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When Low Rates Speak Loud: exchange rate dynamics
under different interest rate regimes

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Non-technical Summary

This study investigates how exchange rates respond to interest rate differentials across different monetary environments. The question is particularly relevant in recent decades, as many countries experienced both historically low interest rates and subsequent sharp increases following global inflationary pressures.

Using monthly data from 46 countries between 2000 and 2024, the paper examines whether the relationship between interest rates and exchange rate movements changes depending on whether countries are in a low or high interest rate regime. The approach relies on panel models that allow for country-specific characteristics and regime-dependent effects, with thresholds determined in a data-driven way.

The results provide two main insights. First, the sensitivity of exchange rates to interest rate differentials is greater when interest rates are low. In such environments, even small changes in interest rates can trigger disproportionately large movements in exchange rates, reflecting investors' search for yield. Second, by clustering countries with similar behaviors, the study highlights the heterogeneity of exchange rate dynamics: emerging economies, in particular, tend to show stronger responses to interest rate changes than advanced economies.

For policymakers, these findings carry important implications. In low interest rate environments, monetary policy actions have a stronger impact on exchange rates but may also generate higher volatility. Emerging markets may therefore need to complement traditional interest rate tools with macroprudential policies, foreign exchange interventions, or capital flow management. More broadly, the results underscore the importance of adapting policy frameworks to the prevailing global financial environment to safeguard stability.

Sumário Não Técnico

Este estudo investiga como as taxas de câmbio respondem a diferenciais de juros em diferentes ambientes monetários. A questão é particularmente relevante nas últimas décadas, quando muitos países experimentaram tanto taxas de juros historicamente baixas quanto aumentos posteriores acentuados nos juros, em resposta a pressões inflacionárias globais.

Utilizando dados mensais de 46 países entre 2000 e 2024, o trabalho examina se a relação entre taxas de juros e movimentos cambiais muda dependendo de os países estarem em um regime de juros baixos ou altos. A abordagem baseia-se em modelos em painel que permitem considerar características específicas de cada país e efeitos dependentes de regime, com limiares definidos de forma totalmente orientada por dados.

Os resultados trazem duas principais conclusões. Primeiro, a sensibilidade das taxas de câmbio aos diferenciais de juros é maior quando os juros estão baixos. Nesses ambientes, pequenas variações nas taxas de juros podem provocar movimentos desproporcionalmente grandes no câmbio, refletindo a busca dos investidores por maior rendimento. Segundo, ao agrupar países com comportamentos semelhantes, o estudo evidencia a heterogeneidade das dinâmicas cambiais: as economias emergentes, em particular, tendem a apresentar respostas mais intensas às variações de juros do que as economias avançadas.

Para os formuladores de políticas, esses resultados têm implicações importantes. Em ambientes de juros baixos, as ações de política monetária têm impacto mais forte sobre o câmbio, mas podem também gerar maior volatilidade. Mercados emergentes podem, portanto, precisar complementar os instrumentos monetários tradicionais com políticas macroprudenciais, intervenções no mercado de câmbio ou gestão de fluxos de capitais. Mais amplamente, os resultados reforçam a importância de adaptar os marcos de política ao ambiente financeiro global vigente para preservar a estabilidade econômica e financeira.

When Low Rates Speak Loud: Exchange Rate Dynamics under Different Interest Rate Regimes ^{*}

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Abstract

This paper examines the relationship between interest rate differentials and exchange rate returns across different monetary regimes, with a particular focus on distinguishing between high- and low-interest-rate setups. Relying on a rich panel dataset comprising 46 countries and over two decades of monthly observations, we estimate panel models that allow for country-specific heterogeneity and regime-dependent dynamics. Thresholds separating regimes are constructed in a fully data-driven manner, including conditional and time-varying specifications. Our findings show that exchange rate elasticity with respect to interest rate differentials indeed depends on the regime and it is usually higher under low interest rates, a result consistent across several model specifications and robustness checks. A clustering analysis is also conducted to uncover groups of countries with similar FX dynamics, further highlighting the heterogeneous nature of currency responses across the international landscape.

Keywords: Exchange Rate Dynamics; Interest Rate Differential; Panel Models.

JEL Classification: C33; E43; F31; F37.

^{*}The views expressed in the paper are those of the authors and do not necessarily reflect those of the Banco Central do Brasil.

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1 Introduction

Over the past two decades, the global economic environment has undergone substantial transformations. Following the 2008 financial crisis and, more recently, the COVID-19 pandemic, interest rates in both advanced and emerging economies reached historically low levels, often approaching or even falling below zero in real terms. However, the recent surge in global inflation has prompted central banks worldwide to reverse course, implementing sharp monetary tightening measures to restore price stability. These changes in monetary conditions raise important questions about the sensitivity of exchange rate movements to interest rate differentials under different regimes.

Exchange rates play a dual role in international economics. On the one hand, they serve as key macroeconomic variables, influencing inflation, trade competitiveness, capital flows, and monetary policy transmission. On the other hand, they represent highly traded financial assets, with daily turnover in the global foreign exchange (FX) market exceeding \$7.5 trillion (BIS, 2022). Despite their centrality, exchange rates have proven notoriously difficult to predict, especially using standard models based on macroeconomic fundamentals. Since the seminal work of Meese and Rogoff (1983 a,b), a broad literature has documented the failure of such models, including those based on the Uncovered Interest Parity (UIP), Purchasing Power Parity (PPP), or monetary fundamentals, to outperform naive random walk benchmarks in out-of-sample forecasts.

Against this backdrop, this paper investigates whether the responsiveness of exchange rates to interest rate differentials varies systematically across monetary regimes (low *versus* high interest rate environments). Specifically, we estimate several panel models using monthly data from 46 countries over the period 2000-2024, allowing for heterogeneity across countries and regime-dependent effects. Thresholds that separate interest rate regimes are constructed in a fully data-driven manner, including unconditional, time-varying, and conditional formulations.

Our empirical findings reveal three key contributions. First, the UIP hypothesis is consistently rejected across virtually all countries in the sample, even after controlling for domestic and global macroeconomic variables. Second, the elasticity of exchange rate returns with respect to interest rate differentials is stronger in low interest rate regimes, suggesting greater sensitivity to monetary signals in such environments. Finally, a clustering analysis identifies groups of countries with similar FX dynamics, further emphasizing the heterogeneous nature of exchange rate behavior.

These results offer important implications for policymakers, particularly in emerging markets. Also, they provide novel insights into the state-contingent behavior of exchange rates and contribute to the literature on international macroeconomics and currency forecasting, particularly in the context of lower interest rates observed, for instance, after the subprime crisis and post-pandemic.

The remainder of this paper is structured as follows. Section 2 presents the econometric framework. Section 3 discusses the dataset and the empirical results. Section 4 concludes with policy implications and directions for future research.

2 Methodology

2.1 The UIP hypothesis

We start our analysis by testing the *Uncovered Interest Parity* (UIP) hypothesis individually for each of the 46 countries in the study, except the U.S., which is assumed to be the foreign country to compute the exchange rates. To do so, we adopt a simple econometric setup for evaluating UIP on a country-by-country basis.

In a nutshell, the UIP theory predicts that the difference in interest rates between two countries should equal the expected change in the exchange rate between their currencies. However, in practice, deviations from the UIP hypothesis often occur, in which the domestic currency can appreciate or depreciate depending on various factors. While higher interest rates may attract investors and increase demand for the domestic currency (e.g., *carry trade* channel), expectations of inflation or future currency depreciation, for example, can lead to the opposite effect.

Moreover, empirical evidence suggests the UIP relationship may not hold uniformly across countries, especially between developed and emerging economies, which underscores the importance of testing UIP on a country-specific level. See, for instance, Hodrick (1987), Isard (2006), and Moore and Roche (2012).

The basic econometric model typically used to test the UIP is a simple linear regression, where the dependent variable is the future change in the exchange rate, and the independent variable is the interest rate differential. For a given country i , the following model is estimated:¹

$$\Delta s_{i,t+1} = \alpha_i + \beta_i (r_{i,t} - r_t^*) + \epsilon_{i,t+1}, \quad (1)$$

where $s_{i,t}$ is the log of the foreign exchange rate of country i at period t (domestic currency per U.S. dollar), Δ is the first-difference operator, $(r_{i,t} - r_t^*)$ is the interest rate differential, $r_{i,t}$ is the log of domestic interest rate, r_t^* is the log of foreign (U.S.) interest rate, $[\alpha_i; \beta_i]$ are the regression parameters (intercept and slope),² and $\epsilon_{i,t}$ is the residual of the regression.

¹For instance, see equation 9 of Isard (2006).

²To account for serial correlation or heteroskedasticity in the error terms, we use robust standard errors.

The UIP hypothesis requires that $\alpha_i = 0$ and $\beta_i = 1$. In other words, one can check the UIP validation by testing the null hypothesis $H_0 : [\alpha_i; \beta_i] = [0; 1]$. Note that under the null hypothesis, taking conditional expectations, and assuming that $\mathbb{E}_t(\epsilon_{i,t+1}) = 0$, equation (1) becomes:

$$\mathbb{E}_t(s_{i,t+1} - s_{i,t}) = \mathbb{E}_t(r_{i,t} - r_t^*) + \mathbb{E}_t(\epsilon_{i,t+1}), \quad (2)$$

$$\mathbb{E}_t(s_{i,t+1}) = s_{i,t} + r_{i,t} - r_t^*, \quad (3)$$

which is the standard UIP relationship written in logs.

We also estimate for each country, individually, an enlarged version of regression (1), in order to control for country characteristics and global factors as well:

$$\Delta s_{i,t+1} = \alpha_i + \beta_i(r_{i,t} - r_t^*) + \gamma x_{i,t} + \delta z_t + \epsilon_{i,t}, \quad (4)$$

where $x_{i,t}$ is a set of domestic control variables, and z_t is a set of common global factors.

2.2 Panel model with single interest rate regime

Next, we investigate the FX rate monthly variation of a group of countries $i = 1, \dots, N$ and estimate the following panel model with fixed effects³ to allow for country-specific characteristics:

$$\Delta s_{i,t+1} = \alpha_i + \beta(r_{i,t} - r_t^*) + \gamma x_{i,t} + \delta z_t + \varepsilon_{i,t+1}, \quad (5)$$

where $s_{i,t}$ is again the log of the foreign exchange rate of country i at period t (domestic currency per U.S. dollar), α_i is the fixed effect parameter, and $(r_{i,t} - r_t^*)$ is the interest rate differential.⁴ The parameter of interest is β and the idea here is to identify the best set of control variables $x_{i,t}$ representing key macroeconomic fundamentals, as well as global variables z_t , that might influence the FX rate variation.

To do so, we base our selection of variables on economic-driven FX rate models considered by Molodtsova and Papell (2009), Wang and Wu (2012), Gaglianone and Marins (2017), and consider the sets of domestic variables ($x_{i,t}$) displayed in Table 1, which represent different specifications of model (5).

³The fixed-effects estimator is implemented via OLS on the within-transformed data, which removes country-specific means. Thus, while OLS is used internally, the results account for unobserved time-invariant heterogeneity across countries.

⁴The forward premium puzzle approach (see Fama; 1984) argued that the interest rate differential might have predictive power to explain FX-rate movements (although in a way that is inconsistent with the UIP); see also Verdelhan (2018), which shows that there is a significant comovement between bilateral exchange rates both in developed and emerging countries.

Table 1 - Selected models for the FX rate change ($\Delta s_{i,t+1}$)

Model	Covariate Vector $x'_{i,t}$
AR(1)	$\Delta s_{i,t}$
PPP model	$q_{i,t} \equiv s_{i,t} + p_t^* - p_{i,t}$
PPP model (differences)	$\Delta q_{i,t}$
Monetary model	$sm y_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$
Monetary model (differences)	$\Delta sm y_{i,t}$
Taylor rule model	$[\pi_{i,t} - \pi_t^*, y_{i,t}^{gap} - y_t^{*gap}, q_{i,t}]$
Taylor rule (smoothing)	$[\pi_{i,t} - \pi_t^*, y_{i,t}^{gap} - y_t^{*gap}, q_{i,t}; r_{i,t-1} - r_{t-1}^*]$
Taylor rule (PPP)	$[\pi_{i,t} - \pi_t^*, y_{i,t}^{gap} - y_t^{*gap}]$
Taylor rule (PPP, smoothing)	$[\pi_{i,t} - \pi_t^*, y_{i,t}^{gap} - y_t^{*gap}, r_{i,t-1} - r_{t-1}^*]$

Notes: The real exchange rate of country i is defined as $q_{i,t} \equiv s_{i,t} + p_t^* - p_{i,t}$ in which $p_{i,t}(p_t^*)$ is the log consumer price index in the home (foreign) country. $\pi_{i,t}(\pi_t^*)$ is the CPI inflation in home and foreign countries. $y_{i,t}^{gap}(y_t^{*gap})$ is the output gap, $r_{i,t}(r_t^*)$ is the short-term interest rate, $m_{i,t}(m_t^*)$ is the money supply, and $y_{i,t}(y_t^*)$ is the output in the home (foreign) country.

2.3 Panel model with two interest rate regimes

Next, we consider different interest rate regimes. The idea is to employ a model with nonlinearities arising from the elasticity on the interest rate differential. To do so, we reestimate the slope β , now under two interest-rate regimes by using the following fixed-effect panel model:

$$\Delta s_{i,t+1} = \alpha_i + \beta^H d_{i,t}^H (r_{i,t} - r_t^*) + \beta^L d_{i,t}^L (r_{i,t} - r_t^*) + \gamma x_{i,t} + \delta z_t + \varepsilon_{i,t+1}, \quad (6)$$

or, alternatively,

$$\Delta s_{i,t+1} = \alpha_i + \beta (r_{i,t} - r_t^*) + \tilde{\beta} d_{i,t}^L (r_{i,t} - r_t^*) + \gamma x_{i,t} + \delta z_t + \varepsilon_{i,t+1}, \quad (7)$$

where $[d_{i,t}^H; d_{i,t}^L]'$ are dummy variables designed to identify the *high* and *low* regimes for each country. Our goal is to test the null hypothesis $H_0: \beta^H = \beta^L$ (or, alternatively, $\tilde{\beta} = 0$).

The identification strategy is based on the construction of the dummy variables $[d_{i,t}^H; d_{i,t}^L]'$ using the threshold $\bar{r}_{i,t}$, as follows:

$$\begin{cases} d_{i,t}^H = 1 ; & \text{if } r_{i,t} > \bar{r}_{i,t} \\ d_{i,t}^H = 0 ; & \text{if } r_{i,t} \leq \bar{r}_{i,t} \\ d_{i,t}^L = 1 - d_{i,t}^H \end{cases} \quad . \quad (8)$$

In this paper, we design four approaches to build the individual thresholds $\bar{r}_{i,t}$. The first (naive) approach ($\bar{r}_{i,t}^1$) is simply a constant interest rate, chosen according to our database in order to split the sample (of high and low interest rates) in two subsamples with the same amount of observations.

In the second approach, we adopt the U.S. interest rate plus one standard deviation as threshold $\bar{r}_{i,t}^2$. In the third approach, we use the first unconditional quartile of $r_{i,t}$ as threshold $\bar{r}_{i,t}^3$. In the fourth approach, we define threshold $\bar{r}_{i,t}^4$ using a conditional quantile of the country interest rate differential, as follows: $(\bar{r}_{i,t}^4 - r_t^*) \equiv Q_{\tau=0.25}(r_{i,t} - r_t^* | \mathcal{F}_t)$. Note that in this setup, we build a time-varying *value-at-risk* measure for each country, which is then used to split the observations in the two considered interest-rate regimes.⁵ Table 2 summarizes these four approaches.

Table 2 - Interest rate thresholds ($\bar{r}_{i,t}$)

threshold	definition	variation in t -dimension ?	variation in i -dimension ?
$\bar{r}_{i,t}^1$	4.25% p.y.	no	no
$\bar{r}_{i,t}^2$	$(r_t^* + \sigma_{r_t^*})$	yes	no
$\bar{r}_{i,t}^3$	$Q_{\tau=0.25}(r_{i,t})$	no	yes
$\bar{r}_{i,t}^4$	$r_t^* + Q_{\tau=0.25}(r_{i,t} - r_t^* \mathcal{F}_t)$	yes	yes

In this manner, the construction of the four thresholds is entirely data-driven. Moreover, the thresholds $\bar{r}_{i,t}^2$ and $\bar{r}_{i,t}^4$ are *time-varying*, whereas $\bar{r}_{i,t}^3$ and $\bar{r}_{i,t}^4$ vary from *country-to-country*. These four distinct approaches are designed to check the robustness of results in respect to the parameters of interest $[\beta^H; \beta^L]$.

2.4 Mixed-effect panel model

We also introduce *heterogeneity* in the investigation of the β^H and β^L parameters (i.e., elasticity of FX rate change in respect to the interest rate differential) by considering a *mixed-effect* panel-data model (also known as the *mixed linear* model) that takes into account individual heterogeneity in regression coefficients; see Cameron and Trivedi (2009) for a basic introduction in a panel-data context; and Searle, Casella, and McCulloch (1992), and McCulloch, Searle, and Neuhaus (2008) for a more general treatment:

$$\Delta s_{i,t+1} = \alpha_i + \beta_i^H d_{i,t}^H (r_{i,t} - r_t^*) + \beta_i^L d_{i,t}^L (r_{i,t} - r_t^*) + \gamma x_{i,t} + \delta z_t + \varepsilon_{i,t+1}, \quad (9)$$

$$\beta_i^H = \beta_0^H + \nu_i^H, \quad \nu_i^H \sim \mathcal{N}(0, \sigma_{\nu^H}^2), \quad (10)$$

$$\beta_i^L = \beta_0^L + \nu_i^L, \quad \nu_i^L \sim \mathcal{N}(0, \sigma_{\nu^L}^2). \quad (11)$$

⁵The information set $\mathcal{F}_t$ includes an intercept and lagged values of the interest rate differential, VIX, EPU, U.S. dollar index, oil price, CRB foodstuffs, and CRB metals. See section 3.1 for further details on data.

Following the *mixed-effect* panel-data literature, we estimate (9) by maximum likelihood assuming a *random-effect* specification for β_i^H and β_i^L . This parsimonious specification allows the identification of the heterogeneous coefficients β_i^H and β_i^L across countries.

3 Empirical Exercise

3.1 Data

The dependent variable ($\Delta s_{i,t+1}$) is the monthly change of the foreign exchange rate (local currency in respect to U.S. dollar). The set of domestic control variables ($x_{i,t}$) includes: interest rate, inflation⁶, industrial production⁷, and money supply⁸. We also included in $x_{i,t}$ the *degree of trade openness*, defined as the proportion of GDP made up of exports and imports.⁹

The set of global variables (z_t) includes: VIX (volatility index of *Chicago Board Options Exchange*), EPU (*Economic Policy Uncertainty* index of Baker et al., 2015), GPR (*Geopolitical Risk* index of Caldara and Iacoviello, 2021), oil price (crude, WTI), CRB commodity index (all, foods or metals), MSCI stock market aggregate index (emerging or developed economies), and U.S. dollar index (DXY, geometric average of six major currencies in respect to U.S. dollar).¹⁰

The sample covers the period from January 2000 to June 2024 ($T = 294$ observations) and the full set of countries ($N = 46$) is presented in Appendix A.¹¹

Based on the International Monetary Fund (IMF) classification¹², the set of 46 countries is divided as advanced economies (14 countries) or emerging and developing economies (32 countries).

⁶Consumer Price Index, all items, in levels or monthly percentage change.

⁷All series are seasonally adjusted. The average industrial production index for 2010 (base-year) is set to 100. The industrial production gap (proxy for the output gap) is built using the Hodrick-Prescott (HP) filter.

⁸M1 seasonally adjusted, standardized and in billion US\$.

⁹Countries like Singapore have a very high degree of openness due to their reliance on international trade, while other countries like Brazil have relatively lower degrees of openness.

¹⁰As robustness exercises (reported in Appendix E), we expand the set of global variables by including two crisis-related dummies: one for the global financial crisis (Sep/08 to Mar/09, covering the period from the Lehman Brothers bankruptcy to the trough of the S&P 500), and another for the COVID-19 pandemic (Mar/20 to Aug/20, from the WHO's declaration of the pandemic to the subsequent stabilization of stock markets and capital flows). In addition, we incorporate an uncertainty indicator for infectious diseases, the EMV tracker (https://www.policyuncertainty.com/infectious_EMV.html), as well as a U.S. financial conditions measure (the Chicago Fed National Financial Conditions Index). Finally, we replace the EPU index for China with its Japanese counterpart and exclude the U.S. dollar index, in order to better capture alternative sources of policy uncertainty and reduce potential collinearity among global controls.

¹¹The data sources are: (i) IFS (International Financial Statistics, International Monetary Fund), (ii) LSEG Refinitiv (Thomson Reuters), (iii) FRED Economic Data (Federal Reserve Bank of St. Louis), and (iv) individual national statistics.

¹²The IMF classifies countries into advanced economies, emerging markets and developing economies based on several factors, including GDP per capita, economic structure, and level of industrialization. The advanced economies in our database are: Canada, Czech Republic, Denmark, Iceland, Israel, Japan, Korea, New Zealand, Norway, Singapore, Sweden, Switzerland, United Kingdom, United States. For more details, see: <https://www.imf.org/en/Publications/WEO/weo-database/2023/April/groups-and-aggregates>

In addition, we employ the following two filters to better investigate the FX rate changes *vis-à-vis* interest rate differentials across the 46 countries: (i) negative-slope filter;¹³ and (ii) exchange rate regime filter.¹⁴

The first filter is designed to select those countries with a negative relationship between interest rate differentials and exchange rate variation. The idea is to focus on countries like Brazil, where this relationship has been typically negative along the past decades (e.g., due to carry trade).

The second filter is a framework verification based on exchange rate regimes, designed to remove from the analysis those countries with frequent central bank interventions on the exchange rate market, or usual constraints on capital mobility.¹⁵

As a result, after excluding the U.S. (our reference country for computing exchange rates) and applying the first filter (negative-slope), we end up with 29 countries, listed in Table A.2. By additionally considering the second filter (FX rate regime), we have a total of 22 countries, presented in Table A.3.

Finally, within the set of 22 countries, we identify groups of countries with similar behavior in terms of exchange rate dynamics. To do so, we use cluster analysis (*k-means*) on the correlation matrix of the exchange rate panel data series ($\Delta s_{i,t}$) considering the full sample in time dimension. The idea is to empirically reveal groups of similar countries (i.e., with high or mild positive correlation of pairwise FX rate returns), and then re-estimate the panel data models according to such groups. See Appendix B for more details.

¹³We estimate for each country a regression of the exchange rate change $\Delta s_{i,t+1}$ onto an intercept, the interest rate differential ($r_{i,t} - r_t^*$), and a set of control variables, formed by idiosyncratic variables ($q_{i,t}$, $\pi_{i,t} - \pi_t^*$, $y_{i,t}^{gap} - y_t^{*gap}$) as well as global variables (VIX, dollar index, oil price, CRB foods, CRB metals). Those countries that show a positive slope for ($r_{i,t} - r_t^*$) are excluded in this filter.

¹⁴We first classify (yearly) each of the 46 countries according to the following exchange rate regimes: (1) free floating; (2) floating; and (3) others. To do so, we use the IMF annual classification available at <https://www.elibrary-arear.imf.org/Pages/SummaryFeatures.aspx>. Next, we compute for each country the median classification (1, 2 or 3) along the time dimension, and exclude those countries that (overall) are not free floating or floating.

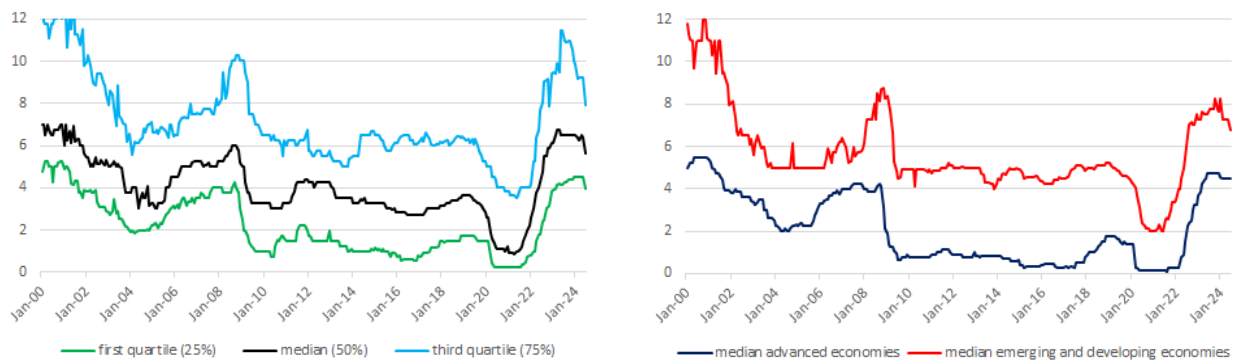
¹⁵According to the FX regime filter, the following countries are excluded: Bangladesh, Bulgaria, Costa Rica, Côte d'Ivoire, Denmark, Egypt, Jordan, Malaysia, Saudi Arabia, Senegal, Singapore, Tunisia, Ukraine, Vietnam.

3.2 Results

3.2.1 Overview of exchange rate dynamics and interest rates

Figures 1, 2, and 3 provide an overview of the international interest rate landscape and its relationship with exchange rate dynamics over the past two and a half decades. Figure 1 illustrates the wide dispersion of short-term interest rates across all the 46 countries in the sample, reflecting differences in monetary policy stances and macroeconomic fundamentals. Notably, several emerging economies display persistently higher interest rates compared to developed countries, which often operate under lower rate environments.

Figure 1 - Short-term interest rates ($r_{i,t}$) in 46 selected countries (% per year)

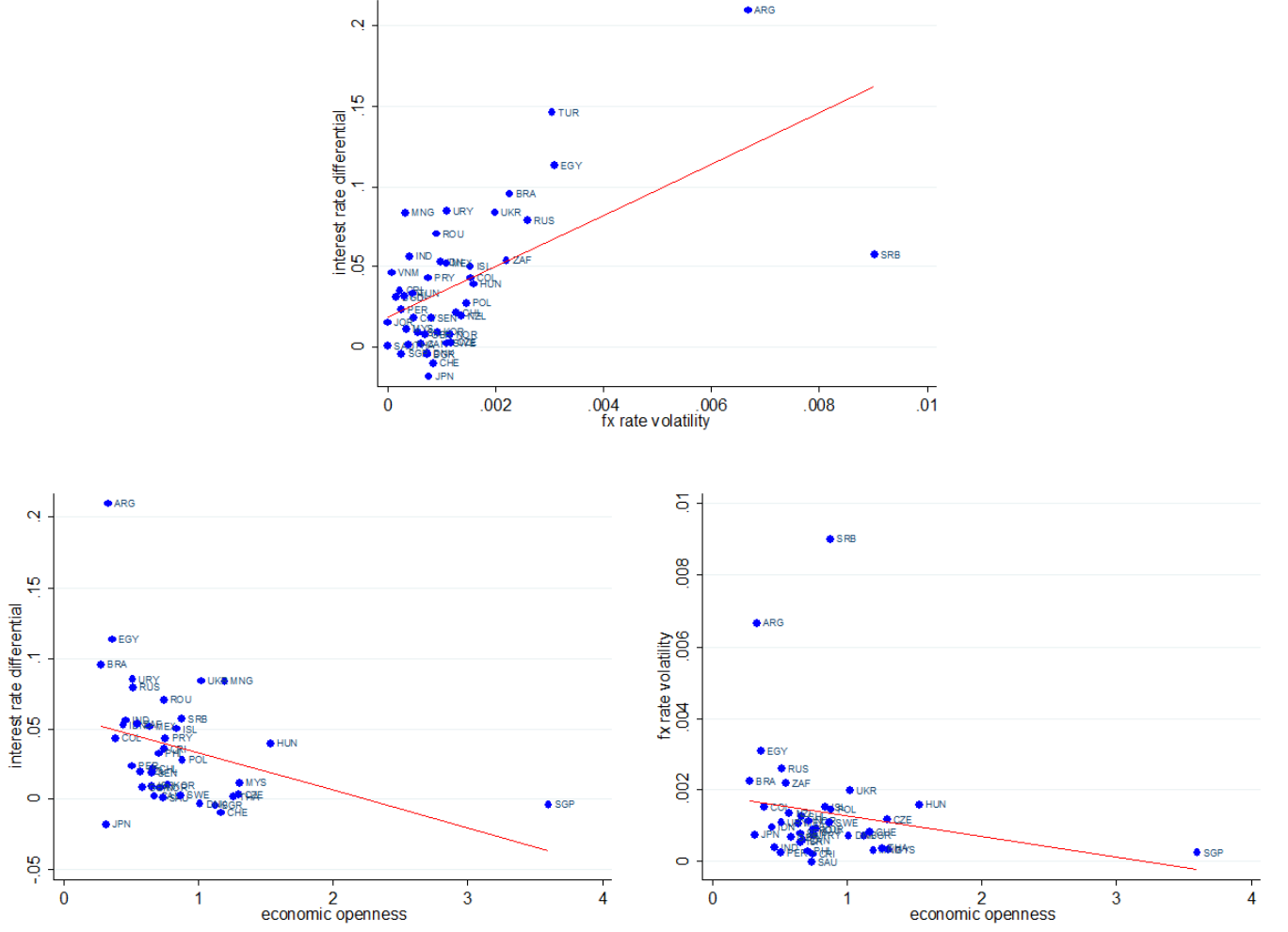


Notes: The graph on the left panel shows the median interest rate across all countries, as well as the first and third quartiles.

The graph on the right panel presents the median interest rate across advanced or emerging and developing economies.

Figure 2 complements this view by presenting each country's average interest rate differential (relative to the U.S.), foreign exchange (FX) rate volatility, and economic (trade) openness. The first graph reveals a pattern whereby countries with higher interest rate differentials tend to exhibit elevated FX rate volatility, suggesting greater exposure to speculative capital flows and global risk factors (e.g., Menkhoff et al., 2012). The two last panels of Figure 2 reveal a negative relationship between trade openness and both interest rate differentials and FX rate volatility. This indicates that countries more integrated into global trade tend to have lower interest rate gaps relative to the U.S. and more stable FX rate movements, indicating that commercial integration may act as a buffer against external shocks in currency markets.

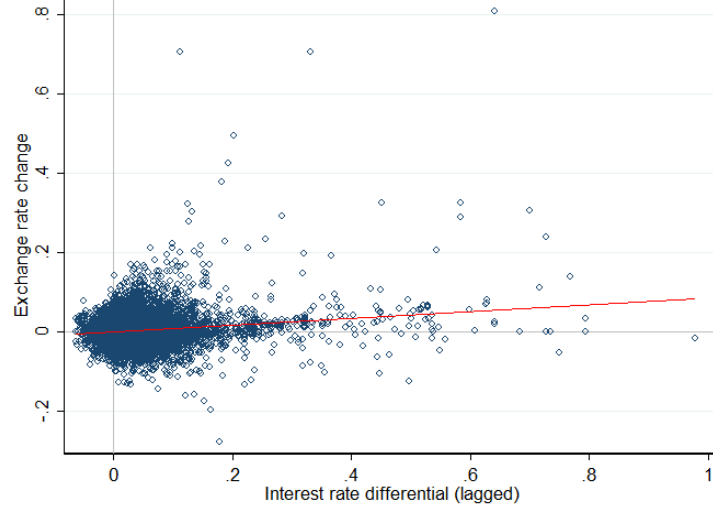
Figure 2 - Interest rate differential ($r_{i,t} - r_t^*$), FX rate volatility and economic openness across the set of 46 countries (except the U.S.)



Notes: Average values for each country considering full sample in time dimension. Economic openness is defined as the time-average of $(\text{exports}_{i,t} + \text{imports}_{i,t})/\text{GDP}_{i,t}$, and FX rate volatility as the time-average of $(\Delta s_{i,t})^2$.

Figure 3 further reinforces these findings by displaying a scatter plot of FX rate changes against interest rate differentials. The plot highlights a generally weak and noisy relationship, yet the slope of the red regression line suggests that, on average, higher interest rates are associated with currency depreciation. This result underscores the complexity of FX markets and the potential influence of additional factors such as capital flow dynamics, risk premiums, and investor expectations. Taken together, these figures provide empirical motivation for the more nuanced panel regression and regime-switching models employed in the subsequent sections.

Figure 3 - Scatter-plot of $\Delta s_{i,t+1}$ versus $(r_{i,t} - r_t^*)$
for the set of 46 countries (except the U.S.)



Note: Full sample in both (time and country) dimensions. The maximum value of interest rate differential is truncated

in the plot for illustration purposes. The red line represents a simple linear regression with intercept and slope.

3.2.2 Cluster analysis

The results in Appendix B focus on the cluster analysis of 22 countries based on the pairwise correlations between exchange rate variations. This method groups countries into clusters with similar exchange rate dynamics, allowing for a more nuanced understanding of how different economies respond to external shocks and internal economic conditions.

One key finding from the cluster analysis is that countries heavily reliant on commodity exports or with more volatile economic structures, for example, tend to be grouped together, indicating that these economies exhibit similar exchange rate behaviors when exposed to global shocks.

In contrast, countries with diversified economies or more stable financial systems tend to form a separate cluster, suggesting that their exchange rates are less influenced by global volatility and more responsive to domestic factors.

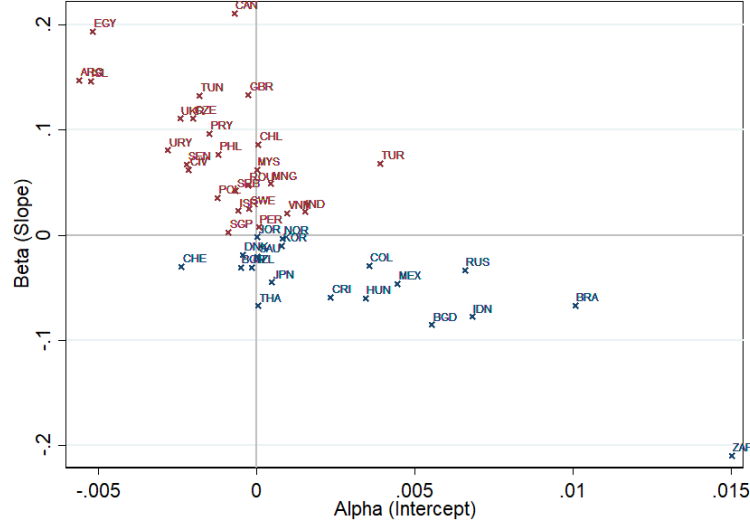
This clustering approach highlights the heterogeneity across countries in terms of exchange rate responses and provides a useful framework for understanding the diverse macroeconomic environments faced by the selected countries analyzed.

3.2.3 Testing the UIP hypothesis

The UIP hypothesis is tested individually for each country, through the null hypothesis $H_0 : [\alpha_i; \beta_i] = [0; 1]$, and based on estimates presented in Figure 4.

Figure 4 - Estimated parameters $[\alpha_i; \beta_i]$ from the regression:

$$\Delta s_{i,t+1} = \alpha_i + \beta_i (r_{i,t} - r_t^*) + \epsilon_{i,t+1}$$



Note: The scatter-plot shows the parameters estimated individually for all 46 countries, excepting the U.S.

The results of the (Wald) test reveals a strong rejection of the UIP for all countries, as the maximum p-value obtained among all countries is 5.72e-4. According to the empirical literature, rejection of the UIP can be due to risk premiums, capital controls, or market inefficiencies, among many other factors that affect the exchange rate variation.¹⁶

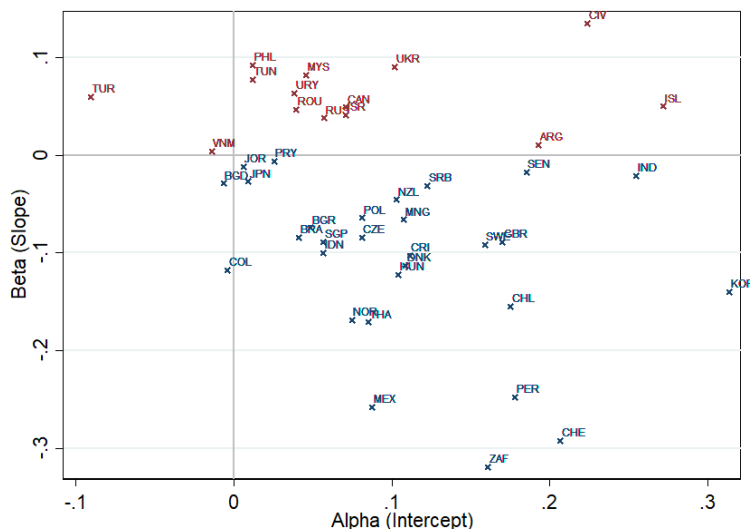
Figure 5 shows the $[\alpha_i; \beta_i]$ parameters estimated from an enlarged specification that controls for country-specific variables and global factors.

Again, the null hypothesis $H_0 : [\alpha_i; \beta_i] = [0; 1]$ is strongly rejected in all countries at a 5% significance level. The maximum p-value obtained (for Egypt) is 0.015. Excluding this country, the maximum p-value falls to 0.002.

¹⁶The UIP hypothesis has been vastly examined in the literature along the past decades from various perspectives and contexts. Most studies indicate that while UIP may work in short time frames or in developed economies (Chaboud and Wright, 2005; Mehl and Cappiello, 2009), it often fails in long-term predictions, particularly in emerging markets (Bhatti, 2014; Cuestas et al., 2015). Factors such as risk premiums, irrational expectations, and structural changes in economies play crucial roles in the theory's validity (Engel, 2014; Flood and Rose, 2002). Additionally, the literature suggests that UIP should be tested at a country-specific level to better understand its limitations and practical applications (McCallum, 1994; Lothian and Wu, 2011).

Figure 5 - Estimated parameters $[\alpha_i; \beta_i]$ from the regression:

$$\Delta s_{i,t+1} = \alpha_i + \beta_i (r_{i,t} - r_t^*) + \gamma x_{i,t} + \delta z_t + \epsilon_{i,t+1}$$



Note: The scatter-plot shows the parameters estimated individually for all 46 countries, excepting the U.S. and Egypt (that is not included in the plot as its parameters lie outside the graph scale). The set of control variables in the regression is the same used in the negative-slope filter described in section 3.1.

Of course, the statistical test based on the enlarged regression referred in Figure 5 is not a *strict* UIP test anymore, but it helps one to check for omitted variables in the standard UIP regression, and also to verify the robustness (or not) of estimated coefficients $[\alpha_i; \beta_i]$ in the presence of additional control variables. Overall, the estimated parameters are quite different when comparing Figures 4 and 5, suggesting that, indeed, it is important to consider country-specific variables and global factors in regression (1).

Next, we deepen the analysis by discussing various panel model estimates, under single or double interest rate regimes, and also considering different sets of countries.

3.2.4 Single interest rate regime

The results shown Appendix C provide valuable insights into the determinants of exchange rate variations $\Delta s_{i,t+1}$, with focus on both domestic and global variables.

Table C.1, based on the broader sample of 46 countries, provides a comprehensive overview of how exchange rates respond to macroeconomic variables across diverse economies. In this context, the dependent variable is the exchange rate variation, defined as local currency per U.S. dollar, meaning an increase in this variable denotes a depreciation of the local currency (or a strengthening of the U.S. dollar).

One key outcome from Table C.1 is the predominantly positive relationship between $(r_{i,t} - r_t^*)$, that is, the lagged interest rate differential (domestic minus U.S. interest rates) and the exchange rate change $\Delta s_{i,t+1}$. This indicates that higher local interest rates relative to U.S. rates, on average, are associated with currency depreciation of the local currency.

However, this relationship is not uniform across all countries in our sample, and the aggregate results reflect the mixed behavior, for example, of developed and emerging markets (and the broader trends across various economic environments). The inclusion of countries with different exchange rate regimes and diverse economic conditions means that Table C.1 only presents a generalized view of the relationship between $\Delta s_{i,t+1}$ and $(r_{i,t} - r_t^*)$, across a diverse set of economies, that deserves a better and detailed investigation.

To deepen the analysis, two filters are applied in subsequent tables (C.2 to C.4) to separate particular FX rate dynamics (i.e., selecting only countries with free floating or floating FX rate regimes and/or with negative relationship between FX rate change and lagged interest rates differential). As result, the analysis hereafter focus on 29 countries (after the negative-slope filter) or 22 countries (where both the negative-slope and the floating FX rate regime filters are in place).

One of the key outcomes from Tables C.2 to C.4 is the consistent negative and statistically significant relationship between the interest rate differential and exchange rate change, of course, in great part obtained by applying the negative-slope filter in the sample. The significance of this result across different model specifications suggests that interest rate differentials remain a primary driver of exchange rate movements. This also indicates that higher interest rates attract capital inflows, strengthening the local currency.

After an extensive exploratory quest using many specifications in Tables C.2 to C.4, and taking into account not only the search for a parsimonious but a solid specification, which should retain significant regressors and exhibit a superior fit (R^2), we arrive at model *Hybrid7* in Table C.4.

Besides the negative sign for the interest rate differential in model Hybrid7, the negative coefficient of the real exchange rate change $\Delta q_{i,t}$, which reflects the price level-adjusted value of the currency, indicates a rise in domestic prices relative to the U.S. leads to currency appreciation. This finding suggests that real exchange rate misalignments tend to correct over time, with nominal exchange rates adjusting to reflect relative price differences between the domestic and foreign economies, which affects the competitiveness of local economy.

Further examination reveals that other country-specific variables, such as inflation differential $(\pi_{i,t} - \pi_t^*)$,¹⁷ and the monetary model-based regressor $(\Delta smy_{i,t})$,¹⁸ also play significant roles in exchange rate dynamics.

Additionally, global factors show strong influences on exchange rates as well. The U.S. dollar index¹⁹ consistently exhibits positive coefficients, implying that as the dollar strengthens, other currencies depreciate. Economic policy uncertainty indexes²⁰ also tend to be associated with exchange rate changes. Similarly, commodity indexes (such as oil prices²¹ and CRB food and metals²²) and stock market indexes²³ from developed and emerging economies all contribute to exchange rate variations, further demonstrating the sensitivity of exchange rates to both domestic and international market conditions.

¹⁷The inflation differential tends to have a negative impact on the exchange rate change, which could be related to the notion that unexpected inflationary pressures (when perceived as persistent) can lead to tighter monetary policy, which in turn may affect exchange rate dynamics. Also, recall that central banks, in general, respond primarily to inflation expectations rather than to contemporaneous monthly inflation figures.

¹⁸The positive coefficient on $\Delta smy_{i,t}$ suggests that when the actual exchange rate exceeds the level implied by relative money supplies and outputs, the local currency tends to depreciate further relative to the U.S. dollar. This result indicates that deviations from the theoretical equilibrium rate persist, meaning that when a currency is overvalued compared to the level predicted by the monetary model, it is likely to continue depreciating. Economically, this reflects a market-driven correction, where the exchange rate adjusts in response to perceived misalignment, signaling that fundamentals based on money supply and output levels also contribute to exchange rate movements.

¹⁹The U.S. dollar index (DXY) coefficient is consistently positive and significant, indicating that dollar appreciation relative to a basket of currencies leads to local currency depreciation. This reflects the dollar's global dominance, as a stronger dollar can trigger capital outflows, raise the cost of servicing dollar-denominated debt, and reduce trade competitiveness, particularly in emerging markets. Since the DXY enters the regressions with a lag, the mechanical contemporaneous relation with local currencies is mitigated, though endogeneity concerns could remain given its heavy weight on the euro and the yen. Appendix E reports robustness checks excluding the DXY, with results remaining qualitatively unchanged.

²⁰The EPU indices for U.S. and China show negative coefficients, meaning that increased economic policy uncertainty tends to be associated with an appreciation of the local currency. This may reflect investors seeking higher returns in emerging markets or countries with attractive yields when uncertainty is high in developed markets, leading to appreciation of the local currencies in the sample.

²¹The negative coefficient of oil prices suggests that many of the countries in the sample may be net oil exporters, where higher oil prices improve the trade balance and lead to stronger inflows of foreign currency. As global demand for oil rises, the revenue from oil exports boosts the local economy, strengthens the currency, and reduces dependence on external financing. For oil-importing countries, however, higher oil prices can have the opposite effect by increasing production costs and inflation, but the overall negative sign in this model implies that oil-exporting nations likely dominate the effect in our sample. Another possible explanation is that oil prices are positively correlated with global economic activity. Higher oil prices are often associated with stronger economic activity worldwide, which can reduce the negative impact of higher oil prices on importing countries. For instance, increased exports of other goods due to stronger external demand may mitigate the effect of more expensive oil.

²²Commodity indexes (CRB food and CRB metals) show distinct effects. The CRB food index exhibits a negative coefficient (like oil prices), indicating that higher food prices are associated with an appreciation of local currency, particularly in countries that are net food exporters. The negative coefficient implies that rising global food prices improve the trade balance of these countries, leading to currency appreciation. In contrast, the CRB metals index has a positive coefficient, indicating that higher metal prices are associated with local currency depreciation, which could reflect the fact that several countries in the sample are net importers of metals, and thus rising prices increase trade deficits, putting pressure on the local currency.

²³The coefficients for stock market indices such as MSCI Developed and MSCI Emerging present negative signs, which suggests that higher returns in stock markets are associated with appreciation of the local currency. This indicates that better performance in such markets is linked to a decrease in the exchange rate, as investors are more likely to invest in these markets, leading to stronger demand for the local currency.

In sum, the Hybrid7 model in Table C.4 demonstrates that a variety of both domestic and global factors influence exchange rate dynamics,²⁴ often in ways that reflect investor risk perceptions and expectations about economic fundamentals. The signs of the regressors in this model show that exchange rate movements are driven by a combination of monetary policy, inflation dynamics, and global market conditions, highlighting the complex interplay between local and external factors in shaping currency behavior across the analyzed group of countries.

3.2.5 Two interest rate regimes

Appendix D explores further the previous results by analyzing potential differences across interest rate regimes, based on thresholds described in Table 3. The results in Appendix D indicate that the negative relationship between the interest rate differential and exchange rate variation, obtained in the previous section, remains significant under both regimes. A negative relationship implies that an increase in the interest rate differential tends to appreciate the domestic currency.

Moreover, considering the sets of 29 or 22 countries (Tables D.2 to D.7) in periods of low interest rates, the negative response of the exchange rate is typically stronger in magnitude (although not statistically different in some cases).

Table 3 - Interest rate thresholds $\bar{r}_{i,t}$

threshold	sample average (% p.y.)	% of periods in lower interest rate regime: average of $(d_{i,t}^L)$
$\bar{r}_{i,t}^1$	4.25%	50%
$\bar{r}_{i,t}^2$	3.88%	46%
$\bar{r}_{i,t}^3$	3.28%	30%
$\bar{r}_{i,t}^4$	2.91%	24%

One possible explanation is that during low interest rate periods, capital flows may be more sensitive to changes in interest rate differentials, as investors seek yield in a low-rate environment, leading to a larger exchange rate response. Additionally, lower rates may signal a more accommodative monetary policy, increasing the sensitivity of exchange rate movements to external shocks and interest rate changes.

²⁴Some exceptions include the trade balance proxy, represented by the degree of openness or trade intensity, that appears to have limited significance in explaining exchange rate movements. This result may reflect that while trade openness impacts long-term currency valuations, short-term exchange rate variations are more influenced by financial flows, interest rate differentials, and global risk perceptions. Similarly, the output gap differential also shows a weak relationship with exchange rates, indicating that deviations in economic activity may not be as immediate or impactful on currency movements compared to other macroeconomic or financial variables.

The empirical findings in Appendix D also suggest that the exchange rate’s response to interest rate differentials varies significantly across country groups, with emerging markets, including Brazil, exhibiting a more pronounced sensitivity to higher interest rates compared to developed economies, like Switzerland or United Kingdom. This is particularly relevant for countries like Brazil, which often face greater exposure to global economic risks and capital flow volatility.

This difference in response across different groups highlights how market perception and risk aversion are crucial in determining exchange rate dynamics. Investors may view high interest rates in developed economies as an indicator of strong economic performance, whereas in emerging markets, the same interest rate increase could be seen as a red flag for future instability.

In turn, Appendix E reports a series of robustness checks aimed at assessing the stability of our baseline results reported in Table D.3. The inclusion of crisis-related dummies for the Global Financial Crisis (GFC) and the COVID-19 pandemic does not materially alter the main coefficients of interest, suggesting that our findings are not driven by these extreme episodes. Similarly, extending the set of global controls to incorporate an infectious diseases uncertainty index (EMV tracker) and the Chicago Fed National Financial Conditions Index, while substituting the Chinese EPU for its Japanese counterpart and excluding the dollar index, yields results that remain consistent with the baseline specification.

To further assess the stability of our baseline estimates, we also conduct joint Wald tests for potential structural breaks associated with the Global Financial Crisis. In particular, we interact the interest rate differential variables with a GFC dummy and test whether the coefficients of these interaction terms are jointly equal to zero. Table E.5 reports the corresponding p-values, indicating that the sensitivity of exchange rates to interest rate differentials does not change significantly during the crisis period. Taken together, these exercises reinforce the conclusion that the effects we document are robust to alternative specifications and to the presence of major global shocks.

3.2.6 Mixed-effect

Next, we discuss the results of the *mixed-effect* model taking into account individual country heterogeneity as in (9). According to Table F.1 in Appendix, the maximum likelihood estimates of $[\beta_0^H; \beta_0^L]'$ are quite similar to those presented in Tables D.1 to D.3. However, the estimated variances for the *random effects* in the interest rate regime coefficients, namely $[\sigma_{\nu^H}^2; \sigma_{\nu^L}^2]'$, were statistically null across all specifications.

In other words, the results point out that variances of the random slopes are zero, and there is no gain in maintaining random effects in the interest rate regime coefficients. In this sense,

country-specific fixed intercepts are relatively more important to capture the average structural heterogeneity in exchange rate variation.

Given this result, it is recommended to focus the analysis on the parsimonious form of the model discussed in previous section, that is, panel regressions with country fixed effects and global fixed coefficients for the interest rate regimes and other variables. This specification preserves heterogeneity in the intercept across countries, essential for controlling for persistent structural characteristics, without overparameterizing the model.

4 Conclusions

This paper investigated the relationship between interest rate differentials and exchange rate dynamics across 46 countries over a 25-year period, with particular attention to how this relationship varies under different interest rate regimes. By employing a panel framework with data-driven and heterogeneous regime thresholds, we found robust evidence that the elasticity of exchange rate changes to interest rate differentials is higher during periods of low interest rates. Moreover, the UIP hypothesis is strongly rejected across all specifications and country groups, even after controlling for domestic and global macroeconomic variables. Cluster analysis further highlighted cross-country heterogeneity in exchange rate behavior, with emerging markets generally exhibiting greater sensitivity to interest rate changes than advanced economies.

From a policy perspective, our findings suggest that in low interest rate environments, where global yield-seeking behavior intensifies, even small changes in interest rate differentials can trigger disproportionate movements in exchange rates. For central banks in emerging markets, this implies that monetary policy becomes more potent as a tool for exchange rate management in such regimes. However, it also increases the risk of overshooting and volatility. While interest rate hikes serve as a typical defense mechanism against inflation, policymakers must weigh these actions against their potential side effects on domestic demand, debt servicing costs, and financial stability.

Additionally, the results underscore the importance of tailoring exchange rate policy frameworks to the prevailing global interest rate environment. In particular, emerging economies should consider strengthening complementary tools such as macroprudential measures, foreign exchange interventions, and capital flow management to support currency stability without over-reliance on interest rates alone.

As a promising avenue for future research, the use of panel quantile regression methods (e.g., Galvao, Lamarche and Lima, 2023) could help capture heterogeneous effects of interest rate differentials across the distribution of exchange rate changes. This would be particularly useful for

understanding market behavior during episodes of financial stress or extreme currency movements, where tail risks and nonlinearities become more relevant. Incorporating such models may offer further insights into regime-dependent vulnerabilities and guide the design of more resilient monetary and exchange rate policies.

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Appendix A. Groups of countries and regions

Table A.1 - Set of 46 countries grouped by geographical region

<i>North America</i> Canada, Mexico, United States	<i>Middle East</i> Israel, Jordan, Saudi Arabia
<i>Central and South America</i> Argentina, Brazil, Chile, Colombia, Costa Rica, Paraguay, Peru, Uruguay	<i>Africa</i> Côte d'Ivoire, Egypt, Senegal, South Africa, Tunisia
<i>Northern and Western Europe</i> Denmark, Iceland, Norway, Sweden, Switzerland, United Kingdom, Poland	<i>Asia-West and Central</i> Bangladesh, India, Russian Federation, Singapore, Thailand, Turkey, Vietnam
<i>Eastern and Central Europe</i> Bulgaria, Czech Republic, Hungary, Romania, Serbia, Ukraine	<i>Asia-Pacific</i> Indonesia, Japan, Korea, Malaysia, Mongolia, New Zealand, Philippines

Table A.2 - Set of 29 countries grouped by geographical region
(after filtering for negative-slope)

<i>Americas</i> Brazil, Chile, Colombia, Costa Rica, Mexico, Paraguay, Peru	<i>Africa and Middle East</i> Jordan, Senegal, South Africa
<i>Northern and Western Europe</i> Denmark, Norway, Sweden, Switzerland, United Kingdom, Poland	<i>Asia-West and Central</i> Bangladesh, India, Singapore, Thailand
<i>Eastern and Central Europe</i> Bulgaria, Czech Republic, Hungary, Serbia	<i>Asia-Pacific</i> Indonesia, Japan, Korea, Mongolia, New Zealand

Table A.3 - Set of 22 countries grouped by geographical region
(after filtering for negative-slope and floating FX rate regime)

<i>Americas</i> Brazil, Chile, Colombia, Mexico, Paraguay, Peru
<i>Africa and Asia</i> India, Indonesia, Japan, Korea, Mongolia, New Zealand, South Africa, Thailand
<i>Europe</i> Czech Republic, Hungary, Norway, Poland, Serbia, Sweden, Switzerland, United Kingdom

Appendix B. Cluster analysis on exchange rate change ($\Delta s_{i,t}$)

Table B.1 - Set of 22 countries divided into 2 clusters

Cluster	#1	#2
countries	Brazil, Chile, Colombia, India, Indonesia, Japan, Mexico, Mongolia, Paraguay, Peru, Serbia	Czech Rep, Hungary, Korea, New Zealand, Norway, Poland, South Africa, Sweden, Switzerland, Thailand, United Kingdom
num. countries	11	11
max. correl.	0.60	0.85
mean correl.	0.23	0.60
min. correl.	-0.11	0.38

Note: Cluster analysis (k-means) on the correlation matrix of $\Delta s_{i,t}$ using full sample in time dimension.

Table B.2 - Set of 22 countries divided into 4 clusters

Cluster	#1	#2	#3	#4
countries	Brazil, Chile, Colombia, India, Indonesia, Korea, Mexico, Peru, South Africa, Thailand	Czech Rep, Hungary, New Zealand, Norway, Poland, Sweden, Switzerland, United Kingdom	Mongolia, Paraguay	Japan, Serbia
num. countries	10	8	2	2
max. correl.	0.60	0.85	0.14	0.07
mean correl.	0.44	0.69	0.14	0.07
min. correl.	0.27	0.54	0.14	0.07

Note: Cluster analysis (k-means) on the correlation matrix of $\Delta s_{i,t}$ using full sample in time dimension.

Table B.3 - Set of 22 countries divided into 7 clusters

Cluster	#1	#2	#3	#4	#5
countries	Brazil, Chile, Colombia, Mexico, Peru	India, Indonesia, Korea, South Africa, Thailand	Czech Rep, Hungary, New Zealand, Norway, Poland, Sweden	Switzerland, United Kingdom	Mongolia, Paraguay
num. countries	5	5	6	2	2
max. correl.	0.60	0.56	0.85	0.54	0.14
mean correl.	0.50	0.46	0.74	0.54	0.14
min. correl.	0.36	0.36	0.62	0.54	0.14

Notes: Cluster analysis (k-means) on the correlation matrix of $\Delta s_{i,t}$ using full sample in time dimension. Japan and Serbia are, respectively, in clusters #6 and #7.

Appendix C. Panel data, single interest rate regime

Table C.1 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, set of 46 countries

Regressors	(1) Basic	(2) AR	(3) PPP	(4) PPP diff.	(5) Monetary	(6) Monet. diff.	(7) Taylor1	(8) Taylor2	(9) Taylor3	(10) Taylor4
$(r_{i,t} - r_t^*)$	0.0743*** (0.0227)	0.0791*** (0.0239)	0.0784*** (0.0215)	0.0778*** (0.0231)	0.0795*** (0.0277)	0.0683*** (0.0227)	0.0631*** (0.00891)	0.0840*** (0.0123)	0.0622*** (0.00972)	0.0855*** (0.0137)
$\Delta s_{i,t}$		-0.0666*** (0.0245)								
$q_{i,t}$			-0.0127*** (0.00330)				-0.0153*** (0.00358)	-0.0144*** (0.00308)		
$\Delta q_{i,t}$				-0.0903*** (0.0219)						
$smg_{i,t}$					0.000640 (0.000481)					
$\Delta smg_{i,t}$						0.0903*** (0.0175)				
$(\pi_{i,t} - \pi_t^*)$							0.312 (0.189)	0.328 (0.203)	0.273 (0.192)	0.292 (0.208)
$(y_{i,t}^{gap} - y_t^{*gap})$							-0.0170*** (0.00446)	-0.0152*** (0.00384)	-0.0175*** (0.00451)	-0.0157*** (0.00386)
$(r_{i,t-1} - r_{t-1}^*)$								-0.0277*** (0.0131)		-0.0303*** (0.0132)
constant	-0.00335*** (0.000627)	-0.00366*** (0.000672)	0.0535*** (0.0147)	-0.00395*** (0.000675)	-0.00777*** (0.00305)	1.31e-05 (0.000759)	0.0646*** (0.0159)	0.0609*** (0.0137)	-0.00382*** (0.000597)	-0.00370*** (0.000622)
num. observ.	12,341	12,341	12,292	12,292	10,549	10,531	11,022	11,007	11,022	11,007
R^2 overall	0.126	0.129	0.122	0.135	0.127	0.194	0.137	0.141	0.145	0.147

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $smg_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$. To save space, we omitted here the estimates for VIX, dollar index, oil price, and CRB.

Table C.2 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, set of 29 countries

Regressors	(1) Basic	(2) AR	(3) PPP	(4) PPP diff.	(5) Monetary	(6) Monet.diff.	(7) Taylor1	(8) Taylor2	(9) Taylor3	(10) Taylor4
$(r_{i,t} - r_t^*)$	-0.0413** (0.0193)	-0.0480** (0.0227)	-0.0523** (0.0210)	-0.0485** (0.0232)	-0.0515*** (0.0166)	-0.0381*** (0.0124)	-0.0686*** (0.0143)	0.00708 (0.0164)	-0.0500*** (0.0144)	0.0171 (0.0157)
$\Delta s_{i,t}$		-0.154*** (0.0316)								
$q_{i,t}$			-0.0147*** (0.00281)				-0.0168*** (0.00235)	-0.0170*** (0.00242)		
$\Delta q_{i,t}$				-0.144*** (0.0313)						
$sm y_{i,t}$					-0.000614 (0.000408)					
$\Delta sm y_{i,t}$						0.0686*** (0.0126)				
$(\pi_{i,t} - \pi_t^*)$							-0.156** (0.0665)	-0.156** (0.0675)	-0.183** (0.0697)	-0.184** (0.0707)
$(y_{i,t}^{gap} - y_t^{*gap})$							-0.0167*** (0.00322)	-0.0166*** (0.00321)	-0.0167*** (0.00332)	-0.0165*** (0.00333)
$(r_{i,t-1} - r_{t-1}^*)$								-0.0830*** (0.0266)	-0.0732*** (0.0259)	
constant	-0.00268** (0.000998)	-0.00322*** (0.00116)	0.0633*** (0.0127)	-0.00326*** (0.00113)	0.00189 (0.00250)	-7.45e-05 (0.000948)	0.0726*** (0.0102)	0.0737*** (0.0105)	-0.00268*** (0.000957)	-0.00256** (0.000969)
num. observ.	7,872	7,872	7,857	7,857	6,868	6,859	7,189	7,184	7,189	7,184
R^2 overall	0.151	0.168	0.145	0.168	0.144	0.195	0.151	0.151	0.159	0.159

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $sm y_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$. To save space, we omitted here the estimates for VIX, dollar index, oil price, and CRB.

Table C.3 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, set of 22 countries

Regressors	(1) Basic	(2) AR	(3) PPP	(4) PPP diff.	(5) Monetary	(6) Monet.diff.	(7) Taylor1	(8) Taylor2	(9) Taylor3	(10) Taylor4
$(r_{i,t} - r_t^*)$	-0.0435* (0.0214)	-0.0512* (0.0256)	-0.0532** (0.0227)	-0.0528* (0.0263)	-0.0548*** (0.0182)	-0.0373** (0.0136)	-0.0696*** (0.0156)	0.0116 (0.0194)	-0.0538*** (0.0157)	0.0209 (0.0190)
$\Delta s_{i,t}$		-0.160*** (0.0327)								
$q_{i,t}$			-0.0159*** (0.00344)				-0.0186*** (0.00288)	-0.0188*** (0.00297)		
$\Delta q_{i,t}$				-0.152*** (0.0329)						
$sm y_{i,t}$					-0.000655 (0.000467)					
$\Delta sm y_{i,t}$						0.0796*** (0.0153)				
$(\pi_{i,t} - \pi_t^*)$							-0.200** (0.0936)	-0.202** (0.0951)	-0.242** (0.0979)	-0.244** (0.0993)
$(y_{i,t}^{gap} - y_t^{*gap})$							-0.0185*** (0.00353)	-0.0183*** (0.00350)	-0.0184*** (0.00363)	-0.0183*** (0.00361)
$(r_{i,t-1} - r_{t-1}^*)$								-0.0896*** (0.0296)		-0.0820** (0.0291)
constant	-0.00335** (0.00121)	-0.00405*** (0.00141)	0.0684*** (0.0157)	-0.00399*** (0.00139)	0.00182 (0.00294)	-0.000219 (0.00120)	0.0805*** (0.0127)	0.0817*** (0.0131)	-0.00327** (0.00116)	-0.00310** (0.00118)
num. observ.	6,047	6,047	6,038	6,038	5,214	5,206	5,536	5,533	5,536	5,533
R^2 overall	0.153	0.172	0.148	0.171	0.150	0.205	0.157	0.156	0.164	0.163

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $sm y_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$.

To save space, we omitted here the estimates for VIX, dollar index, oil price, and CRB.

Table C.4 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, set of 22 countries

Regressors	(11) Hybrid 1	(12) Hybrid 2	(13) Hybrid 3	(14) Hybrid 4	(15) Hybrid 5	(16) Hybrid 6	(17) Hybrid 7
$(r_{i,t} - r_t^*)$	-0.0354** (0.0146)	-0.0432*** (0.0153)	-0.0455*** (0.0154)	-0.0398** (0.0161)	-0.0445*** (0.0154)	-0.0453** (0.0161)	-0.0510*** (0.0171)
$\Delta q_{i,t}$	-0.277*** (0.0332)	-0.257*** (0.0383)	-0.253*** (0.0381)	-0.267*** (0.0396)	-0.257*** (0.0385)	-0.261*** (0.0386)	-0.262*** (0.0386)
$\Delta smy_{i,t}$	0.110*** (0.0227)	0.108*** (0.0218)	0.112*** (0.0224)	0.104*** (0.0213)	0.108*** (0.0216)	0.113*** (0.0222)	0.111*** (0.0213)
$(\pi_{i,t} - \pi_t^*)$	-0.465*** (0.120)	-0.484*** (0.0992)	-0.484*** (0.0997)	-0.408*** (0.0908)	-0.486*** (0.0990)	-0.426*** (0.0904)	-0.435*** (0.0912)
$(y_{i,t}^{gap} - y_t^{*gap})$	-0.000279 (0.00691)						
Degree trade $_{i,t}$	0.000268 (0.00374)						
Dollar index $_t$	0.647*** (0.0801)	0.609*** (0.0776)	0.612*** (0.0776)	0.508*** (0.0830)	0.594*** (0.0776)	0.504*** (0.0817)	0.512*** (0.0803)
VIX $_t$	0.000150* (8.29e-05)	0.000184** (7.77e-05)	0.000200** (7.41e-05)	-8.59e-05 (7.42e-05)	0.000174** (7.88e-05)	-0.000105 (7.96e-05)	
EPU Global $_t$			1.73e-05 (1.65e-05)				
EPU USA $_t$			-5.17e-05** (2.05e-05)			-0.000120*** (2.23e-05)	-0.000118*** (2.09e-05)
EPU China $_t$			-2.71e-05*** (3.22e-06)			-3.26e-05*** (3.00e-06)	-3.27e-05*** (3.02e-06)
GPR $_t$			5.30e-06 (1.17e-05)				
Oil price $_t$	-0.0453*** (0.0100)	-0.0441*** (0.00945)	-0.0484*** (0.00979)	-0.0304*** (0.00877)	-0.0415*** (0.00929)	-0.0333*** (0.00909)	-0.0324*** (0.00877)
CRB $_t$	-0.0849*** (0.0278)	-0.0777*** (0.0260)	-0.0699** (0.0268)	-0.0243 (0.0215)			
CRB food $_t$					-0.0489*** (0.0133)	-0.0660*** (0.0138)	-0.0668*** (0.0137)
CRB metals $_t$					-0.0324** (0.0140)	0.0508*** (0.0108)	0.0527*** (0.0111)
MSCI devel. $_t$				-0.0710*** (0.0181)		-0.110*** (0.0219)	-0.0968*** (0.0205)
MSCI emerg. $_t$				-0.0883*** (0.0197)		-0.111*** (0.0195)	-0.114*** (0.0198)
constant	-0.000461 (0.00310)	-0.000317 (0.00144)	-0.000538 (0.00139)	0.00514*** (0.00157)	1.63e-05 (0.00148)	0.00584*** (0.00170)	0.00391*** (0.000644)
num. observ.	4,927	5,199	5,158	5,199	5,199	5,158	5,158
R^2 overall	0.269	0.252	0.259	0.280	0.254	0.301	0.299

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $smy_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$.
Some variables are transformed as follows: (i) Δx_t : EPU, GPR; (ii) $\Delta \ln(x_t)$: dollar index, oil price, CRBs MSCI devel. and emerg.

Appendix D. Panel data, two interest rate regimes

Table D.1 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, set of 46 countries

Regressors	(1) threshold $\bar{r}_{i,t}^1$	(2) threshold $\bar{r}_{i,t}^2$	(3) threshold $\bar{r}_{i,t}^3$	(4) threshold $\bar{r}_{i,t}^4$
$(r_{i,t} - r_t^*)^{high}$	0.0589*** (0.0184)	0.0594*** (0.0182)	0.0550*** (0.0181)	0.0547*** (0.0174)
$(r_{i,t} - r_t^*)^{low}$	0.00486 (0.0224)	-0.0260 (0.0234)	0.0185 (0.0292)	0.0409** (0.0170)
$\Delta q_{i,t}$	-0.182*** (0.0286)	-0.182*** (0.0286)	-0.182*** (0.0286)	-0.178*** (0.0291)
$\Delta smy_{i,t}$	0.105*** (0.0194)	0.105*** (0.0194)	0.105*** (0.0194)	0.101*** (0.0179)
$(\pi_{i,t} - \pi_t^*)$	-0.0491 (0.0761)	-0.0487 (0.0759)	-0.0444 (0.0747)	-0.0304 (0.0803)
Dollar index _t	0.418*** (0.0552)	0.418*** (0.0552)	0.418*** (0.0553)	0.414*** (0.0565)
EPU USA _t	-8.34e-05*** (1.64e-05)	-8.33e-05*** (1.64e-05)	-8.31e-05*** (1.63e-05)	-8.09e-05*** (1.56e-05)
EPU China _t	-2.66e-05*** (3.00e-06)	-2.66e-05*** (3.00e-06)	-2.66e-05*** (2.98e-06)	-2.66e-05*** (2.98e-06)
Oil price _t	-0.0283*** (0.00726)	-0.0283*** (0.00727)	-0.0282*** (0.00725)	-0.0273*** (0.00715)
CRB food _t	-0.0363*** (0.00810)	-0.0362*** (0.00811)	-0.0360*** (0.00817)	-0.0374*** (0.00832)
CRB metals _t	0.0547*** (0.0114)	0.0547*** (0.0114)	0.0546*** (0.0114)	0.0536*** (0.0112)
MSCI emerg. _t	-0.0954*** (0.0162)	-0.0947*** (0.0162)	-0.0956*** (0.0161)	-0.100*** (0.0152)
MSCI devel. _t	-0.0548*** (0.0173)	-0.0558*** (0.0172)	-0.0548*** (0.0174)	-0.0500*** (0.0173)
constant	0.000567 (0.000705)	0.000353 (0.000731)	0.000698 (0.000695)	0.000549 (0.000670)
num. observ.	10,430	10,430	10,430	10,417
R^2 overall	0.243	0.243	0.242	0.246
Wald test (p-value)	0.0262**	0.0053***	0.1729	0.4087
$H_o : (r_{i,t} - r_t^*)^{high=low}$				

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $smy_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$.
Some variables are transformed as follows: (i) Δx_t : EPU; (ii) $\Delta \ln(x_t)$: dollar index, oil price, CRBs MSCI devel. and emerg.

Table D.2 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, set of 29 countries

Regressors	(1) threshold $\bar{r}_{i,t}^1$	(2) threshold $\bar{r}_{i,t}^2$	(3) threshold $\bar{r}_{i,t}^3$	(4) threshold $\bar{r}_{i,t}^4$
$(r_{i,t} - r_t^*)^{high}$	-0.0440** (0.0160)	-0.0456** (0.0167)	-0.0502*** (0.0151)	-0.0488*** (0.0123)
$(r_{i,t} - r_t^*)^{low}$	-0.0823*** (0.0222)	-0.0776*** (0.0151)	-0.0762*** (0.0271)	-0.0479 (0.0335)
$\Delta q_{i,t}$	-0.237*** (0.0347)	-0.237*** (0.0346)	-0.237*** (0.0346)	-0.237*** (0.0347)
$\Delta smy_{i,t}$	0.0940*** (0.0173)	0.0939*** (0.0172)	0.0939*** (0.0171)	0.0937*** (0.0172)
$(\pi_{i,t} - \pi_t^*)$	-0.379*** (0.0713)	-0.377*** (0.0711)	-0.376*** (0.0715)	-0.375*** (0.0731)
Dollar index _t	0.510*** (0.0786)	0.510*** (0.0786)	0.511*** (0.0787)	0.511*** (0.0786)
EPU USA _t	-9.57e-05*** (1.82e-05)	-9.54e-05*** (1.81e-05)	-9.55e-05*** (1.81e-05)	-9.50e-05*** (1.82e-05)
EPU China _t	-3.03e-05*** (2.76e-06)	-3.03e-05*** (2.75e-06)	-3.03e-05*** (2.74e-06)	-3.02e-05*** (2.75e-06)
Oil price _t	-0.0267*** (0.00732)	-0.0266*** (0.00729)	-0.0266*** (0.00727)	-0.0265*** (0.00732)
CRB food _t	-0.0533*** (0.0116)	-0.0534*** (0.0116)	-0.0534*** (0.0117)	-0.0537*** (0.0116)
CRB metals _t	0.0505*** (0.00893)	0.0503*** (0.00903)	0.0503*** (0.00889)	0.0499*** (0.00897)
MSCI emerg. _t	-0.0978*** (0.0169)	-0.0974*** (0.0169)	-0.0980*** (0.0168)	-0.0972*** (0.0166)
MSCI devel. _t	-0.0755*** (0.0179)	-0.0761*** (0.0178)	-0.0755*** (0.0182)	-0.0762*** (0.0179)
constant	0.00314*** (0.000495)	0.00306*** (0.000537)	0.00329*** (0.000453)	0.00315*** (0.000501)
num. observ.	6,796	6,796	6,796	6,791
R^2 overall	0.275	0.275	0.273	0.275
Wald test (p-value)	0.0869*	0.1627	0.3581	0.9679
$H_0 : (r_{i,t} - r_t^*)^{high=low}$				

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $smy_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$.

Some variables are transformed as follows: (i) Δx_t : EPU; (ii) $\Delta \ln(x_t)$: dollar index, oil price, CRBs MSCI devel. and emerg.

Table D.3 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, set of 22 countries

Regressors	(1) threshold $\bar{r}_{i,t}^1$	(2) threshold $\bar{r}_{i,t}^2$	(3) threshold $\bar{r}_{i,t}^3$	(4) threshold $\bar{r}_{i,t}^4$
$(r_{i,t} - r_t^*)^{high}$	-0.0463** (0.0177)	-0.0477** (0.0186)	-0.0526*** (0.0168)	-0.0503*** (0.0137)
$(r_{i,t} - r_t^*)^{low}$	-0.0975*** (0.0271)	-0.0899*** (0.0149)	-0.0725** (0.0342)	-0.0541 (0.0377)
$\Delta q_{i,t}$	-0.262*** (0.0386)	-0.262*** (0.0385)	-0.262*** (0.0386)	-0.262*** (0.0386)
$\Delta smy_{i,t}$	0.112*** (0.0214)	0.111*** (0.0213)	0.111*** (0.0212)	0.111*** (0.0213)
$(\pi_{i,t} - \pi_t^*)$	-0.441*** (0.0913)	-0.437*** (0.0910)	-0.436*** (0.0915)	-0.437*** (0.0939)
Dollar index _t	0.513*** (0.0803)	0.512*** (0.0804)	0.512*** (0.0805)	0.513*** (0.0803)
EPU USA _t	-0.000118*** (2.10e-05)	-0.000118*** (2.09e-05)	-0.000118*** (2.08e-05)	-0.000117*** (2.11e-05)
EPU China _t	-3.27e-05*** (3.04e-06)	-3.27e-05*** (3.03e-06)	-3.27e-05*** (3.00e-06)	-3.26e-05*** (3.03e-06)
Oil price _t	-0.0326*** (0.00880)	-0.0325*** (0.00875)	-0.0324*** (0.00874)	-0.0324*** (0.00881)
CRB food _t	-0.0666*** (0.0137)	-0.0668*** (0.0137)	-0.0667*** (0.0138)	-0.0673*** (0.0136)
CRB metals _t	0.0533*** (0.0110)	0.0530*** (0.0111)	0.0529*** (0.0110)	0.0527*** (0.0111)
MSCI emerg. _t	-0.115*** (0.0198)	-0.114*** (0.0197)	-0.115*** (0.0198)	-0.114*** (0.0194)
MSCI devel. _t	-0.0956*** (0.0207)	-0.0964*** (0.0206)	-0.0962*** (0.0209)	-0.0967*** (0.0207)
constant	0.00390*** (0.000659)	0.00379*** (0.000709)	0.00402*** (0.000623)	0.00391*** (0.000670)
num. observ.	5,158	5,158	5,158	5,155
R^2 overall	0.300	0.299	0.298	0.300
Wald test (p-value)	0.0599 *	0.1076	0.5436	0.8872
$H_o : (r_{i,t} - r_t^*)^{high=low}$				

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $smy_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$.

Some variables are transformed as follows: (i) Δx_t : EPU; (ii) $\Delta \ln(x_t)$: dollar index, oil price, CRBs MSCI devel. and emerg.

Table D.4 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, 22 countries, 3 regions

Regressors	(5) single regime	(6) threshold $\bar{r}_{i,t}^1$	(7) threshold $\bar{r}_{i,t}^2$	(8) threshold $\bar{r}_{i,t}^3$	(9) threshold $\bar{r}_{i,t}^4$
$(r_{i,t} - r_t^*)^{region1}$	-0.0470** (0.0173)				
$(r_{i,t} - r_t^*)^{region2}$	-0.0938*** (0.0272)				
$(r_{i,t} - r_t^*)^{region3}$	-0.0169 (0.0245)				
$(r_{i,t} - r_t^*)^{low, region1}$		-0.0589** (0.0259)	-0.0519 (0.0478)	-0.000581 (0.0720)	-0.0540 (0.0370)
$(r_{i,t} - r_t^*)^{low, region2}$		-0.151** (0.0542)	-0.109*** (0.0178)	-0.143*** (0.0266)	-0.138* (0.0688)
$(r_{i,t} - r_t^*)^{low, region3}$		-0.0591* (0.0318)	-0.0691** (0.0245)	-0.219** (0.0936)	0.0331 (0.0467)
$(r_{i,t} - r_t^*)^{high, region1}$		-0.0470** (0.0173)	-0.0469** (0.0172)	-0.0399* (0.0215)	-0.0461*** (0.0160)
$(r_{i,t} - r_t^*)^{high, region2}$		-0.0814*** (0.0254)	-0.0910*** (0.0313)	-0.0972*** (0.0268)	-0.0863*** (0.0225)
$(r_{i,t} - r_t^*)^{high, region3}$		-0.0116 (0.0268)	-0.0115 (0.0257)	-0.0193 (0.0190)	-0.0320 (0.0190)
$\Delta q_{i,t}$	-0.262*** (0.0386)	-0.263*** (0.0387)	-0.262*** (0.0386)	-0.263*** (0.0386)	-0.262*** (0.0386)
$\Delta smy_{i,t}$	0.111*** (0.0213)	0.112*** (0.0214)	0.111*** (0.0213)	0.112*** (0.0212)	0.111*** (0.0213)
$(\pi_{i,t} - \pi_t^*)$	-0.441*** (0.0892)	-0.446*** (0.0893)	-0.444*** (0.0890)	-0.445*** (0.0889)	-0.447*** (0.0926)
Dollar index _t	0.512*** (0.0805)	0.513*** (0.0804)	0.513*** (0.0806)	0.513*** (0.0807)	0.513*** (0.0805)
EPU USA _t	-0.000117*** (2.09e-05)	-0.000118*** (2.10e-05)	-0.000117*** (2.09e-05)	-0.000118*** (2.10e-05)	-0.000117*** (2.07e-05)
EPU China _t	-3.27e-05*** (3.02e-06)	-3.27e-05*** (3.03e-06)	-3.27e-05*** (3.02e-06)	-3.27e-05*** (3.01e-06)	-3.28e-05*** (3.06e-06)
Oil price _t	-0.0326*** (0.00879)	-0.0327*** (0.00880)	-0.0327*** (0.00877)	-0.0327*** (0.00879)	-0.0326*** (0.00882)
CRB food _t	-0.0674*** (0.0136)	-0.0672*** (0.0137)	-0.0674*** (0.0136)	-0.0669*** (0.0136)	-0.0678*** (0.0135)
CRB metals _t	0.0530*** (0.0111)	0.0537*** (0.0110)	0.0532*** (0.0111)	0.0540*** (0.0112)	0.0529*** (0.0111)

Table D.4 (cont.) - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$,
22 countries, 3 regions

Regressors	(5) single regime	(6) threshold $\bar{r}_{i,t}^1$	(7) threshold $\bar{r}_{i,t}^2$	(8) threshold $\bar{r}_{i,t}^3$	(9) threshold $\bar{r}_{i,t}^4$
MSCI emerg. _t	-0.115*** (0.0198)	-0.115*** (0.0199)	-0.115*** (0.0197)	-0.115*** (0.0198)	-0.114*** (0.0191)
MSCI devel. _t	-0.0959*** (0.0207)	-0.0950*** (0.0208)	-0.0956*** (0.0207)	-0.0965*** (0.0212)	-0.0962*** (0.0209)
constant	0.00410*** (0.000601)	0.00399*** (0.000601)	0.00401*** (0.000655)	0.00406*** (0.000632)	0.00414*** (0.000634)
num. observ.	5,158	5,158	5,158	5,158	5,155
R^2 overall	0.295	0.296	0.295	0.294	0.295

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $sm_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$.
Some variables are transformed as follows: (i) Δx_t : EPU; (ii) $\Delta \ln(x_t)$: dollar index, oil price, CRBs MSCI devel. and emerg.
Geographical regions are defined in Table A.3, as follows: (1) Americas, (2) Africa and Asia, and (3) Europe.

Table D.5 - Hypothesis tests on $(r_{i,t} - r_t^*)$ slopes, 22 countries, 3 regions

Wald test (p-value)	(5)	(6)	(7)	(8)	(9)
Ho: $(r_{i,t} - r_t^*)^{i=j}$	single regime	threshold $\bar{r}_{i,t}^1$	threshold $\bar{r}_{i,t}^2$	threshold $\bar{r}_{i,t}^3$	threshold $\bar{r}_{i,t}^4$
<i>region1=region2</i>	0.1195				
<i>region1=region3</i>	0.3035				
<i>region2=region3</i>	0.0325**				
<i>region1, high=low</i>		0.6435	0.9172	0.4728	0.7835
<i>region2, high=low</i>		0.0467**	0.5844	0.0901*	0.3204
<i>region3, high=low</i>		0.3501	0.1642	0.0446**	0.0367**
<i>low, region1=region2</i>		0.1010	0.3186	0.0860*	0.2827
<i>low, region1=region3</i>		0.9963	0.7701	0.0792*	0.1587
<i>low, region2=region3</i>		0.1320	0.1694	0.4384	0.0425**
<i>high, region1=region2</i>		0.2083	0.1877	0.0874*	0.1099
<i>high, region1=region3</i>		0.2538	0.2423	0.4680	0.5431
<i>high, region2=region3</i>		0.0502*	0.0458**	0.0150**	0.0534*

Notes: *** p<0.01, ** p<0.05, * p<0.1. Geographical regions are defined in Table A.3, as follows: (1) Americas, (2) Africa and Asia, and (3) Europe. In first column, "high" and "low" denote the interest rate regimes. Tests are based on estimates from Table D.4.

Table D.6 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, 22 countries, clusters

Regressors	(10) single regime	(11) threshold $\bar{r}_{i,t}^1$	(12) threshold $\bar{r}_{i,t}^2$	(13) threshold $\bar{r}_{i,t}^3$	(14) threshold $\bar{r}_{i,t}^4$
$(r_{i,t} - r_t^*)^{cluster1}$	-0.0652*** (0.0169)				
$(r_{i,t} - r_t^*)^{cluster2}$	-0.103*** (0.0330)				
$(r_{i,t} - r_t^*)^{cluster3}$	-0.0509*** (0.0147)				
$(r_{i,t} - r_t^*)^{cluster4}$	-0.0250 (0.0470)				
$(r_{i,t} - r_t^*)^{Japan}$	-0.0881*** (0.00979)				
$(r_{i,t} - r_t^*)^{Mongolia}$	-0.0485*** (0.0124)				
$(r_{i,t} - r_t^*)^{Paraguay}$	-0.00600 (0.00733)				
$(r_{i,t} - r_t^*)^{Serbia}$	0.0372*** (0.00358)				
$(r_{i,t} - r_t^*)^{cluster1, low}$		-0.0752*** (0.0256)	-0.0758 (0.105)	-0.0303 (0.0972)	-0.0802* (0.0435)
$(r_{i,t} - r_t^*)^{cluster1, high}$		-0.0651*** (0.0165)	-0.0653*** (0.0190)	-0.0577* (0.0330)	-0.0633*** (0.0142)
$(r_{i,t} - r_t^*)^{cluster2, low}$		-0.186** (0.0814)	-0.134*** (0.0293)	-0.143*** (0.0406)	-0.214*** (0.0737)
$(r_{i,t} - r_t^*)^{cluster2, high}$		-0.0928*** (0.0314)	-0.100** (0.0354)	-0.105*** (0.0329)	-0.0909*** (0.0283)
$(r_{i,t} - r_t^*)^{cluster3, low}$		-0.0422 (0.0414)	-0.0830*** (0.0209)	-0.174 (0.144)	-0.0385** (0.0153)
$(r_{i,t} - r_t^*)^{cluster3, high}$		-0.0520*** (0.0149)	-0.0458** (0.0188)	-0.0477*** (0.0126)	-0.0548*** (0.0149)
$(r_{i,t} - r_t^*)^{cluster4, low}$		-0.0724*** (0.00912)	-0.00771 (0.0594)	-0.0900*** (0.0109)	0.0460 (0.135)
$(r_{i,t} - r_t^*)^{cluster4, high}$		0.198*** (0.0331)	-0.0591 (0.0695)	-0.0131 (0.0500)	-0.0525** (0.0192)
$(r_{i,t} - r_t^*)^{Japan, low}$		-0.0883*** (0.00987)	-0.0882*** (0.00982)	-0.142*** (0.0107)	0.00650 (0.0196)
$(r_{i,t} - r_t^*)^{Japan, high}$		-	-	-0.0722*** (0.0100)	-0.124*** (0.00767)
$(r_{i,t} - r_t^*)^{Mongolia, low}$		-	0.404*** (0.101)	-0.107*** (0.0178)	-0.0212* (0.0120)
$(r_{i,t} - r_t^*)^{Mongolia, high}$		-0.0489*** (0.0125)	-0.0365** (0.0133)	-0.0631*** (0.0106)	-0.0549*** (0.0132)

Table D.6 (cont.) - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, 22 countries, clusters

Regressors	(10) single regime	(11) threshold $\bar{r}_{i,t}^1$	(12) threshold $\bar{r}_{i,t}^2$	(13) threshold $\bar{r}_{i,t}^3$	(14) threshold $\bar{r}_{i,t}^4$
$(r_{i,t} - r_t^*)^{Paraguay, low}$		-0.0661* (0.0331)	-0.0556 (0.0404)	0.0312 (0.0529)	0.170*** (0.0198)
$(r_{i,t} - r_t^*)^{Paraguay, high}$		-0.00500 (0.00721)	-0.00525 (0.00732)	-0.00692 (0.00721)	-0.0189** (0.00704)
$(r_{i,t} - r_t^*)^{Serbia, low}$		-0.180*** (0.0140)	-0.654*** (0.139)	-0.323*** (0.0241)	0.134*** (0.00442)
$(r_{i,t} - r_t^*)^{Serbia, high}$		0.0171*** (0.00287)	-0.00749 (0.0103)	0.00627 (0.00399)	0.0140*** (0.00467)
$\Delta q_{i,t}$	-0.263*** (0.0386)	-0.263*** (0.0387)	-0.263*** (0.0387)	-0.263*** (0.0387)	-0.262*** (0.0386)
$\Delta smy_{i,t}$	0.111*** (0.0213)	0.112*** (0.0215)	0.111*** (0.0214)	0.112*** (0.0213)	0.111*** (0.0213)
$(\pi_{i,t} - \pi_t^*)$	-0.432*** (0.0889)	-0.437*** (0.0892)	-0.437*** (0.0889)	-0.439*** (0.0885)	-0.432*** (0.0929)
Dollar index $_t$	0.512*** (0.0806)	0.512*** (0.0807)	0.512*** (0.0808)	0.513*** (0.0810)	0.512*** (0.0804)
EPU USA $_t$	-0.000118*** (2.09e-05)	-0.000118*** (2.11e-05)	-0.000118*** (2.10e-05)	-0.000118*** (2.10e-05)	-0.000118*** (2.05e-05)
EPU China $_t$	-3.26e-05*** (3.02e-06)	-3.27e-05*** (3.02e-06)	-3.26e-05*** (3.03e-06)	-3.27e-05*** (3.02e-06)	-3.27e-05*** (3.07e-06)
Oil price $_t$	-0.0324*** (0.00878)	-0.0326*** (0.00881)	-0.0325*** (0.00878)	-0.0325*** (0.00880)	-0.0323*** (0.00881)
CRB food $_t$	-0.0670*** (0.0136)	-0.0667*** (0.0137)	-0.0668*** (0.0137)	-0.0668*** (0.0137)	-0.0677*** (0.0133)
CRB metals $_t$	0.0524*** (0.0113)	0.0533*** (0.0111)	0.0524*** (0.0113)	0.0533*** (0.0114)	0.0529*** (0.0114)
MSCI emerg. $_t$	-0.115*** (0.0197)	-0.115*** (0.0199)	-0.115*** (0.0197)	-0.115*** (0.0199)	-0.113*** (0.0195)
MSCI devel. $_t$	-0.0966*** (0.0208)	-0.0958*** (0.0209)	-0.0960*** (0.0207)	-0.0971*** (0.0214)	-0.0991*** (0.0209)
constant	0.00414*** (0.000519)	0.00424*** (0.000555)	0.00430*** (0.000558)	0.00427*** (0.000649)	0.00425*** (0.000545)
num. observ.	5,158	5,158	5,158	5,158	5,155
R^2 overall	0.296	0.297	0.297	0.296	0.297

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $sm y_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$.

Some variables are transformed as follows: (i) Δx_t : EPU's; (ii) $\Delta \ln(x_t)$: dollar index, oil price, CRBs MSCI devel. and emerg.

Cluster #1: Brazil, Chile, Colombia, Mexico, Peru. Cluster #2: India, Indonesia, Korea, South Africa, Thailand.

Cluster #3: CzechRep, Hungary, New Zealand, Norway, Poland, Sweden. Cluster #4: Switzerland, United Kingdom.

Table D.7 - Hypothesis tests on $(r_{i,t} - r_t^*)$ slopes, 22 countries, clusters

Wald test (p-value)	(10)	(11)	(12)	(13)	(14)
Ho: $(r_{i,t} - r_t^*)^{i=j}$	single regime	threshold $\bar{r}_{i,t}^1$	threshold $\bar{r}_{i,t}^2$	threshold $\bar{r}_{i,t}^3$	threshold $\bar{r}_{i,t}^4$
<i>cluster1=cluster2</i>	0.3039				
<i>cluster1=cluster3</i>	0.5215				
<i>cluster1=cluster4</i>	0.4350				
<i>cluster2=cluster3</i>	0.1219				
<i>cluster2=cluster4</i>	0.1701				
<i>cluster3=cluster4</i>	0.5943				
<i>cluster1, high=low</i>		0.7054	0.9097	0.6766	0.6102
<i>cluster2, high=low</i>		0.1085	0.4711	0.3217	0.0329**
<i>cluster3, high=low</i>		0.8215	0.2783	0.3742	0.0385**
<i>cluster4, high=low</i>		0.0000***	0.0445**	0.1871	0.4162
<i>Japan, high=low</i>		-	-	0.0000***	0.0000***
<i>Mongolia, high=low</i>		-	0.0001***	0.0117**	0.0003***
<i>Paraguay, high=low</i>		0.0558*	0.2153	0.4690	0.0000***
<i>Serbia, high=low</i>		0.0000***	0.0001***	0.0000***	0.0000***

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In first column, "high" and "low" denote the interest rate regimes.

Tests are based on estimates from Table D.6. Cluster #1: Brazil, Chile, Colombia, Mexico, Peru.

Cluster #2: India, Indonesia, Korea, South Africa, Thailand. Cluster #3: CzechRep, Hungary, New Zealand,

Norway, Poland, Sweden. Cluster #4: Switzerland, United Kingdom.

Appendix E. Robustness exercise

Table E.1 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, 22 countries, threshold $\bar{r}_{i,t}^1$

Regressors	(1)	(2)	(3)	(4)	(5)	(6)
$(r_{i,t} - r_t^*)^{high}$	-0.0632*** (0.0177)	-0.0641*** (0.0192)	-0.0428** (0.0173)	-0.0391** (0.0173)	-0.0544** (0.0192)	-0.0615*** (0.0194)
$(r_{i,t} - r_t^*)^{low}$	-0.104*** (0.0221)	-0.103*** (0.0246)	-0.0941*** (0.0258)	-0.0732*** (0.0246)	-0.0940*** (0.0290)	-0.0874*** (0.0243)
$d_t^{GFC2008}$	0.00452 (0.00360)					0.0166*** (0.00499)
$d_t^{COVID2020}$	-0.0238*** (0.00497)					-0.0325*** (0.00596)
Infect_emv_index _t		-0.000397*** (9.29e-05)				0.000118 (8.60e-05)
FCI USA _t			-0.00114 (0.000943)			-0.00479*** (0.00119)
Dollar index _t	0.484*** (0.0791)	0.507*** (0.0795)	0.509*** (0.0811)	0.491*** (0.0809)		
EPU Japan _t				-5.84e-05*** (1.64e-05)		-3.99e-05*** (1.12e-05)
EPU China _t	-3.16e-05*** (2.92e-06)	-3.35e-05*** (3.10e-06)	-3.28e-05*** (3.04e-06)		-2.70e-05*** (2.81e-06)	
EPU USA _t	-0.000121*** (2.20e-05)	-0.000119*** (2.13e-05)	-0.000119*** (2.18e-05)	-0.000137*** (2.17e-05)	-0.000144*** (2.02e-05)	-0.000162*** (2.24e-05)
$\Delta q_{i,t}$	-0.275*** (0.0409)	-0.266*** (0.0398)	-0.262*** (0.0385)	-0.268*** (0.0388)	-0.227*** (0.0385)	-0.252*** (0.0409)
$\Delta smy_{i,t}$	0.127*** (0.0250)	0.120*** (0.0233)	0.112*** (0.0217)	0.115*** (0.0224)	0.119*** (0.0221)	0.140*** (0.0265)
$(\pi_{i,t} - \pi_t^*)$	-0.493*** (0.0957)	-0.468*** (0.0902)	-0.431*** (0.0909)	-0.456*** (0.0912)	-0.392*** (0.0870)	-0.448*** (0.0903)
Oil price _t	-0.0370*** (0.00938)	-0.0371*** (0.00937)	-0.0328*** (0.00886)	-0.0325*** (0.00892)	-0.0317*** (0.00869)	-0.0369*** (0.00945)
CRB food _t	-0.0689*** (0.0132)	-0.0601*** (0.0137)	-0.0676*** (0.0136)	-0.0632*** (0.0136)	-0.0905*** (0.0135)	-0.0849*** (0.0123)
CRB metals _t	0.0568*** (0.0109)	0.0579*** (0.0111)	0.0512*** (0.0104)	0.0360*** (0.0103)	0.000639 (0.0128)	-0.00622 (0.0121)
MSCI emerg. _t	-0.111*** (0.0192)	-0.113*** (0.0194)	-0.112*** (0.0192)	-0.104*** (0.0193)	-0.165*** (0.0173)	-0.138*** (0.0165)
MSCI devel. _t	-0.0948*** (0.0210)	-0.103*** (0.0215)	-0.102*** (0.0212)	-0.106*** (0.0213)	-0.0758*** (0.0208)	-0.0960*** (0.0225)
constant	0.00475*** (0.000711)	0.00541*** (0.000837)	0.00342*** (0.000690)	0.00998*** (0.00200)	0.00448*** (0.000691)	0.00721*** (0.00157)
num. observ.	5,158	5,158	5,158	5,199	5,158	5,199
R ² overall	0.305	0.300	0.301	0.295	0.247	0.258
Wald test (p-value)	0.0739 *	0.1063	0.0608 *	0.1717	0.1716	0.2621

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $smy_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$.

Some variables are transformed as follows: (i) Δx_t : EPU's; (ii) $\Delta \ln(x_t)$: dollar index, oil price, CRBs MSCI devel. and emerg.

The Wald test is based on the null hypothesis $H_0 : (r_{i,t} - r_t^*)^{high=low}$

Table E.2 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, 22 countries, threshold $\bar{r}_{i,t}^2$

Regressors	(1)	(2)	(3)	(4)	(5)	(6)
$(r_{i,t} - r_t^*)^{high}$	-0.0651*** (0.0182)	-0.0662*** (0.0199)	-0.0443** (0.0181)	-0.0404** (0.0180)	-0.0560** (0.0201)	-0.0644*** (0.0201)
$(r_{i,t} - r_t^*)^{low}$	-0.0874*** (0.0144)	-0.0860*** (0.0168)	-0.0850*** (0.0147)	-0.0622*** (0.0171)	-0.0814*** (0.0156)	-0.0564*** (0.0136)
$d_t^{GFC2008}$	0.00438 (0.00362)					0.0163*** (0.00509)
$d_t^{COVID2020}$	-0.0239*** (0.00506)					-0.0325*** (0.00596)
Infect_emv_index _t		-0.000400*** (9.69e-05)				0.000114 (8.91e-05)
FCI USA _t			-0.00112 (0.000943)			-0.00469*** (0.00121)
Dollar index _t	0.484*** (0.0792)	0.507*** (0.0796)	0.509*** (0.0813)	0.490*** (0.0810)		
EPU Japan _t				-5.96e-05*** (1.69e-05)		-4.17e-05*** (1.14e-05)
EPU China _t	-3.15e-05*** (2.91e-06)	-3.35e-05*** (3.09e-06)	-3.28e-05*** (3.03e-06)		-2.70e-05*** (2.80e-06)	
EPU USA _t	-0.000120*** (2.21e-05)	-0.000119*** (2.13e-05)	-0.000119*** (2.17e-05)	-0.000137*** (2.17e-05)	-0.000143*** (2.01e-05)	-0.000162*** (2.24e-05)
$\Delta q_{i,t}$	-0.274*** (0.0408)	-0.266*** (0.0397)	-0.261*** (0.0385)	-0.267*** (0.0388)	-0.227*** (0.0384)	-0.252*** (0.0409)
$\Delta smy_{i,t}$	0.127*** (0.0249)	0.120*** (0.0233)	0.112*** (0.0216)	0.115*** (0.0223)	0.119*** (0.0220)	0.140*** (0.0265)
$(\pi_{i,t} - \pi_t^*)$	-0.490*** (0.0955)	-0.465*** (0.0901)	-0.428*** (0.0906)	-0.453*** (0.0909)	-0.389*** (0.0867)	-0.446*** (0.0898)
Oil price _t	-0.0370*** (0.00936)	-0.0370*** (0.00936)	-0.0327*** (0.00881)	-0.0325*** (0.00888)	-0.0316*** (0.00865)	-0.0368*** (0.00945)
CRB food _t	-0.0692*** (0.0132)	-0.0602*** (0.0137)	-0.0677*** (0.0136)	-0.0634*** (0.0136)	-0.0906*** (0.0135)	-0.0851*** (0.0123)
CRB metals _t	0.0565*** (0.0110)	0.0576*** (0.0112)	0.0510*** (0.0106)	0.0357*** (0.0105)	0.000420 (0.0129)	-0.00656 (0.0122)
MSCI emerg. _t	-0.110*** (0.0192)	-0.113*** (0.0194)	-0.112*** (0.0191)	-0.104*** (0.0193)	-0.165*** (0.0173)	-0.138*** (0.0165)
MSCI devel. _t	-0.0958*** (0.0209)	-0.104*** (0.0214)	-0.103*** (0.0212)	-0.106*** (0.0212)	-0.0766*** (0.0208)	-0.0969*** (0.0225)
constant	0.00470*** (0.000756)	0.00537*** (0.000889)	0.00332*** (0.000737)	0.0100*** (0.00209)	0.00441*** (0.000743)	0.00749*** (0.00168)
num. observ.	5,158	5,158	5,158	5,199	5,158	5,199
R^2 overall	0.304	0.300	0.300	0.295	0.246	0.258
Wald test (p-value)	0.3504	0.4354	0.1282	0.4223	0.3402	0.7448

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $smy_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$.
Some variables are transformed as follows: (i) Δx_t : EPU's; (ii) $\Delta \ln(x_t)$: dollar index, oil price, CRBs MSCI devel. and emerg.
The Wald test is based on the null hypothesis $H_0 : (r_{i,t} - r_t^*)^{high=low}$

Table E.3 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, 22 countries, threshold $\bar{r}_{i,t}^3$

Regressors	(1)	(2)	(3)	(4)	(5)	(6)
$(r_{i,t} - r_t^*)^{high}$	-0.0677*** (0.0161)	-0.0679*** (0.0174)	-0.0491*** (0.0162)	-0.0423** (0.0158)	-0.0582*** (0.0185)	-0.0630*** (0.0177)
$(r_{i,t} - r_t^*)^{low}$	-0.0781** (0.0313)	-0.0684** (0.0294)	-0.0695* (0.0346)	-0.0451 (0.0348)	-0.0605* (0.0349)	-0.0520 (0.0306)
$d_t^{GFC2008}$	0.00435 (0.00362)					0.0162*** (0.00510)
$d_t^{COVID2020}$	-0.0239*** (0.00508)					-0.0324*** (0.00600)
Infect_emv_index _t		-0.000403*** (9.90e-05)				0.000112 (9.31e-05)
FCI USA _t			-0.00114 (0.000936)			-0.00467*** (0.00120)
Dollar index _t	0.483*** (0.0794)	0.507*** (0.0797)	0.509*** (0.0813)	0.490*** (0.0812)		
EPU Japan _t				-6.02e-05*** (1.72e-05)		-4.18e-05*** (1.16e-05)
EPU China _t	-3.16e-05*** (2.89e-06)	-3.35e-05*** (3.07e-06)	-3.28e-05*** (3.01e-06)		-2.70e-05*** (2.78e-06)	
EPU USA _t	-0.000120*** (2.20e-05)	-0.000119*** (2.13e-05)	-0.000119*** (2.16e-05)	-0.000137*** (2.15e-05)	-0.000143*** (2.01e-05)	-0.000162*** (2.23e-05)
$\Delta q_{i,t}$	-0.274*** (0.0408)	-0.266*** (0.0398)	-0.261*** (0.0385)	-0.267*** (0.0388)	-0.227*** (0.0385)	-0.252*** (0.0410)
$\Delta smy_{i,t}$	0.127*** (0.0249)	0.120*** (0.0233)	0.112*** (0.0215)	0.115*** (0.0223)	0.119*** (0.0219)	0.140*** (0.0264)
$(\pi_{i,t} - \pi_t^*)$	-0.490*** (0.0959)	-0.464*** (0.0905)	-0.427*** (0.0913)	-0.452*** (0.0915)	-0.388*** (0.0871)	-0.446*** (0.0902)
Oil price _t	-0.0369*** (0.00936)	-0.0370*** (0.00940)	-0.0326*** (0.00880)	-0.0324*** (0.00891)	-0.0315*** (0.00864)	-0.0368*** (0.00949)
CRB food _t	-0.0692*** (0.0133)	-0.0602*** (0.0137)	-0.0677*** (0.0138)	-0.0634*** (0.0137)	-0.0906*** (0.0136)	-0.0852*** (0.0123)
CRB metals _t	0.0564*** (0.0109)	0.0575*** (0.0111)	0.0509*** (0.0105)	0.0356*** (0.0104)	0.000260 (0.0128)	-0.00661 (0.0121)
MSCI emerg. _t	-0.110*** (0.0192)	-0.113*** (0.0194)	-0.112*** (0.0192)	-0.104*** (0.0193)	-0.165*** (0.0174)	-0.138*** (0.0165)
MSCI devel. _t	-0.0957*** (0.0214)	-0.104*** (0.0219)	-0.103*** (0.0215)	-0.107*** (0.0218)	-0.0767*** (0.0211)	-0.0971*** (0.0232)
constant	0.00482*** (0.000650)	0.00544*** (0.000758)	0.00354*** (0.000680)	0.0102*** (0.00196)	0.00450*** (0.000679)	0.00744*** (0.00159)
num. observ.	5,158	5,158	5,158	5,199	5,158	5,199
R^2 overall	0.304	0.300	0.299	0.294	0.246	0.259
Wald test (p-value)	0.7374	0.9872	0.5342	0.9365	0.9396	0.7241

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $smy_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$.
Some variables are transformed as follows: (i) Δx_t : EPU's; (ii) $\Delta \ln(x_t)$: dollar index, oil price, CRBs MSCI devel. and emerg.
The Wald test is based on the null hypothesis $H_0 : (r_{i,t} - r_t^*)^{high=low}$

Table E.4 - Fixed-effects models, dependent variable: $\Delta s_{i,t+1}$, 22 countries, threshold $\bar{r}_{i,t}^4$

Regressors	(1)	(2)	(3)	(4)	(5)	(6)
$(r_{i,t} - r_t^*)^{high}$	-0.0660*** (0.0138)	-0.0671*** (0.0152)	-0.0472*** (0.0133)	-0.0411*** (0.0134)	-0.0574*** (0.0150)	-0.0633*** (0.0158)
$(r_{i,t} - r_t^*)^{low}$	-0.0719* (0.0364)	-0.0718* (0.0386)	-0.0487 (0.0369)	-0.0469 (0.0361)	-0.0634 (0.0407)	-0.0691* (0.0388)
$d_t^{GFC2008}$	0.00441 (0.00354)					0.0163*** (0.00507)
$d_t^{COVID2020}$	-0.0240*** (0.00504)					-0.0325*** (0.00597)
Infect_emv_index _t		-0.000402*** (9.63e-05)				0.000115 (8.87e-05)
FCI USA _t			-0.00112 (0.000929)			-0.00468*** (0.00123)
Dollar index _t	0.484*** (0.0790)	0.508*** (0.0795)	0.510*** (0.0811)	0.491*** (0.0809)		
EPU Japan _t				-6.01e-05*** (1.68e-05)		-4.16e-05*** (1.14e-05)
EPU China _t	-3.15e-05*** (2.91e-06)	-3.35e-05*** (3.09e-06)	-3.27e-05*** (3.04e-06)		-2.69e-05*** (2.81e-06)	
EPU USA _t	-0.000120*** (2.22e-05)	-0.000119*** (2.15e-05)	-0.000119*** (2.19e-05)	-0.000137*** (2.18e-05)	-0.000143*** (2.02e-05)	-0.000162*** (2.25e-05)
$\Delta q_{i,t}$	-0.275*** (0.0409)	-0.266*** (0.0398)	-0.261*** (0.0386)	-0.268*** (0.0389)	-0.227*** (0.0386)	-0.252*** (0.0410)
$\Delta smy_{i,t}$	0.127*** (0.0250)	0.120*** (0.0234)	0.112*** (0.0216)	0.115*** (0.0224)	0.119*** (0.0220)	0.140*** (0.0265)
$(\pi_{i,t} - \pi_t^*)$	-0.492*** (0.0985)	-0.466*** (0.0934)	-0.427*** (0.0939)	-0.454*** (0.0941)	-0.390*** (0.0903)	-0.448*** (0.0937)
Oil price _t	-0.0369*** (0.00941)	-0.0370*** (0.00942)	-0.0326*** (0.00886)	-0.0324*** (0.00896)	-0.0315*** (0.00870)	-0.0368*** (0.00949)
CRB food _t	-0.0697*** (0.0131)	-0.0607*** (0.0136)	-0.0682*** (0.0136)	-0.0639*** (0.0135)	-0.0911*** (0.0134)	-0.0856*** (0.0122)
CRB metals _t	0.0564*** (0.0109)	0.0575*** (0.0111)	0.0506*** (0.0105)	0.0356*** (0.0105)	0.000319 (0.0129)	-0.00635 (0.0122)
MSCI emerg. _t	-0.110*** (0.0189)	-0.112*** (0.0190)	-0.111*** (0.0188)	-0.103*** (0.0188)	-0.165*** (0.0171)	-0.138*** (0.0161)
MSCI devel. _t	-0.0960*** (0.0210)	-0.104*** (0.0214)	-0.103*** (0.0212)	-0.107*** (0.0213)	-0.0767*** (0.0208)	-0.0965*** (0.0225)
constant	0.00476*** (0.000721)	0.00543*** (0.000848)	0.00343*** (0.000713)	0.0102*** (0.00205)	0.00450*** (0.000707)	0.00746*** (0.00167)
num. observ.	5,155	5,155	5,155	5,196	5,155	5,196
R^2 overall	0.304	0.300	0.301	0.295	0.246	0.258
Wald test (p-value)	0.8174	0.8606	0.9539	0.8250	0.8365	0.8342

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. $smy_{i,t} \equiv s_{i,t} - ((m_{i,t} - m_t^*) - (y_{i,t} - y_t^*))$.
Some variables are transformed as follows: (i) Δx_t : EPU's; (ii) $\Delta \ln(x_t)$: dollar index, oil price, CRBs MSCI devel. and emerg.
The Wald test is based on the null hypothesis $H_0 : (r_{i,t} - r_t^*)^{high=low}$

Table E.5 - Wald tests for structural breaks
around the Global Financial Crisis in 2008/2009

Threshold	Wald test (p-value)
$\bar{r}_{i,t}^1$	0.1382
$\bar{r}_{i,t}^2$	0.0528
$\bar{r}_{i,t}^3$	0.0724
$\bar{r}_{i,t}^4$	0.1410

Notes: Interaction terms between the interest rate differentials and the GFC dummy are included in model (6) of Tables E.1 to E.4. The p-values above come from a joint Wald test based on the null hypothesis:

$$H_0 : d_t^{GFC2008} * (r_{i,t} - r_t^*)^{high} = d_t^{GFC2008} * (r_{i,t} - r_t^*)^{low} = 0.$$

Appendix F. Mixed-effect model

Table F.1 - *Mixed-effect* panel regression estimation

set of 46 countries

	β_0^H	β_0^L	$\sigma_{\nu^H}^2$	$\sigma_{\nu^L}^2$	obs.
$\bar{r}_{i,t}^1$	0.008	-0.030	$1.36e - 03$	$4.09e - 16$	10,430
$\bar{r}_{i,t}^2$	0.007	-0.044	$1.32e - 03$	$2.20e - 17$	10,430
$\bar{r}_{i,t}^3$	0.006	-0.027	$1.17e - 03$	$1.73e - 17$	10,430
$\bar{r}_{i,t}^4$	0.007	0.002	$1.26e - 03$	$6.43e - 03$	10,417

set of 29 countries

	β_0^H	β_0^L	$\sigma_{\nu^H}^2$	$\sigma_{\nu^L}^2$	obs.
$\bar{r}_{i,t}^1$	-0.044	-0.082	$1.18e - 21$	$8.26e - 24$	6,796
$\bar{r}_{i,t}^2$	-0.046	-0.078	$2.28e - 15$	$5.12e - 17$	6,796
$\bar{r}_{i,t}^3$	-0.050	-0.076	$2.78e - 20$	$1.21e - 19$	6,796
$\bar{r}_{i,t}^4$	-0.051	-0.051	$2.56e - 20$	$3.98e - 03$	6,791

set of 22 countries

	β_0^H	β_0^L	$\sigma_{\nu^H}^2$	$\sigma_{\nu^L}^2$	obs.
$\bar{r}_{i,t}^1$	-0.046	-0.097	$3.84e - 15$	$1.33e - 18$	5,158
$\bar{r}_{i,t}^2$	-0.048	-0.090	$6.02e - 20$	$3.86e - 22$	5,158
$\bar{r}_{i,t}^3$	-0.053	-0.072	$1.14e - 16$	$4.05e - 15$	5,158
$\bar{r}_{i,t}^4$	-0.052	-0.063	$9.41e - 16$	$4.09e - 03$	5,155

Note: The remaining estimates are omitted to save space.