Monetary Policy and the Short-Rate Disconnect in Emerging Economies*

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Abstract

We document that the imperfect pass-through of policy rates into short-term market rates in emerging economies can be explained by fluctuations in external financing, conditional on common global shocks. Emerging market central banks adhere to Taylor-type rules and lower their policy rates when economic activity slows down, including as a response to U.S. monetary policy tightening. This suggests a countercyclical monetary policy stance. However, since the transmission of policy rates to short-term market rates is impaired, market rates do not go down with the deceleration of economic activity. They go up as they encompass countercyclical risk premia. To explain this short-rate disconnect, we present a simple model in which domestic banks transmit fluctuations in global financial conditions to short-term market rates, and document that, indeed, the market-policy rate differential significantly comoves with dollar funding conditions and the domestic banking sector's external exposure. Our findings shed light on the transmission and effectiveness of monetary policy in emerging economies.

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1 Introduction

Emerging economies are often susceptible to sudden stops and capital flow reversals, as they are highly exposed to fluctuating external financial conditions. During these episodes of capital flow volatility, monetary authorities face intricate dilemmas. Consider the effects of a U.S. monetary tightening, causing tighter global financial conditions and a downturn in economic activity both in the U.S. and worldwide. In such scenario, emerging economies' central banks have two options. First, they can increase their policy rate in line with the Federal Reserve, aiming to prevent large fluctuations in capital flows and exchange rates. Alternatively, they can lower their policy rate to mitigate the negative impact of contracting global demand and tighter financial conditions on domestic economic activity.

We argue that these countries' exposure to the global financial cycle (Miranda-Agrippino and Rey, 2020; Kalemli-Ozcan, 2019) fundamentally shapes these trade-offs as it impairs the monetary policy's ability to affect local financial conditions. We show that central banks in emerging economies with flexible exchange rates do reduce their policy rates when local economic activity decelerates (*i.e*, a *countercyclical* monetary policy stance). However, the transmission of these policy rates to short-term market rates is significantly hindered due to fluctuating conditions in domestic financial intermediaries' international funding markets.

We begin by studying the typical behavior of emerging economies' policy rates vis-à-vis local inflation and economic activity. To do so, we first estimate policy rules à la Taylor (1993, 1999) and find that central banks adjust the policy rate in response to changes in both inflation and economic conditions (as measured by the output gap or GDP growth). In this regard, we observe that central banks in emerging economies operate similarly to their counterparts in advanced economies. We then study the correlation of local interest rates with local economic activity (as measured by real GDP growth). Similarly, we find that policy rates are lowered when local economic activity decelerates. However, we uncover that short-term market rates, including 3-month treasury or money market rates, tend to increase during economic recessions, consistent with countercyclical risk premia. This stands in contrast to advanced economies where policy rates and short-term market rates decrease in tandem when economic activity slows down. This evidence indicates that local monetary policy in both emerging and advanced economies has demonstrated a countercyclical stance over the past three decades. However, emerging economies' market rates exhibit a *disconnect*

from local policy rates.

We document that a disconnect between policy and market rates emerges following a U.S. monetary policy tightening, identified using the high-frequency identification approach of Gertler and Karadi (2015), where such tightenings are shown to be linked to fluctuations in global financial conditions (Miranda-Agrippino and Rey, 2020; Kalemli-Ozcan, 2019).[1] Following a US monetary policy tightening, emerging economies lower policy rates, yet market rates increase, on average. We observe a similar decoupling between policy rates and market rates during a the so-called Taper Tantrum episode, an unexpected exogenous U.S. monetary policy tightening.

We hypothesize that movements in the local short-term differential, the difference between local market rates and policy rates, originate from emerging economies' reliance on capital flows that make them subject to fluctuating global funding conditions. We present a simple model that focuses on the role of domestic banks in transmitting fluctuations in external financial conditions domestically, influencing the dynamics of local short-term market rates. Within our model, domestic banks rely both on domestic deposits and on international markets for dollar funding (in line with the evidence in Baskaya et al., 2017, and Hahm et al., 2013). According to our model, fluctuations in dollar funding conditions and banks exposure to external funding directly impact the marginal funding costs of domestic banks, and, consequently, influence the equilibrium local market rates. The pass-through of monetary policy to short-term rates becomes incomplete and impaired by fluctuating funding costs influenced by conditions in global financial markets.

We verify that the short rate disconnect, that is the differential between the policy rate and market rate in emerging economies is significantly related to both dollar funding premia and banks exposure to external funding. Empirically, the short-term differential is higher when the dollar premium, the premium a country pays on its dollar-denominated bonds compared to U.S. bonds, proxied by the EMBI spread, is higher. A 10 p.p. increase in the EMBI spread is associated with a 1.5-2 p.p. higher short-term differential. We also find that a country's short-term differential is larger in periods where its banks' exposure to external funding is larger. We use data from Avdjiev et al. (2022) to measure a country's domestic banking sector share of external liabilities, and find that a 10 p.p. larger share of external liabilities is associated with a 1-1.5 p.p. higher short-term differential. Our model rationalizes these

[1] See also Dedola et al. (2017), and Degasperi et al. (2023).

co-movements between quantities, prices and the short-rate disconnect wedge: when dollar funding costs rise or the banks' exposure to these costs rises via their external borrowing, domestic banks require a domestic market rate that exceeds the policy rate to hold the market bond.

Related literature Our paper contributes to a well-established literature in international monetary economics and finance, and builds on previous studies that have examined the transmission of the global financial cycle through local banks' funding conditions (di Giovanni et al., 2022; Fendoglu et al., 2019) and changes in global risk perceptions (Miranda-Agrippino and Rey, 2020; Kalemli-Ozcan, 2019; Chari et al., 2021).

Our research is closely related to the empirical literature that examines the challenges to monetary policy effectiveness in emerging economies. We draw upon the work of Rey (2013) and Miranda-Agrippino and Rey (2020), who document that changes in global risk aversion and U.S. monetary policy significantly affect global leverage and capital flows, in both floaters and peggers, and argue that the global financial cycle may limit the monetary autonomy of countries with floating exchange rate regimes. Obstfeld et al. (2019) contribute to this discussion by documenting that floaters experience milder macroeconomic and financial fluctuations compared to peggers during periods of heightened global risk aversion. Kalemli-Ozcan (2019) documents the disconnect between short rates and monetary policy rates, showing that this wedge is explained by changes in investors' risk perceptions towards a given country. The risk premia in short-term market rates play a crucial role in explaining the documented responses to U.S. monetary policy for floaters and can explain the milder response of floaters relative to peggers as monetary policy aimed at limiting exchange rate volatility can be counterproductive. Floating exchange rates, by absorbing shocks to risk premia, provide some degree of insulation from external influences.

Our research indicates that the global financial cycle manifest itself in emerging economies through a disconnect between policy rates and relevant short-term market rates – preventing insulation of these economies from external shocks through their monetary policy by impairing the transmission of their monetary policy.[2]

The literature on monetary and fiscal policies in emerging markets was initiated by the seminal work of Kaminsky et al. (2005). In a sample that covers 1960–2003, Kaminsky et al.

[2] A related strand of the literature studies the cross-country co-movement of market interest rates. A list of papers include Shambaugh (2004); Bluedorn and Bowdler (2010); Miniane and Rogers (2007); Klein and Shambaugh (2015); Obstfeld (2015); Han and Wei (2018).

find strong evidence in favor of procyclical fiscal policy (see also Gavin and Perotti, 1997), and some evidence in support of the notion of procyclical monetary policy. More recently, in a sample that covers 1960–2009, Vegh and Vuletin (2013) find a positive correlation between the cyclical components of policy rates and real GDP in emerging economies especially in the more recent part of the sample, after 2000. Our contribution is to show that even though emerging markets' central banks' monetary policy has displayed a countercyclical stance, it does not completely transmit to short-term market rates. We thus emphasize that using short-term market rates to proxy for the stance of monetary policy may lead one to draw inaccurate conclusions about the cyclical properties of the monetary policy stance in emerging economies, even though this practice appears justified for advanced economies.

Our paper also contributes to the existing literature on emerging economies' business cycles and the dynamics of real interest rates, initiated by Neumeyer and Perri (2005). The question was later explored by several studies, such as Aguiar and Gopinath (2007), García-Cicco et al. (2010), Fernández and Gulan (2015), Fernández-Villaverde et al. (2011), and Coulibaly (2021). Our paper focuses on a mechanism where local banks' reliance on international markets for funding exposes local short-term funding conditions to global financial fluctuations, with implications for their business cycles.

The rest of the paper proceeds as follows. Section 2 studies the behavior of monetary policy rates in emerging economies. Section 3 documents the disconnect between policy rates and short-term market rates in emerging economies. Section 4 develops a partial-equilibrium model that highlights a possible link between short-term differentials and banks' external funding conditions. Section 5 documents the comovement between the short-term differential, financial premia, and banks' external exposure. Section 6 concludes.

2 What do central banks in emerging economies do?

We document the behavior of monetary policy vis-à-vis local inflation and economic activity. To characterize the monetary policy stance we use publicly announced policy rates.

Dataset Our sample focuses on countries and time periods that are characterized by a flexible exchange rate regime. For the classification of exchange rate regimes we rely on the historical exchange rate classification in Ilzetzki et al. (2019), which is a country-quarter level

time varying classification.[3] We use available quarterly data from 1990:Q1 to 2018:Q4, an unbalanced sample. Appendix A lists the countries included in the dataset.

We collect all available data on policy rates (i^P). Policy rates are the target interest rate set by central banks in their efforts to influence short-term interest rates as part of their monetary policy strategy. For policy interest rates, our preferred data source is the *BIS*. If *BIS* data are not available we use data from the *IMF International Financial Statistics* or from national sources retrieved from *Bloomberg*. The choices of the sources are of no material difference. In fact, when all sources are available the correlation between *BIS* rates and data from alternative sources is always above 0.96.

We also collect all available data on short-term market rates (i^M), specifically treasury rates and interbank money market rates. The maturity of short-term interest rates in our sample is 3 months.The sources of treasury and money market rates are *IMF International Financial Statistics* or national sources retrieved from *Bloomberg*. See Appendix Tables A.2-A.4 for more details about the data.

Policy rates around episodes of global distress To present few examples from our dataset, we explore the behavior of policy rates during two noteworthy episodes of global recessions (often referred to as "risk-off" shocks), namely the Global Financial Crisis and COVID-19. It is evident from Figure 1 that both advanced and emerging economies lowered their policy rates during these two global recessions.[4] We find this result noteworthy as emerging economies currencies depreciated during these events and given a high degree of exchange rate pass-through, such currency depreciations can feed back into inflation.[5] In addition, depreciations can cause balance sheet distress for governments and firms that have borrowed in foreign currency.

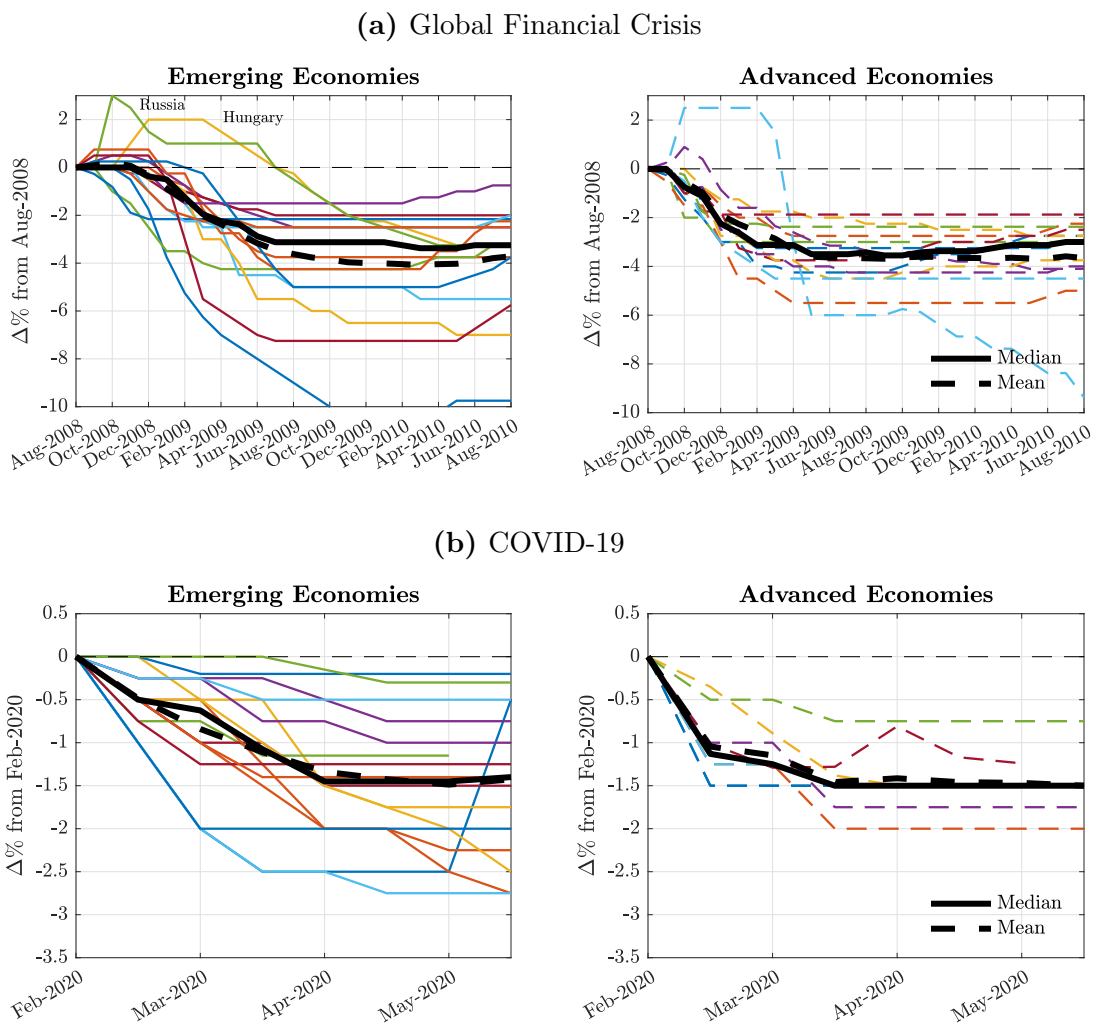
Estimation of central banks' reaction function To summarize a central bank's reaction function, macroeconomists frequently use interest rate rules, such as the ones put forward by Taylor (1993, 1999). Such policy rules describe how the monetary authority adjusts its

[3] A country is considered to have a flexible exchange rate regime if, in a given quarter, its exchange rate was within a moving band that is narrower than or equal to +/-2 percent or was classified as managed floating, freely floating or freely falling in Ilzetzki et al. (2019).

[4] Focusing largely on the sudden stops occurred in 2008Q4 around GFC, Eichengreen and Gupta find that monetary policy was eased in response to these sudden stops more often than it is tightened (only 8 out of 43 EMs tightened). They rely on IMF reports and market commentary to code changes in monetary policies, following the narrative approach of Romer and Romer (1989) and Alesina et al. (2018).

[5] Several studies document a high exchange rate pass-through into import prices in EMEs (see, for example, Burstein and Gopinath, 2014).

Figure 1: Monetary policy rates around episodes of global financial distress



Notes: The figure report the p.p. change in policy rates in both emerging and advanced economies during the 2008-2009 Global Financial Crisis (Panel (a)) and during COVID-19 (Panel (b)).

policy instrument (typically the short-term policy rate) in response to deviations of inflation and economic conditions from their objectives. A standard version of a Taylor-type rule is: $i_t^P = \rho i_{t-1}^P + (1-\rho)\left(\phi_\pi \pi_t + \phi_y \tilde{y}_t\right) + \varepsilon_t^P$. According to this rule, the central bank adjusts the policy rate in response to changes in inflation (with coefficient ϕ_π) and economic conditions, such as output growth or the output gap (with coefficient ϕ_y). The rule allows for policy smoothing by including a first-order autoregressive term, and for i.i.d. monetary policy shocks, ε_t^P.

To estimate the central bank's reaction function we thus consider the following regression:

$$i_t^P = \alpha + \beta_1 i_{t-1}^P + \beta_2 \pi_t + \beta_3 \tilde{y}_t + \epsilon_t \tag{1}$$

We follow Carvalho et al. (2021) in using ordinary least squares (OLS) to estimate the parameters of the Taylor rule.[6] To estimate equation (1) we use the country's policy rate. Inflation is the rate of change in the consumer price index (CPI). To measure economic conditions, we use either the rate of change in the country's real gross domestic product (ΔGDP_t) or the country's output gap (output gap_t) from IMF (2020, Chapter 3).

Table 1: Estimated central banks' reaction function

	Emerging Economies		Advanced Economies	
	i_t^P	i_t^P	i_t^P	i_t^P
	(1)	(2)	(3)	(4)
i_{t-1}^P	0.860***	0.826***	0.936***	0.917***
	(0.0058)	(0.0079)	(0.0076)	(0.0094)
π_t	0.394***	0.419***	0.280***	0.280***
	(0.027)	(0.034)	(0.030)	(0.031)
ΔGDP_t	0.00892**		0.00104	
	(0.0037)		(0.0019)	
output gap_t		0.0591***		0.0996***
		(0.020)		(0.013)
R-Squared	0.93	0.87	0.95	0.95

Notes: The table reports estimates of equation (1) by OLS. For both emerging and advanced economies, columns (1) and (3) use real GDP growth to proxy for economic activity while columns (2) and (4) use the output gap (we apply spline interpolation to annual output gap data to obtain quarterly figures). These regressions feature country fixed effects. Data are at a quarterly frequency. The sample period is 1990:q1–2018:q4. Standard errors are reported in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

We report the results of the estimated central banks' reaction function in Table 1 for both advanced and emerging economies.

[6] Carvalho et al. (2021) argue that OLS outperforms instrumental variables (IV) in small samples if the structural monetary policy innovations explains only a small fraction of the variance of regressors in the Taylor rule regression. We find it plausible that the systematic component of monetary policy dominates the variation in policy rates, and thus structural monetary policy innovations are quantitatively unimportant in both in advanced and emerging economies.

First, we note that the R-squared of these regressions is high, indicating that Taylor rules appear to describe the conduct of monetary policy in these countries fairly well. Second, the estimates of Taylor rule coefficients are generally similar across emerging and advanced economies, both qualitatively and quantitatively. In both sets of economies, the central bank raises its policy rate in response to higher inflation and improving economic conditions, measured either with GDP growth or the output gap. For emerging economies, the specification with the output gap implies that the point estimates for ϕ_π and ϕ_y are around 2.4 and 0.34, respectively.[7] These estimates are both statistically and economically significant and, again, similar to the corresponding estimates for advanced economies. In line with the literature, we estimate a significant amount of policy rate smoothing by central banks in both sets of economies.

We verify that these results are not driven by the high-inflation countries or crisis periods. To do so, we exclude countries that have experienced inflation rates above 40 percent over a 12-month period and periods during the 6 months immediately following a currency crisis and accompanied by a regime switch. Appendix Table B.1 reports the estimates of Taylor rule coefficients for this modified sample. All results remain statistically significant. In addition, one may wonder if the central bank's reaction function of emerging economies is well characterized by the response to output gap, inflation, and interest rate smoothing, and whether central banks independently respond to exchange rate fluctuations (Calvo and Reinhart, 2002). In this respect, we have confirmed the robustness of these results to incorporating the rate of nominal exchange rate depreciation into the central bank's reaction function (Appendix Table B.2).

We thus observe that the monetary policy behavior, as captured by estimated central banks' reaction functions, suggests that the stance of monetary policy in emerging economies is countercyclical.

The cyclical behavior of policy rates We now turn to examining the cyclical behavior of policy rates. This is a commonly used metric to assess whether monetary policy acts pro- or countercyclically (see, for example, Kaminsky, Reinhart, and Végh, 2005, and Vegh and Vuletin, 2013).

To this end, we study the relationship between current GDP growth and policy rates

[7] One obtains these numbers by mapping the estimates of equation (1) to the reaction function: $i_t^P = \rho i_{t-1}^P + (1-\rho)\left(\phi_\pi \pi_t + \phi_y \tilde{y}_t\right) + \varepsilon_t^P$.

both contemporaneously and at short-term horizons (since policy rates tend to respond gradually to observed changes in GDP, *e.g.*, Table 1). In particular, we adopt a reduced-form local projection approach: we regress policy rates at horizons within 2 years on current real GDP growth, controlling for lag of the dependent variable. More specifically, we consider the following regression relationships:

$$i^P_{t+h} = \alpha^P_h + \beta^P_h \Delta gdp_t + \gamma^P_h i^P_{t-1} + \epsilon^P_{t+h}; \tag{2}$$

for $h = 0, \ldots, 8$ quarters.

The coefficients of interest are the β^P_h's in equation (2). The β^P_h's in equation (2) captures the relationship between current real GDP growth and the policy rate, both contemporaneously and in the near future.

Figure 2 (Panel (a)) depicts the estimated β^P_h's in regression equation (2) (blue line) for both emerging and advanced economies. In both advanced and emerging economies, we observe that high real GDP growth predicts a significant increase in policy rates within two years. These results are consistent with the estimates of the Taylor rule coefficients (Table 1), and indicate that the monetary policy stance is generally countercyclical in emerging economies. We also observe that the correlation between policy rates and GDP growth is milder in emerging when compared to advanced economies. This difference might be due to the relative prevalence of supply shocks in emerging economies (as argued, *e.g.*, in Frankel (2010)).

3 Short-term market rates in emerging economies

Policy rates are the target interest rate set by central banks in their efforts to influence short-term interest rates as part of their monetary policy strategy. For this reason, we now explore whether the monetary policy stance implied by policy rates is reflected in the dynamics of short-term market rates. In doing so, we note that we moved away from the practice of using short-term market rates to proxy for the stance of monetary policy. Short-term market rates such as treasury rates or interbank money market rates are not necessarily "risk-free" in emerging economies. Treasury rates are rates at which governments issue their debt instruments, money market rates are rates charged on loans among banks. While closely related, these market rates are not directly comparable, and they measure the stance of

monetary policy only imperfectly. Below, we show that distinguishing between policy rates and market rates is of first-order importance in emerging economies.

The cyclical behavior of short-term market rates We now examine the cyclical behavior of short-term rates. In the baseline analysis, we use 3-month treasury rates as measure of short-term market rates. A corresponding analysis that uses 3-month money market rates as measure of market rates is reported in Appendix C.

As in equation (2) above, we study the dynamic relationship between GDP growth and market rates using reduced form local-projections. That is:

$$i^M_{t+h} = \alpha^M_h + \beta^M_h \Delta gdp_t + \gamma^M_h i^M_{t-1} + \epsilon^M_{t+h}; \tag{3}$$

for $h = 0, \ldots, 8$ quarters.

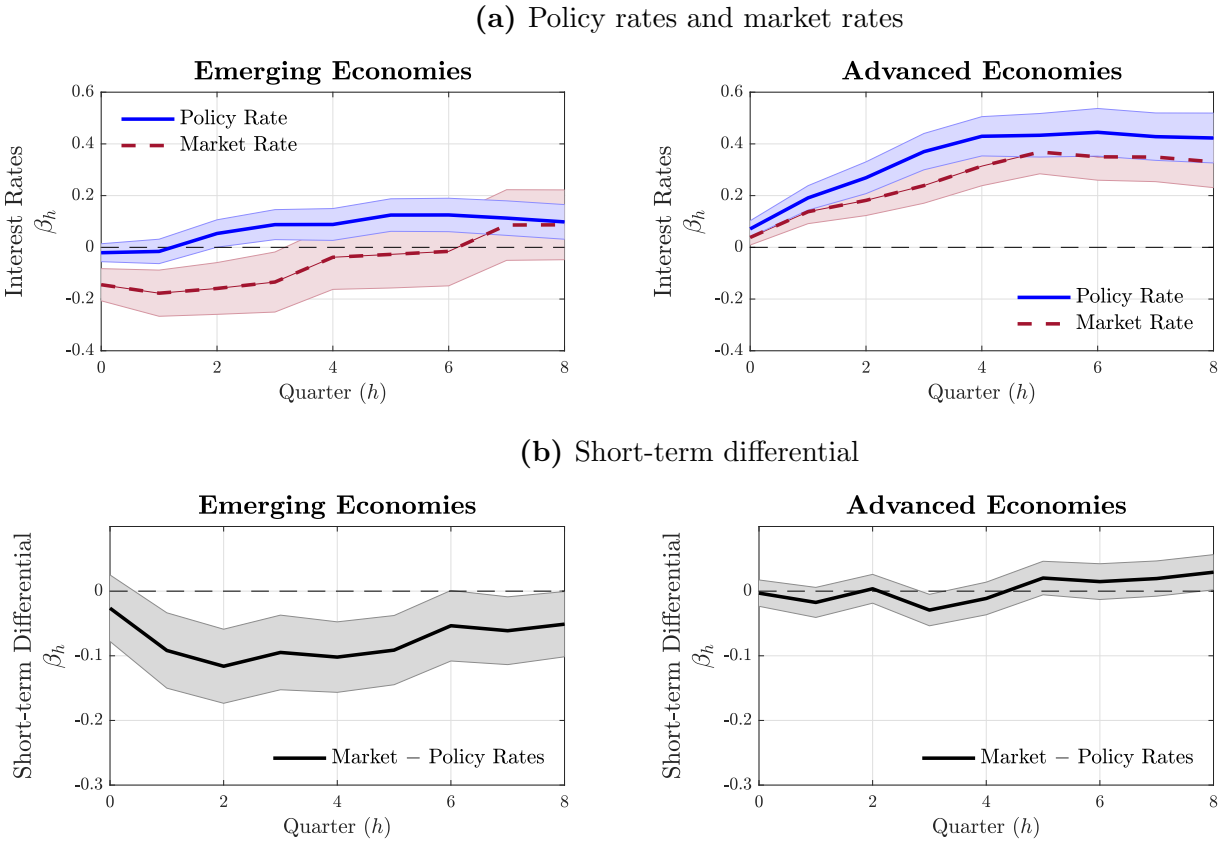
In regression equation (3), i^M denotes the country's short-term market rate and gdp_t is the country's real GDP. Figure 2 depicts the estimated β^M's in regression equation (3) for both emerging and advanced economies (red lines). Although in emerging economies high real GDP growth predicts a significant increase in policy rates within two years, high real GDP growth also predicts a significant decline in 3-month treasury rates within two years. To the contrary, in advanced economies policy and market rates exhibit a very similar relationship with real GDP growth, moving very much in tandem over the business cycle.

The above evidence reveals that, unlike in advanced economies, there is a disconnect between policy rates and market rates over the business cycle in emerging economies. We define the *short-term differential* as the difference between market rates and policy rates $(i^M_t - i^P_t)$, and explore the dynamics of this object vis-a-vis real GDP growth in the same local-projection setting as above:

$$i^M_{t+h} - i^P_{t+h} = \alpha^d_h + \beta^d_h \Delta gdp_t + \gamma^d_h \left(i^M_{t-1} - i^P_{t-1}\right) + \epsilon^d_{t+h}; \tag{4}$$

The right panels of Figure 2 depicts the estimated β^d_h's in regression equation (4). The results confirm that high GDP growth is associated with a systematic divergence between policy rates and market rates. Because market rates tend to be systematically above policy rates during recessions, the short-term differential increases in recessions. This is not the case in advanced economies, where the market-policy differential is virtually uncorrelated with GDP growth.

Figure 2: Cyclical behavior of interest rates in emerging and advanced economies



Notes: The figure reports the panel estimates of β_h's in regression equations (2) and (3) (top panels) and regression equation (4) (bottom panels). 90% confidence intervals are shown by the shaded areas. These regressions feature country fixed effects. Data are at a quarterly frequency.

Taken together, these findings indicate that there is a systematic difference in the cyclical behavior of short-term market rates between emerging and advanced economies. One implication of this result is that the common practice of using short-term market rates to proxy for the stance of monetary policy may lead to inaccurate conclusions about monetary policy stance cyclicality in emerging economies.

Policy rates as measures of the monetary policy stance In the context of emerging and developing economies, one may be concerned that policy rates are not an appropriate measure of the monetary policy stance. In fact, some of these countries may not use an interest rate as the main monetary policy tool. To address this concern, we reproduce our main results for the subsample of emerging economies that conduct interest-rate-based monetary policy. To determine whether the central bank uses a policy rate as the primary monetary policy

instrument for most part of the sample period, we follow Brandão-Marques et al.'s (2021) classification based on the examination of historical reports, such as IMF Article IV staff reports, and monetary policy reports issued by central banks.[8] Notwithstanding the smaller sample size, the results for this subsample of emerging economies, reported in Figure B.1 align closely with the baseline results, indicating a strong degree of monetary policy counter-cyclicality and a significant difference in cyclicality between policy rates and short-term market rates.

3.1 Effects of U.S. monetary policy tightening on emerging economies

While the cyclical behavior of policy rates summarizes the general tendencies of monetary policy in emerging economies, it may conceal different conduct of central banks in response to different shocks. We now study the effects of an identified U.S. monetary policy shock, which is exogenous and external from the viewpoint of the small open economies in the sample. We trace out the effects of the U.S. monetary policy shocks on policy rates as well as short-term market rates and macroeconomic aggregates.

All economic agents in emerging economies pay close attention to the stance of U.S. monetary policy as it affects global demand as well as the cost of international borrowing. To extract the exogenous component in U.S. monetary policy changes we follow the high-frequency identification approach in Gertler and Karadi (2015).[9] In particular, the baseline U.S. policy indicator is the 12-month U.S. treasury rate, and it is instrumented with Gertler and Karadi's (2015) estimated surprises in 3-month Fed Fund Futures (FF4). To trace out the effects of U.S. monetary policy shocks, we use panel local projections with instrumental variables (see Jordà, 2005, and Stock and Watson, 2018). Our regression specification is:

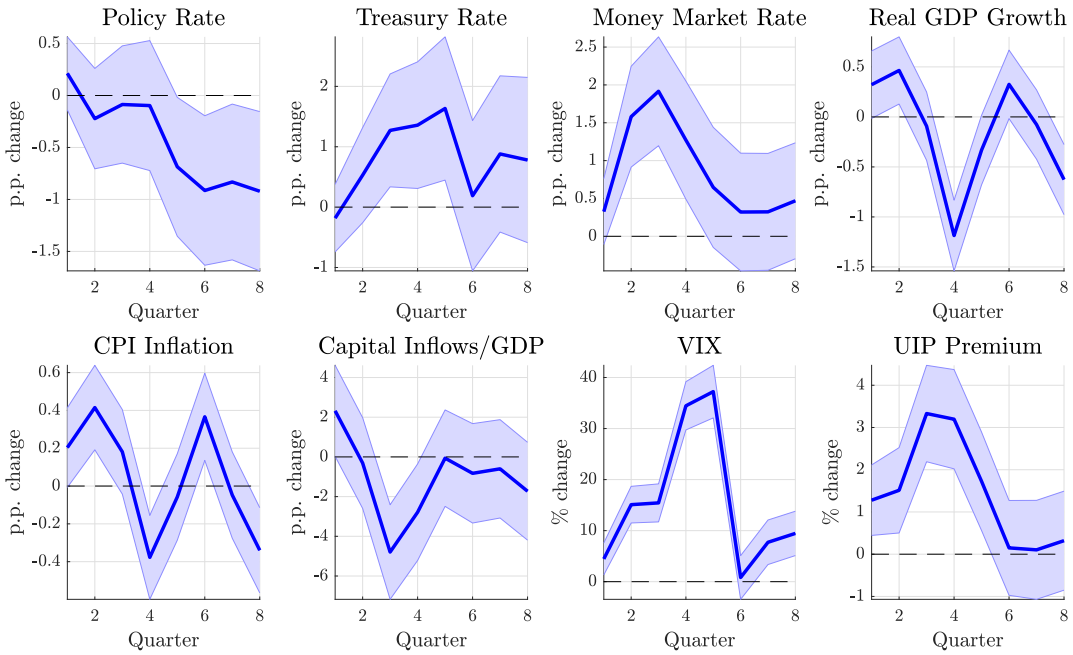
$$y_{j,t+h} = \alpha_j + \beta_h \hat{i}_t^{US} + \gamma_h W_t + \varepsilon_{j,t+h} \qquad h = 0, 1, 2, 3 \ldots \tag{5}$$

where, as above, $y_{j,t+h}$ is a vector of macro and financial variables of country j at time $t+h$, and controls (W_t) include four lags of the dependent variable, U.S. 12-month treasury rate,

[8] The countries selected as conducting interest-rate based monetary policy are: Armenia, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Egypt, Guatemala, Hungary, Malaysia, Mexico, Pakistan, Paraguay, Peru, Philippines, Poland, Romania, Russia, South Africa, Sri Lanka, Thailand, Turkey, Ukraine, Uruguay, and Vietnam.

[9] We emphasize the importance of isolating the local policy rate reaction to external U.S. monetary policy shocks, rather than examining the unconditional correlation between local and U.S. policy rates. This correlation could be influenced by the endogenous response of policy rates to numerous, potentially correlated shocks.

Figure 3: Dynamic effects of a U.S. monetary policy tightening on emerging economies



Notes: Impulse responses are obtained from panel local projections. 90% confidence intervals (calculated using Newey-West standard errors) are shown by the shaded areas. The U.S. policy (12-month U.S. treasury rate) is instrumented by Gertler and Karadi (2015) shock FF4 (estimated from surprises in 3-month Fed Fund Futures). Controls include 4 lags of the dependent variable, U.S. 12-month treasury rate, output growth and inflation differentials. The impulse is an impact 1 percentage point increase in the U.S. policy rate. These regressions feature country fixed effects.

global capital inflows, output growth differentials and inflation differentials. In regression equation (5), $\hat{i}_t^{US}$ denote the instrumented 12-month U.S. treasury rate, obtained from the first stage regression equation: $\hat{i}_t^{US} = \alpha + \delta Z_t + u_t$ where Z_t are Gertler and Karadi's (2015) estimated surprises in 3-month Fed Fund Futures. In Appendix Table B.3, we show that the monetary policy shocks from Gertler and Karadi (2015) pass conventional weak instrument tests.

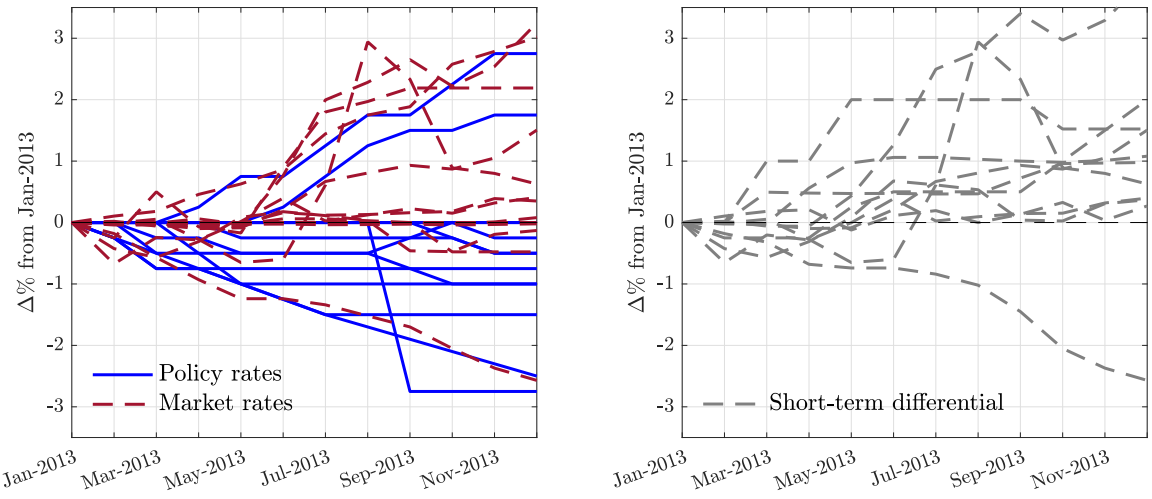
Figure 3 reports the impulse responses to an identified U.S. monetary tightening. We find that an exogenous increase in U.S. interest rates leads to a delayed decline in emerging economies' GDP with delayed capital outflows.[10] The responses of the VIX (a proxy for global risk aversion and uncertainty), and the UIP premium (the expected excess return on the home currency 1-year treasury bond) are consistent with those in Miranda-Agrippino

[10] Our measure of capital inflows is total debt inflows to GDP from Avdjiev et al. (2022).

and Rey (2020), and Kalemli-Ozcan (2019).[11]

Let us elaborate on the response of the policy rate and the short-term interest rates. In the wake of an exogenous tightening in U.S. monetary policy, central banks in EMEs cut their policy rates while both treasury and money market rates significantly increase. This evidence is consistent with the notion U.S. monetary policy shocks bring about a significant changes in risk premia, as in Kalemli-Ozcan (2019). We emphasize that the fact that emerging economies' central banks cut rates when the Fed raises the Fed Funds rate does not necessarily imply that they are insulated from the actions of the Fed. We simply observe that the response of emerging economies is to lower rates after an exogenous US monetary policy tightening. The impact of exchange rate/balance sheet effects may still be important and induce emerging economies' central banks to lower rates *less* than what they would have done if they were solely looking at domestic economic conditions.

Figure 4: Policy rates and market rates around Taper Tantrum



Notes: The figure report the p.p. change in policy rates and 3-month treasury rates in emerging economies (left panel) and the short-term differential (right panel) from January 2013.

We observe that a similar decoupling between policy rates and market rates occurred during a specific episode of unexpected U.S. monetary policy tightening, i.e. the so-called Taper Tantrum episode. The Taper Tantrum of 2013 refers to a period of financial market volatility that occurred when then Federal Reserve Chairman Ben Bernanke suggested it might scale back its quantitative easing (QE) program in May 2013. As a result of the announcement,

[11] See also Dedola et al. (2017) and Degasperi et al. (2023)

investors feared that the reduction in bond purchases would lead to rising U.S. interest rates with significant spillovers in emerging economies (see, *e.g.*, Chari et al. (2021)). Figure 4 reports the evolution of policy and market rates in emerging economies starting from January 2013. Notably, while policy rates predominantly decreased throughout 2013, market rates tended to rise during the same period. The overall evidence thus suggests that global fluctuations, driven by U.S. monetary policy, contribute to the apparent disconnect between market and policy rates in emerging economies.[12]

4 A model of banks in emerging economies

We have documented that short-term market rates decouple from policy rates in emerging economies, resulting in time-varying short-term differentials. We hypothesize that these fluctuations derive from the reliance of emerging economies' banking sector on fluctuating external funding conditions. To explore this hypothesis, we present a simple model outlining how the balance sheet of the local banking sector can transmit external financial conditions to home market rates, resulting in an incomplete pass through of local monetary policy to market rates. The model displays two empirically-relevant features of emerging economies: (i) the key role of local financial intermediaries in the short-term local currency bond market; (ii) these intermediaries' significant dependence on the global funding market. We derive testable predictions, and we take them to the data in Section 5.

Environment We start from the observation that short (safe) instruments are predominantly held by intermediaries in the country, such as commercial banks and money-market mutual funds. We argue that these intermediaries, which we call "home banks" throughout this paper, are the marginal investor in treasury and money market, hence determine home-currency market rate. This aspect of the model is consistent with the fact that local banks are often designated market makers in treasury bond markets, as well as a dominant player in the money market, in many emerging economies.

Home Banks Risk-neutral banks hold short-term market bonds (B^M_{t+1}) with gross returns in home currency R^M_t. On the liability side, home banks issue deposits to households (D_{t+1}) at the gross policy rate R^P_t in home currency or borrow from foreigners ($D^{\star,\$}_{t+1}$) at the gross

[12] Witheridge (2023) highlights that lower policy rates following a US monetary policy tightening can result in a model in which the fiscal authority does not adjust taxes sufficiently to stabilize debt, and deficits are financed by a "passive" monetary authority.

dollar interest rate $\hat{R}_t^{\star}$. Banks take borrowing rates as given.

We assume all financial contracts are short term and non-contingent. We also assume that foreign financial contracts are all denominated in foreign currency. Thus, home banks' assets are in home-currency but a fraction of their liabilities are in foreign currency. Consistent with the prevailing regulatory regimes in many emerging economies that limit currency mismatches on the balance sheet of financial intermediaries, we assume that home banks hedge their foreign-currency liability positions. The banks' realized profits at $t+1$ are therefore

$$\Pi_{t+1}^{B} = B_{t+1}^{M} - D_{t+1} - F_t D_{t+1}^{\star,\$}, \tag{6}$$

where $F_t \equiv F_{t,t+1}$ denotes the forward exchange rate, defined as the forward price of dollars in terms of home currency. Hedging of foreign currency positions implies that the banks' time-$t+1$ dollar debt is converted into home currency at the forward rate F_t. The balance sheet accounting identity reads

$$\frac{B_{t+1}^{M}}{R_t^{M}} = \frac{D_{t+1}}{R_t^{P}} + \frac{S_t D_{t+1}^{\star,\$}}{\hat{R}_t^{\star}}. \tag{7}$$

The balance sheet accounting identity implies that time-t total assets equal time-t total liabilities, expressing the time-t dollar liability position in home currency at the spot exchange rate S_t.

To simplify the analysis, we abstract from modeling the investment and funding decisions of these banks, and assume they have some pre-existing financial positions, which are possibly time-varying. We use ω_t to denote the banks' share of external liabilities in total liabilities (using eq. (7)):

$$\omega_t = \frac{\frac{S_t D_{t+1}^{\star,\$}}{\hat{R}_t^{\star}}}{\frac{D_{t+1}}{R_t^{P}} + \frac{S_t D_{t+1}^{\star,\$}}{\hat{R}_t^{\star}}} = \frac{S_t D_{t+1}^{\star,\$}}{B_{t+1}^{M}} \frac{R_t^{M}}{\hat{R}_t^{\star}}.$$

Using these definitions, home bank's profits can be written as:

$$\Pi_{t+1}^{B} \equiv \left(1 - (1-\omega_t)\frac{R_t^{P}}{R_t^{M}} - \omega_t \left(\frac{F_t}{S_t}\right)\frac{\hat{R}_t^{\star}}{R_t^{M}}\right) B_{t+1}^{M} \tag{8}$$

Risk-neutrality and perfect competition across banks drive expected bank profits to zero in

each period, and the short-term market rate would thus be:

$$R_t^M = (1-\omega_t)R_t^P + \omega_t \left(\frac{F_t}{S_t}\right) \hat{R}_t^\star. \tag{9}$$

The local-currency short-term market rate R_t^M reflects the marginal funding costs of home banks, *i.e.* a weighted average of local policy rates and external funding conditions (evaluated in home-currency). A first implication of equation (9) is that the pass-through of monetary policy to short-term rates is incomplete: an increase in the local policy rate implies a less than one-to-one increase in the short-term market rate, for given external funding conditions. Moreover, the degree of pass-through incompleteness depends on local banks' reliance on the global funding market, governed by ω_t. If $\omega_t = 0$, the pass-through is complete because local banks entirely rely on local deposits. Instead, if $\omega_t = 1$, the pass-through is zero as local banks only borrow from the global funding market. For intermediate levels of banks' external exposure, $\omega_t \in (0,1)$, the pass-through of domestic monetary policy is incomplete.

Short-term differential Using the covered interest parity condition ($F_t/S_t = R_t^M/R_t^\star$), we rearrange equation (9) and how the short-term differential is related to external dollar funding costs and the external exposure of the domestic banking sector:

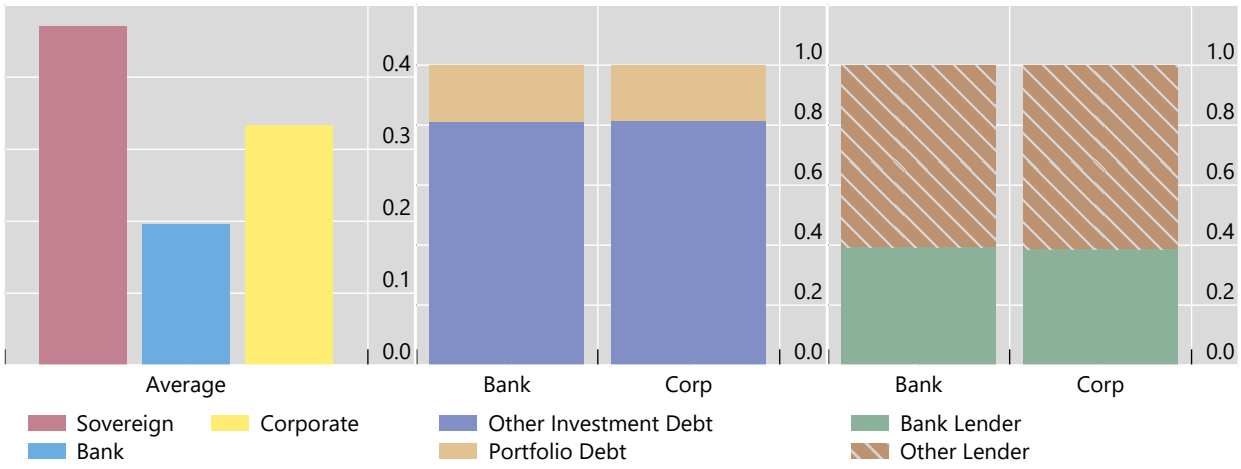
$$\underbrace{\frac{R_t^M - R_t^P}{R_t^M}}_{\substack{\text{Short-term} \\ \text{differential}_t}} = \underbrace{\frac{\omega_t}{1-\omega_t}}_{\substack{\text{Banks} \\ \text{external} \\ \text{exposure}_t}} \underbrace{\left(\frac{\hat{R}_t^\star - R_t^\star}{R_t^\star}\right)}_{\substack{\text{Dollar funding} \\ \text{premium}_t}}. \tag{10}$$

First, the short-term differential comoves with the dollar funding premium as long as the foreign liability share is positive ($\omega_t > 0$). A higher dollar premium results in an increase in the short-term differential. It increases the costs of funding of local banks and, in turn, they pass them to market rates in proportion to banks' external exposure.[13]

Second, the short-term differential increases with banks' external exposure, as measured by the the share of external borrowing relative to total borrowing, as long as the dollar funding premium is positive ($\hat{R}_t^\star - R_t^\star > 0$, the empirically relevant case). In the model, a higher fraction of external liabilities increases banks' borrowing costs, which, in turn, pass them to

[13] Bianchi and Lorenzoni (2022) propose a model in which time-varying dollar premium – due to changes in risk appetite of global intermediaries – is a primary source of economic fluctuations in emerging economies. We model these premia as an exogenous variable, and study how changes in them influence the home bank's demand for the market bond. In principle, however, the dollar funding premium can be correlated with domestic or external shocks, including US monetary policy surprises.

Figure 5: Facts about the external debt of emerging economies



(a) Share of External Debt **(b)** Shares of Instruments **(c)** Shares of Lenders

Notes: The source of the data for these figures is Avdjiev et al. (2022). See also Fang et al. (2022), Hardy and Zhu (2023), and Arslanalp and Tsuda (2014). The data are stocks in 2022:Q4 for 34 emerging economies.

market rates in proportion to banks' external exposure.

Evidence on the external debt of emerging economies The model delivers a tight link between banks' external funding conditions and the local market rate. Two elements primarily contribute to this result. First, home financial intermediaries are the key players in the short-term home-currency bond market. Using data from Fang et al. (2022) and Hardy and Zhu (2023), we gather that domestic banks held, on average, around 30% of outstanding government bonds in emerging economies in 2022. The second key element is that home banks borrow a fraction of their liabilities from the global funding market in U.S. dollars. Hahm et al. (2013) shows that the share of external liabilities of the domestic banking sector is around 35% on average for the emerging economies reporting to BIS.

In Figure 5, we report some evidence on the relevance of the intermediary role of domestic and global banks. Using 34 emerging economies in 2022, panel (a) shows that most of the foreign capital is borrowed by the sovereign of the country, followed by corporates and then banks. Historically, banks and corporates had equal shares, and banks had even higher shares if one includes the 1980s and 1990s (Avdjiev et al., 2022). Here, we plot the latest year available to show that banks are still important intermediaries notwithstanding changing patterns in global liquidity where non-bank lenders acquire an increasingly important role

and domestic corporates issue more international bonds as EMs increasingly join corporate bond indices. Panel (b) zooms in blue (bank) and yellow (corporate) bars in panel (a) and documents that when these borrowers borrow, they mainly borrow using loans (purple) and not bonds (brown). Panel (c) zooms in that brown part of panel (b) and reports the type of lender for the "Portfolio debt" in panel (b). Even though a large part of the portfolio flows come from non-bank lenders (brown-white stripes), as also documented by the literature (e.g. Avdjiev et al., 2020), a non-negligible part shown in green in panel (c) comes from global banks. Global banks are also the lenders accounting for the "Other Investment Debt", *i.e.* loans, section in panel (b).

These patterns are interesting. Despite the rise in global non-bank financial intermediation via portfolio investors (such as mutual funds) for emerging markets, global and domestic banks remain the main intermediaries that allocate and intermediate global capital to and within these countries, supporting the main structure of our model.

5 Short rate disconnect and global financial conditions

We have documented that short-term market rates tend to depart from policy rates over the business cycle in emerging economies. In this section, we verify that the time-varying short-term differentials correlate with the premium on dollar funding, influenced by conditions in global financial markets, and the banking sector's external exposure.

We use the EMBI spread to proxy for the premium that a country pays on its dollar-denominated bonds relative to U.S. bonds $\hat{R}^{\star}_t - R^{\star}_t$.[14] To measure the share of external liabilities of the banking sector we use domestic banks' foreign liabilities (portfolio debt + other investment debt) as fraction of total domestic banks' liabilities (domestic + external) from Avdjiev et al. (2022).

Table 2 reports the estimated coefficients of a panel regression of the short-term differential on the dollar funding premium and banks' external exposure. The regression is at monthly frequency and includes country fixed effects, or country and time fixed effects.

First, Table 2 reveals that the short-term differential – the difference between the *home* market rate and the *home* policy rate – significantly comoves with the the dollar funding premium, a measure that is heavily influenced by *global* financial conditions. A 10 p.p. increase

[14] See Gopinath et al. (2023) who shows that dollar premium for sovereign bonds correlates with U.S. monetary policy shocks and VIX.

Table 2: Short-term differential and funding conditions

	Dependent variable: Short-term differential					
Dollar Funding Premium	0.211***		0.154***	0.157***		0.088*
	(0.030)		(0.029)	(0.036)		(0.036)
Banks External Exposure		0.144***	0.133***		0.126***	0.120***
		(0.012)	(0.012)		(0.012)	(0.012)
R-squared	0.442	0.460	0.465	0.496	0.512	0.513
Observations	3027	3027	3027	3027	3027	3027
Countries	30	30	30	30	30	30
Country FE	✓	✓	✓	✓	✓	✓
Time FE				✓	✓	✓

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: We use the EMBI spread to proxy for the premium that a country pays on its dollar-denominated bonds relative to U.S. bonds $\hat{R}_t^\star - R_t^\star$. To measure the share of external liabilities of the banking sector we use domestic banks' foreign liabilities (portfolio debt + other investment debt) as fraction of total domestic banks' liabilities (domestic + foreign) from Avdjiev et al. (2022).

in the EMBI spread is associated, on average, with around 1.5-2 p.p. increase in the short-term market rate relative to the policy rate. This supports the model's prediction that fluctuations in a country's external funding conditions transmit to the short-term market rate and contribute to its divergence from the policy rate.

Second, Table 2 indicates that the short-term differential widens at higher levels of banks' external exposure. Specifically, a 10 p.p. increase in a country's share of external liabilities corresponds to a 1-1.5 p.p. higher short-term differential. This relationship is both statistically and economically significant, and it supports the model's prediction. In the model, when external funding is costlier than domestic funding, an increase in banks' external exposure leads to a rise in their overall cost of funding, and this cost is transmitted to local market rates.[15]

Finally, in our analysis, we have operated under the assumption that the covered interest parity (CIP) condition remains valid. Should CIP not hold, the short-term differential would exhibit comovement with CIP deviations. Deviations from CIP would indeed impact the

[15] Appendix Table C.1 indicates that money market rates are also related to banks' external exposure and funding conditions.

funding costs of domestic banks, leading to fluctuations in the required return on the domestic market bond. In a prior version of this paper, we empirically confirmed that the short-term differential exhibits a significant correlation with CIP deviations for a subset of economies of Table 2 for which we could construct reliable CIP deviations. This finding aligns with recent evidence from Keller (2021) suggesting that banks in Peru engage in arbitrage when faced with higher CIP deviations. Importantly, we found no systematic relationship between the short-term differential and movements in uncovered interest parity (UIP) deviations. This is consistent with the model in Section 4, where banks fully hedge their foreign-currency positions. It is worth noting that UIP deviations may still significantly influence emerging economies through channels other than fluctuations in the short-term differentials.

6 Conclusions

Understanding how central banks conduct monetary policy in emerging economies is crucial as they face complex and evolving trade offs (Gourinchas, 2018; Akinci and Queraltó, 2018; Kalemli-Ozcan, 2019; Egorov and Mukhin, 2020; Boz et al., 2020; Auclert et al., 2021). In this paper, we document that the monetary policy transmission in emerging economies is impaired, in a way that manifests itself through a disconnect between policy rates and short-term market rates. Even though central banks respond to economic recessions by cutting policy rates – a counter-cyclical monetary policy stance – their stimulus transmits to short-term market rates – the rates relevant for consumption and investment decisions – only imperfectly.

We provide evidence that the short-term disconnect is related to fluctuations in external financial conditions, even after controlling for VIX/time fixed effects. We interpret this evidence through the lenses of a simple model of the banking sector of emerging economies. If local banks borrow a fraction of their liabilities from the global funding market in US dollar and hedge their currency mismatch, market rates departs from the policy rate and the differential is related to global funding conditions and the external borrowing of domestic banks.

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Appendix

A Sample

Table A.1: List of countries

A. Emerging Economies

Afghanistan, Islamic Republic of	Ecuador	Malta	Serbia, Republic of
Albania	Egypt	Mauritania	Seychelles
Angola	Gambia, The	Mauritius	Sierra Leone
Argentina	Georgia	Mexico	Singapore
Armenia, Republic of	Ghana	Moldova	Slovak Republic
Azerbaijan, Republic of	Guatemala	Mongolia	Slovenia
Bangladesh	Hungary	Morocco	South Africa
Belarus	India	Mozambique	Sri Lanka
Bolivia	Indonesia	Myanmar	Tanzania
Brazil	Iraq	Nepal	Thailand
Bulgaria	Jamaica	Nicaragua	Tunisia
Cambodia	Kazakhstan	Nigeria	Turkey
Chile	Kenya	Pakistan	Uganda
China	Korea, Republic of	Paraguay	Ukraine
Colombia	Kosovo, Republic of	Peru	Uruguay
Congo, Democratic Republic of	Kuwait	Philippines	Vietnam
Costa Rica	Kyrgyz Republic	Poland	Zambia
Croatia	Latvia	Romania	
Czech Republic	Libya	Russian Federation	
Dominican Republic	Malaysia	Rwanda	

B. Advanced Economies

Australia	Germany	Japan	Sweden
Canada	Iceland	New Zealand	Switzerland
Denmark	Ireland	Norway	United Kingdom
Euro Area	Israel	Portugal	
Finland	Italy	Spain	

Table A.2: Dataset: policy rates

Country	Start	End	Observations	Country Group	Source	*Bloomberg* ticker
Australia	1990q1	2018q4	116	AE	BIS, IMF	
Canada	1992q4	2017q3	100	AE	BIS, IMF	
Denmark	1990q1	1998q4	36	AE	BIS, IMF	
Euro Area	1998q4	2018q4	81	AE	Bloomberg	EURR002W
Germany	1990q1	1998q4	36	AE	Bloomberg	DERPDRT

Iceland	1998q1	2018q4	76	AE	BIS, Bloomberg	ICBRANN
Israel	1995q1	2018q4	96	AE	BIS, Bloomberg	ISBRANN
Japan	2008q4	2015q4	29	AE	BIS, Bloomberg	BOJDPBAL
New Zealand	1999q1	2018q4	80	AE	BIS, IMF	
Norway	1990q1	2017q1	109	AE	BIS, IMF	
Portugal	1990q1	1993q2	14	AE	IMF	
Sweden	1994q2	2014q4	75	AE	BIS, Bloomberg	SWRRATEI
Switzerland	2000q1	2011q2	46	AE	BIS, Bloomberg	SZLTTR
United Kingdom	1990q1	2018q4	116	AE	BIS, Bloomberg	UKBRBASE
Afghanistan, Islamic Republic of	2015q1	2018q4	16	EME	.	
Albania	1992q3	2013q4	86	EME	IMF	
Angola	2011q4	2018q4	29	EME	IMF	
Argentina	2002q1	2018q4	68	EME	BIS, Bloomberg	ARLLMONP
Armenia, Republic of	1999q4	2018q4	77	EME	IMF	
Azerbaijan, Republic of	1993q1	2018q4	27	EME	IMF	
Bangladesh	1990q1	2011q4	88	EME	Bloomberg	BNRPREPO
Belarus	2000q1	2018q4	44	EME	IMF	
Bolivia	1999q1	2008q3	39	EME	Bloomberg	BOPXIX
Brazil	1994q3	2018q4	98	EME	BIS, IMF	
Bulgaria	1991q1	1996q4	24	EME	IMF	
Cambodia	1994q1	1997q3	13	EME	IMF	
Chile	1995q2	2018q4	95	EME	BIS, IMF	
China	2005q3	2018q4	54	EME	BIS, Bloomberg	CHLR12MC
Colombia	1995q2	2018q4	95	EME	BIS, IMF	
Congo, Democratic Republic of	2006q1	2018q2	26	EME	IMF	
Costa Rica	2006q1	2018q4	52	EME	IMF	
Croatia	1993q4	1998q4	21	EME	BIS, IMF	
Czech Republic	1995q4	2018q4	93	EME	BIS, Bloomberg	CZARANN
Dominican Republic	2004q1	2017q3	55	EME	Bloomberg	BCRDONRT
Egypt	2006q1	2018q4	39	EME	Bloomberg	EGBRDRAR
Gambia, The	1990q1	2018q4	116	EME	IMF	
Georgia	2008q1	2018q4	44	EME	Bloomberg	9151P270
Ghana	1990q1	2018q1	113	EME	Bloomberg	GHBRPOLA
Guatemala	1997q1	2018q4	88	EME	Bloomberg	GUIRLR
Hungary	1990q1	2018q4	116	EME	BIS, Bloomberg	HBBRANN
India	1990q1	2018q4	100	EME	BIS, Bloomberg	RSPOYLDP
Indonesia	1990q1	2018q4	116	EME	BIS, IMF	
Iraq	2004q3	2008q4	18	EME	Bloomberg	IQITPR
Jamaica	2002q1	2018q1	65	EME	.	
Kazakhstan	2005q2	2018q4	55	EME	IMF	
Kenya	2006q2	2018q3	50	EME	IMF	
Korea	1999q2	2018q4	79	EME	BIS, IMF	
Kuwait	1990q1	2002q4	50	EME	IMF	
Kyrgyz Republic	2000q1	2018q4	76	EME	IMF	
Libya	1990q1	2013q1	76	EME	IMF	
Malaysia	1995q4	2018q4	66	EME	BIS, IMF	
Malta	1990q1	2007q4	72	EME	IMF	
Mauritania	1990q1	2012q4	92	EME	IMF	
Mauritius	2006q4	2018q4	49	EME	IMF	
Mexico	1998q4	2018q4	81	EME	BIS, Bloomberg	2736R001
Moldova	2000q1	2018q4	76	EME	Bloomberg	9216R001
Mongolia	2007q3	2018q4	46	EME	IMF	
Morocco	1994q1	2008q2	48	EME	IMF	

Mozambique	2012q1	2018q4	23	EME	Bloomberg	MZBRANN
Myanmar	2012q2	2018q2	25	EME	Bloomberg	MMDRCBR
Nepal	1990q1	2018q4	105	EME	IMF	
Nicaragua	1990q1	1995q1	14	EME	IMF	
Nigeria	2007q1	2018q4	48	EME	Bloomberg	NGCBANN
Paraguay	2011q1	2018q4	32	EME	IMF	
Peru	2001q1	2018q4	72	EME	BIS, Bloomberg	PRRRONUS
Philippines	1990q1	2018q4	108	EME	BIS, Bloomberg	PPCBON
Poland	1993q1	2018q4	96	EME	BIS, Bloomberg	POREANN
Romania	2003q1	2012q3	39	EME	BIS, Bloomberg	ROKEPOLA
Russia	1992q1	2018q4	98	EME	BIS, IMF	
Rwanda	1990q1	2017q2	99	EME	IMF	
Serbia	1997q1	2018q4	80	EME	BIS, Bloomberg	SEKEPOLA
Sierra Leone	1990q1	2018q4	44	EME	Bloomberg	7246R001
Singapore	1990q1	2018q4	116	EME	Bloomberg	5766R001
Slovak Republic	2001q2	2008q4	31	EME	IMF	
Slovenia	1992q1	2001q2	38	EME	IMF	
South Africa	1995q1	2018q4	96	EME	BIS, IMF	
Tanzania	1992q2	2012q4	83	EME	IMF	
Thailand	2000q2	2018q4	75	EME	BIS, Bloomberg	BTRRHALL
Tunisia	2000q1	2018q4	76	EME	Bloomberg	TNPORATE
Turkey	1990q1	2018q4	115	EME	BIS, Bloomberg	TUBROBRA
Uganda	2011q3	2018q4	22	EME	Bloomberg	UGCBANNC
Uruguay	2007q3	2018q2	44	EME	Bloomberg	URDAIC
Vietnam	1996q1	2018q3	91	EME	IMF	
Zambia	2012q2	2018q4	27	EME	Bloomberg	ZMCBRATE

Notes: The table reports the sample coverage of policy rates and their sources. When data come from national sources we retrieve it from *Bloomberg* and report the relevant *Bloomberg* ticker in the last column.

Table A.3: Dataset: treasury rates

Country	Start	End	Observations	Country Group	Source	*Bloomberg* ticker
Australia	2009q2	2018q4	39	AE	Bloomberg	GACGB3M
Canada	1997q3	2018q4	85	AE	IMF, Bloomberg	GCAN3M,1566591
Denmark	1993q2	1998q4	23	AE	Bloomberg	GDGT3M
Germany	1993q2	1998q4	23	AE	Bloomberg	GETB1
Iceland	2000q1	2018q3	51	AE	Bloomberg	ICLB3MAY
Israel	1992q1	2018q4	108	AE	Bloomberg	ISMB03M
Italy	1990q4	1996q3	24	AE	Bloomberg	GBOTS3MO
Japan	1992q3	2014q3	89	AE	Bloomberg	GJTB3MO,GTJPY3MGovt
New Zealand	1999q1	2018q4	80	AE	Bloomberg	NZB3MAY
Norway	1995q2	2018q4	95	AE	Bloomberg	GNGT3M
Portugal	1990q1	1993q2	14	AE	IMF, Bloomberg	GTPTE3MGovt,1826591
Sweden	1993q2	2015q1	88	AE	Bloomberg	GSGT3M
Switzerland	2002q1	2011q2	38	AE	Bloomberg	SWIB3MAY
United Kingdom	2000q1	2018q4	76	AE	Bloomberg	UKTT3MAY
Albania	2010q1	2013q4	16	EME	IMF, Bloomberg	ALAT3MAV,9146591
Angola	2004q3	2018q3	34	EME	Bloomberg	AOTB3MAY,6146R005
Argentina	2015q4	2018q3	12	EME	Bloomberg	LBAC3MAY
Armenia, Republic of	2010q4	2018q4	32	EME	Bloomberg	ARTB3MAY

Brazil	2007q1	2018q4	48	EME	IMF, Bloomberg	2236591,GEBR03M
China	2011q1	2018q4	32	EME	Bloomberg	GCNY3M,OECNR002,findIMFversion
Czech Republic	1993q3	2018q4	83	EME	Bloomberg	9356R003,CZTA3MAY
Egypt	2006q1	2018q4	52	EME	Bloomberg	EGTBY3,EGPT3MCBEP
Gambia, The	2015q3	2018q4	12	EME	Bloomberg	CBGMTP3M
Ghana	1990q1	2018q4	116	EME	IMF, Bloomberg	6526591,GHAB3MAY
Hungary	1990q1	2018q3	114	EME	IMF, Bloomberg	HUTZ3MAY,GTHUF3MGovt,9446591
India	2000q2	2018q1	72	EME	Bloomberg	IYTB3M,FBTB3M
Indonesia	2012q1	2018q4	28	EME	Bloomberg	BV3M0132,ASCIAY3M
Iraq	2002q4	2008q4	22	EME	Bloomberg	4336R002
Jamaica	1997q4	2018q4	75	EME	Bloomberg	JMTB3MYL
Kenya	1995q1	2018q4	96	EME	IMF, Bloomberg	KNRETB91,6646591
Korea	1999q2	2018q4	69	EME	Bloomberg	GTKRW3MGovt
Kosovo, Republic of	2012q1	2017q1	12	EME	Bloomberg	KSTT3MAY
Kuwait	1990q1	2002q4	46	EME	IMF	
Kyrgyz Republic	1994q1	2018q4	100	EME	IMF	
Latvia	1994q3	1999q4	22	EME	IMF, Bloomberg	LRTB03AD,9416591
Malaysia	1990q1	2016q4	80	EME	IMF, Bloomberg	MA3MAY,C1133M,5486R001,5486591
Malta	1990q1	2007q4	72	EME	IMF, Bloomberg	1816591,CBMP3M
Mauritius	1997q3	2018q4	77	EME	Bloomberg	BMTB91WY
Mexico	1991q1	2018q4	105	EME	Bloomberg	GCETAA91,MPTBCCMPNCurncy
Moldova	2013q2	2018q4	23	EME	Bloomberg	MKTB3MNY
Mongolia	2012q4	2017q3	18	EME	Bloomberg	MGFX12WK
Mozambique	2003q2	2018q3	62	EME	IMF, Bloomberg	MZTB3MAY,6886591
Myanmar	2015q1	2018q4	16	EME	Bloomberg	MB3MAY
Nepal	1990q1	2018q4	106	EME	IMF, Bloomberg	NPRTTB91,5586591
Nigeria	2008q1	2018q4	44	EME	Bloomberg	NIAT3MAV,NGTB3M
Pakistan	1998q3	2018q4	81	EME	Bloomberg	PAK3CY
Philippines	1990q1	2018q3	106	EME	IMF, Bloomberg	GTPHP3MGovt,5666591
Poland	1995q2	2008q4	48	EME	Bloomberg	PDAT3MAY
Romania	1994q1	2012q3	67	EME	IMF	
Russia	2010q1	2018q4	36	EME	Bloomberg	MICXRU3M
Rwanda	2009q2	2018q4	38	EME	Bloomberg	RWTB3MAY
Serbia	2003q2	2016q1	49	EME	Bloomberg	SRAT3MAV,BIEEBO3M
Seychelles	2008q1	2018q4	44	EME	Bloomberg	SCTB3MAY
Sierra Leone	1990q1	2018q4	116	EME	IMF, Bloomberg	SETT3MAY,7246591
Singapore	1998q1	2018q4	84	EME	Bloomberg	MASB3M
Slovenia	1998q2	2001q2	13	EME	IMF, Bloomberg	9616591,SVAT3MAY
South Africa	1995q1	2018q4	96	EME	IMF, Bloomberg	SATA3MAV,1996591
Sri Lanka	1995q1	2018q4	96	EME	Bloomberg	SLTN3MYD
Tanzania	1993q4	2018q2	99	EME	IMF, Bloomberg	TZTB3MAY,7386591
Thailand	1999q4	2018q2	58	EME	Bloomberg	TH3MAY
Turkey	1990q1	2008q2	58	EME	IMF	
Uganda	1990q1	2018q4	116	EME	IMF, Bloomberg	UATB3MAY,7466591
Ukraine	2014q1	2018q4	11	EME	Bloomberg	UKAUAY3M
Uruguay	2015q2	2018q3	13	EME	Bloomberg	NUTB3MAY
Zambia	2003q4	2018q4	61	EME	Bloomberg	ZMITTBAM,ZITB3MAY

Notes: The table reports the sample coverage of treasury rates and their sources. When data come from national sources we retrieve it from *Bloomberg* and report the relevant *Bloomberg* ticker in the last column.

Table A.4: Dataset: money market rates

Country	Start	End	Observations	Country Group	Source	*Bloomberg* ticker
Australia	1996q4	2018q4	89	AE	Bloomberg	ADBB3MCMPNCurncy
Canada	1991q4	2018q4	109	AE	Bloomberg	CDOR03
Denmark	1990q1	1998q4	36	AE	Bloomberg	CIBO03M
Euro Area	1998q4	2014q4	65	AE	Bloomberg	EUDRCCMPNCurncy
Finland	1990q1	1994q4	20	AE	IMF	
Iceland	1998q3	2018q4	82	AE	Bloomberg	SEDL3MDE
Ireland	1991q2	1996q3	22	AE	Bloomberg	DIBO03M
Israel	2000q4	2018q4	73	AE	Bloomberg	TELBOR03
Italy	1991q1	1996q3	23	AE	Bloomberg	RIBORM3M
Japan	1990q1	2017q2	106	AE	Bloomberg	JY0003M
New Zealand	1995q4	2018q4	93	AE	Bloomberg	NDBB3MCMPNCurncy
Norway	1990q1	2018q4	116	AE	Bloomberg	NIBOR3M
Portugal	1990q1	1993q2	14	AE	Bloomberg	OEPTR005
Sweden	1990q1	2015q1	101	AE	Bloomberg	STIB3M
Switzerland	1990q1	2011q2	86	AE	Bloomberg	SF0003M
United Kingdom	1990q1	2018q4	116	AE	Bloomberg	BP0003M
Argentina	2001q4	2011q4	41	EME	Bloomberg	ARLBP90
Chile	2001q4	2018q4	69	EME	Bloomberg	CLTN90DS,CLTN90DN
China	2005q3	2018q4	54	EME	Bloomberg	CNIBR3M,SHIF3M
Colombia	1995q1	2018q4	96	EME	Bloomberg	COMM90D
Costa Rica	2016q1	2018q4	12	EME	Bloomberg	CRRI3M
Czech Republic	1993q2	2018q4	103	EME	Bloomberg	PRIB03M
Hungary	1997q2	2018q4	87	EME	Bloomberg	BUBOR03M
India	1998q4	2018q4	81	EME	Bloomberg	IN003M
Indonesia	1997q2	2018q4	87	EME	Bloomberg	JIIN3M
Kazakhstan	2001q3	2018q4	70	EME	Bloomberg	KZDR90D
Korea	2004q3	2018q4	58	EME	Bloomberg	KRBO3M
Kuwait	1990q1	2002q4	44	EME	IMF, Bloomberg	KIBOB3M,4436586
Malaysia	1990q1	2018q4	89	EME	Bloomberg	KLIB3M
Mexico	1997q1	2018q4	88	EME	IMF, Bloomberg	MXIB91DT,2736586
Nigeria	2008q1	2018q4	42	EME	Bloomberg	NRBO3M
Pakistan	2001q3	2018q4	69	EME	Bloomberg	PKDP3M
Paraguay	2012q3	2018q4	26	EME	Bloomberg	PYMM3MON
Peru	2002q3	2018q4	66	EME	Bloomberg	PRBOPRB3
Philippines	2001q2	2018q4	70	EME	Bloomberg	PREF3MO
Poland	1996q3	2018q4	90	EME	Bloomberg	WIBR3M
Romania	1998q1	2012q3	59	EME	Bloomberg	BUBR3M
Russia	2000q3	2018q4	74	EME	Bloomberg	MMIBR3M,MOSKP3
Serbia	2005q3	2018q4	54	EME	Bloomberg	9421P276
Singapore	1999q3	2018q4	78	EME	Bloomberg	SIBF3M
Slovak Republic	1995q1	2008q4	56	EME	Bloomberg	BBOR3M
South Africa	1999q1	2018q4	80	EME	Bloomberg	JIBA3M
Sri Lanka	2000q4	2018q4	70	EME	Bloomberg	SLBR3MON
Thailand	2002q2	2018q4	67	EME	Bloomberg	BOFX3M
Tunisia	2016q2	2018q4	11	EME	Bloomberg	TUNBOR3M
Turkey	2006q4	2018q4	49	EME	Bloomberg	TRLXB3M
Vietnam	2009q2	2018q4	39	EME	Bloomberg	VNCD3MO

Notes: The table reports the sample coverage of money market rates and their sources. When data come from national sources we retrieve it from *Bloomberg* and report the relevant *Bloomberg* ticker in the last column.

B Additional Tables and Figures

Taylor rule estimates excluding high-inflation countries and crisis periods Table B.1 reports the estimates of Taylor rule coefficients for a sample that excludes countries that have experienced inflation rates above 40 percent over a 12-month period and periods during the 6 months immediately following a currency crisis and accompanied by a regime switch.[16] The results for this subsample of EMEs are reported in Table B.1.

Table B.1: Estimated central banks' reaction function (excluding high-inflation countries and crisis periods)

	Emerging Economies		Advanced Economies	
	i_t^P	i_t^P	i_t^P	i_t^P
i_{t-1}^P	0.889***	0.873***	0.944***	0.930***
	(0.0066)	(0.0073)	(0.0075)	(0.0082)
π_t	0.213***	0.330***	0.304***	0.265***
	(0.023)	(0.027)	(0.029)	(0.028)
ΔGDP_t	0.0102***		0.00133	
	(0.0034)		(0.0017)	
output gap_t		0.0324**		0.0844***
		(0.016)		(0.011)
R-squared	0.90	0.89	0.96	0.95

Notes: The table reports estimates of equation (1) by OLS. For both emerging and advanced economies, the first specification uses real GDP growth to proxy for economic activity while the second specification uses the output gap. These regressions feature country fixed effects. Data are at a quarterly frequency. Standard errors are reported in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

Results for subsample of EMEs that conduct interest-rate-based monetary policy Here we report our main results for the subsample of EMEs that uses a policy rate as the primary monetary policy instrument for most part of the sample period, following Brandão-Marques et al.'s (2021) classification based on the examination of historical reports, such as

[16] Thus, we exclude the "freely falling" category in Ilzetzki et al. (2019).

Table B.2: Estimated central banks' reaction function (including rate of exchange rate depreciation)

	Emerging Economies		Advanced Economies	
	i_t^P	i_t^P	i_t^P	i_t^P
i_{t-1}^P	0.857***	0.824***	0.939***	0.921***
	(0.0057)	(0.0078)	(0.0075)	(0.0094)
π_t	0.356***	0.368***	0.290***	0.289***
	(0.027)	(0.034)	(0.029)	(0.031)
ΔGDP_t	0.00908**		0.00109	
	(0.0037)		(0.0018)	
output gap_t		0.0780***		0.0966***
		(0.020)		(0.013)
Δ Spot Ex. Rate_t	0.0681***	0.0573***	-0.0199***	-0.0157***
	(0.0071)	(0.0077)	(0.0043)	(0.0044)
R-Squared	0.93	0.87	0.95	0.95

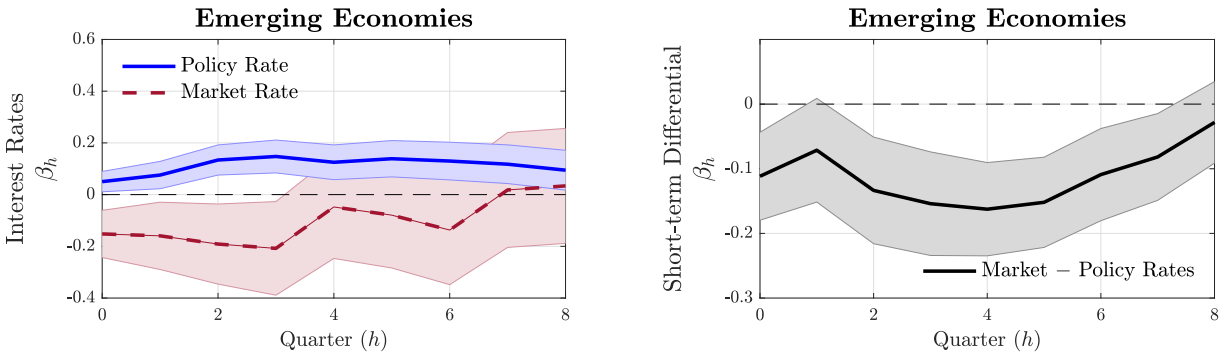
Notes: The table reports estimates of equation (1) by OLS. For both emerging and advanced economies, the first specification uses real GDP growth to proxy for economic activity while the second specification uses the output gap. These regressions feature country fixed effects. Data are at a quarterly frequency. Standard errors are reported in parentheses (* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$).

IMF Article IV staff reports, and monetary policy reports issued by central banks. The countries selected as conducting interest-rate based monetary policy are: Armenia, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Egypt, Guatemala, Hungary, Malaysia, Mexico, Pakistan, Paraguay, Peru, Philippines, Poland, Romania, Russia, South Africa, Sri Lanka, Thailand, Turkey, Ukraine, Uruguay, and Vietnam. The results for this subsample of EMEs are reported in Figure B.1.

C Money-market rates in emerging economies

Figure B.1: Cyclical behavior of interest rates in emerging and advanced economies (using sub-sample of EMEs that conduct interest-rate-based policy)

(a) Policy rates and market rates



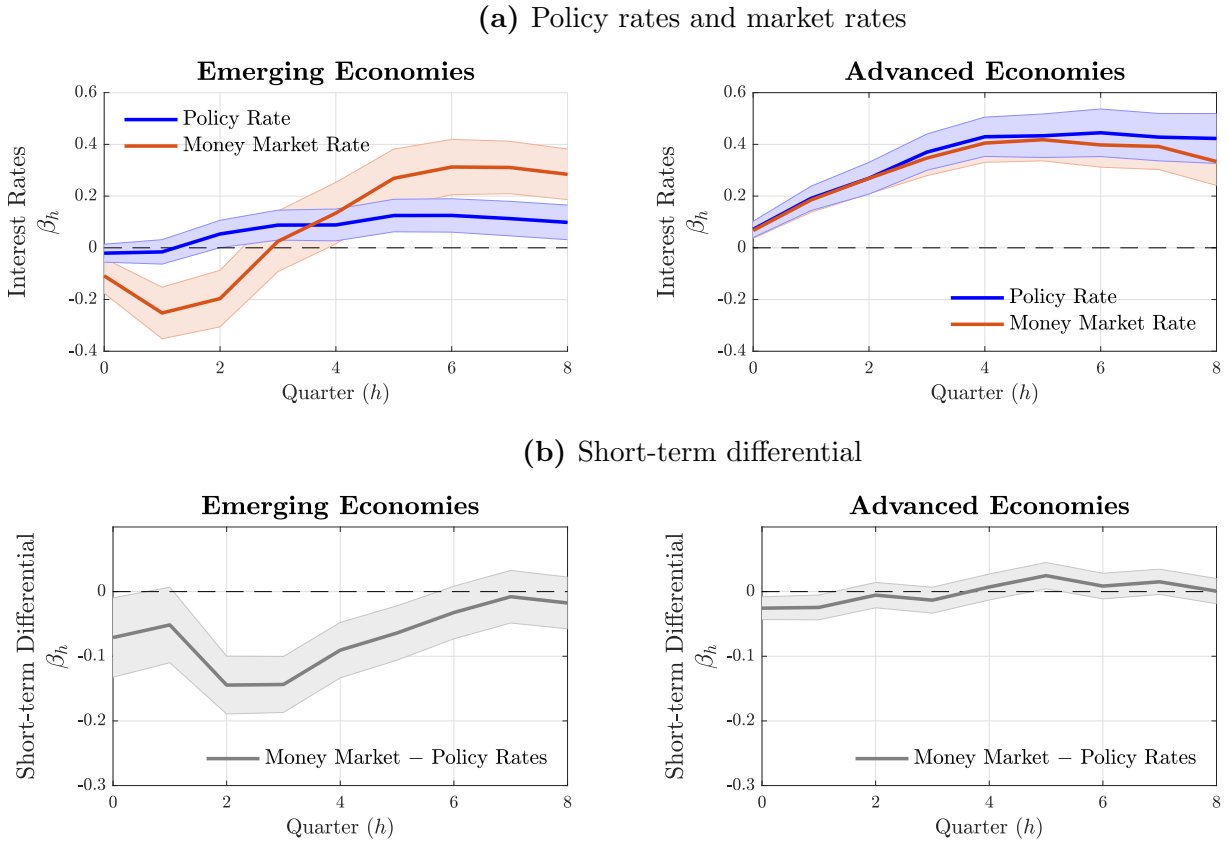
Notes: The figure reports the panel estimates of β_h's in regression equations (2) and (3) and regression equation (4). 90% confidence intervals are shown by the shaded areas. These regressions feature country fixed effects. Data are at a quarterly frequency.

Table B.3: Weak instrument test for U.S. monetary policy shock

Dependent variable	Cragg-Donald Wald F statistic	Kleibergen-Paap rk Wald F statistic
Policy Rate	311.90	311.87
Treasury Rate	173.63	173.69
Money Market Rate	180.50	180.48
Real GDP growth	458.87	459.21
CPI Inflation	476.25	476.86
Capital Inflows/GDP	304.05	304.03
VIX	442.12	442.80
UIP Premium	95.12	95.07

Note: The weak instrument test results are displayed above for the baseline specification (Figure 3) and for $h = 1$. We report the Cragg-Donald Wald F statistic and the Kleibergen-Paap rk Wald F statistic. The Stock-Yogo weak ID test critical value at 10% maximal IV size is equal to 16.38.

Figure C.1: Cyclical behavior of interest rates in emerging and advanced economies (using money market rates)



Notes: The figure reports the panel estimates of β_h's in regression equations (2) and (3) (top panels) and regression equation (4) (bottom panels). 90% confidence intervals are shown by the shaded areas. These regressions feature country fixed effects. Data are at a quarterly frequency.

Table C.1: Short-term differential and funding conditions
(using money market rates)

	Dependent variable: Short-term differential					
Dollar Funding Premium	0.363***		0.346***	0.448***		0.412***
	(0.072)		(0.076)	(0.093)		(0.099)
Banks External Exposure		0.044*	0.014		0.054**	0.022
		(0.019)	(0.020)		(0.020)	(0.021)
R-squared	0.366	0.360	0.367	0.408	0.403	0.408
Observations	2113	2113	2113	2113	2113	2113
Countries	20	20	20	20	20	20
Country FE	✓	✓	✓	✓	✓	✓
Time FE				✓	✓	✓

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$