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DEFAULT OR DEPRECIATE, AND THE ORIGINAL SIN REDUX

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Default or Depreciate, and the Original Sin Redux [1]

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Abstract

We propose a theory of domestic and foreign currency debt and limited commitment to exchange rate and debt repayment policies. We show that while exchange rate depreciation can be costly, it also reduces the real value of domestic-currency debt and helps smooth consumption without the repercussions of default. In times of exceptional liquidity strain, we demonstrate that the government can face lower bond spreads by inflating the local-currency debt through a moderate currency depreciation, even when the government's ability to issue local-currency debt is constrained. Our model provides new insights into the long-held views of the "original sin" and its "redux".

Keywords: Sovereign default, inflationary bias, investor base, original sin, original sin redux
JEL Codes: E31, F34, F45

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1 Introduction

Record-high public borrowing requirements have emerged as a central challenge in current macroeconomic debates. This issue weighs particularly heavily on emerging-market economies (EMEs), which face disproportionate pressures during periods of financial market stress. Precisely when EME sovereigns need external financing most, they confront severe limitations in their ability to issue external debt denominated in their own currency – a constraint known as "original sin" (Eichengreen and Hausmann, 1999). Figure 1 illustrates this pattern for major EMEs during both the global financial crisis and the COVID-19 shock. In both episodes, sharp reversals in global risk appetite coincided with collapses in local-currency (LC) sovereign debt and surges in foreign-currency (FC) denominated EME sovereign debt held by foreign investors. This recurrence of original sin, termed "original sin redux" (Bertaut et al., 2025), materializes rapidly despite two decades of structural efforts by EME governments to enhance monetary policy credibility and mitigate their inflationary bias (Kydland and Prescott, 1977; Calvo, 1978).

In this paper, we reassess these long-held views of the original sin and its redux by developing a theory and a quantitative sovereign default model. Our model incorporates an explicit portfolio choice for the sovereign, where it must decide whether to issue debt in both domestic and foreign currencies. The government also optimally sets the depreciation rate of the exchange rate through discretion and may choose to default outright on its debt obligations. The multifaceted interaction between LC sovereign debt issuance under an inflationary bias and default risk guides the government's decision-making process. Through this model, we aim to reassess the traditional views of the "original sin" and its "redux".

Our model departs from the Eaton and Gersovitz (1981) setup by introducing nominal debt contracts. Specifically, while foreign-currency (FC) debt represents a real contract, domestic-currency (LC) debt enables sovereigns to smooth consumption during times of stress, as LC debt burdens may be inflated away under limited commitment to exchange rate policy. In our model, ex post currency depreciations result in real distortions, as in Rotemberg (1982)-type menu costs. The resulting inflation bias, as seen in Barro and Gordon (1983) and Aguiar et al. (2014), reduces expected real payoffs to lenders, causing bond yields to reflect a currency risk premium. This premium increases the nominal cost of borrowing in LC debt relative to FC debt.

Our environment features risk-averse foreign lenders segmented by their currency preferences for sovereign bonds, with these preferences diverging further during stress episodes – see the supporting evidence in the Online Appendix.[1] Our endogenously derived segmented-lender stochastic discount factors (SDFs) nest the clientele feature of Greenwood et al. (2018) and the preferred-habitat feature of Vayanos and Vila (2021): quantities matter for risk premia, but in our case LC debt also adds state contingency via inflation, altering the the pricing kernel–return covariance, thereby reducing FC spreads under adverse macroeconomic fundamentals. This setup allows us to capture the original sin redux, by introducing a liquidity shock to the degree of impatience of LC bond investors.[2] In periods of abundant liquidity, the sovereign finds it optimal to issue LC debt even it offers higher nominal returns over domestic currency debt to compensate lenders for the currency risk. This is because the sovereign can use currency depreciations as a discretionary lever to reduce real debt burdens. However, when global liquidity tightens and EME fundamentals weaken, LC bond investors become more impatient than hard-currency lenders toward future payouts – intensifying the excess borrowing cost of LC debt and encouraging the empirically observed hard-currency debt issuance (IMF, 2020b). We also introduce endogenous debt recovery for bonds in default – symmetric across currencies – as a solution to a Nash bargaining problem between the sovereign and its lenders to resolve debt renegotiation as in Yue (2010).

We calibrate our baseline specification to Mexico, which is representative of the dynamics of LC sovereign debt shares that are observed in EMEs (shown in Figure 1) over the period 2004-19. The model performs well in matching the time series averages of total government debt-to-GDP ratio, bond spreads across currencies, LC debt share of sovereign debt and inflation over the reference period. The baseline model also predicts that consumption and FC debt are more volatile than output, while the trade balance, bond yields, and inflation are less volatile. The output costs of depreciating the currency disciplines the sovereign to manage real debt burdens through strategic

[1] Evidence from Bertaut et al. (2025) on US-based holders of EME sovereign debt over the past two decades indicates that mutual funds – typically more responsive to shifts in global risk sentiment – hold a disproportionately large share of domestic-currency EME government bonds (see Figure C.1 in the Online Appendix). In contrast, insurance companies and pension funds predominantly invest in hard-currency sovereign bonds, favoring their relative stability and dollar-denominated returns to mitigate currency mismatch risks over longer investment horizons.

[2] This shock reflects the increased sell-off of LC sovereign bonds by foreign investors who fear amplified losses as EME currencies depreciate during periods of worsening global risk sentiment (Carstens and Shin, 2019). This pattern aligns with the observed tendency of sovereigns to issue hard-currency external debt – such as US dollar-denominated bonds, which are insulated from depreciation risk – during periods of financial stress, as LC bond pricing is more vulnerable to shifts in global conditions (Chamon et al., 2018).

adjustments in the currency composition of debt as in the data rather than through excessive exchange rate fluctuations, resulting in high debt-to-GDP volatility across both currencies. Excess bond yields and debt-to-GDP ratios over FC debt and net exports emerge countercyclical in our simulations, reflecting empirical co-movements.

Using our model, we show that while higher foreign holdings of LC sovereign debt increase the vulnerability of EMEs to reversals in global risk appetite, the transfer of currency risk and active management of the currency structure of sovereign debt help to reduce sovereign bond spreads. To this end, we apply the same path of adverse income shocks leading up to a reversal in global liquidity conditions to the baseline model and to an economy with dollarized public debt. We find that the sovereign in the baseline model tilts its debt portfolio towards LC denomination in the run-up to the liquidity crises, depreciates its currency and faces lower bond spreads than the economy with dollarized public debt. Despite reduced foreign demand for new LC debt issuance during risk-off episodes, the sovereign enjoys improved borrowing terms because ex post exchange rate depreciation offers incentive-compatible state contingency on the existing debt stock.

A simplified version of our model without the liquidity shocks continues to account for equilibrium LC debt issuance under tranquil global conditions, while failing to replicate the dynamics of original sin redux during stress periods.

Since currency depreciations are distortionary and limited commitment to exchange rate policy is priced in ex ante by foreign lenders, the normative question is whether LC debt issuance increases welfare. This would be a rather trivial analysis if debt contracts were modeled as one-period contracts so that the addition of an additional borrowing instrument better completes the markets. However, in the case of long-term debt contracts, the inclusion of an additional borrowing instrument could exacerbate the debt-dilution problem that is typical of long-term debt environments. Taking all these aspects into account, we find that an unanticipated switch from the baseline economy to the economy with dollarized public debt – with identical total debt-to-GDP ratios in both economies – decreases household welfare. This welfare loss stems primarily from the decline in government debt market value as the sovereign loses its ability to reduce debt burdens over the business cycle, with losses intensifying as output approaches the default threshold.

The debt sustainability benefits of optimal currency depreciations in our environment help explain the ability of EMEs to weather the extraordinary COVID-19 shock largely without major

debt events (with the exception of Argentina, which happens to have a very low LC share of external debt). In Figure A.1, we show that countries with a higher LC share of total foreign holdings of government debt prior to the COVID-19 shock experienced larger currency depreciations (with a correlation coefficient of 0.27) and smaller increases in FC government bond spreads (with a correlation coefficient of -0.44) during the pandemic. Therefore, our analysis predicts that in countries with a higher LC share in foreign holdings of government debt prior to the pandemic, a large part of the post-pandemic rise in government bond yields (Hofmann et al., 2020) could be attributed to increased currency risk rather than credit risk.

Our contributions are threefold. First, we demonstrate that an EME sovereign can achieve lower bond spreads by proactively managing the currency composition of its debt, even during exceptional crises such as the COVID-19 pandemic that severely constrain LC debt issuance. Second, we suggest that heterogeneous lender behavior is essential for explaining the empirical dynamics of the currency composition of EME sovereign debt with chronic inflation histories. Third, we explicitly model the utility maximization problem of risk-averse lenders investing in EME sovereign debt, generating endogenous stochastic discount factors, and replace ad-hoc debt recovery assumptions with endogenous debt renegotiation between the sovereign and its lenders.

Related literature. Our paper contributes to a large literature on inflation bias and original sin. The earlier research attributed the lack of domestic-currency debt in international debt markets to an inflation bias stemming from a lack of monetary policy credibility (Kydland and Prescott, 1977; Calvo, 1978). Later on, Calvo (1988) highlighted the benefits of mitigating the inflation bias, resulting from a debt-dilution problem identified by Barro and Gordon (1983). Aguiar et al. (2015) suggest that a mix of high- and low-debt member countries may constitute an optimal currency union arrangement, given the lack of commitment to price stability and the possibility of self-fulfilling debt crises. It is widely observed that a similar inflationary bias has been mitigated in the EMEs thanks to the adoption of stronger macroeconomic policy frameworks (notably central bank independence), which has accordingly allowed the original sin to dissipate (Du and Schreger, 2016). In addition to departing from these studies by introducing endogenous default, we add a new dimension to this literature by examining whether the increased foreign ownership of LC sovereign debt hampers the ability of EME governments to avert debt crises in exceptional episodes of stress, during which foreigners tend to fire-sell LC sovereign bonds (Figure 1 and Bertaut et al. (2025)).

This paper builds on a number of important studies that have shed light on the currency composition of sovereign debt. Ottonello and Perez (2019) find that avoiding the dilution effects of high inflation and real exchange rate depreciation implies larger shares of FC sovereign debt under limited commitment to debt issuance levels and inflation policy. These authors argue in their online appendix that extending their environment to include default explains about 60% of the empirically observed LC sovereign debt shares, while we are able to account for 87% of the currency composition of defaultable sovereign debt. Engel and Park (2022) consider enforcement constraints on the choice of default and currency debasement and show that the debt composition is biased towards FC debt under less credible monetary policy. However, they abstract from the equilibrium realization of outright default on multiple currency debt. These authors consider an extension where defaults occur in equilibrium, but only when the economy is in the original sin state where no LC debt issuance is possible. Our framework also differs from both studies by showing that explicit modeling of lenders' problems is key for capturing the original sin redux in exceptional financial stress episodes and by introducing endogenous debt recovery upon default.

Önder and Sunel (2021) show that higher borrowing costs for a country exiting a currency union lead to welfare losses, although LC debt issuance is useful to avoid debt crises. Their work and the studies that are mentioned above abstract from the original sin redux, which makes LC debt issuance difficult in stress episodes and limits the debt sustainability benefits of discretionary inflation. By introducing this feedback, we are able to assess whether the original sin really dissipates or whether it weighs on EMEs in a different form through increased vulnerability to global financial conditions. Du et al. (2020) show that if countercyclical discretionary inflation policies increase lenders' risk aversion to holding LC debt, then, sovereigns that cannot commit to price stability would find it harder to issue more domestic-currency debt, despite its hedging benefits. These authors abstract from default and study a two-period model. In contrast, we examine the impact of default risk and the business cycle characteristics of the currency management of sovereign debt.

Our paper contributes to the segmentation and preferred-habitat literature by showing LC and FC bonds are priced by distinct marginal holders. We model each bond type as priced by segmented investors who exclusively hold either LC or FC debt. This mirrors partially-segmented markets in Greenwood et al. (2018), where clienteles with limited risk-bearing capacity make quantities matter for risk premia, and the preferred-habitat view of Vayanos and Vila (2021), where upward-

sloping demand generates quantity-driven premia. In our context, the "habitats" are currencies: LC investors absorb inflation-duration risk, whereas global investors absorb dollar-default risk. The key difference is that LC debt also provides state contingency through inflation. This reduces default incentives and compresses FC spreads during crises, despite LC debt investors requiring a positive currency premium on average.

Finally, our paper relates to a strand of the literature on currency devaluations that coexist with defaults. Da-Rocha et al. (2013) show that in the absence of a commitment not to devalue and when self-fulfilling crises are possible, effective debt limits become tighter. This leads to devaluation announcements that trigger defaults. Na et al. (2018) argue that devaluations coexist with defaults to help eliminate labor market disequilibria that arise during debt crises. Bianchi and Mondragon (2022) examine self-fulfilling debt crises in the context of maintaining monetary policy autonomy or joining a monetary union and find that the possibility of exchange rate devaluations under independent monetary policy can eliminate self-fulfilling rollover crises. This strand of literature overlooks the benefits of domestic currency debt issuance as it builds on Cole and Kehoe (2000), Aguiar and Gopinath (2006) and Arellano (2008) environments that are essentially original sin economies. By modeling multiple currency sovereign debt issuance, we propose a new angle to this literature by showing that moderate exchange rate depreciations can lower bond spreads.

The remainder of the paper is organized as follows. The next section discusses heterogeneous lender risk appetite toward multiple currency EME sovereign debt. Section 3 describes a theoretical model of the currency structure of defaultable sovereign debt and discretionary exchange rate policy. Section 4 reports quantitative results from the baseline model. Section 5 explores the underlying model mechanisms of the model. Finally, section 6 concludes the paper.

2 Lenders' risk appetite in multiple currency sovereign debt

Figure 1, as well as recent studies such as Borri (2018), (IMF, 2020b) and Bertaut et al. (2025), show that during periods of low global investor sentiment, EMEs face significant obstacles in selling LC debt to foreign investors. This leads to an original sin redux, as described in Carstens and Shin (2019). We attribute this phenomenon to a heightened investor tendency to discount future LC sovereign debt payouts more aggressively during episodes of market stress. Thus, studying

the currency management of foreign-held risky sovereign debt requires assigning a central role to foreign lenders. First, studying an environment of foreign ownership of LC sovereign debt represents a sharp departure from the Eaton and Gersovitz (1981)-class of sovereign default models. That is, while the contractual obligations of hard-currency EME sovereign debt are primarily overseen by foreign jurisdictions, almost all EME LC sovereign debt is issued under domestic law (Du and Schreger, 2016). This highlights the different risk appetite of holders of domestic- and FC EME sovereign debt and the premium they demand for holding such assets (Chamon et al., 2018).

Another problem with LC sovereign debt is that it is vulnerable to currency risk, unlike hard-currency debt, which is a perfect hedge against such risk. This vulnerability is due to a limited commitment to exchange rate policy, which leads the sovereign to reduce real repayments of peso-denominated debt in order to smooth consumption, leading to an ex post currency depreciation bias. To protect their returns from this inflation bias, buyers of domestic-currency bonds would demand a currency depreciation premium, as suggested by the literature, including Barro and Gordon (1983) and the analytical findings of Campbell and Viceira (2001), who argue that the optimal portfolio of risk-averse investors is tilted towards inflation-indexed bonds, while less risk-averse investors hold long-term nominal bonds for speculative purposes only if they reflect a positive inflation risk premium.

Third, the pricing of EME sovereign bonds is strongly influenced by global conditions, making foreign ownership of LC EME sovereign debt a source of financial vulnerability for EME governments. In recent work, Morelli et al. (2022) find that EME sovereign bonds purchased by global financial intermediaries, which are more exposed to aggregate shocks, experience larger price declines than other EME sovereign bonds. Further discussions by Borri (2018), Carstens and Shin (2019) and Bertaut et al. (2025) highlight the role of the currency structure of EME sovereign bonds in the transmission of such price effects. In particular, the increase in the foreign ownership of domestic-currency EME sovereign debt over the past two decades (the so-called dissipating original sin) has transferred the currency risk from EME sovereigns to foreign lenders. However, since foreign lenders typically calculate their losses in dollar units, and since EME currencies tend to depreciate against hard currencies (that are insulated) in stress episodes, the migration of currency risk from borrowers to lenders implies that the latter will sell EME LC sovereign bonds at a faster pace in such *risk-off* episodes, further reducing the price of these bonds. Indeed, Chamon et al. (2018)

show that while the premium between debt issued under domestic and foreign law is negligible in benign times, in episodes of stress, debt issued under foreign law (mainly denominated in dollars) trades at a premium relative to the debt overseen under domestic law (mainly denominated in LC).

3 A model of the currency structure of sovereign debt

We study a small open economy model inhabited by a continuum of infinitely lived, identical households and a sovereign government. Time is discrete. The output of the domestic economy is subject to endowment shocks under incomplete markets. The sovereign maximizes the utility of the representative household and aims to smooth its consumption over time by issuing domestic and FC denominated debt in international financial markets. Foreign lenders are segmented along the currency dimension. There is a single tradable final good for private consumption and the law of one price applies. Therefore, price inflation coincides with exchange rate depreciation. The sovereign can default on its external debt obligations without discriminating among lenders, if it deems it optimal to do so. In addition, it has a discretionary exchange rate determination policy at its disposal – similar to a managed float – which allows the government to depreciate the currency ex post. A second source of uncertainty is the global state of liquidity, which directly affects the degree of impatience of foreign lenders who hold domestic currency sovereign debt. Unless otherwise indicated, upper and lower case letters refer to nominal and real variables, respectively.

3.1 Sovereign economy

Households and endowments. Households' preferences over consumption flows are defined as

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u(c_t) \tag{1}$$

where $0 < \beta < 1$ is the subjective discount factor (identical across individuals) and $\mathbb{E}$ is the mathematical expectation operator. The utility function $u(c) = \frac{c^{1-\sigma}}{1-\sigma}$ is continuous and strictly concave in consumption and satisfies the Inada condition, $\lim_{c \to 0^+} u'(c) = \infty$, with $\sigma > 1$ denoting the constant relative risk aversion (CRRA) parameter.

The small open economy's endowment y is a single tradable good that follows the process

$$\log y_{t+1} = (1-\rho) \log \bar{y} + \rho \log y_t + \varepsilon_{t+1} \tag{2}$$

subject to zero mean and constant variance Gaussian innovations with $|\rho| < 1$.

Debt contracts. The government issues domestic and FC (e.g. peso and dollar) denominated debt in international bond markets. For the sake of simplicity, we abstract from seigniorage, which has become less important as a source of fiscal revenue over the past two decades, thanks to successful inflation targeting regimes. The proceeds of foreign debt issuance finance the trade deficit and are returned to households in a lump sum.

We rule out selective outright defaults for tractability reasons so that the government reneges on its bond obligations without discrimination in the currency dimension. Yet, as in Calvo (1988), the government can strategically inflate away its foreign liabilities to the extent that it issues peso debt. Upon outright default, the government is immediately banned from issuing debt in either currency and loses access to foreign debt markets for a random number of periods in the future until a successful debt renegotiation occurs.

Let B denote the total nominal revenue (denominated in domestic currency units) collected by sovereign debt issuance:

$$B_t = (1-d_t)[\underbrace{q_t^F E_t(b_{t+1}^F - (1-\delta^F)b_t^F) - \kappa^F E_t b_t^F}_{\text{debt revenue on dollar bonds}} + \underbrace{q_t^L(B_{t+1}^L - (1-\delta^L)B_t^L) - \kappa^L B_t^L}_{\text{debt revenue on peso bonds}}]. \tag{3}$$

The total bond revenue is multiplied by a single indicator function $1-d_t$ on credit standing. If the economy is in default or in a financial exclusion spell that followed a previous default, the credit standing is "bad" ($d_t = 1$), so that the sovereign cannot issue any bonds. b_t^F stands for dollar denominated real amount of bonds that accrue from the previous period. Since we assume that foreign price level is exogenous and constant at $P_t^* = 1 \ \forall t$, when we multiply this object by the nominal exchange rate of dollar against pesos E_t, we arrive at its nominal value in peso units. B_t^L on the other hand, represents peso denominated debt obligations issued in foreign capital markets in the previous period. q_t^F and q_t^L are the discount prices of dollar and peso denominated bonds, which are inversely related to the nominal yield paid on each respective bond.

Foreign obligations of the sovereign in (3) are long term. We assume so, in order to generate more realistic levels of indebtedness as well as interest rate spreads faced by EMEs as in Hatchondo and Martinez (2009). Long-term bonds mature geometrically at the rate δ^j with $j \in \{F, L\}$ – denoting the currency denomination – and carry a coupon payment of $\kappa^j = \frac{\delta^j + r^*}{1+r^*}$ units in terms of

the consumption good, where r^* is the net real risk-free international interest rate. The parameter κ^j can be expressed as $\kappa^j = \delta^j + (1-\delta^j)\frac{r^*}{1+r*}$ where δ^j represents the fraction of bonds that mature during the period and pay the full face value. The remaining fraction $1-\delta^j$ corresponds to bonds that do not mature but instead pay a coupon, where the effective coupon rate is given by $\frac{r^*}{1+r^*}$. By differentiating maturity rates across currencies with $\delta^L > \delta^F$, we obtain a lower average duration for peso denominated bonds than for dollar denominated bonds as observed in the data for EMEs (Aizenman et al., 2021; OECD, 2025).

Repayment. Previously issued dollar-denominated debt entails a gross nominal payout of $\mathcal{R}_t^F E_t b_t^F$, where $\mathcal{R}_t^F = \kappa^F + (1-\delta^F)q_t^F$ reflects both the per-unit return on matured bonds and the option value associated with selling non-matured bonds. Combining the assumptions of an exogenous and constant foreign price level, the existence of a single tradable good, and the holding of the law of one price, leads to the determination of the domestic price level at time t by the nominal exchange rate $P_t = E_t P_t^* = E_t$. Under these conditions, dollar-denominated debt functions as a real contract, yielding a gross real payout of $\mathcal{R}_t^F E_t b_t^F / P_t = \mathcal{R}_t^F b_t^F$.

In contrast, the gross real payout of previously issued peso-denominated debt is subject to ex post adjustment through the domestic price level. This is because the depreciation rate of the domestic currency – set at the sovereign's discretion, without commitment to a predetermined exchange rate path – implies that the domestic inflation rate satisfies $1+\pi_t = \frac{P_t}{P_{t-1}} = \frac{E_t}{E_{t-1}}$ under the law of one price. Henceforth, we treat inflation and currency depreciation interchangeably. The gross nominal payout of LC debt is defined by $\mathcal{R}_t^L B_t^L$ where $\mathcal{R}_t^L = \kappa^L + (1-\delta^L)q_t^L$ represents the per-unit return on matured bonds and the option value of selling non-matured peso-denominated bonds. When deflated by the domestic price level P_t, the gross real payout of peso debt becomes $\mathcal{R}_t^L b_t^L/(1+\pi_t)$, with real volume of previously issued peso-denominated debt is defined as $b_t^L = B_t^L / P_{t-1}$. As a result, the government may inflate away its real burden of peso denominated debt by choosing a high currency depreciation rate in the current period.

When the sovereign fulfills its debt obligations at date t it can issue new debt in dollars b_{t+1}^F and pesos b_{t+1}^L. Therefore, the economy faces the resource constraint

$$c_t = y_t\left(1 - \frac{\theta}{2}\left[\pi_t - \pi^*\right]^2\right) + \frac{B_t}{E_t}. \tag{4}$$

The quadratic term in the deviation of the net inflation rate from a target rate of inflation π^* reflects output costs of inflation, as in Rotemberg (1982)-type menu costs, which are created by exchange rate depreciations in our model economy.[3] The scaling parameter $\theta > 0$ measures the intensity of the cost of deviating inflation from the target. These output costs and foreign lenders' pricing function taking into account the expectation of future depreciations result in equilibrium inflation to be bounded from above (see below). The real debt revenue term on the right-hand side follows from equation (3).

The price and payout of both debt instruments are functions of the sovereign debt portfolio and the aggregate state $s_t = \{y_t, l_t\}$, comprised of current endowment level y_t and the state of global liquidity l_t (discussed in detail below), which are also the sources of uncertainty in the model. When the sovereign repays, real transfers that are rebated back to the households become

$$\frac{B_t}{E_t} = q_t^F b_{t+1}^F - \mathcal{R}_t^F b_t^F + q_t^L b_{t+1}^L - \frac{\mathcal{R}_t^L b_t^L}{1+\pi_t}. \tag{5}$$

Inserting nominal payout definitions for $\mathcal{R}_t^F$ and $\mathcal{R}_t^L$ in (5) and combining with (4) imply

$$\begin{aligned} c_t = y_t \left(1 - \frac{\theta}{2}\left[\pi_t - \pi^*\right]^2\right) + q_t^F(b_{t+1}^F, b_{t+1}^L, s_t)\left(b_{t+1}^F - (1-\delta^F)b_t^F\right) - \kappa^F b_t^F \\ + q_t^L(b_{t+1}^F, b_{t+1}^L, s_t)\left(b_{t+1}^L - \frac{(1-\delta^L)b_t^L}{1+\pi_t}\right) - \kappa^L \frac{b_t^L}{1+\pi_t}. \end{aligned} \tag{6}$$

Default. When government repudiates its debt obligations, it is excluded from international capital markets and is not able to issue new debt for a stochastic number of periods. That is, re-entry to debt markets occurs only with probability $0 < \psi < 1$. Being in financial autarky implies households can consume only the endowment of the economy, which reflects a resource penalty of being in the default state. That is,

$$c_t = y_t - \phi\left(y_t\right) > 0. \tag{7}$$

We assume $\phi(.)$ takes a quadratic form, $\phi\left(y\right) = \max\{0,\ d_0 y + d_1 y^2\}$ with $d_1 > 0$ to avoid default in high income realizations as discussed by Arellano (2008) and Chatterjee and Eyigungor (2012).

[3] Arellano et al. (2020) develop a New Keynesian framework featuring strategic sovereign default in which domestic firms face quadratic price adjustment costs, generating output costs of inflation that are quasi-endogenous and comparable to those arising in our model.

To model defaults more realistically, we assume that if the sovereign regains access to financial markets, it starts out with a restructured debt stock that reflects an endogenous haircut rate of $0 < 1 - \hat{\omega}(b_t^L, b_t^F, s_t) < 1$. The haircut rate is the outcome of a successful Nash bargaining process as in Yue (2010). Given that we abstract from selective defaults, we assume that a special purpose vehicle oversees the bargaining between the sovereign and all of its creditors (see below). This implies that the government does not renegotiate separately with creditors of FC and LC debt, despite they lend the sovereign through segmented markets. We assume that sovereign always repays after successful debt renegotiations.

For numerical tractability, we assume that currency depreciation only plays a role to reduce the outstanding stock of debt after financial autarky ends. Suppose that the sovereign is out of the debt restructuring procedures T periods after the most recent default, which, say, had occurred at date t^*. In this case, it enters the markets with a stock of $\hat{\omega}(b_{t^*}^L, b_{t^*}^F, s_{t^*+T}) b_{t^*}^F$ in dollar debt and a stock of $\frac{\hat{\omega}(b_{t^*}^L, b_{t^*}^F, s_{t^*+T}) b_{t^*}^L}{\prod_{t=t^*}^{t^*+T}\left[1+\hat{\pi}_t(b_t^F, b_t^L, s_t)\right]}$ in peso debt. The term $\hat{\pi}_t(b_t^F, b_t^L, s_t)$ in the denominator of the latter denotes the debt reducing impact of exchange rate depreciations that the government would have chosen optimally during the state of default, which would accumulate over T periods. Empirical evidence from Na et al. (2018) shows that defaults coinciding with currency devaluations are not followed by further increases in currency devaluation. Motivated by this finding, and noting that the sovereign cannot issue or repay debt while in default, we set $\left\{\hat{\pi}_t(b_t^F, b_t^L, s_t)\right\}_{t=t^*}^{t^*+T-1} = 0$ and currency depreciation can differ from zero only at date $t^* + T$, suppressing the real output costs of inflation in equation (7) until that period. This assumption also implies that re-entry settlement is negotiated in real terms, precluding any incentives to inflate away debt during debt renegotiation.[4]

For analytical and quantitative tractability, we abstract from selective defaults by employing a unified credit stance indicator d_t for both types of bond issuance in equation (3). While incorporating selective defaults could offer a microfoundation for lender segmentation along the currency dimension, doing so would substantially complicate the model. Our framework already differentiates key sovereign bond characteristics – such as duration – across currencies while modeling endogenous debt recovery. Introducing selective defaults would necessitate modeling two distinct endogenous debt renegotiation processes, potentially with separate default costs, thereby entan-

[4]This is equivalent to imposing a currency peg upon default with $\pi^* = 0$. The first order condition for optimal inflation choice then minimizes the output cost of depreciation, $-y_t\theta[\pi_t - \pi^*] = 0$ which yields $\pi_t = \pi^* = 0$.

gling the effects of duration heterogeneity, bond recovery rates, and default penalties. To maintain focus and avoid diluting the core contributions of the paper, we leave the exploration of selective defaults to future research. Importantly, despite this abstraction, the two debt instruments remain priced differently due to currency depreciation risk and shorter maturities on peso-denominated bonds, and potential variation in investor impatience toward future payouts from distinct bonds.

In models with defaultable long-term debt and positive debt recovery, the government may find it optimal to dilute creditors by issuing aggressively just before default, generating counterfactual pre-default consumption booms (Hatchondo et al., 2014, 2017; Guler et al., 2025). To rule out this artifact without constraining secondary-market pricing, we impose a floor $\underline{q}$ on the *primary-market* issuance price, secondary-market prices may fall below $\underline{q}$. We set $\underline{q}$ to the smallest value that eliminates pre-default consumption spikes and verify that the constraint is slack in all simulations.

Recursive representation of debt repayment and issuance, and inflation policies. Let v^r and v^d represent value functions of repayment versus default on the government debt, respectively. Since there is partial debt recovery, both value functions are defined over the debt composition, output and the state of global liquidity.

For any combination of the debt portfolio, output and global liquidity, the default decision is determined by comparing the values of repayment and default,

$$v(b^F, b^L, s) = \max_{d \in \{0,1\}} \left\{ v^r(b^F, b^L, s), v^d(b^F, b^L, s) \right\} \tag{8}$$

so that if $v^r(b^F, b^L, s) > v^d(b^F, b^L, s)$, the decision rule for default takes the value $\hat{d}(b^F, b^L, s) = 0$. Otherwise, one obtains $\hat{d}(b^F, b^L, s) = 1$.

Value of repayment satisfies,

$$v^r(b^F, b^L, s) = \max_{c, b^{F'}, b^{L'} > 0, \pi \geq 0} \left\{ u(c) + \beta \, \mathbb{E}_{s'|s} \left[v(b^{F'}, b^{L'}, s') \right] \right\}, \quad \text{subject to} \tag{9}$$

$$\begin{aligned}
c &= y \left(1 - \frac{\theta}{2} \left[\pi - \pi^* \right]^2 \right) + q^F(b^{F'}, b^{L'}, s) \left(b^{F'} - (1 - \delta^F) b^F \right) - \kappa^F b^F \\
&\quad + q^L(b^{F'}, b^{L'}, s) \left(b^{L'} - \frac{(1 - \delta^L) b^L}{1 + \pi} \right) - \kappa^L \frac{b^L}{1 + \pi}, \\
q^F(b^{F'}, b^{L'}, s) &\geq \underline{q} \; \forall \; b^{F'} > (1 - \delta^F) b^F, \\
q^L(b^{F'}, b^{L'}, s) &\geq \underline{q} \; \forall \; b^{L'} > \frac{(1 - \delta^L) b^L}{1 + \pi},
\end{aligned}$$

where the mathematical expectation $\mathbb{E}$ is calculated over the processes of output and global liquidity $s = \{y, l\}$, which is explained in Section 3.2. The solution to the maximization of the repayment value leads to the policy functions for borrowing, inflation, and consumption defined over the state space of the economy; $\hat{b^F}(b^F, b^L, s), \hat{b^L}(b^F, b^L, s), \hat{\pi}(b^F, b^L, s), \hat{c}(b^F, b^L, s)$.

Value of defaulting on sovereign debt is indicated by,

$$\begin{aligned}
v^d(b^F, b^L, s) = u(y - \phi(y)) + \beta \, \mathbb{E}_{s'|s} \Big[\psi \, v^r \Big(\hat{\omega}(b^F, b^L, s') b^F, \hat{\omega}(b^F, b^L, s') b^L, s' \Big) \\
+ (1 - \psi) \, v^d \Big(b^F, b^L, s' \Big) \Big]
\end{aligned} \tag{10}$$

where the optimal recovery rate over outstanding stock of debt after the latest default, $\hat{\omega}(b^F, b^L, s')$, is resolved through a renegotiation process between lenders and the sovereign as described below.

Endogenous debt renegotiation. Endogenous debt recovery is determined through a Nash bargaining procedure as in Yue (2010), adapted to a multiple currency debt environment. The total surplus from a successful debt restructuring negotiation is shared between the sovereign and its creditors overseen by a special purpose vehicle. The surplus of the sovereign is the difference between the value of regaining access to financial markets, represented by $v^r \Big(\omega(b^F, b^L, s) b^F, \hat{\omega}(b^F, b^L, s) b^L, s \Big)$, and the value of staying in financial autarky forever, defined by

$$v^{aut}(s) = u(y - \phi(y)) + \beta \, \mathbb{E}_{s'|s} \left[v^{aut}(s') \right]. \tag{11}$$

The surplus of lenders is the difference between the option value of recovered bonds and a threat point of zero value, as lenders would not receive any repayment if debt renegotiation fails. In the absence of selective defaults, the special purpose vehicle calculates the total surplus of foreign and domestic currency creditors by aggregating all bonds in the two currency denominations:

$$MV(b^F, b^L, s) = b^F\left[\kappa^F + (1-\delta^F)q^F(b^{F'}, b^{L'}, s)\right] + b^L\left[\frac{\kappa^L}{1+\pi} + (1-\delta^L)q^L(b^{F'}, b^{L'}, s)\right]. \quad (12)$$

The optimal debt recovery rate maximizes total surplus of the sovereign and its creditors by assigning $0 < \varphi < 1$ fraction of the total surplus to the sovereign and the rest to the creditors:

$$\hat{\omega}(b^F, b^L, s) = \arg\max_{\omega\in[0,1]} \left[v^r\left(\omega(b^F, b^L, s)b^F, \omega(b^F, b^L, s)b^L, s\right) - v^{aut}(s)\right]^{\varphi} \quad (13)$$

$$\times\left[MV\left(\omega(b^F, b^L, s)b^F, \omega(b^F, b^L, s)b^L, s\right)\right]^{1-\varphi}.$$

3.2 Foreign lenders

Foreign lenders live for two periods as overlapping generations as in Diamond, 1965; Tirole, 1985; Broner et al., 2013. Lenders are risk averse and smooth consumption over their lifetime via saving in domestic and foreign currency denominated sovereign bonds, which are traded in segmented markets. Each generation receives exogenous endowment w in both periods. In the first period, lenders allocate their exogenous endowment between consumption C^j and savings in risky sovereign bonds $b^{*j'}$ where $j \in \{F, L\}$ indicates the currency denomination of bonds. The investment period for each lender coincides with a state in which the sovereign may have either good or bad credit standing. For tractability, we assume that bonds that undergo restructuring are also traded in segmented markets. Consequently, lenders do not allocate their portfolio simultaneously between newly issued or restructured sovereign debt. In the second period, lenders consume, $C^{j'}$, which equals their period-two wealth plus the returns from holdings of risky sovereign bonds, denoted by $\mathcal{R}^j(b^{F'}, b^{L'}, s')$, as defined in Section 3.1. Therefore, upon exiting the bond market, lenders do not transfer any residual wealth to the next generation. The equilibrium bond prices $q^j(b^{F'}, b^{L'}, s)$ adjust to ensure market clearing in both peso and dollar denominated bond markets, so that $b^{j'} = b^{*j'}$.

FC lenders' subjective discount factor $\beta^F = \bar{\beta} = \frac{1}{1+r^*}$ only relates to the risk-free international interest rate so that they seek no-arbitrage between saving in risky sovereign bonds and international risk-free bonds. In contrast, we assume that LC lenders' subjective discount factor $\beta^L(s)$ depends on global liquidity conditions. In particular, during relatively tranquil times with abundant global liquidity, we assume that domestic currency lenders are as impatient as FC lenders. In contrast, peso debt lenders become more impatient than dollar investors when global liquidity is scarce with, $\beta^L(s|l^H) = \bar{\beta} = \beta^F > \beta^L(s|l^L) = \underline{\beta}$ with $l \in \{l^H, l^L\}$ and $l^H > l^L$.[5]

As in Bianchi et al. (2018) and Hatchondo et al. (2025), the stochastic process of global liquidity follows the Markov chain with the transition matrix

$$\mathbf{P} = \begin{bmatrix} p_{LL} & p_{LH} \\ p_{HL} & p_{HH} \end{bmatrix}. \tag{14}$$

$p_{LH} \in [0,1]$ is the transition probability of switching back to a high liquidity state following a stress episode, while p_{LL} is the transition probability of remaining in low liquidity state. This parameter is calibrated to target the duration of liquidity crises in our sample, so that $p_{LL} = 1 - p_{LH}$ follows from the Markov transition property. $p_{HL} \in [0,1]$ on the other hand, is the likelihood of entering a liquidity crisis following a tranquil period.

$$p_{HL} = \min\left\{ p^0_{HL} \exp\left[-p^1_{HL} \log(y_t) + \frac{(p^1_{HL})^2 \sigma^2_\varepsilon}{2} \right], 1 \right\}. \tag{15}$$

The parameterization of this probability reflects the idea that financial conditions for the EME tighten under less favorable macroeconomic fundamentals as discussed by Calvo et al. (2006) and is consistent by the recent findings of Bertaut et al. (2025) and IMF (2020b) that domestic currency bond flows to EMEs become more responsive to domestic fundamentals than FC debt flows when global capital flows are exceptionally volatile. Specifically, we calibrate $0 < p^0_{HL}$ and $1 < p^1_{HL}$ suggesting that a lower and more volatile EME output increases the likelihood of the co-existence of reduced risk appetite of LC bond holders and global liquidity crises. Parameters and p^0_{HL}, p^1_{HL} can be jointly picked to target the frequency of liquidity crises and the size of income shortages

[5] Section 2 includes a discussion of lender preferences towards LC sovereign debt and global financial conditions. See Online Appendix A for a literature review on the expanding foreign investor base of domestic-currency EME sovereign debt.

relative to a trend that are associated with such stress episodes, respectively. Finally, $p_{HH} = 1 - p_{HL}$ follows from the Markov transition property.

Lenders' problem when the sovereign has good credit standing. Risk-averse lenders' preferences are characterized by Epstein and Zin (1989) recursive utility, with a strictly concave period utility function of $U(C^j) = (C^j)^{1-\Gamma}$ from the class of power utility functions, with $j \in \{F, L\}$ denoting lender specialization in currency, and a constant relative risk aversion parameter of Γ, and the inverse of intertemporal elasticity of substitution ϱ. We begin with describing the utility maximization problem of dollar investors who allocate their periodic wealth w between consumption C^F and saving in FC sovereign bonds $b^{*F'}$ to consume $C^{F'}$ in the second period of their life.

$$\max_{C^F, C^{F'}, b^{*F'} > 0} \left[(1-\bar{\beta}) U(C^F)^{1-\varrho} + \bar{\beta} \left(\mathbb{E}_{s'|s} \left\{ U(C^{F'})^{1-\Gamma} \right\} \right)^{\frac{1-\varrho}{1-\Gamma}} \right]^{\frac{1}{1-\varrho}}, \text{ subject to} \tag{16}$$

$$C^F(b^{F'}, b^{L'}, s) = w - q^F(b^{F'}, b^{L'}, s) b^{*F'}, \tag{17}$$

$$C^{F'}(b^{F'}, b^{L'}, s') = w + \underbrace{\mathcal{R}^F(b^{F'}, b^{L'}, s') b^{*F'}}_{\substack{\text{Return on investing} \\ \text{in FC sovereign debt}}}, \text{ with}$$

$$\mathcal{R}^F(b^{F'}, b^{L'}, s') = \left(1 - d\left(b^{F'}, b^{L'}, s'\right)\right) \left[\kappa^F + (1-\delta^F) q^F(b^{F''}, b^{L''}, s')\right] + d\left(b^{F'}, b^{L'}, s'\right) q_d^F(b^{F'}, b^{L'}, s') \tag{18}$$

Lenders take as given the price of FC bonds $q^F(b^{F'}, b^{L'}, s)$ the issuance portfolio $b^{F'}, b^{L'}$ of the sovereign, and the aggregate state of the economy $s \in \{y, l\}$, when choosing their position in FC bonds. Given the issuance portfolio choice of the sovereign and the transition of the stochastic states s', the sovereign's default decision in the next period $d(b^{F'}, b^{L'}, s')$ determines the expected pay-off $\mathcal{R}^F(b^{F'}, b^{L'}, s')$ from investing in FC sovereign debt. If sovereign repays in the next period, $d(b^{F'}, b^{L'}, s') = 0$, the lender earns the coupon κ^F and has the option value to sell the non-matured bonds at the next period's bond price $q^F(b^{F''}, b^{L''}, s')$. If sovereign defaults in the next period, $d(b^{F'}, b^{L'}, s') = 1$, the lender has only the option value to sell the bonds in default at the bond restructuring price, $q_d^F(b^{F'}, b^{L'}, s')$.

Risk-averse investors in peso bonds solve a similar consumption-savings problem:

$$\max_{C^L, C^{L'}, b^{*L'} > 0} \mathbb{E}_{s'|s} \left\{ \left[(1-\beta(s)) U(C^L)^{1-\varrho} + \beta(s) \left(\mathbb{E}_{s'|s} \left\{ U(C^{L'})^{1-\Gamma} \right\} \right)^{\frac{1-\varrho}{1-\Gamma}} \right]^{\frac{1}{1-\varrho}} \right\}, \text{ subject to} \tag{19}$$

$$C^L(b^{F'}, b^{L'}, s) = w - q^L(b^{F'}, b^{L'}, s) b^{*L'}, \tag{20}$$

$$C^{L'}(b^{F'}, b^{L'}, s') = w + \underbrace{\frac{\mathcal{R}^L(b^{F'}, b^{L'}, s') b^{*L'}}{1 + \pi(b^{F'}, b^{L'}, s')}}_{\substack{\text{Return on investing} \\ \text{in LC sovereign debt}}}, \text{ with}$$

$$\mathcal{R}^L(b^{F'}, b^{L'}, s') = \left(1 - d\left(b^{F'}, b^{L'}, s'\right)\right) \left[\kappa^L + (1-\delta^L) q^L(b^{F''}, b^{L''}, s')\right] + d\left(b^{F'}, b^{L'}, s'\right) q_d^L(b^{F'}, b^{L'}, s') \tag{21}$$

Unlike dollar investors, the return on investing in LC debt $\mathcal{R}^L(b^{F'}, b^{L'}, s')$ is deflated by the gross currency depreciation rate, $\pi(b^{F'}, b^{L'}, s')$, if sovereign repays in the next period. Nevertheless, currency depreciation still would not play any role in states where the sovereign would choose to default in the next period $d\left(b^{F'}, b^{L'}, s'\right) = 1$, reflecting our simplifying technical assumption.

Under the two-period version of Epstein and Zin (1989) recursive preferences, investors of dollar and peso denominated sovereign bonds have the following respective pricing kernels:

$$M^F(s, s') = \underbrace{\bar{\beta} \left(\frac{C^{F'}(b^{F'}, b^{L'}, s')}{C^F(b^{F'}, b^{L'}, s)} \right)^{-\varrho}}_{\text{Intertemporal substitution}} \underbrace{\left(\frac{U(C^{F'}(b^{F'}, b^{L'}, s'))}{\mathbb{E}_{s'|s} \left\{ U(C^{F'}(b^{F'}, b^{L'}, s'))^{1-\Gamma} \right\}^{1/(1-\Gamma)}} \right)^{\frac{\varrho-\Gamma}{1-\varrho}}}_{\text{Risk aversion adjustment}} \tag{22}$$

$$M^L(s, s') = \underbrace{\beta(s) \left(\frac{C^{L'}(b^{F'}, b^{L'}, s')}{C^L(b^{F'}, b^{L'}, s)} \right)^{-\varrho}}_{\text{Intertemporal substitution}} \underbrace{\left(\frac{U(C^{L'}(b^{F'}, b^{L'}, s'))}{\mathbb{E}_{s'|s} \left\{ U(C^{L'}(b^{F'}, b^{L'}, s'))^{1-\Gamma} \right\}^{1/(1-\Gamma)}} \right)^{\frac{\varrho-\Gamma}{1-\varrho}}}_{\text{Risk aversion adjustment}} \tag{23}$$

The first term in each pricing kernel captures the impact of intertemporal variation in lenders' consumption on bond pricing. In the case of peso bond investors, this term is affected by the state of global liquidity conditions. The second term in each pricing kernel captures the risk aversion adjustment as lenders judge how much the stochastic terminal value from consuming in period two deviates from a certainty equivalent utility benchmark. The separation between risk aversion and intertemporal substitution under Epstein-Zin preferences –particularly the ability to maintain high IES alongside moderate risk aversion – allows for more nuanced state-contingent pricing that accommodates greater debt issuance at lower average spreads (see Section 5.5). When the inverse

of the intertemporal elasticity of substitution equals constant relative risk aversion, $\varrho = \Gamma$, pricing kernels collapse to the standard case with constant relative risk aversion preferences.

Dollar and peso bond investors use these pricing kernels to price sovereign bonds through the following conditions:

$$q^F(b^{F'}, b^{L'}, s) = \mathbb{E}_{s'|s}\left\{M^F(s,s')\mathcal{R}^F(b^{F'}, b^{L'}, s')\right\} \tag{24}$$

$$q^L(b^{F'}, b^{L'}, s) = \mathbb{E}_{s'|s}\left\{M^L(s,s')\frac{\mathcal{R}^L(b^{F'}, b^{L'}, s')}{1+\pi(b^{F'}, b^{L'}, s')}\right\} \tag{25}$$

A few aspects of the pricing schedules deserve discussion given the definitions of return on dollar and domestic denominated currency sovereign debt $\mathcal{R}^F(b^{F'}, b^{L'}, s'), \mathcal{R}^L(b^{F'}, b^{L'}, s')$ in equations (18) and (21). First, since we assume that lenders have deep pockets, they buy government debt as long as they are as well off as an outside option. This entails pricing the sum of earned coupon and market value of selling the bonds in the subsequent period through their stochastic discount factors (22) and (23). Second, since there is limited commitment to debt repayment and exchange rate policy, the next period's expected payoffs are calculated by taking into account the default risk for debt in both currency denominations, and, additionally is affected by the currency depreciation risk for peso debt.

The embedded currency-risk in pricing condition (25) implies that if the sovereign actively issues debt in both currencies in equilibrium and uses partial repudiation through inflation $\pi(b^{F'}, b^{L'}, s') > 0$, it is more likely to offer higher nominal interest rates to peso lenders than to dollar lenders

$$\mathbb{E}_{s'|s}\left\{M^L(s,s')\frac{\mathcal{R}^L(b^{F'}, b^{L'}, s')}{q^L(b^{F'}, b^{L'}, s)}\right\} \geq \mathbb{E}_{s'|s}\left\{M^F(s,s')\frac{\mathcal{R}^F(b^{F'}, b^{L'}, s')}{q^F(b^{F'}, b^{L'}, s)}\right\} = 1, \tag{26}$$

with the ratios of nominal payout to bond price $R^{j'}/q^j$ for $j \in \{F, L\}$ indicating nominal rates of interest offered on respective bonds.[6] Moreover, since LC lenders become more impatient during stress episodes, the divergence between their stochastic discount factor and that of FC lenders makes it more difficult for this condition to hold. This further increases the sovereign's nominal

[6]See the discussion in Section 5.1 regarding the necessary conditions for positive nominal yield spreads over LC debt. Although LC debt offers excess nominal yields, its positive issuance in equilibrium reflects the sovereign's state-contingent discretionary use of inflation to mitigate default risk and smooth consumption. Section 5.3 shows that higher inflation costs – capturing stricter inflation targets – supports greater LC debt issuance. Similarly, in Section 5.4, we show that the equilibrium supports higher LC debt shares when domestic-currency debt maturities increase.

borrowing costs in its own currency, leaving it unable to issue domestic-currency debt precisely when transferring currency risk to foreign lenders is most critical, as exemplified by EMEs during the global financial crisis and the COVID-19 crisis.[7]

Finally, in cases where the lenders' wealth w is assumed to be arbitrarily large, the sovereign's borrowing has a weak effect on the volatility of lenders' consumption and, consequently, on their pricing kernels.[8] Nevertheless, from the sovereign's perspective, the pricing kernels remain endogenous, as the prices at which sovereign bonds are issued – and the returns to lenders – are determined by the sovereign's optimal choices regarding the currency composition of its debt, as well as its decisions on default and inflation.

The sovereign does not discriminate between creditors when declaring an outright default. This allows the government to reduce the default risk on both classes of debt, should it inflate away the peso debt burden by choosing a positive depreciation rate. As a result, it is the dynamic interplay between the premia paid for currency and default risks and heterogeneous lender impatience depending on global financial conditions that ultimately pins down the sovereign debt portfolio in equilibrium.

Lenders' problem when the sovereign has bad credit standing. Lenders that arrive in a state where the sovereign is in a bad credit standing face a similar problem but with a different set of risky returns. In particular, the problem of dollar investors who allocate their wealth between consumption and purchasing FC debt that undergoes restructuring is:

[7] See Figure 1 and Figure 1.17-2 in IMF (2020a), highlighting how global financial conditions (alongside domestic fundamentals) shape the currency structure debt, as shown by Bertaut et al. (2025) and IMF (2020b). Removing the assumption of heterogeneous lender impatience increases equilibrium level of domestic-currency debt issuance, but particularly during during risk-off episodes, contrary to the data. Therefore, assuming increased impatience of LC lenders during risk-off periods is essential to capture the original sin redux. See Section 5.2.

[8] We run robustness on the size of lender wealth in Section 5.6. Hatchondo et al. (2016) analyze a limiting case in which the lenders' pricing kernel depends solely on the exogenous growth process of their own consumption. See Section 5.7 for a discussion of the implications of adopting this polar case.

$$\max_{C_d^F, C_d^{F'}, b_d^{*F'} > 0} \left[(1-\bar{\beta}) U(C_d^F)^{1-\varrho} + \bar{\beta} \left(\mathbb{E}_{s'|s} \left\{ U(C_d^{F'})^{1-\Gamma} \right\} \right)^{\frac{1-\varrho}{1-\Gamma}} \right]^{\frac{1}{1-\varrho}}, \text{ subject to} \tag{27}$$

$$C_d^F(b^F, b^L, s) = w - q_d^F(b^F, b^L, s) b_d^{*F'}, \tag{28}$$

$$C_d^{F'}(b^F, b^L, s') = w + \underbrace{\mathcal{R}_d^F(b^F, b^L, s') b_d^{*F'}}_{\substack{\text{Return on investing} \\ \text{in FC sovereign debt} \\ \text{under restructuring}}}, \text{ with}$$

$$\mathcal{R}_d^F(b^F, b^L, s') = \psi \hat{\omega}(b^F, b^L, s') \left[\kappa^F + (1-\delta^F) q^F(b^{F'}, b^{L'}, s') \right] + (1-\psi) q_d^F(b^F, b^L, s'). \tag{29}$$

The expected return from investing in dollar-denominated debt under restructuring, $\mathcal{R}_d^F(b^F, b^L, s')$, depends on two main factors: whether the sovereign regains access to international financial markets in the subsequent period, and, if access is regained, the outcome of the debt restructuring negotiation. If the sovereign exits financial autarky with probability ψ, a negotiated haircut of $1 - \hat{\omega}\left(b^F, b^L, s'\right)$ is applied to the outstanding sovereign debt. Following a successful debt renegotiation, it is assumed that the sovereign resumes repayment. In this case, lenders receive the coupon payment κ^F and may sell any non-matured debt at the market price $q^F(b^{F'}, b^{L'}, s')$. The new debt levels after restructuring are given by $b^{F'} = \hat{b^L}\Big(\hat{\omega}(b^F, b^L, s') b^F, \hat{\omega}(b^F, b^L, s') b^L, s'\Big)$ and $b^{L'} = \hat{b^L}\Big(\hat{\omega}(b^F, b^L, s') b^F, \hat{\omega}(b^F, b^L, s') b^L, s'\Big)$ where $b^{F'}$ and $b^{L'}$ are determined by the borrowing policy functions for dollar- and peso-denominated debt, evaluated at the levels corresponding to the recovered outstanding stock of debt in both currencies.

Similarly, lenders who purchase peso denominated sovereign bonds that undergo restructuring solve a similar consumption-savings problem:

$$\max_{C_d^L, C_d^{L'}, b_d^{*L'} > 0} \mathbb{E}_{s'|s} \left\{ \left[(1-\beta(s)) U(C_d^L)^{1-\varrho} + \beta(s) \left(\mathbb{E}_{s'|s} \left\{ U(C_d^{L'})^{1-\Gamma} \right\} \right)^{\frac{1-\varrho}{1-\Gamma}} \right]^{\frac{1}{1-\varrho}} \right\}, \text{ subject to} \tag{30}$$

$$C_d^L(b^F, b^L, s) = w - q_d^L(b^F, b^L, s) b_d^{*L'}, \tag{31}$$

$$C_d^{L'}(b^F, b^L, s') = w + \underbrace{\frac{\mathcal{R}_d^L(b^F, b^L, s') b_d^{*L'}}{1 + \pi(b^F, b^L, s')}}_{\substack{\text{Return on investing} \\ \text{in LC sovereign debt} \\ \text{under restructuring}}}, \text{ with}$$

$$\mathcal{R}_d^L(b^F, b^L, s') = \psi \hat{\omega}(b^F, b^L, s') \left[\kappa^L + (1-\delta^L) q^L(b^{F'}, b^{L'}, s') \right] + (1-\psi) q_d^L(b^F, b^L, s'). \tag{32}$$

where $b^{F'}$ and $b^{L'}$ are defined similar to the case of dollar lenders' problem. If financial exclusion for the sovereign ends in the subsequent period, the optimal gross inflation rate would take into account the outcome of the successful debt renegotiation with $1+\pi(b^F,b^L,s') = 1+\pi\Big(\hat{\omega}(b^F,b^L,s')b^F, \hat{\omega}(b^F,b^L,s')b^L, s'\Big)$. Otherwise, $1+\pi(b^F,b^L,s')=1$ would hold under financial autarky, reflecting our technical assumption.

The solution to the utility maximization problem for lenders who purchase sovereign bonds denominated in both foreign and domestic currency – when these bonds are subject to restructuring – yields the following pricing kernels:

$$M_d^F(s,s') = \underbrace{\bar{\beta}\left(\frac{C_d^{F'}(b^F,b^L,s')}{C_d^F(b^F,b^L,s)}\right)^{-\varrho}}_{\text{Intertemporal substitution}} \underbrace{\left(\frac{U(C_d^{F'}(b^F,b^L,s'))}{\mathbb{E}_{s'|s}\left\{U(C_d^{F'}(b^F,b^L,s'))^{1-\Gamma}\right\}^{1/(1-\Gamma)}}\right)^{\frac{\varrho-\Gamma}{1-\varrho}}}_{\text{Risk aversion adjustment}} \tag{33}$$

$$M_d^L(s,s') = \underbrace{\beta(s)\left(\frac{C_d^{L'}(b^F,b^L,s')}{C_d^L(b^F,b^L,s)}\right)^{-\varrho}}_{\text{Intertemporal substitution}} \underbrace{\left(\frac{U(C_d^{L'}(b^F,b^L,s'))}{\mathbb{E}_{s'|s}\left\{U(C_d^{L'}(b^F,b^L,s'))^{1-\Gamma}\right\}^{1/(1-\Gamma)}}\right)^{\frac{\varrho-\Gamma}{1-\varrho}}}_{\text{Risk aversion adjustment}} \tag{34}$$

Finally, given the definitions for subsequent period bond returns in equations (29) and (32), these kernels are used by lenders to price bonds through the following conditions:

$$q_d^F(b^F,b^L,s) = \mathbb{E}_{s'|s}\Big\{M_d^F(s,s')\mathcal{R}_d^F(b^F,b^L,s')\Big\} \tag{35}$$

$$q_d^L(b^F,b^L,s) = \mathbb{E}_{s'|s}\left\{M_d^L(s,s')\frac{\mathcal{R}_d^L(b^F,b^L,s')}{1+\pi(b^F,b^L,s')}\right\} \tag{36}$$

Our lender segmentation assumption relates to preferred-habitat pricing through type-specific pricing kernels: LC and FC bonds are priced by the marginal investors who hold them, so that $q_t^j = \mathbb{E}_t[m_{t+1}^j R_{t+1}^j]$, following a generic notation, for $j \in \{L,F\}$. This maps naturally to partially segmented markets in Greenwood et al. (2018), where clienteles face finite risk-bearing capacity and quantities move risk premia, and to the preferred-habitat framework in Vayanos and Vila (2021), where upward-sloping demand curves generate quantity-driven premia. In our context, "habitats" are currencies (LC vs. FC) rather than maturities: the LC clientele bears inflation-duration risk, while global investors bear dollar-default risk.

Unlike preferred-habitat models with explicit bond holding costs, our wedge operates through state contingency: the LC bond share affects default incentives and the covariance term in $q_t^j = \mathbb{E}_t[m_{t+1}^j]\,\mathbb{E}_t[R_{t+1}^j] + \text{cov}_t(m_{t+1}^j, R_{t+1}^j)$, compressing FC spreads in stress episodes even though investors demand a positive currency premium over LC bonds on average. Conceptually, our "low-liquidity" state proxies tight arbitrageur risk-bearing capacity in Greenwood et al. (2018); Vayanos and Vila (2021), and the quantity channel is therefore present in reduced form, but our identification of LC debt as state-contingent insurance is distinct and complementary.[9]

3.3 Equilibrium

Lenders observe the limited commitment to repayment and exchange rate policy of the sovereign so that there is no reputation building via signaling. Krusell and Smith (2003) show that such lack of commitment to future policies might cause indeterminacy of Markov equilibria in the infinite horizon. Therefore, we focus on Markov Perfect Equilibria which arise as the limits of finite horizon economies wherein the government's equilibrium default, borrowing and exchange rate depreciation decisions depend only on payoff relevant state variables.

Definition 1 (Markov Perfect Equilibrium) *Given the exogenous states of the economy y and l, a Markov Perfect Equilibrium consists of value functions v, v^r, and v^d; bond pricing functions q^F, q^L, q_d^F, and q_d^L; a symmetric default rule $\hat{d}$ and debt recovery rate $\hat{\omega}$; borrowing rules $\hat{b}^F$ and $\hat{b}^L$; and a currency depreciation rule $\hat{\pi}$ such that:*

1. *Given the bond pricing functions, the government policy rules $\{\hat{d}, \hat{b}^F, \hat{b}^L, \hat{\pi}\}$ and the debt recovery rate $\hat{\omega}$ solve the utility-maximization problem defined in (8), (9), and (10), as well as the debt renegotiation problem in (13).*

[9] We read the state-dependence in the LC kernel as a sufficient statistic for preferred-habitat/segmentation tightness (Greenwood et al., 2018; Vayanos and Vila, 2021). In such models, the Euler equation associated with the LC bond choice can be written as $1 = q_t^L\ \mathbb{E}_t[m_{t+1}^A R_{t+1}^L] + W_t$, where W_t is a time-t wedge (inverse-demand/holding-cost) that depends on net LC bonds supply and arbitrageur capacity. Because $W_t \in \mathcal{F}_t$, it can be absorbed into an effective kernel $\tilde{m}_{t+1}^L \equiv m_{t+1}^A + W_t / \mathbb{E}_t[R_{t+1}^L]$, yielding $1 = q_t^L\ \mathbb{E}_t[\tilde{m}_{t+1}^L R_{t+1}^L]$. Operationally, we parameterize $\beta^L(s)$ as $\beta^L(s) \equiv \bar{\beta}\ \exp\{-\phi\, \text{Y}_t\}$, where Y_t summarizes preferred-habitat tightness (inverse-demand slope, arbitrageur capacity, and the LC share); $\phi > 0$ steepens the LC kernel in risk-off states. To a first order approximation, this reproduces the quantity/capacity-driven price impact in Greenwood et al. (2018); Vayanos and Vila (2021), while our mechanism – state-contingent inflation altering $\text{cov}_t(m_{t+1}^L, R_{t+1}^L)$ and default incentives – remains the driver of cross-currency spillovers.

2. *Given the government policy rules* $\{\hat{d}, \hat{b}^F, \hat{b}^L, \hat{\pi}\}$ *and the debt recovery rate* $\hat{\omega}$*, the bond pricing functions* q^F*,* q^L*,* q^F_d*, and* q^L_d *satisfy conditions (24), (25), (35), and (36).*

4 Quantitative analysis

We calibrate the quantitative version of the model described in Section 3 to the 2004-19 episode of the Mexican economy to exclude the exceptional COVID-19 crisis. This period is characterized by the well documented fact that EMEs started using domestic currency denominated external debt instruments more frequently compared to the past.[10] We use the updated version of the Arslanalp and Tsuda (2014) database in computing our key empirical target of domestic currency share in foreign-held sovereign debt. These authors report the local/foreign currency breakdown of central government debt securities held by foreign lenders for 22 EMEs during the 2004-21 episode. Therefore, dividing the LC denominated stock of central government debt securities to the general government gross debt held by foreign lenders provides a proxy for the portfolio share of domestic currency in foreign-held sovereign debt.[11] This allows us to study cyclical properties of the currency composition of sovereign debt for the Mexican economy.

4.1 Numerical solution

This section briefly explains the algorithm to find the solution while relegating further details to Appendix A.1. We use a value function iteration approach using black-box minimization routines evaluated with linear interpolations. The main challenge is to find optimal triplets of $b^{F'}, b^{L'}, \pi$ to attain a convergence criterion of 10^{-5}, as some portfolio allocations may yield highly similar continuation values. Thus, we start with a global search method until the differences in subsequent iterations remain the same. We then switch to the local search to find optimal triplets of $b^{F'}, b^{L'}, \pi$ in the neighborhood of candidate optima obtained by the global method. We also ensure that the model yields very similar results without invoking local search methods.

[10] See Ottonello and Perez (2019), Du and Schreger (2021) and Engel and Park (2022).

[11] The investor base comprises of the official sector (central bank for the case of domestic holders), banks and nonbanks. Our definition of the portfolio might understate the peso share of external public debt if local governments are able to issue external debt in domestic currency, which is less likely relative to the ability of the central government. See Online Appendix C for further details on Arslanalp and Tsuda (2014) data.

After approximating for the Markov Perfect Equilibrium, we simulate the model economy many times for a large number of periods and take the averages over those simulated samples to compute business cycle moments. While computing the moments, we use the deviations of the natural logarithm of model variables from an HP trend. For empirical consistency, we pick time series that exclude outright default events while calculating cyclical moments implied by the model.

4.2 Model calibration and parameterization

The parameters used in the computation of the baseline model are reported in Table 1. The model period is a quarter. The discount factor of households is parameterized at $\beta = 0.97$. We use a standard value for the household risk aversion parameter of the CRRA class utility functions and set $\sigma = 2$. The persistence $\rho = 0.816$ and volatility $\sigma_\epsilon = 0.0127$ parameters of the income process are determined to match the HP-detrended component of the logarithm of Mexico's annualized real GDP for the period 1980-2019. Seasonally adjusted real GDP series are taken from the OECD. The implied mean log-income becomes $\bar{y} = -\frac{\sigma_\epsilon^2}{2} = -0.00008$. The quarterly risk-free international real interest rate is set to $r^* = 0.01$. The decay rate for dollar-denominated long-term bonds is set to $\delta^F = 0.0275$, which implies about 6 years for the term to maturity of hard-currency Mexican sovereign debt.[12] Given that weighted average term to maturity for LC debt is about half that of FC debt in EMEs the decay rate of peso-denominated long-term bonds is set to $\delta^L = 0.055$ (OECD, 2025). The coupon rate for dollar debt κ^F is determined by imposing a no-default risk condition on the bond pricing equation (24), in which $q^F(b^{F'}, b^{L'}, s)$ approximately takes the value $\frac{1}{1+r^*}$. This implies, $\kappa^F = \frac{\delta^F + r^*}{1+r^*} = 0.0371$. Following a similar logic, coupon rate of peso debt is set at $\kappa^L = 0.0644$. The periodic target rate for inflation is set to $\pi^* = 0.74\%$ taking the central bank of Mexico's annual inflation target of 3% as reference. Probability of re-entering foreign debt markets $\psi = 0.1667$ is calibrated to a standard value and implies about one and a half year of exclusion from international capital markets following a default. The parameter governing the sovereign's Nash bargaining power in the debt renegotiation process is set to $\varphi = 0.85$ to match a debt recovery

[12] Following the Macaulay formulation, the duration of a long-term bond in our framework becomes $\frac{1+i^F}{\delta^F + i^F}$, where i^F is the risky yield on the sovereign bond, an endogenous equilibrium object. If the bond fully matures in the current period $\delta^F = 1$, the duration becomes one period. The model-implied debt maturity resembles that in Bianchi et al. (2018) to ensure comparability with the literature.

rate of $\hat{\omega} = 0.50$, consistent with the historical debt recovery patterns documented by Cruces and Trebesch (2013) during sovereign default episodes.

We take the global financial crisis and the COVID-19 crisis as reference for extreme risk-off episodes of the last two decades during which there has been a large reversal in global risk sentiment. The monthly VIX index, a gauge for global risk sentiment, has been above four standard deviations of its historical average (since 2004) in each of these episodes. Additionally, for a representative set of EMEs, real GDP has been below its trend by around 3.8 percentage points in these two episodes. Therefore, the two parameters, $p^0_{HL} = 0.0575$ and $p^1_{HL} = 5.75$, that affect the Markov transition probability (15) of switching from high risk tolerance episodes to low risk tolerance episodes are jointly calibrated to target a frequency of once every decade and an output loss of 3.7% (relative to trend), respectively. Finally, given the moderate duration of the liquidity crises, we set the Markov transition probability of remaining in low liquidity towards peso bonds $p_{LL} = 0.1$.

The discount factor of dollar lenders satisfies $\bar{\beta} = \frac{1}{1+r^*} = 0.99$. The reciprocal of the intertemporal elasticity of substitution in the Epstein and Zin (1989) recursive utility function of both lenders is set to $\varrho = 0.5$. The coefficient of constant relative risk aversion of both lenders deviates from this value and is equal to $\Gamma = 2$. Exogenous lender wealth $w = 100$ is calibrated to match the share of Mexican sovereign debt in global asset portfolio of private lenders of about 1%.[13]

The remaining four parameters are jointly calibrated to get the baseline model match four empirical moments: The two penalty parameters for the output costs of outright default $d_0 = -0.45$ and $d_1 = 0.56$, the output cost intensity parameter of inflation $\theta = 60$ and the discount factor of peso lenders $\underline{\beta} = 0.98$ in episodes of low global liquidity. These parameters are jointly picked by simulating the model to match a sovereign debt-to-GDP ratio of 30.3%, a FC denominated sovereign bond spread of 2.2% and inflation rate of 4.1% per annum and a LC share of foreign-held sovereign

[13]According to OECD (2025), the IMF's Coordinated Portfolio Investment Survey and the World Bank's World Federation of Exchanges database, sovereign debt accounted for approximately 30% of global investor portfolios in 2024 when both debt and equity are considered. Based on the Arslanalp and Tsuda (2014) dataset, Mexico's share of global outstanding sovereign debt – covering both advanced and emerging market economies – was around 1% over 2004-19. In our model, output is normalized to one, and we target a sovereign debt-to-GDP ratio of 30%. Therefore, $w = 100 * \bar{y}$ holds in the parameterization.

debt of 41.4%, where these figures correspond to the time series averages of their respective moment in the sample period.[14]

We extend the methodology of Du and Schreger (2016) to compute model-generated LC credit spreads in an environment with multiple currency debt instruments. Specifically, we first solve for the pricing schedule of a synthetic and default risk-free peso denominated bond as explained in greater detail in Appendix A.2. This allows us to obtain a default risk-free yield-to-maturity of r_t^{*L} for peso bonds. The credit spread on peso denominated bonds can then be calculated by $r_t^L - r_t^{*L} = \frac{\kappa^L}{q_t^L} - \delta^L - r_t^{*L}$. The definition of the yield-to-maturity of defaultable peso bonds r_t^L follows our geometrically decaying long-term bonds formulation.

4.3 Baseline model versus data

The first two columns of Table 2 report baseline model's performance in replicating long-term and cyclical properties of the Mexican economy in the sample period. The upper panel suggests that the model is able to generate an empirically plausible inflation rate as well as a LC sovereign debt share. Particularly, the portfolio share of domestic currency debt is 36.2% against 41.4%, and average inflation emerges as 5.4% vis-à-vis 4.1% in the data. The calibration exercise is also successful in matching the sovereign debt-to-GDP ratio and credit spreads on FC debt. Using fixed-for-fixed cross currency swaps and under certain assumptions, Du and Schreger (2016) isolate credit risk of domestic currency bonds as deviations from covered interest parity. These authors' dataset imply an average credit spread on Mexican peso denominated bonds of 0.5% per annum in the sample period. The model produces an average domestic currency credit spread of 0.3% per annum, without explicitly targeting this moment in the calibration routine.

The baseline model produces broadly plausible volatility patterns (the middle panel of Table 2) without targeting second-order business cycle moments. Specifically, consumption and FC debt-to-GDP ratio are more volatile than output, whereas trade balance-to-GDP ratio, excess yields on both bonds, as well as inflation are less volatile than output. Under the lack of commitment to exchange rate policy, deviating from the inflation target leads to a real cost of 0.05% of output in the

[14] Data on total sovereign debt-to-GDP ratio and the currency composition of foreign-held sovereign debt are collected from the April 2021 vintage of the updated dataset of Arslanalp and Tsuda (2014). For dollar denominated country risk premia, we use the EMBI Global index compiled by JP Morgan. We use year-on-year changes in the consumer price index published by the OECD to measure inflation.

long-term, given our calibration. This cost is high enough for the sovereign to reduce its appetite to create excessive fluctuations in the exchange rate. Instead, the sovereign proactively tilts the currency structure of debt to minimize the likelihood of costly outright defaults. This is evident in large standard deviations in debt-to-GDP ratios in both currencies in the effort of reducing real debt burdens over the business cycle.

Our model successfully predicts the procyclicality of consumption and the countercyclicality of the net exports-to-GDP ratio and FC sovereign bond spreads (see the bottom panel of Table 2). However, the model generates countercyclical LC sovereign bond spreads, whereas the data exhibit acyclical dynamics. This discrepancy stems from the stronger positive co-movement between LC and FC credit spreads in our model compared to the data.

The model generates correlations consistent with the currency management of sovereign debt, including countercyclical dynamics in FC sovereign debt-to-GDP ratio and a strong portfolio rebalancing effect between dollar- and peso-denominated sovereign bonds. These patterns are broadly consistent with the data, except for the LC sovereign debt-to-GDP ratio, which exhibits mild countercyclicality in the model but procyclicality in the data. The latter relates to the interaction between inflation and output dynamics. In the data, inflation exhibits only a mild co-movement with output, suggesting that the effects of subdued domestic demand in the Mexican economy – under less favorable macroeconomic fundamentals – have outweighed the average impact of exchange rate pass-through on inflation. By contrast, our simulations indicate that the benefits of reducing real debt burdens through partial repudiation via inflation outweighs the output costs of inflating away the economy under lower income (see the discussion in Section 5.1). The empirically consistent positive co-movement between the LC sovereign debt-to-GDP ratio and inflation in our simulations, which appears stronger in the model than in the data, largely accounts for the dynamics of peso-denominated debt-to-GDP ratio.

4.4 Decision rules in the baseline model

How does the sovereign adjust the currency composition of its debt portfolio in response to liquidity crises? The left panel of Figure 2 plots the debt issuance frontier as a function of global liquidity conditions. Specifically, the frontiers represent combinations of dollar ($b^{F'}$) and peso

($b^{L'}$) debt issuance (expressed as a percentage of mean income, normalized to one) that sustain a reference consumption level. The solid and dashed lines correspond to low and high degrees of domestic-currency lenders' impatience toward future payouts from LC sovereign debt investments, respectively. The bold points on each frontier represent the equilibrium choices that maximize the value of repayment for the sovereign.

The negative slope of the debt frontiers (rather than a slope of zero) indicates that the model allows for simultaneous accumulation of debt in both instruments, enabling active portfolio rebalancing between FC and LC debt as the sovereign achieves the reference consumption level. Second, the debt issuance frontier shifts inward during liquidity crises, reflecting tighter borrowing constraints. Third, comparing equilibrium portfolio choices across different degrees of peso lenders' impatience reveals that higher impatience shifts the debt issuance portfolio northwest relative to lower impatience. This pattern indicates that as the cost of peso debt rises during risk-off episodes – when the sovereign is expected to increasingly inflate away its peso debt burden – the sovereign tilts its debt composition toward hard currency when global liquidity is scarce.

Numerical decision rules confirm a stronger inflationary bias when outstanding peso debt is larger and global liquidity is low. The right panel of Figure 2 shows the decision rule for currency depreciation (in percent per annum) as a function of outstanding peso debt across the two global liquidity levels, holding outstanding dollar debt fixed at its mean across simulations. The optimal exchange rate policy prescribes a higher rate of currency depreciation when the stock of peso debt is larger under low liquidity. Under high liquidity and sufficiently high initial peso debt levels, however, the sovereign faces a steeper bond price menu as a function of peso-denominated debt. In this case, the marginal benefit of reducing the debt burden through inflation rapidly declines with higher peso-denominated debt and does not justify further real distortions from inflation (see Section 5.1 for an analytical discussion of this property).

4.5 Excess bond yields on peso debt and currency composition of sovereign borrowing

We assume LC lenders are more impatient towards future payouts from sovereign debt during stress episodes. At the same time, LC debt bears currency depreciation risk that originates from the sovereign's incentives to exert an inflation bias to use the hedging benefits of LC debt (see

Figure 2 and Section 5.1 for a discussion). In this section, we compare the model-implied nominal yields-to-maturity of peso and dollar debt, to see how they evolve amidst the counterbalancing effects ensuing from asymmetric degrees of lender impatience and currency risk. The nominal yields-to-maturity for peso and dollar debt are computed by $r_t^L = \frac{\kappa^L}{q_t^L} - \delta^L$ and $r_t^F = \frac{\kappa^F}{q_t^F} - \delta^F$, as implied by the geometrically decaying long-term coupon payments formulation. We then plot in the left panel of Figure 3 the excess yield-to-maturity on LC bonds over FC bonds $r_t^L - r_t^F$ for a given sample path after attaining long-run averages. The chart also shows episodes of financial stress – indicated by the shaded periods – during which impatience towards future payouts from peso debt rises. We find that even though during normal times lenders are equally impatient, LC nominal bond yields are higher than FC bond yields, by 51 basis points on average, reflecting the effect of the currency risk premium in the nominal yield of LC debt (see Section 5.1 for theoretical underpinnings of this finding). During liquidity crises, the currency risk premia gets further elevated, expanding excess nominal yields on LC debt even more, consistent with the response of the sovereign to strengthen its inflationary bias against the reduced patience of lenders to invest in LC bonds when global sentiment is dim.

The evolution of relative bond yields is instrumental for the model's success in generating strong substitutability between hard- and domestic-currency sovereign debt over the business cycle as a sign of active currency management of debt to reduce default risk. The model-implied evolution of optimal portfolio composition (corresponding to the evolution of nominal excess yields on LC debt depicted on the left panel of Figure 3), are demonstrated in the right panel of Figure 3. Simulations assert that there is a very clear negative relationship between the debt accumulation paces of the two instruments and the share of LC debt declines substantially when the sovereign faces higher excess yields on peso debt during crisis episodes as shown on the left panel. In addition, we highlight that as shown in Table 2, simulations produce a strong negative cross correlation coefficient of -0.85 between dollar and peso debt-to-GDP ratios as in the data (see also Figure 1) without targeting this empirical moment.

4.6 Currency management of sovereign debt, risk-off episodes and bond spreads

We find that sustained issuance of domestic-currency sovereign debt to foreign lenders provides insurance to EMEs during abrupt reversals in investor sentiment toward LC bonds. Specifically, the gradual reduction of original sin enables the sovereign to transfer exchange rate risk to foreign investors, delivering substantial fiscal relief during risk-off episodes characterized by original sin redux. We demonstrate this by comparing two model economies – a baseline and a counterfactual – subject to identical income shocks and liquidity crises. In the counterfactual economy (labeled the "dollarized public debt" scenario), the government cannot issue peso-denominated bonds in international financial markets; all outstanding debt and new issuances must be denominated in hard currency. We then compare optimal debt management strategies across both specifications over the business cycle, examining currency composition and exchange rate policies in the baseline model. In the baseline specification, liquidity crises arise when increased lender impatience toward future payouts from peso-denominated bonds coincides with adverse macroeconomic fundamentals. By contrast, in the counterfactual economy, these episodes reflect only a persistent sequence of negative output shocks, with no effect on lender impatience.

Figure 4 shows that the total debt-to-GDP ratio (fine-dashed line in the left panel) in the economy with dollarized public debt rises steadily as it approaches liquidity crises (indicated by the shaded regions), during which bond spreads surge due to adverse macroeconomic fundamentals. In contrast, the gradual accumulation of successive negative shocks in the run-up to liquidity crises induces the sovereign in the baseline economy to tilt the currency structure of its debt toward pesos (dashed lines in the left panel) and to deleverage in dollars (dotted lines in the left panel). Simultaneously, the sovereign announces larger currency depreciations (fine-dashed lines in the right panel) as it approaches liquidity crises, with the objective of reducing the LC debt burden. The resulting fiscal relief enables the sovereign to offer lower hard-currency bond spreads both over the business cycle and during liquidity crises compared to the economy with dollarized public debt (compare the dotted and dashed lines in the right panel).

Our findings help explain how EME sovereigns successfully weathered the onset of the COVID-19 crisis without a major debt event, despite the pandemic representing an exceptional risk-off episode that coincided with adverse macroeconomic fundamentals. We show that LC debt facilitates

incentive-compatible state contingency through the ex post choice of exchange rate depreciation. Consistent with our results, many countries with a higher LC share of foreign-held sovereign debt prior to the pandemic experienced larger currency depreciations while simultaneously experiencing smaller increases in country risk premia during the COVID-19 crisis (see Figure A.1 in Appendix A.3).

4.7 Welfare consequences of losing the ability to issue domestic-currency debt

How do the reduced bond spreads under LC debt issuance fare against costly currency depreciations without any commitment to exchange rate policy? We answer this question by computing welfare gains of an unanticipated switch from our baseline specification to the counterfactual economy with dollarized public debt. In particular, we compute state-dependent welfare gains in terms of percentage changes in compensating consumption variations that would leave sovereign indifferent between staying in the environment with both dollar and peso debt issuance and switching to the economy with dollarized public debt. We measure consumption-equivalent welfare gains denoted by η as,

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u\left(\tilde{c}_t[1+\eta]\right) = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u\left(c_t\right), \tag{37}$$

in which the consumption streams $\{\tilde{c}_t\}_{t=0}^{\infty}$ and $\{c_t\}_{t=0}^{\infty}$ are attained in the baseline economy and the economy with dollarized public debt, respectively. Welfare gain measure η is evaluated at the quadruple of initial hard-currency and peso debt, endowment and the state of liquidity and is derived from equilibrium value functions with

$$\eta(b^F, b^L, s) = \left[\frac{v(\mathbf{b}^F, s)}{\tilde{v}(b^F, b^L, s)}\right]^{\frac{1}{1-\sigma}} - 1,$$

utilizing the CRRA form for household preferences. To make a proper comparison, $\tilde{v}(b^F, b^L, s)$ and $v(\mathbf{b}^F, s)$ are value functions evaluated at identical levels of initial total debt with $\mathbf{b}^F = b^F + b^L$ and aggregate states in the baseline economy and the economy with dollarized public debt, respectively. In our welfare change calculations, we take into account the impact of the transition dynamics, during which the initial stock of domestic-currency debt is left to mature completely over time without the sovereign being able to issue new LC sovereign debt. Positive values for η imply that

the benevolent sovereign would prefer transitioning into an economy with dollarized public debt instead of staying in an economy where it can issue both dollar and peso debt.

We find that switching to a regime of dollar-only issuance reduces welfare (see the top panel of Figure 5). Specifically, the welfare differences from this unanticipated regime change, evaluated at the ergodic mean of debt-to-GDP ratios across the two currencies in the baseline economy, are negative across all income and global liquidity state realizations. Losses are larger as the economy's endowment approaches the default threshold (moving leftward from the rightmost point on the horizontal axis), where the positive gap between bond spreads in the dollarized public debt economy and FC bond spreads in the baseline economy widens (see the right panel of Figure 4). For output levels where the sovereign is in default, the loss of discretionary currency depreciation becomes irrelevant, and welfare losses decline. Finally, for output levels at which the sovereign repays its coupons, welfare losses diminish under lower global liquidity (dashed lines). This occurs because of the stronger inflationary bias under low global liquidity when outstanding peso debt is sufficiently large (see the right panel of Figure 2). In these states, switching to the original sin economy is relatively less costly, as the sovereign avoids the distortionary inflation bias. This channel is muted in the output region where the sovereign is in default.

These welfare results are not trivial ex ante. This is because quantitative default models with long-term debt are subject to the well-documented debt dilution problem. Therefore, removing the additional long-term debt instrument (LC bonds) from the portfolio problem could have attenuated the debt dilution, leading to welfare gains. In contrast, the shorter duration of LC bonds in our environment, shores up bond prices given that the default risk is identical for both bonds, whereas the reduction in average bond maturity mitigates the debt dilution problem. On the other hand, if we had only considered one-period debt contracts, losing the additional debt instrument would not have led to a debt-dilution problem and the study of its welfare consequences would have been trivial.

Finally, to shed more light on these non-trivial welfare consequences, we rerun the welfare experiment assuming zero initial debt in the baseline economy. In this case, switching to the original sin regime slightly improves welfare, as the benefits of inflation in the baseline economy are substantially reduced with no initial stock of domestic currency debt (see the bottom panel of

Figure 5). Across global liquidity states, the ranking of the welfare gains resemble those observed at output levels in the default region from the previous experiment, where inflation played no role.

5 Inspecting model mechanisms

In this section, we analytically explore debt portfolio and currency depreciation choices of the sovereign under simplifying assumptions, demonstrate the importance of rising risk aversion towards domestic-currency debt during financial stress episodes and the role of real distortions created by exchange rate depreciations.

5.1 Portfolio and currency depreciation choices

We analytically study the optimal debt portfolio and currency depreciation choices of the sovereign using some illustrative simplifications. This is because the government in our framework faces a nontrivial portfolio choice problem, while simultaneously deciding on the optimal currency depreciation policy. In particular, we follow the strategy developed by Bianchi et al. (2018) and Aguiar et al. (2019) and first focus on a triple of debt portfolio objects and currency depreciation rate that support a constant consumption level. We assume that both bond pricing conditions (24) and (25), and the value function in problem (9) are differentiable as in Arellano and Ramanarayanan (2012). We also abstract from debt recovery and set the target inflation rate π^* to zero. These simplifying assumptions and the accompanying use of Euler equations are purely for the ease of purpose of analytical exposition as in Bianchi et al. (2018) and Aguiar et al. (2019). Our numerical solutions (shown in Section 4.4) do not rely on Euler equation methods and neither impose any differentiability assumption on optimality conditions nor impose any restriction on the level of consumption.

Under these simplifying assumptions, the budget constraint of the sovereign who enters the current period with a good credit standing is written as

$$\bar{c} = y\left(1 - \frac{\theta}{2}\pi^2\right) + q^F\left(b^{F'} - (1-\delta^F)b^F\right) - \kappa^F b^F + q^L\left(b^{L'} - \frac{(1-\delta^L)b^L}{1+\pi}\right) - \kappa^L\frac{b^L}{1+\pi} \tag{38}$$

with $\bar{c}$ representing our reference consumption level and bond prices q^F and q^L defined over $(b^{F'}, b^{L'}, s)$. With no loss of generality, our focus is on the determination of optimal LC denominated debt for given currency depreciation and FC debt issuance policy. Therefore, define peso borrowing that supports $\bar{c}$ as $\widehat{b^L}(b^{F'}, \pi, \mathcal{S})$ with $\mathcal{S} = \{\bar{c}, b^F, b^L, s\}$ denoting the "state of the world". Applying the implicit function theorem to equation (38) shows how optimal LC borrowing depends on currency depreciation and FC debt while keeping $\bar{c}$ constant, as defined by partial derivatives $\frac{\partial \widehat{b^L}}{\partial \pi}$ and FC debt $\frac{\partial \widehat{b^L}}{\partial b^{F'}}$ (see Appendix A.4 for a derivation and discussion of these objects).

Optimal debt portfolio. Since we fixed consumption, optimal portfolio and currency depreciation policy can be characterized by maximizing the return value in problem (9) subject to all future portfolio and currency depreciation policies being optimal. Particularly, optimal portfolio and currency depreciation solve,

$$\begin{aligned} &\max_{b^{F'}>0, \pi \geq 0} \ \mathbb{E}_{s'|s}\left[v(b^{F'}, \widehat{b^L}(b^{F'}, \pi, \mathcal{S}), s')\right], \\ &\text{subject to } \widehat{b^L}(b^{F'}, \pi, \mathcal{S}) > 0, \end{aligned} \tag{39}$$

retaining our preference to limit interest to equilibria in which the sovereign always borrows in its available debt instruments. We relegate the explicit derivations regarding the solution of this problem to Online Appendix B (which additionally includes an Euler equation approach). The solution yields two optimality conditions for sovereign debt portfolio and currency depreciation:

$$\mathbb{E}_{s'|s}\Big[(1-d')\underbrace{u'(c')\left(\kappa^F + q^{F'}(1-\delta^F)\right)}_{\text{Cost of increasing dollar debt}}\Big] = \mathbb{E}_{s'|s}\Bigg[(1-d')\underbrace{u'(c')\left(\frac{\kappa^L + q^{L'}(1-\delta^L)}{1+\pi'}\right)}_{\text{Benefit of reducing peso debt}}\Bigg]\overbrace{\left(-\frac{\partial \widehat{b^L}}{\partial b^{F'}}\right)}^{\substack{\text{Portfolio} \\ \text{adjustment}}} \tag{40}$$

$$\mathbb{E}_{s'|s}\left[(1-d')u'(c')\frac{\left(\kappa^L + q^{L'}(1-\delta^L)\right)}{1+\pi'}\right] \underbrace{\left(-\frac{\partial \widehat{b^L}}{\partial \pi}\right)}_{\substack{\text{Effect of inflation} \\ \text{on portfolio}}} = 0 \tag{41}$$

Equation (40) equates cost of tilting debt portfolio towards FC to its benefit. The left-hand side is the utility cost of repaying one more unit of the coupon κ^F and carrying $q^{F'}(1-\delta^F)$ amounts

of long-term FC debt over the next period. The right-hand side displays the benefit of avoiding the repayment of LC debt in the next period thanks to the portfolio rebalancing towards dollar bonds in the current period. Both payoffs are taken into account in repayment states so that they are multiplied by $1 - d'$. They are also affected from the pricing behavior of international lenders coded in $q^{F'}$ and $q^{L'}$ as well as the expected optimal inflation bias $\pi' > 0$ in the subsequent period.

Hedging benefits of domestic-currency debt. The Euler equation for LC bond issuance – denoted by equation (B.9) in the Online Appendix B – is useful to illustrate the hedging benefits of issuing peso debt. Suppressing notation for brevity, this condition implies

$$
\begin{aligned}
u'(c) \underbrace{\left(q^L + \frac{\partial q^L}{\partial b^{L'}} \left[b^{L'} - \frac{(1-\delta^L) b^L}{1+\pi} \right] + \frac{\partial q^F}{\partial b^{L'}} [b^{F'} - (1-\delta^F) b^F] \right)}_{\text{Net increase in consumption by borrowing one more unit of peso debt}} \\
= \beta \, \mathbb{E}_{s'|s} \left[(1-d')u'(c') \underbrace{\frac{\kappa^L + q^{L'}(1-\delta^L)}{1+\pi'}}_{\substack{\text{(Diluted) cost of carrying} \\ \text{long-term peso debt}}} \right] \\
= \beta \underbrace{\mathbb{E}_{s'|s} \left[(1-d')u'(c') \right] \mathbb{E}_{s'|s} \left[\frac{\kappa^L + q^{L'}(1-\delta^L)}{1+\pi'} \right]}_{\text{Debt repayment cost with partial repudiation through inflation}} \\
+ \underbrace{\beta \, \text{cov}_{s'|s} \left((1-d')u'(c'), \frac{\kappa^L + q^{L'}(1-\delta^L)}{1+\pi'} \right)}_{\text{Hedging benefit of inflating peso debt away}}. \qquad (42)
\end{aligned}
$$

The first term in equation (42) captures the benefit of issuing peso debt in the current period. The second term – representing its cost – can be decomposed into (i) a component tied to the next period's real debt burden, and (ii) a covariance term between this burden and the marginal utility of future consumption. The first term in this decomposition shows how an inflationary bias can lower the future real debt burden and reduce foregone future consumption. The covariance reflects hedging benefits against outright default risk: in states of low output and consumption, this term is likely to be negative, partially offsetting debt issuance costs as higher inflation helps reduce default risk under adverse macroeconomic fundamentals.

The inflationary bias of the sovereign – to partially repudiate domestic-currency denominated debt and obtain hedging benefits against outright default risk – is counterbalanced by the real costs of inflating away the economy and by the excess returns on LC debt offered to foreign lenders. These excess returns, which are inversely related to the LC bond issuance price q^L, can be analyzed by first defining the nominal interest rates on each borrowing instrument and using foreign lenders' pricing kernels. Specifically, using the definitions for nominal payout on dollar and peso-denominated sovereign debt in (18) and (21), the nominal rates of return on dollar and peso denominated debt, $R^{F'} = \mathcal{R}^{F'}/q^F$ and $R^{L'} = \mathcal{R}^{L'}/q^L$, are defined as:

$$R^{F'} = \frac{(1-d')[\kappa^F + (1-\delta^F)q^{F'}] + d'q_d^{F'}}{q^F} \quad \text{and} \quad R^{L'} = \frac{(1-d')[\kappa^L + (1-\delta^L)q^{L'}] + d'q_d^{L'}}{q^L} \tag{43}$$

Inserting these rates of return on FC and LC debt into bond pricing conditions (24) and (25) yields

$$\begin{aligned} 1 = \mathbb{E}_{s'|s}\left[M^F(s,s')R^{F'}\right] &= \mathbb{E}_{s'|s}\left[M^L(s,s')\frac{R^{L'}}{1+\pi'}\right] = \mathbb{E}_{s'|s}\left[M^L(s,s')R^{L'}\right]\mathbb{E}_{s'|s}\left[\frac{1}{1+\pi'}\right] \\ &+ \operatorname{cov}_{s'|s}\left(M^L(s,s')R^{L'}, \frac{1}{1+\pi'}\right). \end{aligned} \tag{44}$$

The right-hand sides of the first and third equalities in (44) can be rearranged to define excess gross nominal return on peso debt over dollar debt as

$$\frac{\mathbb{E}_{s'|s}\left[M^L(s,s')R^{L'}\right]}{\mathbb{E}_{s'|s}\left[M^F(s,s')R^{F'}\right]} = \frac{1 - \overbrace{\frac{\operatorname{cov}_{s'|s}\left(M^L(s,s')R^{L'}, \frac{1}{1+\pi'}\right)}{\mathbb{E}_{s'|s}\left[M^F(s,s')R^{F'}\right]}}^{\text{Reduced risk of outright default when positive}}}{\underbrace{\mathbb{E}_{s'|s}\left[\frac{1}{1+\pi'}\right]}_{\text{Discounting due to inflationary bias}}}. \tag{45}$$

The covariance term in the numerator of (45) – measuring the relationship between LC bond interest rates and the impact of inflation on ex post real returns, $1/(1+\pi')$ – can be negative in some future states, providing a weak condition for a positive LC bond spread. Furthermore, the denominator in (45) reflects the expected discounting effect from inflationary bias, which always increases LC bond spreads. However, when the sovereign leverages higher inflation for hedging

benefits to reduce outright default risk, the covariance term can turn positive. That is, lenders could accept lower compensation despite higher inflation, reflecting their reduced concern for default risk. In these cases, LC bond spreads will remain positive only if foreign lenders expect that the increased risk of partial default (from inflationary bias) outweighs the reduction in outright default risk provided by the hedging benefits of inflation with $\mathbb{E}_{s'|s}\left[\frac{1}{1+\pi'}\right] < 1 - \frac{\text{cov}_{s'|s}\left(M^L(s,s')R^{L'}, \frac{1}{1+\pi'}\right)}{\mathbb{E}_{s'|s}\left[M^F(s,s')R^{F'}\right]}$.

Currency depreciation policy. Equation (41) characterizes optimal currency depreciation policy. Since $q^{L'}$ would be positive in a repayment state and $\kappa^L > 0$, using equation (A.2) in Appendix A.4, one can show that optimal currency depreciation policy satisfies[15]

$$\theta y \pi = \left[\kappa^L + q^L(b^{F'}, \widehat{b^L}, s)(1-\delta^L)\right] b^L \Big/ (1+\pi)^2. \tag{46}$$

This condition equates marginal output cost of inflating away the economy (left) to the marginal benefit of reducing real payments of peso debt. Applying the implicit function theorem to (46) relates the currency depreciation policy to endowment by:

$$\frac{\partial \pi}{\partial y} = \frac{-\theta\pi + \left[\frac{\partial q^L(b^{F'}, \widehat{b^L}, s)}{\partial \widehat{b^L}} \frac{\partial \widehat{b^L}}{\partial y} + \frac{\partial q^L(b^{F'}, \widehat{b^L}, s)}{\partial y}\right] \frac{(1-\delta^L)b^L}{(1+\pi)^2}}{\theta y + 2\left[\kappa^L + q^L(b^{F'}, \widehat{b^L}, s)(1-\delta^L)\right] \frac{b^L}{(1+\pi)^3} - \left[\frac{\partial q^L(b^{F'}, \widehat{b^L}, s)}{\partial \widehat{b^L}} \frac{\partial \widehat{b^L}}{\partial \pi}\right] \frac{(1-\delta^L)b^L}{(1+\pi)^2}}. \tag{47}$$

For ease of exposition, let us assume that debt contracts are short term and entail only one period. In this case, $\delta^L = \kappa^L = 1$, so that bond price plays no role in the determination of optimal currency depreciation policy in condition (46) and whole outstanding debt is inflated away. Since $\theta > 0$, one obtains $\frac{\partial \pi}{\partial y} < 0$. This finding highlights the deviation from commitment to exchange rate policy. That is, optimal currency depreciation is countercyclical, to achieve better consumption smoothing by inflating LC debt away in bad times. The resulting currency depreciation would then translate into an inflation bias via pass-through and create deviations from price stability. This feature makes the introduction of liquidity shocks consistent with the concept of the original sin redux discussed by Bertaut et al. (2025), as EME currency depreciations during stress times hurt the balance sheet of exposed international lenders who fund themselves with hard-currency funds.

[15] We thank an anonymous referee for observing that a similar condition applies under a general inflation target, even with unconstrained consumption and without differentiability assumptions.

This in turn, increases the likelihood of a bond sell-off by these investors followed by a reduction in their tolerance to risk, which is captured by the liquidity shock in their pricing kernel (23).

Now, consider the case of long-term debt with $0 < \delta^L, \kappa^L < 1$. In this case, there are instances in which currency depreciation policy becomes procyclical. Particularly, one has $\frac{\partial \pi}{\partial y} \geq 0$ if $\left[\frac{\partial q^L(b^{F'}, \widehat{b^L}, s)}{\partial \widehat{b^L}} \frac{\partial \widehat{b^L}}{\partial y} + \frac{\partial q^L(b^{F'}, \widehat{b^L}, s)}{\partial y}\right] \frac{(1-\delta^L)b^L}{(1+\pi)^2} \geq \theta\pi$. The left-hand side of this inequality is the incremental increase in marginal benefit of reducing real debt burdens via inflation as income increases. Note that this term is reduced by the negative impact of issuing more peso debt on peso debt issuance price q^L. The right-hand side on the other hand, stands for the incremental increase in marginal cost of reducing real debt burdens via inflation as income increases. Therefore, the sovereign sets currency depreciation procyclically if the former outweighs the latter.

Finally, applying the implicit function theorem to condition (46) to examine the relationship between currency depreciation policy and the outstanding stock of LC debt implies,

$$\frac{\partial \pi}{\partial b^L} = \frac{\frac{\partial q^L(b^{F'}, \widehat{b^L}, s)}{\partial \widehat{b^L}} \frac{\partial \widehat{b^L}}{\partial b^L}(1-\delta^L)b^L + \kappa^L + q^L(b^{F'}, \widehat{b^L}, s)(1-\delta^L)}{\theta y(1+\pi)^2 + 2\left[\kappa^L + q^L(b^{F'}, \widehat{b^L}, s)(1-\delta^L)\right] \frac{b^L}{(1+\pi)} - \frac{\partial q^L(b^{F'}, \widehat{b^L}, s)}{\partial \widehat{b^L}} \frac{\partial \widehat{b^L}}{\partial \pi}(1-\delta^L)b^L}. \tag{48}$$

According to this condition, for one-period debt contracts with $\delta = \kappa = 1$, it is always optimal to increase currency depreciation when the stock of LC debt is higher. In contrast, for long-term debt contracts with $0 < \delta^L, \kappa^L < 1$, raising currency depreciation in response to higher LC debt is optimal only if the benefit of reducing the real peso debt burden outweighs the increased default risk associated with issuing additional peso debt – an inclination of the sovereign when choosing a higher level of inflation. That is, $\kappa^L + q^L(b^{F'}, \widehat{b^L}, s)(1-\delta^L) > -\frac{\partial q^L(b^{F'}, \widehat{b^L}, s)}{\partial \widehat{b^L}} \frac{\partial \widehat{b^L}}{\partial b^L}(1-\delta^L)b^L$. In our full model with global liquidity shocks and without simplifying restrictions, it is always optimal to increase inflation under low liquidity as the existing stock of LC debt rises. In contrast, under high liquidity, bond pricing schedules are uniformly higher than under low liquidity. This implies that at sufficiently high initial peso debt levels, default risk can increase more rapidly than under low liquidity, leading to declining inflation as the initial peso debt level rises (see the right panel of Figure 2).

Our analytical findings shed light to the numerical approximation of the quantitative model that allows non-differentiability of value functions in hinting that (i) optimal currency structure depends

on how default risk premium weighs against currency risk premium, wherein the latter originates from the sovereign's urge to use the hedging benefits of LC debt, (ii) currency depreciation is countercyclical when inflating away peso debt is useful for consumption smoothing purposes and (iii) there is a strong incentive to inflate away the peso debt.

5.2 The role of heterogeneous lender behavior during stress episodes

The original sin redux refers to the unfortunate situation of the sovereign's reduced ability to issue more LC debt to foreign lenders during stress episodes. In our setup, this is achieved by increasing the degree of impatience of domestic-currency lenders when global liquidity is low. This section omits this assumption and considers a version of the model economy in which the subjective discount factor of peso lenders is equal to that of dollar lenders in all states, $\beta^L(s) = \beta^F = \bar{\beta} \ \forall s$.

The third column of Table 2 reports moments for this alternative specification, which produces a domestic-currency debt share closer to the data but at the cost of higher average inflation. Removing original sin redux from the model encourages the sovereign to issue more local-currency debt and inflate away the economy more aggressively. This allows the sovereign to exploit the hedging benefits of domestic-currency debt under limited commitment to exchange rate policy, increasing inflation's countercyclicality relative to the baseline model.

The decoupling between domestic- and hard-currency debt issuance under homogeneous lender impatience is evident in several ways: long-term bond spreads shift from hard-currency to domestic-currency debt, the correlation between outstanding debt-to-GDP ratios across currencies becomes more negative, and the co-movement of bond spreads weakens. Although hedging through discretionary currency depreciations is improved during repayment periods, the excessive use of costly inflation increases the frequency of outright defaults relative to the baseline economy.

The specification with homogeneous lender impatience produces empirically realistic average long-term LC sovereign debt shares. However, it sharply contradicts the data regarding the repercussions of risk-off episodes. Specifically, the right panel of Figure 6 shows that without incorporating rising impatience toward LC debt during reversals in global risk sentiment, the model produces *increasing* domestic-currency debt shares during crises. The model-generated long-term debt ratios also confirm this visual observation, with LC debt share in the average low

liquidity period to increase from 28.1% in the baseline economy to 41.3% in this specification. Correspondingly, the increase in excess yields on LC sovereign debt during crisis episodes is also muted (see the left panel of Figure 6). This finding reflects the sovereign's desire to maximize the hedging benefits of domestic-currency debt during stress episodes with exceptionally weak macroeconomic fundamentals – an intuitive result. Yet the model's implications diverge starkly from the empirical reality of original sin redux demonstrated in Figure 1. In conclusion, when we eliminate the liquidity shock to LC debt investors' impatience, the model still successfully explains the dissipation of original sin through large equilibrium domestic-currency external debt shares. However, it fails to capture the original sin redux dynamics during stress episodes.

5.3 The importance of currency depreciation costs

We find that inflation costs act as a partial commitment device, similar to a successfully implemented inflation targeting regime – a factor that has enabled EME sovereigns to issue more domestic-currency debt over the past two decades. This finding is confirmed from testing the robustness of our results to the intensity of inflation costs, which ensure that equilibrium currency depreciation rates remain bounded above in the baseline model. Specifically, we double the output cost parameter of currency depreciations to $\theta = 120$ while holding all other model parameters constant. The fourth column of Table 2 shows that as the output costs of inflation from currency depreciations increase, the equilibrium supports a LC debt share that is 1.8 percentage points higher than in the baseline economy. This increased prevalence of peso debt stems primarily from more favorable pricing conditions for peso debt issuance, driven by expectations that the sovereign's inflationary bias will be weaker under stronger penalties for deviating from the inflation target. This expectation is confirmed by a 1.1 percentage points lower average inflation produced by this specification compared to the baseline economy.[16]

In terms of second order moments, the increased inflation cost specification performs similarly to the baseline economy, except for higher volatility in both debt-to-GDP ratios and slightly lower inflation volatility over the business cycle. Thus, the sovereign relies more heavily on adjustments to the currency composition of debt rather than using the costly exchange rate policy lever.

[16]When inflation costs are increased arbitrarily, inflation converges to zero and the debt portfolio collapses to peso debt due to the elimination of the currency risk. In this case, peso and hard-currency debt become perfect substitutes.

Although we do not microfound the costs of inflation, the baseline economy's implications are robust to alternative reduced-form specifications of these costs. Table D.2 in the Online Appendix reports simulations under an alternative inflation cost function that modifies equation (4) to $c_t = y_t(1 - \Theta(y_t, \pi_t))$ where $\Theta(y_t, \pi_t) = \max\left\{0, \left(\theta_1 + \theta_2 y_t\right)\frac{[\pi_t - \pi^*]^2}{2}\right\}$ and $\theta_1 = 162$ and $\theta_2 = -20$. In a second robustness check, we replace the output costs of inflation in equation (4) with utility costs by modifying the household utility function in equation (1) to $u(c) = \frac{c^{1-\sigma}}{1-\sigma} - \Theta(y_t, \pi_t)$ where $\Theta(y_t, \pi_t) = \max\left\{0, \theta y_t \frac{[\pi_t - \pi^*]^2}{2}\right\}$ with $\theta = 100$. In both cases, the quantitative implications of our baseline model remain broadly unchanged.

5.4 The role of shorter debt maturities on LC debt

In our baseline model, we set the bond decay rate for peso-denominated debt to exceed that of dollar-denominated debt $\delta^L > \delta^F$, which generates shorter equilibrium debt maturity for LC sovereign debt consistent with the data (Aizenman et al., 2021; OECD, 2025). In this robustness experiment, we increase the duration of peso debt by choosing a lower δ^L so that $\delta^L = \delta^F$, while holding all other model parameters constant. The results are reported in the fifth column of Table 2.

Extending LC debt maturity strengthens overall debt dilution effects, leading to higher equilibrium indebtedness (Hatchondo et al., 2016). The ability to issue longer-term domestic currency bonds amplifies the sovereign's incentive to inflate away real debt burdens through discretionary currency depreciations. This shifts the optimal debt composition toward peso-denominated issuance. As a result, the model produces several key outcomes: (i) higher long-run average inflation, (ii) more pronounced currency rebalancing reflected in stronger negative co-movement between bond issuances across currencies, (iii) intensified co-movement between inflation and outstanding peso debt-to-GDP ratios as the benefit of inflating away peso debt increases, and (iv) higher volatilities in debt-to-GDP ratios, credit spreads across both currencies, and inflation. Interestingly, despite heightened default risk, credit spreads on LC bonds turn negative in this experiment. This is because the reduction in the bond decay rate δ^L, coupled with the rise in equilibrium inflation, elevates the synthetic risk-free yield-to-maturity for domestic currency bonds (see Appendix A.2 for the derivation). When nominal yields offered by the sovereign fall short of this elevated risk-free benchmark, the measured credit spread becomes negative.

5.5 Removing Epstein-Zin lender preferences

The Epstein-Zin preference specification for lenders in our baseline model separately identifies the roles of intertemporal substitution and risk aversion in determining equilibrium bond prices. In this section, we remove this feature and set $\varrho = \Gamma$, so that lender preferences take the standard CRRA form. The implications of this experiement are presented in the sixth column of Table 2.

The transition from Epstein-Zin to CRRA lender preferences generates markedly different equilibrium outcomes due to the fundamental restriction that CRRA preferences impose: the inverse of the intertemporal elasticity of substitution must equal the relative risk aversion coefficient. Our baseline Epstein-Zin calibration features $\varrho < 1 < \Gamma = 2$, deliberately chosen to separate two conceptually distinct preference dimensions. This parameterization allows lenders to exhibit moderate risk aversion while displaying a strong willingness to substitute consumption across time periods with $1/\varrho > 1$. The high intertemporal elasticity of substitution indicates that lenders are relatively flexible about the timing of consumption, readily shifting resources between periods in response to interest rate differentials.

When we impose CRRA preferences with $\varrho = \Gamma = 2$, this restriction dramatically alters this intertemporal trade-off. Lenders now exhibit a low willingness to substitute consumption across time $1/\varrho < 1$, making them substantially more averse to any variation in consumption paths. The stochastic discount factor loses the additional risk-sensitive component, the second term in stochastic discount factors (22), (23), (33) and (34), that adjusts the pricing kernel based on the ratio of realized to expected continuation utility. This reduces the flexibility with which lenders can price state-contingent payoffs and amplifies their effective aversion to all forms of consumption volatility. Consequently, lenders demand higher risk premiums even as the sovereign reduces its debt issuance in response to these elevated costs. The equilibrium features lower debt levels, reduced default frequency, and compressed volatility in both debt-to-GDP ratios and spreads. However, average credit spreads rise because the sovereign, facing a steeper and less flexible bond price schedule, must compensate lenders more generously per unit of default risk. The motive to partly compensate for the loss of state-contingent bond pricing conditions also prompts the sovereign to increase the countercyclically of inflation relative to the baseline economy.

5.6 The role of exogenous lender wealth

In this section, we explore how simulations in the baseline model respond to changes in exogenous lender wealth, w. The seventh column in Table 2 presents results from doubling lender wealth. As lenders become wealthier, their marginal utility of consumption declines, reducing the welfare cost of losses from sovereign default. Under Epstein-Zin preferences, this effect operates directly through the lenders' stochastic discount factors (22), (23), (33), and (34). Specifically, the intertemporal substitution term varies less dramatically across states when the consumption base is larger, weakening the covariance between the pricing kernel and bond payoffs. Consequently, wealthier lenders demand lower risk premiums for any given default probability and the resulting reduction in lender risk aversion leads to higher equilibrium default risk (Aguiar et al., 2016). These effects, however, impact hard-currency sovereign debt pricing more strongly than LC debt. The reason is that peso lenders' intertemporal substitution remains responsive to global liquidity conditions through the dependency of the subjective discount factor on the state of global liquidity in pricing kernels (23) and (34).

This more accommodating pricing environment for hard-currency debt fundamentally alters sovereign borrowing incentives and risk-taking behavior. Facing a flatter FC bond price schedule – where spreads are less sensitive to debt levels – the sovereign finds it optimal to rebalance its debt issuance portfolio sharply toward FC debt. The currency composition of outstanding debt in low global liquidity states declines from 28% in the baseline economy to 6%. This dramatic shift toward non-inflatable FC debt reduces the sovereign's ability to use inflation for partial repudiation, leading to lower average inflation and acyclical inflation dynamics. However, the reduced reliance on inflation as a state-contingent repayment mechanism comes at a cost: the sovereign instead relies more heavily on outright default to smooth consumption in adverse states, leading to higher default risk overall.

The shift in the sovereign's debt management strategy generates increased volatility along multiple dimensions. The pronounced portfolio rebalancing toward FC debt produces higher volatility in debt-to-GDP ratios and bond spreads across currencies, as the sovereign takes advantage of the more accommodating FC pricing to borrow more aggressively. Additionally, while the sovereign uses inflation less systematically for debt repudiation, the remaining peso debt exhibits stronger

co-movement with inflation in the states where inflation adjustments do occur, contributing to higher inflation volatility despite lower average inflation levels.

5.7 Alternative pricing kernels with negligible sovereign weight in lender portfolio

In this section, we consider an economy in which foreign lenders have arbitrarily high wealth w, so that (i) their consumption $C_t^\star$ and (ii) their stochastic discount factor (SDF) are unaffected by the sovereign's decisions or by the prices of the sovereign's bonds. Intuitively, Mexico accounts for a negligible share of foreign lenders' asset portfolios, and the sovereign is therefore *small* from the perspective of deriving the pricing kernel. In this case, domestic and foreign shocks remain linked only through the correlation between the EME's output and global liquidity conditions; whereas the pricing kernel becomes exogenous to the sovereign.

We model the exogenous pricing kernel using the tractable Epstein–Zin (EZ) structure in Hatchondo et al. (2016). Let the growth rate of each foreign lender's consumption follow the AR(1) process

$$\log g_t^\star = (1-\rho^\star)\mu_{g^\star} + \rho^\star \log g_{t-1}^\star + \varepsilon_t^\star, \qquad |\rho^\star| < 1, \quad \varepsilon_t^\star \sim \mathcal{N}(0, \sigma_{\varepsilon^\star}^2). \tag{49}$$

Assume unit EIS ($\varrho = 1$) and logarithmic period utility. Using the standard EZ recursion (our earlier notation) for foreign lenders,

$$\log V^\star(C_t^\star, g_t^\star) = (1-\beta^\star)\log C_t^\star \; + \; \frac{\beta^\star}{1-\Gamma^\star} \log \mathbb{E}_t\Big[\big(V^\star(C_{t+1}^\star, g_{t+1}^\star)\big)^{1-\Gamma^\star}\Big], \tag{50}$$

where $\Gamma^\star > 0$ is the coefficient of risk aversion and $\mathbb{E}_t[\cdot]$ denotes the mathematical expectation conditional on information available at date t.

Under homotheticity, $V^\star$ factorizes into current consumption and a term that depends only on the state of consumption growth:

$$\log V^\star(C_t^\star, g_t^\star) \;=\; \log C_t^\star \;+\; \log \tilde{V}^\star(g_t^\star), \tag{51}$$

with

$$\log \tilde{V}^\star(g_t^\star) \;=\; \frac{\rho^\star\beta^\star}{1-\rho^\star\beta^\star}\,\log g_t^\star \;+\; \frac{(1-\rho^\star)\beta^\star}{(1-\beta^\star)(1-\rho^\star\beta^\star)}\,\mu_{g^\star} \;+\; \frac{1}{2}\,\frac{(1-\Gamma^\star)\beta^\star}{(1-\beta^\star)(1-\rho^\star\beta^\star)^2}\,\sigma_{\varepsilon^\star}^2. \tag{52}$$

Given $\varrho = 1$, the corresponding SDF becomes

$$M_{t+1} \;=\; \beta^\star \,\frac{(g^\star_{t+1})^{-\Gamma^\star}\,\left(\tilde{V}^\star(g^\star_{t+1})\right)^{1-\Gamma^\star}}{\mathbb{E}_t\Big[\left(g^\star_{t+1}\tilde{V}^\star(g^\star_{t+1})\right)^{1-\Gamma^\star}\Big]}.^{17} \tag{53}$$

Because the sovereign is small, the same M_{t+1} prices all payoffs for that lender type. When we refer to segmented lenders across the currency dimension, we follow the main text and allow a state-dependent discount factor $\beta^L(s')$ for peso lenders to scale the common pricing kernel at,

$$M^L_{t+1} \;=\; \beta^L(s)\,M_{t+1}, \text{ whereas } M^F_{t+1} \;=\; \bar{\beta}\,M_{t+1} \text{ holds for dollar lenders.}$$

Calibration. Following Hatchondo et al. (2016), we set $\Gamma^\star = 59$, calibrate $\beta^\star = 0.9828$, and estimate $\sigma_{\varepsilon^\star} = 0.0039$, and $\rho^\star = 0.8709$ from US quarterly aggregate consumption growth over 1952–2019, interpreting foreign lenders as US investors. The SDF implies a risk-free rate r^f_t through

$$\mathbb{E}_t[M_{t+1}] = \frac{1}{1+r^*_t},$$

and $\beta^\star$ is pinned so that the model-implied average r^* matches the data. Since the pricing kernel is exogenous, we recalibrate the default and inflation cost parameters to hit their corresponding empirical targets as in Section 4.2. The resulting values are $d_0 = -1.15$, $d_1 = 1.26$, and $\theta = 160$.

Model implications. Results are reported in the eighth column of Table 2. The model matches aggregate debt/GDP, FC spreads, inflation, and the currency composition of debt reasonably well. Since Mexico is negligible in lenders' portfolios, sovereign cash-flow risk loads only weakly on the pricing kernel, compressing risk premia and encouraging higher borrowing in both currencies. State-dependent discounting $\beta^L(s)$ continues to tilt issuance towards pesos in high-liquidity states, amplifying volatility in currency composition and spreads relative to the baseline. In this environment the government relies more on outright default than on costly partial repudiation; with our default-state inflation rule unchanged, this delivers near-acyclical inflation on average.

[17] SDF under unit EIS: With $\varrho = 1$, the EZ SDF satisfies

$$M_{t+1} = \beta^\star \left(\frac{C^\star_{t+1}}{C^\star_t}\right)^{-1} \left(\frac{V^\star_{t+1}}{\left(\mathbb{E}_t[(V^\star_{t+1})^{1-\Gamma^\star}]\right)^{1/(1-\Gamma^\star)}}\right)^{1-\Gamma^\star}.$$

Using $V^\star_t = C^\star_t \tilde{V}^\star(g^\star_t)$ and $g^\star_{t+1} = C^\star_{t+1}/C^\star_t$ yields (53).

Nevertheless, inflation remains volatile because it co-moves positively with the outstanding peso debt-to-GDP ratio, whose volatility rises in this specification.

5.8 The role of sovereign's bargaining power in endogenous debt restructuring

In this experiment, we increase the sovereign's bargaining power to $\varphi = 0.95$, holding other parameters constant. Results are shown in the ninth column of Table 2.[18] Stronger sovereign bargaining power reduces the endogenous debt recovery ratio, generating two opposing effects on default probability and spreads (Yue, 2010). Lower recovery rates increase required bond yields for given borrowing levels. However, the downward shift in bond pricing induces the sovereign to lower debt issuance, reducing default likelihood and bond spreads. Our simulations show the second effect dominates, yielding lower default risk and sovereign indebtedness from stronger bargaining power of the sovereign. Reduced default risk discourages costly currency depreciations to lower real debt burdens. Consequently, both the level and countercyclicality of inflation decline, as does the average LC debt portfolio share, relative to the baseline. However, given lower indebtedness and default risk, the co-movement between inflation and outstanding LC debt strengthens (see Section 5.1). Despite reduced default risk, average credit spreads over peso-denominated bonds rise relative to the baseline due to lower synthetic risk-free yields on LC bonds amid diminished inflation risk. In online appendix, we provide a battery of sensitivity tests for different values the sovereign's bargaining power parameter φ.

6 Conclusion

EMEs have been praised for escaping the original sin trap, as the marketing of domestic-currency sovereign debt to foreign creditors mitigates the currency risk that had plagued these countries' public finances. However, recent work has highlighted the risk of going back to square one, as higher foreign holdings of LC sovereign debt expose EMEs to large bond sell-offs in the event of an abrupt reversal in global risk appetite. This has reignited the debate on the trade-offs in terms of reducing the inflationary bias, as governments find it difficult to issue domestic-currency debt to foreign lenders when they need it the most. We quantify this trade-off and find that the

[18] See Table D.3 in the Online Appendix for implications for alternative values of φ.

lever of reducing real debt burdens through discretionary exchange rate depreciation leads to better borrowing terms, even though EMEs find it difficult to sell domestic-currency sovereign debt to foreign lenders when global liquidity is tight. We also find that the benefit of improved borrowing terms from actively managing the currency composition of sovereign debt outweigh the inflationary distortions of exchange rate depreciations, thereby increasing welfare. Our paper fills a gap in the literature by highlighting the central role of lenders in explaining the currency structure of sovereign debt over the business cycle – particularly during episodes of stress – and sheds light on the commendable experience of many EMEs in weathering the COVID-19 shock without a major debt event.

Our framework can be used to explore additional trade-offs that may arise from the expansionary effects of currency depreciations, defaults that are selective on the currency denomination, the co-movement between monetary policy credibility and the currency management of sovereign debt and trade-offs in the allocation of currency risk between domestic and foreign lenders. We leave these compelling extensions, which are beyond the scope of this paper, to future research.

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Table 1: Parameter values

	Parameter	Value
Discount factor of households	β	0.97
Constant relative risk aversion of households	σ	2
Output autocorrelation coefficient	ρ	0.816
Standard deviation of innovations to output	σ_ϵ	0.0127
Mean log output	$\log \bar{y}$	$(-1/2)\sigma_\epsilon^2$
Risk-free international interest rate	r^*	0.01
FC bond decay rate	δ^F	0.0275
LC bond decay rate	δ^L	0.055
Coupon payment on FC debt	κ^F	0.0371
Coupon payment on LC debt	κ^L	0.0644
Inflation target	π^*	0.0074
Exclusion duration	ψ	0.16667
Nash bargaining power of the sovereign	φ	0.85
Probability of entering low risk tolerance	p^0_{HL}	0.0575
Probability of entering low risk tolerance	p^1_{HL}	5.75
Probability of exiting low risk tolerance	p_{LL}	0.1
Discount factor of dollar lenders	$\bar{\beta}$	0.99
Inverse of intertemporal elasticity of substitution for both lenders	ϱ	0.5
Constant relative risk aversion of both lenders	Γ	2
Exogenous investor wealth of both lenders	w	100
Price cap for new debt issuance	$\underline{q}$	0.45
Jointly calibrated in the baseline economy		
Quadratic output cost of inflation	θ	60
Linear output cost of default	d_0	-0.45
Quadratic output cost of default	d_1	0.56
Discount factor of peso lenders under low risk tolerance	$\underline{\beta}$	0.98

Table 2: Data versus model economies

	(1) Data	(2) Baseline economy	(3)[a] No liquidity shocks	(4) Higher inflation costs	(5) Longer LC debt duration	(6) CRRA utility of lenders	(7) Higher lender wealth	(8) Exogenous pricing kernel	(9) Stronger sovereign bargaining power
Long-term statistics, annualized, %									
Debt-to-GDP	30.28	32.79	32.19	31.81	35.49	30.14	31.18	28.50	22.62
Share of LC debt	41.42	36.20	41.75	37.98	47.48	38.09	25.43	46.74	32.27
$r^F - r^{*F}$	2.19	2.14	1.95	1.99	2.46	5.83	1.74	2.50	2.13
$r^L - r^{*L}$	0.52	0.32	0.42	0.33	-1.71	0.56	2.10	4.90	1.81
Inflation	4.13	5.42	5.76	4.30	5.81	5.14	4.65	3.99	4.49
Default rate	n.a.	0.85	1.00	0.70	1.72	0.02	1.66	5.69	0.34
Debt recovery rate	n.a.	50.84	48.99	49.11	49.32	56.56	47.71	48.07	26.71
Volatilities, %[b]									
$\sigma(c)/\sigma(y)$	1.05	1.16	1.16	1.15	1.11	0.90	1.20	1.30	1.14
$\sigma(tb/y)$	0.58	0.51	0.51	0.51	0.43	0.81	0.77	0.84	0.50
$\sigma(r^F - r^{*F})$	0.55	0.47	0.41	0.46	0.81	0.44	0.62	0.77	0.56
$\sigma(r^L - r^{*L})$	0.24	0.79	0.97	0.84	1.81	0.25	1.29	1.72	0.89
$\sigma(\pi)$	0.38	0.14	0.12	0.09	0.19	0.04	0.26	0.13	0.12
$\sigma(b^F/y)$	1.57	7.35	6.88	8.70	13.44	5.44	17.61	15.56	8.13
$\sigma(b^L/y)$	0.79	8.63	7.60	9.91	18.93	3.25	19.76	17.78	9.80
Correlations[b]									
$\rho(c,y)$	0.94	0.98	0.98	0.97	0.98	0.90	0.94	0.88	0.98
$\rho(tb/y,y)$	-0.12	-0.47	-0.47	-0.45	-0.39	0.43	-0.31	-0.28	-0.45
$\rho(r^F - r^{*F},y)$	-0.67	-0.70	-0.76	-0.58	-0.71	-0.43	-0.70	-0.71	-0.61
$\rho(r^L - r^{*L},y)$	0.09	-0.63	-0.42	-0.49	-0.18	-0.63	-0.53	-0.6	-0.60
$\rho(r^L - r^{*L}, r^F - r^{*F})$	0.32	0.72	0.49	0.59	0.42	0.01	0.84	0.95	0.67
$\rho(b^F/y,y)$	-0.58	-0.16	-0.12	-0.14	0.02	-0.58	-0.09	-0.03	-0.09
$\rho(b^L/y,y)$	0.23	-0.11	-0.27	-0.16	-0.20	-0.37	-0.02	-0.10	-0.08
$\rho(b^L/y, b^F/y)$	-0.73	-0.85	-0.94	-0.89	-0.96	0.87	-0.97	-1.00	-0.97
$\rho(\pi,y)$	0.07	-0.11	-0.23	-0.18	-0.07	-0.24	-0.03	0.00	-0.02
$\rho(b^L/y,\pi)$	0.20	0.81	0.75	0.78	0.93	0.95	0.92	0.57	0.99

[a] Colum (3) eliminates asymmetric degree of investor impatience during liquidity shortage periods. Column (4) sets $\theta = 120$. Column (5) sets $\delta^L = \delta^F = 0.0275$. Column (6) sets $\varrho = \Gamma = 2$. Column (7) sets $w = 200$. Column (8) sets $\varrho = 1$ and sets w to an arbitrarily high level. Colum (9) sets $\varphi = 0.95$.

[b] $\sigma(j)$ denotes the standard deviation of variable j. Standard deviation of output in the model is $\sigma(y) = 1.94\%$. $\rho(j,k)$ denotes the correlation coefficient between variables j and k.

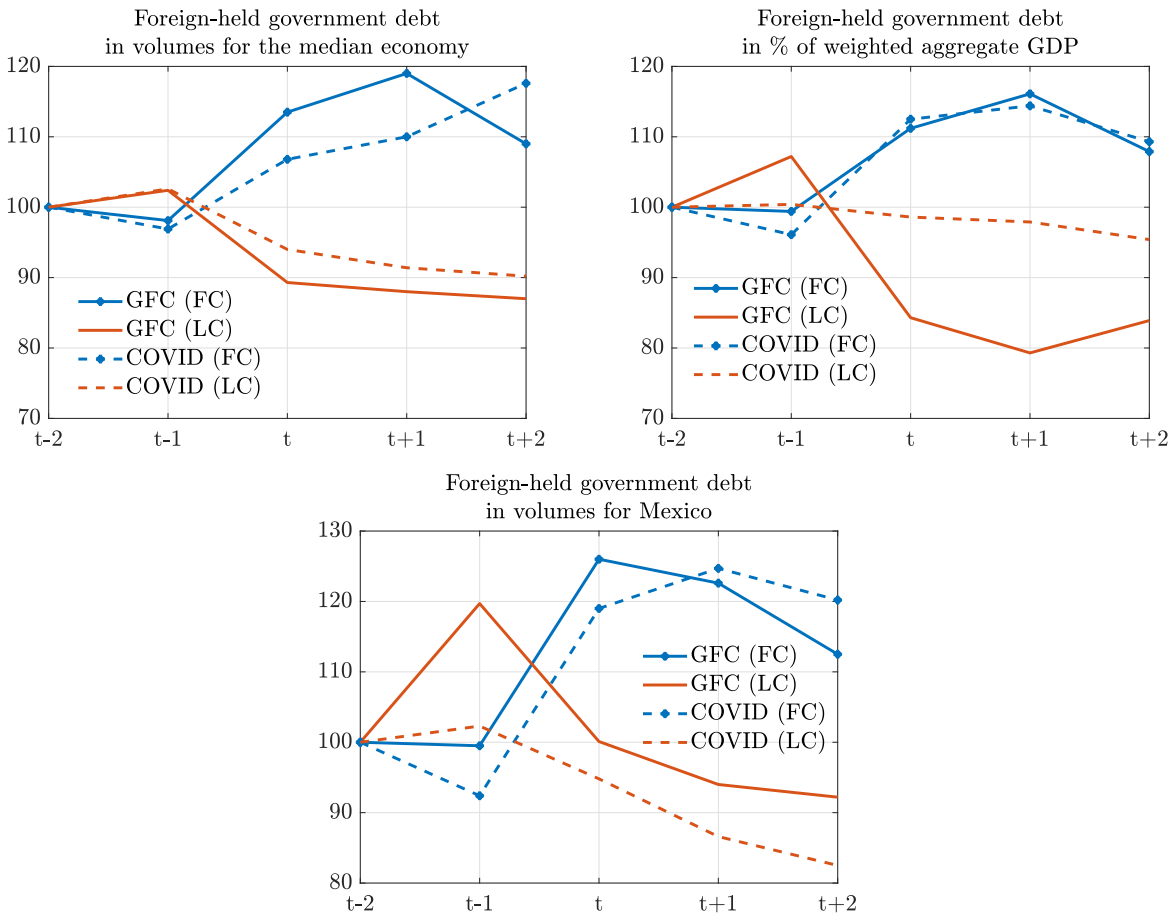

Figure 1: Evolution of foreign-held general government debt in a group of emerging-market economies (EMEs) and in Mexico. The top-left panel shows the evolution of debt in volumes for the median EME obtained by dividing values by the GDP deflator. The top-right panel shows the evolution of debt as a percentage of GDP for the GDP-weighted aggregate EME, using market exchange rates against the US dollar. The bottom panel plots the evolution of debt in volumes for Mexico obtained by dividing values by the GDP deflator. In all panels, lines with(out) diamonds correspond to debt denominated in foreign (local) currency. Solid and dashed lines correspond to the global financial crisis and the COVID-19 crisis episodes, respectively. For data on global financial crisis, the sample includes Argentina, Brazil, Bulgaria, China, Hungary, India, Indonesia, Malaysia, Mexico, Peru, the Philippines, Poland, Romania, Russia, South Africa, Thailand and Turkey. For data on the COVID-19 crisis, the sample additionally includes Chile and Colombia. Time t on the horizontal axis denotes the quarter for each stress episode, in which the volatility index VIX has attained monthly levels that were at least four standard deviations above the historical mean of the index since 2004Q1 – the beginning period of our reference period for model calibration. For comparability across stress episodes and currency denominations, real debt stocks in the left panel and the debt-to-GDP ratios on the right panel are normalized to 100 in quarter $t-2$. Data sources are the IMF Sovereign Debt Investor Base for Emerging Markets dataset, the IMF International Financial Statistics, the OECD Economic Outlook 112 database, LSEG and authors' calculations.

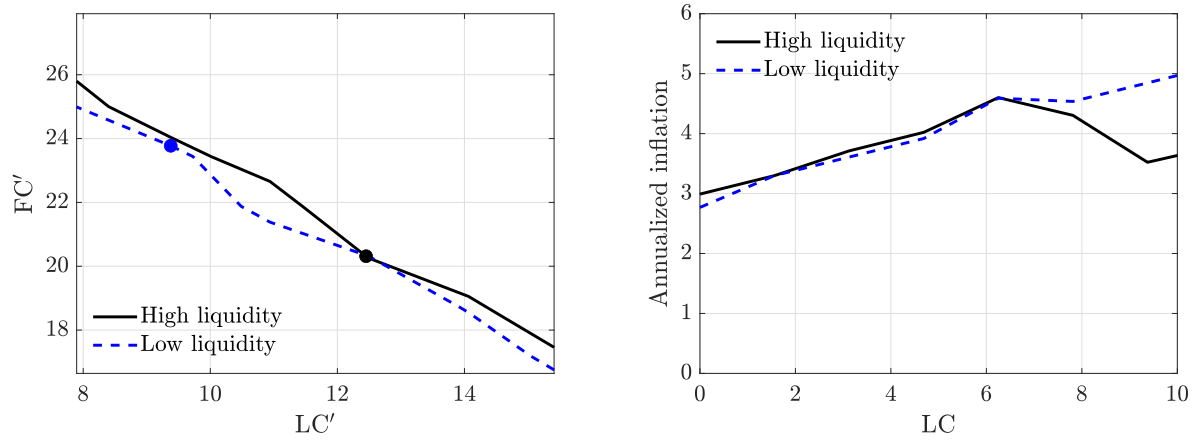

Figure 2: The panel on the left plots the debt issuance frontier (as a percent of mean income that is normalized to one) that supports a reference consumption level in the baseline model for high- and low-liquidity states. The panel on the right plots the currency depreciation policy (in annualized percentage terms) as a function of the state of liquidity and outstanding LC debt, while fixing outstanding FC debt at its average over simulations.

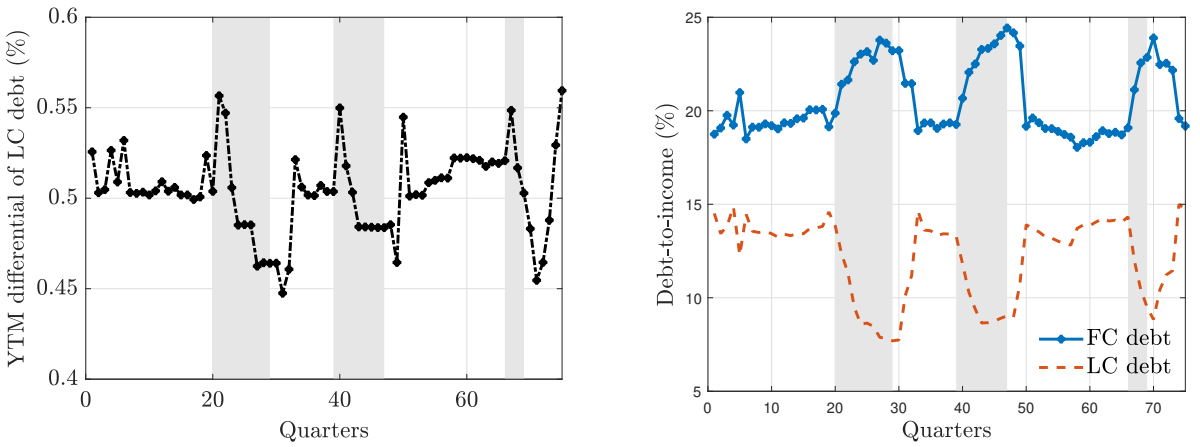

Figure 3: The left panel shows the evolution of excess nominal yield-to-maturity of peso (LC) debt over dollar (FC) debt. The right panel shows corresponding FC and LC debt-to-income ratios implied by model simulations. Shaded areas indicate periods of low global liquidity when lenders become increasingly impatient for returns on peso-denominated debt.

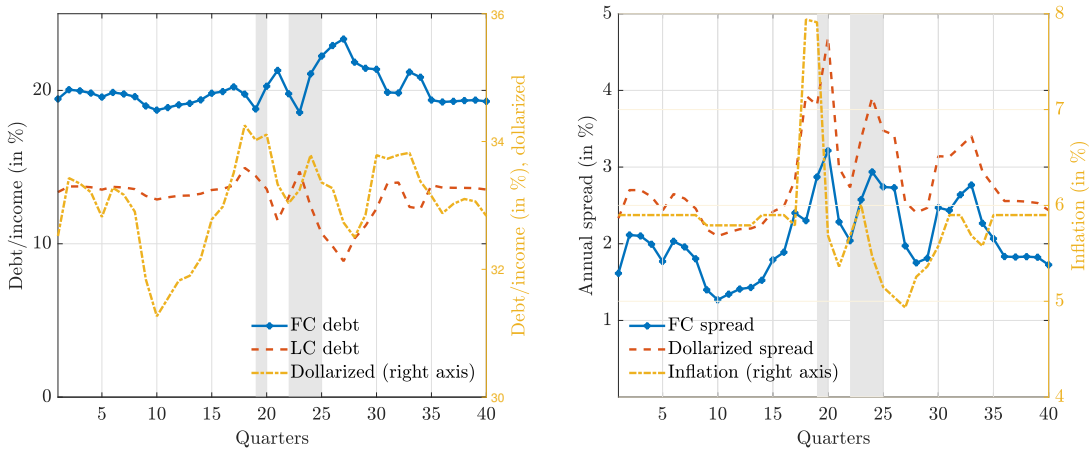

Figure 4: The left panel shows the evolution of the FC and LC debt-to-income ratios in the baseline economy and the FC debt-to-income ratio of the counterfactual economy with dollarized public debt (plotted against the right axis), all in percentages. The right panel shows the evolution of annualized FC debt spreads (solid lines) and currency depreciation rate in the baseline economy (fine-dashed lines plotted against the right axis) and FC debt spreads in the economy with dollarized public debt (dashed lines) implied by the trajectory of endowment shocks used in the left panel. Shaded areas indicate periods of low global liquidity when lenders become increasingly impatient for returns on peso-denominated debt.

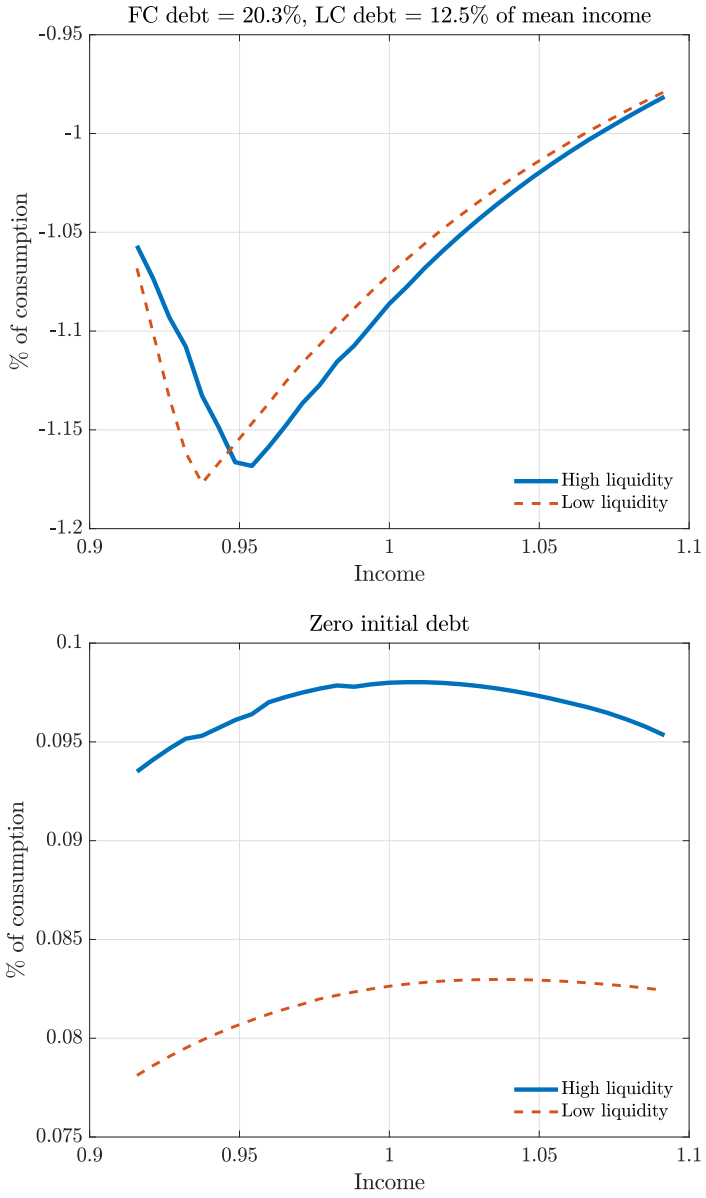

Figure 5: The top panel shows welfare gains following an unanticipated announcement that the economy will transition from the baseline specification to a regime with fully dollarized public debt. Welfare gains are measured in consumption-equivalent percentage terms and plotted as functions of initial endowment and liquidity state. For this exercise, we fix the initial total debt-to-income ratio at the ergodic mean of the dollarized debt economy. The bottom panel presents results from an analogous experiment with one key difference: at the time of the unanticipated switch, the sovereign holds no outstanding debt.

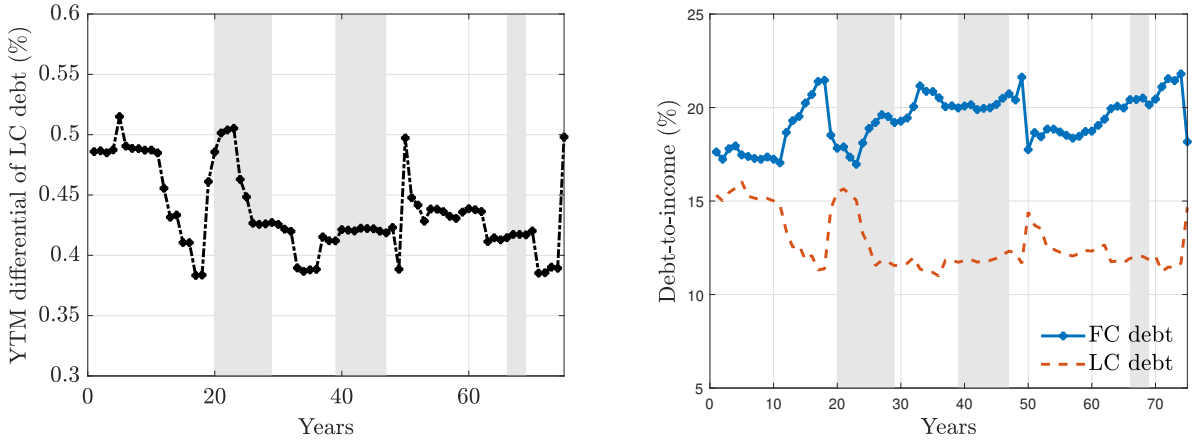

Figure 6: Evolution of excess nominal yield-to-maturity (left panel) of peso (LC) debt over dollar (FC) debt and corresponding FC and LC debt-to-income ratios (right panel) implied by the model with homogeneous lender risk aversion and increased risk aversion of the households (Section 5.2). Shaded areas coincide with stress episodes in the baseline economy depicted in Figure 3 with exceptionally low income but no change in the lenders' level of impatience for returns on peso-denominated debt.

A Appendix

A.1 Numerical approximation algorithm

The computational algorithm used in this paper requires iterating on the value and price functions until a convergence criteria of 10^{-5} is obtained. Functions are evaluated at equally spaced grid points. When evaluations fall outside of the grids, we approximate our functions by interpolating them with cubic splines for bonds and linearly interpolating them for income. For FC and LC debt b^F, b^L and income y, 25 grid points are used, whereas we utilize 100 Gauss-Legendre quadrature points to evaluate expectations over income into the subsequent period.[19]

1. Initial guesses of v^r, v^d, q^F, q^L and ω are set at the their corresponding levels in a finite-horizon economy as follows:

   - $v^r(b^F, b^L, s) = u(y - \kappa^F b^F - \frac{\kappa^L b^L}{1+\pi})$
   - $v^d(b^F, b^L, s) = u(y - \phi(y))$
   - and $q^F = 0, q^L = 0, \omega = 0$.

2. Optimization problem defined in the main text is solved for each grid point on bonds (b^F, b^L), income (y) and global liquidity shock l. We first evaluate the objective on a coarse rectangular grid with 40 nodes in each of $(b^{F'}, b^{L'}, \pi)$. For each *grid triple* $(b^{F'}, b^{L'}, \pi)$, we hold $(b^{L'}, \pi)$ fixed at that triple's values and refine the choice of $b^{F'}$ using Brent's method (univariate maximization), initialized at the triple's $b^{F'}$ and bracketed by its adjacent grid nodes along the $b^{F'}$ dimension. This yields a conditional optimizer $\widehat{b}^{F'}(b^{L'}, \pi; b_0^{F'})$, where $b_0^{F'}$ denotes the grid value used for initialization. We implement maximization by applying Brent's method to the negative of the objective. Starting from the refined candidate $\left(\widehat{b}^{F'}(b^{L'}, \pi; b_0^{F'}), b^{L'}, \pi\right)$, we apply a Nelder–Mead derivative-free routine to refine the maximizer jointly in $(b^{F'}, b^{L'}, \pi)$. This step is robust to kinks induced by the $\underline{q}$ constraint, the repayment/default switch, and the piecewise inflation loss around $\pi^\star$. In default, absent seigniorage or nominal carry-over of legacy local-currency obligations, π enters only through the convex loss; the first-order

[19] Önder (2023) shows the superiority of using black-box optimizers over taste-shocks, particularly when solving a portfolio allocation problem.

condition selects $\pi_t = \pi^\star$ (we normalize $\pi^\star \equiv 0$). Accordingly, we fix π at the target and skip refinement in π on the default branch.

3. Iterate the procedure defined above until the ergodic differences in two iterations remains the same.

4. Invoke local search methods within the neighborhood of the obtained candidate optima $(b^{F'}, b^{L'}, \pi)$ for each grid points of (b^F, b^L, s) in the previous step.

5. Iterate the local search methods for equations (15) to (20) in the main text until convergence criteria of 10^{-5} is obtained.

With the equilibrium value and pricing functions as well as the decision rules for borrowing, default and currency depreciation, we simulate the model. In particular, we:

1. Set the number of samples $N = 2000$, number of periods $T = 1501$ and $T_0 = 500$.

2. Use a random number generator to draw sequences of ε_t for $t = 1, 2, ..., T$ to compute the income of the subsequent periods and to evaluate the continuation value of default. We fix these drawn shocks to use them for each sample $n \in N$.

3. Set the initial endowment y to be mean y with no global liquidity shocks and debt holdings b^F, b^L to be zero.

4. Cut the first T_0 periods of each sample before computing the moments of the simulation so that randomly chosen initial values will not have any influence on moments.

The moments reported in all tables are computed from the 2000 simulated sample paths such that each sample includes 20 years without a default observation. The sample period begins at least 5 years after regaining access to the credit markets following a default episode. Business cycle moments are reported after HP-detrending them with a smoothing parameter of 100. We also make sure that both global search methods and local search methods generate very similar moments.

A.2 Local currency denominated synthetic risk-free bond yields

A synthetic and risk-free peso denominated bond would satisfy the condition

$$q^{*L}\left(b^{F'}, b^{L'}, s\right) \quad = \quad \mathbb{E}_{s'|s}\left\{M^{L}(s,s')\,\frac{\kappa^{L}+(1-\delta^{L})q^{*L}(b^{F''}, b^{L''}, s')}{1+\hat{\pi}(b^{F'}, b^{L'}, s')}\right\}, \tag{A.1}$$

as it would repay in all states of the world. Nonetheless, under no commitment to a pre-determined path for currency deprecation rates, it would still carry a currency depreciation risk premium. The pricing function on the right-hand side of (A.1) satisfies $b^{F''} = \hat{b^{F}}(b^{F'}, b^{L'}, s')$, $b^{L''} = \hat{b^{L}}(b^{F'}, b^{L'}, s')$ as defined in the main text. We solve for (A.1) by following an iterative procedure; using equilibrium borrowing and currency depreciation policy functions as it has no impact on borrowing or currency depreciation decisions. Given the synthetic risk-free pricing schedule, risk-free yields-to-maturity can be computed as $r_t^{*L} = \frac{\kappa^L}{q_t^{*L}} - \delta^L$.

A.3 Response of EMEs to the COVID-19 shock

The top panel of Figure A.1 indicates that majority of the countries that had a higher domestic currency share in foreign-held sovereign debt prior to the COVID-19 crisis faced a lower increase in sovereign risk spreads during the pandemic episode. The figure implies a simple correlation coefficient of -0.44 between average spread increases and the pre-COVID levels of LC share in foreign-held sovereign debt. The bottom panel of Figure A.1 indicates that countries that had a higher domestic currency share in foreign-held sovereign debt prior to the COVID-19 crisis faced a larger exchange rate depreciation against the dollar during the pandemic episode. The figure implies a simple correlation coefficient of 0.27 between average depreciation and the pre-COVID levels of LC share in foreign-held sovereign debt. Intriguingly, for very high LC debt shares, it is likely that the original sin redux effect dominates, creating a non-linear effect on country risk premia and the exchange rates.

A.4 Optimal LC debt issuance in relation to currency depreciation and FC debt issuance decisions

Applying the implicit function theorem to equation (38) shows how optimal LC borrowing depends on currency depreciation $\frac{\partial \widehat{b^L}}{\partial \pi}$ and FC debt $\frac{\partial \widehat{b^L}}{\partial b^{F'}}$, while keeping $\bar{c}$ constant:

$$\frac{\partial \widehat{b^L}}{\partial \pi} = \frac{\overbrace{\theta y \pi - \left[\kappa^L + q^L(1-\delta^L)\right] b^L \Big/ (1+\pi)^2}^{\text{Net reduction in the budget introduced by inflation}}}{\underbrace{q^L + \frac{\partial q^L}{\partial \widehat{b^L}}\left[\widehat{b^L} - \frac{(1-\delta^L)b^L}{1+\pi}\right] + \frac{\partial q^F}{\partial \widehat{b^L}}[b^{F'} - (1-\delta^F)b^F]}_{\text{Net revenue from issuing peso debt}}} \tag{A.2}$$

$$\frac{\partial \widehat{b^L}}{\partial b^{F'}} = \frac{\overbrace{-\left(q^F + \frac{\partial q^F}{\partial b^{F'}}[b^{F'} - (1-\delta^F)b^F] + \frac{\partial q^L}{\partial b^{F'}}\left[\widehat{b^L} - \frac{(1-\delta^L)b^L}{1+\pi}\right]\right)}^{\text{Net revenue from issuing dollar debt}}}{\underbrace{q^L + \frac{\partial q^L}{\partial \widehat{b^L}}\left[\widehat{b^L} - \frac{(1-\delta^L)b^L}{1+\pi}\right] + \frac{\partial q^F}{\partial \widehat{b^L}}[b^{F'} - (1-\delta^F)b^F]}_{\text{Net revenue foregone by reducing peso debt}}} \tag{A.3}$$

with $\frac{\partial \widehat{b^L}}{\partial \pi} = \frac{\partial \widehat{b^L}(b^{F'},\pi,\mathcal{S})}{\partial \pi}$, $\frac{\partial \widehat{b^L}}{\partial b^{F'}} = \frac{\partial \widehat{b^L}(b^{F'},\pi,\mathcal{S})}{\partial b^{F'}}$, $q^L = q^L(b^{F'}, \widehat{b^L}, s)$ and $q^F = q^F(b^{F'}, \widehat{b^L}, s)$.

The numerator of equation (A.2) reflects the *net* reduction in the budget (that would support any constant $\bar{c}$) resulting from a rise in inflation driven by the exchange rate pass-through. An incremental increase in inflation reduces output by the first term, whereas the second term expands the budget because LC debt repayments are inflated away. The denominator of equation (A.2) represents the net revenue from issuing peso debt. For each unit of bond issued, the sovereign raises q^L units of resources. In addition to this, one has to factor in the endogenous impact of new bond issuance on the prices of domestic and hard-currency debt, which is captured in the second and third terms. If $\frac{\partial \widehat{b^L}(b^{F'},\pi,\mathcal{S})}{\partial \pi} > 0$, then the net reduction in budget set is positive, so that it is compensated by selling more LC bonds to attain reference consumption.

Equation (A.3) characterizes the optimal portfolio maintaining the reference consumption. The numerator reflects the net revenue raised by issuing FC debt. Notice again that dollar debt issuance affects both bond prices (captured by partial derivatives) akin to peso debt. If there is a portfolio shift towards dollar debt away from peso debt, so that $\frac{\partial \widehat{b^L}(b^{F'},\pi,\mathcal{S})}{\partial b^{F'}} < 0$, then this term is positive and compensates for the reduction in the budget, which would be captured by the denominator.

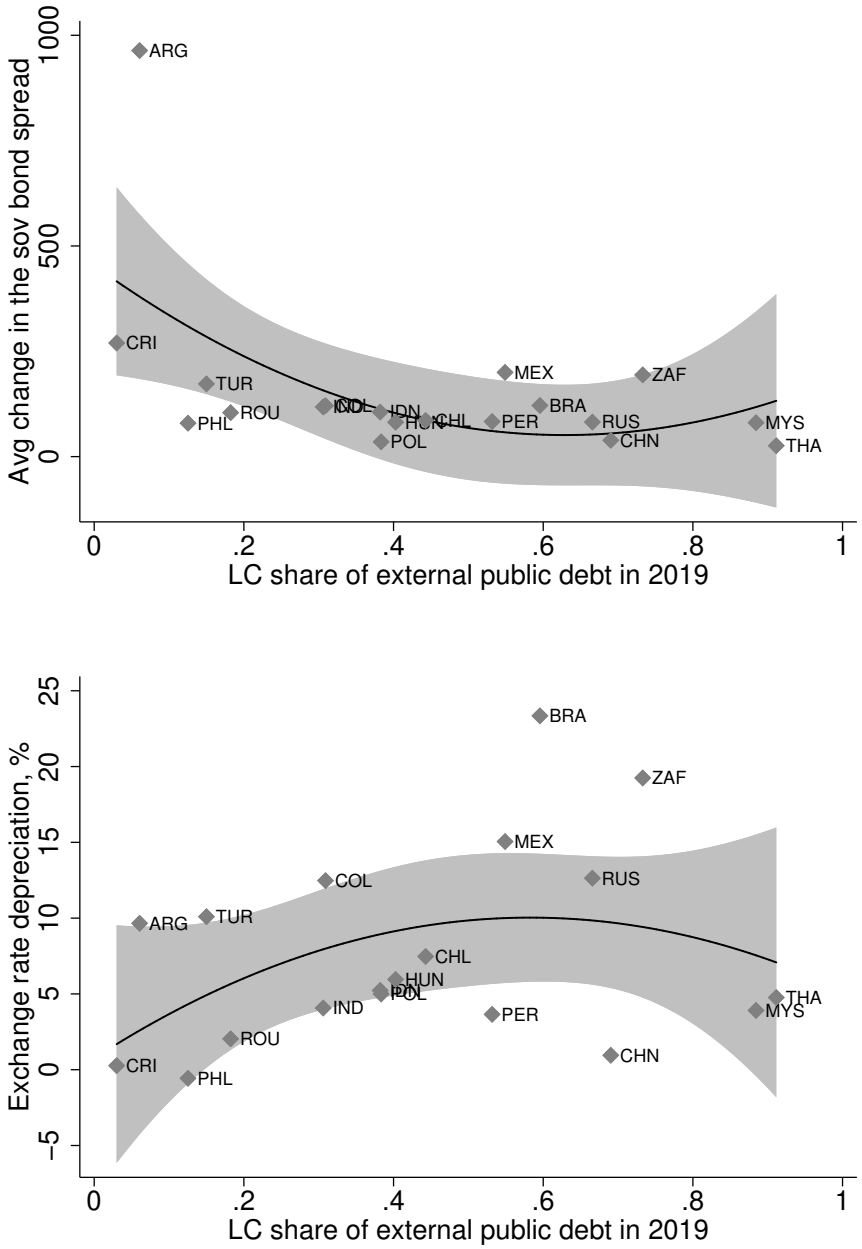

Figure A.1: The vertical axis in the top panel denotes the average EMBI Global bond spread (compiled by JP Morgan) increase in countries as of August 2020 relative to the beginning of 2020. For Thailand, Credit Default Swap spreads are used due to data availability. The vertical axis in the bottom panel denotes the average exchange rate depreciation against the US dollar in countries as of August 2020 relative to the beginning of 2020. The horizontal axes denote the domestic-currency share of foreign-held sovereign debt as of 2019Q4 (2018Q4 for Costa Rica). Solid lines and the shaded areas denote a quadratic fit and a 95% confidence interval, respectively. Data sources are the IMF Sovereign Debt Investor Base for Emerging Markets dataset, the OECD (2020), LSEG, Factset, the OECD Exchange Rates database and authors' calculations.

Online appendix for "Default or Depreciate, and the Original Sin Redux" - Not intended for publication [1]

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Abstract

This online appendix presents evidence on reduced risk aversion towards local-currency denominated emerging-market economy sovereign debt in the last decade, describes mathematical derivations that provide foundation to Section 3.3 in the main text, discusses our data source on foreign holdings of domestic-currency denominated emerging-market economy sovereign debt, and presents additional robustness exercises which are left out of the main text for the sake of brevity.

Keywords: Sovereign default, inflationary bias, investor base, original sin

JEL Codes: E31, F34, F45

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A Foreign investor base characteristics of EME public debt

In this section, we review some facts and insights from the recent empirical literature on investor base heterogeneity of EME sovereign debt, which is useful to bring lenders to the frontline in explaining the recent increased LC share in sovereign EME debt.

U.S. based investor type characteristics. In recent work, Bertaut et al. (2025) present direct evidence on the characteristics of U.S. based EME government debt holders. As illustrated in their Figure 4, which is reproduced here as Figure D.1, a larger part of domestic-currency denominated EME government bonds are held by mutual funds, who are more responsive to reversals in the global risk sentiment. Hard-currency denominated EME government bonds on the hand, are held mostly by insurance and pension funds, who have a longer investment horizon with mainly U.S. dollar denomination of liabilities.

Evidence during COVID-19 driven capital outflows. OECD (2020) reports that at the height of the recent global COVID-19 shock, the share of FC in investment grade sovereign debt issuance tripled its historical average of the last five years. In sharp contrast, the share of FC in non-investment grade debt issuance declined to less than one-third of its historical average for the same period. These issuance dynamics are in accordance with the hypothesis that more risk averse investors (who would save more in investment grade portfolios in episodes of a reduction in global risk appetite) also tend to prefer holding hard currency denominated EME sovereign debt more.

Benchmark- vs. nonbenchmark-driven funds. Sienaert (2012) provides guidelines to debt managers in EMEs with a special focus on the surge in LC sovereign debt markets and the widening nonresident investor base. He identifies major investor types for this class as benchmarked funds that take an index (e.g. JP Morgan GBI-EM index) as a reference in their performance, the official sector (mainly including central banks and sovereign wealth funds), absolute return investors such as hedge funds and benchmarked funds that have not been focusing on EMEs before (e.g. funds that target Barclays Global Aggregate Index, Global AGG or Citibank World Government Bond Index, Citi WGBI).

Arslanalp and Tsuda (2015) report that benchmark-driven investors accounted for more than one-third of the foreign investor base of LC EME government bonds by the end of 2014. They also confirm that their finding is in accordance with JP Morgan surveys on the assets under management, which closely track JP Morgan GBI-EM as a benchmark. A key property of benchmark-driven funds (such as the Barclays Emerging Markets Local Currency Government Index and the Citi Emerging Markets Government Bond Index) is that they typically do not impose minimum investment rating requirements in contrast with global bond indices (including Global AGG index and Citi EGBI). Therefore, the increased prominence of benchmark-driven funds in the total foreign investor base of LC sovereign debt contributes to reduced risk aversion toward this asset class.

Hedge funds are holding more EME LC debt. Sienaert (2012) provides an estimate of about USD 203 billion in 2012Q2 for assets under management by EME dedicated hedge funds (roughly 40% of foreign holdings of EME LC government debt; see Arslanalp and Tsuda (2015)), which generally tolerate more risk relative to central banks or other unconstrained investors that are more sensitive to credit ratings.

Central banks versus sovereign wealth funds. Using IMF's Currency Composition of Official Foreign Exchange Reserves (COFER) data, Sienaert (2012) reports that while central banks' holdings of non-major currency reserves have increased from USD 22 billion in 1999 to USD 294 billion 2012Q1, it still constituted only 5% of the aggregate outstanding international reserve positions covered in the COFER database. Arslanalp and Tsuda (2014) provide country level approximations to this measure by additionally using the Coordinated Portfolio Investment Survey (CPIS) database and find that foreign central bank demand for government bonds issued by EMEs are concentrated in Brazil, China, Indonesia, Malaysia, Mexico, Poland and South Africa. Using their dataset, it is evident that this arguably risk-averse investor base prefers hard currencies over EME currencies.

Sovereign wealth funds on the other hand, can be deemed less risk averse than central banks as their investment portfolio includes funds directed to equity or real estate finance in addition to fixed-income assets. To give an example, Norway's sovereign wealth fund, Government Pension Fund Global of Norway, holds about 12% of its fixed-income investments in emerging market local currency bonds while Norges Bank (Central Bank of Norway) holds none (see Norges Bank

Investment Management (2015)).

Home bias; nationals living abroad versus foreign investors. The home-country bias phenomenon that was uncovered by French and Poterba (1991) is an important empirical finding in international portfolio choice literature. A number of empirical papers provide intuition as to why investors have a preference toward their local assets. These explanations range from behavioral to geographical, including the advantages of collecting specific pieces of information from news given in one's native language. Recently, Maggiori et al. (2018) found that currency denomination of a security is a stronger predictor of an investor's nationality than the nationality of the issuer. To give an anecdotal example, according to the president of the Capital Markets Board of Turkey, in year 2008, at least 30% of foreign investments in the Turkish stock market were made by Turks and Turkish companies founded overseas. This home-bias behavior increases the degree of risk tolerance of the foreign investor base of LC denominated EME public debt relative to the foreign investor base of FC debt, as per the stronger demand of nationals (who reside abroad) for LC denominated assets class.

Motivated by these recent empirical findings on rapidly changing foreign investor base of LC denominated EME sovereign debt, we demonstrate in the following that introducing heterogeneity in the risk appetite of foreign investors is indeed a critical element alongside monetary credibility in understanding currency structure of sovereign debt in EMEs.

B Mathematical derivations

First order conditions to problem (24) in the manuscript are listed as

$$b^{F'} \; : \quad \mathbb{E}_{s'|s}\left[v_1(b^{F'}, \widehat{b^L}, s') + v_2(b^{F'}, \widehat{b^L}, s')\frac{\partial \widehat{b^L}}{\partial b^{F'}}\right] = 0 \tag{B.1}$$

$$\pi \; : \quad \mathbb{E}_{s'|s}\left[v_2(b^{F'}, \widehat{b^L}, s')\right]\frac{\partial \widehat{b^L}}{\partial \pi} = 0 \tag{B.2}$$

where a subscript denotes partial derivative of the return value with respect to the corresponding argument and $'$ symbol denotes the subsequent period. The envelope conditions on the other hand, would read

$$b^F: \quad v_1^r(b^F, b^L, s) = -u'(c)\Big[\kappa + q^F(b^{F'}, \widehat{b^L}, s)(1-\delta)\Big], \quad \frac{\partial v^d(s)}{\partial b^F} = 0 \tag{B.3}$$

$$b^L: \quad v_2^r(b^F, b^L, s) = -u'(c)\frac{\Big[\kappa + q^L(b^{F'}, \widehat{b^L}, s)(1-\delta)\Big]}{1+\pi}, \quad \frac{\partial v^d(s)}{\partial b^L} = 0 \tag{B.4}$$

sticking to the notation that superscripts ^{r} and ^{d} represent values of repayment and outright default, respectively, and reflecting the assumption of no debt recovery, which makes the value of default independent of the outstanding stocks of debt. Using the default policy function d' for the subsequent period, and plugging in the updated version of envelope conditions (B.3) and (B.4) into the first order condition (B.1), one obtains equation (39) in the main text. Equation (40) in the main text follows from inserting the updated envelope condition (B.4) into the first order condition (B.2).

Another method to derive optimal portfolio allocation conditions is to derive Euler equations for both foreign and local currency debt issuance for any level of consumption under the assumption of differentiability. This is accomplished by taking first order conditions of the problem (10) in the main text,

$$b^{F'}: \quad u'(c)\left(q^F(b^{F'}, b^{L'}, s) + \frac{\partial q^F(b^{F'}, b^{L'}, s)}{\partial b^{F'}}\Big[b^{F'} - (1-\delta)b^F\Big] + \frac{\partial q^L(b^{F'}, b^{L'}, s)}{\partial b^{F'}}\Big[b^{L'} - \frac{(1-\delta)b^L}{1+\pi}\Big]\right)$$

$$+ \beta\, \mathbb{E}_{s'|s}\Big[v_1(b^{F'}, b^{L'}, s')\Big] = 0 \tag{B.5}$$

$$b^{L'}: \quad u'(c)\left(q^L(b^{F'}, b^{L'}, s) + \frac{\partial q^L(b^{F'}, b^{L'}, s)}{\partial b^{L'}}\Big[b^{L'} - \frac{(1-\delta)b^L}{1+\pi}\Big] + \frac{\partial q^F(b^{F'}, b^{L'}, s)}{\partial b^{L'}}\Big[b^{F'} - (1-\delta)b^F\Big]\right)$$

$$+ \beta\, \mathbb{E}_{s'|s}\Big[v_2(b^{F'}, b^{L'}, s')\Big] = 0 \tag{B.6}$$

$$\pi: \quad u'(c)\left(-\theta y\pi + \frac{\left[q^L(b^{F'}, \widehat{b^L}, s)(1-\delta)+\kappa\right]b^L}{(1+\pi)^2}\right) = 0. \tag{B.7}$$

Combining the updated envelope conditions (B.3) and (B.4) with first order conditions (B.5) and (B.6) leads to the respective Euler equations for the sovereign debt instruments:

$$u'(c)\left(\underbrace{q^F(b^{F'}, b^{L'}, s) + \frac{\partial q^F(b^{F'}, b^{L'}, s)}{\partial b^{F'}}\left[b^{F'} - (1-\delta)b^F\right] + \frac{\partial q^L(b^{F'}, b^{L'}, s)}{\partial b^{F'}}\left[b^{L'} - \frac{(1-\delta)b^L}{1+\pi}\right]}_{\text{Net increase in consumption by borrowing one more unit of dollar debt}}\right)$$

$$= \beta\,\mathbb{E}_{s'|s}\left[u'(c')(1-d')\Big(\underbrace{\kappa + q^F(b^{F''}, b^{L''}, s')(1-\delta)}_{\substack{\text{Cost of carrying}\\ \text{long-term dollar debt}}}\Big)\right] \tag{B.8}$$

$$u'(c)\left(\underbrace{q^L(b^{F'}, b^{L'}, s) + \frac{\partial q^L(b^{F'}, b^{L'}, s)}{\partial b^{L'}}\left[b^{L'} - \frac{(1-\delta)b^L}{1+\pi}\right] + \frac{\partial q^F(b^{F'}, b^{L'}, s)}{\partial b^{L'}}\left[b^{F'} - (1-\delta)b^F\right]}_{\text{Net increase in consumption by borrowing one more unit of peso debt}}\right)$$

$$= \beta\,\mathbb{E}_{s'|s}\left[u'(c')(1-d')\,\underbrace{\frac{\left[\kappa + q^L(b^{F''}, b^{L''}, s')(1-\delta)\right]}{1+\pi'}}_{\substack{\text{Cost of carrying long-term}\\ \text{peso debt (diluted by inflation)}}}\right] \tag{B.9}$$

Equation (B.7) is the static optimality condition for currency depreciation policy. Euler equations (B.8) and (B.9) equate utility benefit of increasing foreign and local currency debt by one unit in the current period to the expected discounted utility cost of doing so in the subsequent period for each debt instrument, respectively. Since marginal utility of consumption is always positive, using equation (A.3) in the main text, these Euler equations can be combined to derive condition (39) in the main text. Equation (40) in the main text follows from combining equation (A.3) in the main text with (B.7) and (B.9) and using $\beta, u'(c) > 0$.

B.1 Mapping to segmentation and preferred-habitat models

Preferred-habitat models imply an LC pricing condition with a time-t wedge:

$$1 \;=\; q_t^L \;\mathbb{E}_t\big[m_{t+1}^A R_{t+1}^L\big] \;+\; W_t,$$

where W_t captures inverse-demand tightness from clientele quantities and limited arbitrageur capacity (Greenwood et al., 2018; Vayanos and Vila, 2021). Since $W_t \in \mathcal{F}_t$, define the effective kernel $\tilde{m}_{t+1}^L \equiv m_{t+1}^A + W_t / \mathbb{E}_t[R_{t+1}^L]$ to obtain the standard form $1 = q_t^L \; \mathbb{E}_t[\tilde{m}_{t+1}^L R_{t+1}^L]$. Log-linearizing around the steady state gives a first-order equivalence between the wedge and a tilt of the LC kernel:

$$\tilde{m}_{t+1}^L \approx m_{t+1}^A + \frac{\partial m_{t+1}^A}{\partial \beta}\Big|_{\bar{\beta}} \Delta\beta_t, \qquad \Delta\beta_t \;\propto\; W_t.$$

We therefore implement the reduced-form mapping by setting $\beta^L(s) \equiv \bar{\beta} \exp\{-\phi \, \mathrm{Y}_t\}$, where Y_t indexes tightness (e.g., LC net supply and arbitrageur slack). In this sense, the stronger LC SDF response in risk-off states is endogenous to quantities/capacity in reduced form, while our quantitative results hinge on the induced change in the m–R covariance.

C Arslanalp and Tsuda (2014) dataset

Arslanalp and Tsuda (2014) put their data together for 22 EMEs by using BIS International Banking Statistics; ECB; Eurostat; IMF International Financial Statistics (IFS); IMF Coordinated Portfolio Investment Survey (CPIS); IMF Currency Composition of Official Foreign Exchange Reserves (COFER); IMF-World Bank Quarterly External Debt Statistics; and national authorities as data sources. Figures D.2, D.3 and D.4 demonstrate the declining trend in foreign-currency denomination of foreign investor-held government debt at the country level using this dataset. As of 2004Q1, the cross-country average share of hard-currency denominated government debt held by foreign investors was 91% (country number reduces to 14 in this case, due to missing data). As of 2020Q4, this share has declined to 64%.

Du and Schreger (2021) report an average increase in LC denominated external debt share of 37 percentage points for 14 EMEs in the 2003-2017 episode using national sources and the Asian

Development Bank data. Ottonello and Perez (2019) on the other hand, use bond issuance data from Bloomberg and find that share of LC external debt issuance increased by 21 percentage points on average in the 2004-2014 period for 17 EMEs vis-à-vis the 1990-2003 period.

D Robustness exercises left out of the main text

Table D.1 reproduces the empirical and baseline model moments from Table 2 in the main text, supplemented with additional experiments not previously shown. Table D.2 reports additional results from considering alternative specifications of inflation costs compared to the baseline specification. Table D.3 reports additional results from considering alternative parameter values for the bargaining power of the sovereign during debt renegotiation.

Table D.1: Data versus model economies

	(1) Data	(2) Baseline economy	(3)[a] Stronger liquidity shocks	(4) Lower inflation costs	(5) Shorter FC debt duration	(6) Dollarized sovereign debt	(7) Lower lender wealth	(8) Lower IES
Long-term statistics, annualized, %								
Debt-to-GDP	30.28	32.79	32.38	33.22	30.98	32.77	33.23	33.01
Share of LC debt	41.42	36.20	22.02	36.21	34.80	n.a.	33.04	29.75
$r^F - r^{*F}$	2.19	2.14	2.41	2.23	1.68	2.81	3.41	2.50
$r^L - r^{*L}$	0.52	0.32	0.86	-0.58	-0.25	n.a.	-1.68	0.28
Inflation	4.13	5.42	4.47	7.42	5.24	n.a.	5.16	5.00
Default rate	n.a.	0.85	0.51	3.02	0.71	0.53	0.13	0.36
Debt recovery rate	n.a.	50.04	50.48	46.83	46.96	53.42	55.49	51.59
Volatilities, %[b]								
$\sigma(c)/\sigma(y)$	1.05	1.16	1.17	1.12	1.16	1.10	1.09	1.13
$\sigma(tb/y)$	0.58	0.51	0.58	0.41	0.56	0.33	0.46	0.47
$\sigma(r^F - r^{*F})$	0.55	0.47	0.50	0.53	0.74	0.45	0.45	0.48
$\sigma(r^L - r^{*L})$	0.24	0.79	1.47	1.17	1.01	n.a.	0.93	0.84
$\sigma(\pi)$	0.38	0.14	0.26	0.20	0.16	n.a.	0.08	0.12
$\sigma(b^F/y)$	1.57	7.35	17.45	6.82	9.15	2.53	5.37	6.69
$\sigma(b^L/y)$	0.79	8.63	19.81	9.11	11.20	n.a.	6.51	8.03
Correlations[b]								
$\rho(c,y)$	0.94	0.98	0.97	0.98	0.97	0.99	0.98	0.98
$\rho(tb/y,y)$	-0.12	-0.47	-0.43	-0.43	-0.40	-0.51	-0.27	-0.43
$\rho(r^F - r^{*F},y)$	-0.67	-0.70	-0.63	-0.59	-0.55	-0.70	-0.46	-0.59
$\rho(r^L - r^{*L},y)$	0.09	-0.63	-0.33	-0.47	-0.32	n.a.	-0.29	-0.43
$\rho(r^L - r^{*L}, r^F - r^{*F})$	0.32	0.72	0.77	0.58	0.53	n.a.	0.63	0.61
$\rho(b^F/y,y)$	-0.58	-0.16	-0.12	-0.16	-0.12	-0.95	-0.32	-0.21
$\rho(b^L/y,y)$	0.23	-0.11	0.00	-0.14	-0.11	n.a.	-0.15	-0.14
$\rho(b^L/y, b^F/y)$	-0.73	-0.85	-0.98	-0.97	-0.95	n.a.	-0.61	-0.98
$\rho(\pi,y)$	0.07	-0.11	-0.02	-0.11	-0.14	n.a.	-0.07	-0.13
$\rho(b^L/y,\pi)$	0.20	0.81	0.95	0.86	0.88	n.a.	0.97	0.87

[a] Colum (3) sets $\underline{\beta} = 0.97$ during low global liquidity episodes. Column (4) sets $\theta = 30$. Column (5) sets $\delta^L = \delta^F = 0.055$. Column (6) considers an economy with only hard-currency debt issuance. Column (7) sets investor wealth at $w = 50$. Column (8) sets $\varrho = 1.5$.

[b] $\sigma(j)$ denotes the standard deviation of variable j. Standard deviation of output in the model is $\sigma(y) = 1.94\%$. $\rho(j,k)$ denotes the correlation coefficient between variables j and k.

Table D.2: Data versus models with alternative inflation cost specifications

	(1)	(2)	(3)[a]	(4)[b]
	Data	Baseline economy	Quadratic output costs of inflation	Utility costs of inflation
Long-term statistics, annualized, %				
Debt-to-GDP	30.28	32.79	31.72	32.20
Share of LC debt	41.42	36.20	37.20	36.43
$r^F - r^{*F}$	2.19	2.14	2.20	2.18
$r^L - r^{*L}$	0.52	0.32	0.41	0.42
Inflation	4.13	5.42	4.11	4.68
Default rate	n.a.	0.85	0.84	0.66
Debt recovery rate	n.a.	50.04	48.64	49.55
Volatilities, %[c]				
$\sigma(c)/\sigma(y)$	1.05	1.16	1.15	1.14
$\sigma(tb/y)$	0.58	0.51	0.55	0.47
$\sigma(r^F - r^{*F})$	0.55	0.47	0.54	0.49
$\sigma(r^L - r^{*L})$	0.24	0.79	1.20	0.90
$\sigma(\pi)$	0.38	0.14	0.12	0.14
$\sigma(b^F/y)$	1.57	7.35	13.98	10.13
$\sigma(b^L/y)$	0.79	8.63	15.54	11.53
Correlations[c]				
$\rho(c, y)$	0.94	0.98	0.97	0.98
$\rho(tb/y, y)$	-0.12	-0.47	-0.38	-0.46
$\rho(r^F - r^{*F}, y)$	-0.67	-0.70	-0.61	-0.61
$\rho(r^L - r^{*L}, y)$	0.09	-0.63	-0.33	-0.43
$\rho(r^L - r^{*L}, r^F - r^{*F})$	0.32	0.72	0.71	0.73
$\rho(b^F/y, y)$	-0.58	-0.16	-0.04	-0.11
$\rho(b^L/y, y)$	0.23	-0.11	-0.15	-0.11
$\rho(b^L/y, b^F/y)$	-0.73	-0.85	-0.98	-0.95
$\rho(\pi, y)$	0.07	-0.11	-0.17	-0.29
$\rho(b^L/y, \pi)$	0.20	0.81	0.78	0.78

[a] Column (3) considers an alternative specification for the inflation cost function which modifies equation (4) in the main text to $c_t = y_t(1 - \Theta(y_t, \pi_t))$ where $\Theta(y_t, \pi_t) = \max\left\{0, \left(\theta_1 + \theta_2 y_t\right)\frac{[\pi_t - \pi^*]^2}{2}\right\}$ and $\theta_1 = 162$ and $\theta_2 = -20$.

[b] Column (4) replaces the output costs of inflation shown in equation (4) in the main text with utility costs of inflation by modifying the utility function of households in equation (1) in the main text to $u(c) = \frac{c^{1-\sigma}}{1-\sigma} - \Theta(y_t, \pi_t)$ where $\Theta(y_t, \pi_t) = \max\left\{0, \theta y_t \frac{[\pi_t - \pi^*]^2}{2}\right\}$ with $\theta = 100$.

[c] $\sigma(j)$ denotes the standard deviation of variable j. Standard deviation of output in the model is $\sigma(y) = 1.94\%$. $\rho(j, k)$ denotes the correlation coefficient between variables j and k.

Table D.3: Data versus models with alternative bargaining power parameters for the sovereign

	(1)	(2)	(3)	(4)
		Baseline		
	Data	$\varphi = 0.85$	$\varphi = 0.80$	$\varphi = 0.90$
Long-term statistics, annualized, %				
Debt-to-GDP	30.28	32.79	32.68	28.00
Share of LC debt	41.42	36.20	34.64	31.25
$r^F - r^{*F}$	2.19	2.14	2.24	1.81
$r^L - r^{*L}$	0.52	0.32	0.41	0.87
Inflation	4.13	5.42	5.23	4.80
Default rate	n.a.	0.85	1.29	0.34
Debt recovery rate	n.a.	50.04	50.55	43.70
Volatilities, %[a]				
$\sigma(c)/\sigma(y)$	1.05	1.16	1.11	1.13
$\sigma(tb/y)$	0.58	0.51	0.51	0.43
$\sigma(r^F - r^{*F})$	0.55	0.47	0.55	0.44
$\sigma(r^L - r^{*L})$	0.24	0.79	1.19	0.51
$\sigma(\pi)$	0.38	0.14	0.16	0.05
$\sigma(b^F/y)$	1.57	7.35	9.23	2.84
$\sigma(b^L/y)$	0.79	8.63	10.21	3.80
Correlations[a]				
$\rho(c, y)$	0.94	0.98	0.97	0.98
$\rho(tb/y, y)$	-0.12	-0.47	-0.30	-0.51
$\rho(r^F - r^{*F}, y)$	-0.67	-0.70	-0.61	-0.59
$\rho(r^L - r^{*L}, y)$	0.09	-0.63	-0.42	-0.84
$\rho(r^L - r^{*L}, r^F - r^{*F})$	0.32	0.72	0.52	0.46
$\rho(b^F/y, y)$	-0.58	-0.16	-0.19	-0.43
$\rho(b^L/y, y)$	0.23	-0.11	-0.14	-0.17
$\rho(b^L/y, b^F/y)$	-0.73	-0.85	-0.96	-0.74
$\rho(\pi, y)$	0.07	-0.11	0.03	-0.06
$\rho(b^L/y, \pi)$	0.20	0.81	0.79	0.97

[a] $\sigma(j)$ denotes the standard deviation of variable j. Standard deviation of output in the model is $\sigma(y) = 1.94\%$. $\rho(j, k)$ denotes the correlation coefficient between variables j and k.

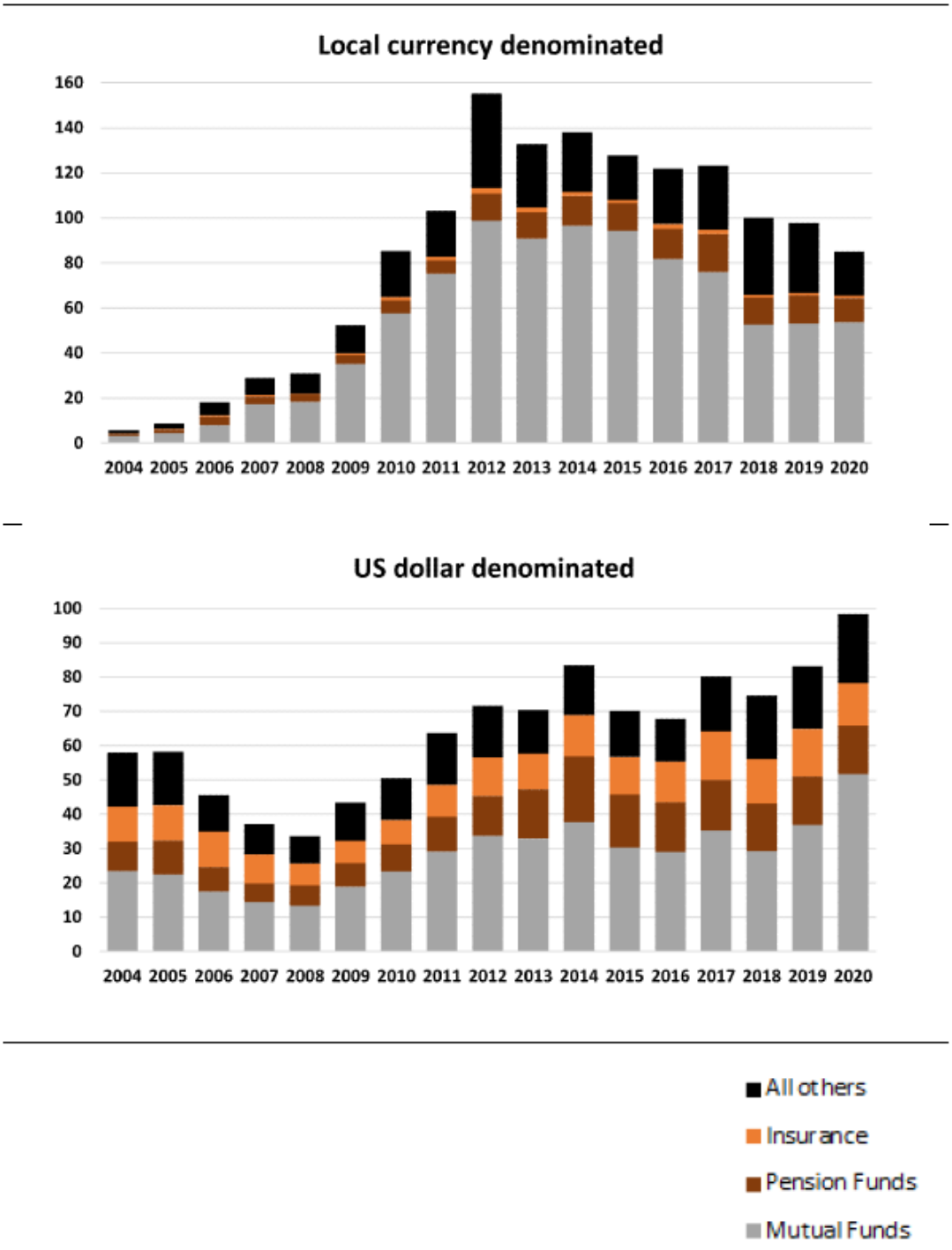

Figure D.1: Breakdown of U.S. based sovereign bond investor types for Brazil, Chile, Colombia, Hungary, Indonesia, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Singapore, South Africa Thailand and Turkey by Bertaut et al. (2025). Holdings are shown in USD billions. The 'All Others' category includes other funds, depository institutions, other financial institutions, and non-financial institutions.

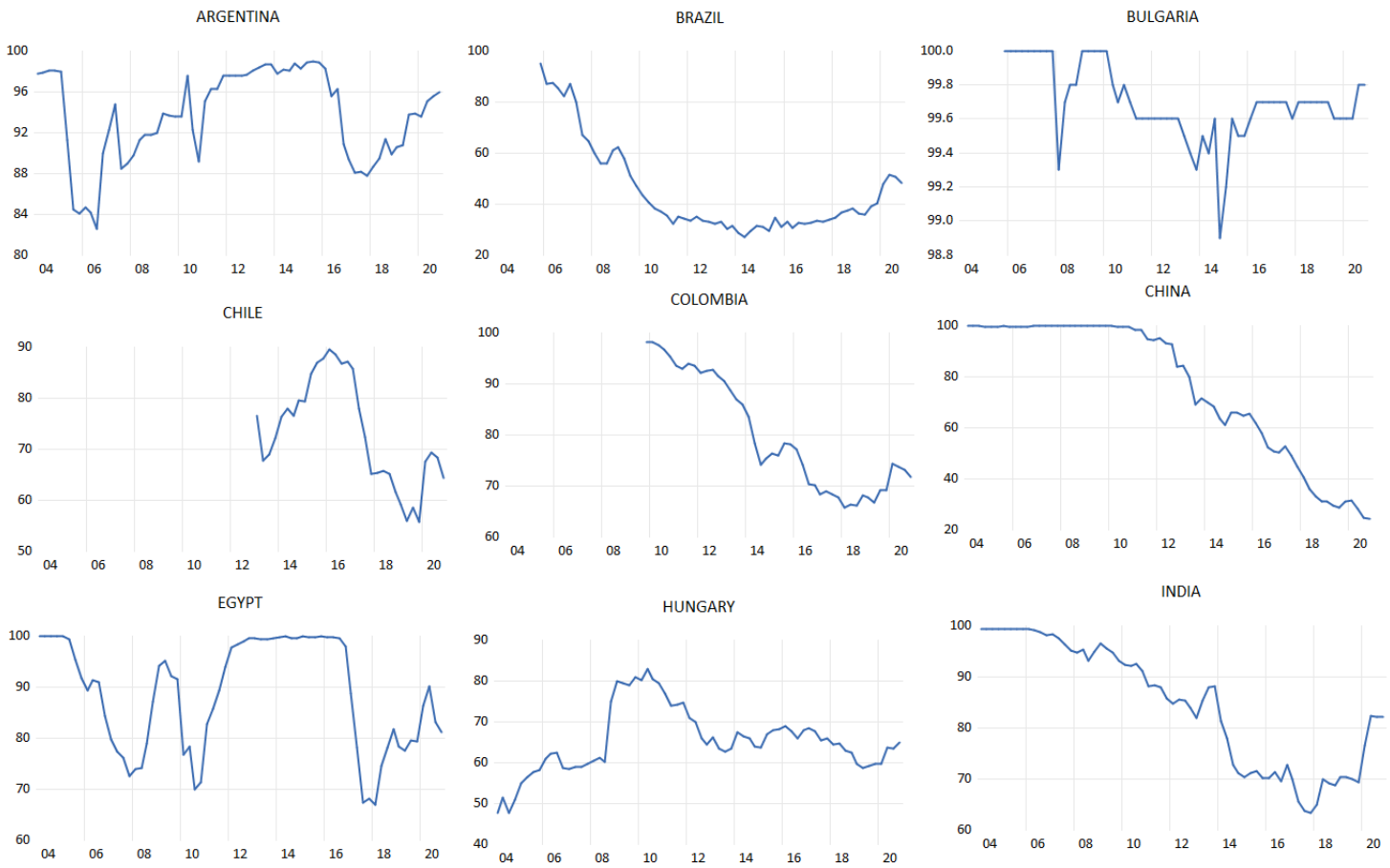

Figure D.2: Percentage of hard-currency denominated EME sovereign debt held by foreign investors.

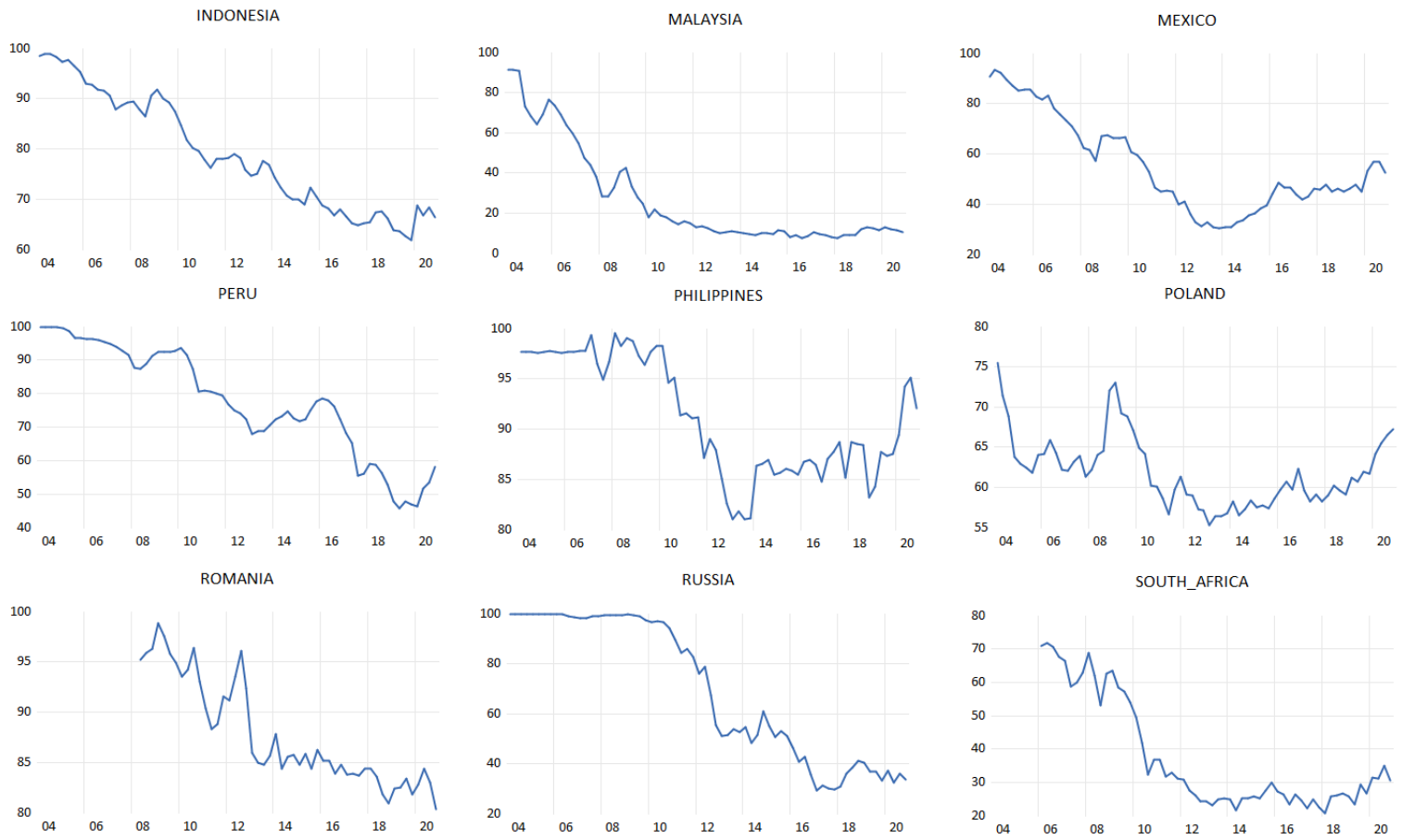

Figure D.3: Percentage of hard-currency denominated EME sovereign debt held by foreign investors, continued.

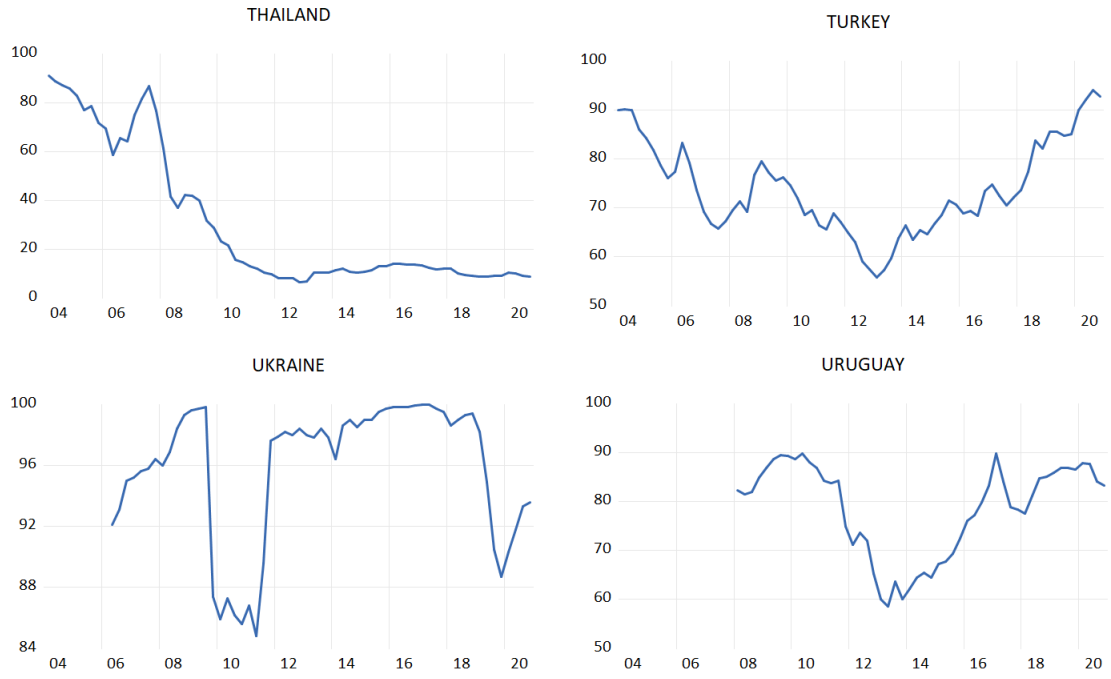

Figure D.4: Percentage of hard-currency denominated EME sovereign debt held by foreign investors, continued.

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