and Voice and Accountability. This composite index provides a comprehensive, standardized measure of a sovereign's constraint against expropriation and institutional commitment. We find that an improvement in IQ is associated with a statistically significant increase in both the LC debt-to-GDP ratio and average LC maturities. This confirms the fundamental trade-off established in our model: sovereigns with weak institutions are forced down a pecking order. They are first pushed into shorter LC maturities and ultimately driven out of the LC market entirely, heavily substituting toward FC debt as a hard commitment mechanism.

We next test the prediction that a higher fraction of LC debt held by foreign investors exacerbates dilution risk, thereby forcing the sovereign to issue shorter-maturity debt. We show that both foreign and domestic LC debt ownership are negatively associated with average LC maturities. As the government floods the financial system with debt, the aggregate risk of default or dilution rises, prompting all lenders to demand shorter maturities to protect their balance sheets. However, the coefficient on foreign ownership is significantly more negative than the coefficient on domestic ownership (more than twice as large in magnitude). This suggests that while emerging markets successfully transitioned toward LC borrowing, heavy foreign participation transformed traditional currency mismatch into maturity risk.

A central prediction of our model is that, while issuing short-term debt successfully mitigates the inflation time-inconsistency problem, it introduces rollover risk. We show that higher leverage is associated with higher exposure to self-fulfilling rollover crises, proxied by the fraction of bonds maturing within one year. We also show that this heightened rollover risk translates directly into baseline macroeconomic penalties. In particular, a higher fraction of near-term maturing debt is associated with wider short-maturity sovereign CDS spreads. This confirms that even in the absence of external market stress, investors actively price a sovereign's structural exposure to frequent refinancing needs.

Another central implication of our theory is that an exogenous shock to the rollover crisis probability triggers macroeconomic and financial distress, and that countries with higher rollover risk are significantly more sensitive to external shocks. A fundamental challenge in studying this relationship is the potential endogeneity between capital flows and financial asset valuations. For example, improved macroeconomic fundamentals may simultaneously attract capital inflows and increase demand for sovereign bonds, making it difficult to isolate causal effects. To address this, we exploit mechanical rebalancing shocks from the GBI-EM Global Diversified Index, the largest and most widely tracked LC government bond benchmark for emerging markets, which generate exogenous shifts in demand for EM sovereign bonds.[1]

We find that a one standard deviation increase in Flows Implied by the Rebalancings (FIR) leads to a 2.87% exchange rate appreciation over a quarter, with the effect rising to 3.62% in high rollover-risk countries—an amplification of about 26%. CDS spreads show a similar pattern: they fall by 3.54% on average, with the decline roughly twice as large in high rollover-risk countries, highlighting their greater vulnerability. These results show that when sudden capital flight occurs, countries forced into the short-term region of the trilemma face immediate, binding refinancing constraints that translate external shocks directly into higher credit risk and currency depreciation.

Our model also predicts that the effects of these shocks should be concentrated at the short end of the yield curve. We show that a one standard deviation increase in FIR reduces short-term bond yields by 0.62 percentage points on average and decline by an additional 0.17 percentage points in countries with a high fraction of bonds maturing within a given year, corresponding to a rollover-risk amplification effect of 28%. By contrast, long-term bond yields show no statistically significant average response. We document similar results for CDS spreads. In particular, while a capital flow shock leads to a significant decline in five-year spreads in countries with high rollover risk, the impact on ten-year spreads is statistically insignificant and roughly one-third as large.

Finally, we validate our framework by showing that countries with high institutional quality face negligible commitment frictions, allowing them to optimally issue only long-term LC debt and avoid this rollover risk. To do this, we construct a comprehensive bond-level dataset covering over 80% of total debt for nine advanced economies. In contrast to emerging markets, the average LC bond maturity in advanced economies has remained stable or even increased over time. Notably, we find no evidence of a significant amplification effect of rollover risk on advanced economy CDS spreads in response to capital flow shocks, confirming that strong institutional governance successfully insulates sovereign solvency from global capital market dynamics.

The rest of the paper proceeds as follows. Section 2 reviews the literature. Section 3 describes the data and presents stylized facts. Section 4 introduces the model. Section 5 reports the empirical results. Section 6 concludes. Details on data construction, variable definitions, and robustness tests are provided in the Appendices.

[1] In the Appendix, we also use fluctuations in the Broad Dollar Index (BDI) and high-frequency U.S. monetary policy shocks to capture outflow shocks and find similar results.

2. Related Literature

This paper relates to several strands of literature. The first applies a corporate finance perspective to sovereign finance. Specifically, Bolton (2016) and Bolton and Huang (2018) model fiat currency as sovereign equity, demonstrating that a nation's optimal capital structure is determined by trading off the dilution costs of inflation against the deadweight costs of sovereign default on FC debt. Our model extends the sovereign's capital structure decision beyond the currency composition of its liabilities to formally incorporate their maturity structure.

We contribute to the foundational macroeconomic literature on the time inconsistency of sovereign debt and the endogenous determination of maturity structures. A long-standing theoretical literature highlights the sovereign's ex-post temptation to dilute the real value of nominal, LC debt via inflation, and the necessity of compressing maturities to maintain credibility as debt burdens rise (Calvo, 1988; Missale and Blanchard, 1994). Subsequent work demonstrates that issuing short-term debt can act as an endogenous commitment device to discipline the sovereign and mitigate this dilution risk (Jeanne, 2009; Arellano and Ramanarayanan, 2012; Broner, Lorenzoni, and Schmukler, 2013; Aguiar and Amador, 2014). We provide the first unified framework that simultaneously endogenizes sovereign debt currency and maturity choices in the presence of inflation moral hazard, rollover risk, and exchange rate risk. We also demonstrate how this joint optimal choice depends critically on structural drivers such as aggregate leverage, institutional quality, and vulnerability to self-fulfilling rollover crises.

We relate to the literature analyzing the currency composition of sovereign debt in emerging markets. Seminal contributions by Eichengreen and Hausmann (1999) and Eichengreen, Hausmann, and Panizza (2005) introduced the concept of *original sin*, referring to emerging markets' historical inability to issue bonds denominated in their domestic currencies. Tirole (2003) revisits the *original sin* debate, demonstrating how dual-agency frictions lead to inefficient reliance on FC borrowing and maturity mismatches. A growing body of recent work reassesses this phenomenon using new granular datasets (Aizenman, Jinjarak, Park, and Zheng, 2021; Bertaut, Bruno, and Shin, 2025; Eichengreen, Hausmann, and Panizza, 2023; Onen, Shin, and Von Peter, 2023; Zheng, 2023; Belz and Breckenfelder, 2025). These papers demonstrate that domestic-currency bond issuance relies heavily on specific macroeconomic variables, institutional characteristics, and the risk-bearing capacity of non-bank financial intermediaries. In contrast, we analyze the maturity structure of LC sovereign bonds and its dynamics compared to FC denominated sovereign bonds. Our empirical analysis highlights how rollover risk in LC debt influences sovereign bond yields, default risk, and exchange rates—an aspect largely overlooked in prior studies focused solely on currency composition.

Our work also draws on a literature on cross-border capital flows and financial asset valuations. Within this field, a number of studies have explored how benchmark indices affect mutual fund portfolio allocations across countries (Shleifer, 1986; Kaul, Mehrotra, and Morck, 2000; Greenwood, 2005; Vayanos and Woolley, 2013; Claessens and Yafeh, 2013; Raddatz, Schmukler, and Williams, 2017; Pandolfi and Williams, 2019; Beltran and He, 2024). While these studies emphasize the role of benchmark-induced capital flows, our focus is on the maturity structure of sovereign debt and its interaction with these shocks. We provide novel empirical evidence that many emerging markets experience significant changes in their debt maturity structures over time, with substantial cross-country heterogeneity. Our analysis finds that the impact of exogenous capital flows on exchange rates, CDS spreads, and bond yields is significantly amplified for countries with a large share of bonds maturing. We also show that short-maturity bonds are more sensitive to these capital flow shocks, underscoring the short-run vulnerabilities associated with rollover risk.

Our analysis is linked to the literature on sovereign risk and sovereign debt markets (Du and Schreger, 2016; Bianchi, Hatchondo, and Martinez, 2018; Du and Schreger, 2022; Cole, Neuhann, and Ordonez, 2024; Barbosa-Alves, Bianchi, and Sosa-Padilla, 2024; Bianchi and Sosa-Padilla, 2024; Moretti, Pandolfi, Schmukler, Bauer, and Williams, 2024), to theoretical work on sovereign bond pricing and self-fulfilling crises (Cole and Kehoe, 2000; Rebelo, Wang, and Yang, 2022; Jiang, Sargent, Wang, and Yang, 2024), as well as to the literature on the resolution of severe banking and financial crises in emerging and transition economies (Enoch, Gulde, and Hardy, 2002). While much of this research focuses on pricing sovereign risk or rare default events, our theoretical framework yields explicit predictions regarding the asset pricing implications of self-fulfilling rollover crises. We empirically validate these predictions using granular bond-level data from 23 emerging economies, providing the first evidence that rollover risk in LC debt contributes to depreciating exchange rates, increasing sovereign CDS spreads, and increasing bond yields. We also show that weaker institutional quality drives a reliance on shorter maturities, leaving these countries disproportionately vulnerable to rollover risk.

Finally, our study connects to the literature on corporate debt rollover risk (Almeida, Campello, Laranjeira, and Weisbenner, 2011; Carvalho, 2015; Kalemli-Ozcan, Laeven, and Moreno, 2015; Valenzuela, 2016; Choi, Hackbarth, and Zechner, 2018; Cortes and Rocha, 2021; Choi, Hackbarth, and Zechner, 2021; Jungherr, Meier, Reinelt, and Schott, 2022; Oliveira, Rafi, and Simon, 2024). For instance, Choi, Hackbarth, and Zechner (2018) show that maturity dispersion reflects firm characteristics and affects exposure to refinancing risk, which in turn shapes capital structure decisions. We focus on sovereign debt, emphasizing how debt maturity profiles influence countries' exposure to external shocks.

3. Data and Stylized Facts

We construct a comprehensive dataset on emerging market sovereign bonds by combining information from several sources. We first describe the data sources and sample construction, and then present a set of novel stylized facts on the debt maturity structure of the countries in our sample.

3.1 Data Sources and Sample Construction

We assemble a novel, granular dataset of sovereign bonds across 23 emerging markets, combining security-level information with macroeconomic, institutional, and financial market data from multiple sources. Table B.1 in the Appendix provides a complete list of all variables, their sources, frequencies, and sample ranges.

Bond-Level Data. Our primary data source is Refinitiv Eikon, which provides security-level information on sovereign bonds, including issuance amounts, coupon rates, coupon payment frequencies, issuance dates, and maturity dates. We collect data on both LC and FC government bonds for 23 emerging markets over the period 2013–2024: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Dominican Republic, Egypt, Hungary, Indonesia, Mexico, Malaysia, Nigeria, Peru, Philippines, Poland, Romania, Russia, Serbia, South Africa, Thailand, Turkey, and Uruguay. We exclude bonds with missing issuance amounts or coupon rates. The resulting dataset comprises 7,243 LC sovereign bond issuances. As shown in Table B.2 in the Appendix, this bond-level dataset is highly comprehensive, covering on average 84% of each country's total government debt. For the advanced economy analysis in Section 5.7, we construct an analogous dataset for nine countries—Australia, Austria, Denmark, France, Italy, South Korea, Spain, Sweden, and Switzerland—covering more than 80% of each country's total debt.

Maturity Structure and Rollover Risk. Using the bond-level data, we construct two key variables for each country and period. First, we compute the average bond maturity as the value-weighted average of years to maturity across all outstanding bonds. Second, we construct a measure of rollover risk, $FBM_{c,t}$, defined as the total value of bonds maturing within one year, normalized by GDP. The detailed construction procedure, including the treatment of coupon payments across different payment frequencies, is described in Section B.3 of the Appendix.

Additional Data. We complement the bond-level data with macroeconomic variables (debt-to-GDP ratios from BIS and CEIC, GDP growth from the IMF, inflation from the World Bank), institutional quality indices (World Bank Worldwide Governance Indicators), financial market data (exchange rates from Compustat, sovereign CDS spreads from Bloomberg and Markit, bond yields from Bloomberg), debt ownership shares from Arslanalp and Tsuda (2014), and capital flow measures constructed from JP Morgan GBI-EM index rebalancings, the Broad Dollar Index, and U.S. monetary policy shocks. These variables and their roles in the empirical analysis are described in detail in Sections 5 and the Appendix.

Sample Overview. Table B.3 presents summary statistics for the basic characteristics of the countries in our sample, distinguishing between countries with high and low rollover risk. Using this dataset, we next establish five empirical facts about the maturity structure of emerging market sovereign debt and its relationship to rollover risk.

3.2 Stylized Facts

An initial examination of the dataset reveals several novel and robust regularities, which we summarize in five stylized facts motivating the subsequent theoretical and empirical analysis.

Fact 1: Emerging markets have become more leveraged over time. Over our sample period from 2013 to 2024, the aggregate sovereign debt burden of emerging market economies has expanded significantly. In 2013, the average general government debt-to-GDP ratio across our sample stood at 27.6%. By 2024, this figure had surged to 45.6%, representing an increase of 18 percentage points in just over a decade. Panel A of Figure 1 plots this pronounced and sustained upward trajectory. This increase in sovereign leverage highlights a fundamental shift in emerging market public finance. As total debt burdens have grown by nearly two-thirds relative to the size of their economies, sovereigns have had to continuously adapt their borrowing strategies, setting the empirical stage for the striking shifts in debt composition and maturity structures that we document below.

Fact 2: The majority of sovereign debt is denominated in LC, and LC leverage has increased. Historically, emerging markets relied heavily on FC borrowing, exposing themselves to severe currency mismatch. However, over our sample period, LC debt is the dominant source of sovereign financing. In 2013, the average LC debt-to-GDP ratio across our sample was 21.9%, compared to just 5.7% for FC debt. By 2024, LC debt had surged to 36.1% of GDP, while FC debt experienced only a marginal increase to 8.0%. This reveals that the massive aggregate leverage expansion documented in Fact 1 was primarily driven by LC issuance, which accounted for over 14 percentage points of the total increase. Panels B and C of Figure 1 plot this evolution, highlighting the stark divergence between the LC and FC debt trajectories. While this widespread transition toward domestic-currency borrowing successfully mitigated traditional exchange rate vulnerabilities, it forced sovereigns to drastically alter the maturity profile of these obligations, as we document next.

Fact 3: LC Debt Maturities Have Shortened Over Time. We next examine how LC debt maturities have evolved over time. We hereby construct the average bond maturity structure by taking the weighted average of years to maturity for each country. For example, if in a given year, country A has two bonds with outstanding amounts of 1,000 and 500 and maturity of 5 years and 10 years, respectively, the average maturity for that country would be ((1,000 * 5) + (500 * 10))/1500 = 6.67 years.

Panel A of Figure 2 shows a pronounced shortening of LC maturities: from 9.06 years in 2013 to 6.98 years in 2024, a decline of 22.96%. By contrast, FC maturities have remained broadly stable over the same period. It amounted to 9.16 years in 2013 and increased to 10.44 years by 2024. As a result, the maturity gap between FC bonds and LC bonds has widened substantially. Consequently, average sovereign bond maturities (across both LC and FC bonds) also declined from 9.04 years in 2013 to 8.72 years by 2024.

Fact 4: Shorter LC maturities are associated with higher LC leverage. Facts 2 and 3 indicate that while emerging market sovereigns successfully expanded their capacity to borrow in LC, this transition coincided with a sustained reduction of their debt maturity profiles. Over our sample period, as the LC debt-to-GDP ratio surged, the average maturity of these obligations systematically declined. Panel B of Figure 2 plots the evolution of average LC bond maturity alongside the LC debt-to-GDP ratio, illustrating this stark negative correlation. This dynamic points to a crucial structural vulnerability: to induce investors to absorb a massive supply of new LC debt, sovereigns have been increasingly forced to issue at the short end of the yield curve. This suggests that the penance for overcoming *original sin* comes at the cost of a new vulnerability, namely rollover risk.

Fact 5: The Fraction of Bonds Maturing Within One Year Varies Substantially Across Countries and Time. We next investigate rollover risk directly using the $FBM_{c,t}$ measure defined above. Note that a shorter average debt maturity at issuance does not mechanically translate to a higher fraction of bonds maturing within one year. For example, countries could manage their rollover risk by refinancing bonds with shortening maturities before they expire, thereby mitigating the effects of shorter average maturities at issuance on rollover risk. Figure 3 reports country time-series averages for 2013–2024, while Figure E.5 in the Appendix shows the time-series dynamics for each country.

Both figures together reveal significant cross-country and within-country time-series variation in the fraction of bonds maturing within one year over the sample period from 2013 to 2024. For instance, in Chile the fraction rose from 0.62% in 2013 to 3.47% in 2023, indicating a strong within-country variation. Additionally, when comparing Chile with Brazil in 2023, the fraction of bonds maturing is 3.47% for the former and 7.96% for the latter, which suggest also a cross-country variation. Such variation suggests that cross-country differences in debt maturity structures is likely to affect their vulnerability to negative economic shocks.

Combining the above with Fact 3, we observe that several countries have experienced rising rollover risk: average bond maturities have declined and this has coincided with an increase in the fraction of bonds maturing. This pattern is evident in Chile, the Czech Republic, Egypt, Indonesia, Mexico, Peru, the Philippines, and South Africa. For example, in Chile the average bond maturities fell from 12.74 years in 2013 to 9.88 years in 2024, while the share of bonds maturing within one year rose from 0.62% to 3.47%. For these countries, the joint evolution of shorter maturities and higher near-term repayment obligations implies an increased exposure to refinancing difficulties, particularly during adverse economic conditions such as capital outflows that reduce liquidity.

4. Model

We develop a model of sovereign borrowing in which a government lacking commitment chooses both the maturity (short vs. long) and the currency denomination (local vs. foreign) of its debt. LC debt is not exposed to exchange rate shocks but gives rise to a time-inconsistency problem: because the sovereign lacks commitment, investors rationally anticipate that LC debt will be diluted through distortionary inflation after issuance.

To mitigate this moral hazard, the sovereign can issue short-term LC debt, which may reduce the convex macroeconomic costs of inflation but exposes the economy to self-fulfilling rollover crises. Alternatively, it can issue FC debt, which serves as a hard commitment device against inflation but introduces default risk via shocks to the real exchange rate.

The optimal debt structure is thus determined by a trilemma between inflation distortions, rollover risk, and currency mismatch. This trade-off depends on the volatility of the real exchange rate and on the strength of inflationary incentives, which are in turn driven by institutional credibility and the share of local-currency debt held by foreign investors.

4.1 Economic Environment

Preferences and Technology. We consider a small open economy (SOE) where the output from capital in place is normalized to zero. There are three time periods $t \in \{0, T/2, T\}$. At time $t = 0$, the sovereign undertakes an investment of size K that yields a deterministic real output at time $t = T$, denoted by y_T. If the sovereign defaults on its debt obligations, the investment is disrupted and output to the sovereign falls to a constrained liquidation value, denoted by $\underline{y} \in (0, y_T)$. The sovereign maximizes expected domestic welfare, defined as expected output net of transfers to foreign creditors, domestic investors' opportunity costs of capital, and macroeconomic deadweight costs.

Financial Environment. The sovereign finances the initial capital K by issuing debt to a pool of risk-neutral competitive domestic and foreign investors. Both types of investors require the same expected real risk-free rate of return, $r^{LC} = r^{FC} \equiv r$, in their respective currencies. Domestic savings are insufficient to absorb the entire issuance, implying that a strictly positive share of sovereign debt is held by foreign investors. Since repayment to domestic investors constitutes a purely internal transfer, inflation reduces the sovereign's real debt burden only through the externally held share, denoted by $f \in (0, 1]$.[2]

We normalize the real exchange rate at time t, S_t, defined as units of local currency per unit of foreign currency, to one. The real exchange rate at time T, $\tilde{S}_T$, is stochastic and follows a continuous cumulative distribution function $F(\cdot)$. We assume that the real exchange rate is expected to stay constant, i.e. $\mathbb{E}_t[\tilde{S}_T] = 1$.[3]

[2] All results extend to environments in which the sovereign derives a strictly lower benefit from diluting domestically held debt than externally held debt. If the benefits are equal, the main results continue to hold, except for the comparative statics with respect to the foreign-held share of debt.

[3] A natural extension is to allow for expected depreciation of the real value of the local currency, i.e. $\mathbb{E}_t[\tilde{S}_T] > 1$. We discuss below, how such an extension would alter the composition of marginal investors in the FC debt market.

Debt Contracts. The sovereign issues debt along two dimensions: maturity and currency denomination. Debt can be issued in LC or FC, and with a Short-Term (ST) maturity of $T/2$ or a Long-Term (LT) maturity of T. Thus, there are four distinct funding options: short-term LC debt (STLC) rolled over once at $T/2$, with nominal yields $i^{LC}_{t,t+T/2}$ for $t \in \{0, T/2\}$; long-term LC debt (LTLC) with maturity T and nominal yield $i^{LC}_{0,T}$; short-term FC debt (STFC) rolled over once at $T/2$, with nominal yields $i^{FC}_{t,t+T/2}$ for $t \in \{0, T/2\}$; and long-term FC debt (LTFC) with maturity T and nominal yield $i^{FC}_{0,T}$.
Inflation. The SOE lacks commitment and can dilute its local-currency (LC) debt through inflation. The dilution of a nominal unit claim over the interval $[t, t+\tau]$ is given by

$$I_{t,t+\tau} = 1 - (1 + \pi_{t,t+\tau})^{-1}.$$

By construction, $I_{t,t+\tau} \in [0, 1]$ for $\pi_{t,t+\tau} \in [0, \infty)$. This formulation allows the SOE to choose time-varying inflation rates within the interval.

Generating inflation imposes distortionary real costs on the domestic economy, captured by a penalty function $k(I_{t,t+\tau}, \tau)$ satisfying

$$\frac{\partial k}{\partial I_{t,t+\tau}} > 0, \quad \frac{\partial^2 k}{\partial I^2_{t,t+\tau}} > 0, \quad \text{and} \quad \frac{\partial^2 k}{\partial I_{t,t+\tau}\, \partial \tau} < 0.$$

The cost of inflation is strictly increasing and convex in total dilution, and a given level of dilution is less costly when spread over a longer horizon. Intuitively, the more the sovereign inflates, the costlier it is for the domestic economy, and these costs accelerate. For instance, moving from 0% to 2% inflation imposes a smaller macroeconomic penalty than moving from 2% to 4%, even though the increment is identical. Similarly, diluting 20% of the debt's real value over eight years is less damaging than over four years, because the required inflation rate per period is lower. This has a direct implication for maturity choice: long-term LC debt gives the sovereign a longer runway to dilute cheaply, which means it will optimally choose to dilute more. Rational lenders anticipate this and demand higher nominal yields on long-term LC debt to compensate, making long-term borrowing more expensive than it first appears, and creating space for short-term debt to emerge as a disciplining device despite its rollover risk.

These properties apply exclusively to local-currency debt as inflation in foreign currency is normalized to zero, reflecting the standard assumption that the sovereign has no monetary instrument to dilute FC liabilities.

We interpret the inflation penalty as a real deadweight loss to domestic output, arising from capital misallocation or the disruptions to the domestic financial system.

While the unconstrained penalty can become arbitrarily large under hyperinflation, the sovereign's liability is strictly limited: if the inflation penalty exceeds the loss associated with liquidation, the sovereign will optimally exercise its outside option to default or switch to FC debt, effectively bounding the realized macroeconomic cost.

Default. Default payoffs to lenders are normalized to zero, and the SOE receives a constrained outside option $\underline{y} < y_T$. Default may occur for two reasons. First, it may occur due to rollover risk at $T/2$ (STLC). Short-term debt exposes the sovereign to self-fulfilling market freezes. With probability $1 - \lambda_r$, lenders roll over the short-term debt claim. With probability λ_r, lenders refuse, confirming a crisis and forcing liquidation (Cole and Kehoe, 2000; Bocola and Dovis, 2019).

Second, default may occur due to the SOE's inability to repay FC debt at T. Specifically, default occurs if a currency depreciation pushes net-output below the outside option: $y_T - D\tilde{S}_T < \underline{y}$, where D is the nominal FC claim at maturity. This defines an endogenous default threshold exchange rate $S_T^c \equiv (y_T - \underline{y})/D$.

4.2 Government Problem

Objective. Let $C \in \{LC, FC\}$ and $M \in \{T/2, T\}$ denote the currency and maturity of sovereign debt. At $t = 0$, the sovereign chooses (C, M) to maximize expected domestic welfare $V(C, M)$:

$$\max_{C \in \{LC,FC\},\, M \in \{T/2,T\}} V(C, M),$$

subject to two constraints. First, a *participation constraint* requires competitive, risk-neutral foreign investors to break even in expectation. Second, a *incentive compatibility constraint* requires that inflation and default policies be chosen optimally after debt issuance, reflecting the sovereign's lack of commitment. Investors price debt in anticipation of the sovereign's ex-post behavior, implying that the debt structure, inflation and default choices, and prices must be mutually consistent in equilibrium.

Foreign investors hold a fraction f of LC debt and are diluted by inflation; domestic holders own $(1 - f)$ and are also diluted, but their losses are internal transfers that net out in the aggregate. As a result, inflation enters welfare only through (i) transfers to foreign investors, $fN(1 - I)$ and (ii) the deadweight cost $k(I, \tau)$. The analysis extends to environments in which the sovereign assigns some weight to dilution of domestic investors, provided this weight is lower than that on foreign investors.

Under rational expectations, the cost of capital to the sovereign is $K(1+r)^{\tau}$, since the required rate of return to both domestic and foreign investors is r. A sovereign debt structure equilibrium is therefore defined as follows.

Equilibrium A rational expectations equilibrium consists of a debt choice (C, M), inflation policy I^*, default rule, and pricing schedules (N, D) such that:

1. Given prices, the sovereign chooses (C, M) to maximize $V(C, M)$.
2. For LC debt, inflation is chosen optimally ex post; for FC debt, default occurs if repayment reduces output below $\underline{y}$.
3. Investors price debt to break even in expectation, incorporating the risk-free rate r and anticipating sovereign policies.
4. Markets clear at issuance $(t = 0)$ and, for short-term debt, at rollover $(t = T/2)$.

To characterize the optimal debt structure, we next derive the value of the sovereign's objective under alternative currency–maturity combinations. The relevant cases are long-term local-currency debt, short-term local-currency debt, and long-term foreign-currency debt, as Proposition 2 establishes that issuing short-term foreign-currency debt is never optimal.

Long-Term LC Debt (LTLC) At maturity T, the sovereign faces a predetermined nominal LC claim N. It chooses inflation $I_{0,T}$ to minimize the total ex-post losses, comprising (i) the real transfer to foreign investors, who hold a fraction f of the debt, and (ii) the cost of macroeconomic distortion $k(I_{0,T}, T)$. The resulting unconstrained minimization problem is:

$$\min_{I_{0,T}} \mathcal{L} = fN(1 - I_{0,T}) + k(I_{0,T}, T)$$

Taking the First-Order Condition (FOC) with respect to $I_{0,T}$ yields:

$$\frac{\partial \mathcal{L}}{\partial I_{0,T}} = -fN + \frac{\partial k(I_{0,T}, T)}{\partial I_{0,T}} = 0$$

$$\implies \frac{\partial k(I^*_{0,T}, T)}{\partial I_{0,T}} = fN.$$

The sovereign inflates until the marginal macroeconomic cost of inflation exactly equals the marginal benefit of diluting the foreign-held nominal debt. Rational foreign investors anticipate this optimal inflation $I^*_{0,T}$ and price the bond to break even:

$$N(1 - I^*_{0,T}) = K(1+r)^T \implies N = \frac{K(1+r)^T}{1 - I^*_{0,T}}$$

Since the FOC $\partial k(I^*, \tau)/\partial I = fN$ pins down I^* for given N, and investors' break-even condition $N(1 - I^*) = K(1+r)^\tau$ pins down N given I^*, the sovereign's valuation under LTLC is

$$V(LC, T) = y_T - K(1+r)^T - k(I^*_{0,T}, T). \tag{1}$$

Short-Term LC Debt (STLC) The sovereign's welfare under a STLC debt structure is solved via backward induction.

Period 2 ($t = T/2$ to T): Assuming the debt is successfully rolled over at $T/2$, the sovereign issues a new nominal claim N_2 to cover the period-1 repayment. At $t = T$, the sovereign solves:

$$\min_{I_{T/2,T}} [fN_2(1 - I_{T/2,T}) + k(I_{T/2,T}, T/2)]$$

The Period 2 FOC is therefore: $\frac{\partial k(I^*_{T/2,T}, T/2)}{\partial I_{T/2,T}} = fN_2$. The period 2 break-even constraint requires $N_2(1 - I^*_{T/2,T}) = N_1(1 - I^*_{0,T/2})(1+r)^{T/2}$.

Period 1 ($t = 0$ to $T/2$): At $t = 0$, the sovereign issues LC debt with a claim N_1 with maturity $t = T/2$. Once debt has been issued, the sovereign chooses aggregate inflation $I_{T/2,T}$, knowing that it will dictate the required rollover size N_2. With probability $1 - \lambda_r$, the market rolls over the debt. With probability λ_r, a crisis occurs and the sovereign receives $\underline{y}$ at time T. The sovereign minimizes the expected sequence of costs:

$$\min_{I_{0,T/2}} \mathcal{L} = (1 - \lambda_r)\left[fN_1(1 - I_{0,T/2})(1+r)^{T/2} + k(I^*_{T/2,T}, T/2)\right] + k(I_{0,T/2}, T/2)$$

The period 1 FOC equates the marginal cost of period 1 inflation to the expected marginal savings on the period 2 debt burden. Substituting the sequential break-even constraint $N_1(1 - I^*_{0,T/2}) = \frac{K(1+r)^{T/2}}{1-\lambda_r}$ into the full expected payoff function across both periods and states yields:

$$V(LC, T/2) = (1-\lambda_r)y_T + \lambda_r \underline{y} - K(1+r)^T - k(I^*_{0,T/2}, T/2) - (1-\lambda_r)k(I^*_{T/2,T}, T/2). \quad (2)$$

Long-Term FC Debt (LTFC) Under a LTFC debt structure, the sovereign issues a nominal FC claim D, due at time $t = T$, which cannot be diluted through domestic inflation. At $t = T$, the sovereign observes the exchange rate shock $\tilde{S}_T$ and defaults if the post-repayment output falls below the liquidation value:

$$y_T - D\tilde{S}_T < \underline{y} \implies \tilde{S}_T > \frac{y_T - \underline{y}}{D} \equiv S^c_T.$$

The nominal FC debt claim is set so that foreign lenders break even. Integrating their payoffs over the non-default states, this requires:

$$\int_0^{S^c_T} D\, dF(s) = K(1+r)^T \implies F(S^c_T)D = K(1+r)^T.$$

The sovereign's ex-ante expected value integrates over both the default and non-default states:

$$V(FC, T) = \int_0^{S^c_T} (y_T - D \cdot s) dF(s) + \int_{S^c_T}^{\infty} \underline{y} dF(s)$$

Factoring out the constants and recognizing that $\int_0^{S^c_T} s\, dF(s) = F(S^c_T)\mathbb{E}[\tilde{S}_T \mid S_T \leq S^c_T]$:

$$V(FC, T) = F(S^c_T)y_T + (1 - F(S^c_T))\underline{y} - F(S^c_T)D\, \mathbb{E}[\tilde{S}_T \mid S_T \leq S^c_T]$$

Substituting the foreign lenders' break-even condition $F(S^c_T)D = K(1+r)^T$ yields the final value function:

$$V(FC, T) = F(S^c_T)y_T + (1 - F(S^c_T))\underline{y} - K(1+r)^T \mathbb{E}[\tilde{S}_T \mid S_T \leq S^c_T] \quad (3)$$

Interestingly, while in equilibria with LC bond financing, both domestic and foreign investors are marginal, the FC market endogenously segments. Foreign investors break even when $F(S^c_T)D = K(1+r)^T$. Domestic investors, evaluating this exact same FC bond in LC, anticipate an expected return of $K(1+r)^T \mathbb{E}[\tilde{S}_T \mid S_T \leq S^c_T]$. Because $\mathbb{E}[\tilde{S}_T] = 1$, the conditional expectation evaluated over the truncated solvency states ($S_T \leq S^c_T$) is strictly less than 1. Therefore, domestic investors cannot break even at the equilibrium market-clearing price. Intuitively, domestic investors cannot break even, since the FC bond pays off in states in which the foreign currency is cheap in terms of the domestic currency, but the SOE defaults in states, in which the foreign currency is valuable.

Assuming that domestic investors cannot issue (i.e. short) sovereign debt on their personal account, the market is segmented and FC debt is held entirely by foreign investors.[4]

4.3 Optimal Debt Composition

We now characterize the sovereign's optimal choice of debt maturity and currency. The problem can be naturally decomposed into two steps. First, conditional on the currency denomination, the sovereign chooses the optimal maturity structure. Second, it chooses between LC and FC debt, taking into account the endogenous maturity choice in each market.

4.3.1 Maturity Choice within Local-Currency Debt

We begin by analyzing the sovereign's maturity choice conditional on issuing LC debt. The following proposition characterizes the relevant tradeoff.

Proposition 1 (LC Maturity Choice)**.** *Conditional on issuing local-currency debt, the sovereign strictly prefers long-term LC debt (LTLC) to short-term LC debt (STLC) if and only if*

$$\lambda_r(y_T - \underline{y}) > k(I^*_{0,T}, T) - \left[k(I^*_{0,T/2}, T/2) + (1-\lambda_r)k(I^*_{T/2,T}, T/2)\right]. \tag{4}$$

Equivalently, STLC is strictly preferred if and only if the reverse inequality holds. Equality implies indifference.

Proof. The sovereign prefers LTLC to STLC if and only if $V(LC, T) > V(LC, T/2)$. Substituting (1) and (2) for $V(LC, T)$ and $V(LC, T/2)$, respectively, and noting that the expected repayment term $K(1+r)^T$ cancels because both maturity structures must

[4]If we extend the model to allow for an expected structural depreciation of the local currency ($\mathbb{E}[\tilde{S}_T] > 1$), domestic investors could theoretically value the FC bond more highly and become the marginal buyers. However, an interior equilibrium where both domestic and foreign investors are simultaneously marginal buyers requires a knife-edge condition: the expected depreciation premium must exactly offset the truncation induced by default.

deliver the same expected real return to investors under competitive pricing, yields

$$V(LC,T) - V(LC,T/2) = \lambda_r(y_T - \underline{y}) \\ - \Big[k(I^*_{0,T},T) - k(I^*_{0,T/2},T/2) - (1-\lambda_r)k(I^*_{T/2,T},T/2)\Big].$$

The result follows immediately. □

To gain intuition, note that the left-hand side of equation (4) captures the expected output loss from a rollover crisis. The right-hand side represents the difference in inflation deadweight costs when the SOE makes a single inflation decision at time $t = 0$ for the entire period up to time T and when it makes two separate decisions: the first decision is made at $t = 0$ for aggregate inflation until $T/2$ and the second is made at time $t = T/2$ for aggregate inflation until T.

Thus, Proposition 1 states that LTLC debt may be dominated by STLC debt, if the latter provides sufficiently more inflation discipline. To see why this can be the case, it is useful to interpret Proposition 1 through the equilibrium inflation cost $C(\tau) \equiv k(I^*(\tau),\tau)$, where $I^*(\tau)$ solves $\frac{\partial k}{\partial I}(I^*(\tau),\tau) = fN$. Recall that a longer horizon lowers the marginal cost of aggregate inflation, i.e. $\frac{\partial k}{\partial I_{t,t+\tau}\partial\tau} < 0$, which induces the sovereign to choose a higher aggregate inflation rate as the time horizon increases. To see this more precisely, we take the first derivative of the equilibrium cost w.r.t. the time horizon, τ

$$\frac{\partial C}{\partial \tau} = \frac{\partial k}{\partial \tau}(I^*(\tau),\tau) - \frac{\frac{\partial k}{\partial I}(I^*(\tau),\tau)\,\frac{\partial^2 k}{\partial I\,\partial\tau}(I^*(\tau),\tau)}{\frac{\partial^2 k}{\partial I^2}(I^*(\tau),\tau)}.$$

Hence, the increase of distortionary costs of inflation with the time-horizon depends crucially on the cross-derivative $\frac{\partial k}{\partial I_{t,t+\tau}\partial\tau}$. The more negative it is, the steeper the increase in total distortionary costs of inflation. This can make it optimal to issue short-term claims, i.e. choose shorter time horizons τ, even if this exposes the issuer to rollover risk.

Intuitively, marginal costs of aggregate inflation may be highly convex over short time-horizons. For example, even if the SOE starts implementing an expansionary monetary policy at time $t = 0$, its effects on inflation may materialize only with a lag. Moreover, influencing the monetary stance of the central bank is difficult in the short run, as institutional changes, such as staffing decisions, take time to implement.

By contrast, as the time horizon increases, it becomes easier for the SOE to affect aggregate inflation. Political pressure on the central bank is more likely to take effect, and even moderate monetary easing accumulates into higher inflation over longer periods. This accumulation effect is stronger in countries with weaker institutional quality (low g), where the central bank's resistance to political pressure is limited, as we formalize in Section 4.4. Accordingly, the marginal cost of inflation declines with the horizon, i.e. $\frac{\partial k}{\partial I_{t,t+\tau}\partial \tau} << 0$.

In sum, when the horizon sufficiently reduces marginal inflation costs, the resulting increase in equilibrium inflation dominates, making long-term debt more distortionary and rendering short-term debt attractive despite rollover risk.

4.3.2 Maturity Choice within Foreign-Currency Debt

We next consider the sovereign's maturity choice conditional on issuing FC debt. The following proposition formally states the result.

Proposition 2 (FC Maturity Choice)**.** *Long-term foreign-currency debt (LTFC) strictly dominates short-term foreign-currency debt (STFC).*

Proof. See Appendix A. □

To understand Proposition 2, note that under FC debt, domestic inflation cannot dilute liabilities, so shortening maturity provides no commitment benefit. The only effect of issuing STFC is therefore to introduce rollover risk at the interim date $T/2$. To compensate investors for the possibility that the debt cannot be rolled over, the sovereign must promise a higher repayment at $T/2$. Conditional on successful rollover, this larger obligation is refinanced into a higher face value due at T.

This higher refinanced face value increases the sovereign's exposure to exchange-rate risk at maturity. In particular, because default occurs when $y_T - DS_T < \underline{y}$, a larger D lowers the default threshold $S^c_T = (y_T - \underline{y})/D$, expanding the set of states in which default occurs. Hence, even absent a rollover crisis, STFC leads to strictly higher expected default losses at T. Combined with the additional liquidation risk at $T/2$, this implies that STFC is strictly dominated by long-term FC debt.

4.3.3 Currency Choice and the Debt Trilemma

We now characterize the sovereign's optimal choice between LC and FC debt. Combining Propositions 1 and 2, the sovereign compares the optimal LC instrument (either LTLC or STLC) with LTFC.

This choice reflects a fundamental trilemma between (i) inflation distortions, (ii) rollover risk, and (iii) currency mismatch. LC debt avoids currency mismatch but creates a time-inconsistency problem, as the sovereign can dilute nominal claims through inflation. FC debt eliminates this inflation incentive, but exposes the sovereign to default risk triggered by exchange rate depreciations. Shortening maturity mitigates inflation distortions but introduces rollover risk.

The following proposition characterizes the conditions under which FC debt is preferred.

Proposition 3 (Currency Choice)**.** *Foreign-currency debt (LTFC) is preferred to local-currency debt if and only if the macroeconomic cost of inflation exceeds the expected cost of an exchange-rate crisis.*

More formally:

1. *If LTLC is optimal within LC debt, then LTFC is preferred if and only if*

$$k(I^*_{0,T}, T) > (1 - F(S^c_T))(y_T - \underline{y}) + K(1+r)^T \left(\mathbb{E}[\tilde{S}_T \mid S_T \leq S^c_T] - 1 \right). \tag{5}$$

2. *If STLC is optimal within LC debt, then LTFC is preferred if and only if*

$$k(I^*_{0,T/2}, T/2) + (1 - \lambda_r) k(I^*_{T/2,T}, T/2) > (1 - \lambda_r - F(S^c_T))(y_T - \underline{y}) \tag{6}$$

$$+ K(1+r)^T \left(\mathbb{E}[\tilde{S}_T \mid S_T \leq S^c_T] - 1 \right). \tag{7}$$

Proof. See Appendix A. □

Proposition 3 characterizes the sovereign's currency choice as a comparison between two distortion margins: inflation under LC debt and default under FC debt.

Under LC debt, the distortion arises from the sovereign's ex-post incentive to dilute nominal liabilities through inflation. The equilibrium level of inflation, I^*, is pinned down by the first-order condition $\frac{\partial k}{\partial I} = fN$, which equates the marginal cost of inflation with the marginal benefit of dilution, proportional to the foreign-held share f of the total nominal debt claim N. As a result, both I^* and the associated distortionary costs $k(I^*)$ are increasing in f. Intuitively, a higher foreign ownership share raises the sovereign's effective gains from inflation, strengthening its ex-post incentives to inflate and thereby exacerbating the associated macroeconomic distortions.

The marginal cost of inflation, which governs the left-hand side of the first-order condition, reflects institutional credibility. Sovereigns with strong institutions can effectively commit to low inflation by making it very costly to increase inflation, even at moderate inflation levels, thereby mitigating the severity of the inflation distortion.

Under FC debt, by contrast, inflation is no longer a policy instrument, but the sovereign is exposed to default risk driven by exchange rate fluctuations. Default occurs when a sufficiently large real depreciation renders repayment infeasible, which happens with probability $1 - F(S^c_T)$. This probability captures the sovereign's exposure to exchange-rate risk and depends on both the volatility of the real exchange rate and the debt burden. Greater exchange rate uncertainty increases the likelihood of entering default states, raising the expected costs of FC debt.

The sovereign's currency choice therefore reflects a trade-off between endogenous inflation distortions under LC debt—whose severity is governed by f and institutional credibility—and state-contingent default losses under FC debt, whose likelihood is captured by $1 - F(S^c_T)$. LC debt is preferred when inflation distortions are limited, while FC debt becomes optimal when the inflation problem is sufficiently severe relative to the expected costs of default.

The following Lemma provides conditions under which LTLC and LTFC dominate, respectively.

Lemma 1 (Marginal inflation costs and debt denomination)**.** *Let $k(I, \tau)$ be continuously differentiable and strictly convex in I. Consider LC debt with nominal claim N at horizon τ, and recall that discretionary inflation solves*

$$I^* \in \arg\min_{I} \{ fN(1 - I) + k(I, \tau) \},$$

so that any interior optimum satisfies

$$\frac{\partial k}{\partial I}(I^*, \tau) = fN.$$

Then:

1. *If*

$$\left. \frac{\partial k}{\partial I}(I, \tau) \right|_{I \downarrow 0} > fN,$$

then the sovereign optimally sets $I^* = 0$. In this case, local-currency long-term debt (LTLC) strictly dominates foreign-currency debt (LTFC).

2. *If*

$$\lim_{I \to \infty} \frac{\partial k}{\partial I}(I, \tau) < fN,$$

then no finite interior solution exists, and the sovereign's incentive to inflate remains strictly positive for all I. In this case, the LC equilibrium unravels, and FC debt strictly dominates LC debt.

Proof. See Appendix A. □

4.4 Quantitative Analysis and Calibration

To analyze the sovereign's optimal debt portfolio decisions and generate comparative statics, we map the general theoretical framework to specific functional forms and calibrate the model to standard emerging market debt parameters.

4.4.1 Functional Forms

Cost of Inflation. We assume the macroeconomic welfare penalty of dilution is strictly quadratic in the chosen inflation rate (I) and scaled by the horizon (τ) and an institutional quality parameter (g):

$$k(I,\tau) = \frac{g}{2}\frac{I^2}{\tau^\eta}$$

Plugging in the sovereign's optimal discretionary inflation rule from the First-Order Condition ($I^* = fN\frac{\tau^\eta}{g}$), the equilibrium deadweight cost of inflation becomes:

$$k(I^*,\tau) = \frac{f^2N^2\tau^\eta}{2g}$$

Because the penalty is quadratic, a higher foreign ownership share (f) or a higher nominal debt burden (N) quadratically increases the equilibrium macroeconomic distortion.
Liquidation Value. If the sovereign defaults, retained output falls to a constrained dynamic liquidation value, defined as a proportion $\alpha \in (0,1)$ of the net surplus under solvency:

$$\underline{y} = \alpha\left(y_T - K(1+r)^T\right)$$

Exchange Rate Dynamics. We implement a discrete two-point distribution for the exchange rate shock at T. The real exchange rate enters a severe depreciation state (S_{bad}) with probability p, and a normal state (S_{good}) with probability $1-p$. Because the unconditional expectation must satisfy $\mathbb{E}[\tilde{S}_T] = 1$, the normal state is determined by:

$$S_{good} = \frac{1-pS_{bad}}{1-p}$$

Under this discrete distribution, the sovereign's value function for long-term FC debt collapses to a closed-form expected payoff:

$$V(FC,T) = (1-p)y_T + p\underline{y} - K(1+r)^T S_{good}$$

where this closed form assumes $S_{good} < S_T^c < S_{bad}$, so that default occurs exclusively in the depreciation state.

4.4.2 Calibration Strategy

The model is calibrated to align with empirical and quantitative studies on sovereign default.

Debt-to-GDP Ratio (K/y_T): We normalize the required capital investment to $K = 2.0$ and set target output at maturity to $y_T = 5.0$. This targets an implied Debt-to-GDP ratio of 40%, consistent with our empirical facts.

Output Loss in Default ($\underline{y}$): We set $\alpha = 0.40$, imposing a 60% loss on the net surplus. We assume this severe penalty to ensure that the sovereign has no incentive to strategically default, which is necessary to sustain a viable FC debt equilibrium.[5]

Exchange Rate Dynamics ($\tilde{S}_T$): We parameterize a "crisis state" with a probability of $p = 0.18$. Over our 8-year maturity horizon, this precisely maps to a standard 2.45% annualized crisis probability (Arellano, 2008). In this state, the currency depreciates to $S_{bad} = 1.5$, the classical 50% sudden-stop benchmark for a severe emerging market crash (Frankel and Rose, 1996; Reinhart and Rogoff, 2009). To analytically maintain $\mathbb{E}[\tilde{S}_T] = 1.0$, the model forces the normal state to carry a mild cumulative appreciation ($S_{good} \approx 0.89$), consistent with long-run real exchange rate catch-up (the Balassa-Samuelson effect).

Maturity Structure (T): The maturity for long-term debt is set to $T = 8.0$ years, closely matching the 7.95 years average maturity for LC sovereign bonds in our empirical sample. Consequently, short-term debt requires a single rollover midway through the project at $\tau = 4.0$ years.

Risk-Free Rate (r): The real risk-free rate is set to $r = 0.04$ (a 4% annualized rate), reflecting standard parameterizations of the lenders' opportunity cost (Arellano, 2008).

Rollover Crisis Probability (λ_r): The baseline probability of a self-fulfilling rollover crisis is anchored at $\lambda_r = 0.05$. This aligns with the mean fraction of bonds maturing in our sample as well as standard default probabilities.

Foreign Ownership Share (f): In the model, the sovereign derives no benefit from diluting domestically held debt. In practice, however, sovereigns retain weaker but non-negligible incentives to dilute domestic bondholders. If diluting domestic bondholders

[5] Since default payoffs to lenders are normalized to zero in the model, α captures the sovereign's retained output rather than creditor recovery, and is therefore not directly comparable to empirical sovereign haircuts. Our comparative statics results are robust to the choice of α.

generates a fraction $\alpha_d \in (0,1)$ of the gain perceived by the sovereign from diluting foreign ones, the effective dilution parameter becomes $f = f_{obs} + (1 - f_{obs})\alpha_d$, where f_{obs} denotes the observed foreign ownership share. We anchor f_{obs} to the sample average ($f_{obs} = 0.195$) and set $\alpha_d = 0.20$, implying that the sovereign perceives roughly one-fifth of the dilution benefit on domestically held debt. This yields $f \approx 0.36$.

Horizon Scaling (η) and Institutional Quality (g): We set $\eta = 1.5$ to ensure that breaking inflation into shorter intervals provides a convex cost advantage. The scaling parameter g is calibrated to $g = 91.84$. This structural value ensures that the expected output costs of a forced liquidation perfectly offset the inflation cost savings due to short-maturity debt, forcing the intersection of the ST and LT expected value curves to occur precisely at our baseline 5% rollover risk threshold.

4.4.3 Model Dynamics and Comparative Statics

Expected Value vs. Rollover Risk (λ_r). Panel A of Figure 4 plots the sovereign's expected value against the probability of a rollover crisis, λ_r. When the risk of a market freeze is entirely absent ($\lambda_r = 0$), STLC debt strictly dominates. This advantage is driven by two distinct mechanisms captured by our sequential solutions: the sovereign efficiently mitigates the quadratic macroeconomic penalty by breaking inflation into two shorter periods ($\eta > 1$), and it optimally front-loads inflation at $t = 0$ to explicitly shrink the real debt burden that must be rolled over. However, as λ_r increases, the expected value of the ST strategy declines linearly. At precisely $\lambda_r = 0.05$, the expected cost of liquidation exactly offsets the macroeconomic savings. For any rollover risk above this threshold, LTLC debt becomes the strictly optimal choice.

The Currency-Maturity Trilemma (g). Panel B of Figure 4 illustrates the complete currency-maturity trilemma by holding rollover risk constant at $\lambda_r = 0.05$ and varying institutional quality (g). For countries with poor institutional quality ($g < 61.94$), the sovereign hits its maximum taxable capacity; rational lenders demand astronomically high nominal yields, which forces the sovereign to optimally inflate even more to survive, triggering an equilibrium-destroying "inflation death spiral". Because the LC market unravels, the sovereign must issue FC debt to credibly commit to zero inflation. For intermediate institutional quality ($61.94 \leq g < 91.84$), the sovereign can support a LC equilibrium, but the quadratic cost of inflation remains too high to sustain over an 8-year horizon. Here, STLC debt becomes optimal. Finally, for strong institutional quality ($g \geq 91.84$), the costs of inflation are sufficiently low that the sovereign safely locks in LTLC debt, completely immunizing itself from rollover risk.

Expected Value vs. Leverage (K). Panel C of Figure 4 plots the net welfare advantage of issuing long-term debt ($\Delta V = V(LC, T) - V(LC, T/2)$). By utilizing the exact quadratic roots for the equilibrium inflation policy, we observe a strictly concave relationship where high debt burdens trigger an increasingly severe macroeconomic penalty. This theoretical mechanism formally rationalizes our empirical finding that higher LC leverage is strictly associated with shorter maturities.

Expected Value vs. Horizon Scaling (η). Panel D of Figure 4 demonstrates the model's sensitivity to the horizon scaling parameter (η). When η is close to 1, the penalty function is nearly linear, meaning the cost of generating inflation over one continuous 8-year period is almost identical to breaking it into two 4-year bursts. Lacking significant savings, the sovereign has no incentive to expose itself to a market freeze, and long-term debt strictly dominates. As η increases, the penalty function becomes highly convex, capturing the reality that long-term LC debt creates strong incentives to inflate, thereby inflicting large damages on the real economy. Short-term debt only emerges as optimal when the convexity of these inflation savings is sufficiently high to offset the expected output loss of the baseline 5% rollover risk penalty.

Foreign Ownership (f). Panel E of Figure 4 demonstrates that as f increases (i.e., as more foreign capital enters the domestic LC market), the sovereign's temptation to inflate rises sharply. Consequently, higher foreign participation mechanically shrinks the LTLC dominance region, forcing the sovereign into STLC debt. This provides an explanation for our findings that high foreign participation in emerging market LC debt is associated with shorter maturity profiles.

Optimal Inflation Strategy (I^* vs. Leverage). Panel F of Figure 4 plots the optimal inflation policies across varying levels of leverage. For LT debt, the strategy is straightforward ex-post dilution: as leverage increases, rational lenders demand a higher nominal yield, prompting a non-linear acceleration in the implied inflation rate. The ST debt strategy reveals a dynamic problem. When leverage (K) is low, the required real repayment is small, and the forward-looking sovereign behaves as a classical tax-smoother, splitting the inflation burden evenly ($I_1^* \approx I_2^*$) to minimize convex distortions. However, as leverage grows, the sovereign faces a heightened incentive to inflate in the first period to lower the real value of the debt that must be rolled over. This reduced debt burden subsequently lowers the incentive to inflate in the second period, activating a sequential chain-rule effect where the sovereign systematically abandons tax-smoothing and strategically front-loads the inflation tax ($I_1^* > I_2^*$).

4.5 Empirical Implications

Based on our analytical results in subsection 4.3 and the numerical analysis in subsection 4.4, our model yields the following empirical implications:

Implication 1: *Higher leverage and worse institutional quality are associated with a lower share of LC debt and shorter LC debt maturities. This also implies that LC debt maturity is negatively related to the share of LC debt.*

Implication 2: *Countries with higher foreign ownership of their LC debt choose shorter debt maturities.*

Implication 3: *Short-term LC debt mitigates inflation costs but introduces a new vulnerability: countries with higher leverage, which are forced into the short-term region of the debt trilemma, face higher exposure to self-fulfilling rollover crises.*

Implication 4: *Countries with higher rollover risk have higher inflation rates and wider short-maturity CDS spreads.*

Implication 5: *An exogenous increase in rollover risk, λ_r, triggers macroeconomic and financial distress, with countries exhibiting higher baseline rollover risk being more sensitive to such shocks. Moreover, because the refinancing constraint binds at the interim period, this distress is concentrated at the short end of the yield curve.*

Implication 6: *Countries with high institutional quality face negligible incentives to inflate their local currencies, allowing them to optimally issue only long-term LC debt. Consequently, they are not exposed to the rollover risk.*

5. Empirical Analysis

In this section, we take the theoretical predictions of our model to the data and test each of the empirical implications established in Section 4.

5.1 Leverage, Institutional Quality, and Debt Structure

To test *Implication 1*, we investigate the baseline determinants of sovereign debt composition, focusing on the roles of aggregate leverage and institutional quality. We estimate the following regression:

$$y_{i,t} = \alpha_i + \delta_t + \beta \mathrm{I}_{i,t} + \gamma X_{i,t-1} + \epsilon_{i,t} \tag{8}$$

where the dependent variable $y_{i,t}$ represents our key dimensions of debt structure for country i in year t: the LC debt-to-GDP ratio and the average maturity of LC debt. The vector $\mathrm{I}_{i,t}$ captures our main explanatory variables, which are sovereign leverage (Debt-to-GDP), Institutional Quality (IQ), and the share of LC debt.

To measure institutional quality (IQ), we collect data on the six World Bank Worldwide Governance Indicators: Control of Corruption, Government Effectiveness, Political Stability, Regulatory Quality, Rule of Law, and Voice and Accountability. Figure 5 shows the trends in these indices over time. We then use the first principal component of these six indicators. This composite index provides a comprehensive and standardized measure of a sovereign's constraints against expropriation and its institutional commitment. To mitigate simultaneity bias, the vector $X_{i,t-1}$ includes a set of lagged macroeconomic controls: GDP growth, inflation, and inflation volatility (3-year rolling standard deviation).[6] We include country fixed effects (α_i) to absorb time-invariant unobservable sovereign characteristics and year fixed effects (δ_t) to control for global macroeconomic shocks.

The results, presented in Table 2, provide strong empirical support for *Implication 1*. Column (1) of Table 2 shows that higher leverage is associated with shorter LC debt maturity. Columns (2) and (3) show that an improvement in IQ is associated with a statistically significant increase in both the LC debt-to-GDP ratio and average LC maturities. Directly following from these results, column (4) of Table 2 shows that debt maturity is weakly negatively related to the share of LC debt. As the sovereign expands its LC borrowing, the temptation to inflate grows, forcing a simultaneous reduction in average maturities to prevent the market from unraveling.

Overall, these results confirm a fundamental trade-off established in our model: sovereigns with weak commitment devices (high leverage and weak institutions) are forced down a pecking order. They are first pushed into shorter LC maturities and ultimately driven out of the LC market entirely, heavily substituting toward FC debt as a hard commitment mechanism. This simultaneously demonstrates that the

[6] We also control for lagged WGI_PCA when IQ is not an explanatory variable.

expansion of LC debt shares in emerging markets is systematically accompanied by an elevated reliance on short-term maturities.

5.2 Foreign Ownership and Debt Maturity

We next evaluate how the ownership structure of LC debt affects sovereign debt maturities. Specifically, we test the prediction that a higher fraction of LC debt held by foreign investors exacerbates dilution risk, thereby forcing the sovereign to issue shorter-maturity debt. To test *Implication 2*, we estimate a regression similar to Equation (1), where the dependent variable is the average maturity of LC debt. Our primary explanatory variables of interest are total LC debt, LC debt held by foreign investors as a percentage of GDP, and LC debt held by domestic investors as a percentage of GDP. Figure 6 plots the average ownership of LC and FC debt using data from Arslanalp and Tsuda (2014).

The results are reported in Table 3. We find that the coefficients on both LC debt held by foreign investors and LC debt held by domestic investors are negative and statistically significant. The baseline negative effect across both investor bases reflects a standard capacity and leverage constraint: as the government floods the financial system with debt, the aggregate risk of default or dilution rises, prompting all lenders to demand shorter maturities to protect their balance sheets. However, the coefficient on foreign ownership is significantly more negative than the coefficient on domestic ownership (more than twice as large in magnitude). These results confirm *Implication 2* and provide a rigorous micro-foundation for the penance of overcoming *original sin*: while emerging markets successfully transitioned toward LC borrowing, heavy foreign participation transformed traditional currency mismatch into maturity risk.

5.3 Leverage and Exposure to Rollover Crises

Having established that leverage and foreign participation reduce the maturity of LC debt, we now test another central trade-off of our model: While issuing short-term debt successfully mitigates the inflation time-inconsistency problem, it introduces a new vulnerability by exposing the sovereign to self-fulfilling rollover crises.

To test whether highly leveraged countries are systematically forced into this vulnerable region of the debt trilemma, we examine the relationship between sovereign leverage and rollover risk.To proxy for rollover risk, we use the variable $FBM_{c,t}$ defined in Section 3 (see Section B.3 in the Appendix for construction details). Higher values of this variable indicate higher rollover risk. We then estimate a regression where the dependent variable is our measure of rollover exposure and our primary explanatory variable is the Debt-to-GDP ratio. We maintain the inclusion of standard macroeconomic controls, as well as country and time fixed effects.

Table 4 collects the results, and confirms the theoretical prediction. We find a positive and statistically significant relationship between leverage and our measure of rollover risk. As the nominal debt burden increases, the sovereign's reliance on continuous refinancing intensifies. This demonstrates that countries unable to commit to long-term nominal stability are endogenously driven into debt structures that heighten their structural vulnerability to sudden stops and refinancing failures.

5.4 Rollover Risk, Inflation, and CDS Spreads

In this Section, we examine whether countries with higher rollover risk also have higher inflation rates and wider short-maturity CDS spreads. To do this, we estimate a regression where our dependent variables are inflation rates and the log of 5Y sovereign CDS spreads. Our main explanatory variable of interest is our measure of rollover risk $FBM_{c,t}$.

Table 5 presents the results. First, we find a positive and statistically significant relationship between elevated rollover risk and inflation. Second, this vulnerability is directly priced into sovereign default probabilities. Table 5 demonstrates that higher rollover risk is systematically associated with wider short-maturity CDS spreads. Together, these results suggest that while issuing short-term debt initially acts as a commitment device, it ultimately leaves the sovereign's price level, and default risk highly exposed to interim refinancing failures.

Our measure of rollover risk, FBM, is based on the maturity structure of LC debt, reflecting the fact that LC debt constitutes a substantially larger share of total sovereign debt than FC debt. To see if rollover risk associated with FC debt is also related to countries' CDS spreads, we extend our analysis by constructing a similar rollover risk measure for FC debt, FBM_FC, and estimate a similar regression, considering both rollover risk in local and foreign currency.

Table 5 shows the results. We find that, while FBM in LC is still significantly related to CDS spreads and inflation rates, there is no significant association with FBM_FC. This is consistent with the fact that FBM in FC is much smaller, and the average debt maturity in FC is longer. Indeed, Tables D.1 and D.2 in the Appendix, and Figure 7 show that FBM_FC is approximately four times smaller than the FBM in LC, and that the average debt maturity in FC is 10.40 years, compared to 7.95 years in LC.

5.5 Capital Flows and Rollover Risk

Our previous findings document a strong association between rollover risk and sovereign financial and macroeconomic conditions. However, these baseline results may be subject to endogeneity, as asset price movements jointly determine refinancing conditions and the ex-post realization of a rollover crisis (λ_r). To address this concern and identify the impact of rollover risk, we exploit the interaction between a sovereign's predetermined debt maturity structure and plausibly exogenous cross-border portfolio capital flows. This strategy provides a direct test of *Implication 5*.

Specifically, we measure baseline exposure to the model's interim refinancing constraint using the *ex-ante* share of bonds maturing within 12 months, while controlling for average debt maturity and country characteristics such as debt-to-GDP ratios and GDP growth. This approach allows us to analyze how the effects of exogenous capital flow shocks vary systematically with a country's exposure to rollover risk.

Our focus on capital flow shocks is directly motivated by the mechanics of the model's interim period, where they affect bond prices through two reinforcing channels. First, an outflow shock represents a sudden tightening of the external lenders' participation constraint, reallocating holdings from relatively inelastic, long-term investors to more price-sensitive arbitrageurs—consistent with evidence on the downward-sloping demand for sovereign debt. Second, falling bond prices raise yields, severely tightening the sovereign's interim budget constraint. This increased cost of rolling over debt amplifies default risk, which can further depress prices in the exact self-reinforcing crisis cycle (λ_r) predicted by our theory. Crucially, the magnitude of these effects depends entirely on the sovereign's position in the debt trilemma: countries with a high share of short-term debt face immediate, binding refinancing pressures and amplified distress, while those with longer maturities are theoretically immunized from these short-term capital flow reversals.

We employ three complementary approaches to capture exogenous variation in cross-border capital flows: flows implied by portfolio rebalancing, shifts in the Broad Dollar Index, and U.S. monetary policy shocks. For brevity, we focus on flows implied by portfolio rebalancing in the main text and report the results for the other methods in the Online Appendix G. To identify the effects of rollover risk, we focus on the interaction between these exogenous capital flows and each country's predetermined debt maturity structure to alleviate further endogeneity concerns.

We follow Carvalho (2015) and use the ex-ante maturity structure of sovereign debt to predict a country's financial position in a given year. We define countries as having their bonds largely maturing in a given year if they have a sufficiently high fraction of their bonds maturing within one year in the previous year. To do so, we sort countries each year into terciles based on the distribution of the one-year lag of $FBM_{c,t}$ and create the dummy $TopFBM_{c,t}$, which equals one if a country is in the top tercile of this distribution. The idea is that countries with a sufficiently higher fraction of bond maturing should face higher rollover risk, which could amplify the effect of capital flows. We use the dummy variable $TopFBM_{c,t}$ and not the variable $FBM_{c,t}$ in this analysis because we want to ensure that we are capturing countries with sufficiently high fraction of their bonds maturing in a given year.[7]

Our main measure of cross-border capital flow shocks is the mechanical rebalancing shocks from the GBI-EM Global Diversified Index—the largest and most widely tracked LC government bond benchmark for emerging markets, with assets under management (AUM) of $222 billion as of December 2021. These index-driven reallocations generate predictable, exogenous shifts in currency-specific demand for sovereign bonds, independent of country-specific fundamentals.

We measure the Flows Implied by the Rebalancings (FIR) by multiplying the mechanical changes in index weights with the total assets under management benchmarked to the GBI-EM Global Diversified Index, normalized by the size of the sovereign debt market of each country (Pandolfi and Williams, 2019). Intuitively, this measure captures the implied dollar amounts that should enter or exit a given country at the time of each index rebalancing, expressed as a percentage of the country's sovereign bond market size.

We aggregate the FIR shocks to the quarterly level to merge them with bond maturity and macroeconomic variables data. This process is implemented by summing the FIR shocks that occur within a quarter (since rebalancing takes place at the end of each month, we observe three FIR shocks per quarter). A similar procedure is widely used in the monetary policy literature to aggregate shocks that occur around FOMC meetings to the quarterly level (see Ottonello and Winberry (2020) for details).

Column (1) and Column (3) of Table 6 confirm that our aggregated FIR measure strongly affects exchange rates, and CDS spreads. In particular, in response to an increase in FIR, the exchange rate appreciates, and CDS spreads decrease. The magnitudes are economically significant. For example, in 2016 Q4, Chile's FIR was equal to -0.6947. Therefore, our estimates from Table 6 would predict an exchange depreciation of $(-0.6947)\times(-0.0099)=$ 0.69%, and an increase in CDS spreads of $(-0.6947)\times(-0.0154)$ = 1.07% in response to these plausibly exogenous outflows.

[7] Note that we use the ex-ante country maturity structure, which alleviates concerns about the endogenous determination of debt maturity. In the Appendix, we further assess the robustness of our bond maturity measure by constructing the FBM measure using DD2, which captures the amount of bonds maturing in two years.

To analyze the heterogeneous responses of countries facing high rollover risk to capital flows, we estimate the following regression:

$$\Delta y_{ct} = \theta_t + \theta_c + \beta_1 FIR_{ct} + \beta_2 TopFBM_{ct} + \beta_3 FIR_{ct} \times TopFBM_{ct} + \gamma' \text{Controls}_{c,t-1} + \epsilon_{ct} \tag{9}$$

where y_{ct} is the log of the exchange rate, or the log of the 5Y CDS at quarter t for country c. We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with FIR. The main coefficient of interest is β_3, which captures the differential effect of capital flow shocks on countries with a higher fraction of bonds maturing, i.e. countries facing higher rollover risk. We expect a negative coefficient for exchange rates and CDS, as the effects of capital inflows should be significantly amplified when countries face high sovereign debt rollover risk. That is, a capital inflow shock should lead to an appreciation of the local currency, expressed as a drop in the price of the U.S. dollar expressed in local currency units. Similarly, a capital inflow shock should decrease the country's CDS spread. Both effects should be amplified by rollover risk, implying a negative sign for β_3.

Table 6 presents the findings. The second column displays the effects of capital flow shocks on exchange rates for countries facing high rollover risk. We find that exchange rates are significantly affected by bond index rebalancings, FIR. Notably, this effect is amplified significantly for countries with a high fraction of bonds maturing. In response to a one standard deviation increase in FIR, exchange rates appreciate by 2.87%. The exchange rate of countries with a higher fraction of maturing bonds appreciates by 3.62%. This represents an amplification effect of approximately 26.13% relative to the baseline appreciation of 2.87%.

We next focus on the impact of capital flow shocks on CDS spreads. Column (4) of Table 6 reveals that the impact of capital flows on CDS spreads is concentrated in countries facing high rollover risk. In response to a one standard deviation increase in FIR, CDS spreads decrease by 3.54%, but this effect is not statistically significant. However, this effect is significantly amplified for countries with a high fraction of maturing bonds. In response to the same increase in FIR, the CDS spreads of these countries decrease by 7.6%, which is twice as large as the impact observed in other countries. These findings are important because they suggest that negative capital flow shocks increase credit risk and, consequently, the probability of sovereign default, for countries with high rollover risk.

Overall, these results perfectly validate the mechanism of *Implication 5*: when sudden capital flight occurs, countries forced into the short-term region of the trilemma face immediate, binding refinancing constraints that translate external shocks directly into acute short-end financial distress and currency depreciation.

5.6 Term Structure Effects

We next provide additional empirical evidence for *Implication 5* by analyzing how capital flow shocks affect the valuation of bonds and CDS with different maturities. Because the refinancing constraint binds specifically at the interim period, our theory predicts that the adverse pricing effects of these shocks should be concentrated at the short end of the yield curve. Therefore, we expect short-term bond yields and 5-year CDS spreads to be highly sensitive to capital flow shocks, whereas long-term bond yields and 10-year CDS spreads remain relatively insulated.

5.6.1 Bond Yield

We collect daily yield data for all government bonds in the JP Morgan index from Bloomberg and estimate specifications similar to those in Section 5.5. The outcome variable is y_{imct}, the yield of bond i, in maturity group $m \in st, mt, lt$, from country c at time t. Short-term bonds (st) have maturities of 1-5 years, medium-term bonds (mt) 5-10 years, and long-term bonds (lt) more than 10 years.

Panel (A) of Table 7 reports the findings for bond yields using FIR shocks. Short-term bond yields are the most sensitive to capital flow shocks: a one-standard-deviation capital flow shock reduces short-term bond yields by 0.62 percentage points on average and decline by an additional 0.17 percentage points in countries with a high fraction of bonds maturing within a given year, corresponding to a rollover-risk amplification effect of 28%. By contrast, long-term bond yields show no statistically significant average response. In the Online Appendix, Tables F.3 and F.4 present consistent results for BDI and monetary policy shocks, with effects concentrated in short- and medium-term maturities.

5.6.2 Credit Default Swaps (CDS)

We next examine how capital flow shocks affect sovereign CDS spreads across different maturities. Unlike bond yields, CDS spreads provide a direct market-based measure of sovereign credit risk. If rollover risk is a key mechanism, we would expect short-maturity CDS contracts (5-year maturity) to respond more strongly to capital flow shocks than longer-maturity contracts (10-year maturity), since they insure against near-term default risk.[8] Consistent with our bond yield evidence, a sharper response of short-maturity CDS spreads and a stronger amplification in countries with greater near-term refinancing needs would provide additional support for the rollover-risk channel.

Panel (B) of Table 7 reports the effects of FIR shocks on five- and ten-year CDS spreads. A one-standard-deviation capital flow shock leads to a significant decline in five-year spreads in countries with high rollover risk, while the impact on ten-year spreads is statistically insignificant and roughly one-third as large. In the Online Appendix, Tables F.3 and F.4 show qualitatively similar patterns for BDI and monetary policy shocks. Overall, the evidence highlights that rollover risk amplifies the effects of capital flow shocks on financial assets much more strongly at shorter maturities.

5.7 Institutional Quality and Advanced Economies

Finally, we test *Implication 6* by examining Advanced Economies (AEs), which serve as the theoretical limit case of our model. The framework predicts a strict, non-linear relationship between a sovereign's institutional credibility and its exposure to debt frictions. Sovereigns with highly credible institutions (a high g in our model) possess a strong commitment mechanism against ex-post dilution. Consequently, the time-inconsistency friction vanishes, allowing these countries to optimally issue long-term, LC debt and bypass the interim refinancing constraint entirely.

To investigate whether AE debt structures exhibit these predicted dynamics, we follow the same procedure as in Section 3 and construct the maturity structure for nine advanced economies: Australia, Austria, Denmark, France, Italy, South Korea, Spain, Sweden, and Switzerland. Our bond-level dataset for these countries is comprehensive, covering more than 80% of each country's total debt.

Figure 8 plots the average bond maturity for these advanced economies and presents a direct comparison with our emerging market sample. The results perfectly align with our prediction: while emerging markets experience a gradual, forced reduction in the average maturity of LC bonds, advanced economies display an increase followed by relative stability over time.[9] Because AEs do not suffer from severe dilution risk, they entirely escape the maturity compression observed in emerging markets.

We next examine whether AEs are structurally immunized from the self-fulfilling rollover crises (λ_r) that plague intermediate-institution countries. For each country in

[8]We do not use CDS spreads with shorter maturities due to data limitations for many countries in our sample.

[9]The Appendix reports country-level average maturities of LC bonds and bonds maturing within one year as a percentage of GDP.

our sample, we construct the fraction of bonds maturing within a given year to proxy for rollover risk. We then estimate the impact of exogenous shocks on CDS spreads using Equations (13) and (14), restricting the analysis to advanced economies. We focus on Broad Dollar Index (BDI) and U.S. monetary policy (MPS) shocks; FIR shocks are excluded, as the J.P. Morgan GBI-EM index covers only emerging markets.

Table 9 presents the results. As dictated by the model, we find no statistically significant amplification effect of rollover risk on CDS spreads: the coefficient on the interaction between BDI and rollover risk is insignificant. Results for monetary policy shocks are qualitatively similar, likewise showing no amplification. Overall, these findings validate the prediction of our theory. Advanced economies reside securely in the high-credibility, long-maturity region of the debt trilemma. Their strong institutional governance grants them stable maturity profiles and sustained access to long-term financing. This effectively neutralizes interim refinancing risks, insulating their sovereign solvency from international capital flow reversals even during periods of severe market stress.

6. Conclusion

This paper provides novel evidence on how shifts in the currency composition of sovereign debt interact with its maturity profile, and the implications this has for financial stability in developing economies. We construct a granular bond-level dataset across 23 emerging markets and document an expansion of LC leverage accompanied by a sustained decline in average debt maturities and a rise in rollover risk. Motivated by these facts, we develop a model where sovereigns face a trilemma between inflation distortions, rollover risk, and currency mismatch. To mitigate the temptation to dilute LC debt via ex-post inflation, sovereigns with higher leverage, weaker institutions, and greater foreign ownership of LC debt are forced to issue short-term debt as a commitment device, leaving the most vulnerable exposed to capital flow reversals.

We then empirically validate the model's predictions. Sovereigns with weaker institutional quality and higher foreign ownership of LC debt systematically issue at shorter maturities, and higher leverage is associated with both lower LC debt shares and shorter maturity profiles. We further show that rollover risk creates severe fragility. Using countries' ex-ante maturity structures and exogenous variation in cross-border capital flows, we find that the effects of capital flight on exchange rates, CDS spreads, and bond yields are significantly amplified when countries face high rollover risk. Because these refinancing constraints bind in the near term, short-maturity assets are particularly sensitive to these shocks.

Our findings underscore that overcoming *original sin* introduces a vulnerability to sovereigns: while the shift toward LC debt eliminates currency mismatch, it exposes sovereigns to inflation distortions and rollover risk. For emerging markets to sustainably overcome *original sin*, establishing the robust institutional credibility required to support long-term debt remains the paramount policy challenge.

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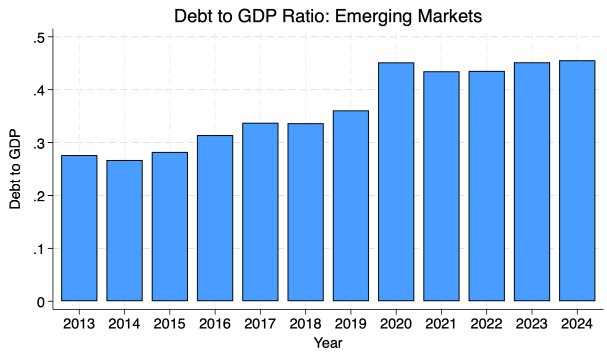
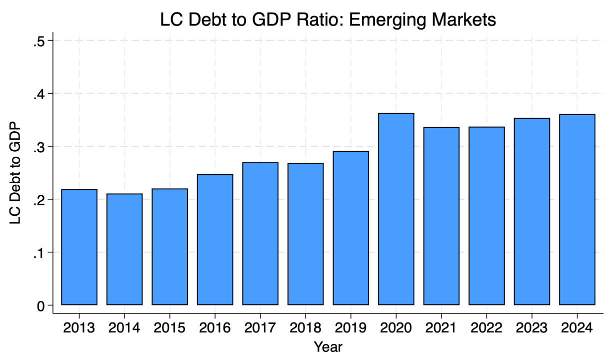
Figures and Tables

(A) Debt to GDP Ratio



(B) LC Debt to GDP Ratio



(C) FC Debt to GDP Ratio

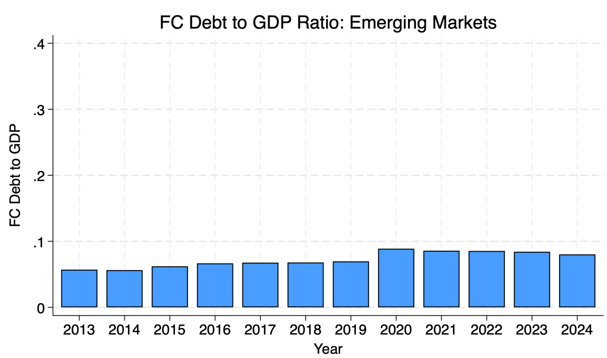
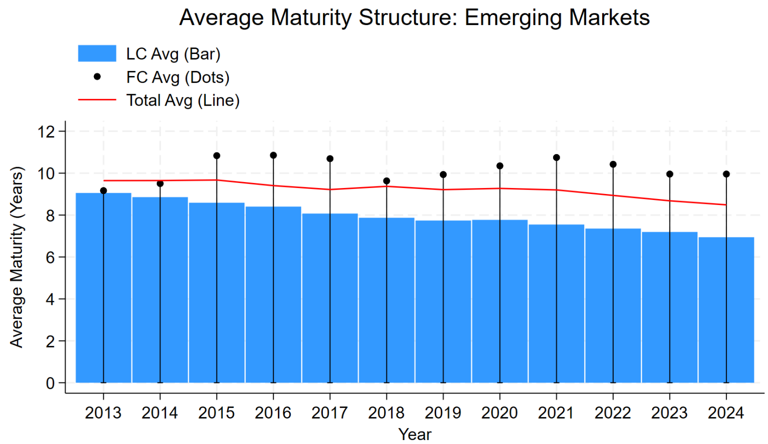


Figure 1. This figure plots the average general government debt-to-GDP ratio (panel A), the average LC general government debt-to-GDP ratio (panel B), and the average FC general government debt-to-GDP ratio (panel C) for the emerging market economies in our sample from 2013 to 2024. To construct this series, we first measure the debt-to-GDP ratio for each country in a given year, and then calculate the simple cross-sectional average across all countries for that year. Data sources: Bank for International Settlements (BIS) and World Bank.

(A) Average Debt Maturity



(B) LC Debt to GDP Ratio and Average Debt Maturity

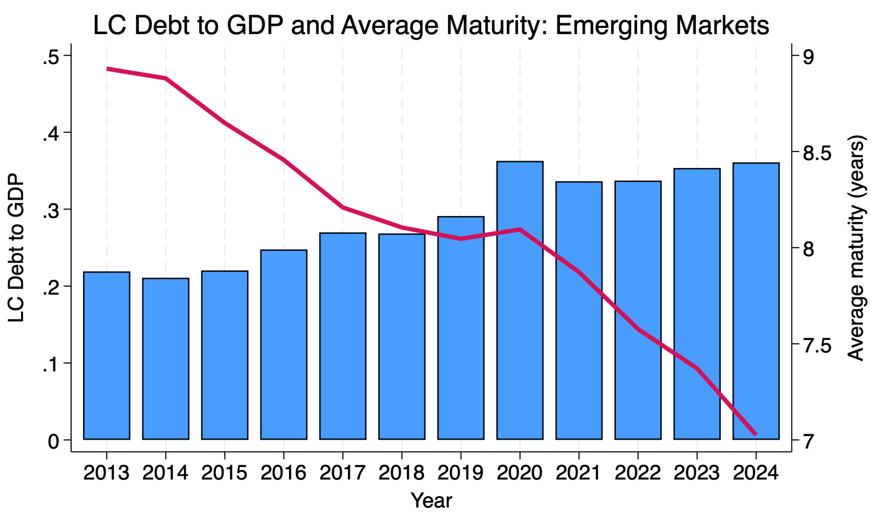
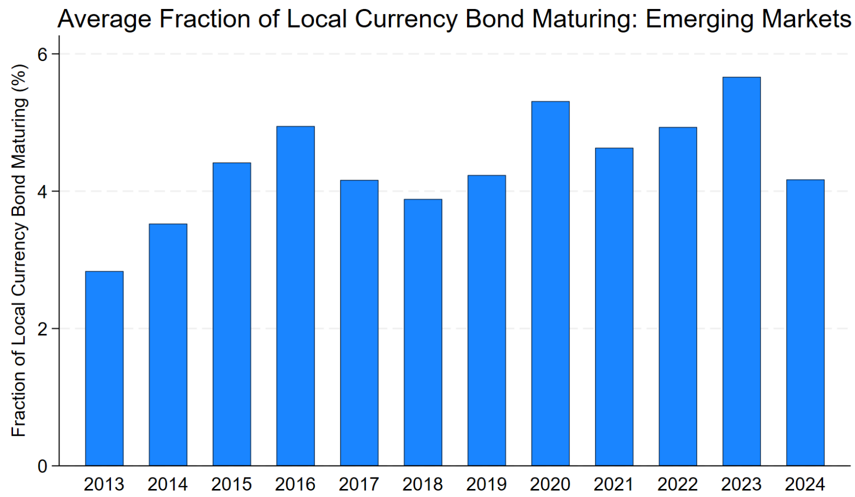


Figure 2. Panel A of this figure reports the LC average bond maturity (blue bars), the FC average bond maturity (black dots), and the total average bond maturity (red line) for all emerging-market countries in our sample from 2013–2024. For each country and year, we compute the weighted average years to maturity of LC and FC debt at the country level. The total average bond maturity is calculated as the weighted average of LC and FC maturities. We then take the simple (unweighted) average across countries in a given year to obtain each data point in the figure. Panel (B) of this figure plots the average LC general government debt-to-GDP ratio (left axis) and total average bond maturity (right axis).Data sources: Bank for International Settlements (BIS), Refinitiv Eikon, and World Bank.

Panel (A): By Year



Panel (B): By Country

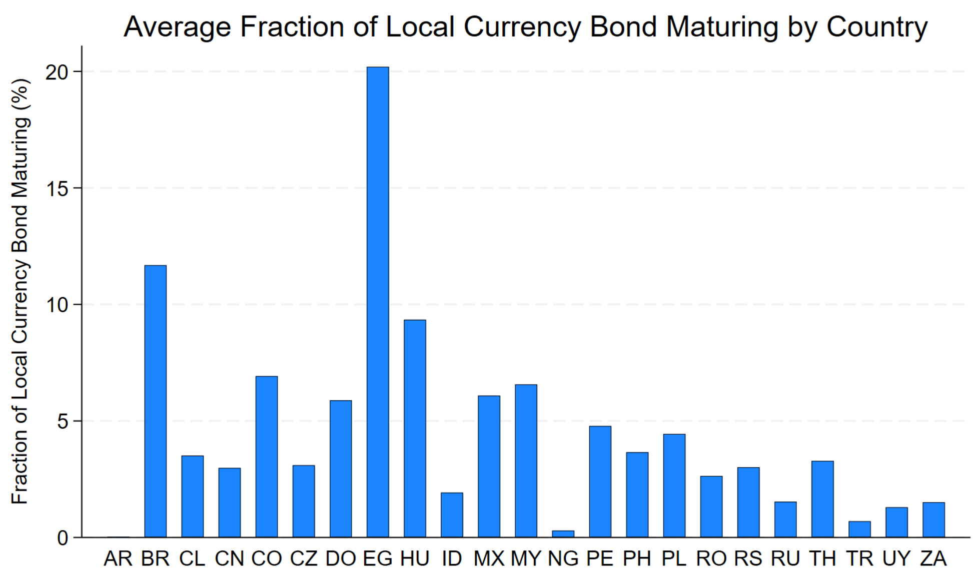


Figure 3. This figure reports the amount of bonds maturing within one year as a percentage of GDP for emerging-market countries in our sample from 2013–2024. The fraction of LC bonds maturing is computed by dividing the value of outstanding bonds maturing within one year by GDP. Panel A reports the cross-country average of the fraction of bonds maturing by year. Panel B reports the average fraction of bonds maturing by country over 2013–2024. Source: Refinitiv Eikon.

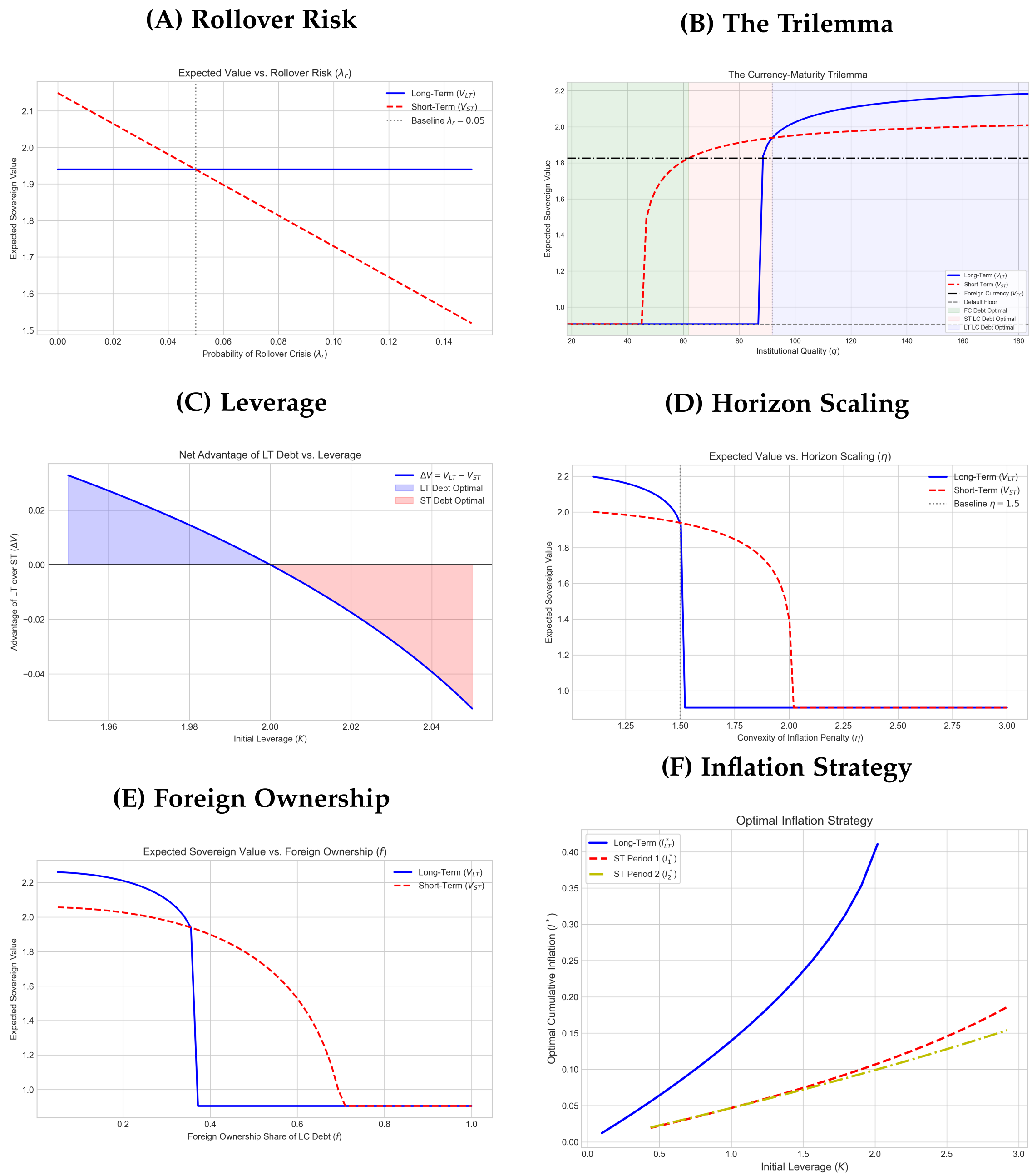


Figure 4. This figure plots the numerical simulations of the sovereign's expected value and optimal policy choices. Panel A illustrates the trade-off between long-term (LT) and short-term (ST) LC debt as the probability of a rollover crisis (λ_r) increases. Panel B maps the currency-maturity trilemma against institutional quality (g); the shaded regions denote the optimal debt policy. Panel C shows the net advantage of LT over ST debt (ΔV) as a function of initial leverage (K). Panel D displays the sensitivity of expected sovereign value to the convexity of the inflation penalty (η). Panel E plots the transition from LT to ST debt optimality as the foreign ownership share (f) increases. Panel F plots the sovereign's optimal inflation strategies under ST and LT debt, across varying levels of leverage.

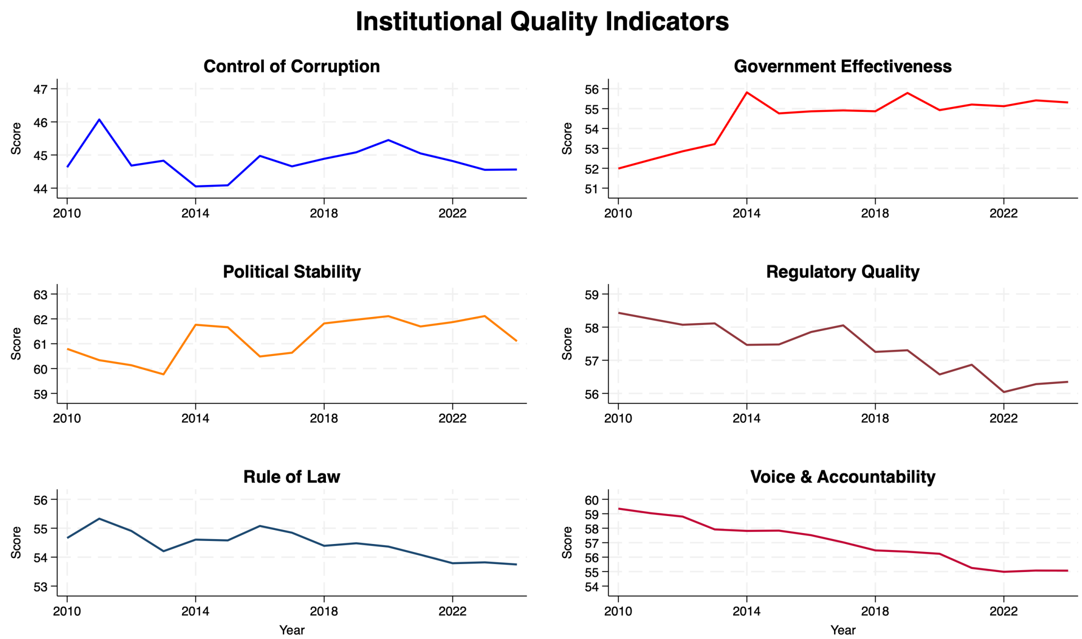
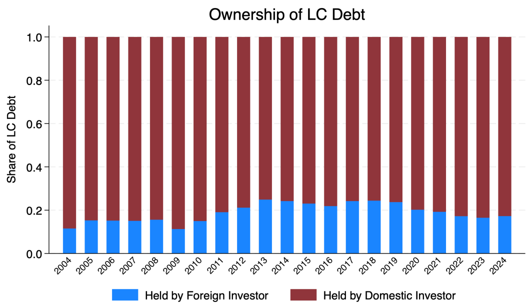
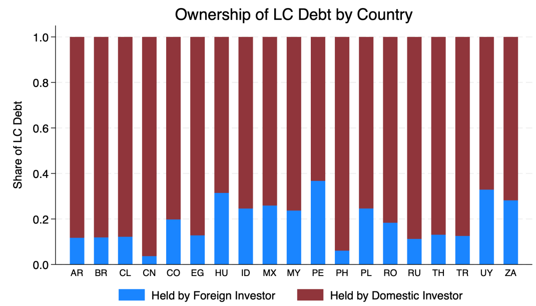


Figure 5. This figure presents institutional quality indices from the World Bank for the 23 countries in our sample. The indices are standardized on a 0–100 scale, with higher values indicating better governance, and cover six dimensions: Control of Corruption, Government Effectiveness, Political Stability, Regulatory Quality, Rule of Law, and Voice and Accountability. The figure plots the evolution of these indicators over time (2010–2024). Source: World Bank.

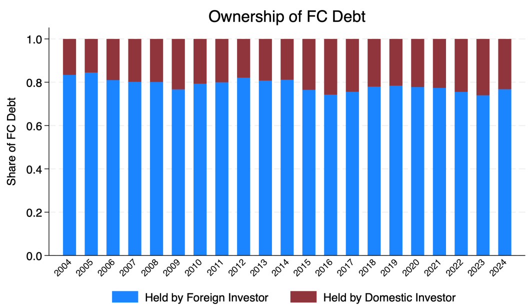
(A) Ownership of LC Debt



(B) Ownership of LC Debt by Country



(C) Ownership of FC Debt



(D) Ownership of FC Debt by Country

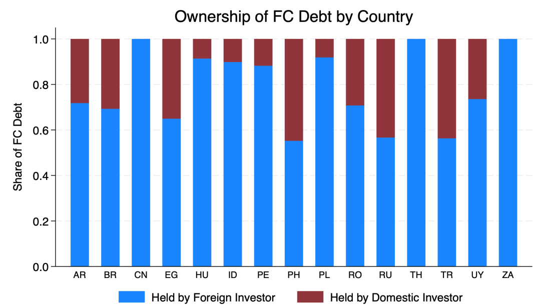


Figure 6. This figure plots the ownership of LC and FC debt. Panel (A) shows the average ownership of LC debt over time. Panel (A) shows the average ownership of LC debt across countries. Panel (C) shows the average ownership of FC debt over time. Panel (C) shows the average ownership of FC debt across countries. Held by Foreign Investor and Held by Local Investor refer to the shares of debt held by foreign and domestic investors, respectively, as collected from Arslanalp and Tsuda (2014).

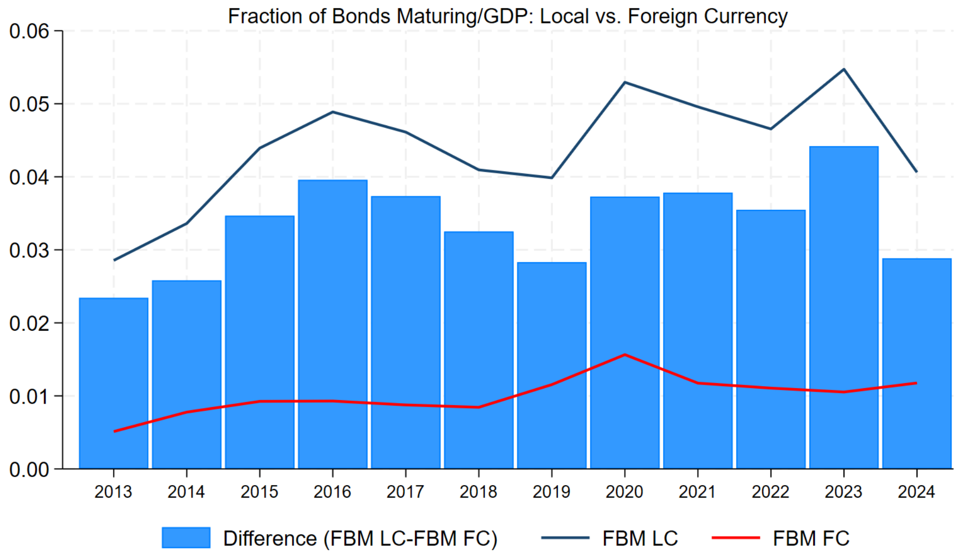
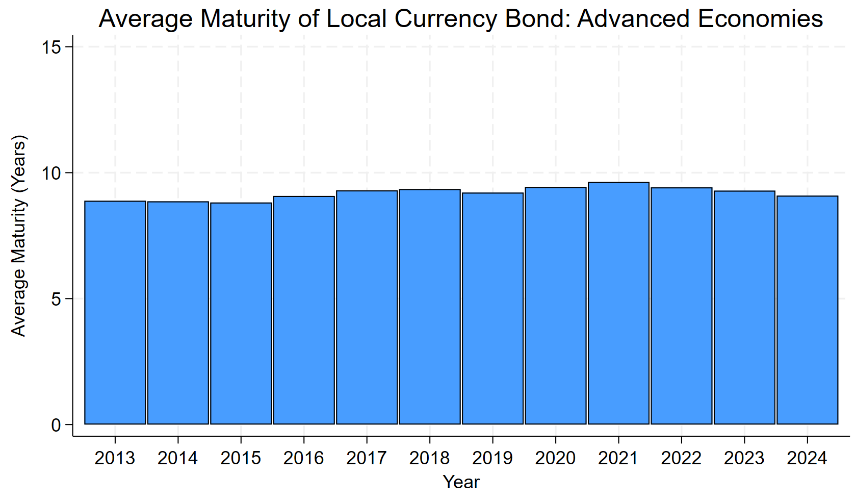


Figure 7. This figure reports the annual average share of bonds maturing within one year, expressed as a percentage of GDP. For each year, we compute the cross-country averages of FBM LC and FBM FC. FBM LC is the fraction of LC bonds maturing within one year (see Equation 11), while FBM FC is the fraction of FC bonds maturing within one year. FBM (LC–FC) is defined as the difference between FBM LC and FBM FC. Source: Refinitiv Eikon.

Panel (A): Advanced Economies Average Maturity



Panel (B): Average Maturity by country group

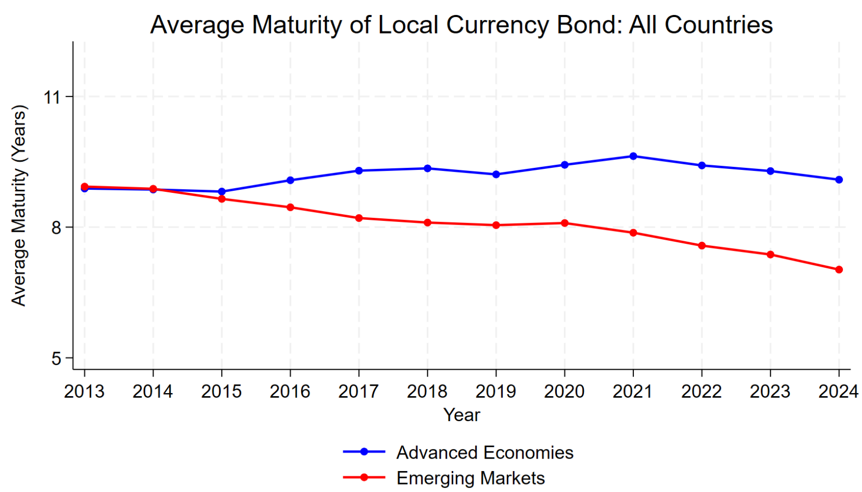


Figure 8. This figure reports the average local currency bond maturity for advanced economies (blue bars and blue line) and emerging markets (red line) from 2013 - 2024. For each country, we compute the yearly weighted average years to maturity of LC debt at the country level. We then take the simple average across country group in a given year to obtain each data point in the graph. The advanced economies in our sample are: Australia, Austria, Denmark, France, Italy, South Korea, Spain, Sweden, and Switzerland. The emerging market countries are: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Dominican Republic, Egypt, Hungary, Indonesia, Mexico, Malaysia, Nigeria, Peru, Philippines, Poland, Romania, Russia, Serbia, South Africa, Thailand, Turkey, and Uruguay. Source: Refinitiv Eikon.

Table 1. Baseline Calibration Parameters

Parameter	Symbol	Value
Leverage (Implies ∼40% Debt/GDP)	K	2.0
Target Output at Maturity	y_T	5.0
Recovery Rate on Net Surplus	α	0.40
Depreciation Probability	p	0.18
Depreciation Shock (50% Depreciation)	S_{bad}	1.50
Long-Term Maturity (Years)	T	8.0
Risk-Free Rate	r	0.04
Rollover Crisis Probability	λ_r	0.05
Horizon Scaling (Convexity)	η	1.5
Institutional Quality Target	g	91.84
Foreign Ownership Share	f	0.36

Table 2. Leverage, Institutional Quality, and Debt Structure

	Debt Maturity	LC Debt/GDP	Debt Maturity	Debt Maturity
Leverage	-3.7196***			
	(1.222)			
Institutional Quality		0.0940***	1.946***	
		(0.0259)	(0.524)	
Share LC				-2.752***
				(0.8049)
Observations	171	175	175	171
Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
R-squared	0.9426	0.9260	0.9322	0.9416

This table reports the estimated coefficients of regressions examining the impact of institutional quality on sovereign debt composition. The dependent variables across specifications are the local currency debt-to-GDP ratio (LC Debt/GDP) and the average maturity of local currency debt (Debt Maturity). The primary variables of interest are Leverage (total Debt/GDP), a measure of institutional quality constructed from the six World Bank Worldwide Governance Indicators (the standardized first principal component), and the share of LC debt. We control for lagged GDP growth, inflation, inflation volatility (3-year rolling standard deviation), and the institutional quality. All specifications include country and year fixed effects. Standard errors are clustered at the time level and are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3. Foreign Ownership and Debt Maturity

	Debt Maturity	**Debt Maturity**	**Debt Maturity**	**Debt Maturity**
LC Debt/GDP	-7.658***			
	(1.876)			
LC Debt Held FI/GDP		-15.299*		-19.712**
		(7.748)		(7.782)
LC Debt Held DI/GDP			-4.594*	-6.821***
			(2.475)	(1.910)
Observations	163	163	163	163
Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
R-squared	0.9358	0.9349	0.9338	0.9374

This table reports the estimated coefficients of regressions examining the impact of foreign ownership on debt maturity. The dependent variable across specifications is the average maturity of local currency debt (Debt Maturity). The primary variables of interest are LC Debt, LC Debt held by FI and LC Debt held by DI. LC Debt held by FI and DI refers to local currency government debt held by foreign and domestic investors, respectively, as reported by Arslanalp and Tsuda (2014). We control for lagged GDP growth, inflation, inflation volatility (3-year rolling standard deviation), and the institutional quality. All specifications include country and year fixed effects. Standard errors are clustered at the time level and are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4. Leverage and Rollover Risk

	Bonds Maturing/GDP	**Bonds Maturing/GDP**	**Bonds Maturing/GDP**
Leverage	0.0187***	0.0103**	0.0122**
	(0.0049)	(0.0042)	(0.0049)
Observations	729	729	650
Controls	No	No	Yes
Country FE	Yes	Yes	Yes
Time FE	No	Yes	Yes
R-squared	0.8409	0.8677	0.8698

This table reports the estimated coefficients of regressions examining the impact of leverage on rollover risk. The dependent variable across specifications is bonds maturing over GDP, that is, the fraction of LC bonds maturing within one year. The primary variable of interest is Leverage (total debt over GDP). Observations are at the country-quarter level. We control for lagged GDP growth, inflation, and inflation volatility. All specifications include country and time fixed effects. Standard errors are clustered at the time level and are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5. Rollover Risk, Exchange Rate, CDS spreads, and Inflation

	Credit Default Swaps	**Credit Default Swaps**	**Inflation Rates**	**Inflation Rates**
FBM	0.043***	0.043***	0.0014*	0.0013*
	(0.011)	(0.011)	(0.0006)	(0.0007)
FBM_FC		-0.0001		0.0010
		(0.003)		(0.0006)
Observations	617	617	670	670
Country FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.97	0.97	0.63	0.63

This table reports the estimated coefficients of $FBM_{c,t}$ on the log CDS spreads and inflation rates. $FBM_{c,t}$ is the standardized fraction of LC bonds maturing within one year. $FBM\_FC_{c,t}$ is the standardized fraction of FC bonds maturing within one year. Observations are at the country-quarter level. Controls include lagged outcome variable, average bond maturity, total debt over GDP, GDP growth, and inflation. Robust standard errors clustered at the time level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 6. Capital Flows and Rollover Risk: Flows Implied by the Rebalancing (FIR)

	Exchange Rate	**Exchange Rate**	**Credit Default Swaps**	**Credit Default Swaps**
FIR	-0.0099***	-0.0287**	-0.0154***	-0.0354
	(0.0030)	(0.0121)	(0.0042)	(0.0283)
FIR × TopFBM		-0.0075**		-0.0406***
		(0.0031)		(0.0120)
Observations	733	673	690	639
Country FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.5193	0.5500	0.5614	0.5633

This table reports the estimated coefficients of FIR and FIR× TopFBM on the changes in the log of the exchange rate, and the log of CDS spreads. Observations are at the country-quarter level. The main independent variable is the measure of standardized flows implied by the rebalancings accumulated to the quarterly-level interacted with *TopFBM*. *TopFBM* is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM_{c,t}$ variable. All regressions control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with FIR. Robust standard errors clustered at the country level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Table 7. Flows Implied by the Rebalancing (FIR) and Term Structure Effects

Panel A: Impact on Bond Yields by Maturity

	Bond Yields (1–5Y)	**Bond Yields (5–10Y)**	**Bond Yields (10Y+)**
FIR	-0.6218***	-0.2837	-0.0592
	(0.2346)	(0.1806)	(0.0984)
FIR × TopFBM	-0.1745**	0.0429	0.0713**
	(0.0782)	(0.0672)	(0.0331)
Observations	4,547	3,290	2,859
Bond FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
R-squared	0.2604	0.3175	0.5116

Panel B: Impact on CDS Spreads by Maturity

	Credit Default Swaps (5Y)	**Credit Default Swaps (10Y)**
FIR	-0.0353	0.0271
	(0.0284)	(0.0583)
FIR × TopFBM	-0.0399***	-0.0119
	(0.0119)	(0.0144)
Observations	642	324
Country FE	Yes	Yes
Time FE	Yes	Yes
Controls	Yes	Yes
R-squared	0.5657	0.6158

Panel A of this table reports the estimated coefficients of FIR and $FIR\times$ TopFBM on changes in bond yields across maturity buckets. Observations are at the bond-quarter level. Panel B reports the estimated coefficients of FIR and $FIR\times$ TopFBM on changes in the log of CDS spreads with 5-year and 10-year maturities. The main independent variable is the measure of standardized flows implied by the rebalancings accumulated to the quarterly-level interacted with $TopFBM$. $TopFBM$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM_{c,t}$ variable. All regressions include controls for average bond maturity, total debt over GDP, GDP growth, interest rates, and their interactions with FIR. Robust standard errors, clustered at the bond level for the bond-yield regressions and at the country level for the CDS regressions, are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Table 9. Capital Flows, Rollover Risk, and Advanced Economies

Panel A: Broad Dollar Index (BDI)

	Credit Default Swaps	**Credit Default Swaps**
$\Delta \log BDI$	-0.0307**	
	(0.0148)	
$\Delta \log BDI \times$ TopFBM	-0.0172	-0.0159
	(0.0156)	(0.0144)
Observations	416	416
Country FE	Yes	Yes
Time FE	No	Yes
Controls	Yes	Yes
R-squared	0.1659	0.3862

Panel B: Monetary Policy Shocks (MPS)

	Credit Default Swaps			
	[d]	[d+1]	[d+2]	[d+3]
MPS	-0.0254	0.0294	-0.9440	-0.9454
	(0.1275)	(0.2178)	(0.9734)	(0.9731)
$MPS \times TopFBM$	-0.1139*	0.0330	-0.3324	-0.3308
	(0.0672)	(0.1577)	(0.3064)	(0.3074)
Observations	584	584	584	584
Country $\times$ Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.1393	0.1411	0.1294	0.1295

Panel A of this table reports the estimated coefficients of $\Delta \log BDI$ and $\Delta \log BDI \times$ TopFBM on the changes in the log of CDS spreads. Observations are at the country-month level. The main independent variable is the broad dollar index (BDI), which is a weighted average of the foreign exchange value of the US dollar against the currencies of a broad group of major US trading partner interacted with $TopFBM$. $TopFBM$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM_{c,t}$ variable. Panel B reports the estimated coefficients of monetary policy shocks (MPS) and their interaction with TopFBM on changes in the log of CDS around the FOMC announcement day (d). The main independent variable is the MPS from Bauer and Swanson (2023), interacted with TopFBM. All regressions include controls for average bond maturity, total debt over GDP, GDP growth, interest rates, and their interactions with MPS or $\log \Delta BDI$. Robust standard errors clustered at the time level are reported in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Online Appendix for "Optimal Sovereign Debt Structure: Evidence and Theory" by Jaewon Choi, Sebastiao Oliveira, Jay Rafi and Josef Zechner

A. Formal Theoretical Derivations and Proofs

Proof of Proposition 1

The sovereign strictly prefers long-term LC debt (LTLC) over short-term LC debt (STLC) if and only if $V(LC, T) > V(LC, T/2)$. Using the value functions derived above:

$$y_T - K(1+r)^T - k(I^*_{0,T}, T) > (1-\lambda_r)y_T + \lambda_r \underline{y} - K(1+r)^T - k(I^*_{0,T/2}, T/2) - (1-\lambda_r)k(I^*_{T/2,T}, T/2)$$

The opportunity cost of capital, $K(1+r)^T$, cancels from both sides. Rearranging:

$$y_T - (1-\lambda_r)y_T - \lambda_r \underline{y} > k(I^*_{0,T}, T) - k(I^*_{0,T/2}, T/2) - (1-\lambda_r)k(I^*_{T/2,T}, T/2)$$

$$\lambda_r y_T - \lambda_r \underline{y} > k(I^*_{0,T}, T) - k(I^*_{0,T/2}, T/2) - (1-\lambda_r)k(I^*_{T/2,T}, T/2)$$

$$\lambda_r (y_T - \underline{y}) > k(I^*_{0,T}, T) - k(I^*_{0,T/2}, T/2) - (1-\lambda_r)k(I^*_{T/2,T}, T/2)$$

Proof of Proposition 2

Let

$$W(D) \equiv \int_0^{(y_T-\underline{y})/D} (y_T - Ds)\, dF(s) + \int_{(y_T-\underline{y})/D}^{\infty} \underline{y}\, dF(s)$$

denote the sovereign's continuation value at date $T/2$ when it enters period T with a foreign-currency face value D due at T. Then W is strictly decreasing in D.

Indeed, writing $S^c(D) \equiv (y_T - \underline{y})/D$, Leibniz' rule gives

$$W'(D) = \int_0^{S^c(D)} (-s)\, dF(s) + \Big(y_T - DS^c(D) - \underline{y}\Big) \frac{dS^c(D)}{dD} F'(S^c(D)).$$

Since $y_T - DS^c(D) = \underline{y}$ by definition of the default threshold, the boundary term is zero, so

$$W'(D) = -\int_0^{S^c(D)} s\, dF(s) < 0.$$

Now compare LTFC and STFC.

For LTFC, let D_L be the date-T face value. Competitive pricing implies

$$\int_0^{S^c(D_L)} D_L \, dF(s) = K(1+r)^T.$$

For STFC, let D_1 be the face value due at $T/2$. Since rollover succeeds only with probability $1-\lambda_r$, date-0 investors must satisfy

$$(1-\lambda_r)D_1 = K(1+r)^{T/2},$$

hence

$$D_1 = \frac{K(1+r)^{T/2}}{1-\lambda_r}.$$

Conditional on successful rollover at $T/2$, the sovereign refinances D_1 into a new date-T face value D_S satisfying

$$\int_0^{S^c(D_S)} D_S \, dF(s) = D_1(1+r)^{T/2} = \frac{K(1+r)^T}{1-\lambda_r}.$$

Because $1/(1-\lambda_r) > 1$, the right-hand side is strictly larger than under LTFC, so

$$D_S > D_L.$$

Since W is strictly decreasing in D,

$$W(D_S) < W(D_L).$$

Therefore, even conditional on successful rollover, STFC yields a strictly lower continuation value than LTFC because it increases the time-T exchange-rate default risk.

Unconditionally, STFC is even worse because with probability λ_r the rollover fails at $T/2$ and the sovereign is forced into liquidation, yielding $\underline{y} < W(D_L)$. Hence

$$V(FC, T/2) = (1-\lambda_r)W(D_S) + \lambda_r \underline{y} < W(D_L) = V(FC, T).$$

Thus LTFC strictly dominates STFC.

Proof of Proposition 3

We prove the threshold for part 1 (LTFC vs LTLC). The sovereign strictly prefers LTFC if and only if $V(FC, T) > V(LC, T)$. Substituting the value functions:

$$F(S_T^c)y_T + (1 - F(S_T^c))\underline{y} - K(1+r)^T \mathbb{E}[\tilde{S}_T \mid S_T \le S_T^c] > y_T - K(1+r)^T - k(I_{0,T}^*, T)$$

Move the inflation penalty $k(I_{0,T}^*, T)$ to the left side and all other terms to the right:

$$k(I_{0,T}^*, T) > y_T - F(S_T^c)y_T - (1 - F(S_T^c))\underline{y} + K(1+r)^T \mathbb{E}[\tilde{S}_T \mid S_T \le S_T^c] - K(1+r)^T$$

Factor the output terms on the right side:

$$y_T - F(S_T^c)y_T - (1 - F(S_T^c))\underline{y} = (1 - F(S_T^c))(y_T - \underline{y})$$

Factor the repayment terms on the right side:

$$K(1+r)^T \mathbb{E}[\tilde{S}_T \mid S_T \le S_T^c] - K(1+r)^T = K(1+r)^T \left(\mathbb{E}[\tilde{S}_T \mid S_T \le S_T^c] - 1\right)$$

Combining these factored terms yields the exact threshold condition for part 1. The proof for part 2 follows the exact same algebraic steps, substituting $V(LC, T/2)$ on the right-hand side.

Proof of Lemma 1

Consider the sovereign's ex-post problem under LC debt:

$$\min_I \{fN(1-I) + k(I, \tau)\}.$$

Define the objective by

$$\Phi(I) \equiv fN(1-I) + k(I, \tau).$$

Its derivative is

$$\Phi'(I) = -fN + \frac{\partial k}{\partial I}(I, \tau),$$

and, since k is strictly convex in I,

$$\Phi''(I) = \frac{\partial^2 k}{\partial I^2}(I,\tau) > 0.$$

Hence Φ is strictly convex, so the inflation choice is characterized by the sign of $\Phi'(I)$.

For part (1), suppose

$$\frac{\partial k}{\partial I}(I,\tau)\bigg|_{I\downarrow 0} > fN.$$

Then

$$\Phi'(0) > 0.$$

By strict convexity, $\Phi'(I)$ is increasing in I, so $\Phi'(I) > 0$ for all $I \geq 0$. Therefore, $\Phi(I)$ is strictly increasing on $[0,\infty)$, implying that the sovereign optimally chooses the corner solution

$$I^* = 0.$$

It follows that LC debt is not diluted and generates no inflation distortion, i.e.

$$k(I^*,\tau) = k(0,\tau) = 0.$$

Under LTLC, the sovereign therefore delivers the promised real repayment without incurring any deadweight loss from inflation. By contrast, LTFC still exposes the sovereign to exchange-rate-driven default risk, which occurs with probability $1 - F(S_T^c)$ and entails strictly positive expected default costs whenever this probability is positive. Hence LTLC strictly dominates LTFC.

For part (2), suppose instead that

$$\lim_{I\to\infty} \frac{\partial k}{\partial I}(I,\tau) < fN.$$

Then, for all sufficiently large I,

$$\Phi'(I) = -fN + \frac{\partial k}{\partial I}(I,\tau) < 0.$$

Since $\Phi'(I)$ never reaches zero, there is no finite interior optimum satisfying

$$\frac{\partial k}{\partial I}(I^*, \tau) = fN.$$

Equivalently, the sovereign's marginal gain from inflation strictly exceeds its marginal cost for all feasible inflation levels, so the incentive to inflate never disappears. In this case, the LC debt market cannot sustain a finite rational-expectations equilibrium: investors anticipate unbounded dilution and would require arbitrarily large nominal compensation. Thus the LC equilibrium unravels. Since FC debt rules out inflation by construction and remains feasible whenever repayment in solvency states can be priced competitively, FC debt strictly dominates LC debt.

B. Data Construction and Coverage

B.1 Variables Sources

This section provides information on the sources of the variables in our sample. Table B.1 reports the variables used in our analysis, along with their sources, frequencies, and ranges.

B.2 Coverage of Bond-level Data

This section provides information on the data coverage of our sample. Table B.2 shows the country-level distribution of Refinitiv Eikon local and foreign currency bond coverage as a share of total government debt. The coverage spans the period 2013–2024.

Appendix Table B.1. Variable Description

Variable	Source	Frequency	Range
Local Currency Bond Data	Refinitiv Eikon	Monthly	2013–2024
Foreign Currency Bond Data	Refinitiv Eikon	Monthly	2013–2024
Debt to GDP Ratio	CEIC	Quarterly	2013–2024
Debt to GDP Ratio	BIS	Annual	2013–2024
LC Debt to GDP Ratio	BIS	Annual	2013–2024
FC Debt to GDP Ratio	BIS	Annual	2013–2024
Inflation Rates	World Bank	Annual	2013–2024
CPI	IMF	Quarterly	2013–2024
Institutional Quality Indexes	World Bank	Annual	2013–2024
Exchange Rates	Compustat	Daily/Annual	2013–2024
CDS Spreads US Dollar (5Y, 10Y)	Bloomberg	Daily	2013–2024
CDS Spreads Local Currency (3Y, 4Y, 5Y)	Markit	Daily	2013–2024
Bond Prices	Bloomberg	Daily	2013–2024
Bond Yields	Bloomberg	Daily	2013–2024
Interest Rates (Policy Rates)	IMF	Quarterly	2013–2024
Debt Held by Foreign and Domestic Investors	Arslanalp and Tsuda (2014)	Quarterly	2004–2024
FIR (Flows Implied by Rebalancing)	JP Morgan / Authors' calc.	Monthly	2013–2024
Broad Dollar Index (BDI)	St. Louis FRED	Daily	2013–2024
Monetary Policy Shocks	Bauer and Swanson (2023)	Event-based	2013–2024
GDP	World Bank	Annual	2013–2024
GDP Growth	IMF, Economist Intelligence Unit	Quarterly	2013–2024
Credit Ratings	Moody's	Monthly	2013–2024
Term Spread	Bloomberg	Monthly	2013–2024
Credit Spread (vs. US)	Bloomberg	Monthly	2013–2024

This table reports the variables used in our analysis, their sources, frequencies, and ranges.

Appendix Table B.2. Refinitiv Eikon Coverage

Country	Mean	Std. Dev.	Max	Min
Argentina	0.9456	0.0611	1.0000	0.7970
Brazil	0.6317	0.2278	0.9993	0.3010
Chile	0.9907	0.0322	1.0000	0.8886
China	0.9478	0.0414	0.9998	0.8595
Colombia	0.9037	0.0607	1.0000	0.7926
Czech Republic	0.9737	0.0373	1.0000	0.9073
Egypt	0.5357	0.1924	0.8574	0.2592
Hungary	0.9186	0.1157	1.0000	0.6220
Indonesia	0.7873	0.0498	0.8764	0.7302
Mexico	0.9693	0.0642	1.0000	0.8324
Malaysia	0.9851	0.0339	1.0000	0.9083
Nigeria	0.3517	0.1455	0.4962	0.1492
Peru	0.9939	0.0145	1.0000	0.9560
Philippines	0.8830	0.0927	0.9791	0.7445
Poland	0.8914	0.1268	1.0000	0.6365
Romania	0.9500	0.1167	1.0000	0.6385
Russia	0.9937	0.0217	1.0000	0.9248
Serbia	0.7770	0.0892	0.8874	0.5766
Thailand	0.9397	0.0623	1.0000	0.8279
Turkey	0.4458	0.1430	0.6784	0.2495
Uruguay	0.6926	0.1094	0.8550	0.5179
South Africa	1.0000	0.0000	1.0000	1.0000

This table reports the country-level distribution of Eikon local- and foreign-currency bond coverage as a share of total government debt reported by CEIC. The coverage spans 2013–2024.

B.3 Measuring the Fraction of Bonds Maturing

The Refinitiv Eikon database provides comprehensive information on government bonds, including the amount issued, coupon payments, coupon frequency, issuance date, and maturity date. This data allows us to construct the maturity structure for each country in our sample and determine the amount of debt maturing each month, quarter, and year. However, this process is not straightforward. First, we exclude bonds from the analysis if they are missing the amount issued or coupon rate. Second, we calculate the interest payments for each active bond by multiplying the annual coupon rate by the outstanding amount and adjusting the payment based on the frequency of the coupon payment. For example, if the payments are semi-annual, we divide the annual coupon payment by two and assign the payment to the corresponding quarter. If a bond is issued in Q1 2020, the coupon payments would occur in Q3 2020, Q1 2021, and so on. Finally, after calculating the interest payments, we combine them with the principal amount of maturing bonds for each quarter. For example, in Mexico in Q2 2021, the interest payment was 134 million USD, and the amount of bonds maturing was 1.12 billion USD, which makes the total maturing bonds based on our definition to be 1.25 billion USD.

Motivated by previous literature (Almeida, Campello, Laranjeira, and Weisbenner, 2011; Choi, Hackbarth, and Zechner, 2018), we define the amount of bonds maturing within one year in a quarter t as:

$$DD1_{c,t} = \sum_{j=0}^{3} (\text{maturing bonds})_{c,t+j} \tag{10}$$

where maturing $\text{bonds}_{c,t}$ represents the amount of local currency bonds maturing (in USD) in quarter t. We calculate maturing $\text{bonds}_{c,t}$ by including both the principal and the coupon, as this provides a measure of total cash outflows at maturity (the total amount of money that the government needs to pay to bondholders at a given time).[10]

We then define our rollover risk measure for quarter t as follows:

$$FBM_{c,t} = \frac{DD1_{c,t}}{\text{GDP}_{c,t}} \tag{11}$$

where GDP is the nominal annualized GDP in USD from EIU (Economist intelligence unit). Note that we use data at the quarterly level because although we have the amount of bond that matures at the monthly frequency, the nominal GDP in USD is only available

[10]We show that our results remain similar when considering only the principal in constructing maturing $\text{bonds}_{c,t}$. Results are available upon request.

at the quarterly frequency. The average of $FBM_{c,t}$ is approximately 4.59%, the standard deviation is 3.47%, and the max and min are 16.35% and 0, respectively.

Table B.3 presents the characteristics of countries with a high fraction of bonds maturing relative to the rest of the sample.[11] We identify significant differences in the fraction of bonds maturing (FBM), underscoring the importance of rollover risk as a critical factor shaping the financial stability of emerging economies. Countries with a high fraction of bonds maturing tend to have lower GDP growth, slower debt growth, and a higher debt-to-GDP ratio. For example, high-rollover-risk countries have an average debt-to-GDP ratio of 59.64%, compared to 45.44% in other countries. In addition, these countries exhibit higher long-term yields and a higher interest-to-exports ratio relative to the rest of the sample.

Appendix Table B.3. Country-Level Summary Statistics: Low vs. High Rollover Risk

Variable	All			Low Rollover Risk			High Rollover Risk		
	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
GDP growth (%)	1.21	0.95	0.018	1.30	0.71	0.01	1.10	0.71	0.03
Debt growth (%)	1.74	1.78	0.027	1.90	1.94	0.03	1.30	1.43	0.02
CA/GDP (%)	-1.04	-1.69	3.43	-1.03	-1.83	3.60	-1.06	-1.23	3.09
Debt/GDP (%)	50.01	44.24	25.07	45.44	42.24	18.03	59.64	47.92	35.89
Interest / Export (%)	4.87	4.44	3.15	4.75	4.28	3.28	5.11	4.70	2.84
CDS Spread	152.42	118.64	112.05	155.81	112.99	128.73	144.28	146.95	63.09
LT Yield (%)	6.17	5.62	3.39	6.07	5.53	3.52	6.39	5.92	3.09
Inflation rate (%)	5.39	3.75	6.44	6.00	4.01	7.00	5.00	3.44	5.00
FBM (%)	4.45	3.67	2.54	2.57	2.52	1.52	8.51	7.48	3.92
Observations		199			136			63	

This table reports the summary statistics of country characteristics. Debt growth is defined as the year-over-year change in government debt. CA/GDP represents the ratio of the current account to GDP. Debt/GDP is the ratio of government debt to GDP. CDS spread is the annual cost, expressed in basis points, that an investor pays to insure against the default of a borrower's debt. IR Spread refers to the interest rate spread within a country, defined as the difference between the rate charged by banks on loans to prime customers and the rate paid by commercial or similar banks on demand, time, or savings deposits. LT yield is the yield on 10-year Treasury bonds. Interest due/export is the ratio of government interest due in a particular year to the country's total exports. FBM represents the fraction of bonds maturing as a proportion of GDP. Countries are classified as high rollover risk if they are in the top tercile in terms of the FBM measure, while countries classified as low rollover risk are those in the middle and bottom terciles of the FBM distribution.

[11] All data are reported at an annual frequency because more variables are available for comparison at this level.

C. Flows Implied by the Rebalancing

This appendix provides additional information on the construction of the Flows Implied by the Rebalancing (FIR). Section C.1 describes the Government Bond–Emerging Market Index (GBI-EM) series from JP Morgan and the rebalancing mechanism, and Section C.2 details how we measure the Flows Implied by the Rebalancing (FIR).

C.1 J.P. Morgan GBI-EM global diversified

The Government Bond–Emerging Market Index (GBI-EM) series, launched in June 2005, was the most frequently followed benchmarks in the EM local currency denominated government bond space, tracked by an estimated $247 billion AUM as of December 2021. In this paper, we use the GBI-EM Global Diversified, which is the largest LC government bond index for emerging countries. It is also the most widely followed benchmark in its class with AUM of $222 billion as of December 2021.

According to J.P. Morgan, a country qualifies for index inclusion if its Gross National Income (GNI) per capita remains below the Index Income Ceiling (IIC) for three consecutive years. The IIC is adjusted annually based on the global GNI per capita growth rate, as reported by the World Bank. In 2024, the IIC level is $23,287. J.P. Morgan determines which securities from each country are included in each index. Bonds entering the GBI-EM Global Diversified must meet quantitative criteria (a minimum face amount outstanding of $1 billion and at least 2.5 years to maturity) and qualitative criteria regarding overall market liquidity and tradability. Specifically, bonds must have both bid and ask prices available. Moreover, the index is denominated entirely in USD, with bond and country weights determined by converting all LC debt into USD.

Countries with explicit capital controls are excluded from the index. That is, countries with capital controls—either de jure or de facto—that limit the ability of international investors to repatriate proceeds from the domestic currency (e.g., restrictions on selling local currency and receiving USD, EUR, etc.) or restrict the free trade of the official currency (e.g., limits on transaction size or the existence of multiple exchange rates) are deemed ineligible. Historically, such situations have led to the exclusion of countries like Egypt (removed in 2024), Nigeria (removed in 2015), and Argentina (removed in 2019), following the imposition of capital controls that impaired investors' ability to adequately replicate exposure.

The index's diversification methodology imposes a 10% weight cap at the country level, with any residual weight redistributed accordingly. No tactical adjustments are made based on recent asset performance. As a result, larger markets such as Indonesia, China, and Mexico, which have significant index-eligible debt stock, will routinely reach the 10% country cap, while smaller markets with limited issuance will have lower weights in the index. As countries cannot have a benchmark weight higher than 10%, the GBI-EM global diversified is rebalanced monthly on the last weekday of the month. Since the mechanical rebalancings by the GBI-EM Global Diversified index are, in principle, informationless and unrelated to any new information about the economic conditions of a country, this generates exogenous capital flows.

Consider the following example. Suppose that before the rebalancing, Indonesia's weight is 12%, Chile's weight is 7% and Argentina's weight is 1%. For simplicity, assume there are 11 countries in the index, and the other 8 countries are fixed at the 10% cap. The rebalancing mechanism (cap-driven rebalancing) implies that Indonesia's weight is reduced to 10%, Chile's weight is increased to 8.75%, and Argentina's weight is increased to 1.25%. Mutual funds have to sell LC sovereign bonds of Indonesia and buy LC sovereign bonds of Chile and Argentina. As a result, Chile and Argentina will experience capital inflows that are uncorrelated with macroeconomic conditions.

C.2 Measuring Flows Implied by the Rebalancing

We follow Pandolfi and Williams (2019) to construct flows implied by the rebalancings or capital flow shocks (FIR). As discussed above, a significant source of variation in FIR stems from the fund's practice of imposing a 10% cap on the bond weight of each emerging economy within the index. When a country surpasses this 10% cap, the fund divests its ownership of the excess bond holdings to reduce its weight to the stipulated 10%. The remaining holdings are then redistributed proportionally to their market value across the other countries included in the index.

We sum across bonds i and normalize by market size to obtain FIR for country c at time t as follows:

$$FIR_{ct} = \sum_i FIR_{ict} = \sum_i (w_{ict} - w_{ict}^{BH}) \frac{AUM_t}{MV_{ict-1}} \tag{12}$$

where w_{ct} is the weight of a country at time t, $w_{ct}^{BH} = w_{ct-1} \times \left(\frac{R_{ct}}{R_t}\right)$, R_{ct} is the country-level bond's return in month t at the country level, and R_t is the J.P. Morgan GBI-EM Global Diversified Index return in month t. Intuitively, w_{ct}^{BH} is the buy-and-hold weight, i.e., it is the weight a bond would have if the only changes affecting it were due to price movements. AUM_t is Asset under management (in USD) that tracks the J.P. Morgan GBI-EM Global Diversified, and MV_{ct-1} the previous period USD market value of government debt securities.

Table C.1 presents the summary statistics of the components that build the FIR. Table C.2 shows country-wise breakdown of the components that build the FIR, in line with Table C.1. Table C.3 collects the frequency distribution of countries in our sample. Note that the frequency distribution of countries reported is not the same due to different inclusion dates. For instance, China was included in January 2020, Argentina was included from January 2017 to January 2020, the Czech Republic was included after January 2017, Egypt was included after January 2022, Nigeria was included from January 2013 to January 2016, and Russia was dropped in May 2022.

Table C.4 shows that a higher FIR is associated with lower CDS spreads and lower exchange rates around rebalancing dates. Notably, we find no evidence of pre-trends: in the days prior to the rebalancing, the relationship between FIR and CDS is close to zero and becomes statistically significant only after the rebalancing dates. The impact on exchange rates is qualitatively similar. Although we observe an effect three days before the rebalancing (statistically significant at the 10% level), the effects are much stronger afterward. For example, the effect of FIR on exchange rates is 4.5 times greater when comparing three days before the rebalancing with three days after it.

Appendix Table C.1. Aggregate Level Summary Statistics

	Obs	Mean	Std Dev	Min	Max
Panel (A): FIR components					
FIR (%)	1,792	0.016	1.046	-3.195	5.222
Country Market Value (MV)	1,798	60,112	47,726	644	255,998
Weight in the index (w_{ct})	1,798	0.056	0.037	0.001	0.100
Buy-hold Weight in the index (w_{ct}^{bh})	1,792	0.056	0.037	0.001	0.107
Asset Under Management (AUM_t)	1,798	204,263	11,639	178,716	223,129
Index Return (%)	1,798	0.076	0.032	-0.070	0.091
Bond Return (%)	1,792	-0.139	0.025	-0.455	0.194
Panel (B): Monetary Policy Shocks					
MPS	348	0.000	0.053	-0.240	0.160
Panel (C): Broad Dollar Index					
BDI	4,828	105.445	12.230	85.469	130.214

Panel (A) of this table reports the summary statistics of components that build the flows implied by the index rebalancing (FIR) variables, constructed from the JP Morgan Government Bond Index - Emerging Markets Global Diversified (GBI-EM Global Diversified). The components include country market value in million USD (MV), weight in the index (w_{ct}), buy-hold weight in the index (w_{ct}^{bh}), asset under management in million USD (AUM_t), index return, and bond return. w_{ct}, w_{ct}^{bh}, and returns are expressed in decimal points. FIR is reported in percentage. We exclude months with substantial rebalancing events in the JP Morgan GBI-EM Index due to the upgrade or downgrade of the credit rating of countries in our sample during the analysis period (Jan 2013 - March 2024). Panel (B) presents the summary statistics of monetary policy shocks from Bauer and Swanson (2023) from 1988 to 2023. MPS is the orthogonalized monetary policy surprise (MPS_ORTH) measure, computed as the residuals from regressing MPS raw on macro and financial variables (see Bauer and Swanson (2023) for details). MPS raw is the unadjusted monetary policy computed as the first principal component of the changes in ED1-ED4, scaled so that the impact on ED4 is unity. Panel (C) shows the summary statistics of the the broad dollar index (BDI), which is a weighted average of the foreign exchange value of the US dollar against the currencies of a broad group of major US trading partner from 2006 to 2025.

Appendix Table C.2. Summary Statistics by Country

	FIR (%)	MV	w_{ct}	w_{ct}^{bh}	Return
Argentina	-0.654	6,144	0.007	0.007	0.971
Brazil	-0.003	129,904	0.097	0.097	1.000
Chile	0.068	18,723	0.016	0.016	0.999
China	0.665	125,746	0.091	0.092	1.000
Colombia	0.032	56,528	0.057	0.057	0.998
Czech Republic	0.306	57,670	0.047	0.046	0.998
Dominican Republic	-0.028	1,888	0.002	0.001	1.005
Egypt	-0.204	14,960	0.011	0.012	0.996
Hungary	-0.020	40,940	0.043	0.043	0.998
Indonesia	0.068	97,366	0.095	0.095	0.999
Mexico	0.051	121,325	0.099	0.099	0.998
Malaysia	-0.040	86,718	0.085	0.085	1.000
Nigeria	-0.019	11,671	0.018	0.018	0.989
Peru	0.069	25,015	0.024	0.024	0.998
Philippines	-0.281	2,320	0.003	0.003	0.999
Poland	0.009	93,398	0.088	0.088	0.999
Romania	0.218	30,985	0.029	0.029	1.000
Serbia	0.148	4,263	0.003	0.003	1.000
Russia	-0.033	67,679	0.073	0.073	0.997
Thailand	0.084	89,430	0.086	0.086	1.001
Turkey	-0.234	41,520	0.052	0.052	0.998
Uruguay	-0.109	2,036	0.002	0.002	1.003
South Africa	0.029	92,242	0.090	0.090	0.997

This table reports a country-wise breakdown of the summary statistics for the components that constitute the flows implied by the index rebalancing (FIR) variables. FIR is in percentage, Market Value is in millions of US Dollar, w_{ct}, w_{ct}^{bh}, and Return are in decimal points. The methodology used to calculate these statistics is consistent with that described for Table C.1.

Appendix Table C.3. Frequency Distribution of Countries

Country	Obs	Percent	Cum.
Argentina	21	1.13	1.13
Brazil	100	5.57	6.70
Chile	100	5.57	12.27
China	43	2.36	14.63
Colombia	100	5.57	20.20
Czech Republic	65	3.66	23.86
Dominican Republic	59	3.32	27.18
Egypt	20	1.07	28.25
Hungary	100	5.57	33.82
Indonesia	100	5.57	39.39
Mexico	100	5.57	44.96
Malaysia	100	5.57	50.53
Nigeria	21	1.13	51.66
Peru	100	5.57	57.23
Philippines	97	5.40	62.63
Poland	100	5.57	68.20
Romania	99	5.57	73.78
Serbia	30	1.63	75.41
Russia	78	4.33	79.74
Thailand	100	5.57	85.31
Turkey	100	5.57	90.88
Uruguay	64	3.55	94.43
South Africa	100	5.57	100.00
Total	1,798	100.00	

This table reports the frequency distribution of countries over the analysis period (January 2013–March 2024). Obs denotes the number of observations for each country during this period. We exclude months with substantial rebalancing events in the JP Morgan GBI-EM Index resulting from credit rating upgrades or downgrades of countries in our sample.

Appendix Table C.4. Pretrend and Post-Rebalancing Analysis

Panel (A): CDS

	[d-4]	[d-3]	[d-2]	[d-1]	[d]	[d+1]	[d+2]	[d+3]	[d+4]
FIR_{ct}	-0.047	-0.050	-0.101	-0.134	-0.205	-0.256**	-0.224*	-0.294**	-0.332**
	(0.0597)	(0.0561)	(0.0572)	(0.0588)	(0.0737)	(0.1384)	(0.1392)	(0.1535)	(0.1780)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,571	1,571	1,571	1,571	1,571	1,571	1,571	1,571	1,555
Number of countries	18	18	18	18	18	18	18	18	18
R^2	0.355	0.350	0.418	0.469	0.489	0.490	0.498	0.499	0.471

Panel (B): Exchange Rates

	[d-4]	[d-3]	[d-2]	[d-1]	[d]	[d+1]	[d+2]	[d+3]	[d+4]
FIR_{ct}	-0.058	-0.069*	-0.133***	-0.190***	-0.288***	-0.283***	-0.294***	-0.311***	-0.292***
	(0.0379)	(0.0367)	(0.0415)	(0.0458)	(0.0652)	(0.0703)	(0.0706)	(0.0747)	(0.0811)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,756	1,756	1,756	1,756	1,756	1,756	1,756	1,756	1,736
Number of countries	23	23	23	23	23	23	23	23	23
R^2	0.2137	0.2522	0.2682	0.3165	0.3212	0.3184	0.3246	0.3475	0.3111

This table reports the estimated coefficients of FIR on CDS spreads (Panel A), and exchange rates (Panel B). FIR is the measure of standardized flows implied by the rebalancings (see Section 3). The cumulative log change is measured over an interval from four days prior to the rebalancing date (*d*) to four days after. All regressions include time and country fixed effects. Robust standard errors clustered at the country level are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

D. Local Currency versus Foreign Currency Debt

This appendix provides summary statistics on countries' debt maturity structures. Table D.1 reports local- and foreign-currency debt as a share of GDP, the average maturity of local- and foreign-currency debt, and the fraction of bonds maturing for both. Tables D.3 and D.2 present a country-level breakdown of these statistics. All statistics are computed using the bond-level data from Refinitiv Eikon.

Appendix Table D.1. Summary Statistics: Local vs. Foreign Currency

	Obs	Mean	Median	p25	p75	Std.Dev
LC/GDP	178	0.2765	0.2635	0.1525	0.3505	0.1559
FC/GDP	178	0.0704	0.0569	0.0223	0.1064	0.0598
Diff (LC - FC)	178	0.2079	0.1909	0.0810	0.2890	0.1808
Debt Maturity in LC	1,104	7.950	7.452	5.312	10.189	3.519
Debt Maturity in FC	1,079	10.406	10.581	6.859	12.810	5.200
Debt Maturity (LC-FC)	1,079	-2.490	-2.433	-5.692	0.230	5.689
$FBM_{c,t}$	734	0.045	0.038	0.019	0.061	0.034
$FBM\_FC_{c,t}$	734	0.010	0.007	0.002	0.014	0.011
FBM (LC-FC)	734	0.035	0.028	0.011	0.051	0.035

This table reports the summary statistics of a country maturity structure. LC/GDP is the outstanding local currency bonds over GDP, and FC/GDP is the outstanding foreign currency bonds over GDP. Diff (LC-FC) is the difference between LC/GDP and FC/GDP. Debt Maturity in LC is the local currency average bond maturity structure constructed by taking the weighted average of years to maturity on a country level. Debt Maturity in FC is the foreign currency average bond maturity structure constructed by taking the weighted average of years to maturity on a country level. $FBM_{c,t}$ is the fraction of local currency bonds maturing within one year (see Equation 11), and $FBM\_FC_{c,t}$ is the fraction of foreign currency bonds maturing within one year. Debt Maturity (LC-FC) is the difference between debt maturity in LC and debt maturity in FC. FBM (LC-FC) is the difference between $FBM_{c,t}$ and $FBM\_FC_{c,t}$. Source: Refinitiv Eikon.

Appendix Table D.2. Summary Statistics: Local vs. Foreign Currency by Country

	Debt Maturity in LC	Debt Maturity in FC	Debt Maturity (LC-FC)	$FBM_{c,t}$	$FBM\_FC_{c,t}$	FBM (LC-FC)
Argentina	7.036	12.612	-5.576	0.0005	0.014	-0.014
Brazil	5.827	8.432	-2.605	0.122	0.005	0.116
Chile	11.725	12.215	-0.490	0.035	0.002	0.032
China	7.437	16.227	-8.789	0.032	0.0001	0.032
Colombia	8.442	14.116	-5.675	0.066	0.007	0.058
Czech Republic	7.151	3.730	3.421	0.036	0.005	0.030
Dominican Republic	6.694	13.093	-6.399	0.064	0.041	0.023
Egypt	2.789	10.161	-7.372	0.153	0.017	0.135
Hungary	5.285	7.198	-1.913	0.100	0.023	0.076
Indonesia	9.811	12.238	-2.428	0.0167	0.008	0.008
Mexico	9.548	12.846	-3.298	0.062	0.014	0.047
Malaysia	8.464	5.395	3.314	0.068	0.0002	0.068
Nigeria	9.867	9.721	0.147	0.0023	0.0005	0.001
Peru	12.411	16.849	-4.438	0.051	0.009	0.0428
Philippines	8.367	10.685	-2.318	0.037	0.011	0.025
Poland	5.375	6.102	-0.727	0.0459	0.015	0.030
Romania	4.905	9.198	-4.293	0.0283	0.0198	0.008
Serbia	3.422	5.314	-1.892	0.0347	0.021	0.013
Russia	5.738	11.441	-5.704	0.0162	0.0058	0.010
Thailand	11.725	2.148	9.672	0.0350	0.00003	0.0349
Turkey	4.589	9.227	-4.639	0.006	0.012	-0.005
Uruguay	10.070	15.772	-5.702	0.0152	0.024	-0.009
South Africa	16.174	11.271	4.903	0.0155	0.0011	0.0143

This table reports a country-level breakdown of summary statistics on maturity structure. Debt Maturity (LC) is the mean LC average bond maturity, constructed as the weighted average years to maturity at the country level. Debt Maturity (FC) is the mean FC average bond maturity, constructed analogously. $FBM_{c,t}$ is the mean fraction of LC bonds maturing within one year (see Equation 11), and $FBM\_FC_{c,t}$ is the mean fraction of FC bonds maturing within one year. Debt Maturity (LC–FC) is the mean difference between local- and foreign-currency debt maturities. FBM (LC–FC) is the mean difference between $FBM_{c,t}$ and $FBM\_FC_{c,t}$.

Appendix Table D.3. Summary Statistics: Local vs. Foreign Currency Debt Share by Country

	LC/GDP	FC/GDP	Diff (LC - FC)
Argentina	0.1096	0.1929	-0.0833
Brazil	0.5958	0.0205	0.5753
Chile	0.1889	0.0556	0.1332
China	0.3293	0.0000	0.3293
Colombia	0.2804	0.0849	0.1955
Czech Republic	0.2914	0.0378	0.2536
Hungary	0.3973	0.1686	0.2286
Indonesia	0.1768	0.0626	0.1142
Mexico	0.2655	0.0529	0.2126
Malaysia	0.5133	0.0159	0.4973
Peru	0.1164	0.0736	0.0428
Philippines	0.2898	0.0871	0.2027
Poland	0.3089	0.0964	0.2126
Romania	0.1565	0.1446	0.0119
Russia	0.0890	0.0232	0.0582
Thailand	0.3075	0.0000	0.3075
Turkey	0.1467	0.0947	0.0520
South Africa	0.4153	0.0470	0.3683

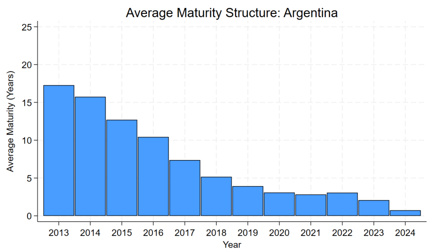
This table reports a country-wise breakdown of the summary statistics on each country's currency composition. LC/GDP is the mean of outstanding local currency bonds over GDP, and FC/GDP is the mean of outstanding foreign currency bonds over GDP. Diff (LC-FC) is the difference between LC/GDP and FC/GDP.

E. Maturity Structure: Emerging and Advanced Economies

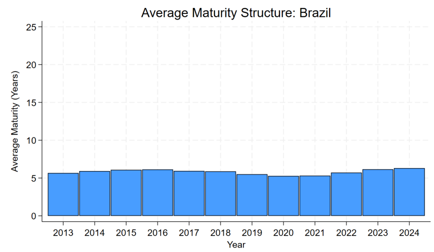
This appendix presents additional evidence on the maturity structure of emerging and advanced economies. Figure E.4 shows the average LC bond maturity, and Figure E.5 plots the amount of bonds maturing within one year as a percentage of GDP for each emerging economy in our sample over time. Figures E.6 and E.7 show the average LC bond maturity, while Figures E.8, E.9, and E.10 plot the amount of bonds maturing within one year as a percentage of GDP for each advanced economy.

Local Currency Average Bond Maturity per Country: Emerging Economies.

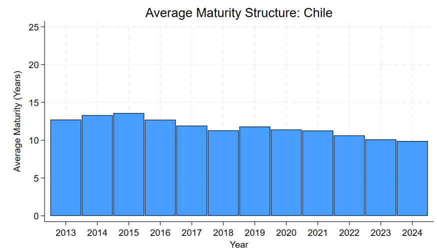
(A) Argentina



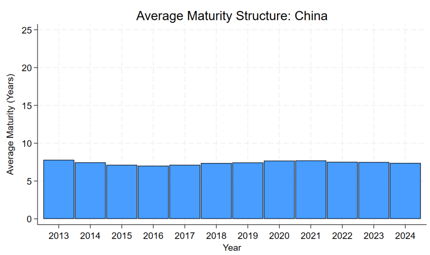
(B) Brazil



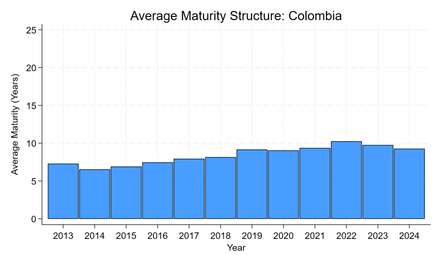
(C) Chile



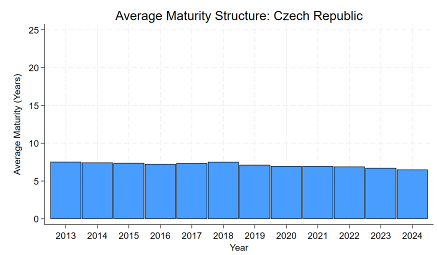
(D) China



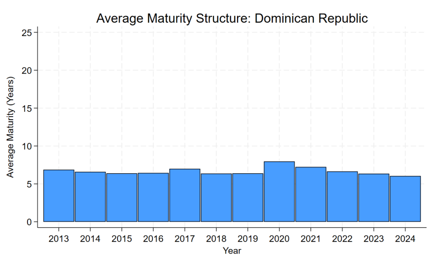
(E) Colombia



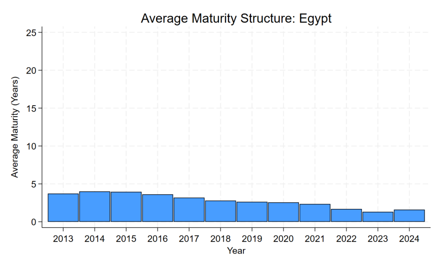
(F) Czech Republic



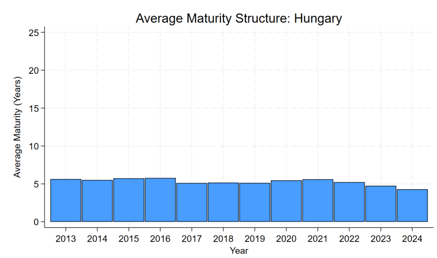
(G) Dominican Republic



(H) Egypt

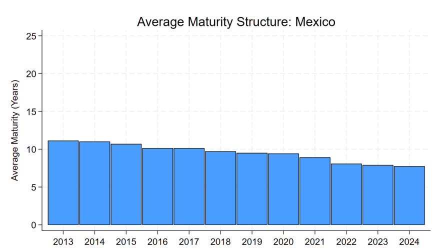


(I) Hungary

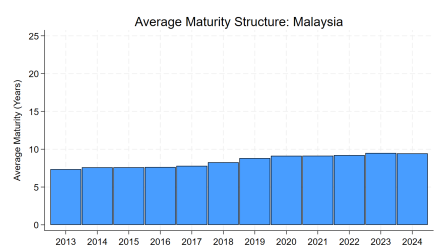


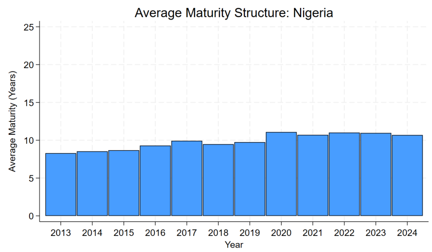
(J) Indonesia

(K) Mexico

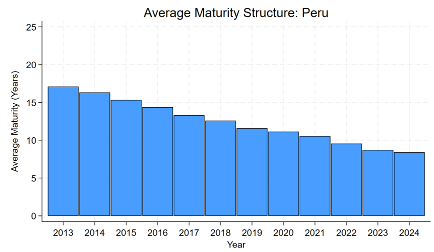


(L) Malaysia

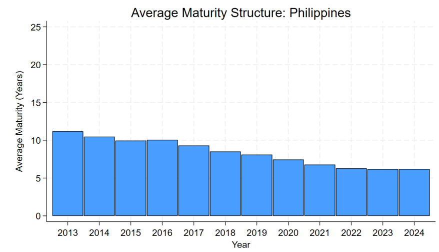




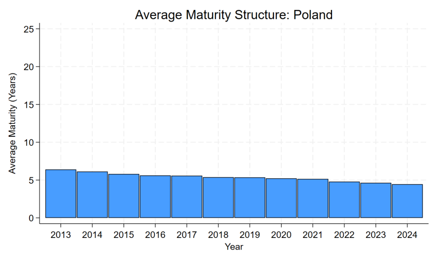
(M) Nigeria



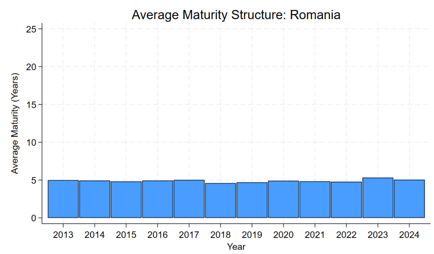
(N) Peru



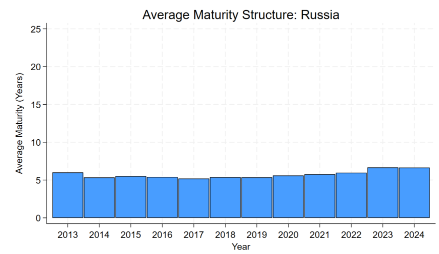
(O) Philippines



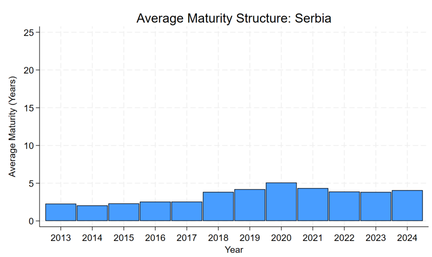
(P) Poland



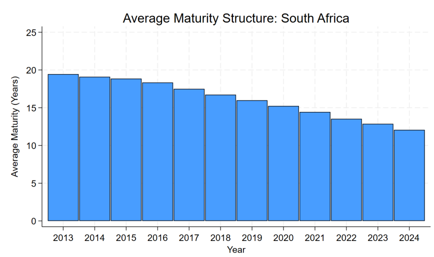
(Q) Romania



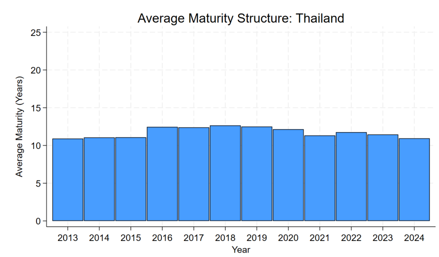
(R) Russia



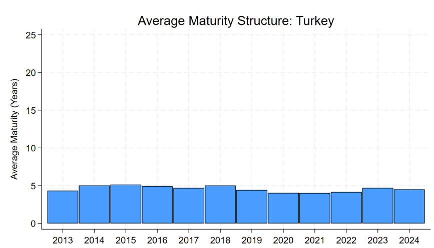
(S) Serbia



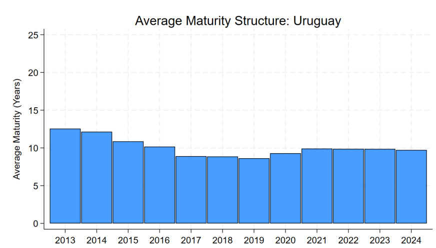
(T) South Africa



(U) Thailand



(V) Turkey

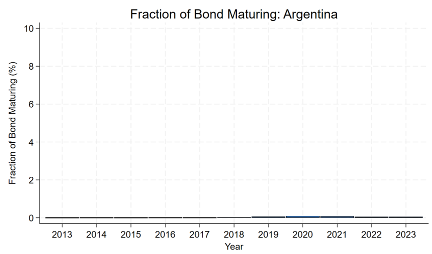


(W) Uruguay

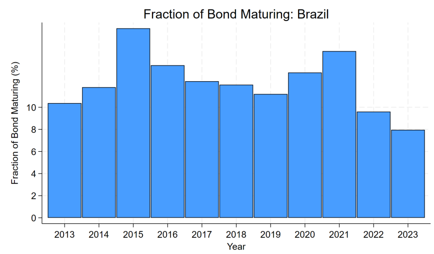
Appendix Figure E.4. This figure reports the local currency (LC) average bond maturity per country from 2013–2024. We construct the LC average maturity by computing the weighted average years to maturity of LC debt at the country level in each year. Source: Refinitiv Eikon.

Fraction of LC Bonds Maturing by Country: Emerging Economies.

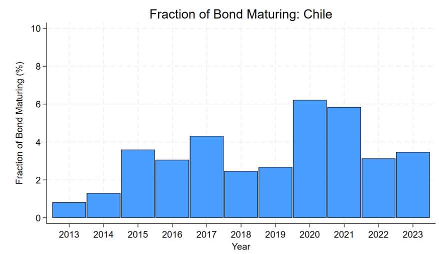
(A) Argentina



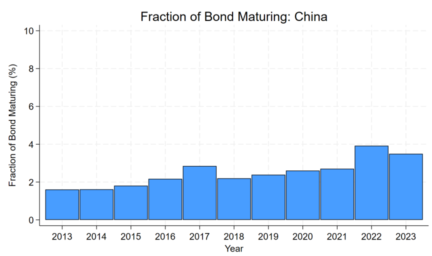
(B) Brazil



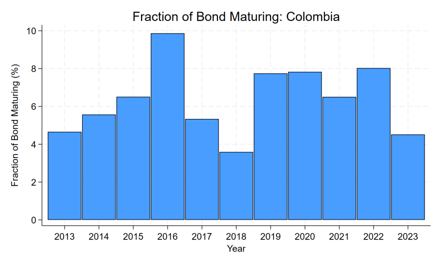
(C) Chile



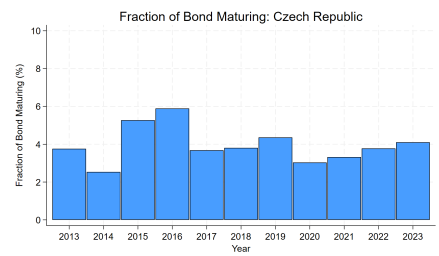
(D) China



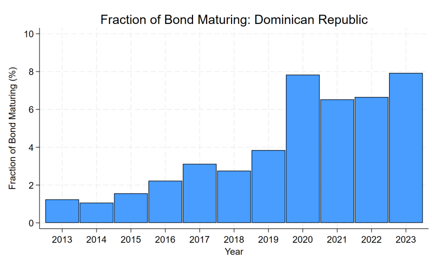
(E) Colombia



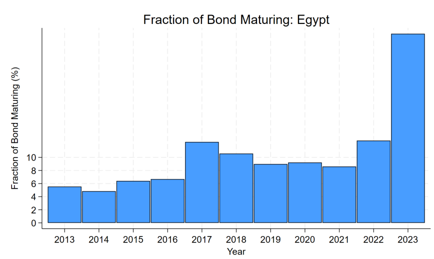
(F) Czech Republic



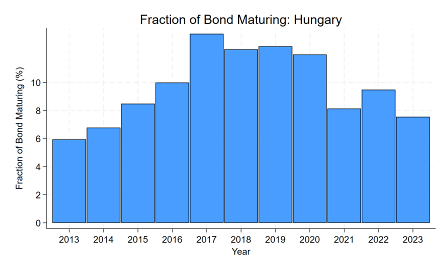
(G) Dominican Republic



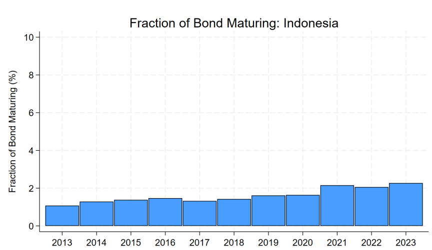
(H) Egypt



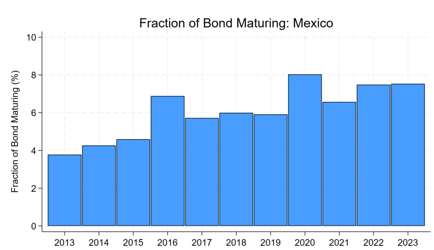
(I) Hungary



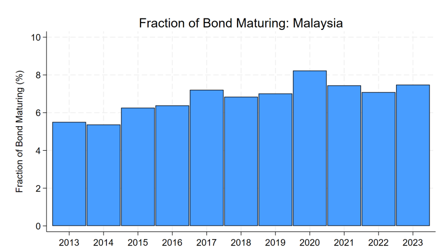
(J) Indonesia

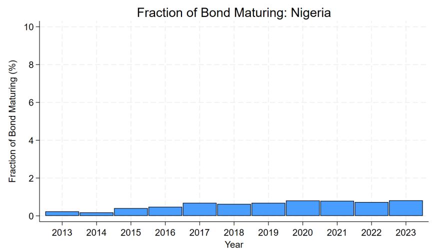


(K) Mexico

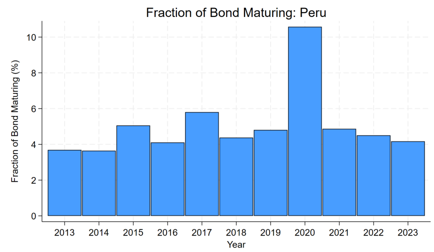


(L) Malaysia

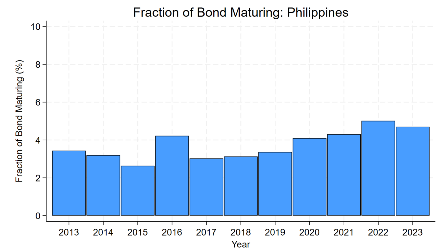




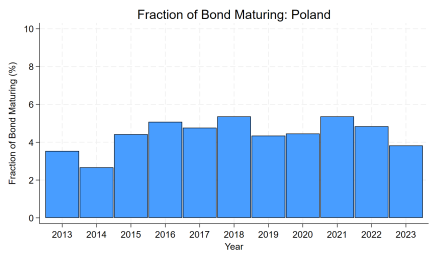
(M) Nigeria



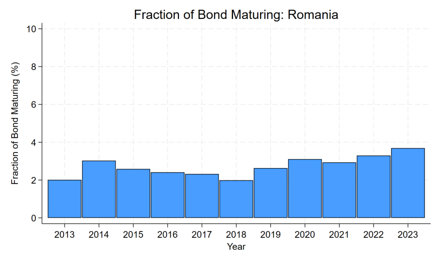
(N) Peru



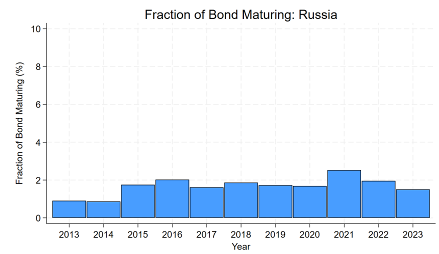
(O) Philippines



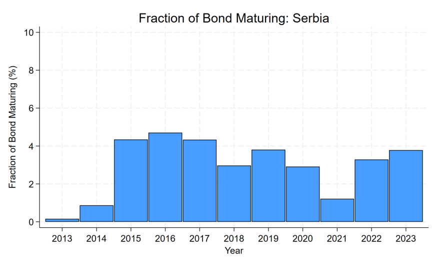
(P) Poland



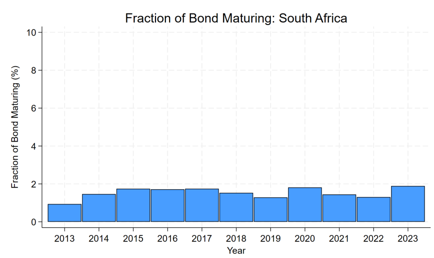
(Q) Romania



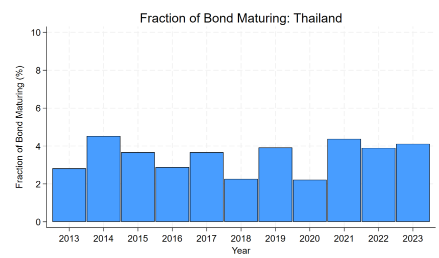
(R) Russia



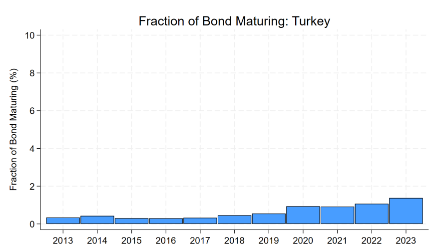
(S) Serbia



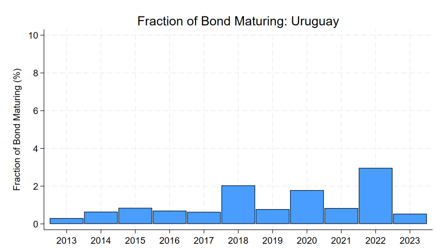
(T) South Africa



(U) Thailand



(V) Turkey

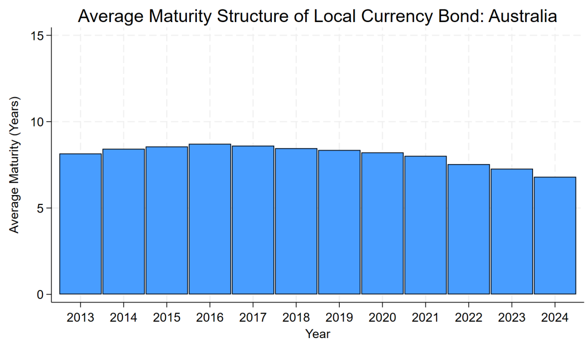


(W) Uruguay

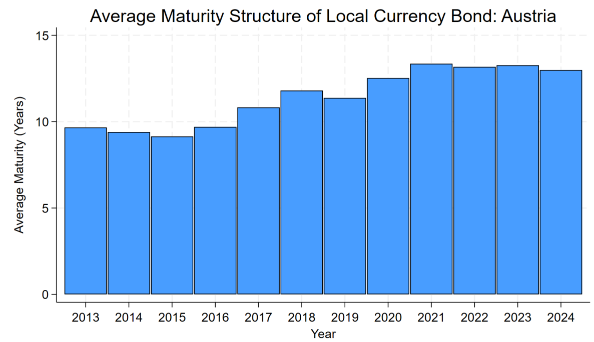
Appendix Figure E.5. This figure reports the amount of bonds maturing within one year as a percentage of GDP for each country in our sample from 2013 to 2024. The fraction of LC bonds maturing is computed by dividing the value of outstanding bonds maturing within one year by GDP. Source: Refinitiv Eikon.

Appendix Figure E.6. Local Currency Average Bond Maturity per Country: Advanced Economies.

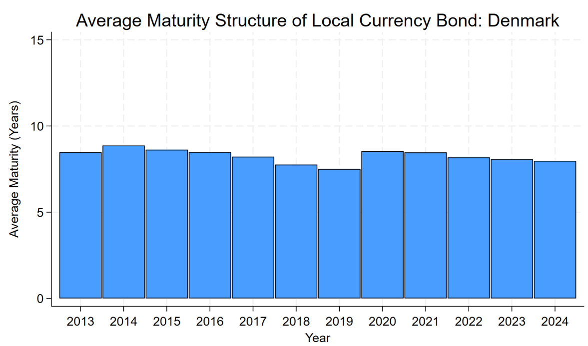
(A) Australia



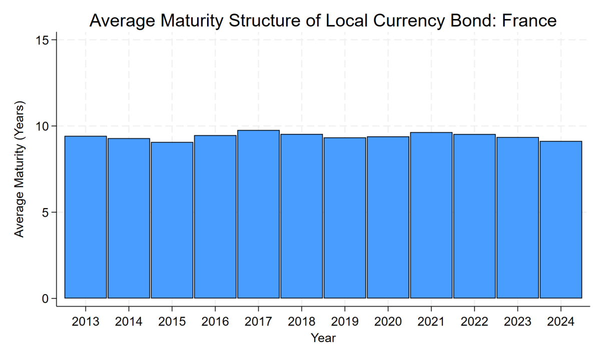
(B) Austria



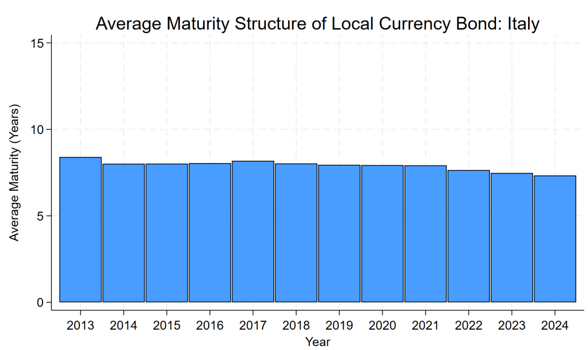
(C) Denmark



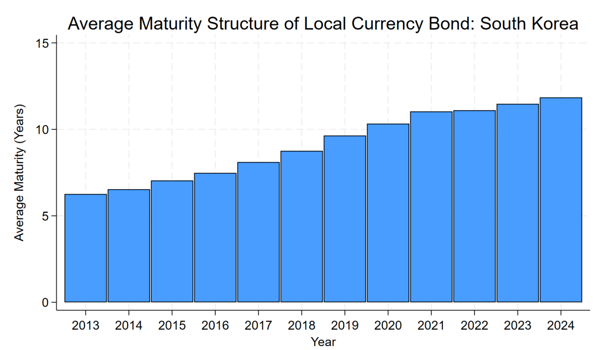
(D) France



(E) Italy



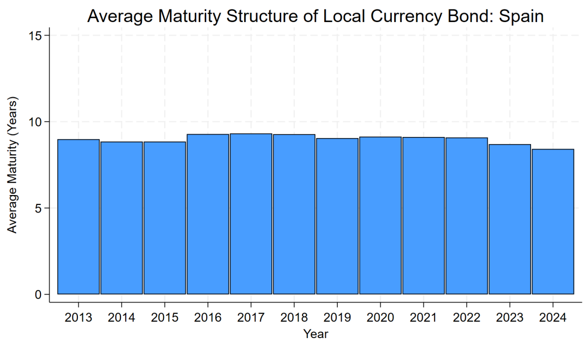
(F) South Korea



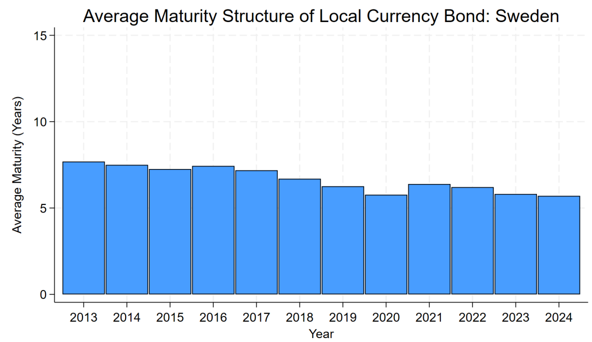
This figure reports the local currency (LC) average bond maturity per country from 2013–2024. We construct the LC average maturity by computing the weighted average years to maturity of LC debt at the country level in each year. Panels (A), (B), (C), (D), (E), and (F) plot the average bond maturity for Australia, Austria, Denmark, France, Italy, and South Korea, respectively. Source: Refinitiv Eikon.

Appendix Figure E.7. Local Currency Average Bond Maturity per Country: Advanced Economies

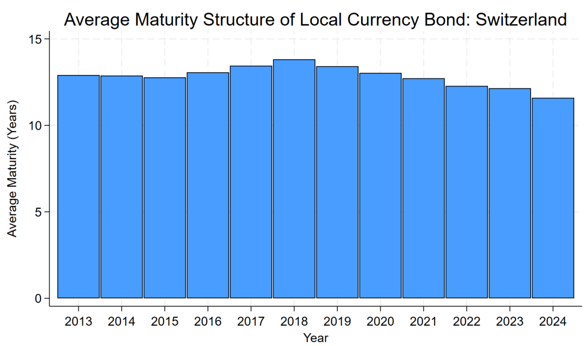
(A) Spain



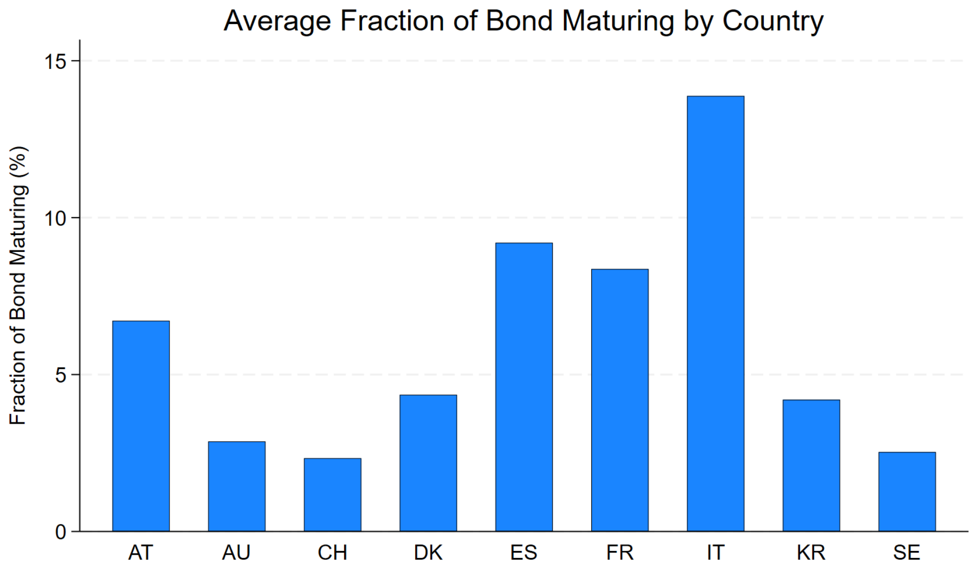
(B) Sweden



(C) Switzerland



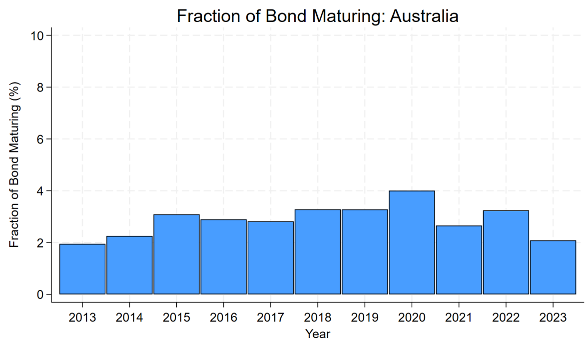
This figure reports the local currency (LC) average bond maturity per country from 2013–2024. We construct the LC average maturity by computing the weighted average years to maturity of LC debt at the country level in each year. Panels (A), (B) and (C) plot the local currency average bond maturity for Spain, Sweden, and Switzerland, respectively. Source: Refinitiv Eikon.



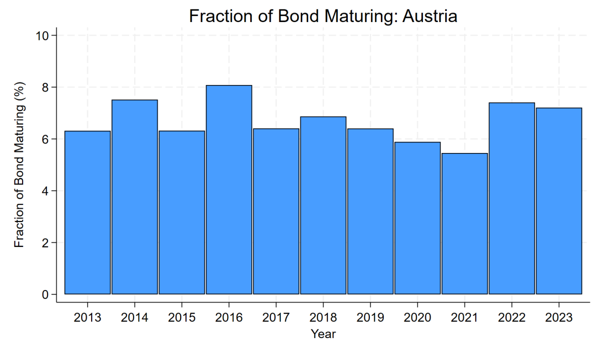
Appendix Figure E.8. This figure reports the amount of bonds maturing within one year as a percentage of GDP for each advanced-economy country in our sample from 2013–2024. The fraction of LC bonds maturing is computed by dividing the value of outstanding bonds maturing within one year by GDP. AT, AU, CH, DK, ES, FR, IT, KR, and SE refer to Austria, Australia, Switzerland, Denmark, Spain, France, Italy, South Korea, and Sweden, respectively. Source: Refinitiv Eikon.

Appendix Figure E.9. Fraction of LC Bonds Maturing by Country: Advanced Economies.

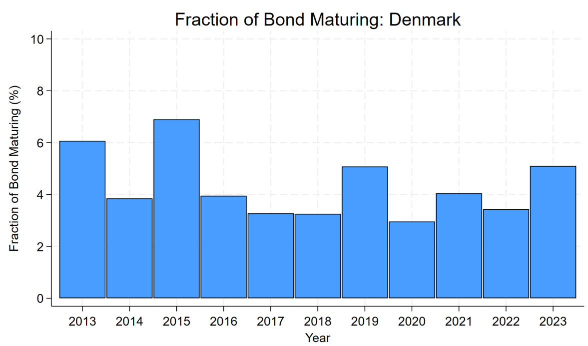
(A) Australia



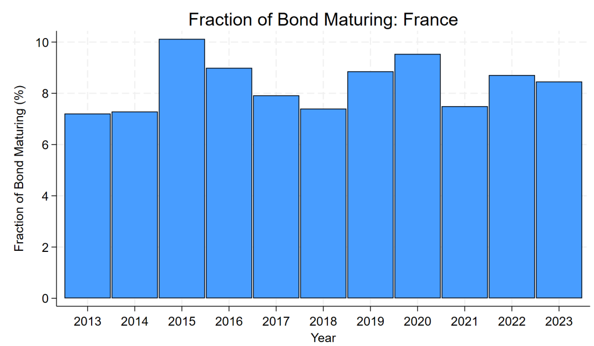
(B) Austria



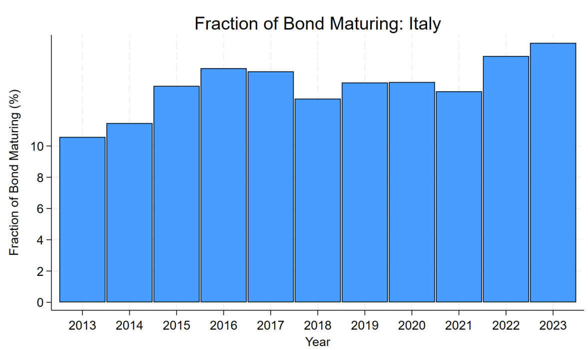
(C) Denmark



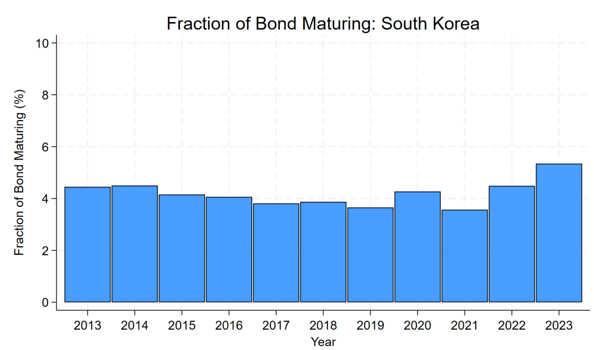
(D) France



(E) Italy



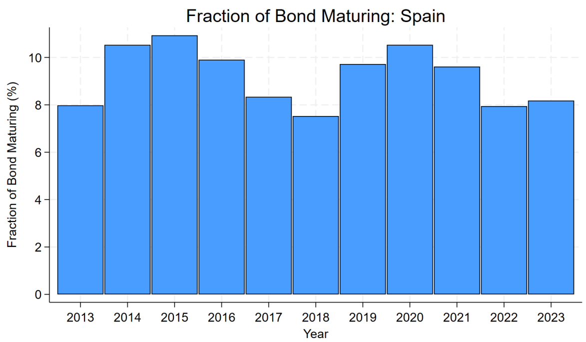
(F) South Korea



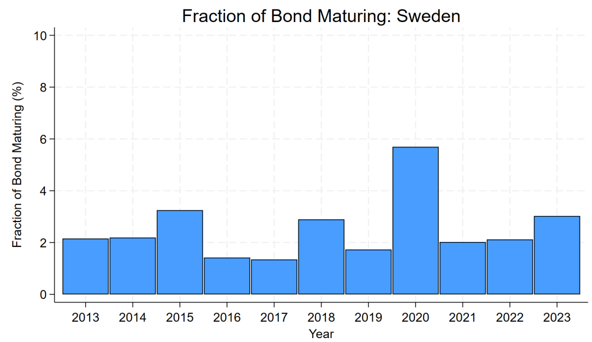
This figure reports the amount of bonds maturing within one year as a percentage of GDP for each country in our sample from 2013 to 2024. The fraction of LC bonds maturing is computed by dividing the value of outstanding bonds maturing within one year by GDP. Panels (A), (B), (C), (D), (E), and (F) plot the fraction of bond maturing for Australia, Austria, Denmark, France, Italy, and South Korea, respectively. Source: Refinitiv Eikon.

Appendix Figure E.10. Fraction of LC Bonds Maturing by Country: Advanced Economies.

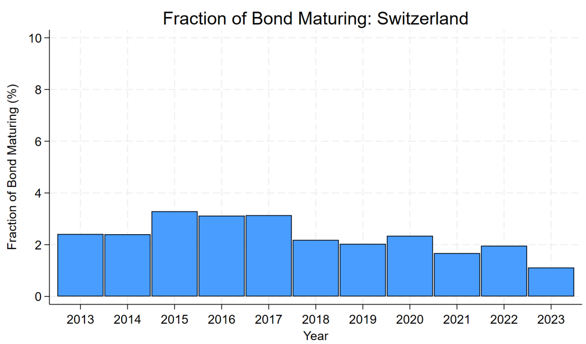
(A) Spain



(B) Sweden



(C) Switzerland



This figure reports the amount of bonds maturing within one year as a percentage of GDP for each country in our sample from 2013 to 2024. The fraction of LC bonds maturing is computed by dividing the value of outstanding bonds maturing within one year by GDP. Panels (A), (B), and (C) plot the fraction of bond maturing for Spain, Sweden, and Switzerland, respectively. Source: Refinitiv Eikon.

F. Additional Measures of Capital Flows

F.1 Flows Implied by Shifts in the Broad Dollar Index (BDI)

As our second measure of capital flow shocks, we use changes in the BDI. Prior research shows that dollar appreciations are systematically associated with portfolio outflows and reductions in foreign investor holdings of LC sovereign bonds across emerging markets (Jansen, Shin, and Von Peter, 2024).

We estimate the following regression:

$$\begin{aligned} \Delta y_{ct} = \theta_c + \beta_1 \Delta \log BDI_t + \beta_2 TopFBM_{ct} + \beta_3 \Delta \log BDI_t \times TopFBM_{ct} \\ + \gamma' \text{Controls}_{c,t-1} + \epsilon_{ct} \end{aligned} \tag{13}$$

where y_{ct} is the outcome variable of country c at month t, defined as in Equation (9), but without considering exchange rates, to avoid confounding effects. The broad dollar index (BDI) is a weighted average of the foreign exchange value of the US dollar against the currencies of a broad group of major US trading partners; an increase represents a stronger US dollar.[12] The vector of controls is the same as in Equation (9).

Table F.1 presents the results. Consistent with our hypothesis, we find that rollover risk significantly amplifies the effects of BDI shocks, and the economic magnitudes are substantial. In response to a one–standard-deviation increase in the BDI index, the CDS of countries with high rollover risk increases by 2.19%, corresponding to approximately 13% of one standard deviation of CDS changes, while no effect is observed for other countries.

F.2 Flows Implied by U.S. Monetary Policy Shocks (MPS)

Following Miranda-Agrippino and Rey (2020), we also utilize U.S. monetary policy shocks identified from movements in federal funds futures around Federal Open Market Committee (FOMC) announcements for identification. Contractionary surprises are well documented to trigger global capital retrenchment and tighten financial conditions in emerging markets, thereby offering another plausibly exogenous source of variation in capital flows.

Specifically, we measure monetary policy shocks as in Bauer and Swanson (2023), who construct them from changes in the first four quarterly Eurodollar futures

[12] The BDI is composed of the following countries: Euro Area, Canada, Japan, Mexico, China, United Kingdom, Taiwan, Korea, Singapore, Hong Kong, Malaysia, Brazil, Switzerland, Thailand, Philippines, Australia, Indonesia, India, Israel, Saudi Arabia, Russia, Sweden, Argentina, Venezuela, Chile, and Colombia.

contracts within a 30-minute window around FOMC announcements. These measures capture unexpected shifts in interest rate expectations and are widely used as a proxy for U.S. monetary policy shocks.

We estimate the following specification:

$$\Delta y_{c,t} = \theta_{cy} + \beta_1 MPS_t + \beta_2 TopFBM_{ct} + \beta_3 MPS_t \times TopFBM_{ct} + \gamma' Controls_{c,t-1} + \epsilon_{ct} \quad (14)$$

where $y_{c,t}$ is the outcome variable from country c at time t (the outcome variables are the same as in Equation (9)). $\Delta y_{c,t}$, defined as $y_{c,d+z} - y_{c,d-1}$, is the cumulative change over an interval from one day prior to the FOMC date, d, to z days after it. In the baseline results, we use z=$\{0,1,2,3\}$. θ_{cy} represents Country $\times$ Year fixed effects. MPS_t is the monetary policy shock from Bauer and Swanson (2023) described above. The vector of controls is the same as in Equation (9).

Table F.2 shows the results for CDS spreads. We find that rollover risk significantly amplifies the effects of U.S. contractionary monetary policy shocks, and the magnitudes are again economically meaningful. For example, a one–standard-deviation contractionary shock increases the CDS of countries with high rollover risk by 2.23% three days after the FOMC announcement, corresponding to about 26% of one standard deviation of CDS changes, which highlights that the effect is substantial in relative terms. We also analyze the impact on exchange rates in Table F.2. We find that contractionary shocks lead to a depreciation of exchange rates in EM economies, and rollover risk amplifies these effects, but the magnitudes are not statistically significant.

Appendix Table F.1. Capital Flows and Rollover Risk: Broad Dollar Index (BDI)

	Credit Default Swaps	**Credit Default Swaps**
$\Delta \log$ BDI	-0.0073	
	(0.0280)	
$\Delta \log$ BDI $\times$ TopFBM	0.0292***	0.0365***
	(0.0070)	(0.0072)
Observations	879	879
Country FE	Yes	Yes
Time FE	No	Yes
Controls	Yes	Yes
R-squared	0.1761	0.2935

This table reports the estimated coefficients of $\Delta \log BDI$ and $\Delta \log BDI \times$ TopFBM on the changes in the log of CDS spreads. Observations are at the country-month level. The main independent variable is the broad dollar index (BDI), which is a weighted average of the foreign exchange value of the US dollar against the currencies of a broad group of major US trading partner interacted with $TopFBM$. All regressions control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with $\Delta \log BDI$. Robust standard errors clustered at the time level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table F.2. Capital Flows and Rollover Risk: Monetary Policy Shocks (MPS)

Panel A: Credit Default Swaps	[d]	[d+1]	[d+2]	[d+3]
MPS	0.0973	-0.0063	0.2554	0.2723
	(0.3052)	(0.3765)	(0.4732)	(0.4674)
$MPS \times TopFBM$	0.1387*	0.1653	0.3058**	0.3072**
	(0.0737)	(0.0994)	(0.1465)	(0.1466)
Observations	1,237	1,237	1,237	1,222
Country x Year	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.1838	0.0831	0.1209	0.1212
Panel B: Exchange Rates	[d]	[d+1]	[d+2]	[d+3]
MPS	0.2404	0.2606	0.2326	0.2442
	(0.1803)	(0.1827)	(0.1972)	(0.2011)
$MPS \times TopFBM$	0.0358	0.0330	0.0169	0.0173
	(0.0311)	(0.0352)	(0.0431)	(0.0437)
Observations	1,416	1,416	1,416	1,399
Country x Year	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.2424	0.2468	0.2280	0.2417

Panel A reports the estimated coefficients of MPS and $MPS \times TopFBM$ on changes in the log of CDS over a four-day window around the FOMC announcement date (d). Panel B reports the estimated coefficients of MPS and $MPS \times TopFBM$ on changes in the log of exchange rates over the same window. MPS is the monetary policy shock from Bauer and Swanson (2023). TopFBM is an indicator equal to one if a country is in the top tercile of the $FBM_{c,t}$ distribution. All regressions control for average bond maturity, total debt over GDP, GDP growth, interest rates, and their interactions with MPS. Robust standard errors clustered at the time level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Appendix Table F.3. Broad Dollar Index (BDI) Shocks and Term Structure Effects

Panel A: Impact on Bond Yields by Maturity

	Bond Yields (1–5Y)	Bond Yields (5–10Y)	Bond Yields (10Y+)
$\Delta \log BDI$	-0.2608***	-0.3128**	0.0005
	(0.0803)	(0.1388)	(0.0375)
$\Delta \log BDI \times$ TopFBM	-0.0523***	-0.0495**	0.0087
	(0.0159)	(0.0185)	(0.0133)
Observations	13,727	9,922	8,620
Bond $\times$ Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
R-squared	0.1790	0.2348	0.2501

Panel B: Impact on CDS Spreads by Maturity

	CDS (5Y)	CDS (10Y)
$\Delta \log BDI$	0.0006	0.0568***
	(0.0221)	(0.0172)
$\Delta \log BDI \times$ TopFBM	0.0209***	0.0437***
	(0.0078)	(0.0109)
Observations	2,075	892
Country $\times$ Year FE	Yes	Yes
Controls	Yes	Yes
R-squared	0.1784	0.3692

Panel A of this table reports the estimated coefficients of $\Delta \log BDI$ and $\Delta \log BDI \times$ TopFBM on changes in bond yields across maturity buckets. Observations are at the country-month level. Panel B reports the estimated coefficients of $\Delta \log BDI$ and $\Delta \log BDI \times$ TopFBM on changes in the log of CDS spreads with 5-year and 10-year maturities. The main independent variable is the broad dollar index (BDI), a weighted average of the foreign exchange value of the U.S. dollar against the currencies of a broad group of major U.S. trading partners, interacted with $TopFBM$. $TopFBM$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM_{c,t}$ variable. All regressions include controls for average bond maturity, total debt over GDP, GDP growth, interest rates, and their interactions with $\Delta \log BDI$. Robust standard errors, clustered at the bond level for the bond-yield regressions and at the time level for the CDS regressions, are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table F.4. Monetary Policy Shocks (MPS) and Term Structure Effects

	Bond Yields			
	[d]	[d+1]	[d+2]	[d+3]
Panel A: 1–5 Years Maturity				
MPS	0.1502	0.1581	-0.4402	-0.4258
	(0.2055)	(0.3983)	(0.4495)	(0.4472)
MPS × TopFBM	0.2276***	0.2288**	0.0843	0.0812
	(0.0779)	(0.0980)	(0.1247)	(0.1245)
Observations	8,179	8,179	8,179	8,179
Bond × Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.1695	0.1873	0.2150	0.2095
Panel B: 5–10 Years Maturity				
MPS	0.4091**	0.6407*	-0.0981	-0.0797
	(0.2061)	(0.3344)	(0.3396)	(0.3349)
MPS × TopFBM	0.1508*	0.1200	0.0140	0.0128
	(0.0868)	(0.1013)	(0.1326)	(0.1325)
Observations	5,859	5,859	5,859	5,859
Bond × Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.1480	0.1980	0.2191	0.2052
Panel C: Over 10 Years Maturity				
MPS	0.5532**	0.2153	-0.1198	-0.1259
	(0.2270)	(0.3116)	(0.3130)	(0.3134)
MPS × TopFBM	0.1473**	0.1374	0.1594	0.1579
	(0.0702)	(0.0936)	(0.1157)	(0.1158)
Observations	5,138	5,138	5,138	5,138
Bond × Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.1801	0.2306	0.2189	0.2188

	Credit Default Swaps			
	[d]	[d+1]	[d+2]	[d+3]
Panel D: 5-Year CDS				
MPS	0.096	-0.013	0.254	0.271
	(0.305)	(0.376)	(0.473)	(0.467)
$MPS\times$ TopFBM	0.134*	0.159	0.300**	0.302**
	(0.074)	(0.100)	(0.146)	(0.146)
Observations	1,245	1,245	1,245	1,229
Country × Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.184	0.083	0.121	0.121
Panel E: 10-Year CDS				
MPS	0.198	0.275	0.439	0.439
	(0.220)	(0.348)	(0.455)	(0.455)
$MPS\times$ TopFBM	0.118	0.161	0.247	0.243
	(0.079)	(0.120)	(0.176)	(0.176)
Observations	537	537	537	531
Country × Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.177	0.166	0.205	0.197

Panels A–C of this table report the estimated coefficients of MPS and its interaction with $TopFBM$ on changes in bond yields across maturity buckets (1–5 years, 5–10 years, and over 10 years). Panels D and E report the effects on the log of CDS spreads with 5-year and 10-year tenors. d denotes the FOMC day. MPS is the monetary policy shock from Bauer and Swanson (2023). All regressions include controls for average bond maturity, total debt over GDP, GDP growth, interest rates, and their interactions with MPS. Robust standard errors, clustered at the bond level for the bond-yield regressions and at the time level for the CDS regressions, are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

G. Additional Results and Robustness

This appendix presents additional results and robustness tests to which we subject our baseline findings.

G.1 Importance of Debt/GDP

We examine whether a country's Debt/GDP ratio implies a differential response to capital flow shocks and compare its importance to rollover risk. Each quarter, we sort countries into terciles based on the distribution of Debt/GDP and create the dummy variable $TopDebt_{c,t}$, which equals one if a country is in the top tercile of this distribution. We then estimate Equations (9), (13), and (14), including $TopDebt_{c,t}$ and its interaction with the capital flow shock, while keeping the same control variables.

Table G.1 reports the results for the FIR shock. First, the coefficient associated with FIR $\times$ TopFBM remains virtually unchanged relative to our baseline findings. Second, rollover risk appears to play a more important role than "leverage" (Debt/GDP) in explaining a country's differential response to exogenous capital flows. Results using the BDI and monetary policy shocks are reported in Tables G.2 and G.3 and show qualitatively similar patterns. These findings underscore the unique role of rollover risk in amplifying the effects of capital flows in emerging markets.

G.2 Additional Controls

In this section, we test the robustness of our results to alternative specifications and additional controls. First, we re-estimate our baseline results including the interaction of TopFBM with GDP growth in the set of controls to ensure that the heterogeneous effects of capital flows are not driven by differences in cyclicality (see Jungherr, Meier, Reinelt, and Schott (2022) and others). Tables G.4, G.5, and G.6 show that our findings remain unchanged. Second, Beltran and He (2024) show that flows implied by rebalancing have persistent effects on exchange rates. To address this concern, we re-estimate our baseline results including the lag of FIR as an additional control. Table G.7 shows that our results are qualitatively the same. Overall, these findings suggest that there is little to no confounding effect and that adding controls does not alter the regression results.

G.3 Countries at the 10% threshold

One concern with our results is that, when measuring the flows implied by the rebalancing (FIR), we also use data from countries at the 10% country-weight cap, and the flows from these countries may be correlated with macroeconomic fundamentals. For instance, if Brazil's country weight is rebalanced from 12% to 10%, the resulting outflows from Brazil could be driven by its economic performance, which might also be correlated with broader macroeconomic conditions that affect our outcome variables.

To address this concern, we construct a FIR measure that excludes flows from countries potentially correlated with macroeconomic conditions. The procedure is identical to that described in Subsection C.2, but we exclude countries at the 10% threshold. The idea is that when Brazil's weight is rebalanced from 12% to 10%, it results in an increase in the weight of a smaller country, such as Chile. In this case, the capital flows experienced by Chile's LC bonds would be unrelated to its own economic conditions and would instead reflect the reallocation caused by the larger country reaching the 10% cap. As a result, in this analysis, we exclude the outflows from Brazil and consider only the inflows to Chile.

We then estimate our main results using the FIR measure described above. Table G.8 presents our findings. We consistently find that the impact of FIR on exchange rates, and CDS spreads is significantly amplified for countries facing high rollover risk. Notably, the magnitudes are also very similar to those in our baseline analysis, which does not exclude countries in the top 10%. This is important as it suggests that the flows implied by the rebalancing are plausibly exogenous. These results highlight the robustness of our identification strategy and further underscore the important role of rollover risk in the transmission of capital flow shocks.

G.4 Pre-determined Maturity

As previously discussed, asset price movements can themselves affect rollover risk by influencing investor sentiment and refinancing conditions. To address this concern and better identify the causal impact of rollover risk, our baseline approach uses the ex-ante country maturity structure, which helps alleviate these concerns. Specifically, we define TopFBM using the distribution of the one-year lag of FBM, which represents the amount of bonds maturing in a given year as predicted from the previous year.

In this section, we conduct an additional robustness analysis of our bond maturity measure by constructing the FBM measure in a manner similar to Section 3, but using DD2, which captures the amount of bonds maturing in two years. This approach further ensures that the country's maturity structure is predetermined. Tables G.9–G.11 report qualitatively similar findings when using this alternative measure of rollover risk.

G.5 Uncertainty Shocks

Akinci, Kalemli-Özcan, and Queralto (2022) show that when U.S. uncertainty rises, the foreign country's exchange rate vis-à-vis the dollar depreciates and capital flows out of the country. Motivated by this evidence, we examine how changes in the VIX affect exchange rates and CDS spreads, and whether these impacts are amplified by rollover risk. To do so, we re-estimate our baseline specification, replacing BDI shocks with uncertainty shocks while keeping the same set of control variables.

Table G.12 presents the results. In response to a one–standard-deviation increase in the VIX, exchange rates depreciate by 6.45%. Rollover risk amplifies this impact by 38.44%. The findings for CDS spreads are even stronger: a one–standard-deviation increase in the VIX leads to a 6.83% rise in CDS spreads. This effect is approximately 1.1 times larger for countries facing rollover risk. Overall, our findings suggest that global uncertainty shocks are transmitted more strongly to countries with greater rollover risk

Appendix Table G.1. FIR and Rollover Risk: The importance of Debt/GDP

	Exchange Rate	**Credit Default Swaps**
FIR	-0.0240	-0.0209
	(0.0168)	(0.0278)
FIR × $TopFBM$	-0.0078**	-0.0421***
	(0.0036)	(0.0138)
FIR × $TopDebt$	0.0078	0.0262
	(0.0091)	(0.0192)
Observations	672	638
Country FE	Yes	Yes
Time FE	Yes	Yes
Controls	Yes	Yes
R-squared	0.5541	0.5657

This table reports the estimated coefficients of FIR, FIR× TopFBM, and FIR× TopDebt on the changes in the log of the exchange rate and the log of CDS. Observations are at the country-quarter level. The main independent variable is the measure of standardized flows implied by the rebalancings accumulated to the quarterly-level interacted with $TopFBM$. $TopFBM$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM_{c,t}$ variable. $TopDebt_{c,t}$ is an indicator variable that equals one if a country is in the top tercile of the distribution of Debt/GDP (sorted by quarter). We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with FIR. Robust standard errors clustered at the country level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table G.2. BDI and Rollover Risk: The importance of Debt/GDP

	Credit Default Swaps	**Credit Default Swaps**
$\Delta \log BDI$	0.0024	
	(0.0289)	
$\Delta \log BDI \times$ TopFBM	0.0268***	0.0318***
	(0.0074)	(0.0076)
$\Delta \log BDI \times$ TopDebt	0.0199*	0.0395***
	(0.0111)	(0.0108)
Observations	878	878
Country FE	Yes	Yes
Time FE	No	Yes
Controls	Yes	Yes
R-squared	0.1778	0.2973

This table reports the estimated coefficients of $\Delta \log BDI$, $\Delta \log BDI \times$ TopFBM, and $\Delta \log BDI \times$ TopDebt on the changes in the log of CDS. Observations are at the country-month level. The main independent variable is the broad dollar index (BDI), which is a weighted average of the foreign exchange value of the US dollar against the currencies of a broad group of major US trading partner interacted with $TopFBM$. $TopFBM$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM_{c,t}$ variable. $TopDebt_{c,t}$ is an indicator variable that equals one if a country is in the top tercile of the distribution of Debt/GDP (sorted by quarter). We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with $\Delta \log BDI$. Robust standard errors clustered at the time level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table G.3. MPS and Rollover Risk: The importance of Debt/GDP

	Credit Default Swaps			
	[d]	[d+1]	[d+2]	[d+3]
MPS	0.1035	0.0187	0.3228	0.3331
	(0.3278)	(0.4065)	(0.5130)	(0.5050)
$MPS \times TopFBM$	0.1363*	0.1586	0.2893**	0.2921**
	(0.0761)	(0.1000)	(0.1423)	(0.1423)
$MPS \times TopDebt$	0.0122	0.0475	0.1268	0.1145
	(0.0894)	(0.1127)	(0.1348)	(0.1295)
Observations	1,235	1,235	1,235	1,220
Country × Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.1838	0.0831	0.1211	0.1213

This table reports the estimated coefficients of MPS, $MPS\times$ TopFBM, and $MPS\times$ TopDebt on the changes in the log of CDS, where d is the day of the FOMC. The main independent variable is the monetary policy shock from Bauer and Swanson (2023) interacted with $TopFBM$. $TopFBM$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM_{c,t}$ variable. $TopDebt_{c,t}$ is an indicator variable that equals one if a country is in the top tercile of the distribution of Debt/GDP (sorted by quarter). We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with MPS. Robust standard errors clustered at the time level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table G.4. FIR and Rollover Risk: Cyclicality

	Exchange Rate	**Credit Default Swaps**
FIR	-0.0285**	-0.0353
	(0.0123)	(0.0283)
FIR × *TopFBM*	-0.0074**	-0.0402***
	(0.0033)	(0.0123)
TopFBM × GDP Growth	0.0307	0.0580
	(0.0400)	(0.1539)
Observations	673	639
Country FE	Yes	Yes
Time FE	Yes	Yes
Controls	Yes	Yes
R-squared	0.5503	0.5634

This table reports the estimated coefficients of FIR and FIR× TopFBM on the changes in the log of the exchange rate and the log of CDS. Observations are at the country-quarter level. The main independent variable is the measure of standardized flows implied by the rebalancings accumulated to the quarterly-level interacted with *TopFBM*. *TopFBM* is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM_{c,t}$ variable. We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with FIR. We also control for cyclicality, measured by the interaction of TopFBM with GDP growth. Robust standard errors clustered at the country level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table G.5. BDI and Rollover Risk: Cyclicality

	Credit Default Swaps	**Credit Default Swaps**
$\Delta \log BDI$	-0.0068	
	(0.0279)	
$\Delta \log BDI$ $\times$ TopFBM	0.0288***	0.0358***
	(0.0071)	(0.0073)
$TopFBM$ $\times$ GDP Growth	0.0511	0.0844
	(0.0857)	(0.0873)
Observations	879	879
Country FE	Yes	Yes
Time FE	No	Yes
Controls	Yes	Yes
R-squared	0.1762	0.2938

This table reports the estimated coefficients of $\Delta \log BDI$ and $\Delta \log BDI \times$ TopFBM on the changes in the log of CDS. Observations are at the country-month level. The main independent variable is the broad dollar index (BDI), which is a weighted average of the foreign exchange value of the US dollar against the currencies of a broad group of major US trading partner interacted with $TopFBM$. $TopFBM$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM_{c,t}$ variable. We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with $\log \Delta BDI$. We also control for cyclicality, measured by the interaction of TopFBM with GDP growth. Robust standard errors clustered at the time level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table G.6. MPS and Rollover Risk: Cyclicality

	Credit Default Swaps			
	[d]	[d+1]	[d+2]	[d+3]
MPS	0.0981	-0.0035	0.2555	0.2758
	(0.3078)	(0.3775)	(0.4746)	(0.4686)
$MPS \times TopFBM$	0.1382*	0.1634	0.3058**	0.3048**
	(0.0743)	(0.1004)	(0.1475)	(0.1483)
$TopFBM$ × GDP Growth	0.0039	0.0137	0.0004	0.0171
	(0.0323)	(0.0394)	(0.0503)	(0.0481)
Observations	1,237	1,237	1,237	1,222
Country × Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.1838	0.0831	0.1209	0.1213

This table reports the estimated coefficients of MPS and $MPS\times$ TopFBM on the changes in the log of CDS, where d is the day of the FOMC. The main independent variable is the monetary policy shock from Bauer and Swanson (2023) interacted with $TopFBM$. $TopFBM$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM_{c,t}$ variable. We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with MPS. We also control for cyclicality, measured by the interaction of TopFBM with GDP growth. Robust standard errors clustered at the time level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table G.7. FIR and Rollover Risk: Persistence

	Exchange Rate	**Credit Default Swaps**
FIR	-0.0248**	-0.0317
	(0.0101)	(0.0293)
FIR × $TopFBM$	-0.0059**	-0.0391***
	(0.0027)	(0.0119)
Lag of FIR	-0.0062*	-0.0068
	(0.0032)	(0.0064)
Observations	673	639
Country FE	Yes	Yes
Time FE	Yes	Yes
Controls	Yes	Yes
R-squared	0.5583	0.5643

This table reports the estimated coefficients of FIR and FIR× TopFBM on the changes in the log of the exchange rate and the log of CDS. Observations are at the country-quarter level. The main independent variable is the measure of standardized flows implied by the rebalancings accumulated to the quarterly-level interacted with $TopFBM$. $TopFBM$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM_{c,t}$ variable. We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with FIR. We also add one lag of FIR to control for persistence. Robust standard errors clustered at the country level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table G.8. FIR and Rollover Risk: Excluding countries at 10% threshold

	Exchange Rate	**Credit Default Swaps**
FIR	-0.0318**	-0.0348
	(0.0122)	(0.0330)
FIR × $TopFBM$	-0.0066*	-0.0346***
	(0.0034)	(0.0113)
Observations	525	491
Country FE	Yes	Yes
Time FE	Yes	Yes
Controls	Yes	Yes
R-squared	0.5792	0.5299

This table reports the estimated coefficients of FIR and FIR× TopFBM on the changes in the log of the exchange rate and the log of CDS. Observations are at the country-quarter level. The main independent variable is the measure of standardized flows implied by the rebalancings accumulated to the quarterly-level interacted with $TopFBM$. $TopFBM$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM_{c,t}$ variable. We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with FIR. We exclude countries at the 10% threshold when constructing the FIR measure. Robust standard errors clustered at the country level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table G.9. Capital Flows and Rollover Risk: FIR Shocks

	Exchange Rate	**Credit Default Swaps**
FIR	-0.0419**	-0.0398
	(0.0196)	(0.0347)
FIR × $TopFBM\_DD2$	-0.0090**	-0.0331**
	(0.0042)	(0.0150)
Observations	626	598
Country FE	Yes	Yes
Time FE	Yes	Yes
Controls	Yes	Yes
R-squared	0.5591	0.5610

This table reports the estimated coefficients of FIR and FIR× TopFBM_DD2 on the changes in the log of the exchange rate, and the log of CDS. Observations are at the country-quarter level. The main independent variable is the measure of standardized flows implied by the rebalancings accumulated to the quarterly-level interacted with $TopFBM\_DD2$. $TopFBM\_DD2$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM\_DD2_{c,t}$ variable ($FBM\_DD2_{c,t} = \frac{DD2_{c,t}}{\text{GDP}_{c,t}}$), where DD2 is the amount of debt due in two years. We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with FIR. Robust standard errors clustered at the country level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table G.10. Capital Flows and Rollover Risk: BDI Shocks

	Credit Default Swaps	**Credit Default Swaps**
$\Delta \log BDI$	-0.0134	
	(0.0285)	
$\Delta \log BDI \times TopFBM\_DD2$	0.0172*	0.0215**
	(0.0087)	(0.0082)
Observations	799	799
Country FE	Yes	Yes
Time FE	No	Yes
Controls	Yes	Yes
R-squared	0.1685	0.2841

This table reports the estimated coefficients of $\Delta \log BDI$ and $\Delta \log BDI\times$ $TopFBM\_DD2$ on the changes in the log of CDS. Observations are at the country-month level. The main independent variable is the broad dollar index (BDI), which is a weighted average of the foreign exchange value of the US dollar against the currencies of a broad group of major US trading partner interacted with $TopFBM\_DD2$. $TopFBM\_DD2$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM\_DD2_{c,t}$ variable ($FBM\_DD2_{c,t} = \frac{DD2_{c,t}}{\text{GDP}_{c,t}}$), where DD2 is the amount of debt due in two years. We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with $\log \Delta BDI$. Robust standard errors clustered at the time level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table G.11. Capital Flows and Rollover Risk: Monetary Policy Shocks

	Credit Default Swaps			
	[d]	[d+1]	[d+2]	[d+3]
MPS	0.0588	-0.0984	0.0969	0.1130
	(0.3070)	(0.3790)	(0.4587)	(0.4531)
$MPS \times TopFBM\_DD2$	0.0999	0.1213	0.2115	0.2120
	(0.0675)	(0.0963)	(0.1324)	(0.1326)
Observations	1,141	1,141	1,141	1,126
Country × Year FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.1957	0.1047	0.1590	0.1599

This table reports the estimated coefficients of MPS and $MPS\times$ $TopFBM\_DD2$ on the changes in the log of CDS, where d is the day of the FOMC. The main independent variable is the monetary policy shock from Bauer and Swanson (2023) interacted with $TopFBM\_DD2$. $TopFBM\_DD2$ is an indicator variable that equals one if the country is in the top tercile in terms of the $FBM\_DD2_{c,t}$ variable ($FBM\_DD2_{c,t} = \frac{DD2_{c,t}}{\text{GDP}_{c,t}}$), where DD2 is the amount of debt due in two years. We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with MPS. Robust standard errors clustered at the time level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.

Appendix Table G.12. VIX and Rollover Risk

	Exchange Rate	**Exchange Rate**	**Credit Default Swaps**	**Credit Default Swaps**
VIX	0.0645***		0.0683***	
	(0.0101)		(0.0243)	
VIX × TopFBM		0.0248*		0.0740**
		(0.0137)		(0.0333)
Observations	673	673	639	639
Country FE	Yes	Yes	Yes	Yes
Time FE	No	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes
R-squared	0.99	0.99	0.82	0.88

This table reports the estimated coefficients of VIX and $VIX \times TopFBM$ on the log of exchange rates and CDS spreads. Observations are at the country-quarter level. The main independent variable is the VIX interacted with $TopFBM$. $TopFBM$ is an indicator variable that equals one if the country is in the top tercile in terms of the FBM_c, t variable. We control for average bond maturity, total debt over GDP, GDP growth, interest rates, and the interaction of these variables with VIX. Robust standard errors clustered at the time level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.10$.