Abstract

We propose monetary policy credibility as a unifying explanation for sovereign debt denomination decisions, inflation dynamics, and bond risks. In a New Keynesian model with partial monetary policy commitment and a sovereign debt portfolio choice, governments with low credibility issue more foreign currency debt, thereby enhancing inflation credibility at the cost of higher default. Low credibility also limits the government’s ability to offset cost-push shocks, leading to high inflation recessions and pro-cyclical bond returns. In a panel of 30 emerging and developed countries, we use local currency bond-stock betas, nominal bond yields, inflation and CDS spreads to construct a monetary policy credibility rank and show that it is highly correlated with average local currency debt shares over the period 2005-2014.
1 Introduction

Over the past decade, the market for emerging market government debt has undergone a remarkable transformation. In the 1980s and 1990s, most emerging market sovereigns and several developed country governments relied heavily on foreign currency (FC) finance. This left the borrowers vulnerable to currency fluctuations and financial crises (Eichengreen and Hausmann 1999). Since the Asian Financial Crisis, the share of government bonds issued in local currencies (LC) has grown rapidly, constituting more than half of external debt issued by major emerging market sovereigns (Du and Schreger 2015b). However, the shift towards local currency government bonds has been highly uneven across markets, raising the question of what drives these differences.

This paper provides a unified framework for studying the currency composition of sovereign debt, inflation, and the risks of local currency bonds, based on central bank credibility. We develop an analytically tractable model of the government’s optimal portfolio of liabilities and monetary policy, building on a standard log-linearized New Keynesian framework. The central bank can engage in forward guidance and communicate a contingent plan for future monetary policy, but a low credibility central bank is likely to renge on this plan in the next period. Variation in central bank credibility generates a wide array of testable predictions.

Using a sample of 30 developed and emerging markets over the period 2005-2014, we show that the currency composition of sovereign debt varies with inflation, credit default swap (CDS) spreads, inflation cyclicality and local currency bond risks, as predicted by the model. Using the model as guidance, we construct a monetary policy credibility rank and show that it explains 46% of the cross-country variation in local currency debt shares.

Figure 1A provides evidence on the Australian sovereign debt portfolio and inflation expectations over time as an instructive case study. After a substantial monetary policy
reform in the early 1990s, the Reserve Bank of Australia became one of the first internationally to commit to an official inflation target, thereby affirming the independence of the central bank. The share of foreign currency and inflation-indexed debt declined rapidly from an average of 46% in the 1980s to 12% in the 1990s and 10% in the 2000s. Breakeven inflation dropped simultaneously from 8% in the 1980s to 4% in the 1990s and below 3% in the 2000s. A higher share of nominal debt and lower inflation should, if anything, reduce the pressure on the government to overhaul the monetary policy framework, making reverse causality unlikely. The Australian experience is therefore consistent with central bank credibility leading to lower inflation and a higher share of local currency nominal debt.

Figure 1B shows that the relation between inflation and local currency debt shares is similarly negative in a cross-section of 30 countries. This negative relation might at first seem surprising, if a higher share of local currency debt increases the government’s incentive to create inflation. However, a negative relation emerges naturally in our model where persistently high inflation indicates a lack of monetary policy credibility (Kydland and Prescott 1977, Barro and Gordon 1983, Rogoff 1985) and low credibility governments find it costly to borrow in their own currency.

Our modeling framework builds on a two-period canonical New-Keynesian monetary policy framework (Clarida, Gali, and Gertler 1999, CGG) and its recent small open economy extensions (Gali and Monacelli 2005). Inflation and output move along an upward-sloping New Keynesian Phillips curve, which is subject to cost-push shocks. The central bank conducts monetary policy through its control of short-term interest rates, which affect consumers’ consumption-saving decisions.

On the fiscal side, the government chooses LC and FC debt optimally to satisfy a constant real financing need. Introducing a government portfolio choice problem into this framework builds on the literature on government debt and inflation with exogenous and inflation-indexed bonds – is often used as a market-based measure of inflation compensation, but may also contain liquidity premia and inflation risk premia (Pflueger and Viceira, 2015).
debt denomination (Sargent and Wallace 1981, Leeper 1991, Sims 1994, Woodford 1995, Cochrane 2001, Davig, Leeper, and Walker 2011, Cochrane 2011, Niemann, Pichler, and Sorger 2013, Sunder-Plassmann 2014). With imperfect credibility, LC debt generates an incentive to inflate away the debt.\(^3\) When issuing FC debt, the government trades off the benefit of providing commitment against future inflation with the increase in default costs. We keep the model tractable by assuming that local currency bonds and stocks are priced by a risk-neutral international investor and that purchasing power parity holds.

The model generates numerous testable implications. Inflation and default risk decrease in credibility while the local currency debt share increases in credibility. In addition, high credibility leads to more pro-cyclical inflation and and more countercyclical LC bond returns. In our model, credible central banks offset cost-push shocks, which drive up inflation and drive down output and stock returns, by committing to low future inflation. Therefore, expected inflation is low and LC bond returns are high during recessions. In contrast, governments with non-credible central banks can offset cost-push shocks only imperfectly. With persistent cost-push shocks and a non-credible central bank, drops in output are associated with high current and expected inflation and low LC bond returns.

Using data from 11 developed and 19 emerging markets, we show that the share of LC debt, LC bond betas, inflation cyclicality, inflation, and CDS spreads, have a strong common component and commove as predicted by the model.\(^4\) Consistent with the model, we find that CDS spreads and inflation are 91\% and 72\% correlated with LC bond-stock betas across countries, respectively. Moreover, countries with high CDS spreads and inflation have a higher share of LC debt.

\(^3\)There is a large literature on the optimality of inflationary taxation in the domestic setting (Calvo 1978, Barro 1983, Barro and Gordon 1983, Kydland and Prescott 1977, Bohn, 1988, 1990). While there may be incentives to create surprise inflation in a closed economy, the incentive to create surprise inflation is plausibly even stronger when debt is held by international agents (Bohn 1991). While there are parallels to the international household portfolio choice problem (Devereux and Saito 1997, Campbell, Serfaty-De Medeiros, and Viceira 2010, Devereux and Sutherland 2011, Evans and Hnatkovska 2014), the government’s problem in our model differs in that it takes into account the portfolio’s effect on future monetary policy and default.

\(^4\)We estimate expected inflation-output betas by regressing inflation forecast revisions onto output forecast revisions. We measure the LC bond-stock beta as the regression coefficient of LC bond excess returns onto local equity excess returns. The LC bond-CDS beta is measured as the regression coefficient of LC bond excess returns onto changes in CDS spreads.
spreads and inflation have lower expected inflation-output betas, and lower bond-CDS betas. Emerging countries tend to have lower expected inflation-output betas and bond-CDS betas, but there is substantial variation within emerging countries.

We find that for some countries in our sample LC bonds appreciate when default risk, as proxied by CDS spreads, increases. Such a finding would be deeply puzzling in a world without monetary policy commitment, where inflation expectations increase during recessions. In contrast, with a credible central bank inflation expectations can drop sufficiently during downturns to increase bond prices just as default risk rises.

We construct a monetary policy credibility rank by sorting countries according to the first principal component (PC) of CDS spreads, realized and survey-based expected inflation, inflation-output betas, nominal bond yields, bond-stock betas and bond-CDS betas. As predicted by the model, we show that the ranking is strongly correlated with the share of nominal debt in the sovereign portfolio. A one-standard-deviation move in the credibility ranking is associated with a 17 percentage point decrease in the LC debt share.

This paper most closely relates to a recent literature on inflation commitment and debt limits when the debt denomination is exogenous (Araujo, Leon, and Santos 2013, Aguiar, Amador, Farhi and Gopinath 2014, Chernov, Schmid, and Schneider 2015, Sunder-Plassmann 2014, Bacchetta, Perazzi, and Van Wincoop 2015, Du and Schreger 2015b, Corsetti and Dedola 2015). We expand on these papers along two dimensions. First, we model the government’s optimal time-varying share of internationally held local currency debt. Second, we allow the central bank to engage in optimal forward guidance with partial credibility. While the literature has considered dollarization or monetary unions as commitment devices for central banks (i.e. Obstfeld 1997), we consider optimal monetary policy when the central bank has partial credibility.

The paper is also related to a recent literature on time-varying bond risks (Baele, Bekaert, and Inghelbrecht 2010, Andreasen 2012, David and Veronesi 2013, Campbell,
that is primarily focused on the US and the UK. This paper differs from the previous literature, in that we focus on governments’ optimal debt issuance as an important margin for bond risks.

The structure of the paper is as follows. In Section 2, we present a New Keynesian model with a government debt portfolio choice and sovereign default risk. In Section 3, we solve the model and discuss the model’s implications and comparative statics. In Section 4, we present empirical evidence on the key implications of the model. Section 5 concludes.

2 Model

In this section, we will describe the model assumptions and setup. We will study a two-period version of the standard New Keynesian model. We add two new features to this standard model. First, we allow the government to optimally choose the currency denomination of sovereign debt. Second, we model government credibility by introducing a parameter that allows us to vary the probability that the government implements its promised future policy or implements discretionary policy. This means that in addition to setting short-term nominal interest rate policy, the government also decides what currency to fund itself in. In order to decide which currency to borrow in, the government trades off the increased sovereign default risk from borrowing using FC debt with the temptation for future inflation from using LC debt. This tradeoff is very different depending on the level of the government’s credibility and the interactions between debt denomination and monetary policy will generate a host of predictions that we will discuss and test in sections 3 and 4.
2.1 Setup and Timing

The model has two time periods. In period 1, the government has no debt outstanding. After observing the period 1 cost-push shock, it chooses period 1 monetary policy and the sovereign debt portfolio. The government also determines a contingent plan for period 2 monetary policy, knowing that it will only be able to implement this plan probability $p$. This probability $p$ that the government sticks to its announced plan is how we parameterize central bank credibility. It can be thought of as capturing the effectiveness of institutions in overcoming the incentive problems often faced by central banks, as in Persson and Tabellini (1993).

In period 2, the government simply implements the contingent plan with probability $p$. However, with probability $1 - p$ the government acts myopically. A myopic government faces an incentive to inflate away LC bonds held by foreigners. Finally, at the end of the period the government defaults or repays the debt. Sovereign default is exogenous and the probability of default depends on the debt composition and will be discussed in detail below.

2.2 Macroeconomic Dynamics and Monetary Policy

We build on the standard log-linearized New Keynesian model with optimal monetary policy (Clarida, Gali, and Gertler 1999, CGG).\(^5\) The output gap – the difference between actual real output and potential output with no nominal rigidities – is pro-cyclical and serves as the business cycle variable in our model. The dynamics for the log output gap $x_t$, log inflation $\pi_t$ and the log nominal interest rate $i_t$ satisfy the consumer’s Euler equation and a log-linearized forward-looking Phillips curve.

\(^5\)Gali and Monacelli (2005) obtain analogous expressions for inflation and output dynamics and welfare in a small open economy model. They find that degree of openness and the substitutability of goods across countries may affect the slope of the Phillips Curve relation, but the basic functional forms are unchanged.
For \( t = 1, 2 \) we have that

\[
\begin{align*}
x_t & = E_t x_{t+1} - \psi [i_t - E_t \pi_{t+1}], \\
\pi_t & = \lambda x_t + \beta E_t \pi_{t+1} + u_t.
\end{align*}
\]

(1)

(2)

The Euler equation (1) arises from the consumer’s intertemporal tradeoff. In New Keynesian models, it is standard to derive the forward-looking Euler equation (1) by assuming power utility and setting consumption equal to the output gap.

Relation (2) is the New Keynesian Phillips curve (PC), capturing firms’ price-setting and production decisions. Current period inflation increases with the output gap and future expected inflation. A forward-looking PC of the form (2) can be derived if firms update their prices infrequently as in Calvo (1983). The shock \( u_t \) simultaneously increases inflation and decreases output and captures cost-push shocks, wage-markup shocks, or productivity shocks.

Monetary policy determines the nominal policy rate \( i_t \), thereby setting output according to the Euler equation. It can therefore achieve any output-inflation tradeoff along the PC (2) by choosing the appropriate nominal interest rate.

Cost-push shocks follow an AR(1) process with autocorrelation \( \rho_u \)

\[
\begin{align*}
\epsilon_{u,t} & \sim i.i.d. N(0, \sigma_u^2).
\end{align*}
\]

(3)

(4)

To more clearly exhibit the mechanism at work, we consider a two-period version of the standard New Keynesian macroeconomic model, as in Romer (2006). We set \( u_0 = 0 \) without loss of generality. We assume that inflation and the output gap are constant at
zero from period 3 onwards

\[ \pi_t = 0 \ \forall \ t \geq 3, \quad (5) \]

\[ x_t = 0 \ \forall \ t \geq 3. \quad (6) \]

Besides clarifying the exposition, the assumption (5) is plausible if a partially credible government controls policy over the medium run, but takes long-run inflation as given. A further advantage is that a finite-period model always has a unique solution. This need not be the case for infinite-period New Keynesian models, which may have multiple equilibria (Evans 1986, Uhlig 1999, Cochrane 2011).

### 2.3 Debt Issuance

Let \( D_{1}^{LC} \) and \( D_{1}^{FC} \) denote the face values of LC and FC debt issued in period 1 and maturing in period 2. We use \( q_{1}^{LC} \) and \( q_{1}^{FC} \) to denote the corresponding prices per unit of face value.

FC and LC debt differ in terms of the real repayment in case of no default. While the government is required to repay FC bond holders their real initial face value, the required payments to LC bond holders decrease with inflation. To preserve tractability and focus on the first-order effect of inflation surprises on bond returns, we approximate real repayments to LC bond holders log-linearly around conditional expected inflation

\[
\exp(-\pi_2) \approx \exp(-E_1\pi_2) \left(1 - (\pi_2 - E_1\pi_2)\right). \quad (7)
\]

To focus the analysis on the government’s allocation decision across LC and FC debt, we abstract from intertemporal consumption decisions, taking total real borrowing as given. Denoting the real financing need by \( V \), the government chooses debt issuance
subject to the budget constraint

\[ q_1^{FC} D_1^{FC} + q_1^{LC} D_1^{LC} = V. \tag{8} \]

The assumption (8) can be justified if the government either needs to finance an exogenous path of aggregate public consumption purchases (Obstfeld 1997) or if it needs to borrow a constant amount in order to invest in the country’s productive technology (Grossman and Van Huyck 1988).

2.4 Default Probabilities and Costs

Next, we specify default probabilities and costs. We model the default probability as increasing more sharply in FC than in LC debt. Eichengreen and Hausmann (2005) argue forcefully that issuing FC debt exposes emerging countries to increased default risk, with accompanying default costs. Moreover, the government defaults on all its liabilities simultaneously. In practice, cross-default clauses imply that a default on one government bond constitutes a default on all bonds (Choi, Gulate, and Posner 2012) and substantial default risk is priced into both LC and FC sovereign debt (Du and Schreger 2015a). A theoretical literature, beginning with Broner, Martin, and Ventura (2010) and Broner and Ventura (2011), argues that that secondary markets effectively presents governments from defaulting only on one class of bondholders.\footnote{While this literature focuses on defaulting on foreigners versus residents, a similar argument may apply to LC and FC debt.}

We model the default probability as an increasing function in the weighted sum of the face value of FC debt \( D_1^{FC} \) and the expected real face value of LC debt \( D_1^{LC} \cdot \exp(-E_1 \pi_2) \). The weights are given by \( \theta^{FC} > \theta^{LC} \geq 0 \), implying that the default probability increases more sharply in FC debt than in LC debt. We assume that the default probability
conditional on time 1 information is given by

\[ P_1 = \frac{\theta^{FC}D_1^{FC} + \theta^{LC}\exp(-E_1\pi_2)D_1^{LC}}{1 + \theta^{FC}D_1^{FC} + \theta^{LC}\exp(-E_1\pi_2)D_1^{LC}}. \]  

(9)

Figure 3, Panel (A) shows that the functional form (9) satisfies several desirable properties. The red solid line varies \( D^{FC} \) holding \( D^{LC} \) constant at zero and the blue dashed line varies \( D^{LC}\exp(-E_1\pi_2) \) holding \( D^{FC} \) constant at zero. The default probability is zero when the country has no debt outstanding and increases towards one as the real expected debt face value increases, capturing key features of sovereign and corporate default models (Merton 1974, Aguiar and Gopinath 2006, Arellano 2008). While we capture the relatively larger impact of FC debt on default risk in reduced form, a potential channel could operate through exchange rate shocks, which increase the volatility of real debt service for FC debt.

While surprise inflation likely reduces the real debt burden and hence default risk from LC debt (Fisher 1933), extending the model along this dimension would only strengthen the government’s incentive to inflate away LC debt and hence the main mechanism in the model. In some sense, a greater ability to use inflation to avoid default would correspond to a lower \( \theta^{LC} \).

We model real economic costs upon default as increasing with the total expected real face value of debt, but are bounded above by a constant \( a \), consistent with evidence that larger sovereign defaults are costlier (Cruces and Trebesch 2013). For some \( b > 0 \) and \( a \geq \frac{b}{\beta - 1}V \), real default costs are

\[ a - \frac{b}{D_1^{FC} + D_1^{LC}\exp(-E_1\pi_2)}. \]  

(10)

Expected default costs are real default costs (10) multiplied by the default probability (9). We formally assume full default, so investors recover nothing in default. However, optimal debt issuance would be unchanged if we assumed instead that expected default
costs (10) are net of investors’ expected default recovery. Intuitively, investors’ expected recovery raises bond prices at issuance, allowing the government to raise more funds for each dollar of face value.

### 2.5 Government Objective Function

The government’s objective function combines a standard monetary policy objective to smooth fluctuations in the output gap and inflation with a desire to minimize debt repayments and default costs. Rather than explicitly deriving the objective function from microfoundations ourselves, we build on Woodford (2003, Chapter 6), who formally derives a second-order Taylor expansion to consumer utility in a monetary policy model with Calvo (1983) price setting. The period $t$ loss function is given by

$$L_t = \alpha^x x_t^2 + \alpha^\pi \pi_t^2 + \left(1 - P_{t-1}^d\right) \left(D_{t-1}^{FC} + D_{t-1}^{LC} \exp(-E_{t-1} \pi_t)(1 - (\pi_t - E_{t-1} \pi_t))\right) + Cost_{t-1}^{td}.$$  \hspace{1cm} (11)

The first term in the loss function captures losses due to price-setting frictions and monopolistically competitive firms. As in Woodford (2003, Chapter 6), welfare depends quadratically on inflation and the output gap and can be thought of as a second-order approximation to consumer welfare. Since in period 1 the government has no debt outstanding, this is the only term in the period 1 loss function. Intuitively, the output gap enters quadratically into the monetary policy criterion, because firms need labor to produce output and worker-consumers are close to their optimal consumption-leisure tradeoff. In the presence of price-setting frictions inflation is costly, because it distorts firms’ prices and hence quantities from the first-best. Woodford suggests output and inflation weights for plausible price-setting frictions of $\alpha^x/\alpha^\pi = 0.05$.

The real debt repayment term captures expected real payoffs to foreign bondholders with the approximation (7). Ex-post inflation redistributes wealth from foreign bond
holders to domestic consumers. Real debt repayments therefore decrease in inflation and more so when the government has more LC debt outstanding. The third term in the loss function captures expected losses from default.

The government minimizes the discounted sum of period losses

$$\min_{\pi_1, x_1, D_1^{FC}, D_1^{LC}, \pi_2, x_2} E_1 \sum_{t=1}^{2} \beta^t L_t,$$  \hspace{1cm} (12)

subject to the PC relation (2) and the budget constraint (8).

2.6 Modeling Bonds and Stocks

In keeping with the qualitative nature of the model, we make the simplest possible assumptions to price bonds and stocks. Bonds and stocks are priced by a risk-neutral international investor with a constant discount factor $\beta$ and the exchange rate obeys purchasing power parity. FC and LC bond prices are equal to the discounted expected payoff on the debt:

$$q_1^{FC} = \beta(1 - P_1),$$  \hspace{1cm} (13)

$$q_1^{LC} = \beta(1 - P_1)exp(-E_1\pi_2).$$  \hspace{1cm} (14)

Log excess returns on a one-period LC bond are given by

$$r_1^{LC} - E_0 r_1^{LC}$$

$$= -(E_1 - E_0) \left( q_1^{LC} - log(1 - P_1) \right),$$

$$= -(E_1 - E_0) \left( \pi_2 - log(1 - P_1) \right)$$  \hspace{1cm} (15)

We model stocks as a pro-cyclical asset by assuming that dividends are given by

$$div_t = \delta x_t.$$  \hspace{1cm} (16)
We approximate log equity excess returns using Campbell’s (1991) loglinear decomposition. For a log-linearization constant $\rho$ close to one, log equity excess returns are

\[ r_1^e - E_0 r_1^e = \delta (E_1 - E_0) \sum_{j=0}^{2} \rho^j \Delta x_{1+j}, \quad (17) \]

\[ = \delta (1 - \rho) (E_1 - E_0) (x_1 + \rho x_2). \quad (18) \]

The expression (16) follows the asset pricing literature, which models dividends as a levered claim on consumption (Abel 1990, Campbell 1986, 2003). Small New Keynesian models often set consumption equal to the output gap (CGG), in which case stocks become a levered claim on consumption. While equity prices and returns in the model are highly stylized, the output gap and expected inflation similarly drive equity and bond returns in Campbell, Pflueger, and Viceira’s (2015) New Keynesian asset pricing model, which explicitly accounts for the consumption-output gap relation and time-varying risk premia.

3 Model Solution

We solve the model recursively, first solving for the government’s optimal period 2 policy and then for optimal period 1 policy. For expressing the model solution, it is convenient to define

\[ s_1 = D_1^{LC} (1 - P_1^d) \exp (-E_1 \pi_2). \quad (19) \]

The share of real funds raised as LC debt is closely related to $s_1$ and given by $s_1^{\frac{\Omega}{\Pi}}$. In an abuse of notation, we also refer to $s_1$ as the “local currency debt share”.

3.1 No-Commitment Regime

Let $\pi_2^{nc}$ and $x_2^{nc}$ denote period 2 inflation and the output gap in the no-commitment regime. The solution in the no-commitment regime is particularly simple. Without commitment,
the government minimizes period 2 welfare (11) subject to the PC constraint (2). The first-order condition is

$$2\alpha^x\lambda^{-1}x_2^{nc} + 2\alpha^\pi\pi_2^{nc} - s_1 = 0,$$

(20)

implying that

$$\pi_2^{nc} = \frac{\lambda^2 s_1 + 2\alpha^x u_2}{2(\alpha^\pi\lambda^2 + \alpha^x)};$$

(21)

$$x_2^{nc} = -\frac{\lambda\alpha^\pi\pi_2^{nc}}{\alpha^x \pi_2^{nc}} + \frac{\lambda}{2\alpha^x s_1}. $$

(22)

A higher LC debt share $s_1$ therefore biases no-commitment inflation upwards, relative to a baseline where the government only trades off output and inflation distortions. Up to an exogenous component independent of policy, the weighted sum of output and inflation deviations then is

$$\alpha^x (x_2^{nc})^2 + \alpha^\pi (\pi_2^{nc})^2 = \frac{\lambda^2 s_1^2}{4(\alpha^\pi\lambda^2 + \alpha^x)}. $$

(23)

Figure 3, Panel (B) shows expected welfare losses from ex-post inflation (23). Welfare losses increase quadratically in the LC debt share $s_1$, because a higher LC debt share increases the incentive to expropriate foreign LC bondholders and distortions are quadratic in inflation and the output gap.

### 3.2 Commitment Regime

We first express the expected default cost in terms of the LC share $s_1$. Substituting in the budget constraint (8) we can then write (up to a constant that does not matter for optimal policy)

$$Cost_1 = -\frac{c}{2(\alpha^\pi\lambda^2 + \alpha^x)} s_1 + \frac{d}{4(\alpha^\pi\lambda^2 + \alpha^x)} s_1^2,$$

(24)
where

\[ c = 2(\alpha \pi \lambda^2 + \alpha^x)(\theta^{FC} - \theta^{LC}) \left( a + 2b \theta^{FC} - \frac{b}{\beta^{-1}V} \right), \quad (25) \]

\[ d = 4(\alpha \pi \lambda^2 + \alpha^x) \frac{b(\theta^{FC} - \theta^{LC})^2}{\beta^{-1}V}. \quad (26) \]

Figure 3, Panel (C) shows the expected default cost (24). Since we have assumed that \( \theta^{FC} > \theta^{LC} \) and \( a > \frac{b}{\beta^{-1}V} \), \( Cost_1 \) is strictly decreasing in \( s_1 \). The condition \( b > 0 \) implies that \( d > 0 \), so \( Cost_1 \) is convex in the LC debt share. Scaling \( c \) and \( d \) by \( 2(\alpha \pi \lambda^2 + \alpha^x) \) and \( 4(\alpha \pi \lambda^2 + \alpha^x) \) respectively simplifies the solution for the LC debt share.

Intuitively, expected default costs decrease in the LC debt share because LC debt reduces the probability of default. A lower default probability also implies that the government issues a smaller face value debt, thereby lowering real default costs. The product – default probability times real default cost – therefore decreases convexly in \( s_1 \).

Next, we solve for the government’s optimal period 1 policy and the commitment plan for period 2 inflation and the output gap, which we denote \( \pi_c^2 \) and \( x_c^2 \). Let \( \phi_1 \) and \( \phi_2 \) denote the Lagrange multipliers for the period 1 and period 2 Phillips Curves. Substituting in the no-commitment solution and again ignoring constants, the government minimizes the
Lagrangian

\[ \mathcal{L} = \alpha x x^2 + \alpha \pi_1^2 + \beta p E_1 \left[ \alpha x (x_2^c)^2 + \alpha \pi_2^2 \right] \]

Inflation and Output Distortions with Commitment

\[ + \beta (1 - p) \frac{\lambda^2 s_1^2}{4(\alpha \pi \lambda^2 + \alpha^x)} \]

Inflation and Output Distortions without Commitment

\[ - \beta \frac{c}{2(\alpha \pi \lambda^2 + \alpha^x)} s_1 + \beta \frac{d}{4(\alpha \pi \lambda^2 + \alpha^x)} s_1^2 \]

Expected Default Cost

\[ + \phi_1 \left[ \pi_1 - \lambda x_1 - \beta p E_1 \pi_2^c - \beta (1 - p) \frac{\lambda^2 s_1 + 2 \alpha^x \rho u_1}{2(\alpha \pi \lambda^2 + \alpha^x)} - u_1 \right] \]

Period 1 PC

\[ + \beta p \phi_2 \left[ \pi_2^c - \lambda x_2^c - u_2 \right]. \]

Period 2 PC

Expected period 2 inflation enters into the period 1 PC as a weighted sum of commitment

and no-commitment regimes. Rational expectations together with the budget constraint

(8) imply that expected debt repayments are constant and hence do not affect optimal

policy.

The first-order conditions with respect to \( \pi_1 \) and \( \pi_2^c \) give

\[ \pi_1 = - \frac{\alpha^x}{\lambda \alpha^x} x_1, \]

\[ \pi_2^c = - \frac{\alpha^x}{\lambda \alpha^x} (x_2^c - x_1). \]

In period 1, the government raises inflation when the output gap is low. Period 2

inflation enters into both the period 1 and period 2 Phillips Curves. The commitment

plan therefore has the government raise period 2 inflation when the period 2 output gap

is low relative to period 1.

The first-order condition with respect to the LC share is

\[ s_1 = \frac{c}{\lambda^2 (1 - p) + d} + \frac{2 \alpha^x}{\lambda^2 (1 - p) + d} x_1, \]
Figure 3, Panel (D) illustrates how (34) arises as a tradeoff between current-period costs and future expected benefits of LC debt. The red solid and blue dashed lines show the expected period 2 costs with high credibility and low credibility, respectively. With low credibility, period 2 costs decrease more slowly in the LC debt share, because LC debt generates an incentive to create ex-post inflation. Optimal LC debt shares equate the marginal expected period 2 benefit of increasing the LC debt share with period 1 costs.

Issuing LC debt generates period 1 costs, because a higher LC debt share raises expected inflation, which enters into the PC (2) similarly to a cost-push shock. With low credibility, LC debt has smaller period 2 marginal benefits. Hence, for any given marginal period 1 cost, the optimal LC debt share is lower. Of course, the period 1 cost of LC debt may also differ across low- and high-credibility central banks. However, the first effect dominates and low credibility leads to a lower average LC debt share.

3.3 Model Implications

We summarize the model implications in several propositions. Despite its simplicity, the model has numerous testable implications for inflation and output dynamics, bond risks, the sovereign debt portfolio, and default risk. Proofs and closed-form model solutions are in the appendix.

**Proposition 1** The level of inflation decreases in credibility.

When monetary policy is credible, it is unlikely that the government will inflate away LC debt, lowering inflation expectations. Through the New Keynesian PC, inflation today is positively related to inflation expectations, so current inflation decreases in credibility.

**Proposition 2** The LC debt share increases in credibility.

One of the key distortions from issuing LC debt is the possibility of inflation when commitment breaks down in period 2. As illustrated in Panel (D) of Figure 3, when credibility
is high, the government is less concerned about inefficiently high inflation in period 2 and hence issues a larger LC debt share.

**Proposition 3** *The default probability decreases in credibility.*

The default probability increases more steeply in FC debt than in LC debt. Since a credible government issues more LC debt and less FC debt, it has lower default risk.

**Proposition 4** *The expected inflation-output beta increases with credibility.*

When credibility is low, cost-push shocks simultaneously decrease the output gap and increase inflation. The central bank trades off output against current-period inflation through the PC, but it can never reverse the sign of the initial shock. With persistent cost-push shocks, expected inflation also increases and the expected inflation-output beta is negative.

A credible central bank can credibly signal future policy, or engage in forward guidance. Following a positive cost-push shock, the central bank mitigates the increase in inflation and decrease in the output gap by committing to lower future inflation. It follows that optimal forward guidance increases the expected inflation-output gap beta.

**Proposition 5** *The LC bond-stock beta decreases with credibility.*

In the model, stock returns are positively related to current and future expected output gaps. LC bond returns move inversely with expected inflation and the probability of default. Since inflation cyclicality increases with credibility and LC bonds move inversely with expected inflation, LC bond betas decrease in credibility. In addition, a more credible government chooses a less variable debt issuance policy and hence less volatile default risk, further reducing LC bond betas.

**Proposition 6** *Default risk varies counter-cyclically.*
Despite not making any explicit assumptions about the cyclicality of default risk, we obtain the plausible prediction that expected default rises during recessions, consistent with empirical evidence by Tomz and Wright (2007). During recessions, the commitment value of FC debt is especially valuable. The government therefore issues a larger share of FC debt, thereby incurring higher default risk in exchange for lower inflation expectations. It is important to note, however, that this is a different mechanism than what would drive the cyclical properties of default risk in models of strategic sovereign default. In a framework where the government is choosing whether to repay the debt, defaults are more likely in recessions because marginal consumption is high and so the government places a high value on additional resources.

**Proposition 7** The LC bond-default risk beta increases with credibility.

This follows from LC bond returns being more countercyclical when credibility is high and default risk being countercyclical.

Figure 4 shows the model-implied comovement between bond-stock betas, bond-default betas, default probabilities, and inflation. Each point on the red solid line corresponds to a different value of credibility. Bond-stock betas increase with inflation and default risk, since both indicate a lack of credibility in the model. Bond-default betas move inversely with bond-stock betas and hence decrease in inflation and default risk. The relation between bond-default betas and default is convex for low default probabilities, because the denominator — variation in default risk — goes to zero as default risk approaches zero.

We contrast the implications of our baseline model with a version of the model, where the LC debt share is pre-determined and exogenous. Each point on the blue dashed line corresponds to a different exogenous LC debt share, while credibility is constant. In this case, the relation between inflation and credibility is reversed, because a higher exogenous LC debt share increases the government’s incentive to create ex-post inflation. However, both bond-stock betas and bond-default risk betas do not vary with inflation and default probabilities. This arises, because the first-order conditions (32) and (33) are independent
of the LC debt share and credibility is constant along the blue dashed line. Moreover, when commitment fails, the LC debt share determines the overall level of inflation, but not the government’s marginal tradeoff between inflation and the output gap.\textsuperscript{7}

4 Empirical Evidence

Next, we use data from 11 developed countries and 19 emerging markets to test the model predictions.

4.1 Data and Variable Construction

We focus on inflation and default dynamics, bond risks and sovereign debt portfolios in 11 developed markets (Australia, Canada, Denmark, Germany, Japan, New Zealand, Norway, Sweden, Switzerland, United States and United Kingdom) and 19 emerging markets (Brazil, Chile, China, Colombia, Czech Republic, Hungary, Indonesia, Israel, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Singapore, South Africa, South Korea, Thailand and Turkey).

For LC bond yields, we use primarily Bloomberg fair value (BFV) curves. BFV curves are estimated using individual LC sovereign bond prices traded in secondary markets. Since sufficient numbers of bonds spanning different maturities are needed for yield curve estimation, the availability of the BFV curve is a good indicator for the overall development of the LC nominal bond market. Countries such as Argentina, Uruguay and Venezuela only have a handful of fixed-rate bonds and hence do not have a BFV curve. As for most emerging markets in our sample BFV curves are available starting in the mid-2000s, we focus on the period 2005-2014 to maintain a balanced panel.

To measure default risk, we use sovereign credit default swap spreads (CDS) from

\textsuperscript{7}Extending our model to include a stronger incentive to inflate away LC debt in recessions would presumably further widen the contrast between the predictions with endogenous and exogenous LC debt shares. If a higher exogenous LC debt share makes inflation more countercyclical and bond betas more pro-cyclical, exogenous LC debt shares may even predict that bond betas decrease with default risk.
Markit. Sovereign CDS contracts offer insurance for investors in the event of sovereign default.\textsuperscript{8} All sovereign CDS contracts are denominated in U.S. dollars and hence CDS spreads offer an approximation for the shadow costs of issuing a U.S. dollar debt for different sovereign issuers.\textsuperscript{9}

To measure inflation risk and the perceived cyclicality of inflation, we use realized inflation from Haver and inflation forecasts from Consensus Economics, respectively. Finally, we measure the share of nominal debt in total sovereign debt portfolios with data from BIS Debt Securities Statistics, OECD Central Government Debt Statistics, and several individual central banks.

4.1.1 Bond Risks: Bond-Stock and Bond-CDS Betas

Given the log yield on an $n$-year bond traded at par $y_{cnt} = \log(Y_{cnt})$, the log holding period return on the bond is given by

$$r_{c,n,t+\Delta t}^b \approx D_{cn}y_{cnt} - (D_{cn} - \Delta t)y_{c,n-1,t+\Delta t},$$

where $D_{cn} = \frac{1-(1+Y_{cnt})^{-n}}{1-(1+Y_{cnt})^{-1}}$ is the duration of the bond (Campbell, Lo and MacKinlay, 1997). We approximate $y_{c,n-\Delta t,t+\Delta t}$ by $y_{c,n,t+\Delta t}$ for the quarterly holding period. We let $y_{t1}$ denote the three-month T-bill yield and then the excess return on LC bonds over the short rate is given by

$$r_{x,n,t+\Delta t}^b = r_{c,n,t+\Delta t}^b - y_{t1}.$$  

From a dollar investor’s perspective, we can rewrite the excess return as

$$r_{x,n,t+\Delta t}^b = [r_{c,n,t+\Delta t}^b - (y_{t1} - y_{t1}^*)] - y_{t1}^*.$$  

\textsuperscript{8}For developed countries, CDS contracts insure against defaults on all Treasury bonds denominated in local currencies under domestic law. However, in emerging markets, CDS contracts are exclusively linked to external debt denominated in foreign currencies.

\textsuperscript{9}US sovereign CDS contracts are denominated in euros.
The dollar investor can hedge away the currency risk of the holding period $\Delta t$ by going long a U.S. T-bill and shorting a LC T-bill with the same market value as the LC bond. By doing so, any movement in the spot exchange rate of the LC has the same offsetting first-order impact on the bond position and the local T-bill position and hence cancels out. After hedging currency risk for the holding period, the dollar investor bears duration risk of the LC bond.

We define the local equity excess returns as the log return on local benchmark equity over the three-month LC Treasury bill:

$$rx_{t+\Delta t}^{m,i} = (p_{t+\Delta}^{m,i} - p_{t}^{m,i}) - y_{t};$$

where $p_{t}^{m,i}$ denotes the log benchmark equity return index at time $t$ in country $i$. We then compute the local bond-stock beta $\beta_{b,s}^{i}$ for each country $i$ by regressing LC bond excess returns $rx_{t+\Delta t}^{b,i}$ on local equity excess returns $rx_{t+\Delta t}^{s,i}$:

$$rx_{t+\Delta t}^{b,i} = \alpha_{i} + \beta_{i}^{b,s} r x_{t+\Delta t}^{s,i} + \epsilon_{it}.$$ 

Bond-stock betas measure the risk exposure of LC bond returns on local equity returns. In addition, we also compute the bond-CDS beta as the regression coefficient of LC bond excess returns on changes in CDS spreads:

$$rx_{t+\Delta t}^{b,i} = \alpha_{i} + \beta_{i}^{b,c} \Delta cds_{t,t+\Delta t}^{i} + \epsilon_{it}.$$ 

### 4.1.2 Cyclicality of Inflation Expectations: Forecast Beta

To measure the expected pro-cyclicality of inflation expectations, we regress the change in the CPI inflation rate predicted by forecasters on the change in their predicted real GDP growth rate. Each month, professional forecasters surveyed by Consensus Economics forecast inflation and GDP growth for the current and next calendar year. We use revisions
of inflation and GDP forecasts each month relative to forecasts made three months ago to infer shocks to investors’ expectation of inflation and output. We pool all revisions for 2006 through 2013 (so that the forecasts themselves were all made post-2005), and run the country by country regressions

\[ \Delta \tilde{\pi}_t = \beta_0 + \beta_{\pi,gdp} \Delta \tilde{gdp}_t + \epsilon_t, \tag{35} \]

where \( t \) indicates the date the revision is made. Country subscripts are suppressed to keep the notation concise. The revisions to inflation forecasts (\( \Delta \tilde{\pi}_t \)) and GDP growth forecasts (\( \Delta \tilde{gdp}_t \)) are measured as percentage changes of forecasts made three months before. The coefficient \( \beta_{\pi,gdp} \) measures the cyclicality of inflation expectations and is the coefficient of interest.

Because forecasts are made for calendar years, the forecast horizon can potentially vary. Consensus forecasts the annual inflation rate up to two years in advance. This means that in January 2008, the forecast of calendar year 2008 inflation is effectively 11 months ahead and the forecast of calendar year 2009 is 23 months. We focus on revisions to the two-year forecast in order to minimize variation in the forecast horizon.

### 4.1.3 Nominal Debt Shares

For developed countries, we construct the share of nominal debt based on the OECD Central Government Debt Statistics and individual central banks, which directly report the instrument composition of debt securities outstanding issued by the central government.

For emerging markets, we measure the share of nominal debt in sovereign debt portfolios using BIS Debt Securities Statistics. Table 16C of the Debt Securities Statistics reports the instrument composition for outstanding domestic bonds and notes issued by the central government (\( D_{t}^{Dom} \)) starting in 1995. Table 12E of the Debt Securities Statistics reports total international debt securities outstanding issued by the general government (\( D_{t}^{int} \)). For emerging markets, as the vast majority of international sovereign
debt is denominated in foreign currency, and local governments rarely tap international debt markets, \( D_{t}^{\text{Int}} \) offers a very good proxy for central government foreign currency debt outstanding. Data for developed countries from are from individual central banks or the OECD. The share of nominal debt is computed as the ratio of the fixed-coupon domestic sovereign debt outstanding \( D_{t}^{\text{Dom}, \text{Fix}} \) over the sum of domestic and international government debt:

\[
\alpha^{\text{Nom}} = \frac{D_{t}^{\text{Dom}, \text{Fix}}}{D_{t}^{\text{Dom}} + D_{t}^{\text{Int}}}
\]

Inflation-linked debt, floating-coupon debt and FC debt are all treated as real liabilities.

### 4.2 Summary Statistics

Table 1 reports summary statistics for inflation, inflation expectations, CDS spreads, nominal bond yields, bond-stocks betas, bond-CDS betas, inflation-output forecast betas, and nominal debt shares by developed and emerging market groups. Compared with developed markets, emerging market CDS spreads are 91 basis points higher on average. While CDS spreads across countries share a large common component (Longstaff, Pan, Pedersen, and Singleton 2011, Ang and Longstaff 2013), our empirical results focus on the substantial cross-country differences in the level of CDS spreads and bond-CDS betas. Emerging market realized inflation is 2.4 percentage points higher and survey-based expected inflation is 2.0 percentage points higher. In addition, inflation is expected to be more counter-cyclical in emerging markets than in developed countries. In particular, survey inflation expectations are on average pro-cyclical for developed markets, but counter-cyclical for emerging markets.

In terms of nominal bond risks, five-year nominal yields are 3.4 percentage points higher in emerging markets than in developed markets. Nominal bond returns are counter-cyclical in developed markets, as evident from negative bond-stock betas and positive bond-CDS betas. By contrast, nominal bond returns are pro-cyclical in emerging markets. Finally, the share of nominal debt in total debt portfolios is 26 percentage points higher
in developed than in emerging markets.

Therefore, compared to developed markets, emerging markets have higher default risk and inflation risk, more counter-cyclical inflation, more pro-cyclical LC nominal bond returns, and a lower share of nominal debt in sovereign debt portfolios. Our theoretical framework attributes these differences between emerging and developed markets to differences in monetary policy credibility.

4.3 Co-movement of Default, Inflation and Nominal Bond Risks

Table 2 reports cross-country correlations of seven empirical proxies for default risk, inflation, and nominal bond risks. All seven empirical measures are highly correlated, with a mean absolute bivariate correlation of 73%. First, CDS spreads are highly correlated with the level of realized inflation and survey-based inflation expectations, with correlations of over 80%. Countries with higher inflation and default risk also tend to have more counter-cyclical inflation expectations, as proxied by the expected inflation-output forecast beta.

Second, in terms of nominal bond risks, countries with higher inflation and default risk tend to have higher nominal bond yields. Moreover, the cyclicality of nominal bond returns with respect to stock excess returns (bond-stock beta) and with respect to changes in CDS spreads (bond-CDS beta) are also strongly correlated with default risk and inflation proxies.

In Figure 5, we plot the correlation between bond-stock betas and bond-CDS betas against CDS spreads and realized inflation, analogously to Figure 4 for the model. Developed markets are denoted by green dots and emerging markets are denoted by red dots. In developed markets, we can see that bond-stock betas are all negative and bond-CDS betas are all positive. Thus, nominal Treasury bonds provide a good hedge against the stock market and default risk. In bad times, when stock market returns are low and CDS spreads are high, nominal Treasury bonds have high excess returns.
However, for most emerging markets, bond-stock betas are positive and bond-CDS betas are negative. Nominal Treasury bonds are risky assets with respect to the stock market and default risk. In bad times, when the stock market performs poorly, nominal bonds have low excess returns and CDS spreads widen. Furthermore, the pro-cyclicality of LC bonds, as captured by bond-stock betas, increases strongly with respect to the mean level of default and inflation risk.

4.4 Monetary Policy Credibility Ranking

The strong common component of these empirical measures supports a unifying explanation of default, inflation and bond risks. We perform a principal component (PC) analysis of the seven empirical measures of default, inflation and nominal bond risks discussed above. While it is difficult to map the level of this measure to a particular level of $p$ in the model, the first principal component of our empirical proxies provides a natural empirical measure to rank countries according to their credibility.

The first PC explains 77% of total variation in all seven of the empirical measures. In last row of Table 2, we report the correlation between the first PC and each of the seven individual risk measures. Countries with high first PC scores are associated with high default, inflation risk and nominal bond yields, more counter-cyclical inflation and more pro-cyclical LC nominal bond returns.

We create a monetary policy credibility ranking by sorting the first PC score by country. Figure 6 visualizes the relationship between the monetary policy credibility ranking and CDS spreads, inflation, inflation-output forecast betas and bond-stock betas. Switzerland, Norway and Germany are ranked as top three, and Indonesia, Russia and Turkey are ranked as bottom three in terms of monetary policy credibility. All 11 developed markets are ranked before the emerging markets.

Figure 6 provides direct empirical evidence for several model propositions from Section 3. Note that a higher credibility rank corresponds to lower monetary policy credibility.
Figure 6, Panel (A) shows that CDS spreads increase in the credibility rank, thereby supporting Proposition 3. Figure 6, Panel (B) shows that countries with a higher credibility rank tend to have higher inflation, thereby supporting Proposition 1. Figure 6, Panel (C) shows that the inflation-output forecast beta decreases in the credibility rank, in support of Proposition 4. Figure 6, Panel (D) shows that bond-stock betas increase in the credibility rank, consistent with Proposition 5.

4.5 Monetary Policy and Sovereign Debt Portfolios

Finally, we test an important implication of the model that countries with higher monetary policy credibility use more nominal debt. In Figure 7 Panel (A), we plot the credibility ranking against the mean share of nominal debt at the country level. The correlation between the two variables is equal to negative 68 percent. Countries with higher monetary policy commitment (lower credibility rankings) indeed use more nominal debt as a fraction of total sovereign borrowing. In Figure 7 Panel (B), we sort the 30 sample countries into 6 portfolios based on credibility, and plot the mean credibility ranking against the mean nominal debt share for each portfolio. The general pattern that nominal debt shares increase with the credibility ranking also holds at the portfolio level. This provides strong support for Proposition 2.

Table 3 shows the regression coefficient and R-squared of running nominal debt shares on the monetary policy credibility index and other empirical moments. In column (1), we regress the nominal debt share on the monetary policy credibility index and obtain a statistically significant negative coefficient -1.9. A one-standard-deviation move in the credibility ranking is associated with a 17 percentage point decrease in the LC debt share. The R-squared of the regression using the credibility index is equal to 46%, higher than using each individual moment alone in columns (2) through (8). In column (9), we control for per capita income and exchange rate regimes of the country. The credibility index remains significant in explaining the nominal debt share. Neither per capita income nor
the exchange rate regime enters significantly after including the credibility index.

5 Conclusion

This paper argues that differences in monetary policy credibility explain discrepancies in the structure of sovereign borrowing and the risks of government bonds across countries. By endogenizing both the business cycle dynamics and the currency choice of sovereign debt, our simple framework gives rise to a number of testable predictions. The key contribution of the paper is to demonstrate how a single change, an increase in monetary credibility, can explain a host of patterns, from the currency denomination of sovereign debt to the cross-country heterogeneity in bond-stock covariances. The empirical support that we find for the testable predictions of model provides strong evidence in favor of the proposed channel.

Our paper is, however, silent on the reason for the increase in central bank credibility. Understanding why some countries have been able to develop institutions that allowed the central bank to become more credible is an obvious direction for future research. Connecting the results in this paper to the earlier theoretical literature on central bank institutional design, such as Persson and Tabellini (1993) and Walsh (1993), may be promising.

The framework’s simplicity also presents opportunities for future research to build on the model along several dimensions. First, investors in the model are risk-neutral, but risk premia are likely to be quantitatively important for bond-stock comovements and the international term structure of interest rates (Campbell, Pflueger, and Viceira 2015). Second, we model the government’s objective function and type as perfectly known. With uncertainty about the central bank’s inflation target (Orphanides and Williams 2004) or the central bank’s type (Backus and Drifil 1985, Barro 1986), policy uncertainty might be reflected in asset prices (Pastor and Veronesi 2012, 2013).
References


Corsetti, Giancarlo and Luca Dedola, 2015, “The Mystery of the Printing Press: Self-Fulfilling Debt Crises and Monetary Sovereignty”, working paper, University of Cambridge and ECB.


Niemann, Stefan, Paul Pichler, and Gerhard Sorger, “Public Debt, Discretionary Policy, and Inflationary Persistence”, *Journal of Economic Dynamics and Control* 37, 1097—1109.


Panel (A) shows the ratio of marketable debt in foreign currency plus inflation-indexed debt to total marketable debt from OECD.stat and the Reserve Bank of Australia. Australian 10-year breakeven inflation, or the difference between nominal bond yields and inflation-indexed bond yields with equal duration, is from the Reserve Bank of Australia.
Figure 2: Model Timeline

- Issue LC and FC debt
- Cost-push shock $u_t$
- Central bank sets policy rate
- Move inflation and output along New Keynesian PC
- Debt comes due
- If default, pay default cost
Note: Panel (A) shows default probabilities (9) as a function of the face value of FC debt (red solid) and LC debt (blue dashed). Panel (B) shows expected distortions due to the incentive to inflate away LC debt in period 2 against the LC debt share. Panel (C) shows expected period 2 default costs (probability of default × cost upon default) against the local currency debt share. Panel (D) shows the combined expected period 2 cost, defined as the sum of expected default costs and the cost of ex-post inflation, with high credibility (red solid) and low credibility (blue dashed). The figure indicates optimal LC debt shares. At the optimum, the marginal expected period 2 benefit of increasing the LC debt share, indicated by dotted black tangency lines, must equal the marginal period 1 cost of increasing the LC debt share.
Figure 4: Model Bond Betas, Default, and Inflation Risk

Note: Panels A and B plot model LC bond-stock betas and LC bond-default betas against expected default probabilities. Panels C and D plot LC bond-stock betas and bond-default betas against period 1 inflation. Each point on the red solid line corresponds to a different level of credibility $p$ with the LC debt share adjusting endogenously to credibility. Each point on the blue dashed line corresponds to a different exogenous LC debt share. As the exogenously given LC debt share increases, inflation increases and the default probability decreases.
Figure 5: Bond Betas, Default, and Inflation Risk (2005-2014)

Note: Panels A and B plot bond-stock betas and bond-CDS betas against mean CDS spreads, respectively. Panels C and D plot bond-stock betas and bond-CDS betas against mean inflation risks, respectively. Developed markets are denoted by green dots and emerging markets are denoted by red dots. The three-letter currency code is used to label countries.
Figure 6: Monetary Policy Credibility Ranking v.s. Other Empirical Moments

Note: Panels A-D show bivariate relationship between the monetary policy credibility ranking with default risk, inflation risk, inflation-output forecast beta and the bond-stock beta, respectively. More credible regimes are associated with smaller monetary policy credibility rankings. Developed markets are denoted by green dots and emerging markets are denoted by red dots. The three-letter currency code is used to label countries.
Figure 7: Monetary Policy Credibility Ranking v.s. Other Empirical Moments

(A) Country-Level Correlation

(B) Portfolio-Level Correlation

Note: In Panel (A), we plot the country-level monetary policy credibility ranking against the share of nominal debt in the sovereign debt portfolio. In Panel (B), we sort 30 sample countries into six portfolios based on monetary policy credibility rankings and plot the mean credibility rankings against the mean nominal debt share in each portfolio.
Table 1: Summary Statistics for Developed and Emerging Markets (2005-2014)

<table>
<thead>
<tr>
<th></th>
<th>(1) CDS</th>
<th>(2) π</th>
<th>(3) Survey π</th>
<th>(4) βπ,ghp</th>
<th>(5) y</th>
<th>(6) βb,s</th>
<th>(7) βb,cds</th>
<th>(8) αNom</th>
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<td><strong>A) Developed Markets (N = 11)</strong></td>
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<td></td>
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<tr>
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<td>0.04</td>
<td>0.13</td>
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<td>2.68</td>
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<td>0.61</td>
<td>-0.18</td>
<td>0.02</td>
<td>65.85</td>
</tr>
</tbody>
</table>

| **B) Emerging Markets (N = 19)** |         |       |              |             |       |          |            |          |
| Mean           | 1.26    | 4.09  | 3.83         | -0.16       | 6.01  | 0.06     | -0.04      | 63.11    |
| S.d.           | 0.58    | 2.05  | 1.66         | 0.43        | 2.91  | 0.12     | 0.11       | 25.58    |
| Max            | 2.17    | 9.07  | 7.90         | 0.75        | 12.33 | 0.32     | 0.14       | 100.00   |
| Min            | 0.27    | 2.05  | 2.06         | -1.22       | 1.67  | -0.07    | -0.30      | 11.97    |

| **C) Full Sample (N = 30)** |         |       |              |             |       |          |            |          |
| Mean           | 0.91    | 3.21  | 3.10         | -0.07       | 4.77  | 0.01     | 0.05       | 72.70    |
| S.d.           | 0.65    | 2.05  | 1.68         | 0.37        | 2.92  | 0.13     | 0.17       | 24.78    |
| Max            | 2.17    | 9.07  | 7.90         | 0.75        | 12.33 | 0.32     | 0.51       | 100.00   |
| Min            | 0.14    | 0.26  | 0.32         | -1.22       | 0.61  | -0.18    | -0.30      | 11.97    |

| **D) Mean Difference between Emerging and Developed Markets (N = 30)** | 0.953*** | 2.391*** | 2.004*** | -0.229* | 3.388*** | 0.160*** | -0.248*** | -26.16*** |
| Mean Diff.     |         |         |           |           |         |          |            |          |
|                | (0.137) | (0.531) | (0.428) | (0.114) | (0.767) | (0.0303) | (0.0466)   | (6.791)  |

Note: This table reports summary statistics for the cross-sectional mean of eight variables for developed and emerging market groups. The variables include (1) CDS, five-year sovereign credit default swap spreads in percentage points, (2) π, realized inflation (%), (3) Survey π, survey inflation (%), (4) βπ,ghp, inflation-output forecast beta, (5) y, five-year nominal LC bond yield, (6) βb,s, bond-stock beta, (7) βb,cds, bond-CDS beta, and (8) αNom, percentage share of nominal debt in total sovereign debt portfolios. Panel (A) reports results for developed markets. Panel (B) reports results for emerging markets. Panel C reports results for the pooled sample. Panel (D) tests the mean difference between developed and emerging markets. Robust standard errors are reported in the parentheses. Significance levels are denoted by *** p<0.01, ** p<0.05, * p<0.1.
### Table 2: Cross-Country Correlations Among Default, Inflation and Nominal Bond Risks

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Note: This table reports cross-country correlations for seven empirical measures across 30 countries during 2005-2014. The variables include (1) CDS, five-year sovereign credit default swap spreads in percentage points, (2) π, realized inflation (%), (3) Survey π, survey inflation (%), (4) β_{π, y}, inflation-output forecast beta, (5) y, five-year nominal LC bond yield, (6) β_{b, s}, bond-stock beta, (7) β_{b, cds}, bond-CDS beta, and (8) First PC, the first principal component of the first seven variables.
Table 3: Cross-Sectional Regression of Nominal Debt Shares

<table>
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</table>

Note: This table reports regression coefficients of nominal debt shares on eight variables. The variables include (1) monetary policy credibility index, (2) CDS, five-year sovereign credit default swap spreads in percentage points, (3) π, realized inflation (%), (4) Survey π, survey inflation (%), (5) βπ,y, inflation-output forecast beta, (6) y, five-year nominal LC bond yield, (7) βh,s, bond-stock beta, and (8) βh,cds, bond-CDS beta, (9) "GDP/capita": per capita GDP obtained from World Development Indicator. (10) "FX regime", Reinhart and Rogoff (2004) de facto exchange rate regime classification.