Exchange Rate Stabilization and Monetary Transmission*

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Abstract

This paper challenges the conventional Mundellian trilemma by arguing that moderate exchange rate stabilization can enhance rather than constrain monetary policy effectiveness in emerging markets. We develop a theoretical model with segmented financial markets where domestic arbitrageurs face risk limits. We show that exchange rate stability attracts foreign investment in local-currency bonds, relaxing financial frictions on domestic arbitrageurs. This strengthens policy rate transmission to long-term yields, giving the central bank better control over the output gap. Our framework shows that it is always optimal to introduce some level of exchange rate targeting. Excessive stabilization such as a hard currency peg, however, raises policy rate volatility, offsetting these gains by increasing the amount of duration risk that must be borne by local arbitrageurs.

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1 Introduction

The conduct of monetary policy in emerging market economies has long been shaped by the influential Mundellian trilemma, which posits that countries cannot simultaneously maintain an independent monetary policy, a fixed exchange rate, and free capital flows (Fleming 1962; Mundell 1963; Obstfeld and Taylor 2004). This framework has profoundly influenced policy advice for emerging markets, with the conventional wisdom advocating that central banks should focus exclusively on domestic stabilization objectives while allowing exchange rates to float freely (e.g., IMF 2007). Under this paradigm, exchange rate fluctuations are viewed as a necessary adjustment mechanism that preserves monetary autonomy, and any attempt to stabilize the currency is seen as constraining the central bank's ability to respond to domestic economic conditions.[1] In practice, emerging market central banks frequently deviate from pure inflation targeting by intervening in foreign exchange markets, suggesting that the theoretical separation between domestic and external objectives may not align with the realities of monetary policy implementation in developing economies (Blanchard, Adler and de Carvalho Filho 2015; Domanski, Kohlscheen and Moreno 2016).

In this paper we challenge this Mundellian paradigm, by arguing that exchange rate stabilization can actually strengthen monetary transmission in EMEs with shallow financial markets. Our novel mechanism works as follows: currency stability attracts foreign investment in long-term local-currency bonds. This reduces the amount of duration risk that local arbitrageurs have to bear, relaxing the bind-

[1] However, empirical evidence on the performance of different exchange rate regimes has been more nuanced. Ghosh, Gulde, Ostry and Wolf (1997) find that pegged exchange rates are associated with lower inflation but also lower growth, while Ghosh, Gulde and Wolf (2000) find that currency boards, typically assimilated to hard pegs, tend to grow faster. More recently, Ilzetzki, Reinhart and Rogoff (2019) provide an updated classification of exchange rate regimes and document the prevalence of intermediate arrangements. We use their classification in our empirical analysis.

ing risk limit they face. In turn, this improves the transmission of policy rate changes to market interest rates and broader financial conditions, since local arbitrageurs are less constrained. We show that, under these conditions, it is always optimal to introduce some degree of exchange rate stabilization. Excessive exchange rate management, however, can become counterproductive because it increases policy rate volatility beyond the point where the benefits of attracting foreign capital are outweighed by the costs of greater interest rate risk. This tightens domestic arbitrageurs' risk limits and impairs monetary transmission.

We motivate our theory with a simple empirical analysis in Section 2. To measure the strength of monetary transmission, we follow the approach of De Leo, Gopinath and Kalemli-Özcan (2024a) by analyzing the pass-through from policy rates to market interest rates, using the 3-month local-currency government yield. This exercise reveals a striking pattern across the 16 major emerging market economies: the effectiveness of monetary policy exhibits an inverted U-shape relationship with exchange rate volatility. The same pattern holds when conditioning instead on a measure of exchange rate regime from Ilzetzki et al. (2019): countries with moderate levels of exchange rate stabilization display significantly stronger transmission from policy rates to market interest rates compared to both fully floating and heavily pegged regimes. This relationship extends beyond interest rates to encompass broader financial conditions, like equity market responses to monetary policy changes.[2]

To explain this empirical regularity, in Section 3 we develop a theoretical model of a small open economy with segmented financial markets and endogenous entry

[2]Note that this is a different question than why some emerging markets fail to loosen monetary policy and sometimes even *hike* their policy rate in response to adverse shocks (Caballero and Krishnamurthy 2003; 2004, Rey 2013, Kalemli-Özcan 2019, Ottonello 2021, Fontanier 2025). Here emerging markets are *trying* to stimulate their economies but the monetary easing has limited pass-through to the macroeconomy.

of international investors. To endogenize the effectiveness of monetary policy, we assume that the central bank only controls the short-term interest rate (the policy rate), but it is the long-term interest rate that transmits financial conditions to the real economy. The central bank thus changes its policy rate to bring the long-term rate close to its target, in order to close the output gap. The transmission from the policy rate to the long-term rate, however, is not perfect because markets are segmented (Vayanos and Vila 2021). Local arbitrageurs with heterogeneous risk tolerance trade short-term and long-term bonds, but face risk limits. When these risk limits are tight, what we deem "shallow financial markets," the transmission from the policy rate to the long-term rate is potentially weak, since the amount of duration risk local arbitrageurs need to bear is large relative to their risk-bearing capacity.

Our key innovation is to allow for the endogenous entry of foreign investors in the long-term local-currency bond market. This has a direct impact on the monetary transmission mechanism, by reducing the amount of long-term bonds that local arbitrageurs need to hold. Relative to their wealth, there is thus less duration risk to bear, which allows for a more aggressive arbitrage along the yield curve. This strengthens the transmission of policy rate changes to long-term interest rates, enhancing monetary policy effectiveness. Encouraging more foreign entry thus allows the central bank to face less segmented markets, and target the output gap more effectively.[3]

Our main insight is that, since foreign investors value returns in their own currency, exchange rate stabilization makes domestic bonds more attractive to for-

[3]In practice, foreign investors can also correspond to carry traders that absorb currency risk, or lenders to domestic arbitrageurs that indirectly absorb currency or duration risk. Our model can be extended to capture these realistic elements. The common ingredient is that foreign investors absorb part of the domestic risk, leaving less risk to be absorbed by domestic arbitrageurs and relaxing their constraints.

eign investors. By deviating from pure output gap targeting and responding to shocks in the exchange rate, the central bank can thus increase the amount of foreign capital that enters the local-currency bond market. This improves the depth of domestic financial markets, which in turn strengthens monetary transmission, overturning the conventional Mundellian wisdom that exchange rate stabilization constrains monetary policy autonomy.[4]

We continue by looking at optimal policy implications in Section 4. While our theory generates a clear motive for exchange rate stabilization, it is not exempt of trade-offs. Responding to exchange rate shocks requires the central bank to allow for some deviation from the output gap target, and also creates unwanted volatility in the policy rate. Perhaps surprisingly, we show that it is nonetheless always optimal to introduce some degree of exchange rate stabilization. This is because, starting from a purely output gap or inflation-focused monetary policy rule, the benefits of improved transmission are first-order, while the costs of deviating from output gap targeting and excess volatility are second-order.

While not designed to match it, our theory also explains another feature of the empirical results presented in Section 2: the fact that the strength of the transmission of monetary policy has an inverted U-shape relation with exchange rate volatility. Our model endogenously generates this pattern, and highlights that optimal policy is really trading off two different risks: currency risk, and duration risk. By pegging the exchange rate, the country can entirely suppress currency risk and attract more foreign capital. But to effectively enforce the peg, large varia-

[4]We also propose a different version of the model where we instead assume that local arbitrageurs need to hold some FX risk, for instance because the emerging economy has some dollar liquidity needs. Interestingly, the same mechanism applies without relying on international investors' endogenous entry: by stabilizing the exchange rate, the central bank reduces the FX risk borne by local arbitrageurs, which unconstrains them and improves monetary transmission. We view this channel working directly through the balance sheet of local arbitrageurs as complementary and equally likely to be empirically relevant. Our broad message is that the strength of monetary transmission is endogenous and can be managed through the distribution of risk holdings.

tions in the policy rate will be necessary to fully offset risk premium shocks (Calvo 1999). This makes it more risky to hold long-term bonds for local arbitrageurs: it increases the amount of duration risk they need to bear on their balance sheet, impairing monetary policy transmission. As such, maximizing the transmission of monetary policy lies in a middle ground that balances the benefits of currency stability against the costs of policy rate volatility.

Related Literature: Our paper is related to several lines of work. First, the theoretical foundation for exchange rate regime choice has been dominated by the Mundellian trilemma since the classic papers of Fleming (1962) and Mundell (1963). Dornbusch (1976) and Obstfeld and Rogoff (1995) formalized the impossible trinity of monetary independence, exchange rate stability, and capital mobility.[5] This framework has been influential in shaping policy recommendations, particularly the advocacy for flexible exchange rates in emerging markets following the currency crises of the 1990s (Obstfeld and Taylor 2004). Our broad contribution is to challenge this conventional wisdom by showing that moderate exchange rate stabilization can actually *enhance* monetary policy transmission in emerging markets, rather than constrain it.

Second, there is a large literature studying optimal monetary policy in New Keynesian small open economies. The seminal papers of Obstfeld and Rogoff (1995), Clarida, Galí and Gertler (2002) and Galí and Monacelli (2005) look at the producer currency pricing case and find no role for targeting the exchange rate. In contrast, Devereux and Engel (2003), Engel (2011) study local currency pricing

[5] Rey (2013) argues that the trilemma may, in fact, be a dilemma. She finds that the global financial cycle, largely driven by U.S. monetary policy, constrains the autonomy of national monetary policies. Corsetti, Kuester, Müller and Schmidt (2024) show that, in response to euro-area monetary-policy shocks, the output of floaters and peggers look similar. Surprisingly, this is because floaters react by changing their interest rate to keep their exchange rate vis-a-vis the euro unchanged.

and find a role for pegging the real exchange rate.[6] In our theory, the desirability of targeting the exchange rate is unrelated to assumptions about the pricing of traded goods.

More recently, Basu, Boz, Gopinath, Roch and Unsal (2023) and Itskhoki and Mukhin (2023) propose models with intermediation friction and noise trader shocks, where stabilizing the exchange rate eliminates a risk-sharing wedge. We show that, when domestic arbitrage capital is limited and foreign capital is deterred by exchange rate risk, FX stabilization can improve monetary policy transmission and enhance macroeconomic stabilization in addition to facilitating risk sharing. In a complementary analysis, Caballero and Simsek (2025) show that when both the exchange rate and domestic asset prices are influenced by noise, FX targeting can backfire by transmitting exchange rate shocks to domestic asset markets. This raises the noise-induced volatility in the domestic market and exacerbates macroeconomic fluctuations. For such environments, they propose targeting a broad financial conditions index that includes domestic asset prices as well as the exchange rate. In our model too, pegging the exchange rate too strongly is not desirable because it can increase policy rate volatility and the duration risk that arbitrageurs must absorb. Nonetheless, some FX targeting typically improves macroeconomic stabilization in our model because it helps attract foreign capital and relax domestic arbitrageurs' constraints. The common thread across these environments is that targeting an appropriate financial variable can improve macroeconomic stabilization by "recruiting" either domestic or foreign capital for policy objectives, but the optimal target depends on which frictions are most prominent.

Third, our paper builds upon a literature emphasizing the role of international

[6] Egorov and Mukhin (2023) study the case of dominant currency pricing, and also show that optimal policy only targets inflation and the output gap. Corsetti and Pesenti (2015) highlight that the endogenous choice of currency denomination for exports should be related to monetary policy volatility.

investors in emerging markets. Closely related to our paper, Hassan, Mertens and Zhang (2023) argue that by stabilizing its exchange rate, a country becomes a safer investment for international investors, which results in domestic capital accumulation and higher domestic wages. We take this argument further, by showing that exchange rate stabilization can also improve the *transmission* of monetary policy. Other recent work studies its importance for shaping CIP deviations (Bacchetta, Benhima and Berthold 2023, De Leo, Keller and Zou 2024b), transmitting the global financial cycle locally (Di Giovanni, Kalemli-Özcan, Ulu and Baskaya 2022, Converse, Levy-Yeyati and Williams 2023), the co-movement between domestic and global bond markets (Xu 2024), capital flows (Lane and Shambaugh 2010, Camanho, Hau and Rey 2022, Avdjiev, Hardy, Kalemli-Özcan and Servén 2022, Fu 2024), equity prices (Rey, Planat, Stavrakeva and Tang 2024, Rey and Stavrakeva 2024, Kacperczyk, Nosal and Wang 2025), and the co-movement between the exchange rate and bond yields (De Leo, Keller, Simoncelli, Villamizar-Villegas and Williams 2025).

In terms of the modeling ingredients, we build on the segmented markets framework, in the tradition of Gabaix and Maggiori (2015) and Vayanos and Vila (2021), which emphasizes the role of arbitrageurs with limited balance sheet capacity in connecting different markets. This idea has been applied to a host of different settings, for instance by Greenwood, Hanson and Liao (2018), Gourinchas, Ray and Vayanos (2022), Greenwood, Hanson, Stein and Sunderam (2023), or Kekre, Lenel and Mainardi (2024).[7] We highlight that, in settings where arbitrageurs are financially constrained, the transmission of monetary policy in this conceptual framework can be endogenously improved by managing the quantities of risk that are

[7]There is also extensive empirical work on market segmentation, e.g., Siriwardane, Sunderam and Wallen (2022), Du, Hébert and Li (2023), Hanson, Malkhozov and Venter (2024), Bryzgalova, Pavlova and Sikorskaya (2025) and Wittwer and Uthemann (2025).

borne by different agents, a key insight of the risk-centric macroeconomics literature (Caballero and Simsek 2020; 2023, Caballero, Caravello and Simsek 2024).[8]

Finally, the financial block of our model is related to the intermediary asset pricing literature (e.g., He and Krishnamurthy (2013), Brunnermeier and Sannikov (2014), Adrian, Etula and Muir (2014), He, Kelly and Manela (2017)), specifically its strand where financial intermediaries face binding risk limits or capital constraints (Fostel and Geanakoplos (2008), Geanakoplos (2010), Brunnermeier and Pedersen (2009), Garleanu and Pedersen (2011), Bruno and Shin (2015)). We show that when domestic arbitrageurs' risk limits bind, the transmission of policy rate changes to long-term interest rates is dampened. More generally, our model reveals that when constrained intermediaries are net buyers of an asset, prices might become relatively less sensitive to fundamental shocks, as prices are partly driven by intermediary capital or risk constraints. This mechanism is related to the fire sales literature (Shleifer and Vishny (2011), Kiyotaki and Moore (1997), Lorenzoni (2008), Dávila and Korinek (2018)), though those models typically consider distress scenarios where intermediaries are net sellers and focus on amplification. Asriyan, Jeenas and Martin (2025) distinguish these from "demand-freeze crises," where conventional policies can be counterproductive as they may exacerbate financial constraints and further distort resource allocation. Our key insight is that in normal times when intermediaries are net buyers, the transmission of fundamental shocks to asset prices is dampened, and policies relaxing their constraints—such as attracting foreign capital to absorb risk—can enhance the transmission.

[8] We thus also relate to a literature studying what drives the strength of the monetary transmission mechanism. Acharya, Imbierowicz, Steffen and Teichmann (2020) find evidence for an impaired transmission channel of monetary policy in Europe in 2006-2010 due to high-risk banks not passing through their funding cost changes. Boehnert, de Ferra, Mitman and Romei (2025) show that, in Europe, countries with a high non-tradable consumption respond less to monetary policy shocks. Ashtari-Tafti, Guimaraes, Pinter and Wijnandts (2024) show that, in the U.S., long-term yields react to policy rate surprises significantly more when market liquidity is high.

2 Motivating Evidence

2.1 Data

We begin by documenting empirical patterns that motivate our theory. Our analysis focuses on 16 major emerging market economies over recent decades.[9] We compile data on monetary policy interest rates and exchange rates from the Bank for International Settlements, and market interest rates using 3-month local-currency government bonds from Bloomberg. Stock market returns (in local currency) are obtained from Jensen, Kelly and Pedersen (2023). To identify the exchange rate regime, we use the classification of de facto exchange rate regime based on Ilzetzki et al. (2019). We exclude episodes of severe devaluations (freely falling periods in the Ilzetzki et al. (2019) classification) to ensure that the results are not driven by crises. We also use the recently compiled Global Macro Database of Müller, Xu, Lehbib and Chen (2025) to compute the volatility of macroeconomic outcomes.

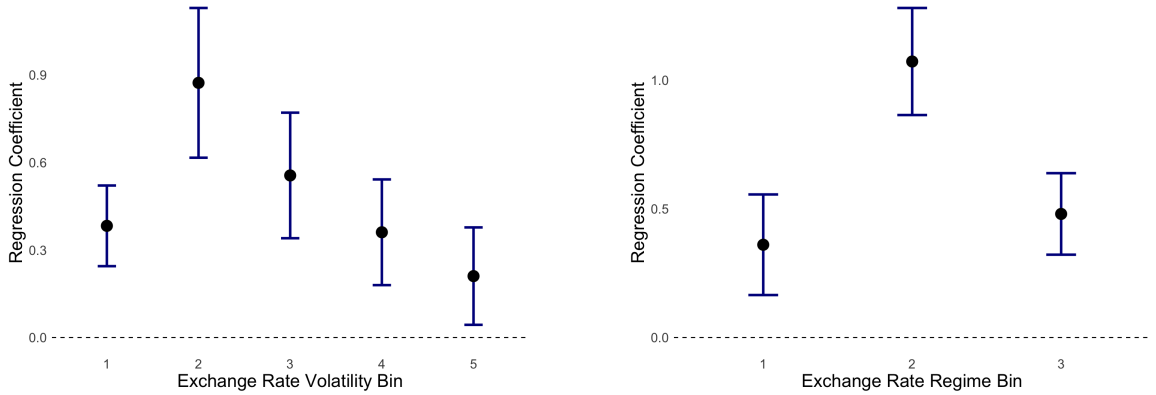
2.2 Exchange Rate Stabilization and Monetary Transmission

To measure monetary transmission, we first follow De Leo et al. (2024a): when the central bank changes the policy rate, how much does this affect the market rate? This measure will then inform our model in Section 3. We are thus interested in the following specification:

$$\Delta r_{j,t} = a + b\Delta i_{j,t} + \epsilon_{j,t} \tag{1}$$

[9]The 16 considered countries are the following: Argentina, Brazil, Chile, Colombia, Hungary, Indonesia, India, Mexico, Malaysia, Peru, Philippines, Poland, Romania, Thailand, Türkiye, and South Africa.

where $\Delta i_{j,t}$ is the change in the policy interest rate in country i at time t relative to the previous month, and $\Delta r_{j,t}$ is the corresponding change in 3-month local-currency government yield over the next three months. To understand whether the strength of the monetary transmission mechanism depends on the level of exchange rate risk, we classify observations in five different bins, depending on the level of the past 12-month FX volatility. The first bin corresponds to the lowest levels of volatility, and the fifth bin corresponds to the highest. We also winsorize observations at the 1% level to ensure that our results are not driven by outliers, since large movements in any of these quantities are not that uncommon in emerging markets. The results are displayed in panel (a) of Figure 1.



(a) Exchange rate volatility

(b) Exchange rate regime

Figure 1: Estimated transmission of policy rate changes to 3-month market interest rates, conditional on exchange rate volatility (left panel) and exchange rate regime (right panel). Bars indicate 95% confidence intervals. The left panel constructs 5 bins of observations, conditioning on the level of the past one-year standard deviation of the exchange rate. Bin 1 corresponds to the lowest level of volatility, and bin 5 to the highest. The right panel follows Hassan et al. (2023): using the Ilzetzki et al. (2019) fine classification, codes 1, 2, and 4 are assigned 0% allowed deviation; codes 5 and 7 are assigned 1%; codes 3, 6, 8, and 11 are assigned 2%; codes 9, 10, and 12 are assigned 5% and code 13 is assigned 10%. We exclude code 14, freely falling currencies, which would only amplify our results. We then construct three bins conditioning on the value of this FX allowed deviation measure.

A larger coefficient b indicates more powerful transmission from the policy rate

to market rates. Figure 1 displays a striking inverted U-shape: countries with high exchange rate volatility also seem to display a weakened monetary transmission mechanism. The strength of the transmission gradually increases as we move to bins with a lower exchange rate volatility. In other words, during periods when an EME's currency is relatively stable, a change in the policy rate leads to a much larger movement in domestic market interest rates. Interestingly, this transmission becomes weaker again when we move towards very low exchange volatility. While our model is designed to match the former part of this evidence (that the monetary transmission mechanism can be improved by lowering exchange rate volatility, relative to a fully floating currency), it will also endogenously generate an inverted U-shape once exchange volatility becomes heavily suppressed (see Section 5).

An obvious concern with this simple empirical exercise is that exchange rate volatility reflects not only the central bank's policy choices but also external shocks that might independently affect monetary transmission. To address this endogeneity concern, we repeat the analysis conditioning on a direct measure of the exchange rate regime rather than realized volatility. We use the Ilzetzki et al. (2019) de facto classification and follow Hassan et al. (2023) to map their fine classification to a measure of how much the currency is "allowed" to deviate by policymakers, then compute the six-month average of this allowed deviation measure. Panel (b) of Figure 1 plots the results. Consistent with panel (a), we find the same inverted U-shape pattern: monetary transmission is strongest in countries with intermediate exchange rate flexibility, weaker in those with highly flexible (floating) regimes, and weaker still in those with very rigid (pegged) regimes.[10]

To check whether our inverted U-shape is a significant pattern in the data, we

[10]We also ran the same analysis using different time horizons for the change in the market rate, or horizon for the average allowed deviation or classification measure, all leading to similar inverted U-shape results. These robustness exercises are included in Appendix B.

estimate a polynomial specification where the coefficient on policy rate changes varies quadratically with exchange rate volatility. Specifically, we regress the three-month change in market rates on policy rate changes, exchange rate volatility, the squared volatility term, and the interactions of both volatility terms with policy changes. This specification allows the marginal effect of monetary policy on market rates to follow an inverted U-shape, increasing initially with exchange rate flexibility before declining at high levels of volatility. Table 1 reports the estimation results. The quadratic interaction term is negative and significant at the 1% level. These estimates confirm the graphical inverted U-shape: monetary policy transmission strengthens as exchange rates become more flexible, but this effect diminishes at very high levels of volatility.

2.3 Exchange Rate Stabilization and Financial Conditions

Next, we extend the analysis to confirm our results on how monetary policy affects broader financial conditions, in particular the stock market, under different FX regimes. We estimate analogous regressions of equity returns (in local currency) on policy rate changes, using the same methodology for classifying exchange rate volatility and flexibility. Figure 2 presents the results. Consistent with the interest rate findings, we observe the same inverted U-shape pattern: policy rate changes have the largest impact on equity returns under intermediate exchange rate regimes, with weaker effects in both highly flexible and highly rigid regimes. Robustness exercises using alternative specifications are presented in Appendix B and yield similar patterns.

Beyond financial markets, we explore whether these patterns extend to macroeconomic outcomes more broadly. If monetary transmission is stronger with moderate exchange rate flexibility, central banks in such regimes should face easier

Table 1: Exchange Rate Volatility and Monetary Policy Transmission

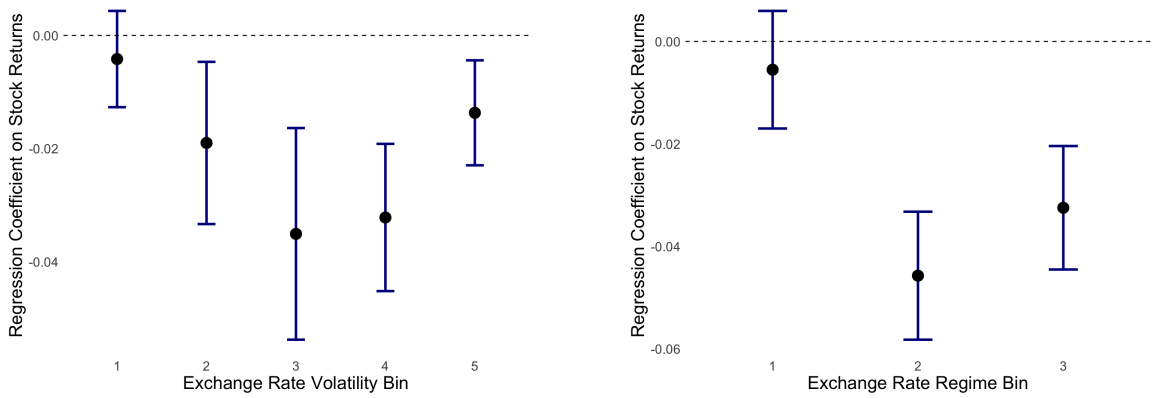
	Δr (Market Rate Change, 3m)			
	(1)	(2)	(3)	(4)
Δi	0.635***	0.566***	0.636***	0.566***
	(0.052)	(0.060)	(0.052)	(0.060)
FX Volatility	−2.114**	−2.660	−2.117**	−2.652
	(1.044)	(1.889)	(1.045)	(1.890)
FX Volatility^2	−2.359	−1.340	−2.359	−1.374
	(1.483)	(5.485)	(1.483)	(5.488)
$\Delta i \times$ FX Volatility	1.026*	4.112***	1.026*	4.115***
	(0.537)	(1.163)	(0.537)	(1.164)
$\Delta i \times$ FX Volatility^2	−2.413***	−10.755***	−2.414***	−10.764***
	(0.841)	(2.973)	(0.842)	(2.975)
Constant	−0.098	−0.204	−0.097	−0.203
	(0.078)	(0.165)	(0.078)	(0.165)
Observations	838	799	838	799
R-squared	0.307	0.312	0.307	0.312
Adjusted R-squared	0.303	0.306	0.302	0.305
F-statistic	73.8***	51.2***	61.5***	44.8***
Controls	None	Capital Controls	US MPS	Both

Notes: Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

FX Volatility scaled by $\times 100$ for interpretability.

Capital Controls includes both overall and bond-specific indices.



(a) Exchange rate volatility (b) Exchange rate regime

Figure 2: Estimated transmission of policy rate changes to stock market returns, conditional on exchange rate volatility (left panel) and exchange rate regime (right panel). Bars indicate 95% confidence intervals. The left panel constructs 5 bins of observations, conditioning on the level of the past one-year standard deviation of the exchange rate. Bin 1 corresponds to the lowest level of volatility, and bin 5 to the highest. The right panel follows Hassan et al. (2023): using the Ilzetzki et al. (2019) fine classification, codes 1, 2, and 4 are assigned 0% allowed deviation; codes 5 and 7 are assigned 1%; codes 3, 6, 8, and 11 are assigned 2%; codes 9, 10, and 12 are assigned 5% and code 13 is assigned 10%. We exclude code 14, freely falling currencies, which would only amplify our results. We then construct three bins conditioning on the value of this FX allowed deviation measure.

stabilization trade-offs, potentially leading to lower volatility of real outcomes. We examine this in Appendix B by computing the standard deviation of key macroeconomic variables—GDP, consumption, investment, and current account—across our exchange rate volatility bins. Figure 10 in the appendix shows a similar U-shaped relationship: volatility of these real variables is lowest at intermediate levels of exchange rate volatility, consistent with the monetary transmission patterns documented above.

2.4 Case study: Brazil

Finally, to ground these cross-country patterns in a concrete example, we highlight the case of Brazil. Brazil officially has a floating exchange rate regime with an inflation-targeting central bank. However, in practice the Banco Central do Brasil has a long history of intervening in currency markets to smooth volatility, often via derivatives or direct dollar auctions on a weekly basis. Key for our purposes, the Banco Central do Brasil publishes monthly data on the volume of outstanding FX swaps. According to our proposed mechanism, movements in the policy rate should have a greater impact on financial conditions during periods where foreign exchange interventions are implemented, since their main purpose is to stabilize the exchange rate. We thus estimate our main specification (1) for Brazil using an 18-month rolling window and plot the (smoothed) coefficient estimates alongside outstanding FX swap volumes in Figure 3. The resulting patterns are broadly consistent with our proposed mechanism. In the early 2000s, when Brazil actively engaged in foreign exchange interventions, monetary transmission was relatively strong. Over the following decade, as intervention activity declined substantially, monetary policy transmission weakened considerably. When Brazil resumed large-scale FX interventions in the mid-2010s, monetary transmission strength recovered accordingly.[11]

[11] With a more powerful monetary transmission mechanism, the central bank should face easier trade-offs when stabilizing the economy, which should result in lower volatility of standard macroeconomic indicators. We confirm that this is the case in Figure 10, in Appendix B.

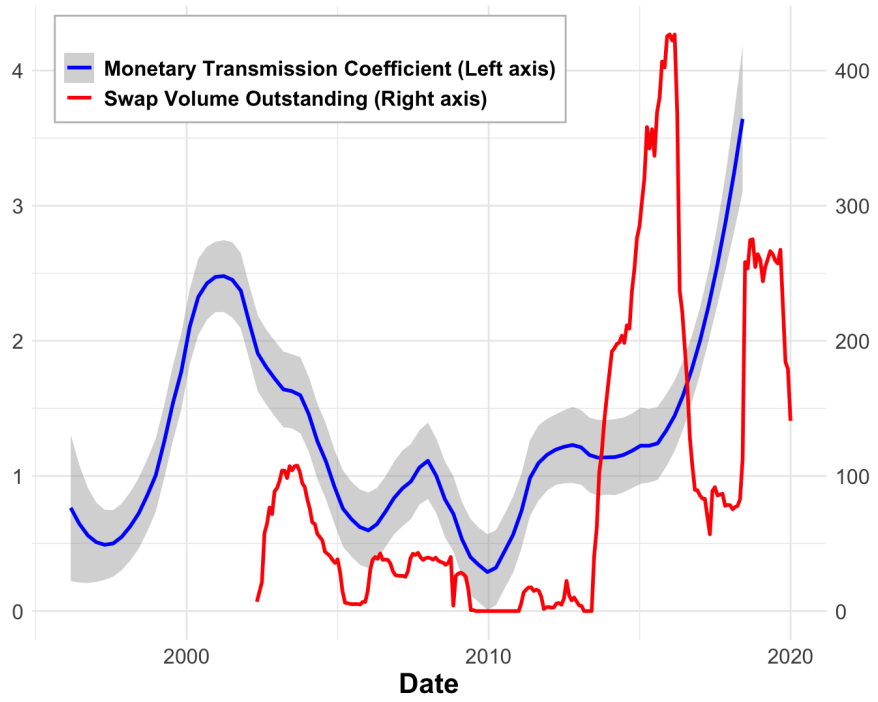


Figure 3: Monetary Transmission and Foreign Exchange Interventions in Brazil. The blue line displays the smoothed rolling regression coefficients derived from an 18-month window of the equivalent of Equation (1), capturing how much the 3-month local-currency yield moves when the central bank moves the policy rate. The red line displays corresponding swap quantities, in thousands of contracts.

3 Model

3.1 Setup

We consider a stylized small open economy with segmented markets, with two novelties: (i) we assume that domestic financial markets are *shallow*, in the sense that there is limited domestic arbitrage capital; and (ii) international investors can endogenously decide to invest in local-currency bonds.

Time is discrete and indexed by $t \in \{0, 1, 2, 3\}$. The central bank follows a policy rule to set the short-term interest rate i_t at all dates. This policy influences the

long term yield at date 1, which we denote with r. Our focus is to understand how different monetary policy rules affect the passthrough at date 1 from the policy rate i_1 to the long-term yield r—the theoretical counterpart to our empirical analysis. In addition to driving the long-term yield, the policy rule affects the exchange rate denoted by e_t (the price of domestic currency in dollars), and its volatility. International investors take the exchange rate volatility as given and decide how much capital to allocate to the domestic bond market at time $t = 0$. Local arbitrageurs absorb the residual bond supply and determine r. Figure 4 illustrates the timing of the model. We next describe all these ingredients.[12]

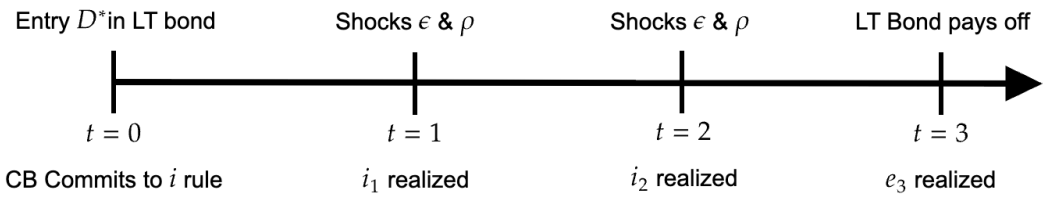


Figure 4: Schematic Model Timeline. The model features four periods. At $t = 0$, the central bank commits to an interest-rate rule, and international investors commit to investing D^* in the long-term local-currency bond market. Shocks ρ_t and ϵ_t hit the economy at $t \in \{1, 2, 3\}$. The central bank follows its interest-rate rule, which results in policy rates i_t and exchange rates e_t in each period. The long-term bond pays off at $t = 3$.

Financial markets and shocks. At dates $t \in \{2, 3\}$, there is only the short-term bond with interest rates i_t set by the central bank. At date $t \in \{1\}$, there are two bonds: a short-term (one-period) bond with interest rate i_t set by the central bank and a long-term bond with interest rate r. The long-term bond pays one unit at

[12]The model can be turned into an OLG structure, in which case future periods would also feature a long-term bond and be similar to our current period $t = 1$. We keep the model stylized to isolate the mechanism of interest.

date $t = 3$. Therefore, its prices at dates 1 and 2 are given by the usual expressions $P_1 = 1/(1+r)^2$ and $P_2 = 1/(1+i_2)$, respectively. This bond is in fixed supply $B = e^b$.

We think of the long-term bond as driving the financial conditions for this economy at date 1. In particular, we view the (unmodeled) output at date 1 as determined by the long-term rate r along with an exogenous aggregate demand shock denoted by ρ_1. Output gaps at date 1 depend on the long-term interest rate gaps $r - (r^* + \rho_1)$, where r^* denotes the gap-minimizing rate without cyclical shocks ("rstar"). Therefore, while the central bank sets i_1, economic activity and output gaps are ultimately driven by the long-term rate r. While this is unconsequential for our positive analysis, it will become important once we study optimal policy in Section 4.[13]

We focus on the determination of the long-term yield at period $t = 1$, but we need to specify policy rules for all periods since the yield at date 1 also depends on future interest rates. Therefore, we assume the economy is hit by an aggregate demand shock ρ_t that might induce a policy response at all dates t.

In addition to aggregate demand shocks ρ_t, the economy is also hit by currency risk premium shocks denoted by ϵ_t. Specifically, we assume the exchange rate at each date t is determined by the following risk-adjusted UIP condition:

$$e_t - \mathbb{E}_t[e_{t+1}] = i_t - i_t^* - (\psi + \epsilon_t). \tag{2}$$

Hence, the currency risk premium $\psi + \epsilon_t$ induces a (stochastic) wedge in the UIP condition (Farhi and Werning 2012; Itskhoki and Mukhin 2025). This type of wedge naturally emerges in models where risk-averse agents require compensa-

[13] See Appendix C.3 for New-Keynesian micro-foundations for the link between the output gap and the long-term interest rate gaps.

tion to engage in carry trading between the local currency and the dollar. For simplicity, in the main text we take equation (2) as given and we assume the wedge is exogenous—we provide microfoundations in Appendix A.1.[14]

Aggregate demand and exchange rate shocks are uncorrelated with each other. They follow i.i.d. normal distributions over time with mean zero and variances σ_ρ^2 and σ_ϵ^2, respectively.

Central Bank: The central bank follows an interest rate rule that responds to both shocks:

$$i_t = \bar{\imath} + \kappa_r \rho_t + \kappa_e \epsilon_t. \tag{3}$$

Here, κ_r and κ_e are the response coefficients to the aggregate demand shock and the risk-premium shock, respectively. For now, we take this rule as given and focus on positive predictions. We investigate central bank objectives and the optimal policy rule in Section 4.

Note that the rule in (3) implies the future nominal interest rate is distributed according to a normal distribution, $\mathcal{N}\left(\bar{\imath}, \kappa_r^2\sigma_\rho^2 + \kappa_e^2\sigma_e^2\right)$. We denote the variance of interest rates with $\sigma_i^2 = \kappa_r^2\sigma_\rho^2 + \kappa_e^2\sigma_e^2$.

International Investors: International investors are assumed to be buy-and-hold investors for simplicity. Their key characteristic is that they value returns in *dollars* rather than in local currency, and hence dislike exchange rate risk. For tractability, we assume that there is a continuum of international investors, indexed by k. Each investor can buy one unit of a local-currency bond that pays off at $t = 3$, and have reservation utility $\bar{U}_k$ distributed uniformly on $[0, 1]$.

[14] Note that, since we focus on the role of the exchange rate from the point of view of the foreigners, we define e_t as the price of the international good in foreign currency. As such, an increase in e_t is an appreciation of the local currency. Given the negative sign on $(\psi + \epsilon_t)$, a positive ϵ depreciates the currency, consistent with UIP arbitrageurs finding it more risky to hold it.

International investors have mean-variance utility, and thus obtain utility by investing in the local-currency bond:

$$U_k = \mathbb{E}[e_3] - e_0 P_0 - \frac{\gamma}{2}\text{Var}[e_3] \tag{4}$$

where P_0 and e_0 are respectively the exogenous price of the long-term bond and exchange rate when international investors enter, and γ is the risk aversion coefficient.[15] International investor k enters as long as $U_k \geq \bar{U}_k$, such that the mass of entrants is given by:

$$D^* = \mathbb{E}[e_3] - e_0 P_0 - \frac{\gamma}{2}\text{Var}[e_3] \tag{5}$$

This stylized entry condition captures the idea that international investors are less willing to enter the local-currency bond market when exchange rate risk is high, while preserving a linear relation between the amount of capital they are willing to invest and the volatility of the exchange rate:

$$dD^* = -\frac{\gamma}{2}\, d\text{Var}[e_3]. \tag{6}$$

Local Arbitrageurs: The rest of the bond supply has to be absorbed by local arbitrageurs, with heterogeneous risk tolerance and potentially binding risk limits. Specifically, there is a continuum of local arbitrageurs indexed by j, having CRRA utility with risk aversion τ_j distributed along a uniform distribution, $\tau \sim \mathcal{U}[0, \theta]$. Each expert starts with wealth $\exp(n)$ and after trading obtains stochastic wealth

[15] We present first the case where international investors enter under some exogenous prices. Otherwise, the interest rate response of the central bank to shocks impacts the long-term rate and the exchange rate, which changes the demand of international investors, complicating the analysis. We relax this assumption in Appendix C.1, and show that this other force unambigously reinforces our results. For this reason we focus on this stripped-down version first to convey our insights more transparently.

$\exp(n_2)$. They are subject to a risk limit:

$$var(n_2) \leq (\overline{\sigma}^n)^2. \tag{7}$$

We let $p_1 = logP_1$ denote the log price of the long-term bond at date 1 . Observe that we approximately have $p_1 \simeq -2r$. The log-return of the bond over the next period is then approximately given by:

$$\log \frac{(1+i_2)^{-1}}{P_1} \approx -i_2 - p_1 \sim \mathcal{N}\left(2r - \bar{i},\ \sigma_i^2\right). \tag{8}$$

Since the asset return follows a log-normal distribution, and investors are CRRA, the optimal portfolio of an *unconstrained* arbitrageur with risk tolerance τ_j is given by (Campbell 2017):

$$\omega_j = \tau_j \frac{2r - \bar{i} - i_1}{\sigma_i^2}. \tag{9}$$

For brevity, we denote by $\chi = \frac{2r-\bar{i}-i_1}{\sigma_i}$ the Sharpe ratio of the long-term bond. The variance of their portfolio is then $\omega_j^2 \sigma_i^2$. Thus, they are unconstrained as long as $\omega_j \sigma_i \leq \overline{\sigma}^n$. In general, the optimal portfolio is then characterized by the following expression:

$$\omega_j \sigma_i = \min\left(\overline{\sigma}^n,\ \tau_j \chi\right). \tag{10}$$

When arbitrageurs are unconstrained, their portfolio risk is equal to their risk tolerance times the Sharpe ratio. When this is larger than the limit, then the arbitrageurs are constrained and their portfolio risk is equal to the risk limit.

The marginal investor is the one at the risk limit. We denote its risk tolerance by $\bar{\tau}$, characterized by:

$$\bar{\tau} = \frac{\overline{\sigma}^n}{\chi}. \tag{11}$$

Arbitrageur j is then constrained if $\tau_j > \bar{\tau}$, and unconstrained otherwise. Since the

marginal investor is indifferent to hold more of the asset, the asset price is equal to her valuation:

$$p_1 = -2r = -\bar{i} - i_1 - \frac{\sigma_i \overline{\sigma}^n}{\bar{\tau}}. \tag{12}$$

3.2 Equilibrium

When there is an interior solution for $\bar{\tau}$, market clearing in the long-term bond market requires:

$$\exp(n)\left(\int_0^{\overline{\tau}} \tau \, dF(\tau) \, \frac{\chi}{\sigma_i} + (1 - F(\overline{\tau})) \, \frac{\overline{\sigma}^n}{\sigma}\right) = \exp(b - d^* + p_1), \tag{13}$$

where $d^* = -\log\left(1 - \frac{D^*}{B}\right)$ is the amount of long-term bonds bought by international investors and $p_1 = -2r$. The left side denotes the total dollar amount invested by the arbitrageurs in the asset and the right side denotes the dollar residual asset supply that needs to be absorbed.

Recall that we assume τ_j has a uniform distribution, $\tau \sim \mathcal{U}[0, \theta]$. This simplifies the market clearing condition: after substituting $\chi = \bar{\sigma}^n / \bar{\tau}$, the left-hand side becomes:

$$\left(\int_0^{\overline{\tau}} \tau \, dF(\tau) \, \frac{\chi}{\sigma_i} + (1 - F(\overline{\tau})) \, \frac{\overline{\sigma}^n}{\sigma_i}\right) = \frac{\overline{\sigma}^n}{\sigma_i}\left(1 - \frac{\bar{\tau}}{2\theta}\right). \tag{14}$$

The equilibrium pair $(r, \bar{\tau})$ is thus characterized by the solution to:

$$p_1 = -2r = \underbrace{n + d^* - b + \log\left(\frac{\overline{\sigma}^n}{\sigma_i}\right) + \log\left(1 - \frac{\bar{\tau}}{2\theta}\right)}_{\text{market clearing}} = \underbrace{-\bar{i} - i_1 - \frac{1}{\bar{\tau}} \overline{\sigma}^n \sigma_i}_{\text{asset pricing}}. \tag{15}$$

The left hand side of (15) is decreasing in $\overline{\tau}$. To see why, observe that arbitrageurs above the marginal one invest up to their risk limit and those below invest less than their risk limit. Therefore, when the marginal arbitrageur is more

risk tolerant, less arbitrageur wealth is invested in the bond, which implies a lower market clearing price. On the other hand, the right side of (15) is increasing in $\overline{\tau}$. When the marginal arbitrageur is more risk tolerant, the bond price is higher. The equilibrium corresponds to the intersection of these two relations.

Importantly, equation (15) shows a direct link between the amount of relative international investment d^* and the number of constrained intermediaries: a larger d^* reduces the amount needed to be absorbed, which results in less intermediaries being constrained (a higher $\bar{\tau}$).

Deep Financial Markets To understand the monetary transmission mechanism, it is useful to look first at the case where domestic financial markets are *deep*, i.e., $\overline{\sigma}^n$ is large relative to σ_i. In this case, the market clearing condition is simpler since we do not have to keep track in movements to the marginal arbitrageur. In particular, the equilibrium bond yield is the solution to

$$r \approx \underbrace{\frac{i_1 + \bar{i}}{2}}_{\text{Expectation Hypothesis}} + \underbrace{\frac{\sigma_i^2}{\theta/2} \exp(b - n - d^*)}_{\text{Term Premium}} \tag{16}$$

This is a common decomposition of the long-term bond yield: the difference between the equilibrium yield and the expected future path of short-term interest rates is given by a term premium, which compensates investors for bearing interest rate risk.[16] This term premium is increasing in the bond supply, the variance of future interest rates, and decreasing in the risk tolerance of the arbitrageurs. In such an environment, attracting foreign investors will result in a *level* effect: reducing the amount of risk that domestic arbitrageurs have to bear lowers the term premium.

[16] In Appendix C, we recast our theory in the influential Vayanos and Vila (2021) framework, and get similar results but with less transparent expressions.

The key feature to notice here is that there is *separability*: the monetary transmission mechanism works entirely through the expectation hypothesis, and the term premium is a separate component. This means that the sensitivity of the long-term yield to the policy rate (the strength of the transmission mechanism) is constant and sizeable:

$$\frac{dr}{di_1} = \frac{1}{2} \tag{17}$$

As such, the central bank can implement a long-term r close to its target $r^* + \rho$ with relatively small policy rate adjustments. This separability feature however disappears once we look at more frictional financial markets, which is the focus of our model.

Shallow Financial Markets More relevant for EMEs, our theory focuses on the case where there is limited domestic arbitrage capital, such that the monetary policy transmission mechanism is weakened. In this case, movements in the policy rate i_1 change $\bar{\tau}$. To see this, we differentiate (15) with respect to i_1 to obtain

$$-\frac{d\bar{\tau}/di_1}{2\theta - \bar{\tau}} = -1 + \frac{d\bar{\tau}/di_1}{\bar{\tau}^2}\overline{\sigma}^n\sigma_i \implies \frac{d\bar{\tau}}{di_1} = \frac{1}{\frac{1}{2\theta-\bar{\tau}} + \frac{\overline{\sigma}^n\sigma_i}{\bar{\tau}^2}} > 0. \tag{18}$$

Importantly, this equation shows that the scarcity of domestic capital *dampens* the sensitivity of the long-term yield to the policy rate, as formalized in the following proposition.

Proposition 1. *The elasticity of the long-term yield with respect to a change in the policy rate is increasing in $\bar{\tau}$, and given by:*

$$\frac{dr}{di_1} = \frac{1}{2} \cdot \frac{1}{1 + \frac{2\theta-\bar{\tau}}{\bar{\tau}^2}\overline{\sigma}^n\sigma_i} \tag{19}$$

Notice that when $\bar{\tau} = \theta$ and that θ grows large, one recovers the deep market case, where all transmission is done through the expectation hypothesis. When $\bar{\tau}$ is relatively low, the sensitivity of the long-term yield to the policy rate is potentially very weak, and monetary policy is impaired. At the extreme is the case where $\bar{\tau} \to 0$: all arbitrageurs are against their risk constraint, and as such cannot adjust their position. This results in a fully inelastic response of the long-term yield to the policy rate, and monetary policy is inoperative in stimulating financial conditions.

Intuitively, when the central bank tries to stimulate the economy by lowering the policy rate i_1, this naturally raises the price of long-term bonds. In a frictional financial market, however, this valuation effect means that investors must invest a greater share of their wealth in the risky bond to hold the same position, which triggers a risk limit for a margin of previously unconstrained arbitrageurs. The marginal investor thus shifts to a lower risk tolerance $\bar{\tau}$, which goes against the stimulating effect of monetary policy, dampening its effect.

Unambiguously, however, the strength of the monetary transmission mechanism increases with d^*: by absorbing some of the supply of long-term bonds, domestic arbitrageurs have to hold less duration risk, which relaxes the risk limit constraint on some of them. This allows them to arbitrage the yield curve more aggressively, and hence transmitting the policy rate to the long-term yield more effectively.

The key insight of our model is that the amount of foreign capital d^* is not fixed, but rather endogenous: by stabilizing the exchange rate, the central bank indirectly increases d^* and thus gains monetary autonomy. This relation is encapsulated in the following derivative:

$$\frac{d\bar{\tau}}{dd^*} = \frac{1}{\frac{1}{2\theta - \bar{\tau}} + \frac{\overline{\sigma}^n \sigma_i}{\bar{\tau}^2}} > 0 \tag{20}$$

Remark 1 (Broader Financial Conditions). While we focus on the transmission of mon-

etary policy to longer-term yields, the same mechanism applies to other financial assets. Any risky asset in positive net supply, such as equities, will be priced according to the same logic. To see this, consider a risk asset with a payoff distributed along a normal distribution with mean μ and variance σ^2. An almost exactly similar expression applies:

$$p_1 = \underbrace{n + d^* - b + \log\left(\frac{\overline{\sigma}^n}{\sigma}\right) + \log\left(1 - \frac{\bar{\tau}}{2\theta}\right)}_{\text{market clearing}} = \underbrace{-\mu - i_1 - \frac{1}{\bar{\tau}}\overline{\sigma}^n\sigma}_{\text{asset pricing}} \tag{21}$$

which leads to an elasticity of the risk asset price with respect to the policy rate of:

$$\frac{dp}{di_1} = -\frac{1}{1 + \frac{2\theta - \bar{\tau}}{\bar{\tau}^2}\overline{\sigma}^n\sigma_i} \tag{22}$$

This is also consistent with our empirical findings in Section 2.3 presented in Figure 2: countries with intermediate levels of exchange rate volatility have a stronger pass-through of monetary policy rate changes to equity prices.

Remark 2 (Fundamentals Elasticity). Notice that the same expression applies when it comes to the elasticity of asset prices to changes in fundamentals μ. In the case of a generic risky asset as we just presented, this elasticity is:

$$\frac{dp}{d\mu} = \frac{1}{1 + \frac{2\theta - \bar{\tau}}{\bar{\tau}^2}\overline{\sigma}^n\sigma_i} \tag{23}$$

Our theory thus implies that risky asset price movements in emerging economies with shallow financial markets will be less driven by fundamental changes, and more by shocks to the risk-bearing capacity of local arbitrageurs, swings in capital flows, or noise. Our model thus also provides a unified framework to study the links between financial fragility (Allen and Gale 2004) and monetary transmission.

Discussion of Assumptions The model contains several assumptions to keep the results tractable. It is for instance straightforward to extend the model to allow for correlated internal and external shocks (see Appendix C.4). We also assumed that local arbitrageurs were only trading local-currency assets. In appendix C.5, we instead assume that local arbitrageurs also need to hold some FX risk, for instance because the emerging economy has some dollar liquidity needs. Interestingly, the same mechanism applies without relying on international investors endogenous entry: by stabilizing the exchange rate, the central bank reduces the FX risk borne by local arbitrageurs, which unconstrains them and improves monetary transmission. As the expressions are more involved in this version of the model, we keep the exposition focused on the simpler case that we laid out above, but we view this channel working directly through the balance sheet of local arbitrageurs as complementary and equally likely to be empirically relevant. Our broad message is that the strength of monetary transmission is endogenous and can be managed through the distribution of risk holdings.

An important implicit assumption we made is that our international investors were not fully diversified globally, since they are reluctant to hold idiosyncratic country risk. We view this as an important stylized fact about investors in emerging markets: Kalemli-Özcan and Varela (2024) show that local risk factors (distinct from country-specific loadings on global factors) are crucial to explain UIP deviations in emerging markets. Converse and Mallucci (2023) also document that how bond mutual funds reallocate in response to risk is inconsistent with the assumption of deep pocketed investors.[17]

[17] Relatedly, there is also an empirical literature documenting that such investments are typically not fully hedged with respect to currency risk. Sialm and Zhu (2024) show that while most funds use currency forwards, they hedge only a small portion of the currency risk. Chen and Zhou (2025) use a dataset of U.S. mutual funds' EMEs currency forwards positions to show that the average fund amplifies its exposure to currency risk rather than hedging it.

Finally, our model relied on the idea that local arbitrageurs are constrained because there is too much duration risk to hold relative to their risk-bearing capacity. Our empirical results, however, showed that the pass-through of monetary policy to 3-month yields was quite weak, even though bonds that mature in only 3 months might hold little duration risk. But it is important to remark that our model delivers the same insights as long as the assets are risky (relatively high σ_i), whatever the source of this risk is. In EMES, this high σ_i could for instance be for a combination of duration, sovereign and liquidity risk.

4 Optimal Policy

Given the structure we laid out in the previous section, we are now interested in understanding the trade-offs the central bank faces when choosing the policy rule:

$$i_t = \bar{i} + \kappa_r \rho_t + \kappa_e \epsilon_t \tag{24}$$

This policy rule directly determines the risks faced by the two classes of agents.[18] Local arbitrageurs have to bear interest rate risk at $t = 2$, which is given by:

$$\sigma_i^2 = \kappa_r^2 \sigma_\rho^2 + \kappa_e^2 \sigma_\epsilon^2 \tag{25}$$

By responding to external shocks ϵ with a positive κ_e, and thus stabilizing the exchange rate, the central bank creates further volatility in the interest rate, which is costly for local arbitrageurs.

On the other hand, international investors face exchange rate risk at $t = 3$,

[18] For simplicity, we assume that the central bank is constrained to use the same rule at all periods, even though agents are exposed to risks at different periods. Hence, changing the rule across periods could in principle be desirable. This constraint is a stand-in for the policy trade-offs in a more general model (e.g., an OLG structure) where all periods would be similar to one another.

which is given by:

$$\sigma_e^2 = \kappa_r^2 \sigma_\rho^2 + (1 - \kappa_e)^2 \sigma_\epsilon^2 \tag{26}$$

Increasing κ_e to bring it closer to 1 thus decreases the amount of risk international investors have to bear when they invest in the local-currency bond market.

Central bank's objective: To analyze optimal policy in this environment, we assume that the central bank minimizes a loss function of the form:

$$\mathcal{L}_1 = \mathbb{E}\left[(r - r^* - \rho_1)^2\right] + \chi \text{Var}[i_1] \tag{27}$$

The first part of this loss function captures the mandate of the central bank to stabilize the output gap: when shocks ρ_t hit the natural rate of interest r^*, the central bank would like to bring the long-term yield r_t back to its target $r^* + \rho_t$.[19] The second term of the loss function penalizes movements in the policy rate (Stein and Sunderam 2018). Without this term, as long as $\frac{dr}{di} \neq 0$, the central bank could perfectly stabilize the output gap by moving the policy rate by enough. This term gives an incentive to the central bank to strengthen the monetary transmission mechanism, since it allows the central bank to stabilize the output gap without large swings in the policy rate. Our analysis is robust to excluding the policy rate volatility term as long as we assume that the central bank is not able to perfectly target the output gap (see the remark at the end of this section).

Starting from a Mundellian policy with $\kappa_e = 0$, the central bank simply follows

[19] Micro-foundations are provided in Appendix C.3: there, we build a stylized new-Keynesian model where borrowers only have income in two periods, and can thus only borrow long-term by issuing two-period bonds. Their demand for consumption is thus directly linked to the long-term rate r_1. With nominal rigidities, output is demand-determined and thus the central bank ends up minimizing deviations from a long-term natural rate of interest, $r^* + \rho_1$.

a linear policy rule that responds to aggregate demand (ρ) shocks:

$$i_1 = \bar{i} + \kappa_r \rho_1 \tag{28}$$

This leads to the following loss:

$$\mathcal{L} = \sigma_\rho^2 \left[\left(1 - \kappa_r \frac{dr}{di} \right)^2 \right] + \chi \sigma_\rho^2 \kappa_r^2 \tag{29}$$

This expression intuitively shows that the output gap losses are driven by two forces: how far the central bank is from perfectly targeting the output gap, and how volatile are the aggregate demand shocks. When the product of κ_r (how responsive is the central bank to these shocks) and the transmission coefficient (how strongly this response gets incorporated into long-term rates) is far from 1, the central bank is far from being able to stablize the economy and incurs large welfare losses. We next show how, in this case, exchange rate stabilization will unambiguously improve welfare.

Exchange rate stabilization: The core insight of our theory is that stabilizing the exchange rate through a positive κ_e can be beneficial for the central bank.[20] This is because it brings more international investors, making it easier for local arbitrageurs to hold the remaining duration risk, and improving monetary transmission through the yield curve. By doing so, however, the central bank has to bear some associated costs: first, it creates inefficient movements in the output gap, since the policy rate moves to respond to risk-premium shocks that are uncorrelated with aggregate demand. And second, it increases the volatility of the policy

[20] We assumed away any link between exchange rates movements and inflation, to focus on our mechanism. Adler, Chang and Wang (2021) find no evidence in EMEs of FXI being used in response to inflation developments, while there is strong evidence that FXI responds to exchange rates.

rate, which we assumed was costly.[21] Despite this, our main result shows that it is always optimal for the central bank to have some degree of exchange rate stabilization.

Proposition 2. *Starting from a policy rule that only targets the output gap, it is always optimal to increase κ_e to a strictly positive value, while decreasing κ_r in order to keep the volatility of the policy rate σ_i^2 constant.*

Proposition 2 highlights that, despite the existence of this trade-off in general, the costs are non-existent when starting from a "traditional" interest rate rule that only responds to fluctuations in the output gap. This is because the costs associated with inducing marginally more interest rate volatility, and the costs associated with marginally deviating from output gap stabilization, are both second-order. By contrast, improving the strength of the monetary transmission mechanism is first-order, and thus always dominates. It is as a result always optimal to introduce *some* degree of exchange rate stabilization. This result is illustrated graphically in Figure 5.

Remark 3 (Policy Rate Volatility). In the loss function (27), we assumed that the central bank cared directly about the level of interest rate volatility. Our main result from Proposition 2 is still robust to disregarding this χ-term as long as the central bank (when constrained to be at $\kappa_e = 0$) finds it optimal to choose a κ_r such that the output gap is not always perfectly closed. Otherwise, if the central bank could respond so aggressively to changes in the natural rate of output (by implementing a $\kappa_r = \left(dr/di\right)^{-1}$), there would be no need to stabilize the exchange rate.

When the transmission mechanism is very weak, however, we view this possibility as unrealistic, for different reasons. First, some parts of the economy could

[21] There could be additional reasons, which we abstract from, for why letting the exchange rate fluctuate widely can be beneficial, see e.g. Allen and Gale (2000) and Hegarty, Moretti, Ottonello and Perez (2024).

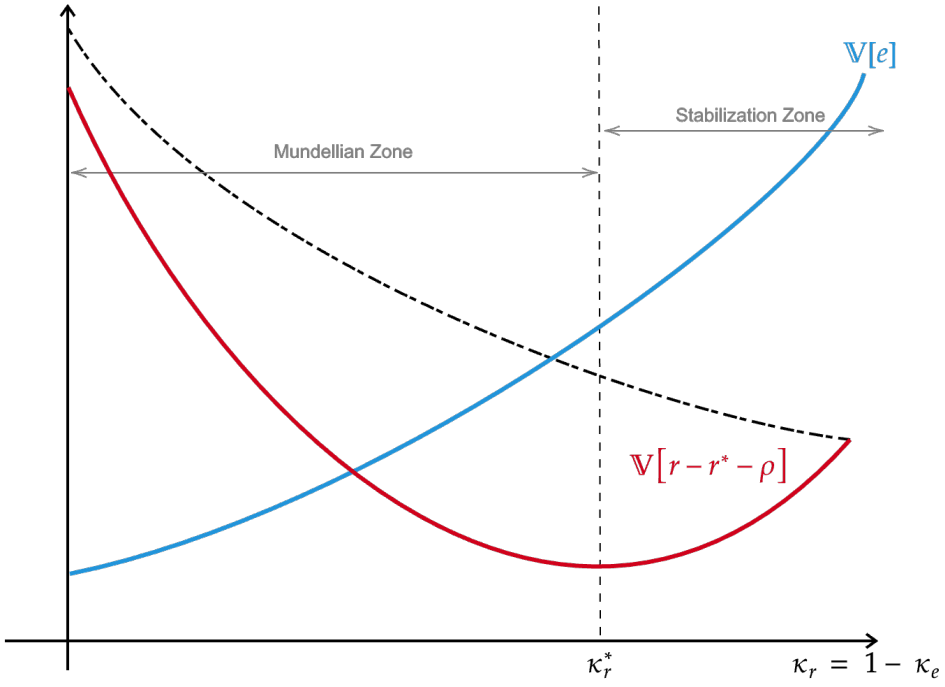


Figure 5: Graphical illustration of the trade-off faced by the central bank when choosing κ_e and κ_r. This presents the case where the weights κ_e and κ_r are constrained to sum to 1. The blue line corresponds to the level of exchange rate volatility, which increases with κ_r since κ_e decreases. The dotted black line plots the volatility of the output gap in the Mundellian case, where the strength of the monetary transmission mechanism is exogenous and constant: increasing κ_r thus decreases output gap volatility, causing also an increase in exchange rate volatility which is costless. The red line depicts the output gap volatility in our theory: starting from the case where the exchange rate is fully flexible ($\kappa_e = 0$), decreasing exchange rate volatility also yields a higher dr/di, which allows the central bank to better stabilize the output gap.

be directly responsive to the policy rate, creating inefficient fluctuations when responding too aggressively. Second, high short-term rate volatility could be costly for financial stability reasons (Stein and Sunderam 2018). Relatedly, it would also increase exchange rate volatility which could be a problem for inflation targeting. Finally, in our theory the coefficient of transmission is endogenous, and it unambiguously decreases with κ_r, since it increases duration risk σ_i. Creating more duration risk will constrain local arbitrageurs even more, lowering $\bar{\tau}$, and addition-

ally lowering the transmission coefficient $\frac{dr}{di}$ (see the next Section 5 for the formal analysis of this point).

5 U-Shape Monetary Transmission

Given this result, it might be tempting to conclude that central banks could maximize the strength of the monetary transmission mechanism, by fully pegging the exchange rate. By fully eliminating currency risk (assuming the peg is credible), the amount of foreign investment in local bonds D^* would sharply increase, leading to a greater sensitivity of the long-term yield to the policy rate. The empirical exercise presented in Section 2, however, suggests that this is not the case: countries with pegs or very narrow bands do not seem to enjoy a greater level of monetary transmission than countries with a managed float.[22]

Perhaps surprisingly, our theory also rationalizes this empirical finding. The reason is that, while stabilizing the exchange rate does increase the amount of foreign capital D^*, it also increases the amount of duration risk local arbitrageurs have to bear. This is visible again by looking at our expression for the strength of the monetary transmission mechanism:

$$\frac{dr}{di_1} = \frac{1}{2} \cdot \frac{1}{1 + \frac{2\theta - \bar{\tau}}{\bar{\tau}^2} \overline{\sigma}^n \sigma_i} \tag{30}$$

While we previously showed that increasing d^* increases dr/di by relaxing the risk constraints on some local arbitrageurs, it is also clear that increasing σ_i^2 decreases the strength of the monetary transmission mechanism. When maximizing

[22] Note that this is a different question than whether it is optimal to do so. Given the loss function (27), it could well be the case that, by having a strong monetary transmission, the country could perfectly close the output gap, but the required volatility in i_t would still be too high for this to be the optimal policy. Our question is narrower here: irrespective of the optimality of the policy, is it the case that dr/di is always increasing with more exchange rate stabilization?

the strength of the monetary transmission mechanism, the central bank thus trades off two different sources of risk to get deeper markets: σ_i^2 vs. σ_e^2. Both quantities of risks are going in opposite directions when the central bank increases the weight on exchange rate stabilization κ_e:

$$\frac{d\sigma_e^2}{d\kappa_e} = -2(1-\kappa_e)\sigma_\epsilon^2 \tag{31}$$

$$\frac{d\sigma_i^2}{d\kappa_e} = 2\kappa_e\sigma_\epsilon^2 \tag{32}$$

The overall change in monetary transmission can be expressed as:

$$d\left\{\frac{dr}{di_1}\right\} \propto \underbrace{\frac{\gamma\sigma_i(1-\kappa_e)}{D^*}}_{\text{Attraction}} - \underbrace{\frac{\kappa_e\theta}{2\theta-\bar{\tau}}}_{\text{Interest rate vol}} \tag{33}$$

Proposition 3. *Consistent with the empirical evidence of Section 2, fully pegging the exchange rate ($\kappa_e = 1$) decreases the strength of the monetary transmission mechanism, dr/di.*

This proposition follows directly from setting $\kappa_e = 1$ in equation (33). The first term, which captures the marginal attraction of foreign capital, becomes zero, while the second term, which captures the amount of duration risk local arbitrageurs have to bear, is strictly negative. This result is illustrated graphically in Figure 6.[23]

[23] Klein and Shambaugh (2015) study middle-ground policies, with only partial capital controls and limited exchange rate flexibility. They show that partial capital controls do not yield better monetary control than with, but that a moderate amount of exchange rate flexibility yields some degree of monetary autonomy, especially in EMEs.

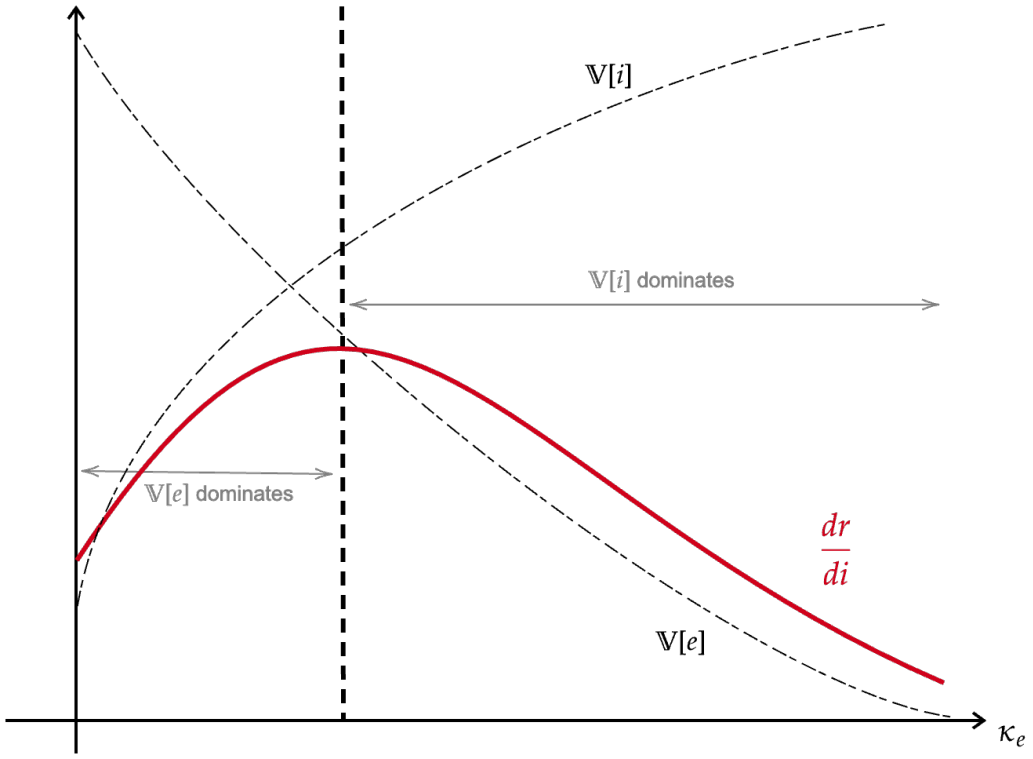


Figure 6: Strength of the monetary transmission mechanism, dr/di, as a function of exchange rate stabilization κ_e. The black dotted lines correspond to the values of σ_i^2 and σ_e^2 when κ_e varies. The red line corresponds to the value of dr/di when κ_e varies.

6 Conclusion

This paper proposes a novel mechanism through which exchange rate stabilization can enhance monetary policy effectiveness in emerging market economies, challenging the conventional Mundellian paradigm. Our theory is motivated by a striking empirical pattern across 16 major emerging markets: monetary transmission exhibits an inverted U-shape relationship with exchange rate volatility, with moderate stabilization yielding stronger transmission than either full flexibility or rigid pegging.

Our model explains this through market segmentation in shallow financial systems. Exchange rate stability attracts foreign investment in local-currency bonds, reducing the duration risk that domestic arbitrageurs must absorb. This strengthens the transmission of policy rate changes to long-term interest rates by enabling more aggressive yield curve arbitrage.

The model generates simple and concrete implications. Starting from a purely output-gap focused rule, it is always optimal for central banks to introduce some degree of exchange rate stabilization. However, excessive stabilization becomes counterproductive by increasing interest rate volatility, beyond the point where foreign capital benefits are offset by duration risk costs.

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A Proofs and Derivations

A.1 UIP Deviation

We assume that the carry trade is segmented as in Jeanne and Rose (2002), Gabaix and Maggiori (2015) and Itskhoki and Mukhin (2025): only some international investors with finite risk-bearing capacity have access to the short rate in dollars and in local currency. Such investors can borrow and lend in both currencies, and must then hold the resulting currency risk.

International investors have mean-variance utility and take zero-capital position. The excess return of borrowing in dollars to invest in the local currency is:

$$(1+i_t) - (1+i^*)\frac{e_t}{e_{t+1}} \tag{A.34}$$

Their portfolio problem is thus:

$$max\omega \quad \omega\left((1+i_t) - (1+i_t^*)\mathbb{E}\left[\frac{e_t}{e_{t+1}}\right]\right) - \frac{\gamma^*}{2}\omega^2\sigma_e^2 \tag{A.35}$$

which yields:

$$\frac{(1+i_t)}{(1+i_t^*)} - \mathbb{E}\left[\frac{e_t}{e_{t+1}}\right] = \gamma^*\omega(1+i_t^*)\sigma_e^2 \tag{A.36}$$

and to the first-order:

$$i_t - i_t^* + e_t - \mathbb{E}\left[e_{t+1}\right] = \gamma^*\omega(1+i_t^*)\sigma_e^2 \tag{A.37}$$

The UIP deviation is thus endogenized, and depends on (i) the risk aversion γ^* of carry traders, (ii) the amount of short term flow they need to absorb ω,and (iii) the exchange rate risk σ_e^2.[24] Any shock to these variables will translate into a

[24]The classic study of Froot and Ramadorai (2005) shows that currency flows are related to short-term

risk premium shock to the UIP condition, ψ. Interestingly, shocks to γ^* or ω will translate into smaller risk-premium shocks ϵ when σ_e^2 is small. UIP deviations will thus be reduced when the central bank stabilizes the exchange rate, as in Itskhoki and Mukhin (2023).

A.2 Derivation of equation (16)

Using $e^{p_1} \approx 1 - 2r$, the unconstrained equilibrium is:

$$1 - 2r = e^{n+d^*-b}\frac{\theta}{2\sigma_i^2}(2r - i_1 - \bar{i}) \tag{A.38}$$

$$\implies 2r\left(1 + e^{n+d^*-b}\frac{\theta}{2\sigma_i^2}\right) = 1 + e^{n+d^*-b}\frac{\theta}{2\sigma_i^2}(i_1 + \bar{i}) \tag{A.39}$$

$$2r = \frac{e^{n+d^*-b}\frac{\theta}{2\sigma_i^2}}{1 + e^{n+d^*-b}\frac{\theta}{2\sigma_i^2}}(i_1 + \bar{i}) + \frac{1}{1 + e^{n+d^*-b}\frac{\theta}{2\sigma_i^2}} \tag{A.40}$$

Notice that since θ is large relative to σ_i^2, to the first-order this becomes:

$$2r = \left(1 - e^{b-n-d^*}\frac{2\sigma_i^2}{\theta}\right)(i_1 + \bar{i}) + e^{b-n-d^*}\frac{2\sigma_i^2}{\theta} \tag{A.41}$$

But since $\frac{2\sigma_i^2}{\theta}$ is small, $\frac{2\sigma_i^2}{\theta}(i_1 + \bar{i})$ is only second order, so this yields:

$$2r = (i_1 + \bar{i}) + e^{b-n-d^*}\frac{2\sigma_i^2}{\theta} \tag{A.42}$$

currency returns. Della Corte, Riddiough and Sarno (2016a) show that after a financial disruption (i.e., a positive shock to γ^*), net-debtor countries experience a currency depreciation. They also test directly further exchange-rate implications from the model of Gabaix and Maggiori (2015). See also Della Corte, Ramadorai and Sarno (2016b) on volatility risk premia forecasting currency returns.

A.3 Proof of Proposition 1

Start from the equilibrium system:

$$p_1 = \underbrace{n + d^* - b + \log\left(\frac{\overline{\sigma}^n}{\sigma_i}\right) + \log\left(1 - \frac{\bar{\tau}}{2\theta}\right)}_{\text{market clearing}} = \underbrace{-\bar{i} - i_1 - \frac{1}{\bar{\tau}}\overline{\sigma}^n\sigma_i}_{\text{asset pricing}}. \tag{A.43}$$

Differentiate each equation to get:

$$-2dr = -\frac{d\bar{\tau}}{2\theta - \bar{\tau}} \tag{A.44}$$

$$-2dr = -di_1 + \frac{d\bar{\tau}}{\bar{\tau}^2}\overline{\sigma}^n\sigma_i \tag{A.45}$$

Using the first condition, replace the change in the marginal arbitrageurs in the second one:

$$2dr = di_1 - \frac{2\theta - \bar{\tau}}{\bar{\tau}^2}\overline{\sigma}^n\sigma_i 2dr \tag{A.46}$$

which yields:

$$2dr\left(1 + \frac{2\theta - \bar{\tau}}{\bar{\tau}^2}\overline{\sigma}^n\sigma_i\right) = di_1 \tag{A.47}$$

leading to the expression in Proposition 1. ∎

It will be also useful for some extensions (e.g. Appendix C.1) to work with a linearized market clearing condition. If arbitrageurs are very constrained, in the sense that $\bar{\tau} \ll \theta$, then we can write:

$$p_1 \backsimeq n + d^* - b - \frac{\bar{\tau}}{2\theta} \tag{A.48}$$

This leads to a simpler differentiation:

$$-2dr = -\frac{d\bar{\tau}}{2\theta} \tag{A.49}$$

$$-2dr = -di_1 + \frac{d\bar{\tau}}{\bar{\tau}^2}\overline{\sigma}^n\sigma_i \tag{A.50}$$

And hence to the following simplified transmission coefficient:

$$\frac{dr}{di} = \frac{1}{2}\frac{1}{1+\frac{2\theta}{\bar{\tau}^2}\overline{\sigma}^n\sigma_i} \tag{A.51}$$

A.4 Loss Function

Start by isolating the equilibrium price p_1, eliminating $\bar{\tau}$ from the conditions:

$$\frac{\overline{\sigma}^n}{\sigma_i}\left(1-\frac{\frac{\overline{\sigma}^n\sigma_i}{2\theta}}{i_1+\bar{i}+p_1}\right) = e^{p_1+b-n-d^*} \tag{A.52}$$

$$\implies i_1+\bar{i}+p_1 = \frac{\frac{\overline{\sigma}^n\sigma_i}{2\theta}}{1-\frac{\overline{\sigma}^n}{\sigma_i}e^{p_1+b-n-d^*}} \tag{A.53}$$

$$\implies i_1+\bar{i}-2r = \frac{\frac{\overline{\sigma}^n\sigma_i}{2\theta}}{1-\frac{\overline{\sigma}^n}{\sigma_i}(1-2r)e^{b-n-d^*}} \tag{A.54}$$

$$\implies i_1+\bar{i}-2r = \frac{\frac{\overline{\sigma}^n\sigma_i}{2\theta}}{1-\frac{\overline{\sigma}^n}{\sigma_i}e^{b-n-d^*}}\frac{1}{1+2r\frac{\frac{\overline{\sigma}^n}{\sigma_i}e^{b-n-d^*}}{1-\frac{\overline{\sigma}^n}{\sigma_i}e^{b-n-d^*}}} \tag{A.55}$$

$$\implies i_1+\bar{i}-2r = \frac{\frac{\overline{\sigma}^n\sigma_i}{2\theta}}{1-\frac{\overline{\sigma}^n}{\sigma_i}e^{b-n-d^*}}\left(1-2r\frac{\frac{\overline{\sigma}^n}{\sigma_i}e^{b-n-d^*}}{1-\frac{\overline{\sigma}^n}{\sigma_i}e^{b-n-d^*}}\right) \tag{A.56}$$

$$\implies i_1+\bar{i}-\frac{\frac{\overline{\sigma}^n\sigma_i}{2\theta}}{1-\frac{\overline{\sigma}^n}{\sigma_i}e^{b-n-d^*}} = 2r\left(1-\frac{\frac{(\overline{\sigma}^n)^2}{2\theta}e^{b-n-d^*}}{\left(1-\frac{\overline{\sigma}^n}{\sigma_i}e^{b-n-d^*}\right)^2}\right) \tag{A.57}$$

which makes clear that there is a transmission through the expectation hypothesis (the first term equal to 1 in the paranthesis) and a dampening term coming from

risk limits, that decreases with d^*. We rewrite this expression simply as:

$$r = \bar{r} + i_1 \frac{dr}{di_1}. \tag{A.58}$$

Optimally, the central bank choses $\bar{i}$ such that the output gap is closed on average, yielding the following expression for the output gap:

$$r_t - r^* - \rho_t = (\kappa_r \rho_t + \kappa_e \epsilon_t) \frac{dr}{di_1} - \rho_t \tag{A.59}$$

which can be rewritten:

$$r_t - r^* - \rho_t = \left(\frac{dr}{di} \kappa_r - 1 \right) \rho_t + \frac{dr}{di} \kappa_e \epsilon_t \tag{A.60}$$

Given that the two shocks are uncorrelated, the loss function for a given policy rule $\{\kappa_r, \kappa_e\}$ is thus given by:

$$\mathcal{L}_t = \sigma_\rho^2 \left[\left(1 - \kappa_r \frac{dr}{di} \right)^2 + \chi \kappa_r^2 \right] + \left(\left(\frac{dr}{di} \right)^2 + \chi \right) \kappa_e^2 \sigma_\epsilon^2 \tag{A.61}$$

A.5 Proof of Proposition 2

Assume that the central bank increases its response to exchange rate fluctuations while keeping its unconditional interest rate volatility constant:

$$\kappa_e d\kappa_e \sigma_\epsilon^2 = -\kappa_r d\kappa_r \sigma_\rho^2 \tag{A.62}$$

This implies that exchange rate volatility is now changing as:

$$d\text{Var}[e_t] = -2 d\kappa_e \sigma_\epsilon^2 \tag{A.63}$$

Notice first that since:

$$\frac{d}{d\bar{\tau}}\frac{dr}{di_1} = \left(\frac{dr}{di_1}\right)^2 \frac{2\theta - \bar{\tau}}{\bar{\tau}^3}\overline{\sigma}^n\sigma_i \tag{A.64}$$

while

$$\frac{d\bar{\tau}}{dd^*} = \frac{1}{\frac{1}{2\theta-\bar{\tau}} + \frac{\overline{\sigma}^n\sigma_i}{\bar{\tau}^2}} = \frac{2\theta - \bar{\tau}}{1 + \frac{2\theta-\bar{\tau}}{\bar{\tau}^2}\overline{\sigma}^n\sigma_i} = 2(2\theta - \bar{\tau})\frac{dr}{di_1} \tag{A.65}$$

implies the change in the strength of monetary transmission when d^* varies is simply:

$$\frac{d}{dd^*}\frac{dr}{di_1} = 2\left(\frac{dr}{di_1}\right)^3 \frac{(2\theta - \bar{\tau})^2}{\bar{\tau}^3}\overline{\sigma}^n\sigma_i > 0 \tag{A.66}$$

We also showed that D^* moves with exchange rate risk so:

$$dD^* = -\frac{\gamma}{2}d\text{Var}[e_3] = \gamma d\kappa_e\sigma_\epsilon^2 \tag{A.67}$$

Such that the strength of the transmission mechanism unambiguously increases by changing the policy rule this way:

$$d\left(\frac{dr}{di_1}\right) = 2\left(\frac{dr}{di_1}\right)^3 \frac{(2\theta - \bar{\tau})^2}{\bar{\tau}^3}\overline{\sigma}^n\sigma_i\frac{\gamma d\kappa_e\sigma_\epsilon^2}{D^*} \tag{A.68}$$

This translates into the following change in welfare given the loss function of the central bank:

$$\begin{aligned} d\mathcal{L}_t = 2\left(\left(\frac{dr}{di}\right)^2 + \chi\right)\kappa_e d\kappa_e\sigma_\epsilon^2 + 2\left(d\frac{dr}{di}\right)\left(\frac{dr}{di}\right)\kappa_e^2\sigma_\epsilon^2 \\ - 2\sigma_\rho^2\left[\left(1 - \kappa_r\frac{dr}{di}\right)\left(d\kappa_r\frac{dr}{di} + \kappa_r d\left(\frac{dr}{di_1}\right)\right)\right] \end{aligned} \tag{A.69}$$

And replace the last terms with the derivations we detailed above:

$$d\mathcal{L}_t = 2\left(\left(\frac{dr}{di}\right)^2 + \chi\right)\kappa_e d\kappa_e \sigma_\epsilon^2 + 2\left(d\frac{dr}{di}\right)\left(\frac{dr}{di}\right)\kappa_e^2\sigma_\epsilon^2 + 2\sigma_\rho^2\left[\left(1-\kappa_r\frac{dr}{di}\right)\left(\frac{\kappa_e\sigma_\epsilon^2}{\kappa_r\sigma_\rho^2}d\kappa_e\frac{dr}{di}\right)\right] - 2\sigma_\rho^2\left[\left(1-\kappa_r\frac{dr}{di}\right)\left(2\kappa_r\left(\frac{dr}{di_1}\right)^3\frac{(2\theta-\bar{\tau})^2}{\bar{\tau}^3}\overline{\sigma}^n\sigma_i\frac{\gamma d\kappa_e\sigma_\epsilon^2}{D^*}\right)\right] \quad \text{(A.70)}$$

To understand whether it is valuable to target the exchange rate to some degree, simply evaluate this derivative at the Mundellian point, $\kappa_e = 0$:

$$d\mathcal{L}_t = -2\sigma_\rho^2\left[\left(1-\kappa_r\frac{dr}{di}\right)\left(2\kappa_r\left(\frac{dr}{di_1}\right)^3\frac{(2\theta-\bar{\tau})^2}{\bar{\tau}^3}\overline{\sigma}^n\sigma_i\frac{\gamma d\kappa_e\sigma_\epsilon^2}{D^*}\right)\right] < 0 \quad \text{(A.71)}$$

A.6 Proof of Proposition 3

Start from the monetary transmission expression and use a total differentiation of its logarithm value (we will work in proportional values, getting rid of positive multipliers to keep expression slightly cleaner):

$$\frac{dr}{di_1} = \frac{1}{2}\cdot\frac{1}{1+\frac{2\theta-\bar{\tau}}{\bar{\tau}^2}\overline{\sigma}^n\sigma_i} \implies d\log\left(\frac{dr}{di_1}\right) \propto \sigma_i\frac{d\bar{\tau}}{\bar{\tau}} - d\sigma_i \quad \text{(A.72)}$$

which simply indicates that an increase in interest rate risk hurst the transmission mechanism since it makes local arbitrageurs more constrained. Now using (15) and differentiating again:

$$dd^* - \frac{d\sigma_i}{\sigma_i} - \frac{d\bar{\tau}}{2\theta-\bar{\tau}} = -\overline{\sigma}^n\frac{d\sigma_i}{\bar{\tau}} + \overline{\sigma}^n\sigma_i\frac{d\bar{\tau}}{\bar{\tau}^2} \quad \text{(A.73)}$$

Isolating the change in the marginal arbitrageur:

$$d\bar{\tau} = \frac{dd^* - \frac{d\sigma_i}{\sigma_i}\left(1 - \frac{\overline{\sigma}^n \sigma_i}{\bar{\tau}}\right)}{\frac{1}{2\theta - \bar{\tau}} + \frac{\overline{\sigma}^n \sigma_i}{\bar{\tau}^2}} \tag{A.74}$$

Plugging this expression in (A.6) yields:

$$d\log\left(\frac{dr}{di_1}\right) \propto -d\sigma_i + \frac{\sigma_i}{\bar{\tau}}\left(\frac{dd^* - \frac{d\sigma_i}{\sigma_i}\left(1 - \frac{\overline{\sigma}^n \sigma_i}{\bar{\tau}}\right)}{\frac{1}{2\theta - \bar{\tau}} + \frac{\overline{\sigma}^n \sigma_i}{\bar{\tau}^2}}\right) \tag{A.75}$$

$$\propto \frac{\sigma_i}{\bar{\tau}} dd^* - d\sigma_i \left(\frac{1}{2\theta - \bar{\tau}} + \frac{\overline{\sigma}^n \sigma_i}{\bar{\tau}^2} + \frac{1}{\bar{\tau}} - \frac{\overline{\sigma}^n \sigma_i}{\bar{\tau}^2}\right) \tag{A.76}$$

$$\propto \frac{\sigma_i}{\bar{\tau}} dd^* - d\sigma_i \left(\frac{1}{2\theta - \bar{\tau}} + \frac{1}{\bar{\tau}}\right) \tag{A.77}$$

Now use the fact that:

$$\frac{d\sigma_e^2}{d\kappa_e} = -2(1 - \kappa_e)\sigma_\epsilon^2 \tag{A.78}$$

$$\frac{d\sigma_i^2}{d\kappa_e} = 2\kappa_e \sigma_\epsilon^2 \tag{A.79}$$

to get:

$$dd^* = \frac{dD^*}{D^*} = -\frac{\gamma d\sigma_e^2}{2D^*} = \frac{\gamma(1 - \kappa_e)\sigma_\epsilon^2}{D^*} d\kappa_e \tag{A.80}$$

so that all together the expression for the change in monetary transmission becomes:

$$d\log\left(\frac{dr}{di_1}\right) \propto \frac{\sigma_i}{\bar{\tau}} \frac{\gamma(1 - \kappa_e)}{D^*} - 2\kappa_e \left(\frac{1}{2\theta - \bar{\tau}} + \frac{1}{\bar{\tau}}\right) \tag{A.81}$$

and finally factor out $1/\bar{\tau}$:

$$d\log\left(\frac{dr}{di_1}\right) \propto \frac{\gamma\sigma_i(1 - \kappa_e)}{D^*} - \frac{\kappa_e \theta}{2\theta - \bar{\tau}} \tag{A.82}$$

B Additional Empirical Evidence

B.1 Robustness of Empirical Findings

In this part, we simply show that our inverted U-shape finding is robust to alternative specifications. Figure 7 shows the main regression using FX volatility as a conditioning variable, but using a different time-horizon for the change in the market rate. Figure 8 shows the main regression using the FX regime as a conditioning variable, but using alternative averaging windows for the discrete classification. Finally, Figure 9 shows the main regression using the FX regime as a conditioning variable, but using stock market returns as the dependent variable and alternative averaging windows for the discrete classification. All results are qualitatively similar to the baseline findings in Section 2.

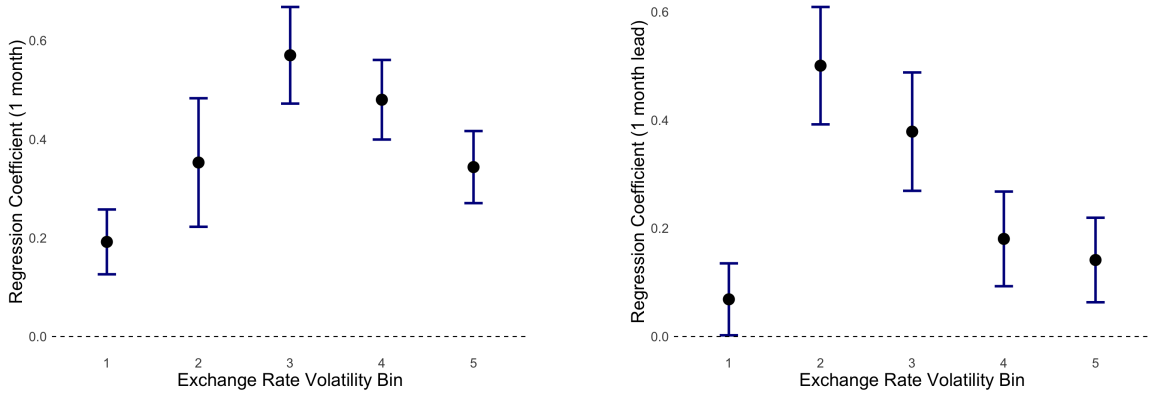


Figure 7: Estimated transmission of policy rate changes to 3-month market interest rates, conditional on exchange rate volatility. Left: contemporaneous 1-month change in market rates. Right: next 1-month change. The rest of the specification is identical to the baseline one in Section 2.

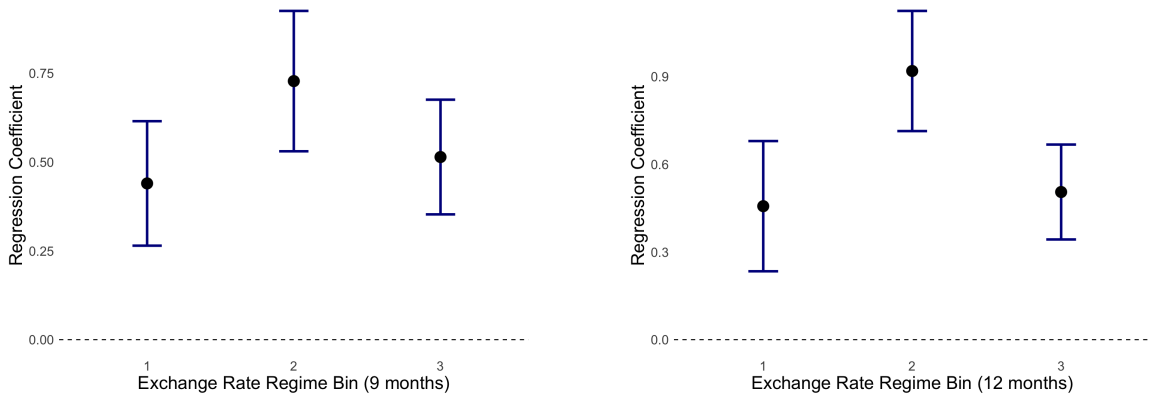


Figure 8: Estimated transmission of policy rate changes to 3-month market interest rates, conditional on exchange rate regimes. Left: 9-month average of the discrete classification. Right: 12-month average. The rest of the specification is identical to the baseline one in Section 2.

B.2 Macroeconomic outcomes volatility

With a more powerful monetary transmission mechanism, the central bank should face easier trade-offs when stabilizing the economy, which should result in lower volatility of standard macroeconomic indicators. To verify that this is indeed the case, we implement the same exchange rate volatility bin classification as in the previous regressions. We then compute the standard deviation of standard macroeconomic outcomes from Müller et al. (2025) within each bin. We exclude extreme levels of exchange rate volatility, which again would only reinforce our results. Figure 10 displays the result, broadly confirming this intuition.

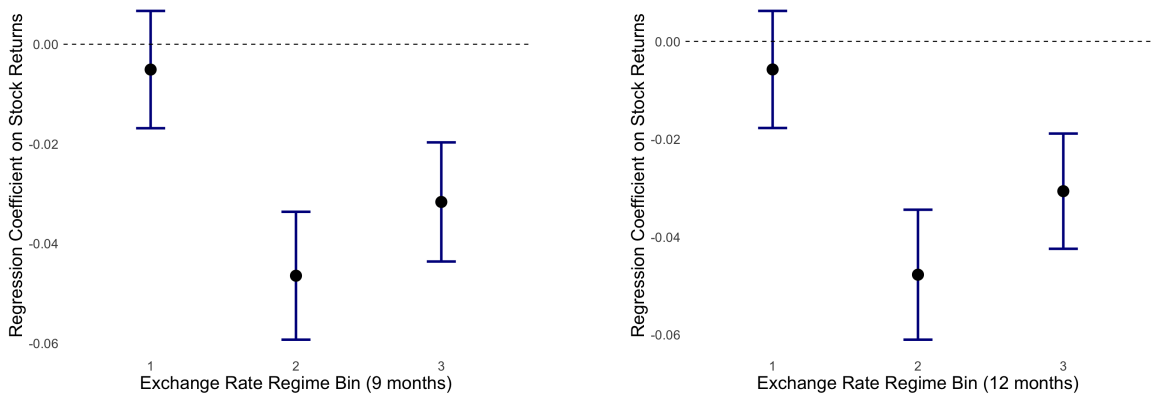


Figure 9: Estimated transmission of policy rate changes to stock market returns, conditional on exchange rate regimes. Left: 9-month average of the discrete classification. Right: 12-month average. The rest of the specification is identical to the baseline one in Section 2.

C Alternative Modeling Setups and Extensions

C.1 International Investors' Response from Monetary Policy

Recall that, since the international investors have a mean-variance objective function, their demand is given by:

$$D^* = \frac{\mathbb{E}_t[e_{t+2}] - e_t P_t}{\gamma \sigma_e^2} \tag{C.83}$$

with $\bar{e} = 1$ through the usual normalization of the price level. To the first-order:

$$D_t^* = \frac{2r_t + (1 - e_t)}{\gamma \sigma_e^2} \tag{C.84}$$

This encapsulates the tradeoffs the foreigners face when deciding how much to invest in the LT bond. When the CB increases their policy rate, this increases the long-term interest rate r, making it more interesting to invest. But at the same time, it appreciates the exchange rate, making it more expensive so invest for for-

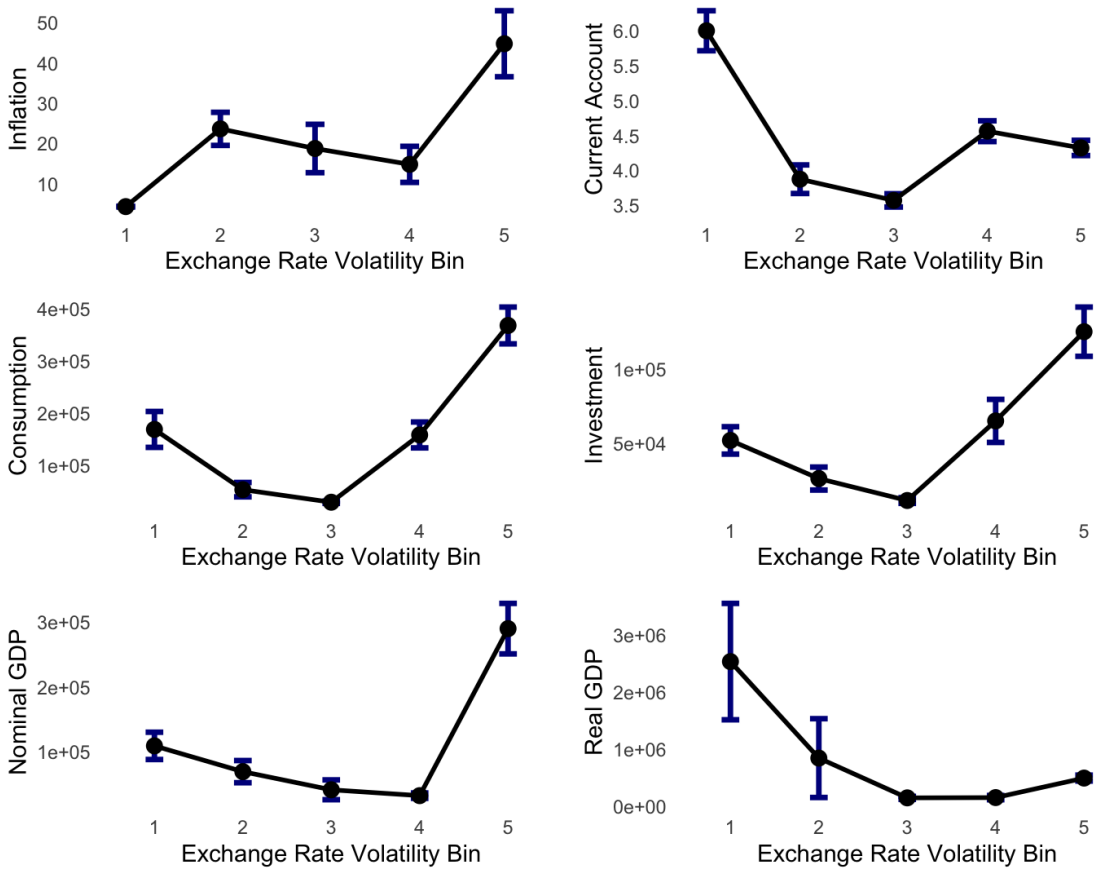


Figure 10: Standard deviation of macroeconomic outcomes, conditional on exchange rate volatility.

eigners that evaluate returns in foreign currencies. This can be seen from writing the change in foreigners' demand when the policy rate is varying:

$$dD_t^* = \frac{2dr_t - di_t}{\gamma\sigma_e^2} \tag{C.85}$$

Since we are studying situations with *under-reaction* of long-term rates, we have:

$$\frac{dD_t^*}{di_t} = \frac{2\frac{dr_t}{di_t} - 1}{\gamma\sigma_e^2} < 0 \tag{C.86}$$

An increase in the policy rate thus decreases the demand for LT bonds. This helps increase the long-term rate, since it puts upward pressure on the term premium. Notice too that this variation in D^* is more pronounced when exchange rate risk is smaller.

Now we can combine this with the linearized equations for equilibrium in the LT bond market:

$$\begin{aligned} 2r_t - i_t - \bar{i} &= \frac{\bar{\sigma}^n \sigma_i}{\bar{\tau}} \\ -2r_t &= \Lambda + \frac{D_t^*}{B} - \frac{\bar{\tau}}{2\theta} \\ D_t^* &= \frac{2r - i_t + i^* + \psi + \epsilon_t}{\gamma \sigma_e^2} \end{aligned}$$

Differentiating gives:

$$\begin{aligned} 2dr_t - di_t &= -d\bar{\tau}\frac{\bar{\sigma}^n \sigma_i}{\bar{\tau}^2} \\ -2dr_t &= +\frac{dD_t^*}{B} - \frac{d\bar{\tau}}{2\theta} \\ D_t^* &= \frac{2dr_t - di_t}{\gamma \sigma_e^2} \end{aligned}$$

To substitute out the effect on the marginal arbitrageur, use:

$$d\bar{\tau} = -\bar{\tau}^2 \frac{2dr_t - di_t}{\bar{\sigma}^n \sigma_i} \tag{C.87}$$

Which yields:

$$-2dr_t = +\frac{2dr_t - di_t}{B\gamma\sigma_e^2} + \bar{\tau}^2 \frac{2dr_t - di_t}{2\theta\bar{\sigma}^n \sigma_i} \tag{C.88}$$

It suffices then to isolate the dr effects to get the coefficient of monetary transmis-

sion:

$$\frac{dr_t}{di_t} = \frac{1}{2}\left(1 + \frac{1}{\frac{\bar{\tau}^2}{2\theta\bar{\sigma}^n\sigma_i} + \frac{1}{B\gamma\sigma_e^2}}\right)^{-1} \tag{C.89}$$

There are now two effects that matter for monetary transmission. The first term is familiar from the main framework we presented. The second one comes from the endogenous response of foreigners to changes in the policy rate. When σ_e^2 goes down, foreigners become more aggressive and adjust their portfolio by more in response to monetary policy shocks, which helps the transmission to long-term rates.

C.2 Vayanos and Vila (2021) framework

In this section, we recast our theory in the influential Vayanos and Vila (2021) framework, which is a popular model of the term structure of interest rates. The model is similar to our baseline framework, except that local arbitrageurs maximize the log-utility of their next period wealth, by allocating their portfolio between short-term bonds (whose return, i_t, is determined by the central bank) and long-term bonds, which pay higher returns but are exposed to duration risk. The one-period excess return on a long-term bond is given by:

$$\frac{(1+\bar{i}_{t+1})^{-1}}{P_t} - (1+i_t) \tag{C.90}$$

where $\bar{i}_{t+1}$ is the expected policy rate next period, and P_t is the price of the long-term bond at t.

Local arbitrageurs at time $t = 1$ are endowed with wealth w and allocate x_1 to

the long-term bond, in order to maximize the following:

$$\max_{x_1} \quad \mathbb{E}_1 \left[\ln \left(w(1+i_1) + x_1 \left(\frac{(1+i_2)^{-1}}{P_1} - (1+i_1) \right) \right) \right] \tag{C.91}$$

As commonly done in this literature, we derive the demand of local arbitrageurs for long-term bonds through a second-order approximation, which yields the following portfolio choice:

$$\underbrace{\frac{\overline{(1+i_2)^{-1}}}{P_1} - (1+i_1)}_{\text{Expected return}} \approx \underbrace{\frac{x_1}{w} \text{Var}[i_2](1+i_1)}_{\text{Risk}} \tag{C.92}$$

C.2.1 Equilibrium

Market clearing in the long-term bond market requires:

$$B = D^* + \frac{w}{\text{Var}[i_2]} \left(\frac{(1+i_1)^{-1}(1+\bar{i}_2)^{-1}}{P_1} - 1 \right) \tag{C.93}$$

which simply states that the total supply of long-term bonds B, net of the position of buy-and-hold international investors, D^*, must equal the demand from local arbitrageurs. This yields the following equilibrium price for long-term bonds, P_1:

$$P_1 = \frac{(1+i_1)^{-1}\overline{(1+i_2)^{-1}}}{1 + \frac{\text{Var}[i_2]}{w}(B - D^*)} \tag{C.94}$$

Deep Financial Markets To understand the monetary transmission mechanism, it is useful to look first at the case where domestic financial markets are *deep*, i.e., w is large. Taking logs of (C.94) gives the following relation:

$$2\ln(1+r) = \ln(1+i_1) - \ln\left(\overline{(1+i_2)^{-1}}\right) + \ln\left(1 + \frac{\text{Var}[i_2]}{w}(B - D^*)\right) \tag{C.95}$$

And hence the equilibrium yield of the long-term bond is approximately given by:

$$r \approx \underbrace{\frac{i_1 + \bar{i}_2}{2}}_{\text{Expectation Hypothesis}} + \underbrace{\frac{\text{Var}[i_2]}{2w}(B - D^*)}_{\text{Term Premium}} \tag{C.96}$$

With deep financial markets, the expectation hypothesis approximately holds, up to a term premium correction term. More importantly, the term premium is separated from the policy rate in expression (C.96). This means that the sensitivity of the long-term yield to the policy rate (the strength of the transmission mechanism) is constant and equal to $1/2$. As such, the central bank can implement a long-term r close to its target $r^* + \rho$ with relatively small policy rate adjustments.

Shallow Financial Markets More relevant for EMEs, our theory focuses on the case where there is limited domestic arbitrage capital, such that the monetary policy transmission mechanism is weakened. In this case, w is relatively low compared to the amount of risk the arbitrageurs need to absorb, and the above approximation does not hold anymore.

We can rewrite the equilibrium as:

$$(1+i_1) = (1+r)^2 \frac{\overline{(1+i_2)^{-1}}}{1 + \frac{\text{Var}[i_2]}{w}(B - D^*)} \tag{C.97}$$

Assuming that $(1+r)^2 \approx 1 + 2r$:

$$(1+i_1)\left(1 + \frac{\text{Var}[i_2]}{w}(B - D^*)\right) = (1+2r)\overline{(1+i_2)^{-1}} \approx 1 + 2r - \overline{i_2} \tag{C.98}$$

Differentiating both sides with respect to i_1, the sensitivity of the long-term yield to the policy rate is given by:

$$\frac{dr}{di_1} = \frac{1}{2} \cdot \frac{1}{1 + \frac{\text{Var}[i_2]}{w}(B - D^*)} \tag{C.99}$$

When the amount of domestic arbitrage capital is low compared to the amount of duration risk (quantity of bonds B and interest rate risk $\text{Var}[i_2]$), the sensitivity of the long-term yield to the policy rate is potentially very weak, and monetary policy is impaired. Unambiguously, however, the strength of the monetary transmission mechanism increases with D^*: by absorbing some of the supply of long-term bonds, domestic arbitrageurs have to hold less duration risk, allowing them to arbitrage the yield curve more aggressively, and hence transmitting the policy rate to the long-term yield more effectively.

C.2.2 Derivations

Equilibrium Demand Local arbitrageurs have the following problem:

$$\max_{x_1} \quad \mathbb{E}_1 \left[\ln \left(w(1+i_1) + x_1 \left(\frac{(1+i_2)^{-1}}{P_1} - (1+i_1) \right) \right) \right] \tag{C.100}$$

Their first-order condition is then:

$$\mathbb{E}_1 \left[\left(\frac{(1+i_2)^{-1}}{P_1} - (1+i_1) \right) \left(w(1+i_1) + x_1 \left(\frac{(1+i_2)^{-1}}{P_1} - (1+i_1) \right)^{-1} \right) \right] = 0 \tag{C.101}$$

As usual in this literature, we derive the demand for long-term bonds through a second-order approximation, assuming that the excess return of holding the long-term bond is small:

$$\frac{(1+i_2)^{-1}}{P_1} - (1+i_1) \approx 0 \tag{C.102}$$

A few steps of algebra yield:

$$\mathbb{E}_1\left[\frac{\frac{(1+i_2)^{-1}}{P_1}-(1+i_1)}{1+\frac{x_1}{w(1+i_1)}\left(\frac{(1+i_2)^{-1}}{P_1}-(1+i_1)\right)}\right]=0 \tag{C.103}$$

$$\implies \mathbb{E}_1\left[\left(\frac{(1+i_2)^{-1}}{P_1}-(1+i_1)\right)\left(1-\frac{x_1}{w(1+i_1)}\left(\frac{(1+i_2)^{-1}}{P_1}-(1+i_1)\right)\right)\right]=0 \tag{C.104}$$

$$\implies \mathbb{E}_1\left[\frac{(1+i_2)^{-1}}{P_1}-(1+i_1)\right]=\frac{x_1}{w(1+i_1)}\mathbb{E}_1\left[\left(\frac{(1+i_2)^{-1}}{P_1}-(1+i_1)\right)^2\right] \tag{C.105}$$

$$\implies \mathbb{E}_1\left[\frac{(1+i_1)^{-1}(1+i_2)^{-1}}{P_1}-1\right]=\frac{x_1}{w}\mathbb{E}_1\left[\left(\frac{(1+i_1)^{-1}(1+i_2)^{-1}}{P_1}-1\right)^2\right] \tag{C.106}$$

This gives the familiar demand function of local arbitrageurs since:

$$\mathbb{E}_1\left[\left(\frac{(1+i_1)^{-1}(1+i_2)^{-1}}{P_1}-1\right)^2\right]\approx \text{Var}[i_2] \tag{C.107}$$

And hence:

$$\underbrace{\frac{(1+i_1)^{-1}(1+\bar{i}_2)^{-1}}{P_1}-1}_{\text{Expected excess return}}\approx x_1\underbrace{\frac{\text{Var}[i_2]}{w}}_{\text{Risk}} \tag{C.108}$$

Or equivalently:

$$x_1\approx\frac{w}{\text{Var}[i_2]}\left(\frac{(1+i_1)^{-1}(1+\bar{i}_2)^{-1}}{P_1}-1\right) \tag{C.109}$$

We then simply equate demand with supply to find the equilibrium price of the long-term bond:

$$B=D^*+\frac{w}{\text{Var}[i_2]}\left(\frac{(1+i_1)^{-1}(1+\bar{i}_2)^{-1}}{P_1}-1\right) \tag{C.110}$$

This finally yields:

$$P_1 = \frac{(1+i_1)^{-1}\overline{(1+i_2)^{-1}}}{1+\frac{\text{Var}[i_2]}{w}(B-D^*)} \tag{C.111}$$

Derivation of (C.99) Assuming that the term $\frac{\text{Var}[i_2]}{w}(B-D^*)$ is not infinitesimal but finite:

$$(1+i_1) = (1+r)^2 \frac{\overline{(1+i_2)^{-1}}}{1+\frac{\text{Var}[i_2]}{w}(B-D^*)} \tag{C.112}$$

Assuming that $(1+r)^2 \approx 1+2r$:

$$(1+i_1)\left(1+\frac{\text{Var}[i_2]}{w}(B-D^*)\right) = (1+2r)\overline{(1+i_2)^{-1}} \approx 1+2r-\overline{i_2} \tag{C.113}$$

and differentiating both sides with respect to i_1 gives:

$$\frac{dr}{di_1} = \frac{1}{2}\cdot\frac{1}{1+\frac{\text{Var}[i_2]}{w}(B-D^*)} \tag{C.114}$$

C.3 New-Keynesian Microfoundations

This part develops New-Keynesian microfoundations designed to address two related points: (1) why is it that the planner cares about movements in the long-term rate r rather than just i, and (ii) why is it that the planner is minimizing a loss function of the form of Equation (A.61).

C.3.1 Environment

We assume that the real side of the economy consists of households who supply labor, and borrowers. Prices and wages are fully rigid, so that output is demand-determined.

Borrowers: Borrowers are in mass M^b and have log utility in period $t = 1$ and linear utility in period $t = 3$. They receive an endowment at $t = 3$ denoted by y_3^b but nothing before. They can only consume by borrowing from local intermediaries at $t = 1$ but since they do not receive any income before $t = 3$, they can only borrow using the long-term bond by collateralizing their future endowment.

Specifically, borrowers maximize:

$$\ln c_1^b + \beta^b c_3^b \tag{C.115}$$

under the budget constraint:

$$c_1^b = b_1 * P_1 \tag{C.116}$$

$$c_3^b = y_3^b - b_1 \tag{C.117}$$

The first-order condition is thus:

$$\frac{1}{c_1^b} = \frac{\beta^b}{P_1} \tag{C.118}$$

and since $c_1^b = b_1 * P_1$ we end up with a fixed supply of long-term debt:[25]

$$b_1 = \beta^b \implies B = M^b \beta^b \tag{C.119}$$

while the consumption level of borrowers is directly pinned down by the long-term rate:

$$c_1^b = \frac{\beta^b}{(1 + r_1)^2} \tag{C.120}$$

[25]This structure is designed to keep the amount of debt, and hence of duration risk, fixed and not responding to policy changes. This would otherwise complicate the analysis, by making B also endogenous in Section 3.

Households: Households do not have access to financial markets and are thus are hand-to-mouth. They supply labor and consume, with the following utility function:

$$c_1^h - \nu \frac{l_1^{1+\varphi}}{1+\varphi} \tag{C.121}$$

The total demand, adding households and borrowers, is thus:

$$c_1 = w l_1 + M^b \frac{\beta^b}{(1+r_1)^2} \tag{C.122}$$

Production: Production is done by a firm owned by foreigners, such that profits are not rebated to households. The production technology is linear, i.e. $y_1 = l_1^h$.

C.3.2 Natural Rate r^*

Using this linear technology and the fact that ouput equals demand, we get:

$$y_1 = w y_1 + M^b \frac{\beta^b}{(1+r_1)^2} \implies y_1 = \frac{M^b \beta^b}{(1-w)(1+r_1)^2} \tag{C.123}$$

Linearizing this for small r as usual, we get the linear relationship between output and the long-term interest rate:

$$y_1 = \frac{M^b \beta^b}{(1-w)}(1-2r_1) \tag{C.124}$$

For a natural rate of output y^*, we can then infer the natural rate of interest:

$$r^* = \frac{1}{2}\left(1 - y^* \frac{(1-w)}{M^b \beta^b}\right) \tag{C.125}$$

For any shock ϱ to the natural rate of output, we can then rescale the shock to express it as a shock to the natural rate of interest:

$$r^* + \rho_1 = \frac{1}{2}\left(1 - y^* \frac{(1-w)}{M^b \beta^b}\right) \underbrace{- \frac{(1-w)}{2M^b \beta^b} \varrho_1}_{+\rho_1} \tag{C.126}$$

C.3.3 Loss Function

In the NK tradition, we are looking at welfare losses around the flexible price equilibrium, where output is equal to the natural rate of output. We denote the allocations at the flexible price optimum with˜. The usual second-order perturbation of the households' utility function yields:

$$U - \tilde{U} = -\frac{\nu \varphi (\tilde{l}_1^h)^{\varphi - 1}}{2} (\tilde{l}_1^h - l_1^h)^2 \tag{C.127}$$

Replacing hours worked with output yields:

$$U - \tilde{U} = -\frac{\nu \varphi (\tilde{l}_1^h)^{\varphi - 1}}{2} (\tilde{y}_1 - y_1)^2 = -\frac{\nu \varphi (\tilde{l}_1^h)^{\varphi - 1}}{2} (y^* + \varrho - y_1)^2 \tag{C.128}$$

where we can substitute the interest rate through Equation (C.126):

$$U - \tilde{U} = -\frac{\nu \varphi (\tilde{l}_1^h)^{\varphi - 1}}{2} \left(\frac{M^b \beta^b}{(1-w)}\right)^2 (r_1 - r^* - \rho_1)^2 \tag{C.129}$$

So that, in expectation, the loss function is just proportional to:

$$\mathcal{L} = \mathbb{E}\left[(r_1 - r^* - \rho_1)^2\right] \tag{C.130}$$

C.4 Correlated Shocks

In this extension we assume that the shocks ϵ and ρ follow a bivariate normal distribution with correlation η. The variance of the interest rate and exchange rate are now given by:

$$\sigma_i^2 = \kappa_r^2\sigma_\rho^2 + \kappa_e^2\sigma_\epsilon^2 + 2\eta\kappa_r\sigma_\rho\kappa_e\sigma_\epsilon \tag{C.131}$$

$$\sigma_e^2 = \kappa_r^2\sigma_\rho^2 + (1-\kappa_e)^2\sigma_\epsilon^2 + 2\eta\kappa_r\sigma_\rho(1-\kappa_e)\sigma_\epsilon \tag{C.132}$$

Relative to the expressions in Section 4, the additional terms in the loss function are:

$$2\eta\left(\left(\frac{dr}{di}\kappa_r - 1\right)\frac{dr}{di}\kappa_e\sigma_\rho\sigma_\epsilon + \chi\kappa_r\sigma_\rho\kappa_e\sigma_\epsilon\right) \tag{C.133}$$

that are added to the terms in Equation (A.61). Taking the total derivative of this expression generates many different terms, but remember that for the purpose of Proposition 2, we only need to evaluate the sign of the derivative at the Mundellian point, $\kappa_e = 0$. At this point, we are only left with the following additional terms:

$$2\eta\sigma_\rho\sigma_\epsilon\left(\chi\kappa_r - \left(1 - \frac{dr}{di}\kappa_r\right)\frac{dr}{di}\right)d\kappa_e \tag{C.134}$$

But importantly, none of these terms are about the improvement in the transmission of monetary policy. So if we start from the optimal monetary policy rule in the case where the strength of transmission is fixed, κ_r is chosen to be such that:

$$\chi\kappa_r = \left(1 - \frac{dr}{di}\kappa_r\right)\frac{dr}{di} \tag{C.135}$$

From this policy point, it is then always optimal to introduce some degree of exchange rate stabilization ($\kappa_e > 0$), regardless of the sign of η.

If the central bank does not start from this point, these terms need to be factored

in to understand whether it is valuable to stabilize the exchange rate on the margin.

C.5 Currency Risk on Intermediaries' Balance Sheet

In this version of the model, local arbitrageurs need to hold (in equilibrium) some amount of currency risk on top of the duration risk. Specifically, local firms have an inelastic demand for S_c currency forwards, whose equilibrium price we denote by f. The return of such an investment for the local arbitrageur is simply $f - \bar{e}$, while the risk associated is the currency risk σ_e.

To keep things tractable, assume that the risk limit takes the following form:

$$\sigma_d + \sigma_c \leq \bar{\sigma}^n \tag{C.136}$$

which means that the sums of the standard deviations of the positions taken in bonds (d) and FC (c) cannot exceed an exogenous limit $\bar{\sigma}^n$. Assuming no correlation between the two investments, the optimal portfolio choice for an arbitrageur with risk tolerance τ is:

$$\omega_d^* = \tau \frac{2r - i_2 - \bar{i}}{\sigma_i^2} = \tau \frac{\chi_d}{\sigma_i} \tag{C.137}$$

$$\omega_c^* = \tau \frac{f - \bar{e}}{\sigma_e^2} = \tau \frac{\chi_c}{\sigma_e} \tag{C.138}$$

The marginal arbitrageur is thus characterized by:[26]

$$\bar{\tau} \left(\chi_d + \chi_c \right) = \bar{\sigma}^n \tag{C.139}$$

We can use the same type of market clearing condition as previously with only one

[26] This expression makes clear why assuming an additive risk limit constraint in equation (C.136) is helpful, yielding the same king of expression as in the baseline model.

asset:

$$\frac{\chi_d}{\sigma_i}\bar{\tau}\left(1-\frac{\bar{\tau}}{2\theta}\right)=BP_1 \tag{C.140}$$

$$\frac{\chi_c}{\sigma_e}\bar{\tau}\left(1-\frac{\bar{\tau}}{2\theta}\right)=S_c \tag{C.141}$$

where S_c is the number of forwards demanded. Summing these two condition yields:

$$\underbrace{(\bar{\tau}\chi_d+\bar{\tau}\chi_c)}_{\bar{\sigma}^n}\left(1-\frac{\bar{\tau}}{2\theta}\right)=\sigma_i BP_1+\sigma_e S_c \tag{C.142}$$

Noticing (as before) that $P_1 \approx -2r$, differentiating gives a simple relation between the change in the marginal arbitrageur and the change in the long-term yield:

$$\frac{\bar{\sigma}^n}{2\theta}d\bar{\tau}=\sigma_i B dr \tag{C.143}$$

which is the same relation as in the previous baseline model: a decrease in r mechanically increases the valuation of the risky asset, which triggers risks limit and thus decreases $\bar{\tau}$.

Now going back to the risk constraint, which we can rewrite:

$$d\chi_d+d\chi_c=-\frac{\bar{\sigma}^n}{\bar{\tau}^2}d\bar{\tau} \tag{C.144}$$

while the market clearing conditions for bonds and currency forwards imply:

$$\chi_c=\frac{S_c\sigma_e}{BP_1\sigma_i}\chi_d \tag{C.145}$$

and so to the first-order:

$$d\chi_c=\frac{S_c\sigma_e}{B\sigma_i}d\chi_d \tag{C.146}$$

Replacing this in equation (C.144):

$$d\chi_d \left(1 + \frac{S_c \sigma_e}{B \sigma_i}\right) = -\frac{\bar{\sigma}^n}{\bar{\tau}^2} d\bar{\tau} \tag{C.147}$$

This is really the same expression as in the baseline model, except that there is an additional term coming from the currency risk. To understand how it impacts transmission, put everything together to express the sensitivity of the long-term yield to the policy rate:

$$\frac{dr}{di_1} = \frac{1}{2} \cdot \frac{1}{1 + \frac{\theta(\sigma_i B)^2}{\bar{\tau}^2(\sigma_i B + \sigma_e S_c)}} \tag{C.148}$$

The relation between the strength of the transmission mechanism and exchange rate risk is thus encoded in the following term:

$$\bar{\tau}^2(\sigma_i B + \sigma_e S_c) \tag{C.149}$$

If this term goes up when σ_e (or S_c) decreases, then we retrieve our main result. Differentiating this term yields:

$$2\bar{\tau}(\sigma_i B + \sigma_e S_c) d\bar{\tau} + \bar{\tau}^2 S_c d\sigma_e \tag{C.150}$$

But remember that the sum of the market clearing conditions, coupled with the risk limit constraint, was giving:

$$\bar{\sigma}^n \left(1 - \frac{\bar{\tau}}{2\theta}\right) = \sigma_i B P_1 + \sigma_e S_c \implies -d\bar{\tau} \frac{\sigma^n}{2\theta} = S_c d\sigma_e \tag{C.151}$$

Plugging this into the previous differentiation:

$$d\left(\bar{\tau}^2(\sigma_i B + \sigma_e S_c)\right) = 2\bar{\tau}(\sigma_i B + \sigma_e S_c) d\bar{\tau} + \bar{\tau}^2 S_c d\sigma_e \tag{C.152}$$

$$= -2\bar{\tau}\frac{2\theta S_c}{\bar{\sigma}^n}(\sigma_i B + \sigma_e S_c)d\sigma_e + \bar{\tau}^2 S_c d\sigma_e \tag{C.153}$$

$$= -2\bar{\tau}2\theta S_c\left(1 - \frac{\bar{\tau}}{2\theta}\right)d\sigma_e + \bar{\tau}^2 S_c d\sigma_e \tag{C.154}$$

$$= -\bar{\tau}S_c\underbrace{\left(4\theta - 3\bar{\tau}\right)}_{>0}d\sigma_e \tag{C.155}$$

This term then goes up if exchange rate risk goes down, improving the transmission mechanism by making arbitrageurs less constrained.