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FIVE FACTS ABOUT THE UIP PREMIUM

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Five Facts about the UIP Premium
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ABSTRACT

We document five novel facts about Uncovered Interest Parity (UIP) deviations vis-à-vis the U.S. dollar for 34 currencies of advanced economies and emerging markets. First, the UIP premium co-moves with global risk aversion (VIX) for all currencies, whereas only for emerging market currencies there is a negative comovement between the UIP premium and capital inflows. Second, the comovement of the UIP premium and the VIX is explained by changes in interest rate differentials in emerging markets, and by expected changes in exchange rates in advanced countries. Third, country risk measured by the degree of policy uncertainty can explain both the negative comovement of the UIP premium with capital inflows and the positive comovement of the UIP premium with VIX going through interest rate differentials in emerging markets. Fourth, there are no overshooting and predictability reversal puzzles—for any currency—when using exchange rate expectations to calculate the UIP premium. Fifth, the classical Fama puzzle disappears in advanced economies in expectations, but it remains for emerging markets. As a result, while global investors expect zero excess returns and earn positive returns in the short-run and negative returns in the long-run by investing in advanced country currencies, the same global investors always expect and earn positive excess returns from emerging market currencies. These results imply that in advanced countries the UIP premium is largely due to deviations from rational expectations and full information, whereas in emerging markets, the UIP premium is a risk premium. Global investors charge an "excess" premium to compensate for policy uncertainty in emerging markets—a premium that is over and above the expected and actual depreciation of these currencies.

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1 Introduction

A central concept in international macroeconomics and finance is the Uncovered Interest Parity (UIP) condition that links interest rates to expected changes in the exchange rate. Under the UIP condition, the home currency is expected to depreciate if the home interest rate is higher than the foreign interest rate, offsetting this interest rate differential. Starting with the influential work of Fama (1984), a large literature, focusing on advanced economies, uses *realized* exchange rates and documents the opposite pattern: high interest rate currencies do not depreciate but appreciate in the near future, implying –on average– excess returns from investing in these currencies.[1] A subsequent literature, also focusing on advanced economies and using *realized* exchange rates, documented puzzling dynamics. The delayed overshooting puzzle, as first documented by Eichenbaum and Evans (1995), shows that the exchange rate appreciates first as a response to a positive shock to interest rate differentials, and only starts depreciating after some time. The predictability reversal puzzle, as documented by Bacchetta and van Wincoop (2010), Engel (2016) and Valchev (2020), shows that UIP deviations switch direction, that is high interest rate currencies have positive excess returns in the near future due to the initial appreciation but, after some time, they start having negative excess returns due to too much depreciation.[2]

We undertake an empirical investigation for the determinants of UIP deviations in a large panel of monthly observations composed of both advanced and emerging countries' currencies. Our sample consists of 34 currencies — 12 advanced economies and 22 emerging markets – over the period 1996-2018. Following Froot and Frankel (1989),[3] we use *expectations* of exchange rates from survey data instead of realized exchange rates in order to be able to measure the exact counterpart of the theoretical UIP condition in the data. We document five novel facts:

1. The UIP premium co-moves with global risk aversion (VIX) for all currencies, whereas only for emerging market currencies there is a negative comovement between the UIP premium and capital inflows.

2. Decomposing the UIP premium into two components—interest rate differentials and expected exchange rate adjustment—reveals that the channel of transmission of global risk aversion differs in emerging markets and advanced economies. In emerging markets, the comovement of the UIP premium and the VIX is explained by the comovement of the VIX with the interest

[1] The empirical Fama literature measures the UIP condition using realized exchange rates on the assumption of rational expectations and full information. In addition, this literature assumes that Covered Interest Parity (CIP) holds by equating the difference between forward rates and spot rates to interest rate differentials. This is why the Fama puzzle is also known as the forward premium/discount puzzle, as forward premium is associated with appreciations instead of depreciations. An excellent review of this literature can be found in Engel (2014).

[2] Froot and Frankel (1989) showed that forecast errors in exchange rate can account for the classic UIP puzzle, whereas Candian and De Leo (2021) show that forecast errors can also account for predictability reversal puzzle and can explain the entire path of excess currency returns. Both papers use only advanced country currencies (G7 or G10) and argue that puzzles stem from deviations from full information and rational expectations. Engel (2016) argues that high interest rate currencies cannot be "risky currencies" if they deliver negative returns most of the time, as sum of all future excess returns are negative, the so-called "Engel puzzle."

[3] Stavrakeva and Tang (2018) also use expectations of exchange rates from survey data for advanced countries.

rate differentials. In advanced economies, this comovement is explained by the comovement of the VIX with expected exchange rate changes.

3. Country risk measured by the degree of policy uncertainty can explain the negative comovement of the UIP premium with the VIX, interest rate differentials and country-specific capital inflows in emerging markets. This is not the case in advanced economies.

4. There are no overshooting and predictability reversal puzzles—for any currency—when using exchange rate expectations to calculate the UIP premium. In emerging markets, a transitory increase in interest rate differentials caused by a policy uncertainty shock leads to lower than required expected depreciations, which creates persistent expected excess returns. In advanced economies, a positive shock to interest rate differentials leads to a permanent expected depreciation that offsets the shock.

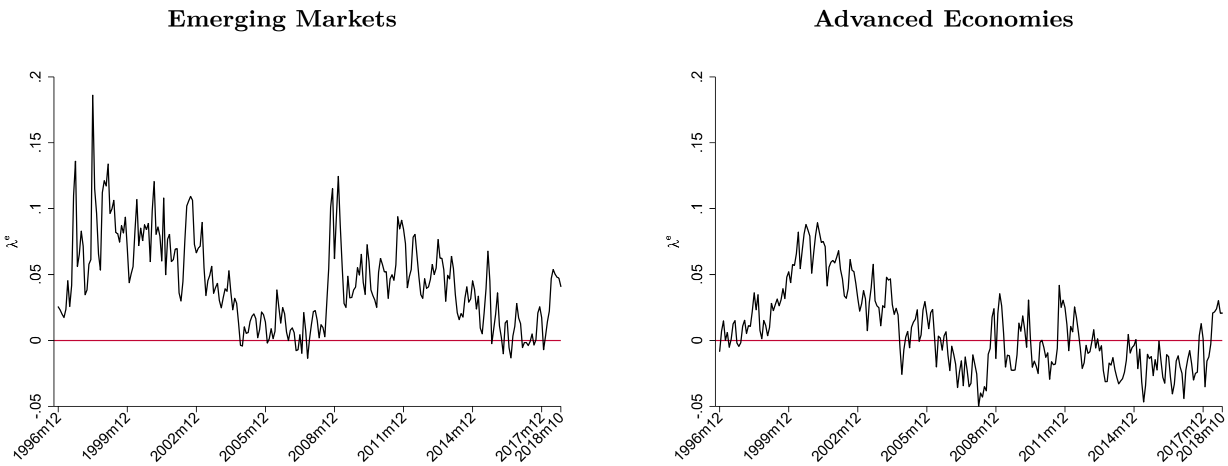
5. The classical Fama puzzle disappears in advanced economies in expectations, but it remains for emerging markets. As a result, while global investors *expect* zero excess returns and earn actual positive returns in the short run and negative returns in the long run by investing in advanced country currencies, the same global investors *expect* and *earn* positive excess returns over the entire horizon from emerging market currencies. The forecast errors in advanced countries are systematic as they are strongly negatively correlated with the interest rate differentials on average, where investors first over-react expecting a depreciation when there is ex-post appreciation, and they under-react later expecting a depreciation that is lower than the actual depreciation. In emerging countries, on the other hand, although there are forecast errors, they are not systematically correlated with the interest rate differential. The same global investors always over-react in emerging markets, expecting a depreciation larger than ex-post depreciation. Hence, expected and actual exchange rate move together. In emerging markets, expected and actual excess returns compensate for the policy uncertainty affecting foreign investors' risk sentiments.

To illustrate our findings in detail, let us start with the UIP condition, $E_t(S_{t+h})(1 + i_t^{US}) = S_t(1 + i_t)$, where i_t and i_t^{US} are the local and the U.S. short-term (12 month) interest rates, and h is a 12-month horizon. E denotes expectations over the next year and S is the exchange rate in units of local currency per USD. Denoting logs with lower case letters, we can write the UIP premium $-\lambda^e_{t+h}-$ in logs as follows:

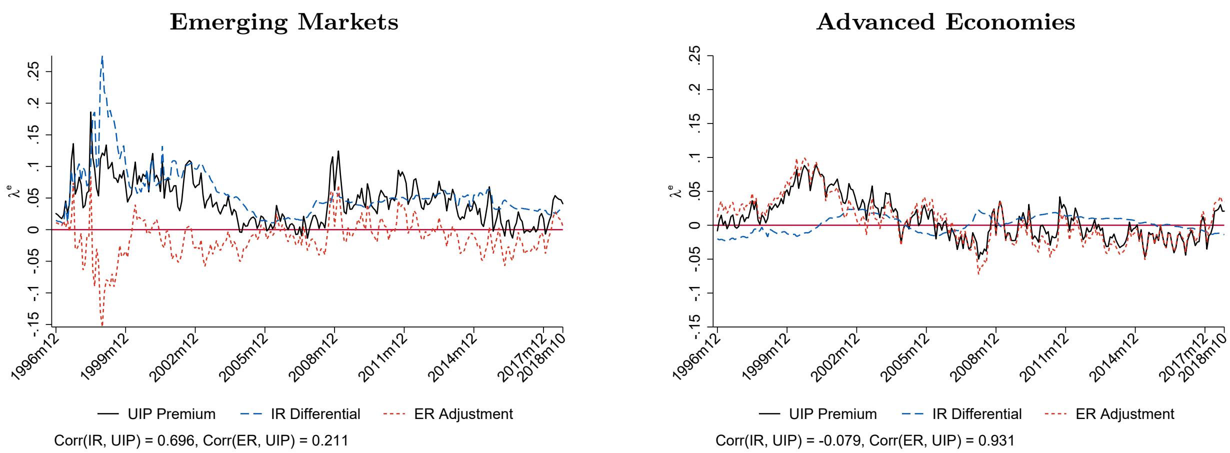
$$\lambda^e_{t+h} = \underbrace{(i_t - i_t^{US})}_{\text{IR Differential}} + \underbrace{(s_t - s^e_{t+h})}_{\text{ER Adjustment}}. \tag{1}$$

When $\lambda^e_{t+h} = 0$, the UIP condition holds, as the interest rate differential and expected exchange rate changes offset each other. Expected excess returns are zero. When $\lambda^e_{t+h} > 0$, the UIP condition does not hold and there are positive expected excess returns from investing in the domestic currency.

The top panel of Figure 1 plots the expected excess returns over our sample period, separating advanced economies from emerging markets. If we do eye-ball econometrics, the first observation to notice is that UIP holds *on average* in advanced countries, as λ^e_{t+h} fluctuates around zero (especially since early 2000s), but it does not hold in emerging markets where λ^e_{t+h} is consistently above zero. We confirm these observations also with Fama regressions.[4,5]



A) UIP Premium



B) Interest Rate Differential and Exchange Rate Adjustment Terms

Figure 1: UIP Premium in Advanced Economies and Emerging Markets

Note: This figure shows the decomposition of the UIP condition between interest rate differential and exchange rate adjustment, at 12 month horizon.

The UIP premium shows high volatility across time. To assess this *dynamics*, we zoom in on the

[4]This original Froot and Frankel (1989) result is confirmed in recent data for advanced economies by Bussiere, Chinn, Ferrara, and Heipertz (2018). In emerging markets, however, UIP does not hold in expectations, even-though we never get the "wrong sign" Fama coefficient. That is, high interest rate emerging markets' currencies are not expected to appreciate. They are expected to depreciate as predicted by the UIP condition. Yet the condition still fails to hold in emerging markets as the expected depreciation is not enough to offset the interest rate differential.

[5]We also compute Figure 1 and Fama regressions at 3 months horizon, obtaining similar results.

exchange rate adjustment and interest rate differential components, defined in equation (1). As the bottom panel of Figure 1 shows, these two components have a contrasting role on the dynamics of their UIP premium across countries. In advanced economies, the UIP premium and the exchange rate adjustment term overlap most of the time, with a correlation over 90 percent, while movements in the interest rate differential term are negligible. In contrast, in emerging markets, interest rate differentials almost perfectly co-move with the UIP premium, a 70 percent correlation, whereas the exchange rate adjustment term is barely correlated with the UIP premium. These interest rate differentials are systematic and are highly correlated with the expected excess returns, specially during periods of high uncertainty, related to emerging markets' crises as in 1990s or to global shocks, as in late 2000s. In our robustness exercises, we show that high inflation in emerging markets cannot explain these patterns.

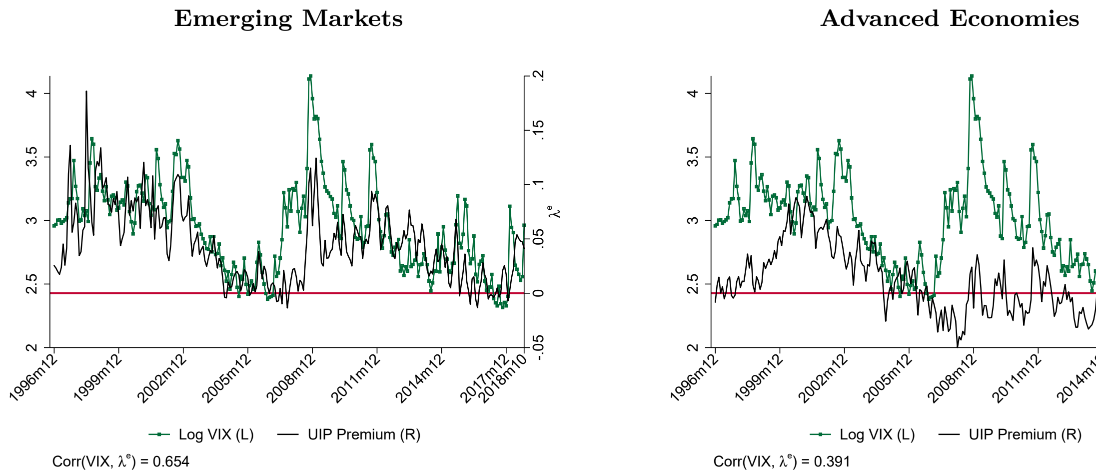
To illustrate the correlation between global shocks/uncertainty and the UIP premium visually, we show in Panel A of Figure 2, a strong correlation between the VIX and the UIP premium in both advanced economies and emerging markets.[6] In Panel B, we break down the UIP premium again in its two components and show that shocks to global investors' risk sentiments affect the UIP premium in these two set of economies through different channels. In emerging markets, the VIX and the interest rate differential track each other closely. Indeed, the VIX has a much higher correlation with the interest rate differential (0.44) than with the exchange rate adjustment term (-0.03). In contrast, in advanced economies, the VIX co-moves more closely with the exchange rate adjustment term (0.29) than with the interest rate differential (0.16).[7]

We argue that the UIP premium in emerging markets is an investment risk premium. Investors ask for an excess compensation that goes over and above their expectations of emerging markets' currency depreciations. This is due to the country risk inherent in emerging market investing. Such country risk will include both default (credit) risk and also uncertain returns on foreign investment. To get at the latter, we extend the economic policy uncertainty (EPU) index of Baker, Bloom, and Davis (2016) for our large set of countries, and document that policy uncertainty linked to credibility of emerging markets' policies is key to explain fluctuations in the UIP premium in these economies. Using panel regressions, we show that, in these economies, an increase in a country's policy uncertainty associates with a higher UIP premium, channeled through a higher interest rate differential. Additionally, we show that the strong negative relationship between capital inflows and the UIP premium –also channeled through interest rate differentials– disappears upon conditioning on policy uncertainty.[8] Hence, global investors' risk sentiment about a country's idiosyncratic

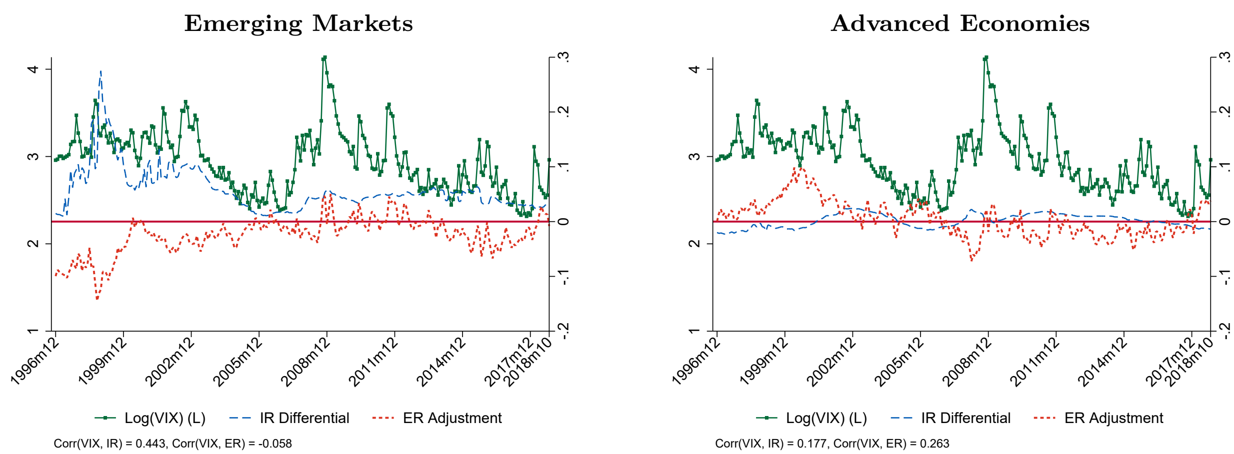
[6] Giovanni, Kalemli-Ozcan, Ulu, and Baskaya (2019) is the original paper that shows the positive comovement between UIP premium and VIX, but only for a single emerging market, Turkey. There is a parallel literature on the correlation between VIX and the CIP deviations, where Du, Tepper, and Verdelhan (2018), Jiang, Krishnamurthy, and Lustig (2021) and Avdjiev, Du, Koch, and Shin (2019) all show a systematic relationship between the US dollar exchange rate, VIX and the CIP deviations.

[7] The exchange rate disconnect literature in terms of the correlation between *realized* changes in exchange rates and the VIX (or predictive power of VIX) delivers mixed results, where some papers find a strong relation (e.g. Sarno, Schneider, and Wagner 2012 and Lilley, Maggiori, Neiman, and Schreger 2019), others do not find much (e.g. Bussiere, Chinn, Ferrara, and Heipertz 2018 and Engel and Wu 2018).

[8] The exchange rate disconnect literature shows a weak correlation between *realized* changes in exchange rates



A) VIX and the UIP Premium



B) VIX and UIP Premium Decomposition

Figure 2: VIX and UIP Premium in Advanced Economies and Emerging Markets

Note: This figure shows the UIP condition at 12 month horizon, its decomposition and the VIX.

policy risk is priced in the interest rate differentials and, by this means, entails a UIP premium. Our results also show the importance of global uncertainty as a determinant of the UIP premium and are consistent with the literature that shows that VIX is a key correlate of risk-free and risky interest rates, policy rate differentials and capital flows (e.g. Rey 2013, Bruno and Shin 2015, Kalemli-Özcan 2019). Notably, the transmission channel of global uncertainty differs for advanced economies, where the VIX mainly affects expected exchange rate changes and, thus, the UIP premium through currency movements.

By running dynamic panel regressions akin to the overshooting literature, we evaluate the

and capital flows (e.g. Kouri 1981, Hau and Rey 2005, Lilley, Maggiori, Neiman, and Schreger 2019). Using *expected* exchange rate changes, Stavrakeva and Tang (2018) find a stronger correlation with capital flows.

response of the UIP premium to an increase in interest rate differentials caused by a transitory shock to policy uncertainty. The UIP premium increases and stays persistent in emerging markets. Although investors over-react and continuously expect a depreciation than realized ex-post, the expected depreciation is never enough to offset the initial shock to interest rate differentials over several months, leading to persistent expected excess returns. None of these results hold in advanced countries. In those countries, a shock to policy uncertainty does not affect interest rate differentials significantly. If we shock the interest rate differentials directly, then there is a permanent expected depreciation in advanced countries that offsets this shock, as implied by the UIP.

To further check that our results are capturing investors' risk sentiments about overall policy uncertainty and go beyond the usual sovereign default risk at which emerging markets are typically associated with (see for example Alvarez, Atkeson, and Kehoe 2009), we complement our analysis with data from the International Country Risk Guide (ICRG). The ICRG reports several breaks down for policy risk that capture the risk to global investors' returns due to unexpected changes to central banks and governments' actions. Hence, we can take a granular approach to our "news" based policy uncertainty (EPU) index. Examples of these risks are expropriation risk of foreign investors, risks of profits repatriation and government accountability affecting market confidence. In an extended analysis, we confirm our previous findings and show that these more narrowly-defined policy risks are associated with increases in the interest rate differential and the UIP premium in emerging markets. Importantly, once these policy risk variables are included into the analysis, the correlation of capital inflows with the interest rate differential and the UIP premium disappears. This result confirms that the UIP premium and the risk "priced" in the interest rate differential capture the risk sentiment of foreign investors about policy uncertainty affecting their returns. Finally, we show that, when removing from our sample countries that defaulted in the last fifty years, our policy-risk variables do not lose significance. This result confirms that none of our policy variables captures only default risk and, hence, their explanatory power on the UIP premium does not go through default. As before, these policy-risk variables are not correlated with the UIP premium in advanced economies.

Overall, these facts show important differences across advanced countries' and emerging markets' investors that are captured by different expectations and reactions to idiosyncratic and global uncertainty shocks. The UIP literature on advanced countries argued that, even if expected returns are zero, actual realized returns are often not zero and such returns appear to be persistent and volatile. A common interpretation in this empirical literature for such results is that there are deviations from FIRE (full information and rational expectations).[9] Another interpretation is that predictability of realized excess returns as arising from FX markets inefficiencies due to financial frictions. The extensive theory literature on UIP deviations focused on both interpretations, either

[9]See for example Dominguez (1986), Frankel and Froot (1987), Froot and Frankel (1989), Ito (1990), Chinn and Frankel (1999), Bacchetta, Mertens, and van Wincoop (2009), Chinn and Frankel (2016), Chinn and Meredith (2005), Ito and Chinn (2007), Stavrakeva and Tang (2018), Candian and De Leo (2021). Focusing on long-run and lower frequency data, researchers show that UIP holds in long horizons –even with *realized* exchange rates– and there are no excess returns for long-term bonds (e.g. Chinn 2006, Lustig, Stathopoulos, and Verdelhan 2019).

modeling deviations from FIRE à la information frictions, behavioral biases, and distorted beliefs,[10] or adopting a financial frictions approach to limit the arbitrage.[11] There are also papers that tend to associate predictable excess returns and UIP deviations with risk averse investors participating in efficient FX markets.[12]

What is new in our paper in the context of this literature is the different behavior of investors for different countries. In advanced countries, we show predictable excess returns and predictable forecast errors given the systematic negative relation between the interest rate differentials and expectational errors. At the same time, we show that emerging markets' case is quite different. Since the same set of global investors invest in both countries and sets of currencies, this is a puzzling result. We argue that even, if investors deviate from FIRE and make expectational errors for both sets of currencies, the form of the error differs given the role of policy uncertainty related risk premium in emerging markets.

To shed more light on this issue, we investigate both average and dynamic behavior of forecast errors. A negative Fama coefficient of 0.2 implies that, a 1 percentage point increase in the interest rate differentials in advanced countries imply 20 percent appreciation, hence 80 percent predictable excess returns. A positive Fama coefficient of 0.6 implies that, a similar 1 percentage point increase in the interest rate differentials in emerging markets imply only 40 percent predictable excess returns. Why would investors leave *less* on the table in emerging markets characterized by higher degree of financial frictions? Why would the deviation from FIRE be worse in advanced countries? Dynamics of the forecast error reveals that investors over-react first in advanced countries, expecting a depreciation and realizing an appreciation, but later they under-react, still expecting a depreciation that is less than the actual depreciation. These patterns deliver the strong negative correlation between the forecast errors and the interest rate differentials in advanced countries. In emerging markets, on the other hand, investors always over-react by expecting a depreciation that always exceeds the actual depreciation. On average, there is no systematic relation between the interest rate differentials and the forecast errors since both expectations and reality move together in emerging markets, even-though neither expected nor actual depreciation can offset the interest rate differential shock fully. We show that the reason for this is the fact that policy uncertainty drives interest rate shocks. As a result, we interpret the UIP premium for emerging markets as an "inefficient" investment risk premium. This premium compensates for the policy uncertainty of investing into these risky countries. Our findings indicate a significant effect of investors' risk sentiments that co-move with policy uncertainty in pricing the risk of investing in emerging markets

[10] Burnside, Eichenbaum, Kleshchelski, and Rebelo (2011), Gourinchas and Tornell (2002), Stavrakeva and Tang (2018), Candian and De Leo (2021), Bacchetta and van Wincoop (2019), Bacchetta and Wincoop (2006), Devereux and Engel (2002), Evans and Lyons (2008).

[11] Gabaix and Maggiori (2015), Gopinath and Stein (2018), Akinci and Queralto (2018), Basu, Boz, Gopinath, Roch, and Unsal (2020), Farhi and Gabaix (2016), and Itskhoki and Mukhin (2017).

[12] See Burnside, Eichenbaum, and Rebelo (2007), Burnside, Eichenbaum, and Rebelo (2008), Chinn and Quayyum (2012), Sarno, Schneider, and Wagner (2012), Sarno and Schmeling (2014), Lustig and Verdelhan (2006), Lustig and Verdelhan (2007), Brunnermeier, Nagel, and Pedersen (2009), Lustig and Verdelhan (2007), Lustig, Roussanov, and Verdelhan (2011), Colacito and Croce (2013), Siemer, Verdelhan, and Gourio (2015), Backus, Foresi, and Telmer (2001), Hassan (2013), Hassan and Mano (2019), Kremens and Martin (2019), and Salomao and Varela (2021).

over and above the expected and actual currency risk.

The paper is structured as follows. Section 2 describes the data including the construction of the EPU index based on news. Section 3 presents panel regressions and assesses the dynamics of the UIP premium. Section 4 estimates dynamic panel regressions (local projections) and discusses the overshooting and predictability reversal puzzles. Section 5 reports the Fama regressions and discusses the classic UIP puzzle. Section 6 undertakes a granular analysis of country risk related to policy uncertainty and credibility. Section 7 presents robustness including the role of inflation, default risk and the difference between UIP and CIP deviations. Section 8 concludes.

2 Data and Measurement: Expectations, Risk Sentiments and News

We employ monthly data from International Monetary Fund (IMF), Bloomberg and Consensus Economics to construct the UIP condition. We obtain the deposit interest rates, money market rates and government bond rates from Bloomberg, the spot exchange rate from International Financial Statistics (IFS) from the IMF, and the exchange rate forecasts data comes from Consensus Economics. This survey provides information on expected exchange rate at 12-month horizon that we use to construct the UIP at this maturity. We additionally conduct robustness tests for UIP at 3 months maturity. We employ the VIX index to proxy for global risk, which we obtain from the Federal Reserve Economic Data (FRED). We use standard capital flows data from IMF, IFS. Following Miranda-Agrippino and Rey (2020), we interpolate all capital flow series to monthly frequency (see Appendix A.1 for details). For the Euro Area, we proceed as follows. We employ individual series of interest rates, exchange rates and capital inflows for countries before they join the Euro. After they join, we use Euro interest and exchange rates and consolidate inflows for the Euro by adding individual country flows and weighting them by the GDP of each country ourselves or using the Euro Area flows from IMF, IFS.

To proxy for domestic policy uncertainty for each country, we employ two different methodologies. We first compute the EPU index for our sample following Baker, Bloom, and Davis (2016). This index is constructed by counting the number of journal articles containing words reflecting economic policy uncertainty and, as such, is a good proxy for global investors' risk on government and central bank policies. To narrow down the factors more relevant creating policy uncertainty, we then complement our analysis with the ICRG, which –as detailed below– reports detailed information of different components of policy risk for each country over time (for example, expropriation risk, government accountability, etc.).

Our panel is for 34 currencies, 12 advanced economies and 22 emerging markets, over the period 1996m11–2018m12, for which we have information for all variables to construct the UIP condition and information about our policy risk variables. Our sample excludes country-month observations when there is a fixed exchange rate regime based on the classification of Ilzetzki, Reinhart, and Rogoff (2017), as in these cases the exchange rate does not move or covary with the interest rate by construction. Appendix A discusses in detail the construction of the series and sample of countries.

In the rest of this section, we discuss the characteristics of the Consensus Economics, EPU and ICRG Risk Guide datasets and present main descriptive statistics of the UIP premium for advanced economies and emerging markets.

Survey Data on Exchange Rate Expectations

Consensus Forecast conducts a monthly survey about expectations on future exchange rates at 1, 3, 12 and 24 months horizons of major participants in the foreign exchange rate market. Appendix A.2 discusses thoroughly the details of this dataset. The coverage is extensive and includes 55 forecasters on average for advanced economies' currencies. Some currencies –as the Euro, Japanese Yen and UK Pound– include more than a hundred of forecasters in several periods. Albeit with a lower number of forecasters, the survey is also comprehensive in emerging markets and includes on average 17 forecasters per currency.

The forecasters interviewed are typically global banks and investors that actively participate in the FX market. Notably, these global agents are present in both advanced economies and emerging markets and, hence, provide together their forecasts for both sets of economies. Having the same set of agents surveyed for both set of economies is important because it implies that different results between advanced economies and emerging markets should not arise from heterogeneity in the type of forecasters among these economies. To provide an example of the forecasters surveyed, in September 2012, for the Japanese Yen (96 forecasters) these included: Goldman Sachs, HSBC, JP Morgan, Citigroup, Bank of Tokio Mitsubishi, IHS Global Insight, General Motors, ING Financial Markets, Barclays Capital, and Morgan Stanley. These ten forecasters were also surveyed for the Euro and the UK pound, which included a total of 103 and 81 forecasters that month. Forecasters of emerging market currencies also included these group of global banks. For example, the main forecasters of the Korean Won (22 forecasters) were: Goldman Sachs, HSBC, JP Morgan, Citigroup, Bank of Tokio Mitsubishi, IHS Global Insight, General Motors, ING Financial Markets. Similarly, the Turkish Lira (28 forecasters) included the same list of forecasters. Other emerging market currencies (as the Argentinean Peso, Brazilian Real, Chilean Peso, Colombian Peso, Hungarian Forint, Indian Rupee, Malaysian Ringgit, Mexican Peso, Polish Zloty and Russian Rouble) also included these forecasters, as well as other global investors like Barclays Capital, BNP Paribas, ABN Amro, Allianz, Royal Bank of Canada, UBS and Royal Bank of Scotland.[13]

Economic Policy Uncertainty and Policy Risk Variables

We construct the EPU index following the methodology of Baker, Bloom, and Davis (2016). In particular, we use the online platform Factiva, which reports journal articles of main international

[13]It is worth mentioning that our database does not provide information about individual forecast series. We know the forecasters as reported above, but we did not have access to their own individual forecast, rather the average forecast at the country level.

newspapers. Our list of words follows Baker, Bloom, and Davis (2016) to which we add four new words to capture additional policy uncertainty characteristic of emerging markers (i.e. capital controls, expropriation, nationalization and corruption). Because we are interested in the perspective of the U.S. international investor, we focus on news reported in international newspapers (such as Financial Times, Reuters and the Wall Street Journal, among others). We construct the EPU index for each currency and month as follows, $EPU_{it} = X_{it}/\frac{1}{12}\sum_{j=1}^{12} Y_{t-j}$, where X_{it} is the number of articles referring to EPU episodes in country i at month t, $Y_t = \sum_i Y_{it}$ is the total number of articles written at month t (i.e. the sum of articles across countries), and Y_{it} is total number of articles referring to country i at month t. We then normalize the index to 100 by estimating $EPU_{it}^N = \frac{EPU_{it}}{\overline{EPU}_i} \times 100$, where $\overline{EPU}_i = \frac{1}{T}\sum_{t=1}^{T} EPU_{it}$ is the average of EPU news for each country across time. Appendix A.3 reports the list of words and newspapers, as well as a detailed description of the methodology employed to construct this index.[14,15]

To narrow down our analysis of a country's policy risk and assess which risks affect the UIP premium the most, we employ data from the ICRG. This dataset breaks down a country's policy risk into several components and present individual index for each of them. In particular, we use *composite country risk* using the ICRG composite risk index, which includes political, economic and financial risks. Political risk contributes 50% to the composite index, and financial and economic risks contribute to the remaining 50%. To pin down the main elements entailing policy risk, we focus on two key elements of the political risk component that capture investors' sentiments: *government policy risk* and *confidence risk*. Government policy risk captures expropriation risk, risk of not being able to repatriate profits and government accountability, where this later evaluates different types of democratic systems and the degree of freedom that a government has to impose policies to its own advantage. Confidence risk assesses consumer confidence and unemployment (see Appendix A.4 for more details).[16]

Main Summary Statistics on the UIP Premium

We present main summary statistics of the UIP premium and its components of equation (1). Confirming the eye-balling econometrics observation of Figure 1, columns 1 and 4 in Table 1 show that there is a striking contrasts between advanced economies and emerging markets. While in

[14] Our methodology to construct the index follows Barrett, Appendino, Nguyen, and de Leon Miranda (2020) and is an adaptation of Baker, Bloom, and Davis (2016) for studies based on international newspapers, i.e. where there is less availability of local newspapers. In particular, the difference with Baker, Bloom, and Davis (2016) is that their index includes a non-minor proportion of local newspapers, which allows them to first compute the share of news for each individual newspaper within a country and then add up the total sum for each country. Instead, Barrett, Appendino, Nguyen, and de Leon Miranda (2020) methodology adds the total number of articles in a country and pools all the newspapers together for each country.

[15] We create the EPU and other policy risk variables for the Euro by computing the weighted average of the respective index of each country, weighted by the country's GDP.

[16] These two indexes come directly from the ICRG data. Our measure of government policy risk is the average of the variables investment profile and democratic accountability, and our measure of confidence risk is the socioeconomic risk variable. We pool investment profile and democratic accountability together as, despite both variables capture different types of risk, they are highly correlated in data and, hence, collinear if used together econometrically.

emerging markets there is a positive UIP premium that reaches – on average – 4 percentage points, the UIP premium in advance economies is small and lower than 1 percentage point.

The decomposition between the interest rate differential and the exchange rate adjustment terms also confirms our previous finding of Figure 1. Columns 2 and 3 show that, in emerging markets, the mean interest rate differential accounts for the bulk of the UIP premium, while the exchange rate adjustment term is negligible. Instead, in advanced economies, the mean interest rate differential and exchange rate adjustment terms are closed to each other, which is consistent with a UIP premium being on average close to zero in these economies. In line with these figures, the table also shows that the larger volatility of the UIP premium in emerging markets is principally explained by the higher volatility of the interest rate differential. In contrast, in advanced economies, the volatility of the UIP premium is more related with exchange rate adjustments.[17]

Table 1: Decomposition of the UIP Premium

	Emerging Markets			**Advanced Economies**		
	UIP Premium (1)	IR Differential (2)	ER Adjustment (3)	UIP Premium (4)	IR Differential (5)	ER Adjustment (6)
Mean	0.040	0.051	-0.011	0.009	0.003	0.007
Median	0.034	0.036	-0.006	0.006	0.001	0.003
Std. Dev.	0.060	0.077	0.063	0.046	0.022	0.049
p25	0.004	0.014	-0.036	-0.022	-0.009	-0.027
p75	0.068	0.065	0.025	0.034	0.015	0.036
N of Observations	3,577	3,577	3,577	2,285	2,285	2,285

Notes: 34 currencies, 22 Emerging Markets, 12 Advanced Economies. Period 1996m11:2018m12. All variables are in logs.

3 The UIP Premium: The Role of Global and Local Uncertainty

In this section, we assess how changes in global investors' sentiment affect the UIP premium. Figure 2 above showed that the UIP premium varies substantially across time and that these fluctuations are highly correlated with global uncertainty, captured by the VIX index. In this section, we go beyond global uncertainty (VIX) and study whether the UIP premium correlates with local economic policy uncertainty across countries and time.

[17]Table A3 reports additional summary statistics of the main variables employed in the paper.

3.1 Local Economic Policy Uncertainty

Do local risk factors affect global investors' sentiments and, by this means, the UIP premium? Which component of the UIP premium do they affect more? Is there any difference between currencies of advanced economies and emerging markets? We approach these questions by comparing the EPU index with the UIP premium across time for advanced economies and emerging markets. Figure 3 plots these correlations. The co-movement between EPU index and the UIP premium is rather small in advanced economies' currencies (2%). In contrast, this correlation is high in emerging market currencies, reaching 50%. These correlations document suggestive evidence that changes in global investors' sentiments due to local policy risk associate with the UIP deviations in emerging markets. Yet these correlations pool all currencies together and, thus, can hinder heterogeneity across emerging market currencies. To control for this heterogeneity, in the next section, we assess these correlations econometrically by estimating panel regressions with currency-fixed effects.

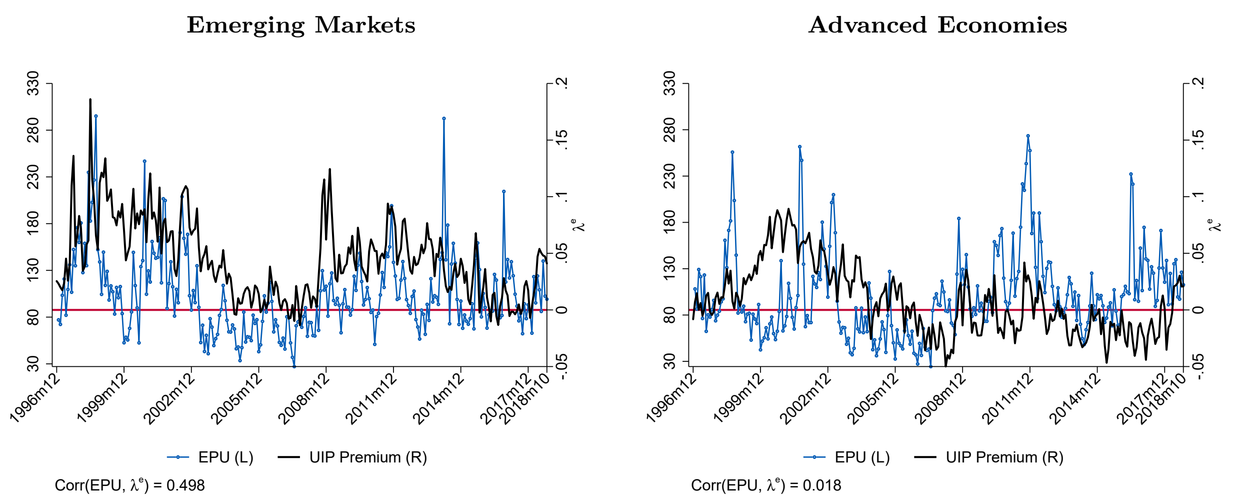


Figure 3: Economic Policy Uncertainty and UIP Premium

3.2 UIP Premium Panel Regressions: Interest Rate and Exchange Rate Disconnect

To assess the sources of the fluctuations of the UIP premium, we estimate panel regressions with currency/country-fixed effects. Note that currency and country is the same as we treat Euro area countries as a group. We study the effect of a global risk factor (VIX) and two local risk factors, country-specific economic policy uncertainty and capital inflows. We then analyze how these risk factors/channels affect each component of the UIP premium. More precisely, we estimate the following panel regression:

$$Y_{it} = \gamma_1 \log(\text{Capital Inflows/GDP}_{it-1}) + \gamma_2 \log(VIX_{t-1}) + \gamma_3\, \text{EPU}_{it-1} + \mu_i + \varepsilon_{it}, \tag{2}$$

where i is currency/country, t is month, Y_{it} is the UIP premium, the interest rate differential term or the exchange rate adjustment term, i.e. $Y_{it} = \{\lambda^e_{it+h}, \text{IR Diff}_{it}, \text{ER Adj}_{it+h}\}$, and the independent variables are lagged one month. μ_i are currency fixed effects that allow assessing the UIP condition within currencies across time. We double cluster the standard errors across time and country/currency. For expositional purposes, we introduce the independent variables sequentially.[18]

Table 2 reports the results. Panel A shows the estimated coefficients of regression (2) in which only capital inflows is included as a regressor. Capital inflows associate with decreases in the UIP premium in emerging markets (column 1). As columns 2 and 3 show, this reduction is channeled through a decrease in the interest rate differential. Capital inflows lower the local interest rate and lead to an expected currency appreciation. Yet, the expected appreciation is not enough to compensate for the lower interest rate differential and the UIP premium drops. The estimated coefficient implies that one percentage point increase in capital inflows over GDP leads to a 0.5 percentage points decrease in the UIP premium. By the same token, a decrease in capital inflows (or capital outflows by foreign investors) will lead to an increase in UIP premium. As the average UIP premium is 4 percent in emerging markets, a change of 0.5 percentage points is an economically significant effect. For comparison, we also show results for advanced countries, where capital inflows do not significantly affect the UIP premium nor its components.

In Panel B, we include the VIX as independent variable to assess the role of global risk on the UIP premium. Both in advanced and emerging economies, the estimated coefficient on the VIX variable is positive and highly statistically significant, suggesting that higher global risk associates with higher UIP premia in both set of countries (columns 1 and 4). The estimated coefficient for emerging economies implies that an increase in the VIX from p25 to p75 leads to 3 percentage points higher UIP premium. Another way to look at this coefficient is considering the increase during the Global Financial Crisis. If the VIX increases as it did after the collapse of Lehman Brothers (2008m8-2008m12) by 150%, the UIP premium in emerging markets would increase by 9 percentage points. The increase in the UIP premium is slightly lower for advanced economies: a rise from p25 to p75 associates with a 2.4 percentage points increase in the premium. Lastly, it is worth remarking that global uncertainty has high explanatory power to account for changes in the UIP premium, as the R^2 increases significantly when including the VIX as a co-variate in both set of economies.

-Fact 1*: The UIP premium co-moves with global risk aversion (VIX) for all currencies, whereas only for emerging market currencies there is a negative comovement between the UIP premium and capital inflows.*

We then assess the channels of transmission of global uncertainty. The VIX shock raises both the interest rate differential and the exchange rate adjustment terms. Yet, there is an interesting difference between emerging markets and advanced economies. In the former, increases in global

[18] We have to drop Colombia, going down to 21 EM as EPU index is not available for Colombia.

uncertainty affect the interest rate differential relatively more. It is then this larger expansion of the domestic interest rate what accounts for the bulk of the increase in the UIP premium following VIX shocks in emerging markets (columns 2 and 3 in Panel B). Instead, in advanced economies, the VIX leads to larger expected changes in the exchange rate, which are the main source of raising the UIP premium upon these shocks (columns 4 and 5 in Panel B). Notably, these results are in line with our observation of Figure 2, where we showed that, in emerging markets, the main channel driving the dynamics of the UIP premium was the interest rate differential and, in advanced economies, this dynamics was mainly driven by exchange rate adjustments.

-Fact 2: *Decomposing the UIP premium into two components—interest rate differentials and expected exchange rate adjustment—reveals that the channel of transmission of global risk aversion differs in emerging markets and advanced economies. In emerging markets, the comovement of the UIP premium and the VIX is explained by the co-movement of the VIX with the interest rate differentials. In advanced economies, this comovement is explained by the co-movement of the VIX with expected exchange rate changes.*

Panel C adds economic policy uncertainty as independent variable. Confirming our earlier findings for emerging markets, the estimated coefficient for the EPU variable is positive and highly statistically significant, indicating that increases in a country's policy uncertainty associate with higher a UIP premium (column 1). Importantly, once we include EPU variable into the regression, capital inflows lose explanatory power to account for changes in the UIP premium. Interestingly, the inclusion of the EPU index does not overpower the VIX coefficient – which remains similar in magnitude and highly statistically significant – suggesting that both a country's policy risk and global risk generate UIP violations and expected excess returns in emerging economies. The estimated coefficient for emerging markets implies that if EPU risk increases from the p25 to p75 (for example, from China to South Korea in the 2016m10), the UIP premium increases by 1 percentage point. Columns 2 and 3 break down the channels of transmission of the higher domestic uncertainty. As expected, an increase in a country's policy uncertainty raises the UIP premium mainly through the interest rate differential channel, where capital inflows' effect on interest rate differential also drops in size. Local policy uncertainty leads to expected depreciations, but this effect is smaller in size than the interest rate differential and is not statistically different from zero. In line with the patterns presented in Figure 3, local economic uncertainty does not affect the UIP premium in advanced economies.

-Fact 3: *Country risk measured by the degree of policy uncertainty can explain the negative comovement of the UIP premium with the VIX, interest rate differentials and country-specific capital inflows in emerging markets. This is not the case in advanced economies.*

Our results on the impact of global uncertainty are consistent with the existing literature show-

Table 2: Dynamics of the UIP Premium: Panel Regressions

	Emerging Markets			Advanced Economies		
	UIP Premium (1)	IR Differential (2)	ER Adjustment (3)	UIP Premium (4)	IR Differential (5)	ER Adjustment (6)
			Panel A- Capital Inflows			
Inflows/GDP$_{it-1}$	-0.005***	-0.005**	-0.000	0.019	-0.008	0.027
	(0.001)	(0.002)	(0.001)	(0.032)	(0.009)	(0.039)
R^2	0.0016	0.0012	0.0000	0.0020	0.0025	0.0033
			Panel B- Global Risk			
Inflows/GDP$_{it-1}$	-0.002***	-0.003**	0.001	0.035	-0.003	0.038
	(0.001)	(0.001)	(0.001)	(0.027)	(0.010)	(0.035)
Log(VIX)$_{t-1}$	0.059***	0.038***	0.021**	0.035***	0.011***	0.024*
	(0.009)	(0.013)	(0.010)	(0.013)	(0.004)	(0.013)
R^2	0.1496	0.0525	0.0199	0.0837	0.0590	0.0364
			Panel C- Country-Specific EPU			
Inflows/GDP$_{it-1}$	-0.001*	-0.002**	0.001	0.034	-0.003	0.036
	(0.001)	(0.001)	(0.001)	(0.027)	(0.010)	(0.034)
Log(VIX)$_{t-1}$	0.054***	0.035***	0.019**	0.037***	0.010**	0.027**
	(0.008)	(0.013)	(0.009)	(0.013)	(0.004)	(0.013)
EPU$_{it-1}$	0.011**	0.007***	0.004	-0.004	0.002	-0.005**
	(0.004)	(0.002)	(0.003)	(0.002)	(0.001)	(0.002)
R^2	0.1750	0.0618	0.0230	0.0871	0.0633	0.0422
Observations	3287	3287	3287	2209	2209	2209
Number of Currencies	21	21	21	12	12	12
Currency FE	yes	yes	yes	yes	yes	yes

Notes: * p < 0.10 ** p < 0.05 *** p < 0.01. Currency-time two-way clustered standard errors in parentheses. Capital inflows are measured as changes in gross debt liabilities. 33 currencies, 21 Emerging Markets, 12 Advanced Economies. Period 1996m11:2018m12.

ing that VIX shocks lead to a retrenchment of capital inflows by foreigners, increases in the domestic interest rates and lead to currency depreciations (e.g. Forbes and Warnock 2012, Rey 2013, Giovanni, Kalemli-Ozcan, Ulu, and Baskaya 2019 and Miranda-Agrippino and Rey 2020). Kalemli-Özcan (2019) shows that the increase in the short-term domestic interest rate comes from the higher risk premium in emerging markets (and not from the higher monetary policy rate) due to an increase in global investors' risk sentiments that also affects the UIP premium and playing a key role in the international transmission. Our contribution is not only to show that the channel of such international transmission of VIX shocks differs between advanced economies and emerging markets, but also to explain why this is the case by documenting a direct link between interest rate differentials and local economic policy uncertainty. Such uncertainty increases the UIP premium in emerging markets, explaining the correlation between capital flows and the UIP premium. As such, emerging markets different responses to global risk factors can be explained by the local economic policy uncertainty that generates an "excessive" UIP premium in these economies.[19] Hence, the correlation between the UIP premium and capital flows in emerging markets –absent in advanced economies– suggests that the UIP premium in emerging markets are "inefficient" as modeled by Basu, Boz, Gopinath, Roch, and Unsal (2020).

4 Dynamics of the UIP Premium and Exchange Rates: The Role Policy Uncertainty Shocks

We now turn to analyze the dynamic response of the UIP premium and expected changes in exchange rate to a positive shock to interest rate differential. We will follow the overshooting/delayed overshooting literatures and analyze these dynamics with impulse responses obtained through Jorda-style local projections by running dynamic panel regressions.

We first assess the well-known U-shaped dynamics of the exchange rates upon domestic interest rate shocks (see Dornbusch 1976, Eichenbaum and Evans 1995, Bacchetta and van Wincoop 2010, and Bacchetta and van Wincoop 2019, among others). Known as the overshooting/delayed overshooting puzzle, previous research has found that a positive shock to domestic interest rate, increases the interest rate differentials and leads to an initial appreciation and then a delayed depreciation, producing a U-shaped dynamics for the *realized* exchange rates. Consistent with this pattern, Engel (2016) shows that high interest rate currencies are not weak (risky) but strong (not risky) as sum of all future excess returns are negative as a result of delayed but strong depreciations.

Notice that this literature only focuses on advanced economies and uses realized exchange rates. Differently than this literature, we will use *expectations* of the exchange rate, both for advanced countries and emerging markets. We run OLS dynamic panel regressions (local projections), where we regress expected exchange rate changes (ER) and UIP premium (that is expected excess returns, λ), separately, on interest rate differential (IR) shocks. The literature undertakes a VAR analysis assuming a global structure for the endogenous variables. The advantage of local projections is to identify the responses without assuming such a structure.[20] We also run an IV regression, instrumenting the shock to domestic interest rate with a rise in policy uncertainty (EPU).

To identify the response of expected changes in the exchange rate to a one percentage point shock to interest rate differential at time t in currency i, conditional on lagged values, we estimate

$$s^e_{it+h+k} - s_{it+k} = \beta_k(i_{it} - i^{US}_t) + \gamma_k(s^e_{it+h+k-1} - s_{it+k-1}) + \delta_k(i_{it-1} - i^{US}_{t-1}) + \mu_i + \epsilon_{it+h+k}, \quad (3)$$

where the coefficient of interest is β_k and reports the response of expected exchange rate change

[19]These results are consistent with Hassan, Schreger, Schwedeler, and Tahoun (2021) who using textual analysis show that global investors' sentiments associate with capital outflows, and heterogeneous currency loadings on global risk help explain the cross-country pattern of interest rates and currency risk premia.

[20]See recent work by Plagborg-Møller and Wolf (2021) that shows that both methods produce equivalent impulse responses.

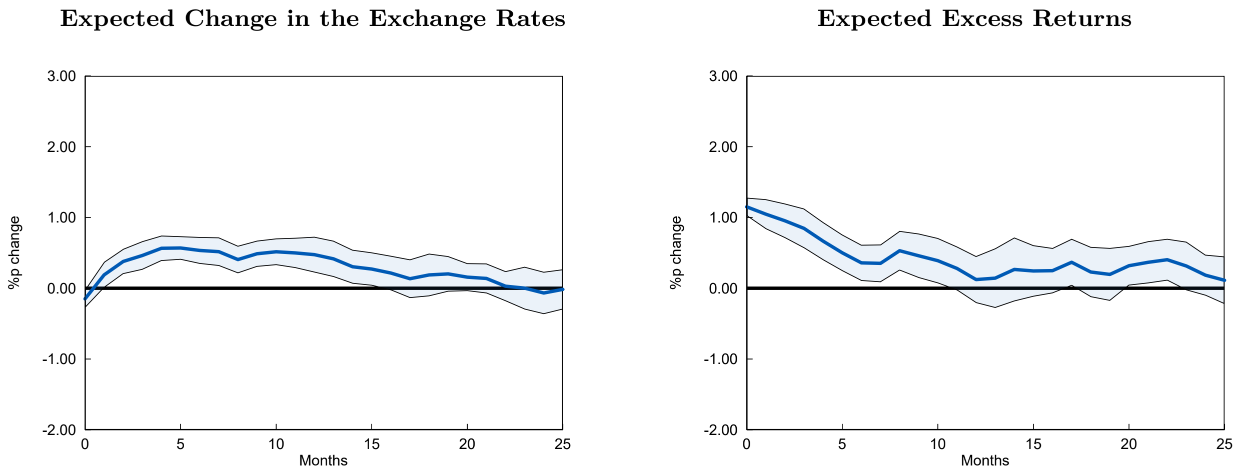
to interest rate differential shocks at k month ahead over a horizon of h. Similarly for the UIP premium/expected excess returns (λ), we run the following with a similar interpretation for β_k:

$$\lambda^e_{it+h+k} = \beta_k(i_{it} - i^{US}_t) + \gamma_k \lambda^e_{it+h+k-1} + \delta_k(i_{it-1} - i^{US}_{t-1}) + \mu_i + \epsilon_{it+h+k}. \tag{4}$$

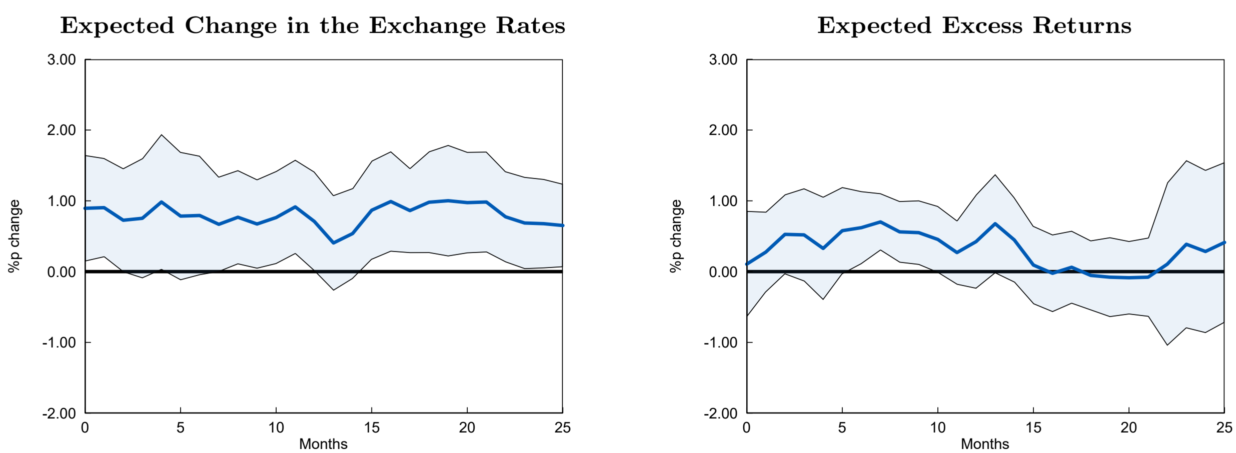
Figure 4 shows these impulse responses for emerging markets in Panel A and advanced economies in Panel B. We plot the response of expected change in the exchange rate to one percentage point interest rate differential shock on the left panel and the response of the UIP premium to the same shock on the right panel. In contrast to the overshooting literature, we do not observe a U-shaped dynamic, but rather an inverted-U-shaped one for emerging markets and no dynamics at all for advanced countries. The exchange rate is expected to depreciate as a result of a positive shock to the domestic interest rate in both set of countries. Since the extent of expected depreciation is less than the one percentage point shock to IR, UIP fails in emerging markets, leading to expected excess returns as shown in top right panel. Interestingly, expected excess returns is persistently positive during the entire time, being still significant at month 20. Hence, even if the shock is transitory, UIP deviations are persistent in emerging markets. In advanced countries, in contrast, one percentage point shock to interest rate differentials is offset with a permanent expected depreciation in the exchange rate of the same size as shown in Panel B of Figure 4. The right panel shows the resulting zero expected excess returns in advanced countries.

Why is there an inverted-U shaped response of expected change in the exchange rate and persistent UIP deviations in emerging markets? Figure 5 answers this question. With an IR shock, investors always expect a depreciation in emerging markets. This implies that the expectations in the ER term above ($s^e_{it+h+k} - s_{it+k}$) increases on impact relative to current spot rate. As actual spot exchange rate starts depreciating later, we have the ER term increasing first and then decreasing, delivering the inverted-U shape dynamics. Similarly, UIP deviations/expected excess returns starts positive and high and then goes down, as expected change in the exchange rate goes down with actual depreciation. Since neither expected or actual depreciation can offset the IR shock, UIP deviations stay positive and persistent over the entire horizon.

To dig deeper, Figure 6 reports results of an IV regression, where we regress interest rate differentials on policy uncertainty shocks first and then use residuals from this first stage in the second stage for impulse responses of expected exchange rate changes and the UIP premium. As we showed before, EPU index captures the changes in risk sentiments of foreign investors in emerging markets. We confirm here with a strong first stage regression shown in Figure 7 that, only for emerging markets, shocks to policy uncertainty captured by increases in the EPU index are positively correlated with the interest rate differentials. This result suggests that domestic interest rates respond to risk appetite of foreign investors that increases with higher policy uncertainty. This can be due to two channels: domestic interest rates are higher due to increased risk premium as a result of higher policy uncertainty and/or monetary authority raises the policy rate as a result



(A) Emerging Markets: Response of ER and UIP Premium to an IR Shock (OLS)



(B) Advanced Countries: Response of ER and UIP Premium to an IR Shock (OLS)

Figure 4: Local Projections

Note: The shaded area shows 95 percent confidence intervals, calculated using Driskoll-Kraay standard errors with a bandwidth lag $h+1$ for horizon h.

of lower risk appetite of foreign investors with higher policy uncertainty.[21]

IV regressions of Figure 6 show that, as a result of a shock to policy uncertainty (that will lead to one percentage point IR shock), we still have the inverted-U shape response of expected changes in the exchange rate and positive expected excess returns (UIP premium). The responses are both dampened as the curves shift down. This is probably because a one-time exogenous policy uncertainty shock will not have persistent effects without the endogenous response of interest rate differentials to such a shock. As shown in the first stage regressions, the endogenous response of

[21] Kalemli-Özcan (2019) shows that higher domestic interest rates as a result of uncertainty shocks/lower risk appetite of foreign investors are due to higher risk premium on emerging markets. Even though policy rates raise as a response to the shock, monetary policy is ineffective and policy rates are disconnected from the market rates.

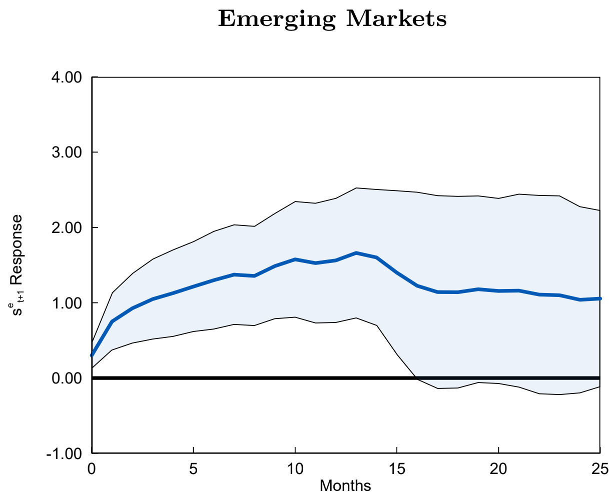


Figure 5: Response of Emerging Market Investors' Exchange Rate Expectations to an IR Shock

interest rate differentials to the EPU shock is very significant and persistent for emerging markets, creating the persistent excess returns and UIP deviations in the OLS regressions. The right panel of 7 shows that there is no such response of interest rate differentials to shocks to policy uncertainty in advanced economies, which is why we do not report the second stage regression for these countries.

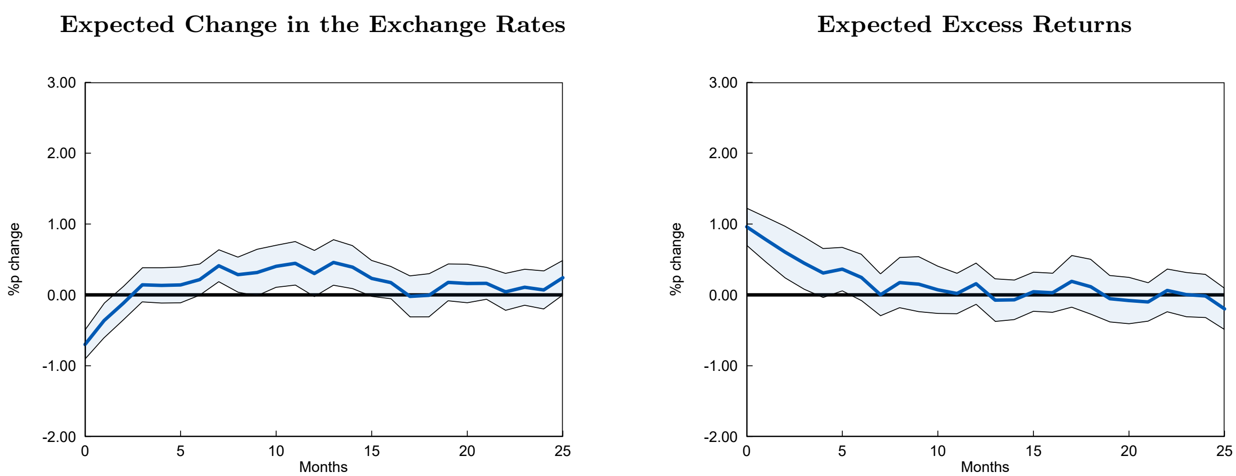


Figure 6: Emerging Markets: Response of ER and UIP Premium to an IR Shock (IV)
Note: The shaded area shows 95 percent confidence intervals, calculated using Driskoll-Kraay standard errors with a bandwidth lag $h+1$ for horizon h.

-Fact 4*: There are no overshooting and predictability reversal puzzles—for any currency—when using exchange rate expectations to calculate the UIP premium. In emerging markets, a transitory increase in interest rate differentials caused by a policy uncertainty shock leads to lower than required expected depreciations, which creates persistent expected excess returns. In advanced economies, a*

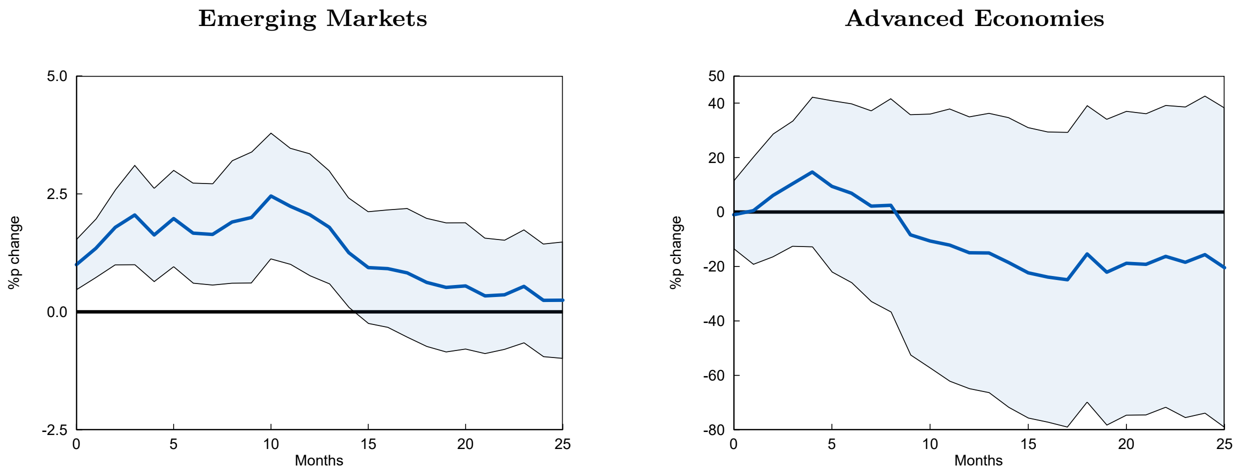


Figure 7: First Stage: IR Response to EPU Shocks
Note: The shaded area shows 95 percent confidence intervals, calculated using Driskoll-Kraay standard errors with a bandwidth lag $h+1$ for horizon h.

positive shock to interest rate differentials leads to a permanent expected depreciation that offsets the shock.

What about realized excess returns? We know that realized excess returns turn from positive to negative for advanced countries (predictability reversal puzzle) and sum of them is negative (Engel puzzle). As we show below in Figure 8, Panel A, we replicate these puzzles for advanced economies with realized exchange rates. However, these puzzles do not exist for emerging markets with realized exchange rates (Panel B), similar to their non-existence with expected exchange rates. Realized excess returns are always positive in emerging markets regardless of the econometric specification with or without lags as shown in Panels (i) and (ii).[22] Again this is due to actual depreciation that is never enough to offset the IR shock.

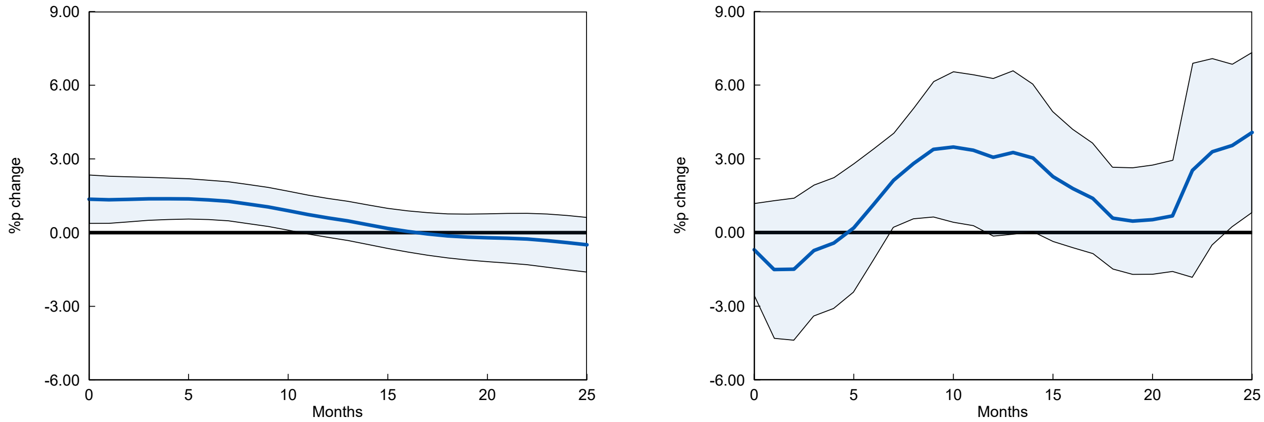
5 The Fama Puzzle: Average UIP Premium

A large literature assesses the validity of the UIP condition employing the so-called Fama regressions. In this section, we revisit this literature and analyze whether the UIP condition holds *on average* by estimating Fama and excess returns regressions using both ex-post realized and expectational data on exchange rates. Section 5.1 presents the Fama and excess return regressions. Section 5.2 evaluates the source of the bias in the Fama regression. Section 5.3, we assess the forecast errors and whether they relate to the deviations from the UIP condition.

[22] There are papers both using lags and not in the literature.

(i) $\lambda_{t+k} = \alpha + \beta_k(i_t - i_t^{US}) + \epsilon_{t+k}$

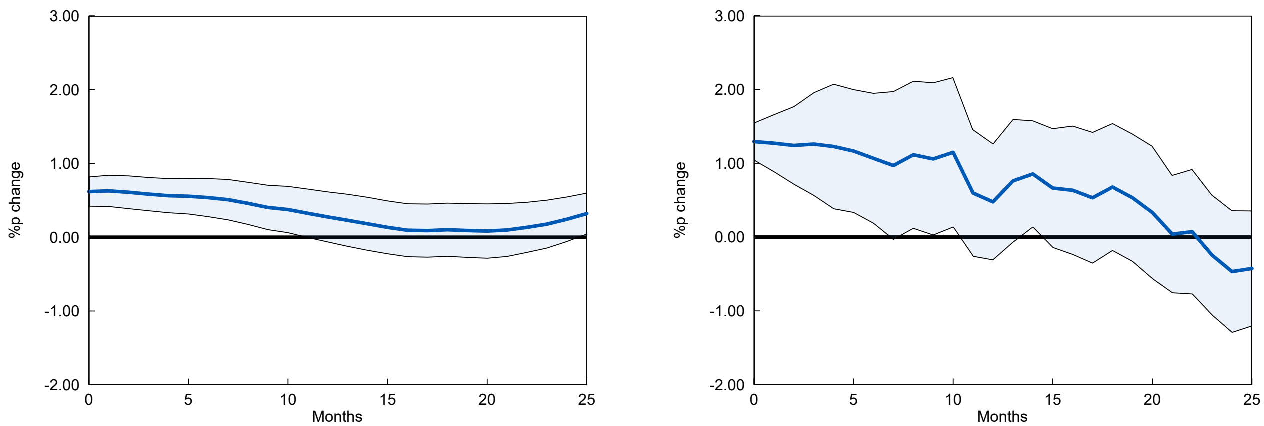
(ii) $\lambda_{t+k} = \alpha + \beta_k(i_t - i_t^{US}) + \delta_k(i_{t-1} - i_{t-1}^{US}) + \gamma_k \lambda_{t-1} + \epsilon_{t+k}$



(A) Advanced Countries: Ex-Post Excess Return Responses to an IR Shock

(i) $\lambda_{t+k} = \alpha + \beta_k(i_t - i_t^{US}) + \epsilon_{t+k}$

(ii) $\lambda_{t+k} = \alpha + \beta_k(i_t - i_t^{US}) + \delta_k(i_{t-1} - i_{t-1}^{US}) + \gamma_k \lambda_{t-1} + \epsilon_{t+k}$



(B) Emerging Markets: Ex-Post Excess Return Responses to an IR Shock

Figure 8: Local Projections: Realized Excess Return Responses to an IR Shock

5.1 Fama and Excess Return Regressions

From the pioneering works of Fama (1984) and Hansen and Hodrick (1980), the empirical international macro and finance literature usually assumes that agents have full information and rational expectations (FIRE) and tests the UIP condition using ex-post exchange rate.[23] We first revisit this literature and assess the UIP condition using realized exchange rate, and then release the FIRE assumption and test it using expectational data.

[23]Under the FIRE assumption, the expected exchange rate can be approximated with the ex-post exchange rate. There can still be an error such that expected exchange rate is equal to the realized rate plus an error term $s_{t+1}^e = s_{t+1} + \epsilon_{t+1}$. Importantly, the assumption is that, under FIRE, this error ϵ is i.i.d. and uncorrelated with the interest rate differential.

Fama and Excess Return Regressions under FIRE

To assess the Fama regression, we estimate the following OLS panel regression

$$s_{it+h} - s_{it} = \beta^F(i_{it} - i_t^{US}) + \mu_i + \varepsilon_{it+h}^F. \tag{5}$$

where the superscript F denotes that equation (5) is computed using ex-post exchange rate (s_{it+h}). If $\beta^F = 1$, interest rate differentials and exchange rate changes offset each other and the UIP condition holds on average under FIRE. If $\beta^F < 1$, the depreciation is lower than implied by the interest rate differential and there are ex-post excess returns. To test econometrically whether there are predictable excess returns, we estimate the following regression

$$\lambda_{it+h}^F = \beta_1^F(i_{it} - i_t^{US}) + \mu_i + \varepsilon_{1it+h}^F, \tag{6}$$

where λ_{it+h}^F denotes excess returns estimated using the realized exchange rate. $\beta_1^F = 0$ implies the absence of predictable excess returns. If β_1^F is statistically different from zero, there are predictable excess returns. In particular, a $\beta_1^F > 0$ implies that the higher the interest rate differential, the higher the excess returns on currency i.[24] In both equations, we cluster the standard errors by currency and time.

Panel A in Table 3 reports the results. Column 1 shows that, for advanced economies, the Fama coefficient is negative –albeit non-statistically significant– suggesting that high interest rate currencies tend to appreciate, instead of depreciate as implied by the UIP condition under FIRE. In line with this result, column 3 presents the excess return regression and shows that excess returns positively and significantly associate with interest rate differentials in these economies. Columns 2 and 4 report the results for emerging markets and indicate that, similarly, there are ex-post excess returns from investing in their currencies. Although the estimated coefficient of the Fama regression has the right sign (0.374) –indicating that is high interest rate emerging market currencies tend to depreciate as implied by the UIP–, it is statistically different from one. As the extent of depreciation is not enough, column 4 confirms that interest rate differentials predict excess returns.

Fama and Excess Return Regressions using Expectational Data

As mentioned above, an important implication of the regressions estimated using realized exchange rate is that they jointly test the UIP condition and FIRE. To disentangle these two, we now employ expectational data on exchange rates and assess the UIP condition without imposing assumptions on rationality and full information. In particular, we replace the right hand sides of regressions (5) and (6) with $s_{it+h}^e - s_{it}$ and λ_{it+h}^e, respectively, and remove the superscript F.

Panel B in Table 3 reports the results. Importantly, the coefficients for advanced economies change substantially when considering subjective expectations. Column 1 shows that the coefficient

[24] Note that equations (5) and (6) are equivalent and that $\beta_1^F = 1 - \beta^F$ (see Appendix C for more details).

is positive and not statistically different from one, which implies that expected exchange rate changes tend to offset changes in the interest rate differential, as the UIP condition implies. Along these lines, the coefficient of the expected excess return regression is not statistically differently from zero, indicating interest rate differentials do not longer predict expected excess returns (column 3 in Panel B). Interestingly, the R^2 also increases to 27% suggesting that interest rate differentials have a higher explanatory power to account for expected exchange rate changes. Columns 2 and 4 present the results for emerging markets. Remarkably, the UIP condition does not hold in these economies when using survey data. The coefficient of the Fama regression (0.48) is still positive and has the right sign, but it is statistically different from one. The presence of expected excess returns is confirmed in column 4, which shows that larger interest rate differentials associate with higher expected excess returns in emerging economies. It is interesting to note that the coefficient of the Fama regression estimated with realized and survey data are close to each other, which suggests that UIP violations cannot be entirely associated with failures to FIRE in these economies.

Table 3: Fama and Excess Return Regressions

	Fama Regression		Excess Return Regression	
	Advanced Economies	Emerging Markets	Advanced Economies	Emerging Markets
	(1)	(2)	(3)	(4)
	Panel A: Realized Exchange Rate			
β^F	-0.399	0.374***	1.399***	0.626***
	(0.361)	(0.115)	(0.361)	(0.115)
P-value ($H_0 : \beta^F = 1$)	0.0027	0.0000		
R^2	0.0034	0.0255	0.0408	0.0682
	Panel B: Expected Exchange Rate			
β	1.220***	0.480***	-0.220	0.520***
	(0.269)	(0.073)	(0.269)	(0.073)
P-value ($H_0 : \beta = 1$)	0.4290	0.0000		
R^2	0.1724	0.2749	0.0068	0.3076
Currency FE	yes	yes	yes	yes
Observations	2,285	3,577	2,285	3,577
Number of Currencies	12	22	12	22

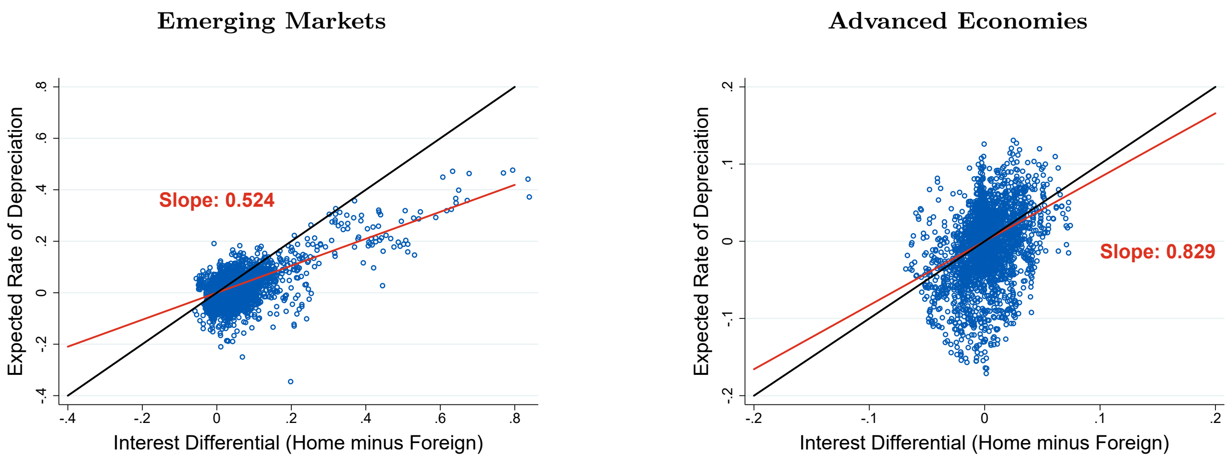
Notes: * p < 0.10 ** p < 0.05 *** p < 0.01. Currency-time two-way clustered standard errors in parentheses. 34 currencies, 22 Emerging Markets, 12 Advanced Economies. Period 1996m11:2018m12.

This section presents two striking results regarding the UIP condition that we summarized visually in Figure 9, where we plot the expected (Panel A) and realized (Panel B) rate of depreciation on the interest rate differentials for advanced economies and emerging markets.[25] Importantly, these

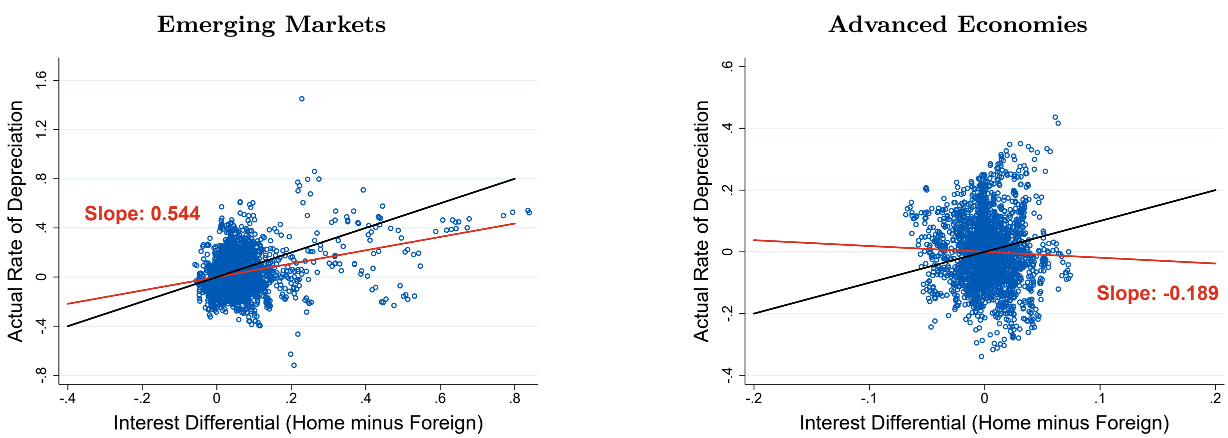
[25]Note that the slope of these regressions are equivalent to UIP regressions without currency fixed effects and, hence, pooling currencies together.

two results indicate fundamental differences between advanced economies and emerging markets.

The first result relates to advanced economies and shows that there is substantial difference between imposing that agents have FIRE and allowing for subjective expectations. As shown in Panel A of Figure 9, our group of forecasters expects that exchange rate changes offset interest rate differentials, as the UIP condition implies. Yet, as shown in Panel B, these forecasts were systematically wrong because advanced economies' currencies appreciated on average by 19%. [26]



A) Test of UIP Using Survey Data on Expectations



B) Test of UIP Using Ex-Post Exchange Rates

Figure 9: UIP with Realized and Expected Exchange Rates in Emerging Markets and Advanced Economies

Our second result relates to the failure of the UIP condition in emerging markets. Given

[26]This result confirms earlier studies, which find similar results using survey data for advanced economies (see for example Froot and Frankel 1989 and Bussiere, Chinn, Ferrara, and Heipertz 2018). Our analysis extend these studies and shows that this finding is not specific to a particular time period, group of developed economies or survey data, but a more general trend of advanced economies.

our results for advanced economies, it is not surprising that the UIP condition also fails when assuming FIRE in emerging markets. Yet, it is remarkable that, even when we allow for subjective expectations, expected exchange rate changes do not offset changes in the interest rate differentials. In fact, the slope of the expected and actual rate of depreciation on the interest rate differential is very similar in emerging markets. This result indicates that failures to FIRE cannot fully account for the violations of the UIP conditions in emerging markets (as it is the case for advanced economies).[27]

These novel and striking results raise two important questions. First, what leads to UIP deviations in emerging markets? Second, why do we observe larger deviations from FIRE in advanced economies than in emerging markets? To dig deeper, in the next sections, we decompose the source of the bias of the Fama regression and study the nature of forecast errors in both set of economies.

5.2 Decomposing the Bias in the Fama Regression

To understand the source of the downward bias of the coefficient of the Fama regression, we follow Froot and Frankel (1989) and decompose the bias arising from forecast errors and from a risk premium. To assess this, note that the probability limit of the coefficient β^F in equation (5) is

$$plim\hat{\beta}^F = \frac{cov(\Delta s_{it+h} - \Delta\overline{s}_i, IR_{it} - \overline{IR}_i)}{var(IR_{it} - \overline{IR}_i)}, \tag{7}$$

where $IR_{it} = i_{it} - i_t^{US}$ denotes the interest rate differential, and the over-line denotes the average of the variable for each currency across months – $\overline{X}_i = \frac{1}{T}\sum_{t=1}^{T} X_{it}$ – and corresponds to the currency fixed effects included in regression (5).[28] We can define the forecast errors as

$$\eta^e_{it+h} = \Delta s_{it+h} - \Delta s^e_{it+h}, \tag{8}$$

and rewrite $plim\beta^F$ as[29]

$$plim\hat{\beta}^F = 1 - b_{RE} - b_{RP} \tag{9}$$

$$\text{where} \quad b_{RE} = -\frac{cov(\eta^e_{it+h} - \overline{\eta}^e_i, IR_{it} - \overline{IR}_i)}{var(IR_{it} - \overline{IR}_i)} \quad \text{and} \quad b_{RP} = \frac{var(\lambda^e_{it+h} - \overline{\lambda}^e_i) + cov(\Delta s^e_{it+h} - \Delta\overline{s}^e_i, \lambda^e_{it+h} - \bar{\lambda}^e_i)}{var(IR_{it} - \overline{IR}_i)}.$$

Equation (9) shows the bias of the Fama coefficient can be broken down into two terms: b_{RE} and

[27] An alternative interpretation of why the UIP condition tends to hold when using survey data relies on surveys implying risk-neutral expectations. This explanation could account for the different results that we obtain when using realized and survey data in advanced economies, but they could not explain why the UIP condition tends to not hold in emerging markets. If surveys imply risk neutral expectations, then the UIP condition –using expectations– should hold for both advanced and emerging economies. As we show below, the different responses in advanced economies and emerging markets can be related to policy uncertainty prevalent in these later.

[28] To simplify notation, we remove the h horizon subscript to variables averaged across time. All our analysis is estimated at 12-month horizon.

[29] Appendix D presents the full derivation of Froot and Frankel (1989) decomposition.

b_{RP}. The first term b_{RE} represents the covariance between the forecast errors and the interest rate differential, and captures whether agents make systematic errors in expectations. The Fama coefficient would be biased downward if higher interest rate differentials lead agents to expect a larger exchange rate change than the change observed ex-post in data. That is, whenever $b_{RE} > 0$. The second term b_{RP} represents a risk premium and is determined by the volatility of the expected excess return and its covariance with the expected exchange rate change. The Fama coefficient would be downward biased – $b_{RP} > 0$ – if there is a time-varying expected excess return and the volatility of the excess return is higher than the comovement between the expected excess return and the expected exchange rate change.

We employ the survey data to compute b_{RE} and b_{RP} and quantify the two forces. Table 4 shows that the source of the bias differs significantly between advanced and emerging economies' currencies. Column 1 in Panel A reports the results for the former and shows that the b_{RE} term is more than an order of magnitude higher than the b_{RP} (1.619 vs -0.220). The larger b_{RE} indicates that systematic errors in expectations are the main source of downward bias of the Fama coefficient in advanced economies.[30] In contrast, in emerging markets, the b_{RP} term is substantially larger than the b_{RE} term (0.520 vs 0.106), pointing that a time-varying risk premium is key in biasing downwards the Fama coefficient (column 2).

Table 4: Decomposition of Bias in Fama Regression

	Advanced Economies	Emerging Markets
	(1)	(2)
	Panel A: Decomposition of Bias of Fama Coefficient	
(i) b_{RE}	1.619	0.106
(ii) b_{RP}	-0.220	0.520
implied β^F from (i) and (ii)	-0.399	0.374
	Panel B: Components of b_{RE} and b_{RP}	
$cov(\eta^e_{it+h} - \overline{\eta}^e_i, IR_{it} - \overline{IR}_i)$	-0.0404	-0.0342
$var(IR_{it} - \overline{IR}_i)$	0.0250	0.3228
$var(\lambda^e_{it+h} - \overline{\lambda}^e_i)$	0.1797	0.2836
$cov(\Delta s^e_{it+h} - \Delta\overline{s}^e_i, \lambda^e_{it+h} - \overline{\lambda}^e_i)$	-0.1853	-0.1158

Notes: 34 currencies, 22 Emerging Markets, 12 Advanced Economies. Period 1996m11:2018m12.

To understand the determinants of the b_{RE} and b_{RP}, we go one step further and break down their components. Column 1 in Panel B shows that, in advanced economies, the b_{RE} term is high because the covariance of the forecast errors and the interest rate differentials is high (relative to the variance of the interest rate differential). In contrast, the b_{RP} term is relatively small because $var(\lambda^e_{it+h})$ and $cov(\Delta s^e_{it+h}, \lambda^e_{it+h})$ tend to offset each other. The results for emerging markets are remarkably

[30] This result is in line with the pioneering work of Froot and Frankel (1989), who used survey data on five main currencies during the 70s and 80s and documented novel evidence of this.

different (column 2). The covariance of forecast errors with the interest rate differential is low and, thus, a low b_{RE}; and the variance of the expected excess return is high and, thus, a high b_{RP}. The higher variance of expected excess returns (i.e. remarkably $var(\lambda^e_{it+h}) > -cov(\Delta s^e_{it+h}, \lambda^e_{it+h})$) confirms our earlier finding that interest rate differentials play a key role in accounting for UIP violations in emerging markets.

In the next sections, we assess econometrically these two different sources of UIP violations: systematic forecast errors critically affecting advanced economies and a time-varying risk premium predominant in emerging markets. In Section 5.3, we focus on forecast errors. In Section 6, we analyze the nature of the risk premium in emerging market currencies and assess how it relates to policy risk present in these economies.

5.3 Forecast Errors

The last sections provided suggestive evidence that systematic errors in expectations were the main source of UIP deviations in advanced economies, but they played a less important role in emerging markets. This result raises the –paradoxical– question of whether the failure of the full information and rational expectation assumption is more important in advanced economies than in emerging markets. In this section, we assess this question econometrically by studying average forecast errors and their evolution across time.

-Average Forecast Errors

As shown by Froot and Frankel (1989), the term b_{RE} in equation (9) can be computed by estimating a regression of the forecast errors on the interest rate differential. This regression allows us to assess whether the term b_{RE} is statistically significantly different from zero and forecast errors are systematically related to interest rate differentials, on average. We estimate

$$\Delta s_{it+h} - \Delta s^e_{it+h} = \gamma(i_{it} - i^{US}_t) + \mu_i + \varepsilon_{2it+h}, \tag{10}$$

where γ is the negative of the term b_{RE} in equation (9). Column 1 in Table 5 shows that the coefficient for advanced economies is negative and highly statistically significant, confirming that b_{RE} can significantly explain the bias of the Fama coefficient β^F in these economies. Remarkably, the estimated coefficient for emerging markets –reported in column 2– is small and non-statistically different from zero.

The difference between both set of economies is striking: does it suggest that global investors make systematic errors in expectations in advanced economies, but they do not in emerging markets? Furthermore, what does this result imply in terms of investors' over-/under- reactions to interest rate differential shocks? To assess these questions, we turn now to analyze the evolution of forecast errors across time.

Table 5: Forecast Error Regression

	Advanced Economies	Emerging Markets
	(1)	(2)
γ_1 $(i_{it} - i_t^{US})$	-1.619***	-0.106
	(0.525)	(0.140)
R^2	0.0538	0.0021
Observations	2,285	3,577
Number of Currencies	12	22
Currency FE	yes	yes

Notes: * p < 0.10 ** p < 0.05 *** p < 0.01. Currency-time two-way clustered standard errors in parentheses. 34 currencies, 22 Emerging Markets, 12 Advanced Economies.

-Evolution of Forecast Errors

To assess the above questions, we estimate

$$\Delta s_{it+h+k} - \Delta s^{e}_{it+h+k} = \beta_k (i_{it} - i_t^{US}) + \mu_i + \epsilon_{it+h+k}, \tag{11}$$

where Δs_{it+h+k} denotes realized exchange rate.[31] Figure 10 plots the evolution of forecast errors following increases in the interest rate differential (blue line) for advanced economies and emerging markets (left and right panels, respectively). To dissect its determinants, we additionally plot the evolution of the realized exchange rate change (green line) and the expected exchange rate change (red line).

In advanced economies, forecast errors are negative in short term (before 30 months), but they become positive in the medium term. This non-linear pattern implies that investors' expectations over-react in the short-term and under-react in the medium term. More precisely, in the short-term, investors expect a depreciation (as shown by the red line and implied by the UIP condition), but the exchange rate appreciates ex-post (green line). Thus, investors' expectations over-react relative to the ex-post realization of the exchange rate. In the medium term and, in line with the delayed overshooting literature, the realized exchange rate depreciates and, importantly, this depreciation exceeds investors' expected depreciation. A higher realized depreciation implies that forecast errors flip sign (becoming positive) and investors' expectations under-react with respect to the observed realization. Put it differently, as highlighted by Candian and De Leo (2021), the negative forecast errors first and positive errors later imply that investors expect that, in the short term, the currency loses more value than what actually happens ex-post (undervaluation) and, in the medium term, gains more value (overvaluation).

Remarkably, in emerging markets, forecast errors are negative both in the short and medium

[31] To facilitate comparison with the literature, we estimate this regressions in a static setting, instead of local projections as we did above in Section 4. The dynamic responses estimated with local projections are similar and available upon request.

term. This negative sign implies that global investors over-react to increases in the interest rate differential and always expect a depreciation higher than its ex-post realization. In particular, in the short term, increases in the interest rate differential lead to ex-post depreciations but, since investors expect a higher depreciation, forecast errors are negative. In the medium term, the exchange rate appreciates ex-post, but investors still expect a depreciation. In other words, in emerging markets, investors over-react to increases in the interest rate differential and expect that the local currency always losses more value than what occurs ex-post in data.[32]

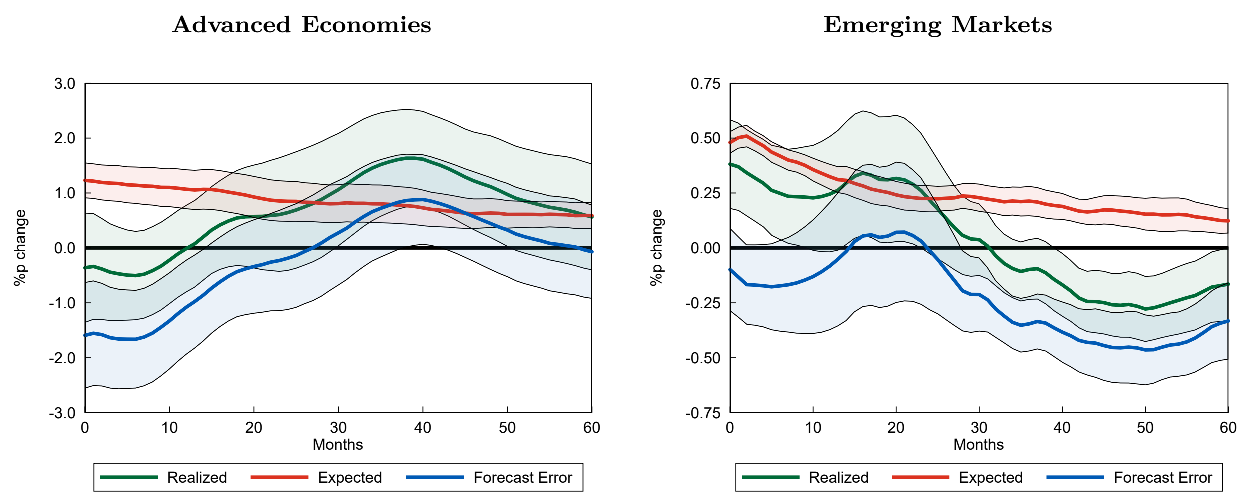


Figure 10: Forecast Error Responses to an Interest Rate Differential Shock (OLS)

A natural question to ask is: why global investors always over-react emerging markets? As argued in Section 4, this pattern relates to policy uncertainty shocks prevalent in these economies. As shown before, global investors' expected depreciation following interest rate differential shocks is driven by increases in policy risk. Policy uncertainty increases global investors' investment risk, which translates into an increase in the interest rate differential and, in turn, into an expected depreciation. More uncertain returns of foreign investment induce investors to over-react to the initial shock and expect a larger depreciation than otherwise observed in data.

-Fact 5 *(part 1): The classical Fama puzzle disappears in advanced economies in expectations, but it remains for emerging markets. As a result, while global investors expect zero excess returns and earn actual positive returns in the short run and negative returns in the long run by investing in advanced country currencies, the same global investors expect and earn positive excess returns over the entire horizon from emerging market currencies. The forecast errors in advanced countries are systematic as they are strongly negatively correlated with the interest rate differentials on average, where investors first over-react expecting a depreciation when there is ex-post appreciation, and they under-react later expecting a depreciation that is lower than the actual depreciation. In emerging*

[32] It is worth noting that the estimated coefficients reported in Table 5 are explained by the patterns observed in the short term.

countries, on the other hand, although there are forecast errors, they are not systematically correlated with the interest rate differential. The same global investors always over-react in emerging markets, expecting a depreciation larger than ex-post depreciation. Hence, expected and actual exchange rate move together.

Discussion of results

Results presented in this section report different patterns between advanced economies and emerging markets. In advanced economies, the UIP condition does not hold on average when considering realized exchange rate changes, but it holds when considering subjective expectations. This indicates that failures to FIRE are a key force explaining UIP deviations in these economies. Along this line, we found that global investors make systematic errors in expectations, where their expectations over-react at the onset of interest rate shocks and under-react in the medium term. These findings provide additional support to the literature documenting that failures to FIRE can explain UIP violations in advanced economies (e.g. Froot and Frankel 1989, Chinn and Frankel 2016, Bussiere, Chinn, Ferrara, and Heipertz 2018, among others) and that investors expect a higher undervaluation of the currency first and a higher overvaluation later than what actually occurs ex-post (Candian and De Leo 2021). Our paper put these two findings together in a unified analysis and shows that both empirical regularities are consistent with one another. Furthermore, we extend these results for a larger set of advanced countries and years, and document –for the first time– a contrasting pattern in emerging markets.

In emerging economies, the UIP does not hold either when using realized and expected exchange rates. This finding raises two puzzling questions. First, does this mean that global investors have failure to FIRE in advanced economies and not in emerging markets? Second, what explains the failure of the UIP in emerging markets? To answer the first question, we studied forecast errors and showed that global investors present failures to FIRE in emerging markets as well. The difference is that global investors always over-react to interest rate differential shocks and expect a higher depreciation than what is realized ex-post in data. This differential response arises from the nature of shocks in emerging markets. In these economies, policy uncertainty shocks lead global investors to consistently expect that the local currency will lose value in time. To answer the second question, in the next section, we reassess the drivers of the UIP premium in emerging markets by digging deeper into the determinants of the EPU index, which –as shown above– is a significant determinant of the UIP premium in these countries.

6 UIP Premium in Emerging Markets: The Role of Policy Risk

Results in the previous sections indicate that the failure of the UIP condition for emerging market currencies relates to the presence of a time-varying risk premium that associates with global risk aversion and country-specific policy uncertainty. In this section, we go deeper in our analysis of local policy uncertainty and ask about its main determinants. With this end, we employ three additional variables reflecting policy uncertainty. A first variable is broadly defined as a *composite country risk* that captures political, economics and financial risks in a country. Political risk is the main component of this variable and weights for 50% of the index. To unpack the determinants of policy risk, we focus on two key variables used in the construction of the political risk component: *government policy risk* and *confidence risk*. As described in Section 2 and Appendix A.4, government policy risk proxies expropriation risk and how democratic and accountable a government is, and confidence risk captures socio-economic conditions that could affect a government's ability to implement policies (such as consumer confidence and poverty). These three variables –composite, government policy and confidence risks– capture then the risk to global investors' returns due to unexpected government actions.[33]

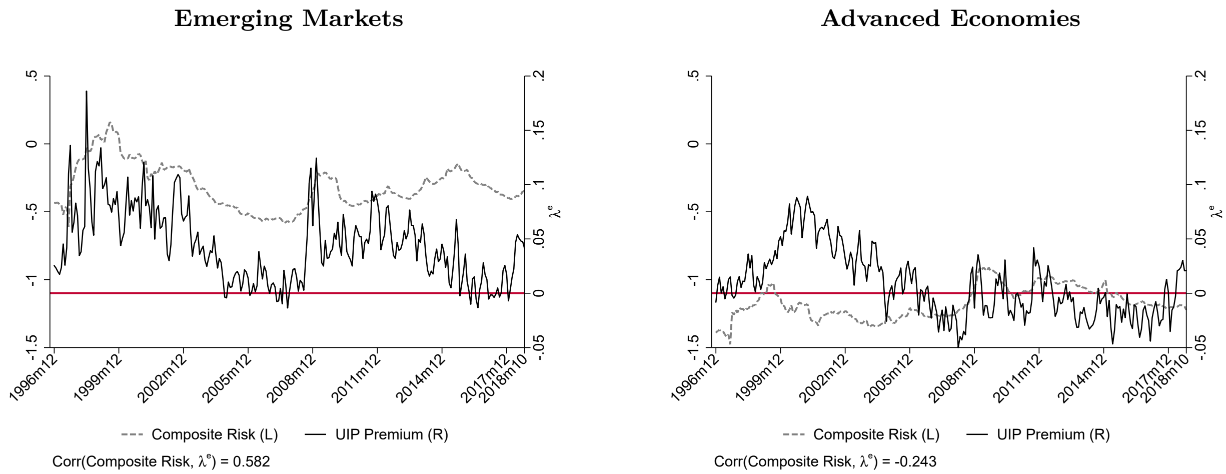
We then employ these variables to revisit our main findings above. We start by presenting the correlation of these variables with the UIP premium. We then reassess the relevance of these variables in our panel regressions. Finally, we revisit the UIP puzzle and evaluate whether these variables can help explaining the risk-premium in emerging market currencies and, hence, the downward bias in the Fama coefficient.

Comovement of UIP Premium and Policy Risk Variables

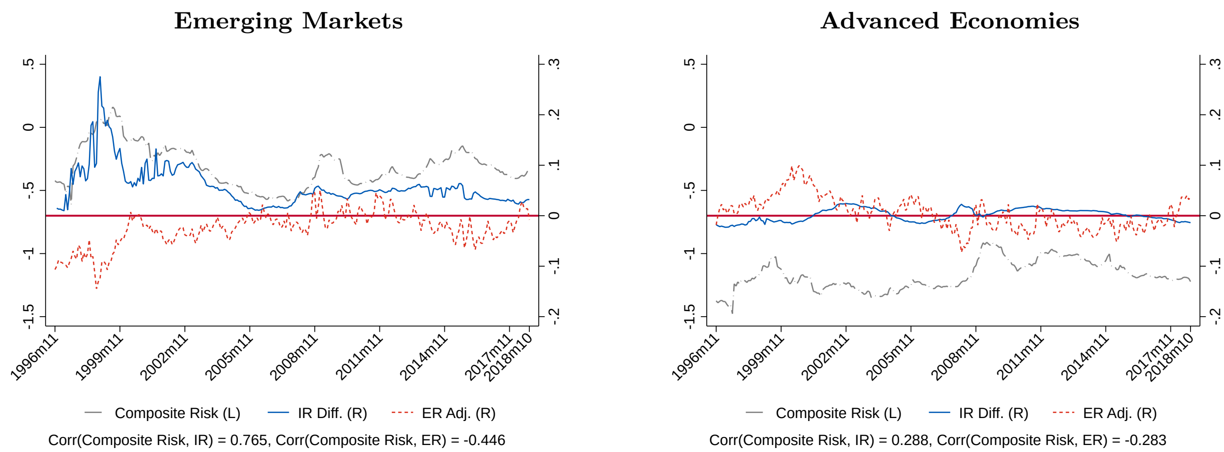
A first glance at the data confirms that the UIP premium highly comoves with the composite risk in emerging markets. The left graph of Panel A in Figure 11 plots the average composite risk index (gray-dashed line) and UIP premium (black line) for emerging markets. Notably, these two lines track each other very closely and their comovement reaches 58%. The higher is the country's composite risk, the higher is the UIP premium on its currency. Interestingly, the correlation has the opposite sign and is smaller for advanced economies (-24%) (right graph).

In Panel B, we plot the correlation of the composite risk index with the two components of the UIP premium, namely the interest rate differential and exchange rate adjustment. Confirming our previous findings, in emerging markets, the composite risk highly correlates with the interest rate differential (76%) and this correlation is much higher than the negative correlation with the exchange rate adjustment (-45%). This higher correlation with the interest rate differential is interesting because –in line with our earlier findings–, it suggests the presence of excess returns associated with a country-specific composite risk for emerging market currencies. As expected, these correlations for advanced economies are much smaller and the comovement of the two components of the UIP premium and the composite risk offset each other.

[33] The ICRG further decompose political risk into other sub-components, such as corruption, law and order, bureaucracy quality, internal and external conflicts, among others. These sub-components capture elements of political risk that are not significantly related to foreign investors' risk sentiments about unexpected changes in government policies that can affect their investment returns. In Appendix A.4, we detail thoroughly all these sub-components and show that the correlation with the UIP premium in emerging markets has usually the wrong (negative) sign and is low (likely due to the low time-series variation of these sub-components).



A) Composite Risk and UIP Premium



B) Composite risk and UIP Decomposition

Figure 11: Composite Risk and the UIP Decomposition in Advanced Economies and Emerging Markets

Note: This figure shows the correlation of composite risk with the UIP premium and UIP decomposition at 12 month horizon.

To unpack the elements implied in the composite risk and affecting foreign investors' sentiments on emerging market currencies, we plot in Figure 12 the comovement of the UIP premium with the two main components of policy risk. The left graph plots the correlation with the government policy risk and shows that uncertainty about government policies highly and positively correlates the UIP premium (28%). Similarly, low confidence highly associates with increases in the UIP premium on emerging markets (62%).

These patterns in data provide suggestive evidence that country-idiosyncratic policy uncertainty could be at the origin of the UIP premium and excess returns on emerging markets' currencies. We turn now to test this econometrically.

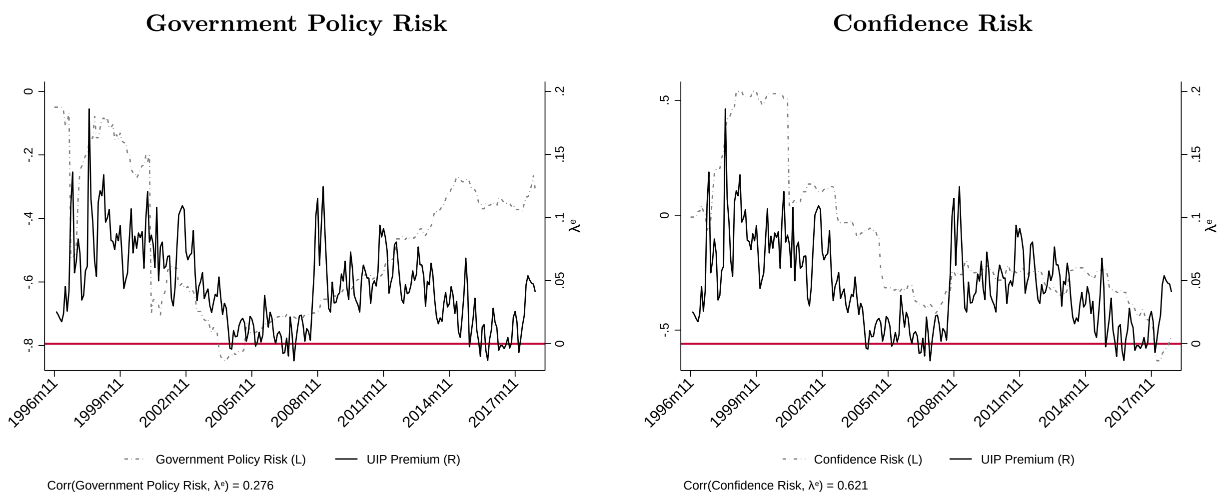


Figure 12: Government Policy and Confidence Risks in Emerging Markets
Note: This figure shows the correlation of between the Government Policy and Confidence Risks with the UIP premium at 12 month horizon.

Panel Regressions

To assess the correlation of policy risk and the UIP premium in emerging markets, we restimate regression (2) by replacing the EPU with the composite, government policy and confidence risk indexes.

Table 6 presents the results. Column 1 shows that the estimated coefficient for the composite risk index is positive and highly statistically significant indicating that increases in a country-specific risk associates with a higher UIP premium on its currency. This coefficient implies that if composite risk increases from the p25 to p75 (from Chile to Russia in the 2016m6), the UIP premium increases by 4 percentage points. As above, columns 2 and 3 show that the channel of transmission of a composite risk shock is the increase in the interest rate differential. Higher composite risk increases the interest rate differential and leads to an expected depreciation but, because the increase in the domestic interest rate is larger, the UIP premium increases. It is worth noting that the composite risk does not overpower the VIX coefficient – which remains similar in magnitude and highly statistically significant –, but it overpowers capital inflows.

Columns 4-6 presents the results for the two components of political risk. Column 4 shows that increases in government policy risk associates higher UIP premium and column 5 confirms a similar correlation for confidence risk. Importantly, column 6 includes both variables together and shows that both variables remain positive and highly statistically significant. Furthermore, both coefficients remain similar in size as those estimated in columns 4 and 5, which indicates that both variables are capturing different policy risks. Finally, it is worth remarking on the R^2 of these regressions, which reaches almost 17% and is close in size to the 19% observed for the composite index (column 1) and 17% captured in the EPU index (column 1, Panel C in Table 2). This similar

Table 6: UIP Deviations in Emerging Markets: Composite, Government Policy and Confidence Risks

	Composite Risk			Unpacking Composite Risk		
	UIP Premium	IR Differential	ER Adjustment		UIP Premium	
	(1)	(2)	(3)	(4)	(5)	(6)
Inflows/GDP$_{it-1}$	-0.001	-0.001*	0.000	-0.002*	-0.002	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log(VIX)$_{t-1}$	0.051***	0.027***	0.024***	0.054***	0.057***	0.054***
	(0.007)	(0.007)	(0.007)	(0.005)	(0.005)	(0.005)
Composite Risk$_{it-1}$	0.052***	0.089**	-0.037			
	(0.015)	(0.037)	(0.030)			
Government Policy Risk$_{it-1}$				0.020***		0.014***
				(0.005)		(0.005)
Confidence Risk$_{it-1}$					0.023***	0.020***
					(0.004)	(0.004)
R^2	0.1948	0.1872	0.0468	0.1540	0.1641	0.1691
Observations	3427	3427	3427	3427	3427	3427
Number of Currencies	22	22	22	22	22	22
Currency FE	yes	yes	yes	yes	yes	yes

Notes: * p < 0.10 ** p < 0.05 *** p < 0.01. Time clustered standard errors in parentheses. Note that given low clusters due to data availability, we cannot double cluster in this regression.

value of the R^2 indicates that the policy uncertainty captured by the EPU and the composite indexes is highly related to these two narrowly-defined measures of policy risk that capture the confidence on in emerging markets' government policies.

These results indicate that both sources of policy risk for foreign investors' returns –namely government policies, restricting profit repatriation and creating expropriation risk, and confidence risk, affecting a government's ability to implement policies– are key to explain the times-series variation of the UIP premium on emerging markets' currencies. Importantly, when policy risk variables are included into the regression, capital inflows lose significance, as before, showing that the impact of capital inflows on the UIP premium in emerging markets is actually capturing the risk perceived by foreign investors of investing in these currencies.

The Fama Puzzle Revisited

Section 5 showed that the downward bias of the Fama coefficient in emerging markets was related to the presence of a risk premium on these currencies. In this section, we evaluate whether this risk premium and, thus, the bias of the Fama coefficient associates with country-specific policy uncertainty.

To evaluate the impact of policy risk on the downward bias of the Fama coefficient, we need to evaluate how a country's policy risk affects the risk premium and Fama coefficient across time. This implies obtaining a currency-specific and time-varying risk premium and Fama coefficient, and assessing their correlation with a country's policy risk. With this end, we estimate the Fama regression for each currency in non-overlapping 18-months rolling windows, and obtain a currency i- and window j-specific Fama coefficient, β_{ij}. More precisely, we estimate

$$\Delta s^e_{ijt+h} = \alpha_{ij} + \beta_{ij}(i_{ijt} - i^{US}_{jt}) + \varepsilon_{ijt+h} \qquad \forall i, j, \tag{12}$$

where j denotes a non-ovelapping rolling window and t is the monthly variation within this window with a 12-month horizon expectation denoted with h. Under subjective expectations, the risk premium has a one-to-one mapping with the Fama coefficient. More precisely, the probability limit of β_{ij} is:[34]

$$plim\hat{\beta}_{ij} = 1 - b_{ij,RP} \qquad \text{and} \qquad b_{ij,RP} = \frac{var(\lambda^e_{ij}) + cov(\Delta s^e_{ij}, \lambda^e_{ij})}{var(IR_{ij})} \tag{13}$$

where $var(\lambda^e_{ij})$, $cov(\Delta s^e_{ij}, \lambda^e_{ij})$ and $var(IR_{ij})$ are calculated across months within window j for each currency i. As such, the Fama coefficient estimated using survey data is equal to one minus the risk premium (i.e. $plim\hat{\beta}_{ij} = 1 - b_{ijRP}$).[35]

To assess the relationship between policy risk and the Fama coefficient, we estimate the following pooled OLS regression:

$$\hat{\beta}_{ij} = \gamma_2 + \gamma_3 \text{ policy risk}_{ij} + \varepsilon_{ij}, \tag{14}$$

where $\hat{\beta}_{ij}$ is the Fama coefficient estimated in regression (12) and policy risk_{ij} is the mean of policy risk in currency i and window j for each of our policy risk variables. The coefficient γ_3 captures the change in the Fama coefficient associated with a change in the policy risk. We then replace the right hand side of equation (14) with $b_{ij,RP}$ and evaluate the correlation between risk premium and policy risk. This correlation should have the opposite sign than the correlation between policy risk and the Fama coefficient. In both regressions (12) and (14), we cluster the standard errors by country.[36]

Panel A in Table 7 presents the results for the Fama coefficient. The result for composite risk is presented in column 1. The estimated coefficient is negative and indicates that an increase in a country's composite risk associates with a contemporaneous decrease in the Fama coefficient. The estimated coefficient implies that if the composite risk increases from the p25 to p75 (from Poland to India in the window 2001m5 to 2002m10) the Fama coefficient would decrease 0.31 percentage points. In columns 2 and 3, we unpack the composite risk in its two components: government policy risk and confidence risk. Both risk are negatively correlated with the Fama coefficient, but only government policy risk is statistically significant.

[34]For expositional simplicity, we removed the time horizon subscript h and note that all our estimates are considered at 12-month horizon.

[35]Using survey data to estimate equation (12) eliminates the term b_{RE}, as the regression already considers subjective expectations. See Appendix D for a derivation of this relationship.

[36]We only cluster the standard errors by country, because there is not enough observations across windows to cluster by time. Note that there are only 13 windows in the sample.

In columns 4 and 5, we go one step further and break down government policy risk in its two sub-components: anti-democratic risk and expropriation risk. Anti-democratic risk captures the level of autocracy of the government and, thus, the degree of freedom that a government has to impose policies to its own advantage. Expropriation risk captures the risk of expropriation, the risk of limiting or banning foreign investors' profits repatriation and payment delays.[37] Interestingly, both anti-democratic risk and expropriation risk are negative and statistically significant, pointing to a downward bias in the Fama coefficient.

For completeness, Panel B presents the regressions estimated using the risk premium as $b_{ij,RP}$ dependent variable. The estimated coefficients for composite, government policy, anti-democratic and expropriation risks are all positive and statistically significant, indicating that higher uncertainty on emerging markets' government policies associate with increases in the risk premium which –in turn– downward bias the Fama coefficient.[38]

-Fact 5 *(continuation): In emerging markets, excess returns compensate for the policy uncertainty affecting foreign investors' risk sentiments.*

Table 7: The Fama Coefficient in Emerging Markets: Composite and Government Policy Risks

	Panel A. Fama Coefficient: $\hat{\beta}_{ij}$				
	Composite Risk	Unpacking Composite Risk		Decomposing Government Policy Risk	
		Government Policy Risk	Confidence Risk	Anti-Democratic Risk	Expropriation Risk
	(1)	(2)	(3)	(4)	(5)
Policy risk$_{i,j}$	-0.592*	-0.764***	-0.139	-0.624***	-0.489*
	(0.328)	(0.253)	(0.186)	(0.180)	(0.256)
R^2	0.0134	0.0414	0.0020	0.0415	0.0205
	Panel B. Risk Premium: $b_{ij,RP}$				
Policy risk$_{i,j}$	0.592*	0.764***	0.139	0.624***	0.489*
	(0.328)	(0.253)	(0.186)	(0.180)	(0.256)
R^2	0.0134	0.0414	0.0020	0.0415	0.0205
Observations	180	180	180	180	180

Notes: * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. Currency-clustered standard errors in parentheses. All regressions include a constant term.

Lastly, in Appendix E, we conduct a decomposition exercise to assess the channels through which policy risk creates a downward bias the Fama coefficient. In line with the analysis of the pre-

[37] More precisely, the anti-democratic risk corresponds to the "democratic accountability" variable and expropriation risk corresponds to the "investment profile" in the ICRG dataset.

[38] In Figure B.1, we come back to the dynamics of the UIP premium and show that anti-democratic risk and expropriation risk are substantlly correlated with the UIP in emerging markets.

vious sections, we find that increases in country-specific policy risk are channelled through higher interest rate differential and, hence, policy risk is "priced-in" the interest rate term. More precisely, our econometric results indicate that both composite and government policy risks associate with increases in the volatility of the interest rate differential ($var(IR_{ij})$), which –in turn– raises the volatility of the UIP premium ($var(\lambda^e_{ij})$) and, by this mean, downward bias the Fama coefficient.

7 Robustness Tests

In this section, we present several robustness tests, such as controlling for inflation rates, default risk, assessing the difference of the UIP with the Covered Interest Rate Parity (CIP) condition, re-estimating regressions with an unbalanced panel, and computing the rolling windows of Section 6 with different lengths.

-Controlling for inflation differentials

A main concern of the analysis is that high interest rate currencies might correlate with high inflation rates and, thus, the UIP premium observed in nominal term might vanished in real terms. To assess this, we re-estimate our panel regressions in equation (2) and add inflation differentials as a control. As Table 8, shows, all our results hold true when including inflation differential as a control. Importantly, the size of the estimated coefficients is very similar to our main estimation in Table 2, indicating that inflation differentials do not significantly affect the importance of the EPU and local policy risk variables driving the UIP premium. Several other robustness including doing the dynamic UIP figures with real UIP deliver the same conclusion.

-Comparing CIP and UIP Deviations

An influential recent literature, mostly focusing on advanced countries, documented a link between CIP deviations, global risk aversion, financial frictions and USD exchange rates (e.g Du, Tepper, and Verdelhan 2018, Jiang, Krishnamurthy, and Lustig 2021 and Avdjiev, Du, Koch, and Shin 2019). In this section, we document that UIP deviations are much larger than CIP deviations and also have a low correlation with each other over time. Calculating CIP deviations for emerging markets is much harder given the limited data on hedging, swaps and forwards.

Going back to our UIP deviation in equation (1), CIP deviation can be written as:

$$\lambda^{CIP}_{t+h} = (i_t - i^{US}_t) + (s_t - f_{t+h}), \tag{15}$$

where f_{t+h} denotes the forward rate. We measure i_t and i^{US}_t using either interbank rates (IBOR) or deposit rates depending on the specification. Both rates come from Bloomberg to follow closely Du, Tepper, and Verdelhan (2018). To measure s_t we resort to the International Financial Statistics

Table 8: Dynamics of the UIP Premium: Panel Regressions

	Emerging Markets			Advanced Economies		
	UIP Premium (1)	IR Differential (2)	ER Adjustment (3)	UIP Premium (4)	IR Differential (5)	ER Adjustment (6)
Inflows/GDP$_{it-1}$	-0.001	-0.002**	0.001	0.039	-0.008	0.047
	(0.001)	(0.001)	(0.001)	(0.027)	(0.007)	(0.033)
Log(VIX)$_{t-1}$	0.049***	0.028***	0.021***	0.024*	0.012**	0.012
	(0.008)	(0.008)	(0.008)	(0.012)	(0.005)	(0.011)
EPU$_{t-1}$	0.010***	0.006***	0.004	-0.002	0.002**	-0.005*
	(0.004)	(0.002)	(0.003)	(0.002)	(0.001)	(0.003)
Inflation Differential$_{t-1}$	1.836***	2.507	-0.671	0.022	0.026	-0.003
	(0.448)	(1.556)	(1.186)	(0.359)	(0.148)	(0.420)
R^2	0.2359	0.1510	0.0319	0.0514	0.1027	0.0255
Observations	3203	3203	3203	1751	1751	1751
Number of Currencies	20	20	20	10	10	10
Currency FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. Currency-time two-way clustered standard errors in parentheses. Capital inflows are measured as changes in gross debt liabilities. 30 countries, 20 Emerging Markets, 10 Advanced Economies. Period 1996m11:2018m12.

(IFS) database and use monthly average spot exchange rates. Finally, to measure f_{t+h} we use forward rates also available at Bloomberg.

We start following Du and Schreger (2021) (DS) analysis and use their data to plot their CIP deviations against ours in their sample of 15 emerging markets and 11 advanced countries.[39] Figure 13 shows that both series are very highly correlated. It is interesting to note that CIP deviations in emerging markets are 10 times larger than the ones in advanced countries. Next, we plot –in the same restricted DS sample– their CIP deviations (DS) against our UIP deviations (KOV) in Figure 14, showing how small CIP deviations are compared to UIP deviations.

Finally, we plot our CIP and UIP deviations in our larger sample in Figure 15, though we calculate CIP deviations using interbank rates, following Du and Schreger (2021), and then we plot both deviations in our larger sample using deposit rates for both in Figure 16. These figures show that, regardless of the interest rates used, UIP and CIP deviations have a very low correlation with each other over time and sometimes with the wrong sign. Even they might both capture similar time varying risk premium in interest rate differentials, the difference between forward and spot rates is much larger than the difference between expected exchange rates and spot rates, hence those interest rate differentials are mostly offset in CIP deviations, rendering these deviations small. Notice that the correlation between UIP and CIP deviations is at best around 30 percent (highest) in emerging markets even when we used same deposit rates to calculate interest rate differentials for both.

-Additional Robustness Tests

[39]We would like to thank Wenxin Du and Jesse Schreger for sharing their CIP deviations data.

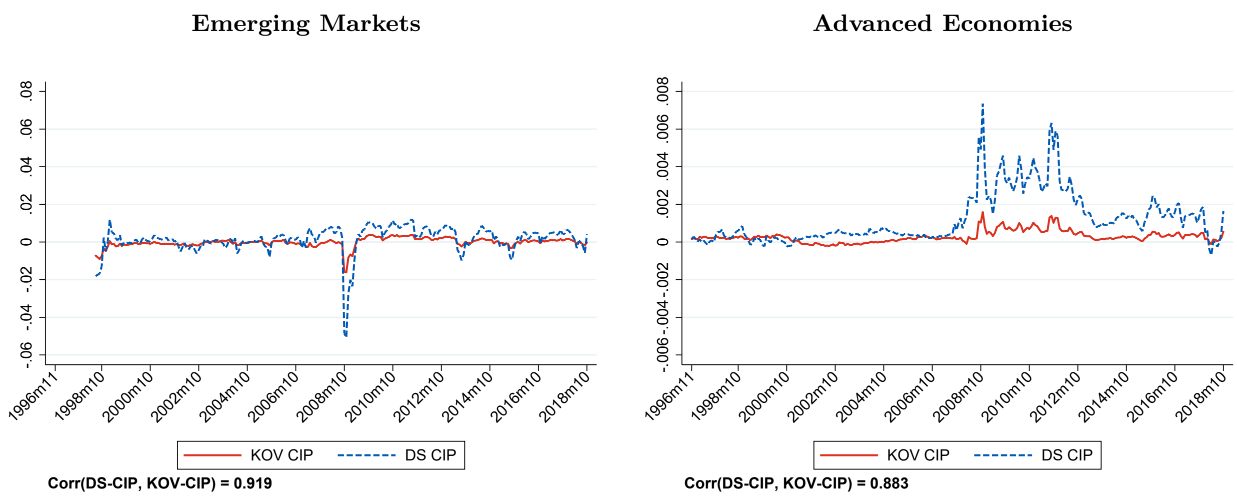


Figure 13: CIP COMPARISON: KALEMLI-OZCAN AND VARELA (KOV) VS. DU AND SCHREGER (DS)

NOTE: This figure shows CIP comparison in a sample that restrict observations to be the same at date-country pairs in DS and our data. Both series use money market interbank rates.

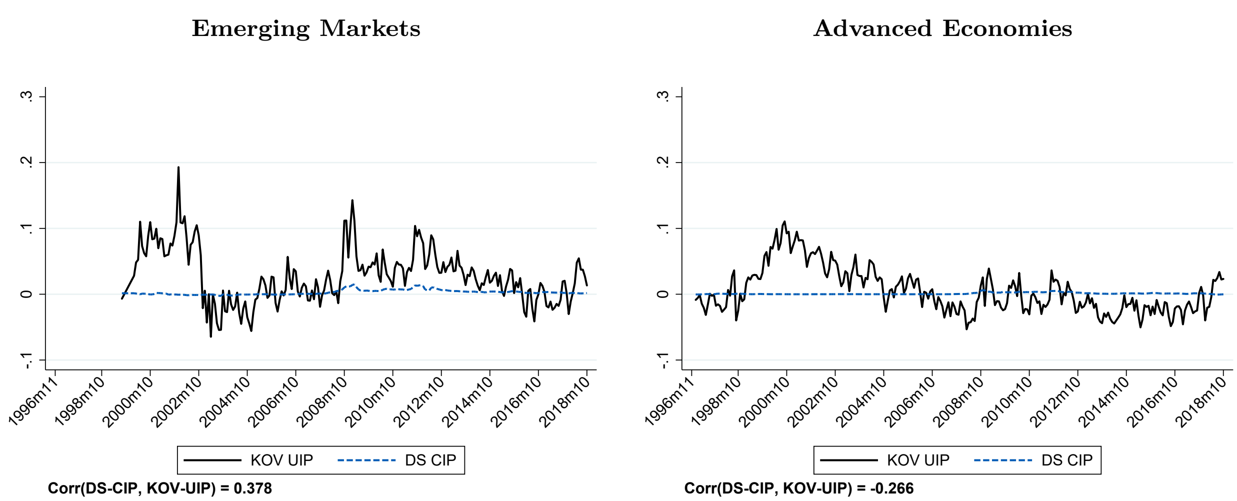


Figure 14: CIP FROM DU AND SCHREGER (2021) AND UIP FROM KALEMLI-OZCAN AND VARELA (12 MONTHS HORIZON)

NOTE: This figure shows CIP deviations and UIP deviations in a sample that restricts observations to be the same at date-country pairs in DS and our data. UIP deviations use deposit rates.

We further conduct three additional tests. First, to make sure that our results are not driven by any defaulters, we drop from the sample Argentina, Brazil, Indonesia, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Romania, Russia, Turkey and Ukraine, which are the countries in our sample that defaulted "at some moment" over the last fifty years. Our results are similar and as strong without including these defaulter countries, as shown in the Table 9.

Second, to make sure that results are not driven by sample selection, we re-estimate these

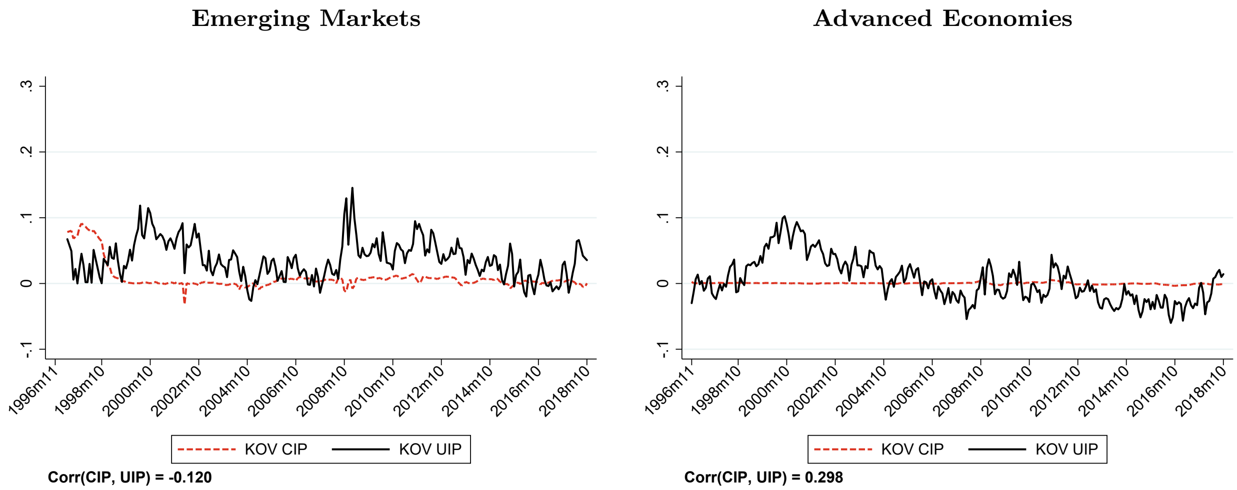


Figure 15: UIP AND CIP (12 MONTHS HORIZON)

NOTE: This figure shows CIP and UIP deviations using our data. We use money market interbank rates to construct CIP, while we use deposit rates to construct UIP.

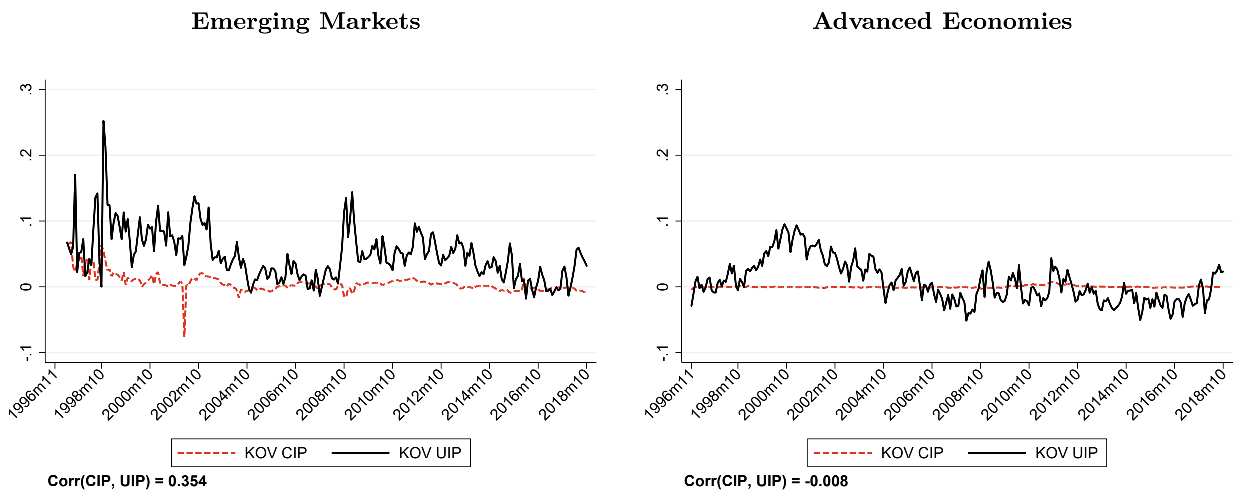


Figure 16: UIP AND CIP (12 MONTHS)

NOTE: This figure shows UIP and CIP deviations using our sample. Both series use deposit rates.

regressions for an unbalanced panel of 34 advanced and emerging economies.[40] Results reported – in Table B.2 in Appendix B – confirm the failure of the UIP condition for both advanced and emerging economies when using realized exchange rates, and its failure for emerging markets when using survey data.

Finally, to assess whether our analysis on the channel creating a downward bias in the Fama coefficient in Section 6 is not driven by the length of the window with which we estimate the β coefficient and b_{RP} term, we re-compute these variables for 12-months and 24-months rolling windows and show in Tables B.3 and B.4 in Appendix B that our results hold true for these different windows.

[40] Recall that our balanced sample consists on countries for which we have observations for all variables to compute the Fama and excess return regressions and the composite risk. In the unbalanced panel, we still exclude fixed pegs.

Table 9: Dynamics of the UIP Premium: Panel Regressions: Sample without Defaulters

	Emerging Markets			Advanced Economies		
	UIP Premium (1)	IR Differential (2)	ER Adjustment (3)	UIP Premium (4)	IR Differential (5)	ER Adjustment (6)
Inflows/GDP$_{it-1}$	-0.001	-0.002***	0.001	0.034	-0.003	0.036
	(0.001)	(0.001)	(0.001)	(0.027)	(0.010)	(0.034)
Log(VIX)$_{t-1}$	0.042***	0.018***	0.024***	0.037***	0.010**	0.027**
	(0.005)	(0.003)	(0.004)	(0.013)	(0.004)	(0.013)
EPU$_{it-1}$	0.007***	0.004***	0.003	-0.004	0.002	-0.005**
	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)
R^2	0.1241	0.1054	0.0443	0.0871	0.0633	0.0422
Observations	1347	1347	1347	2209	2209	2209
Number of Currencies	8	8	8	12	12	12

Notes: * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. Currency-time two-way clustered standard errors in parentheses. This table removes countries in which the sovereign defaulted in the last 50 years.

8 Conclusion

We document five novel facts about Uncovered Interest Parity (UIP) deviations vis-à-vis the U.S. dollar for 34 currencies of advanced economies and emerging markets. We use exchange rate expectations from survey data to calculate the empirical counterpart of the theoretical UIP condition.

The UIP premium co-moves with global risk aversion (VIX) for *all* currencies, whereas *only* for emerging market currencies there is a negative comovement between the UIP premium and capital inflows. The factors behind these comovements differ across two sets of countries: the comovement of the UIP premium and the VIX is explained by changes in interest rate differentials in emerging markets, and by expected changes in exchange rates in advanced countries. The comovement between the UIP premium and capital flows in emerging markets is explained by local policy uncertainty. Upon conditioning on this factor, the UIP premium in emerging markets becomes entirely explained by the VIX and policy uncertainty with no role for capital inflows. There are no overshooting and predictability reversal puzzles, neither for emerging markets or advanced countries, when using exchange rate expectations to calculate the UIP premium. In emerging markets, a transitory increase in interest rate differentials caused by a policy uncertainty shock leads to lower than required expected depreciations over the entire horizon, which creates persistent expected excess returns. In advanced economies, a shock to interest rate differentials leads to a permanent expected depreciation that exactly offsets the shock. Consistent with these dynamic facts, the classical Fama puzzle disappears in advanced economies in expectations, but it remains for emerging markets.

Our results show that, while global investors *expect* zero excess returns and earn actual positive and negative returns by investing in advanced country currencies, the same global investors expect and always earn positive excess returns from emerging market currencies. While the expectational errors are predictable by the interest rate differential in advanced countries, they are not in emerging markets; rather the fact that expected depreciation is always more than the actual depreciation in emerging markets, where neither can offset the interest rate differentials is explained by degree of policy uncertainty. As a result, our interpretation is such that, in emerging markets' UIP premium arises from investors charging an "excess" risk premium to compensate for such policy uncertainty —a premium that is over and above the expected and actual depreciation of these currencies.

Overall, our results have important policy implications. UIP premia constitute the cost of local currency financing relative to foreign currency financing for emerging markets. The fact that such financing costs are high on average and they increase even more during crisis times represents an important new avenue for emerging market monetary and financial policies. There is a recent theory literature suggesting the importance of UIP premium for policy making. Basu, Boz, Gopinath, Roch, and Unsal (2020), in particular, show a key role in smoothing out the UIP premium in the face of risk-on/risk-off shocks to attain optimal policies that maximize welfare in emerging markets. Drenik, Perez, and Kirpalani (2021) develop a model, where policy risk determines the domestic interest rate and, in turn, the endogenous currency choice of borrowing. Understanding the response of UIP premium to shocks and country-specific risks and policies seems to be first order in understanding capital flows related spillovers to emerging markets from advanced countries and hence designing the appropriate policies to deal with such spillovers.

References

Akinci, O., and A. Queralto (2018): "Exchange rate dynamics and monetary spillovers with imperfect financial markets," Staff Reports 849, Federal Reserve Bank of New York.

Alvarez, F., A. Atkeson, and P. J. Kehoe (2009): "Time-Varying Risk, Interest Rates, and Exchange Rates in General Equilibrium," *The Review of Economic Studies*, 76(3), 851–878.

Avdjiev, S., W. Du, C. Koch, and H. S. Shin (2019): "The Dollar, Bank Leverage, and Deviations from Covered Interest Parity," *American Economic Review: Insights*, 1(2), 193–208.

Avdjiev, S., B. Hardy, Şebnem. Kalemli-Özcan, and L. Servén (2018): "Gross Capital Flows by Banks, Corporates and Sovereigns," NBER Working Paper No. 23116.

Bacchetta, P., E. Mertens, and E. van Wincoop (2009): "Predictability in financial markets: What do survey expectations tell us?," *Journal of International Money and Finance*, 28(3), 406–426.

Bacchetta, P., and E. van Wincoop (2010): "Infrequent Portfolio Decisions: A Solution to the Forward Discount Puzzle," *American Economic Review*, 100(3), 870–904.

——— (2019): "Puzzling Exchange Rate Dynamics and Delayed Portfolio Adjustment," Working Paper 26259, National Bureau of Economic Research.

Bacchetta, P., and E. V. Wincoop (2006): "Can Information Heterogeneity Explain the Exchange Rate Determination Puzzle?," *American Economic Review*, 96(3), 552–576.

Backus, D., S. Foresi, and C. Telmer (2001): "Affine Models of Currency Pricing," *Journal of Finance*, 56(1), 279–304.

Baker, S. R., N. Bloom, and S. J. Davis (2016): "Measuring Economic Policy Uncertainty," *The Quarterly Journal of Economics*, 131(4), 1593–1636.

Barrett, P., M. Appendino, K. Nguyen, and J. de Leon Miranda (2020): "Measuring Social Unrest Using Media Reports," *IMF Working Paper*.

Basu, S. S., E. Boz, G. Gopinath, F. Roch, and F. Unsal (2020): "A Conceptual Model for the Integrated Policy Framework," Imf working paper no. 20/121, IMF.

Brunnermeier, M. K., S. Nagel, and L. H. Pedersen (2009): "Carry Trades and Currency Crashes," in *NBER Macroeconomics Annual 2008, Volume 23*, NBER Chapters, pp. 313–347. National Bureau of Economic Research, Inc.

Bruno, V., and H. S. Shin (2015): "Capital flows and the risk-taking channel of monetary policy," *Journal of Monetary Economics*, 71, 119 – 132.

Burnside, C., M. Eichenbaum, I. Kleshchelski, and S. Rebelo (2011): "Do Peso Problems Explain the Returns to the Carry Trade?," *The Review of Financial Studies*, 24(3), 853–891.

Burnside, C., M. Eichenbaum, and S. Rebelo (2007): "The Returns to Currency Speculation in Emerging Markets," *The American Economic Review*, 97(2), 333–338.

——— (2008): "Carry Trade: The Gains of Diversification," *Journal of the European Economic Association*, 6(2-3), 581–588.

Bussiere, M., M. D. Chinn, L. Ferrara, and J. Heipertz (2018): "The New Fama Puzzle," Working Paper 24342, National Bureau of Economic Research.

Candian, G., and P. De Leo (2021): "Imperfect Exchange Rate Expectations," Working paper, Mimeo.

Chinn, M. (2006): "The (partial) rehabilitation of interest rate parity in the floating rate era: Longer horizons, alternative expectations, and emerging markets," *Journal of International Money and Finance*, 25(1), 7–21.

Chinn, M., and J. Frankel (1999): "More survey data on exchange rate expectations: More currencies, more horizons, more tests," International Finance 9508003, Monetary Policy, Capital Flows and Financial Market Developments in the Era of Financial Globalisation: Essays in Honour of Max Fry, edited by Bill Allen and David Dickinson.v.

Chinn, M., and J. Frankel (2016): "A quarter century of currency expectations data: Interest rate parity and the risk premium," Discussion paper, Mimeo.

Chinn, M. D., and G. Meredith (2005): "Testing Uncovered Interest Parity at Short and Long Horizons during the Post-Bretton Woods Era," Working Paper 11077, National Bureau of Economic Research.

Chinn, M. D., and S. Quayyum (2012): "Long Horizon Uncovered Interest Parity Re-Assessed," Working Paper 18482, National Bureau of Economic Research.

Colacito, R., and M. Croce (2013): "International Asset Pricing with Recursive Preferences," *The Journal of Finance*, 68(6), 2651–2686.

Devereux, M. B., and C. Engel (2002): “Exchange rate pass-through, exchange rate volatility, and exchange rate disconnect,” *Journal of Monetary Economics*, 49(5), 913 – 940.

Dominguez, K. M. (1986): “Are foreign exchange forecasts rational?: New evidence from survey data,” *Economics Letters*, 21(3), 277 – 281.

Dornbusch, R. (1976): “Expectations and Exchange Rate Dynamics,” *Journal of Political Economy*, 84(6), 1161–76.

Drenik, A., D. Perez, and R. Kirpalani (2021): “Currency Choices in Contracts,” Discussion Paper 832, Mimeo.

Du, W., and J. Schreger (2021): “CIP Deviations, the Dollar, and Frictions in International Capital Markets„” *Handbook of International Economics*, 5.

Du, W., A. Tepper, and A. Verdelhan (2018): “Deviations from Covered Interest Rate Parity,” *The Journal of Finance*, 73(3), 915–957.

Eichenbaum, M., and C. Evans (1995): “Some Empirical Evidence on the Effects of Shocks to Monetary Policy on Exchange Rates,” *The Quarterly Journal of Economics*, 110(4), 975–1009.

Engel, C. (2014): “Exchange Rates and Interest Parity,” in *Handbook of International Economics*, vol. 4, chap. Chapter 8, pp. 453–522. Elsevier.

——— (2016): “Exchange Rates, Interest Rates, and the Risk Premium,” *American Economic Review*, 106(2), 436–74.

Engel, C., and S. P. Y. Wu (2018): “Liquidity and Exchange Rates: An Empirical Investigation,” Working Paper 25397, National Bureau of Economic Research.

Evans, M. D., and R. K. Lyons (2008): “How is macro news transmitted to exchange rates?,” *Journal of Financial Economics*, 88(1), 26 – 50.

Fama, E. F. (1984): “Forward and spot exchange rates,” *Journal of Monetary Economics*, 14(3), 319 – 338.

Farhi, E., and X. Gabaix (2016): “Rare Disasters and Exchange Rates,” *The Quarterly Journal of Economics*, 131(1), 1–52.

Forbes, K. J., and F. E. Warnock (2012): “Capital flow waves: Surges, stops, flight, and retrenchment,” *Journal of International Economics*, 88(2), 235–251, NBER Global.

Frankel, J. A., and K. A. Froot (1987): “Understanding the U.S. Dollar in the Eighties: The Expectations of Chartists and Fundamentalists,” Working Paper 957, National Bureau of Economic Research.

Froot, K. A., and J. Frankel (1989): “Forward Discount Bias: Is it an Exchange Risk Premium?,” *The Quarterly Journal of Economics*, 104(1), 139–161.

Gabaix, X., and M. Maggiori (2015): “International Liquidity and Exchange Rate Dynamics,” *The Quarterly Journal of Economics*, 130(3), 1369–1420.

Giovanni, J. d., S. Kalemli-Ozcan, M. F. Ulu, and Y. S. Baskaya (2019): “International Spillovers and Local Credit Cycles,” Working Paper 23149, National Bureau of Economic Research.

Gopinath, G., and J. C. Stein (2018): “Banking, Trade, and the making of a Dominant Currency,” Working Paper 24485, National Bureau of Economic Research.

Gourinchas, P.-O., and A. Tornell (2002): “Exchange Rate Dynamics, Learning and Misperception,” Working Paper 9391, National Bureau of Economic Research.

Hansen, L. P., and R. J. Hodrick (1980): "Forward Exchange Rates as Optimal Predictors of Future Spot Rates: An Econometric Analysis," *Journal of Political Economy*, 88(5), 829–853.

Hassan, T., and R. C. Mano (2019): "Forward and Spot Exchange Rates in a Multi-currency World," *Quarterly Journal of Economics*, 134(1), 397–450.

Hassan, T., J. Schreger, M. Schwedeler, and A. Tahoun (2021): "Country Risk," Working Paper Series 157, Institute for New Economic Thinking.

Hassan, T. A. (2013): "Country Size, Currency Unions, and International Asset Returns," *Journal of Finance*, 68(6), 2269–2308.

Hau, H., and H. Rey (2005): "Exchange Rates, Equity Prices, and Capital Flows," *The Review of Financial Studies*, 19(1), 273–317.

Ilzetzki, E., C. M. Reinhart, and K. S. Rogoff (2017): "The Country Chronologies to Exchange Rate Arrangements into the 21st Century: Will the Anchor Currency Hold?," NBER Working Papers 23135, National Bureau of Economic Research, Inc.

Ito, H., and M. Chinn (2007): "Price-Based Measurement of Financial Globalization: A Cross-Country Study of Interest Rate Parity," *Pacific Economic Review*, 12(4), 419–444.

Ito, T. (1990): "Foreign Exchange Rate Expectations: Micro Survey Data," *American Economic Review*, 80(3), 434–49.

Itskhoki, O., and D. Mukhin (2017): "Exchange Rate Disconnect in General Equilibrium," Working Paper 23401, National Bureau of Economic Research.

Jiang, Z., A. Krishnamurthy, and H. Lustig (2021): "Foreign Safe Asset Demand and the Dollar Exchange Rate," *The Journal of Finance*.

Kalemli-Özcan, c. (2019): "U.S. Monetary Policy and International Risk Spillovers," NBER Working Papers 26297, National Bureau of Economic Research, Inc.

Kouri, P. J. (1981): "Balance of Payments and the Foreign Exchange Market: A Dynamic Partial Equilibrium Model," Working Paper 644, National Bureau of Economic Research.

Kremens, L., and I. Martin (2019): "The Quanto Theory of Exchange Rates," *American Economic Review*, 109(3), 810–43.

Lilley, A., M. Maggiori, B. Neiman, and J. Schreger (2019): "Exchange Rate Reconnect," Working Paper 26046, National Bureau of Economic Research.

Lustig, H., N. Roussanov, and A. Verdelhan (2011): "Common Risk Factors in Currency Markets," *The Review of Financial Studies*, 24(11), 3731–3777.

Lustig, H., A. Stathopoulos, and A. Verdelhan (2019): "The Term Structure of Currency Carry Trade Risk Premia," *American Economic Review*, 109(12), 4142–77.

Lustig, H., and A. Verdelhan (2006): "Investing in Foreign Currency is Like Betting on Your Intertemporal Marginal Rate of Subsitution," *Journal of the European Economic Association*, 4(2-3), 644–655.

——— (2007): "The Cross Section of Foreign Currency Risk Premia and Consumption Growth Risk," *American Economic Review*, 97(1), 89–117.

Miranda-Agrippino, S., and H. Rey (2020): "U.S. Monetary Policy and the Global Financial Cycle," *The Review of Economic Studies*, rdaa019.

Plagborg-Møller, M., and C. K. Wolf (2021): "Local Projections and VARs Estimate the Same Impulse Responses," *Econometrica*, 89(2), 955–980.

Rey, H. (2013): "Dilemma not trilemma: the global cycle and monetary policy independence," *Proceedings - Economic Policy Symposium - Jackson Hole*, pp. 1–2.

Salomao, J., and L. Varela (2021): "Exchange Rate Exposure and Firm Dynamics," *The Review of Economic Studies*, Forthcoming.

Sarno, L., and M. Schmeling (2014): "Which Fundamentals Drive Exchange Rates? A Cross-Sectional Perspective," *Journal of Money, Credit and Banking*, 46(2-3), 267–292.

Sarno, L., P. Schneider, and C. Wagner (2012): "Properties of foreign exchange risk premiums," *Journal of Financial Economics*, 105(2), 279–310.

Siemer, M., A. Verdelhan, and F. Gourio (2015): "Uncertainty and International Capital Flows," 2015 Meeting Papers 880, Society for Economic Dynamics.

Stavrakeva, V., and J. Tang (2018): "Survey-based Exchange Rate Decomposition: New Methodology and New Facts," Discussion paper, Mimeo.

Valchev, R. (2020): "Bond Convenience Yields and Exchange Rate Dynamics," *American Economic Journal: Macroeconomics*, 12(2), 124–66.

Appendix A Data

In this section, we first present in detail the source of the data used in this paper and the construction of the individual series. We then provide further details about the Consensus Forecast data on exchange rate expectations.

Appendix A.1 Source of Data and Construction of Individual Series

Table A1 lists variables that we employ in this paper. We obtain spot exchange rate from IMF International Financial Statistics (IFS). IFS provides both period end and period average of daily exchange rates for monthly, quarterly, and yearly frequency.

We collect market interest rates (treasury bill, money market, and deposit rate) from the Bloomberg terminal. We choose interbank offered rate as a money market rate. For a given country and an interest rate, there are various tickers in Bloomberg. We choose the most reliable and long-spanning ticker after checking whether interest rates are in annual percentage rate with the same maturity and denominated in local currency. Interest rates are with maturities of 1, 3, and 12 months in the dataset. As Bloomberg provides daily values for most series, we can get both period end and period average for monthly, quarterly, and yearly frequency. When interest rates are missing from Bloomberg, we obtain data from IMF IFS. Though IFS usually gives interest rates with mixed maturities, some series are with fixed maturity. We refer to country notes of IFS database to check whether the interest rate is of the same maturity, denominated in local currency and calculated as period end or average of daily values. If the series has the same characteristics in all these criteria, we add that series to our database. For some interest rate series, only period end of period average data is available.

Exchange rate forecasts are available only at the end of period. Consensus forecast (mean average) at 1 month, 3 months, 12 months, and 24 months from the survey date. More precisely, the survey form which is usually received on the Survey Date (often the second Monday of the survey month), requests forecasts at the end of the month at 1 month, 3 months, 12 months and 24 months. Thus the forecast periods may be slightly longer than these monthly horizons.

Capital inflows by sector (banks, sovereigns, and corporates) are obtained directly from Avdjiev, Hardy, Kalemli-Özcan, and Servén (2018). Capital inflows are available at quarterly and yearly frequency. Aggregate variables including GDP and current account are downloaded from IMF IFS. For real and nominal GDP and industrial production, we get both non-seasonally-adjusted and seasonally-adjusted data.

Forward rates come from Bloomberg. After downloading forward rates, we convert data into unit of local currency per US dollar. Daily forward rates are available. We download monthly, quarterly, and yearly data for both period end and average of daily values . We get exchange rate forecasts from Consensus Economics. We convert forecasts into local currency per US dollar forecasts using appropriate currency forecasts. We get Emerging Markets Bond Index (EMBI global) from J.P. Morgan. We employ the exchange rate regime classification by Ilzetzki, Reinhart, and Rogoff (2017) to exclude countries with fixed exchange rate regimes.

We proxy global risk with the VIX, which is obtained from Federal Reserve Economic Data (FRED). We obtain detailed information about policy risk from the International Country Risk Guide (ICRG). The International Country Risk Guide (ICRG) rating comprises 22 variables in three subcategories of risk: political, financial, and economic. We normalize these risk indices x using the following formula: $-(x-\mu_x)/\sigma_x$ where μ_x is the mean and σ_x is the standard deviation of a variable x in a full sample. We add the minus sign so that higher normalized indices mean higher risk.

Our sample consists of 12 currencies of advanced economies and 22 of emerging markets over the period 1996m11 and 2018m12. Table A2 presents the sample of countries and Table A3 the summary statistics of the main variables used in this paper.

Table A1: List of Variables

Variable	Description	Frequency	Source
Spot exchange rate	local currency/US dollar, period end and average	month / quarter / year	IMF IFS
Interest rates:			
Treasury bill rate	annual percentage rate, denominated in local currency,		
Money market rate	maturity: 1, 3, 12 month, period end and average	month / quarter / year	Bloomberg, IMF IFS
Deposit rate			
Capital inflows	capital inflows by sector	quarter / year	Avdjiev, Hardy, Kalemli-Özcan, and Servén (2018)
Aggregate variables:			
GDP	local currency (million), real and nominal, non-seasonally-adjusted and seasonally-adjusted series	quarter / year	
Industrial production	index 2010=100, non- and seasonally-adjusted series	month / quarter / year	
Consumer price index	2010=100	month / quarter / year	
Producer price index	2010=100	month / quarter / year	IMF IFS
GDP deflator	2010=100, non- and seasonally-adjusted series	quarter / year	
Current account	million US dollars	quarter / year	
Capital account	million US dollars	quarter / year	
Forward Rates	local currency/US dollar, maturity: 1, 3, 12 month, period end and average	month / quarter / year	Bloomberg
Exchange rate forecasts	local currency/US dollar, period end, forecast horizon: 1, 3, 12, 24 month	month / quarter / year	Consensus Economics
VIX	Chicago Board Options Exchange volatility index	month / quarter / year	FRED
EMBI	Emerging Markets Bond Index (EMBI global)	month	J.P. Morgan
Country Risk	22 variables in three subcategories of risk: political, financial, and economic.	month / year	ICRG
Exchange Rate Regime	Exchange Rate Regime Coarse Classification (1–6)	month / year	Ilzetzki, Reinhart, and Rogoff (2017)

Table A2: List of Currencies

Advanced Economies (1)	Emerging Markets (2)
Australia	Argentina
Canada	Brazil
Denmark	Chile
Euro	China, P.R.: Mainland
Germany	Colombia
Israel	Czech Republic
Japan	Hungary
New Zealand	India
Norway	Indonesia
Sweden	Republic of Korea
Switzerland	Malaysia
United Kingdom	Mexico
	Peru
	Philippines
	Poland
	Romania
	Russian Federation
	Slovak Republic
	South Africa
	Thailand
	Turkey
	Ukraine

Notes: 34 currencies, 12 Advanced Economies and 22 Emerging Markets. Period 1996m11-2018m12.

Table A3: Summary Statistics: All Countries

	Mean	Median	Std. Dev.	p25	p75
Log(VIX)	2.934	2.892	0.356	2.653	3.173
EPU	99.074	76.681	86.299	47.049	124.603
Composite Risk	-0.689	-0.694	0.583	-1.104	-0.265
Government Policy Risk	-0.640	-0.667	0.706	-1.266	-0.167
Confidence Risk	-0.674	-0.772	0.873	-1.411	0.080
Capital Inflows/GDP	0.065	0.023	0.431	-0.002	0.062

Notes: 34 currencies, 22 Emerging Markets, 12 Advanced Economies. Period 1996m11:2018m12. Source: Consensus Forecast, Bloomberg, FRED, IMF, ICRG.

Interest Rates for UIP Calculation

We obtain interest rates to calculate the UIP deviations as follows. First, we replace deposit rates with money market rates of the same maturity if the data coverage for deposit rates is shorter than 5 years in a given country. If the data coverage for market rates is shorter than 5 years in a given country, we replace deposit rates with government bond rates of the same maturity in a given country. Table A4 shows country-year observations of deposit rates that are replaced with money market rates or government bond rates.

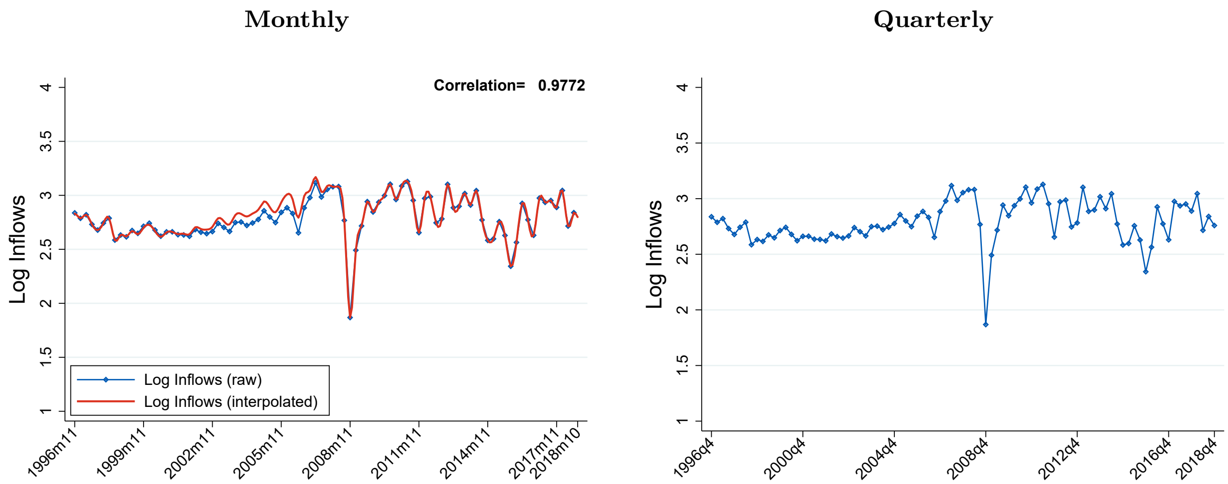
Table A4: Replaced Deposit Rates: Country-year Observations (1996-2018)

Country	Year	Country	Year
Austria	2008-14	Ireland	1999-2016
Canada	1996-2005, 2007-18	Italy	1996, 2014-16
Chile	2001-18	South Korea	2004-18
Colombia	2001-18	Netherlands	2001-14
Finland	1999, 2005-14	Portugal	2002-16
France	1996, 2000-16	Spain	1996-2015
Germany	1996, 2000-14		

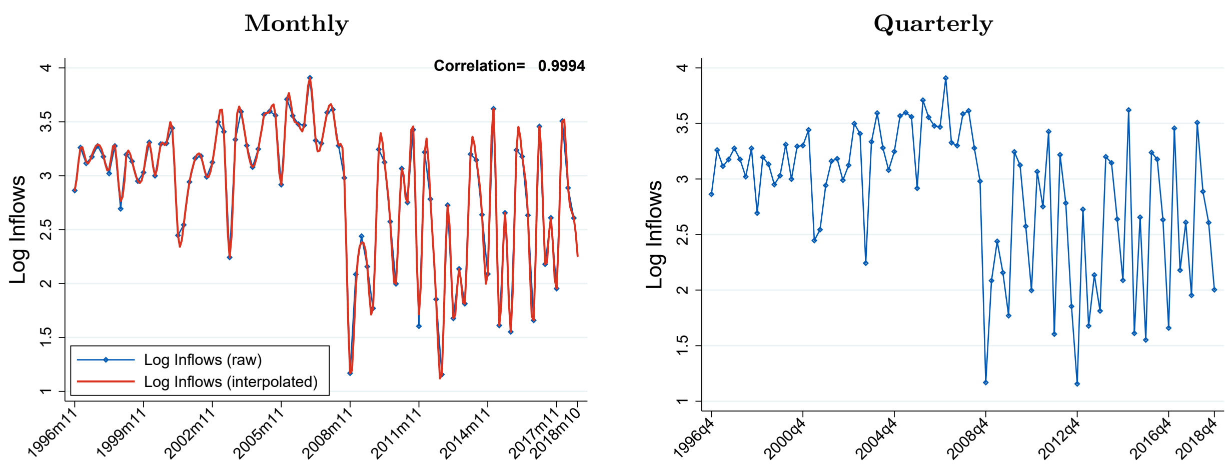
Interpolation of Quarterly Capital Flows

We interpolate quarterly capital flows to get monthly flows using a cubic spline built in Stata. More precisely, we use the following Stata command: `by id: mipolate 'var' date , gen('var'i) spline`, where `id` is country group, `'var'` is flows data, and `date` is a variable denoting months. The interpolated flows are generated with a variable name `'var'i`. This Stata module can be installed by using the command `ssc install mipolate`. Before running this command, quarterly flows are imported into the median month of each quarter. For example, the first quarter flows are imported into February, which is the median month of the first quarter. Then, the command fills remaining empty months with a cubic spline interpolation.

We plot averages of raw data and interpolated data across advanced economies and emerging markets in Figure A1. We plot both raw quarterly flows (blue solid line with diamond labels) and monthly flows interpolated using raw quarterly flows (red solid line). We find that interpolated monthly flows closely track raw quarterly flows with small deviations (the correlation between these two series is 0.99).



(a) Emerging Markets



(b) Advanced Economies

Figure A1: Average Capital Inflows: Raw vs. Interpolated Data

Note: This figure present the interpolation of capital inflows at monthly frequency for advanced economies and emerging markets.

Appendix A.2 Consensus Forecasts

This section provides additional descriptive statistics about the Consensus Forecasts database. Table A5 presents the average number of forecasters per year for currencies of advanced economies and emerging markets, separately. As shown in this table, the number of forecasters surveyed is vast in both set of economies, albeit it is smaller in emerging markets. Table A6 reports the average number of forecasters for each country across time.

Table A5: Number of Forecasters in Consensus Forecasts (all years)

	Advanced Economies (1)	**Emerging Markets** (2)
1996	62	26
1997	63	21
1998	54	14
1999	58	13
2000	57	15
2001	53	14
2002	55	13
2003	58	15
2004	59	16
2005	62	16
2006	61	16
2007	58	15
2008	57	16
2009	50	15
2010	50	17
2011	52	17
2012	56	17
2013	54	16
2014	53	16
2015	54	17
2016	43	19
2017	43	18
Mean	55	17

Notes: 34 currencies, 22 Emerging Markets, 12 Advanced Economies.
Source: Consensus Forecast.

Table A7 presents examples of the main forecasters for the Euro, Yen, UK Pound, Korean Won, Turkish Lira and other emerging markets in September 2012. This table shows that the forecasters surveyed for emerging markets' currencies were also top forecasters in advanced economies. It is worth mentioning that our database does not provide information on individual forecast series and does not indicate which forecasters were surveyed. We collect this information from printed monthly reports created by Consensus Forecasts. These reports provide some examples of forecasters for main currencies, but they do not provide a complete list of forecasters for each currency. As such, the information about individual foresters in Table A7 is only illustrative. For this reason, the empty cells in Table A7 indicate the absence of information about whether the forecaster was surveyed for that currency and, hence, they do *not* indicate that the forecaster was *not* surveyed for that currency. It could easily be the case that the forecaster was also surveyed, but we do not know it.

Table A6: Number of Forecasters By Currency

Average Number of Forecasters			
Advanced Economies		**Emerging Markets**	
Australia	37	Argentina	11
Canada	77	Brazil	13
Denmark	25	Chile	12
Euro Area	101	China, P.R.: Mainland	26
Germany	107	Colombia	10
Israel	11	Czech Republic	12
Japan	98	Hungary	11
New Zealand	31	India	20
Norway	24	Indonesia	23
Sweden	30	Republic of Korea	23
Switzerland	27	Malaysia	24
United Kingdom	84	Mexico	12
		Peru	9
		Philippines	17
		Poland	11
		Romania	8
		Russian Federation	11
		Slovak Republic	9
		South Africa	22
		Thailand	24
		Turkey	23
		Ukraine	4
Average 1996-2018	55		17

Notes: 34 currencies, 22 Emerging Markets, 12 Advanced Economies. Source: Consensus Forecast.

Table A7: Example: Main Forecasters in Advanced Economies and Emerging Markets, September 2012

Advanced Economies			**Emerging Markets**		
Euro	**Yen**	**UK Pound**	**Korean Won**	**Turkish Lira**	**Other EMs***
(1)	(2)	(3)	(4)	(5)	(6)
Goldman Sachs	Goldman Sachs	Goldman Sachs	Goldman Sachs	Goldman Sachs	Goldman Sachs
HSBC	HSBC	HSBC	HSBC	HSBC	HSBC
General Motors	General Motors	General Motors	General Motors	General Motors	General Motors
ING Financial Markets	ING Financial Markets	ING Financial Markets	ING Financial Markets		ING Financial Markets
BNP Paribas	BNP Paribas	BNP Paribas		BNP Paribas	BNP Paribas
JP Morgan	JP Morgan	JP Morgan	JP Morgan	JP Morgan	JP Morgan
Allianz	Allianz	Allianz			Allianz
Oxford Economics	Oxford Economics	Oxford Economics		Oxford Economics	Oxford Economics
Morgan Stanley	Morgan Stanley	Morgan Stanley		Morgan Stanley	Morgan Stanley
Bank of Tokio Mitsubishi	Bank of Tokio Mitsubishi	Bank of Tokio Mitsubishi	Bank of Tokio Mitsubishi	Bank of Tokio Mitsubishi	Bank of Tokio Mitsubishi
Credit Suisse	Credit Suisse	Credit Suisse		Credit Suisse	
Citigroup	Citigroup	Citigroup	Citigroup	Citigroup	Citigroup
Societe Generale	Societe Generale	Societe Generale		Societe Generale	Societe Generale
Royal Bank of Canada	Royal Bank of Canada	Royal Bank of Canada			Royal Bank of Canada
Royal Bank of Scotland	Royal Bank of Scotland	Royal Bank of Scotland			Royal Bank of Scotland
ABN Amro	ABN Amro	ABN Amro			ABN Amro
Barclays Capital	Barclays Capital	Barclays Capital		Barclays Capital	Barclays Capital
Commerzbank	Commerzbank	Commerzbank			Commerzbank
UBS	UBS	UBS	UBS	UBS	UBS
IHS Global Insight	IHS Global Insight	IHS Global Insight	IHS Global Insight	IHS Global Insight	IHS Global Insight
Nomura Securities	Nomura Securities	Nomura Securities	Nomura Economics	Nomura Securities	Nomura Securities
			Macquarie Capital		Macquarie Capital
			ANZ Bank		ANZ Bank

Notes: *Other emerging market currencies' include: Argentinean Peso, Brazilian Real, Chilean Peso, Chinese Renminbi, Colombian Peso, Czech Koruna, Hungarian Forint, Indian Rupee, Indonesian Rupiah, Malaysian Ringgit, Mexican Peso, Peruvian Sol, Polish Zloty, Romanian Leu, Russian Rouble, South African Rand, Ukrainian HRYVNIA. Note that non-filled cells indicate the absence of information about whether the forecaster was surveyed for that currency (i.e. they do *not* indicate that the forecaster was not surveyed for that currency). Source: Consensus Forecast.

Appendix A.3 Economic Policy Uncertainty Index

We construct the EPU index following the methodology of Baker, Bloom, and Davis (2016). In particular, we use the online platform Factiva, which reports journal articles of main international newspapers. We employ the same search procedure as Baker, Bloom, and Davis (2016). Our list of words contains 218 words and follows closely theirs. Since Baker, Bloom, and Davis (2016) list of words is mostly conceived for advanced economies, we include four additional words to better capture policy uncertainty characteristics in emerging markers (i.e. capital controls, expropriation, nationalization and corruption). We report below the list of words used in this paper.

Because we are interested in the perspective of the U.S. international investor, we focus on news reported in international newspapers (see below the complete list of newspapers). Given the lower availability of international newspapers, we follow the methodology of Barrett, Appendino, Nguyen, and de Leon Miranda (2020) to construct our EPU index. This methodology adds total number of articles in a country and pools all the newspapers together for each country.[41] More precisely, define X_{it} the number of articles referring to EPU episodes in country i at time t, Y_{it} total number of articles referring to country i at time t, and $Y_t = \sum_i Y_{it}$ the total number of articles written at each time t (i.e. the sum of articles across countries). We replicate Barrett, Appendino, Nguyen, and de Leon Miranda (2020) index as follows

$$EPU_{it} = \frac{X_{it}}{\frac{1}{12}\sum_{j=1}^{12} Y_{t-j}}$$

where $X_i = \frac{1}{T}\sum_{t=1}^{T} X_{it}$ and $Y = \frac{1}{T}\sum_{t=1}^{T} Y_t$. We normalize the index to 100 by estimating

$$EPU_{it}^{N} = \frac{EPU_{it}}{\overline{EPU}_i} \times 100,$$

where $\overline{EPU}_i = \frac{1}{T}\sum_{t=1}^{T} EPU_{it}$ is the average of EPU news for each country across time. We construct the monthly EPU for the Euro area as follows. We use real GDP data for France, Germany, Greece, Italy and Spain. This real GDP is expressed in local currency and it is reported at a quarterly frequency. Prior to 2000, we transform this real GDP measures to US dollars using the observed average exchange rate in the quarter. From 2000 onward, we assume that all countries use the euro as the relevant currency, so that there is no need for us to convert them to a common currency. We linearly interpolate the real GDP of each country to get GDP at a monthly frequency. As a result, we can aggregate GDP across countries in the eurozone to construct a GDP measure for the entire eurozone. We then construct the Euro Area EPU Index as $EPU_t = \sum_{i=1}^{N} \omega_{it} EPU_{it}$, where

[41] The difference with Baker, Bloom, and Davis (2016) is that their index includes a non minor proportion of local newspapers. Higher heterogeneity across newspapers allows them to first compute the share of news for each individual newspaper within a country and then add up the total sum for each country. In other words, they do not pool all articles within a country together.

$\omega_{it} = RGDP_{it} / \sum_{i=1}^{N} RGDP_{it}$ is the share of the eurozone GDP accounted for by country i, EPU_{it} is the EPU index for country i at time t, and N is the number of countries in the eurozone for which we observe a value for EPU_{it} and their GDP.

List of Words

Our list of words from comes from Baker, Bloom, and Davis (2016). In particular, we use the following list of words from their list: tax, taxation, taxes, policy, government spending, federal budget, budget battle, balanced budget, defense spending, defence spending, military spending, entitlement spending, fiscal stimulus, budget deficit, federal debt, national debt, debt ceiling, fiscal footing, government deficit, fiscal policy, federal reserve, the fed, money supply, open market operations, quantitative easing, monetary policy, fed funds rate, overnight lending rate, the fed, Bernanke, Volker, Greenspan, central bank, interest rates, fed chairman, fed chair, lender of last resort, discount window, central bank, monetary policy, health care, health insurance, prescription drugs, drug policy, medical insurance reform, medical liability, , national security, war, military conflict, terrorism, terror, 9/11, armed forces, base closure, military procurement, military embargo, no-fly zone, military invasion, terrorist attack, banking (or bank) supervision, thrift supervision, financial reform, basel, capital requirement, bank stress test, deposit insurance, union rights, card check, collective bargaining law, minimum wage, closed shop, workers compensation, advance notice requirement, affirmative action, overtime requirements, antitrust, competition policy, merger policy, monopoly, patent, copyright, unfair business practice, cartel, competition law, price fixing, healthcare lawsuit, tort reform, tort policy, punitive damages, medical malpractice, energy policy, energy tax, carbon tax, drilling restrictions, offshore drilling, pollution controls, environmental restrictions, immigration policy, illegal immigration, sovereign debt, currency crisis, currency crises, currency crash, crisis, crises, reserves, tariff, trade, devaluation, capital controls, expropriation, nationalization, corruption

The list of words used in Baker, Bloom, and Davis (2016) is mostly conceived for advanced economies. To better capture that policy uncertainty characteristics of emerging markers, we include five additional words: capital controls, expropriation, nationalization and corruption.

List of Newspapers

We include the following newspapers: ABC Network, Agence France Presse, BBC, The Boston Globe, CBS Network, Chicago Tribune, Financial Times, The Globe and Mail, Houston Chronicle, Los Angeles Times, NBC Network, The New York Times, The San Francisco Chronicle, The Telegraph (U.K), The Wall Street Journal, The Times (U.K), USA Today, Washington Post, Reuters, The Dallas Morning News, The Miami Herald, The Guardian (U.K), and The Economist.

Appendix A.4 ICRG: Composite and Political Risks

Our measures of composite and policy risks come from the International Country Risk Guide (ICRG) dataset which provides data on country's political, economic and financial risks for more than than 140 countries at monthly frequency. We describe below the definition of each variable used in the paper and then present the correlation of the sub-components of political risk with the UIP premium.

A.4.1 Definition of Variables

In our analysis, we employ the composite risk variable to proxy for overall country risk – political, economic and financial risks–, and socioeconomic conditions to capture confidence risk. We pool investment profile and democratic accountability together to measure government policy risk (i.e. the average of both variables). Additionally, we use separately investment profile to proxy for expropriation risk and democratic accountability to capture anti-democratic risk. We describe below all the variables in detail.

-*Composite risk*. It is a composite of political, financial and economic risk. Political risk contributes 50% of the composite rating, while financial and economic risk ratings each contribute 25%. Political risk has 12 components and the assessment is made on the basis of subjective analysis of the available information. Financial and economic risk each have five components and their assessments are made solely on the basis of objective data. The components of political, economic and financial risks are:

-<u>Political risk</u>: government stability*, socioeconomic conditions*, investment profile*, internal conflict*, external conflict*, democratic accountability$^+$, corruption$^+$, military in politics$^+$, religious tensions$^+$, law and order$^+$, ethnic tensions$^+$, and bureaucracy quality. The components with $*$ are given up to 12 points and, hence, have a higher weight, the components with $^+$ are given up to 6 points, and the last component (bureaucracy quality) is given only 4 points.

- Government stability: this index assesses both of the government's ability to carry out its declared programs, and its ability to stay in office. It has three subcomponents that describe government unity, legislative strength and popular support.

- Socioeconomic conditions: this index assesses the socioeconomic pressures at work in society that could constrain government action or fuel social dissatisfaction. It has three subcomponents: unemployment, consumer confidence and poverty.

- Investment profile: this index assesses factors affecting the risk to investment that are not covered by other political, economic and financial risk components. It has three components: contract viability/expropriation, profits repatriation and payment delays.

- Internal conflict: assesses political violence in the country and its actual or potential impact on governance. The subcomponents are: civil war/coup threat, terrorism/political violence and civil disorder.

- External conflict: this index is an assessment both of the risk to the incumbent government from foreign action, ranging from non-violent external pressure (diplomatic pressures, withholding of aid, trade restrictions, territorial disputes, sanctions, etc) to violent external pressure (cross-border conflicts to all-out war). External conflicts can adversely affect foreign business in many ways, ranging from restrictions on operations to trade and investment sanctions, to distortions in the allocation of economic resources, to violent change in the structure of society. The subcomponents are: war, cross-border conflict and foreign pressures.

- Democratic accountability: it is a measure of how responsive and accountable government is to its people. As such, it captures the degree of freedom that a government has to impose policies to its own advantage. It evaluates several types of government from more to less democratic, considering whether it is alternating democracy, dominated democracy, de facto one-party state, de jure one-party state, and autarchy.

- Corruption: assessment of corruption within the political system. Such corruption is a threat to foreign investment for several reasons: it distorts the economic and financial environment; it reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability; and, last but not least, introduces an inherent instability into the political process. The measure considers financial corruption in the form of demands for special payments and bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or loans. It also considers potential corruption in the form of excessive patronage, nepotism, job reservations, 'favor-for-favors', secret party funding, and suspiciously close ties between politics and business.

- Military in politics: considers involvement of militaries in politics,

- Religious tensions: measures the relevance of a single religious group that seeks to replace civil law by religious law and to exclude other religions from the political and/or social process; the desire of a single religious group to dominate governance; the suppression of religious freedom; the desire of a religious group to express its own identity, separate from the country as a whole.

- Law and order: this refers to the strength and impartiality of the legal system and the popular observance of the law.

- Ethnic tensions: refers to the degree of tension within a country attributable to racial, nationality, or language divisions.

- Bureaucracy quality: measures the strength and quality of the bureaucracy. High points are given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services.

-Economic risk: it includes GDP per capita, real GDP growth, inflation rate, budget balance over GDP, current account over GDP.

-Financial risk: it includes foreign debt over GDP, foreign debt service over exports of goods and services, current account over exports of goods and services, net international liquidity as months of import cover, exchange rate stability.

Eurozone ICRG Risk Variable Construction. We construct a monthly eurozone ICRG risk indexes as follows. We use real GDP data for the 19 countries that compose the eurozone. This real GDP is expressed in local currency and it is reported at a quarterly frequency. Prior to 2000, we transform this real GDP measures to US dollars using the observed average exchange rate in the quarter. From 2000 onward, we assume that all countries in the Eurozone use the Euro as the relevant currency, so that there is no need for us to convert them to a common currency. We linearly interpolate the real GDP of each country to get GDP at a monthly frequency. As a result, we can aggregate GDP across countries in the eurozone to construct a GDP measure for the entire Eurozone. We then construct the Eurozone Composite Risk Index as

$$ECR_t = \sum_{i=1}^{N_t} \omega_{it} CR_{it},$$

where $\omega_{it} = RGDP_{it} / \sum_{i=1}^{N_t} RGDP_{it}$ is the share of the Eurozone GDP accounted for by country i, CR_{it} is the ICRG risk index for country i at time t, and N_t is the number of countries in the eurozone for which we observe a value for CR_{it} and their GDP. This latter number can change over time due to reporting issues. However, starting in 1999 all 19 countries in the eurozone have information on both their GDP and the composite risk index.

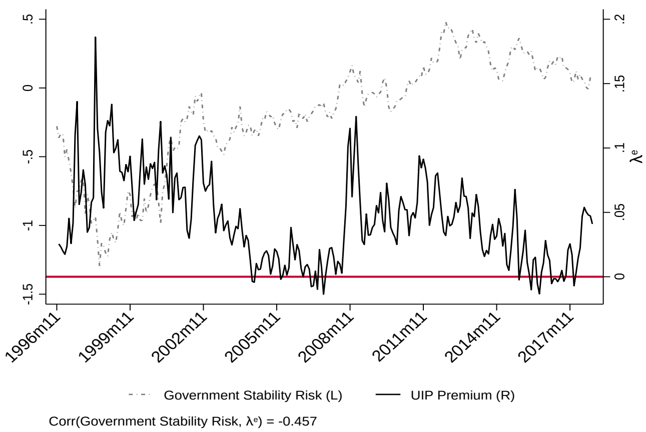
A.4.2 Correlation of Sub-Components of Political Risk and UIP Premium in Emerging Markets

Section 6 focused on two main determinants of political risk correlated with the UIP premium in emerging markets, namely government policy risk (composed by anti-democratic and expropriation risks) and confidence risk. In this section, we present the correlation of other sub-components of political risk with the UIP premium (for emerging markets) not directly employed in this paper, and show that these correlations have usually the wrong (negative) sign and are typically small.[42]

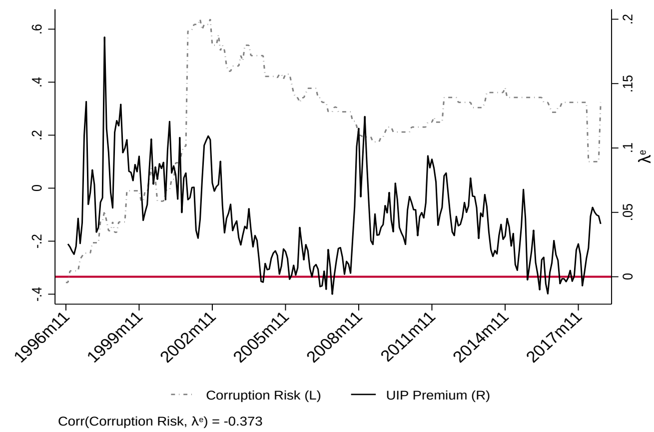
As detailed above, the other sub-components of political risk reported in the ICRG data and not directly used in the paper are: government stability, corruption, external conflict, internal conflict, military in politics, religious tensions, law and order, ethnic tensions and bureaucracy quality. Figure A2 presents the correlation of the UIP premium with each of this components. The correlation with these other subcomponents is usually small and sometimes has the opposite sign. For example, it is interesting to note on the correlation with government stability risk (panel a), which has the wrong sign (negative). This sub-component captures government unity and legislative strength and, hence, is quite different from from our government policy risk variable (which captures expropriation risk). Other examples are sub-components of political risk are: corruption, law and order, religious tensions, bureaucracy quality and ethnic tensions (panels b, c, d, e and f), which have less time-series variation and are negatively correlated with the UIP premium.

Therefore, these figures indicate that these sub-components capture elements of political risk that are not significantly related to foreign investors' risk sentiments, and thus do not significantly correlate with the UIP premium in emerging markets.

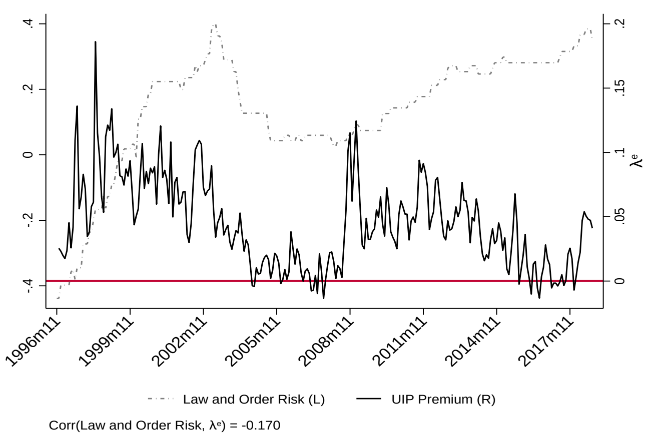
[42]Recall that the correlation of the UIP premium with government policy and confidence risk was presented in Figure 12, and the its correlation with anti-democratic and expropriation risks was reported in Figure B.1.



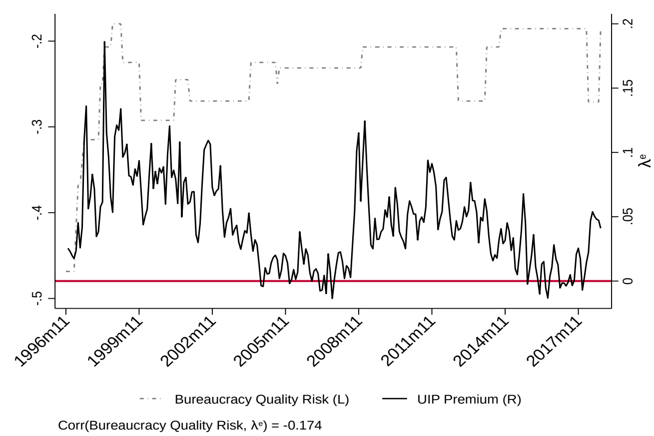
A) Government Stability Risk



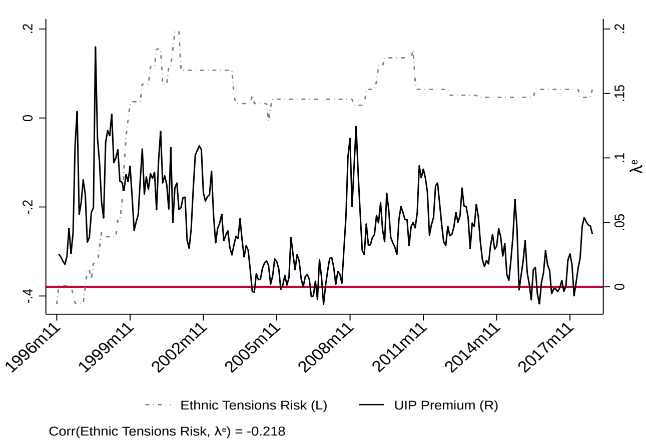
B) Corruption Risk



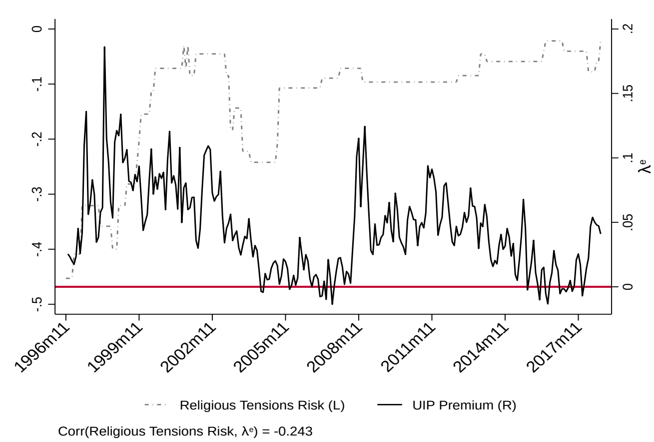
C) Law and Order Risk



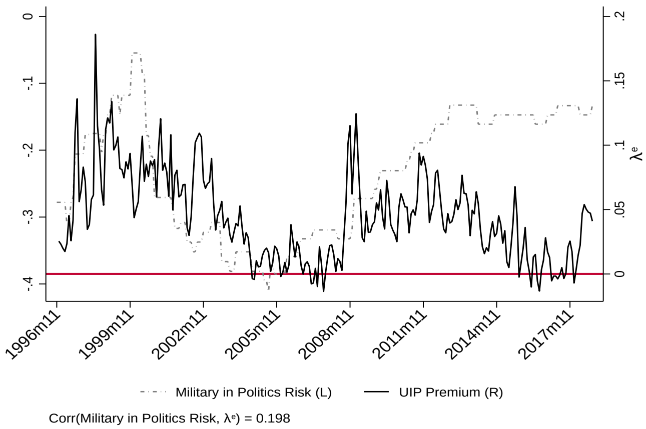
D) Bureaucracy Quality Risk



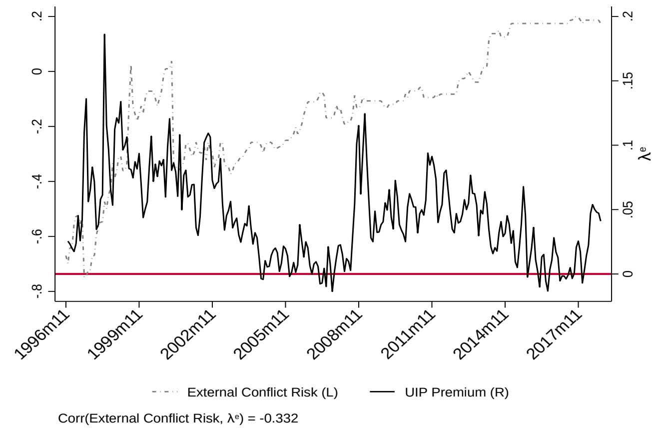
E) Ethnic Tensions Risk



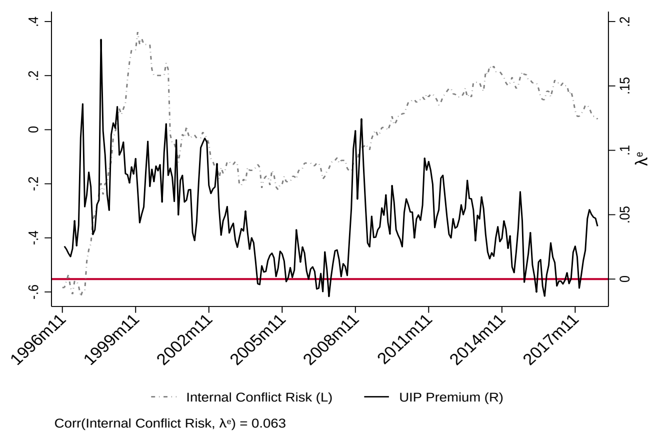
F) Religious Tensions Risk



g) Military in Politics Risk



h) External Conflict Risk



i) Internal Conflict Risk

Figure A2: Correlation of Sub-Components of Political Risk and UIP Premium in Emerging Markets

Note: This figure shows the correlation of other sub-components of political risk (not used in the paper) with the UIP Premium in Emerging Markets.

Appendix B Additional Figures and Tables

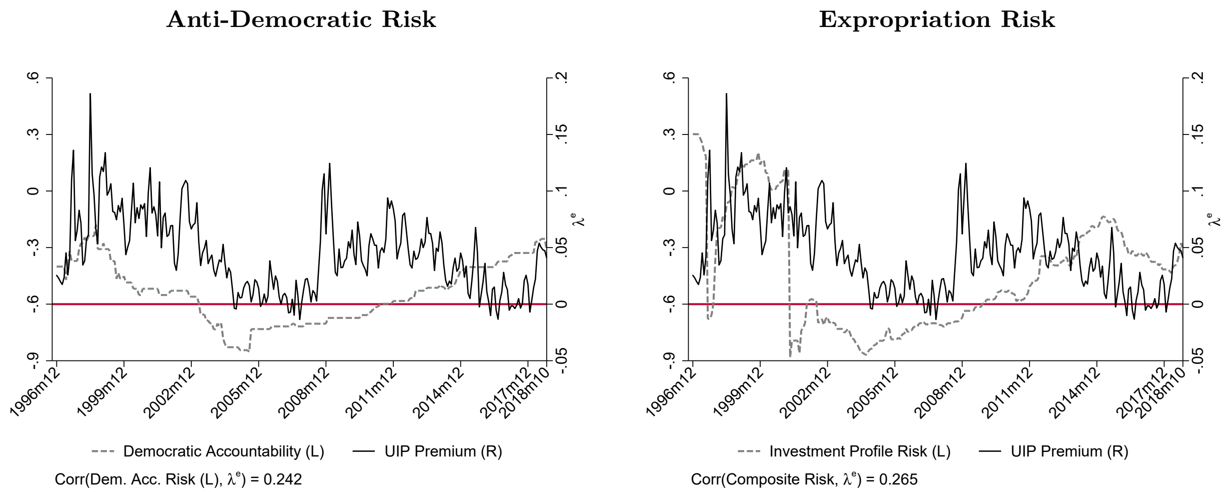


Figure B.1: Decomposing Government Policy Risk in Emerging Markets
Note: This figure shows the correlation of anti-democratic and expropriation risks and the UIP premium 12 month horizon.

Table B.1: Forecast Errors: Summary Statistics

	Advanced Economies (1)	Emerging Markets (2)
Mean	-0.003	-0.010
Median	0.008	0.000
Std. Dev	0.113	0.135
p25	-0.074	-0.078
p75	0.073	0.068
N of Observations	2,286	3,577

Notes: 34 currencies, 22 Emerging Markets, 12 Advanced Economies. Period 1996m11:2018m12. Forecast errors are defined as $\Delta s^e_{it+1} - \Delta s_{it+1}$.

Table B.2: Fama and Excess Return Regressions: Unbalanced Sample

	Fama Regression		Excess Return Regression	
	Advanced Economies	Emerging Markets	Advanced Economies	Emerging Markets
	(1)	(2)	(3)	(4)
	Panel A: Realized Exchange Rate			
β^F	-0.399	0.374***	1.399***	0.626***
	(0.361)	(0.115)	(0.361)	(0.115)
P-value ($H_0 : \beta^F = 1$)	0.0022	0.0000		
R^2	0.0034	0.0255	0.0408	0.0682
	Panel B: Expected Exchange Rate			
β	1.196***	0.482***	-0.196	0.518***
	(0.258)	(0.073)	(0.258)	(0.073)
P-value ($H_0 : \beta = 1$)	0.4620	0.0000		
R^2	0.1750	0.2705	0.0057	0.3007
Currency FE	yes	yes	yes	yes
Observations	2,375	3,755	2,375	3,755
Number of Currencies	12	22	12	22

Notes: * p < 0.10 ** p < 0.05 *** p < 0.01. Currency-time two-way standard errors in parentheses.

Table B.3: The Fama Coefficient in Emerging Markets: Composite and Government Policy Risks (12-Months)

	Panel A. Fama Coefficient: $\hat{\beta}_{ij}$				
	Composite Risk	Unpacking Composite Risk		Decomposing Government Policy Risk	
		Government Policy Risk	Confidence Risk	Anti-Democratic Risk	Expropriation Risk
	(1)	(2)	(3)	(4)	(5)
Policy risk$_{i,j}$	-0.555^{d}	-0.952***	-0.111	-0.686***	-0.729**
	(0.356)	(0.329)	(0.197)	(0.258)	(0.290)
R^2	0.0086	0.0481	0.0009	0.0377	0.0335
	Panel B. Risk Premium: $b_{ij,RP}$				
Policy risk$_{i,j}$	0.555^{d}	0.952***	0.111	0.686***	0.729**
	(0.356)	(0.329)	(0.197)	(0.258)	(0.290)
R^2	0.0086	0.0481	0.0009	0.0377	0.0335
Observations	275	275	275	275	275

Notes: ^{d}p<0.15 * p < 0.10 ** p < 0.05 *** p < 0.01. Currency-clustered standard errors in parentheses. All regressions include a constant term.

Table B.4: The Fama Coefficient in Emerging Markets: Composite and Government Policy Risks (24-Months)

	Panel A. Fama Coefficient: $\hat{\beta}_{ij}$				
	Composite Risk	Unpacking Composite Risk		Decomposing Government Policy Risk	
		Government Policy Risk	Confidence Risk	Anti-Democratic Risk	Expropriation Risk
	(1)	(2)	(3)	(4)	(5)
Policy risk$_{i,j}$	-0.527**	-0.864***	-0.182	-0.669***	-0.612***
	(0.260)	(0.131)	(0.168)	(0.121)	(0.188)
R^2	0.0202	0.1009	0.0066	0.0902	0.0604
	Panel B. Risk Premium: $b_{ij,RP}$				
Policy risk$_{i,j}$	0.527**	0.864***	0.182	0.669***	0.612***
	(0.260)	(0.131)	(0.168)	(0.121)	(0.188)
R^2	0.0202	0.1009	0.0066	0.0902	0.0604
Observations	132	132	132	132	132

Notes: * p < 0.10 ** p < 0.05 *** p < 0.01. Currency-clustered standard errors in parentheses. All regressions include a constant term.

Appendix C Link between the Fama and the Excess Returns Regressions

Recall that the UIP condition in logs is $s^e_{t+h} - s_t = i_t - i^{US}_t$. Using this condition, we can write the Fama regression as

$$s_{t+h} - s_t = \alpha^F + \beta^F(i_t - i^{US}_t) + \varepsilon_{t+h}. \tag{16}$$

Adding and subtracting $i^*_t - i_t$ from each side of equation (16).

$$s_{t+h} - s_t + (i^{US}_t - i_t) = \alpha^F + \beta^F(i_t - i^{US}_t) + (i^{US}_t - i_t).$$

Multiplying both sides for -1 and defining the realized excess returns as $\lambda^F_{t+h} = i_t - i^{US}_t + s_t - s_{t+h}$, we obtain

$$\lambda^F_{t+h} = \alpha^F_1 + \beta^F_1(i_t - i^{US}_t) + \varepsilon_{t+h}, \tag{17}$$

where $\alpha^F = -\alpha^F$ and $\beta^F_1 = 1 - \beta^F$. Then, if $\beta^F_1 = 0$, increases in the interest rate differential do not correlate with excess return, the Fama regression holds ($\beta^F = 1$) and there is no excess return. Instead, if $\beta^F_1 > 0$, increases in the interest rate differential raise excess returns. The coefficient of the Fama regression becomes less than one ($\beta^F < 1$) and there are UIP deviations.

Appendix D Decomposing the Bias in the Fama Regression

In this appendix, we follow Froot and Frankel (1989) to decompose the bias on the Fama regression arising from systematic errors in expectations and from a risk premium.

- Decomposition of Fama Regression under FIRE.

Consider that the probability limit of the coefficient β^F in equation (5) is given by

$$plim\hat{\beta}^F = \frac{cov(\Delta s_{it+h} - \Delta\overline{s}_i, IR_{it} - \overline{IR}_i)}{var(IR_{it} - \overline{IR}_i)} \tag{18}$$

where IR_{it} denotes de interest rate differential, $IR_{it} = i_{it} - i_t^{US}$, and the over-line denotes the average of the variable for each country across quarters corresponding to the country fixed effects included in regression (5), i.e. $\overline{X}_i = \frac{1}{T}\sum_{t=1}^{T} X_{it}$. Note that, when we average out across time, we remove the horizon subscript h, but we still consider our specifications at the same forecast horizon (12 month in our case). We can define the forecast errors as $\eta^e_{it+h} = \Delta s_{it+h} - \Delta s^e_{it+h}$ and use them to replace in equation (18) to obtain

$$plim\hat{\beta}^F = \frac{cov(\Delta s^e_{it+h} - \Delta\overline{s}^e_i, IR_{it} - \overline{IR}_i) + cov(\eta^e_{it+h} - \overline{\eta}^e_i, IR_{it} - \overline{IR}_i)}{var(IR_{it} - I\bar{R}_i)} \tag{19}$$

Using the definition of expected excess returns, we can re-write equation (19) as

$$\begin{aligned}
plim\hat{\beta}^F &= \frac{cov((IR_{it} - \overline{IR}_i) - (\lambda^e_{it+h} - \overline{\lambda}^e_i), IR_{it} - \overline{IR}_i) + cov(\eta^e_{it+h} - \overline{\eta}^e_i, IR_{it} - I\bar{R}_i)}{var(IR_{it} - \overline{IR}_i)} \\
&= \frac{var(IR_{it} - \overline{IR}_i) - cov(\lambda^e_{it+h} - \overline{\lambda}^e_i, IR_{it} - \overline{IR}_i) + cov(\eta^e_{it+h} - \overline{\eta}^e_i, IR_{it} - I\bar{R}_i)}{var(IR_{it} - \overline{IR}_i)} \\
&= 1 + \frac{cov(\eta^e_{it+h} - \overline{\eta}^e_i, IR_{it} - \overline{IR}_i)}{var(IR_{it} - \overline{IR}_i)} - \frac{cov(\lambda^e_{it+h} - \overline{\lambda}^e_i, IR_{it} - I\bar{R}_i)}{var(IR_{it} - \overline{IR}_i)}
\end{aligned} \tag{20}$$

$$\begin{aligned}
plim\hat{\beta}^F &= 1 + \frac{cov(\eta^e_{it+h} - \overline{\eta}^e_i, IR_{it} - \overline{IR}_i)}{var(IR_{it} - I\bar{R}_i)} - \frac{cov(\lambda^e_{it+h} - \overline{\lambda}^e_i, \lambda^e_{it+h} - \overline{\lambda}^e_i + \Delta s^e_{it+h} - \Delta\overline{s}^e_i)}{var(IR_{it} - \overline{IR}_i)} \\
&= 1 + \frac{cov(\eta^e_{it+h} - \overline{\eta}^e_i, IR_{it} - \overline{IR}_i)}{var(IR_{it} - \overline{IR}_i)} - \left(\frac{var(\lambda^e_{it+h} - \overline{\lambda}^e_i) + cov(\lambda^e_{it+h} - \overline{\lambda}^e_i, \Delta s^e_{it+h} - \Delta\overline{s}^e_i)}{var(IR_{it} - \overline{IR}_i)}\right)
\end{aligned} \tag{21}$$

Thus, we have

$$plim\hat{\beta}^F = 1 - b_{RE} - b_{RP} \tag{22}$$

$$\text{where} \quad b_{RE} = -\frac{cov(\eta^e_{it+h} - \overline{\eta}^e_i, IR_{it} - \overline{IR}_i)}{var(IR_{it} - \overline{IR}_i)} \quad \text{and} \quad b_{RP} = \frac{var(\lambda^e_{it+h} - \overline{\lambda}^e_i) + cov(\Delta s^e_{it+h} - \Delta\overline{s}^e_i, \lambda^e_{it+h} - \bar{\lambda}^e_i)}{var(IR_{it} - \overline{IR}_i)}$$

- *Decomposition of Fama Regression using Expectational Data.*
Consider the regression estimated using expected exchange rate changes

$$\Delta s^e_{it+h} = \alpha + \beta(i_{it} - i^*_{it}) + \mu_i + \varepsilon_{1it+h} \tag{23}$$

The probability limit of β is given by

$$plim\hat{\beta} = \frac{cov(\Delta s^e_{it+h} - \Delta\overline{s}^e_i, IR_{it} - \overline{IR}_i)}{var(IR_{it} - \overline{IR}_i)} \tag{24}$$

Combining the definition of expected excess returns in equation (1) and (24) we obtain

$$\begin{aligned} plim\hat{\beta} &= \frac{cov((IR_{it} - \overline{IR}_i) - (\lambda^e_{it+h} - \overline{\lambda}^e_i), IR_{it} - \overline{IR}_i)}{var(IR_{it} - \bar{I}R_i)} \\ &= 1 - \frac{cov(\lambda^e_{it+h} - \overline{\lambda}^e_i, IR_{it} - \overline{IR}_i)}{var(IR_{it} - \overline{IR}_i)} \end{aligned} \tag{25}$$

The probability limit of the Fama coefficient – β – of the regression estimated using expectational data is given by

$$plim\hat{\beta} = 1 - b_{RP} \tag{26}$$

$$\text{where} \quad b_{RP} = \frac{var(\lambda^e_{it+h} - \overline{\lambda}^e_i) + cov(\Delta s^e_{it+h} - \Delta\overline{s}^e_i, \lambda^e_{it} - \bar{\lambda}^e_i)}{var(IR_{it} - \overline{IR}_i)}$$

Appendix E The Fama Puzzle Revisited: A Decomposition Analysis

In this section, we conduct a decomposition analysis to unpack the channels through which policy risk affects the risk premium and downwards bias the Fama coefficient. Recall that the Fama coefficient for country i in window j can be expressed as $plim\hat{\beta}_{ij} = 1 - b_{ij,RP} = 1 - \frac{var(\lambda^e_{ij}) + cov(\Delta s^e_{ij}, \lambda^e_{ij})}{var(IR_{ij})}$ (equation (13)).

Mathematically, one could evaluate how an increase in policy risk in window j in country i affects its Fama coefficient by taking derivatives of this expression with respect to risk. After some algebra, the change in the Fama coefficient would be

$$\frac{\partial \hat{\beta}_{ij}}{\partial \text{policy risk}_{ij}} = \underbrace{-\frac{1}{var(IR_{ij})}\frac{\partial var(\lambda^e_{ij})}{\partial \text{policy risk}_{ij}}}_{\text{UIP Premium Volatility}} - \underbrace{\frac{1}{var(IR_{ij})}\frac{\partial cov(\Delta s^e_{ij}, \lambda^e_{ij})}{\partial \text{policy risk}_{ij}}}_{\text{Comovement ER \& UIP Premium}} + \underbrace{\frac{b_{ij,RP}}{var(IR_{ij})}\frac{\partial var(IR_{ij})}{\partial \text{policy risk}_{ij}}}_{\text{Interest Rate Volatility}}. \tag{27}$$

Equation (27) shows that the change in the Fama coefficient stems from three forces: (i) changes in the volatility of the UIP premium (first term), (ii) changes in the comovement between the expected exchange rate change and the UIP premium (second term), and (iii) changes in the volatility of the interest rate differential (third term). Equation (27) is a mathematical derivation for a particular country i at window j but, under the assumption that each component of the risk premium responds homogeneously across time and countries, we can estimate each of these three forces econometrically.[43] That is, we can regress $var(\lambda^e_{ij})$, $cov(\Delta s^e_{ij}, \lambda^e_{ij})$ and $var(IR_{ij})$ on policy risk and obtain the *average* responses to policy risk across countries and time (i.e. $\frac{\Delta var(\lambda^e_{ij})}{\Delta \text{policy risk}_{ij}}$, $\frac{\Delta var(IR_{ij})}{\Delta \text{policy risk}_{ij}}$ and $\frac{\Delta cov(\Delta s^e_{ij}, \lambda^e_{ij})}{\Delta \text{policy risk}_{ij}}$). Because these derivatives are weighted by the variance of the interest rate differential in each country i and window j and the last derivate is additionally weighted by the risk premium term $b_{ij,RP}$, we estimate them econometrically employing Weighted Least Squares.[44] More precisely, we estimate

$$Y_{ij} = \gamma_4 + \gamma_5 \,\text{policy risk}_{ij} + \varepsilon_{1ij}, \tag{28}$$

[43] To understand this assumption, note that equation (27) captures the change in the β coefficient in a country i at time j upon an increase in policy risk in that period. Yet the econometrician is not interested in each individual response of each country at each moment of time, but on the *average* response across time and countries. To compute average responses, we can assume that each component of the risk premium in equation (27) responds homogeneously across time and countries, and employ these homogeneous responses to obtain the average response of the Fama coefficient to changes in policy risk. Hence, under this homogeneity assumption, the derivative – $\frac{\partial \beta_{ij}}{\partial \text{policy risk}_{ij}}$ – can be interpreted as the *average* response of the Fama coefficient.

[44] The WLS is a good econometric approximation of the derivatives in equation (27). More precisely, the derivatives in equation (27) refer to the response of each country i at time j and are weighted by variables at country i and time j level. So, these are individual responses for each country and time pair. Instead, the WLS weights each observation for each country and time to compute average responses. Put it differently, the WLS weights each observation to estimate individual responses, while the derivatives in equation (27) are the average responses weighted by country and time.

where $Y_{ij} = \{var(\lambda^e_{ij}), cov(\Delta s^e_{ij}, \lambda^e_{ij}), var(IR_{ij})\}$. The regressions for $var(\lambda^e_{ij})$ and $cov(\Delta s^e_{ij}, \lambda^e_{ij})$ are weighted by the variance of the interest rate differential in each country i window j, and that for $var(IR_{ij})$ is weighted by the ratio of the risk premium term and the variance of the interest rate differential in each country i window j.[45]

To assess the impact of the policy risk on the Fama coefficient, we focus on the two main variables of Table 7: composite risk and government policy risk. Panel A in Table E.1 presents the results for composite risk and shows that the driver of the downward bias of the Fama coefficient is the increase in the volatility of the UIP premium. In particular, column 1 shows that the coefficient of the variance of the UIP premium is positive and highly statistically significant, while the other two coefficients – the covariance between exchange rate change and the UIP premium and the interest rate volatility– are close to zero. This result indicates that a one standard deviation in that increases in composite risk associates with a 0.49 percentage points decrease in the volatility of the UIP premium. We can then use the estimated coefficients to check how each of these three forces contribute to the bias of the Fama coefficient. As expected, the increase in the volatility of the UIP premium explains 87% of the bias of the Fama coefficient arising from changes in composite risk.[46]

We then evaluate how composite risk affects each of the component of the variance of the UIP premium. Recall that the UIP premium in country i in period j is given by $\lambda^e_{ij} = IR_{ij} - \Delta s^e_{ij}$ and, thus, its variance is equal to

$$var(\lambda^e_{ij}) = var(IR_{ij}) + var(\Delta s^e_{ij}) - 2cov(IR_{ij}, \Delta s^e_{ij}). \tag{29}$$

To assess the impact of composite risk on each term of equation (29), we regress each of these components on composite risk. Panel B in Table E.1 shows that composite risk associates with increases in both the volatility of the interest rate differential and the volatility of the exchange rate change. Yet the increase in the volatility of the interest rate differential is larger. The estimated coefficients imply that one standard deviation increase in composite risk associates with a 0.16 increase in the variance of the interest rate differential and 0.10 increase in the variance of the expected exchange rate change. The higher increase in the volatility of the interest rate differential is remarkable because it highlights a disconnect between the interest rate and exchange rate changes, and suggests that a country's composite risk is priced in the interest rate differential in emerging markets. In this way, increases in a country's composite risk lead to higher increases in the interest rate differential, which becomes the source of the UIP premium.

Finally, Table E.2 presents the results for the government policy risk. In line with the results on composite risk, Panel A shows that the main components accounting for the downward bias of

[45] Alternatively, with time series long enough, one could estimate these regressions separately for each country, i.e. without imposing homogeneity across countries. That is, one could estimate regression (28) for each country and obtain individual γ_{4i}. Unfortunately, because our data spans only between 1996m11 and 2018m12, we do not have enough time series variation to estimate these coefficients consistently.

[46] Note that the sum of the estimated coefficients of equation (27) (0.878) and the coefficient reported in Table E.1 (0.584) are not exactly identical, due to the presence of non-linearities in this decomposition.

the Fama coefficient is the volatility of the UIP premium, which –as shown in panel B– is mainly driven by the volatility of the interest rate differential.

Table E.1: Decomposition of The Bias of Fama Coefficient in Emerging Markets

	Panel A: Decomposition of Bias of Fama Coefficient		
	UIP premium Volatility (1)	Comovement ER & UIP premium (2)	Interest Rate Volatility (3)
Composite risk$_{i,j}$	0.765***	0.115	0.002***
	(0.066)	(0.176)	(0.001)
Contribution to $\frac{\partial \beta_{ij}}{\partial \text{composite risk}_{ij}}$	87	13	0
($\frac{\partial \beta_{ij}}{\partial \text{composite risk}_{ij}}$ normalized to 100)			
R^2	0.8213	0.0433	0.0072
	Panel B: Components of the Volatility of the UIP Premium		
	$var(IR_{ij})$ (1)	$var(\Delta s^e_{ij})$ (2)	$cov(IR_{ij}, \Delta s^e_{ij})$ (3)
Composite risk$_{i,j}$	0.241*	0.153***	-0.062
	(0.138)	(0.032)	(0.053)
R^2	0.1494	0.1953	0.0626
Observations	180	180	180

Notes: * p < 0.10 ** p < 0.05 *** p < 0.01. Currency-clustered standard errors in parentheses. All regressions include a constant term.

Table E.2: Unpacking Composite Risk: The Role of Government Policy Risk

	Panel A: Decomposition of Bias of Fama Coefficient		
	UIP premium Volatility (1)	Comovement ER & UIP premium (2)	Interest Rate Volatility (3)
Government Policy Risk$_{i,j}$	0.603***	-0.123	-0.001*
	(0.118)	(0.197)	(0.000)
Contribution to $\frac{\partial \beta_{ij}}{\partial \text{gov. policy risk}_{ij}}$	126	-12	0
($\frac{\partial \beta_{ij}}{\partial \text{gov. policy risk}_{ij}}$ normalized to 100)			
R^2	0.2784	0.0272	0.0022
	Panel B: Components of the Volatility of the UIP Premium		
	$var(IR_{ij})$ (1)	$var(\Delta s^e_{ij})$ (2)	$cov(IR_{ij}, \Delta s^e_{ij})$ (3)
Government Policy Risk$_{i,j}$	0.085^d	0.029	-0.015
	(0.052)	(0.036)	(0.015)
R^2	0.0342	0.0129	0.0072
Observations	180	180	180

Notes: d p<.15 * p < 0.10 ** p < 0.05 *** p < 0.01. Currency-clustered standard errors in parentheses. All regressions include a constant term.