Term Structure, Interest Volatility, and the Failure of the UIP Condition

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Abstract: The uncovered interest parity (UIP) condition predicts that the higher-interest-rate currency should depreciate so as to equalize expected returns across currencies. Yet despite its central role in international macro models, this condition is often rejected in the empirical data. This paper argues that UIP coefficient estimates are inherently regime-dependent, a latent feature that becomes visible once one studies their term structure. Using historical Eurocurrency/LIBOR deposit rates at the 1-, 3-, 6-, and 12-month maturities, I document three empirical facts. First, rolling-window UIP coefficient estimates are negatively related to the volatility of interest rate differentials, and this monotonic relationship evolves gradually over time rather than shifting discretely around the 2008 Global Financial Crisis. Second, both the sign and the magnitude of UIP coefficients vary across maturities: under normal times, short-maturity currency trades earn larger premia in high-volatility states, whereas near the zero lower bound the premium shifts toward longer-maturity deposits. Third, these maturity patterns are difficult to reconcile with a pure "delayed-overshooting" explanation based solely on sluggish exchange rate responses to monetary shocks, but they are also hard to explain using a standard finance-based "risk premium" argument alone. Instead, the term-structure evidence from UIP regressions points to the coexistence of both mechanisms, with time-varying risk premia—shaped in part by the signs of yield curve slopes—playing a central role in the UIP puzzle.

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1 INTRODUCTION

The uncovered interest parity (UIP) condition states that the capital loss from expected depreciation offsets the yield advantage of holding a high interest currency. Empirically, when regressing the log-difference of the exchange rate Δs_{t+1} against interest rate differentials $i_t - i_t^*$,

$$\Delta s_{t+1} = \alpha + \beta \left(i_t - i_t^* \right) + e_t$$

the UIP condition implies $\alpha = 0$ and $\beta = +1$. Equivalently, if we define the excess return from holding foreign currency as $\mathrm{rx}_{t+1} \equiv \left(i_t^* + \Delta s_{t+1} \right) - i_t$, and the foreign-to-domestic interest rate differential as $i_t^* - i_t$, regressing excess returns on interest rate differentials

$$\mathrm{rx}_{t+1} = \alpha + \gamma \left(i_t^* - i_t \right) + u_t \tag{1}$$

should yield $\gamma = 0$ (i.e., $\gamma = 1 - \beta$). This no-arbitrage condition is a cornerstone of rational-expectations models and frictionless DSGE macroeconomic frameworks.

However, a large literature has repeatedly rejected this prediction—Empirical studies often find that high-interest-rate currencies tend to appreciate rather than depreciate on average (i.e., $\beta < 0$, or equivalently, $\gamma > 0$), and the regression typically exhibits very low explanatory power as measured by the R-square values. In such cases, investors holding the high interest currency earn not only the higher interest return but also an additional return from currency appreciation. This empirical pattern is commonly referred to as the *UIP puzzle.*

The literature offers two broad explanations for this puzzle. The macroeconomic approach emphasizes delayed responses of exchange rates to monetary shocks due to sticky expectations or information frictions. In this view, UIP deviations arise because exchange rates adjust sluggishly to monetary policy changes. The finance-based interpretation, by contrast, emphasizes that higher-interest-rate currencies may offer additional compensation

because they are systematically exposed to greater risk. Models with time-varying risk premia—including those with Epstein-Zin preferences in long-run risk frameworks as well as rare disaster models—can generate UIP deviations that are consistent with the observed empirical patterns. Understanding the driving forces behind UIP deviations therefore helps bridge macroeconomic models with asset-pricing approaches to currency markets.

This paper introduces a new empirical perspective to this debate by studying the term structure of UIP regressions. Most standard tests of the UIP condition focus either on short-maturity assets (e.g., 1-month interest rates) or on carry-trade portfolios constructed from long-horizon assets (e.g., 10-year government bonds).[1] By contrast, this paper uses Eurocurrency/LIBOR deposit rates at the 1-, 3-, 6-, and 12-month maturities, which provide horizon-specific expected returns quoted at the same point in time. This distinction matters because traditional carry-trade portfolios examine arbitrage opportunities across consecutive periods, whereas the term structure of deposit rates captures the expected compensation from holding foreign-currency deposits over different horizons rather than the price evolution of the same asset over time.

Studying the term structure of UIP regressions provides particularly useful insights during the zero lower bound period and in the recent debate surrounding the "New Fama Puzzle"—the apparent sign reversal of UIP coefficients following the 2008 Global Financial Crisis. The zero lower bound is especially relevant because conventional monetary policy operates primarily through very short-maturity assets (e.g., the federal funds rate, which is the overnight interbank borrowing rate). When short-term interest rates are pushed close to zero, however, the variance of short-term interest rate differentials collapses, mechanically reducing both the precision and magnitude of UIP coefficient estimates. As a result, the apparent sign reversal of the UIP coefficient after the 2008 Global Financial Crisis may partly reflect this econometric compression rather than a genuine structural shift in investors' risk

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[1]By carry trade returns, the literature typically defines returns from holding zero-coupon bonds, such as $R_{t+1}^{(k)} \equiv \frac{P_{t+1}^{(k-1)}}{P_t^{(k)}}$, which capture the excess returns from sequentially holding bonds of the same maturity across periods.

appetite or regulatory changes affecting currency markets.

The zero lower bound environment also provides a useful thought experiment. During normal times—when central banks can influence short-term policy rates—delayed overshooting implies that exchange rates may respond more strongly at shorter horizons than at longer horizons. As a result, short-maturity currency trades tend to command larger excess return premia. By contrast, long-horizon exchange rates tend to evolve more smoothly, consistent with the empirical observation that the UIP condition tends to hold better over longer horizons.

When short-term policy rates are compressed toward zero, however, conventional monetary policy becomes constrained, while longer-term interest rates remain positive and continue to reflect expectations about future monetary policy paths as well as compensation for macroeconomic uncertainty. The persistence of positive long-term rates, in contrast to near-zero short-term rates, suggests that risk premia may shift toward longer maturities during distressed periods in which short-term rates are constrained by the zero lower bound. Such shifts may also be reinforced by unconventional monetary policies, such as quantitative easing, which explicitly target longer-term yields and the slope of the yield curve. The term structure of UIP coefficients therefore provides a natural way to distinguish whether UIP deviations arise primarily from delayed overshooting, time-varying risk premia, or a combination of the two.

Using maturity-specific Eurocurrency/LIBOR deposit rates for the U.S. dollar and the British pound, I find empirical evidence that UIP coefficient estimates vary systematically across both maturities and monetary regimes. The United Kingdom provides a particularly useful testing ground because its exchange rate arrangements have historically moved across pegged, banded, and floating regimes while also experiencing episodes of currency stress and stabilization. In addition, the sterling market is characterized by deep financial markets, minimal capital controls, and relatively limited direct foreign exchange intervention. These features make the bilateral dollar–sterling setting well suited for studying how monetary

regimes and financial conditions shape currency excess returns.

Following the monetary identification literature, I further interpret financial regimes through the signs of the yield curve slopes in the U.S. and the U.K., examining how excess return premia vary across maturities and regimes. When the two yield curves have the same sign—either both upward sloping or both inverted—I interpret these episodes as being dominated by common global factors, such as the global financial cycle. When the yield curve signs differ across the two countries, I interpret the episode as one in which country-specific or idiosyncratic shocks play a larger role. The empirical results suggest that the largest UIP deviations occur precisely during episodes in which the two yield curves have opposite signs.

Given the hegemonic role of the U.S. dollar and the safe-asset properties of U.S. financial markets, the slope of the U.S. yield curve—often interpreted as a proxy for the state of the U.S. economy—appears to wield a particularly strong influence on UIP deviations. I find that when both the U.S. and the U.K. yield curves are upward sloping, the UIP condition tends to hold more closely. However, this interpretation should be treated with caution, as such observations are more common in the sample. When the U.S. yield curve is inverted, by contrast, excess return premia tend to be higher regardless of the sign of the U.K. yield curve. When the U.S. yield curve slope is positive, excess return premia remain present but are smaller in magnitude than during periods with an inverted U.S. yield curve. This pattern highlights the dominant role of U.S. financial conditions and U.S. monetary policy in shaping global currency risk premia.

The central message of this paper is straightforward: the UIP puzzle cannot be fully understood through a single unconditional regression. During normal periods, UIP deviations appear to be dominated by delayed overshooting mechanisms, as reflected in larger excess returns associated with short-maturity deposits. During distressed periods when short-term policy rates are compressed toward zero, risk premia become embedded in the term structure of deposit rates. The yield curves—in particular their signs—therefore provide a concise indicator of when these relationships shift. The contribution of this paper is both conceptual

and empirical: it reframes the UIP puzzle as a maturity-dependent and regime-specific phenomenon rather than a single unconditional anomaly.

1.1 Related Literature

Starting from the seminal Fama (1984) paper, the literature has proposed a range of explanations for the UIP puzzle. Broadly speaking, two major approaches have emerged. The first is the finance-based literature, including Lustig, Roussanov and Verdelhan (2011), Bansal and Shaliastovich (2013), and Colacito and Croce (2013), which emphasizes time-varying risk premia, Epstein-Zin preferences that separate risk aversion from the elasticity of intertemporal substitution, and the role of stochastic discount factor shocks in explaining currency returns. For example, Lustig and Verdelhan (2007) argue that UIP deviations arise because low interest currency hedge domestic investors against aggregate consumption shocks. Lustig, Roussanov and Verdelhan (2011) document that currency excess returns are predictable from the U.S. business cycle conditions. Farhi and Gabaix (2016) introduce a rare-disaster framework in which high interest currencies command risk premia during normal times because they are expected to depreciate in states associated with heightened uncertainty.

The second approach comes from the macroeconomic literature on delayed overshooting and information frictions, in which deviations from UIP arise because exchange rates do not adjust immediately to monetary shocks. Engel (2016) provides a comprehensive review of this literature and documents that UIP tends to hold more closely at longer horizons. He also notes that neither the macroeconomic nor the finance-based explanations fully account for the empirical pattern in which high interest currencies initially depreciate but subsequently appreciate at longer horizons. To reconcile this pattern, he proposes a liquidity-based explanation for exchange rate dynamics.

More recently, the apparent sign reversal of UIP coefficients following the 2008 Global Financial Crisis has generated renewed discussion, often referred to as the "New Fama Puzzle" (Bussière et al., 2022). This debate has been further examined by Engel et al. (2022) and

Yoon (2025). These studies acknowledge that the compression of interest rate differentials during the zero lower bound period complicates the interpretation of UIP regressions. In particular, Engel et al. (2022) argue that UIP coefficients appear inherently unstable and that inflation differentials have become stronger predictors of exchange rate movements in the post-crisis period, although they cannot rule out risk-premium explanations. Yang, Zhang and Zhang (2025) use a Bayesian VAR approach to decompose the contribution of different shocks to UIP deviations and highlight substantial heterogeneity in the transmission mechanisms through which macroeconomic shocks affect currency excess returns.

This paper builds on these insights but advances the argument further by showing that UIP coefficients are not merely unstable—they are systematically regime-dependent. By incorporating the term structure of UIP regressions and relating it to the sign of the yield curve slope, I show that maturity variation contains valuable information about the underlying sources of UIP deviations. While the literature has explored the role of maturity and yield curves in explaining the UIP puzzle, existing work typically focuses either on very short maturities or on very long horizons. The closest related paper is Lustig, Stathopoulos and Verdelhan (2019), which studies the infinite-horizon holding returns of government zero-coupon bonds. Their results suggest that reconciling UIP in the long run requires stronger assumptions about underlying asset-pricing mechanisms. By contrast, Marin and Lloyd (2024) examine how the magnitude of the yield curve slope affects UIP regressions across horizons and show that the UIP coefficient varies systematically with business cycle conditions.

The novelty of my approach is to focus on the *sign* of the yield curve slope—to be specific, whether the yield curve is upward sloping or inverted—because these categories naturally capture regime shifts in monetary and financial conditions. Rather than emphasizing the steepness of the yield curve, I focus on the directional signal it provides. Given the limited set of maturities available in the data (1-, 3-, 6-, and 12-month), this approach provides a transparent classification of macro-financial regimes. The consistent patterns

observed across maturities reinforce the idea that UIP coefficients are closely linked to yield curve characteristics that reflect broader macroeconomic conditions.

While much of the existing literature focuses on advanced economies, there is increasing attention to UIP deviations in emerging markets. For example, Cristi et al. (2024), Kalemli-Ozcan and Varela (2024), and Kalemli-Ozcan (2019) show that contractionary U.S. monetary policy can generate sizable UIP premia in emerging markets, with mechanisms that appear weaker in advanced economies. The contribution of this paper is to show that even among advanced economies, macro-financial conditions play an important role in determining the sign and magnitude of UIP deviations.

The remainder of the paper proceeds as follows: Section 2 describes the empirical strategy, Section 3 discusses the main results, and Section 4 concludes.

2   EMPIRICAL FRAMEWORK

This section describes the empirical strategy used to test maturity-specific UIP regressions. Section 2.1 introduces the notation and data sources. Section 2.2 presents the regression design.

2.1 Notations and Data Sources

The main novelty of the paper is that I extend maturity-specific U.S. dollar–British pound deposit rate series back to 1973 using monthly observations at the 1-, 3-, 6-, and 12-month maturities. For the earlier period prior to 1998, I hand-collect Eurocurrency deposit rate quotations from the historical *Financial Times* archive on the last business day of each month.[2] Figure A1 shows the Eurocurrency rates as reported on July 31, 1973. This figure provides a representative snapshot of bid and offer quotations (i.e., a range) gathered from market participants in the Eurocurrency market, offering a rare long historical series of short-

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[2] When a month-end observation is too blurry to read because of scanning quality, I use the preceding business day instead.

and medium-maturity offshore interest rates.[3] Since 1998, I use LIBOR rates downloaded from the Bloomberg terminal, following the standard approach in the literature.

The *Financial Times* reports Eurocurrency rates in annualized terms, so I convert them into maturity-consistent returns before constructing interest differentials. Let $i_t^{(k),\text{p.a.}}$ and $i_t^{*,(k),\text{p.a.}}$ denote the annualized Eurocurrency rate at maturity $k \in \{1, 3, 6, 12\}$ at year-month t for the U.S. and the U.K. respectively, and $i_t^{(k)}$, and $i_t^{*,(k)}$ denotes the corresponding return over the relevant holding period. Using the standard log approximation for compound interest, one can show:

$$i_t^{(k),\text{p.a.}} \approx \ln\left(1 + i_t^{(k),\text{p.a.}}\right) = \ln\left(\left(1 + i_t^{(k)}\right)^{\frac{12}{k}}\right) = \frac{12}{k}\ln\left(1 + i_t^{(k)}\right) \approx \frac{12}{k}i_t^{(k)} \implies i_t^{(k)} = \frac{k}{12}i_t^{(k),\text{p.a.}}$$

In other words, the maturity-consistent return is proportional to the annualized quote, scaled by $\frac{k}{12}$. This transformation allows interest rates at different maturities to be compared on a common basis.

The dollar–pound exchange rate is taken directly from the Federal Reserve's daily series at the last business day of each month. I define the h period ahead depreciation rate as the log change in the exchange rate between month t and $t + h$,

$$\Delta s_{t \to t+h} \equiv \ln\left(\frac{S_{t+h}}{S_t}\right) = s_{t+h} - s_t \qquad s_t \equiv \ln(S_t) \tag{2}$$

where S_t denotes the level of the exchange rate measured as U.S. dollars per British pound. An increase in S_t therefore represents a depreciation of the U.S. dollar against the British pound.

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[3]The *Financial Times* reports quote Eurocurrency rates in fractional form: in earlier periods, quotations appear in increments of $\frac{1}{8}$, later evolving to $\frac{1}{16}$ and eventually $\frac{1}{32}$.

2.2 Empirical Designs

From the perspective of a U.S. investor, the excess return on a k-month sterling deposit equals the sterling deposit return plus the capital gain (loss) from the appreciation (depreciation) of the British pound (i.e., depreciation of the U.S. dollar), minus the return on a U.S. deposit of the same maturity. Under the concept of fractional discounting, this measure maps directly into the excess return interpretation of UIP regressions,

$$\text{rx}_t^{(k)} \equiv (i_t^{*,(k)} + \Delta s_{t \to t+k} - i_t^{(k)}) = \alpha_t + \beta_t^{(k)}(i_t^{*,(k)} - i_t^{(k)}) + e_t \tag{3}$$

Using the Eurocurrency/LIBOR rates together with the exchange rate series, I estimate rolling-window UIP regressions over 10-year windows (120 months) for each maturity, following Engel et al. (2022). The coefficient of interest measures the response of excess returns to the interest-rate differential at the same maturity. I am particularly interested in whether these coefficients differ across maturities and whether they vary systematically over time and across regimes. The empirical design therefore focuses on the evolution of the coefficients rather than solely on their full-sample averages.

The interpretation of the regression is straightforward: a positive coefficient $\beta_t^{(k)}$ implies that higher-interest currencies earn additional compensation beyond the interest-rate spread—coming from capital gains from appreciate of pounds. In particular, I test two hypotheses of interest: first, whether UIP holds across maturities, $\beta_t^{(1)} = \beta_t^{(3)} = \beta_t^{(6)} = \beta_t^{(12)} = 0$, and second, whether the UIP coefficient is stable over time, $\beta_{t_1}^{(k)} = \beta_{t_2}^{(k)} = \ldots$ for all year-months t.

The coefficients $\beta_t^{(k)}$ are estimated using rolling windows of 10 years (120 months) in order to illustrate the time-varying properties of UIP deviations. The primary objective is to study the point estimates rather than the statistical significance of individual coefficients. When statistical inference is required, I compute Newey-West standard errors to account for overlapping horizons.

The empirical analysis proceeds along three dimensions. First, I relate rolling-window UIP coefficient estimates to the volatility of 1-month interest-rate differentials. Second, I compare the coefficient estimates across maturities to examine whether shorter- and longer-horizon currency trades carry different risk loadings across different regimes. Third, I split the sample according to exchange rate regimes and according to the yield curve signs. Throughout the analysis, Newey-West standard errors are used when conducting inference so that overlapping horizons do not mechanically understate uncertainty. Estimating these coefficients using rolling windows allows the data to reveal whether the UIP relationship is stable, gradually evolving, or driven by specific monetary regimes.

3 MAIN RESULTS AND DISCUSSIONS

The empirical results are organized around three questions. First, how do the coefficient estimates on excess return premia evolve with the volatility of interest-rate differentials over time? Section 3.1 shows that there is a systematic relationship along the time dimension. Second, how do these coefficients differ across maturities? Section 3.2 shows that excess premia are concentrated in short-maturity deposits during normal time but then shift toward long-maturity deposits near the zero lower bound. Third, do exchange rate regimes and yield curve signs (upward-sloping versus inverted) help explain the observed heterogeneity? I find that the yield curve signs provide useful information about the time-varying properties of excess return premia. Taken together, these results suggest that the UIP puzzle is not a single static empirical fact but rather a set of evolving patterns that vary with both maturity horizon and monetary regimes.

3.1 Volatility and Time Evolution

The first result is a strong positive relationship between rolling-window coefficient estimates on excess return premia and the volatility of interest-rate differentials. When the volatility of

interest-rate differentials is high, the coefficient estimates tend to be more positive, indicating a textbook violation of the UIP condition. When the volatility of interest-rate differentials approaches zero—, particularly during the zero lower bound periods when central banks worldwide synchronically lower interest rates, the coefficient estimates on excess return premia turns negative—consistent with UIP condition saying high-interest currency is expected to depreciation—but they also become more extreme in magnitude but also less precisely estimated, as the volatility of the regressor collapses, so periods of low volatility must be interpreted cautiously.

This observation is particularly relevant for the recent studies that interpret the sign reversal of the UIP coefficient after the 2008 Global Financial Crisis as evidence that UIP began to hold more closely—the "New Fama Puzzle." Figure 1, however, suggests a more cautious interpretation: the coefficient estimates evolve gradually alongside the decline in the volatility of interest-rate differentials, which monotonically decline over time rather than exhibiting a sharp structural break around 2008. The relevant empirical pattern is therefore a slow-moving evolution across decades rather than an abrupt post-crisis regime shift.

From an econometric perspective, this relationship also warrants careful interpretation. The OLS estimates depends on the variance of the regressor, $\hat{\beta}_t^{(k)} = \frac{\text{Cov}\left(\text{rx}_t^{(k)}, i_t^{*,(k)} - i_t^{(k)}\right)}{\mathbb{V}\left(i_t^{*,(k)} - i_t^{(k)}\right)}$. A collapse in volatility of the interest-rate differential (i.e., a decline in $\mathbb{V}\left(i_t^{*,(k)} - i_t^{(k)}\right)$) therefore mechanically affects the estimated coefficient.

This pattern also aligns closely with the exchange rate regimes experienced by the U.K.. The path of excess return coefficient estimates moves through the currency-board period, the pre-ERM band, the ERM episode, the post-ERM period, and the later floating regime in a way that suggests regime dependence rather than simple instability. In this sense, the UIP coefficient is not merely "unstable" but appears tied to broader monetary and exchange rate conditions. Without accounting for the long-run gradual decline in interest-rate differential volatility, it is difficult to attribute the post-2008 sign reversals in UIP coefficients purely to changes in market regulations or shifts in monetary policy frameworks.

In short, the central finding of Figure 1 is not only the econometric identity itself but also the gradual decline in interest rate volatility over time and its alignment with monetary regimes and policy environments. This gradual evolution is the key empirical fact that the subsequent subsections seek to explain.

3.2 Maturity Dependence

Section 3.1 establishes that discussions of post-2008 UIP sign reversals must take into account the gradual decline in short-term interest-rate differential volatility over time. This observation raises the question of the mechanism behind the pattern. From a financial perspective, the volatility of interest-rate differentials provides information about the broad risk environment—except in periods when central banks compress short-term rates through monetary policy interventions. This is precisely why focusing exclusively on short-term returns (e.g., the 1-month rate) can be misleading. At the same time, the delayed overshooting literature and much of the empirical evidence suggest that the UIP condition tends to fail at short horizons but hold more closely at longer horizons. Ignoring the speculative nature of short-run currency trading—where exchange rates exhibit substantial larger short-run volatility and hence carry a risk premium —would therefore overlook an important feature of currency markets as financial assets.

Traditional monetary policy operates primarily through short-term rates. For example, the federal funds rate is the overnight interbank borrowing rate in the U.S., while the Bank Rate is the interest rate paid on overnight deposits at the Bank of England by commercial banks. As a result, the macro interpretation—sluggish response to monetary shocks—naturally focus on short-horizon exchange rate responses. At the same time, while traditional monetary theory predicts that long-maturity assets should yield higher returns because they compensate investors for postponing consumption, the behavior of exchange rates introduces an additional dimension. Short-run exchange rates are typically more volatile than long-run exchange rates, implying that short-maturity currency trades may require

larger compensation for exchange-rate risk. Long-maturity deposits, by contrast, embed smoother expectations about the path of future short rates as well as more predictable long-horizon exchange rate movements, and therefore load less heavily on short-run currency trade. Examining the term structure of UIP regressions is therefore essential for distinguishing between short-run monetary explanations and broader risk-premium interpretations for the UIP puzzle.

The main novelty of this paper is therefore to examine excess return coefficients across maturity horizons (1m, 3m, 6m, and 12m).[4] Figure 2 supports this perspective. During periods of high interest-rate differential volatility, the 1-month excess-return coefficient often lies above the 12-month coefficient, indicating that short-maturity currency trades command larger premia. Around and after the Global Financial Crisis, however, this ranking weakens and in some cases reverses as short-term rates are compressed toward zero. In such environments, longer maturities become relatively more informative because they continue to reflect uncertainty about future monetary policy and macroeconomic conditions.

This interpretation is consistent with the experience of quantitative easing. Figure 2 also shows that, since the 2008 Global Financial Crisis, the maturity-specific UIP regressions produce less negative coefficients for long-maturity (12-month) compared with short-maturity (1-month). While short-term monetary policy rates approach the zero lower bound, Long-term rates, however, typically do not fall to zero as easily as short-term rates because they embed expectations about future policy paths and compensation for macroeconomic uncertainty, as supported by the unconventional monetary policies such as quantitative easing to influence the yield curve slopes. In this sense, longer maturities become the natural location where currency risk premia remain visible when short-term interest rate differentials are artificially compressed with the concerted efforts from central banks worldwide.

Figure 3 further sharpens this interpretation by showing that the responsiveness of

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[4]While the literature has explored the term structure of carry trades (e.g., Lustig, Stathopoulos and Verdelhan (2019)), most studies focus on infinite-horizon zero-coupon bonds rather than the gradual maturity transitions documented here.

excess-return coefficients to interest-rate differential volatility declines with maturity. In other words, excess return premia become less sensitive to overall economic risk at longer maturities. Shorter maturities are more responsive to exchange rate volatility than longer maturities, implying that 1-month currency trades are more exposed to risk conditions than 12-month currency trades (with coefficient estimates of 28.5 versus 16.4). Interpreted quantitatively, a one basis point (0.01%pt) increase in the standard deviation of interest-rate differentials is associated with roughly a 0.285%pt increase in currency excess returns. This pattern is both economically intuitive and empirically important, suggesting that the term structure of UIP coefficients contains meaningful information about how investors price currency risk across horizons.

3.3 Yield-Curve Regimes

The previous subsection shows that excess return premia vary across maturities and riskiness states. I now extend the analysis by classifying observations according to the signs of yield-curve slopes the U.S. and the U.K.. This approach is inspired by the idea of distinguishing information and real effects using the responses of the stock market and the bond market to monetary shocks as in Jarociński and Karadi (2020). The yield curve slope is defined as the difference between the 12-month and 1-month Eurocurrency/LIBOR rates, measured in annualized terms, that is, $\text{sign}\left(i_t^{(12),\text{p.a.}} - i_t^{(1),\text{p.a.}}\right)$ and $\text{sign}\left(i_t^{*,(12),\text{p.a.}} - i_t^{*,(1),\text{p.a.}}\right)$ for each year-month t.[5]

This classification yields two natural cases. First, when both countries have yield curves with the same sign—either both upward sloping or both inverted—I interpret the episode as being dominated by common global factors, such as global risk-on or risk-off investment behavior. When the signs differ across countries, I interpret the episode as one in which country-specific or idiosyncratic shocks play a larger role. This distinction is

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[5]I primarily focus on the signs of yield curve (i.e., upward sloping versus inverted) rather than its magnitude, because their directions already provide useful information about whether the economy is in a normal or stressed state. See Marin and Lloyd (2024) for interpretations based on the magnitude of the yield curve slope.

particularly meaningful for the U.K., which has experienced both global financial shocks and country-specific currency crises, such as the 1992 sterling crisis.

Figure 5 reports pooled-sample regressions that separate observations into same-sign and opposite-sign yield-curve episodes. The results are striking. When the two yield curves share the same sign, excess return coefficients are small and often not statistically different from zero, broadly consistent with UIP holding more closely. When the yield-curve signs differ, however, excess return coefficients become positive and statistically significant across maturities, and they tend to decline with maturity. Together with the positive and significant overall regressions, these findings suggest that the overall UIP deviations tend to be driven primarily during episodes of financial stress when the yield curves are in opposite directions. At the same time, the magnitude of excess returns declines with maturity, indicating that longer-horizon exchange rates predictability may partially smooth the currency risk.

These results should nevertheless be interpreted with caution. Table 1 shows that there are more observations in periods when both yield curves share the same sign (302 observations) than when they differ (152 observations). However, this imbalance also suggests that UIP deviations are disproportionately concentrated—and thus driven—by periods when yield-curve signs diverge.[6]

I further refine the yield curve classification into four categories: positive-positive, positive-negative, negative-positive, and negative-negative. This decomposition allows me to examine whether U.S. financial conditions exert a disproportionate influence on global currency risk premia. This question is particularly relevant in light of the literature on the Global Financial Cycle driven by U.S. monetary policy and the role of the U.S. dollar as the dominant international reserve currency (Miranda-Agrippino and Rey, 2022, 2020; Rey, 2013)

Figure 5 shows that the most pronounced excess-return premia arise when the U.S.

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[6]Observations in which either country exhibits a flat yield curve—where the difference between 12-month and 1-month Eurocurrency/LIBOR rates is zero—are excluded. There are only 15 such observations in the entire sample.

yield curve is inverted, and the U.K. yield curve signs seem to play a smaller role. By contrast, there is little evidence of UIP deviations when both yield curves are upward sloping. These findings suggest that UIP tends to hold more closely during normal periods and that U.S. financial conditions play a disproportionate role in shaping global currency risk premia.

More broadly, the results indicate that the yield curve contains economically meaningful information about the nature of UIP deviations. Episodes in which yield curves share the same sign—especially when both are upward sloping—are more closely aligned with the UIP condition. In contrast, episodes in which yield curves move in opposite directions are associated with larger excess returns and more pronounced UIP deviations. An inverted U.S. yield curve, in particular, appears to generate stronger UIP deviations regardless of U.K. conditions. These findings reinforce the regime-dependent view of the UIP puzzle: the UIP deviations are not constant over time and cannot be explained by a single static mechanism across all states of the world.

4   Concluding Remarks

This paper argues that UIP coefficients are not merely unstable; they are both regime-specific and maturity-dependent. Using Eurocurrency/LIBOR rates at the 1-, 3-, 6-, and 12-month maturities, I show that UIP coefficients evolve with the volatility of interest-rate differentials, vary systematically across maturities, and respond to yield-curve regimes. The apparent sign reversal of UIP coefficient estimates after the 2008 Global Financial Crisis must therefore be interpreted with caution—the compression of short-term interest-rate differentials near the zero lower bound introduces econometric complications that can distort the interpretation of the "New Fama Puzzle".

To address this issue, I introduce the term structure of currency deposit rates to disentangle macroeconomic delayed-overshooting mechanisms from financial risk-premium effects. The results suggest that these two explanations are not mutually exclusive. Delayed over-

17

shooting helps explain why short-horizon currency trades tend to violate the UIP condition during normal periods: short-run exchange-rate fluctuations are more volatile than long-run exchange rate movements. By contrast, when short-term interest rates are compressed toward zero by monetary authorities, the term structure considerations become more important in explaining why longer maturities become more informative and why yield curve shapes play a central role. A complete explanation of the UIP puzzle must therefore incorporate both maturity and regime dependence.

Last but not least, this paper shows that UIP deviations are particularly pronounced when U.S. and U.K. yield curves move in opposite directions, suggesting that country-specific shocks become more important when domestic economic conditions diverge. At the same time, the evidence points to a dominant role for U.S. financial conditions in global currency pricing. Episodes with an inverted U.S. yield curve are associated with especially large excess return premia, consistent with the central role of the U.S. dollar in international finance and the convenience-yield interpretation of U.S. safe assets. In short, the UIP condition cannot be understood through a single static regression. Instead, it reflects regime-dependent dynamics in which macroeconomic delayed overshooting and financial risk premia—each operating with different strengths across risk environments—jointly shape the observed UIP deviations.

Figure 1: Negative relationship between excess return coefficients and the volatility of interest rate differentials.
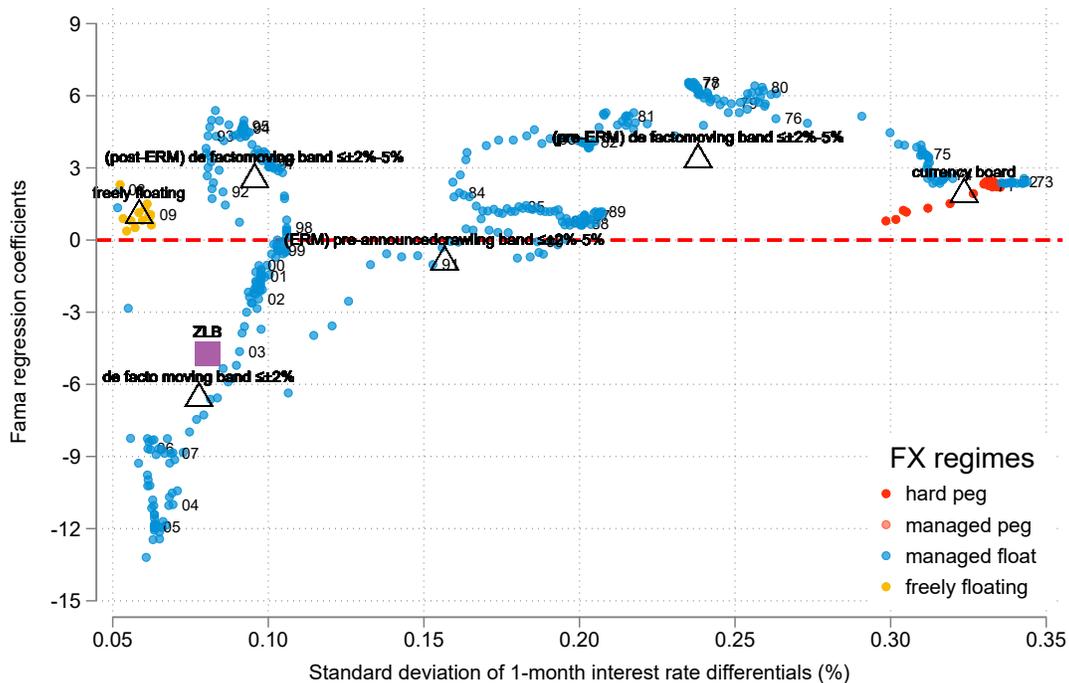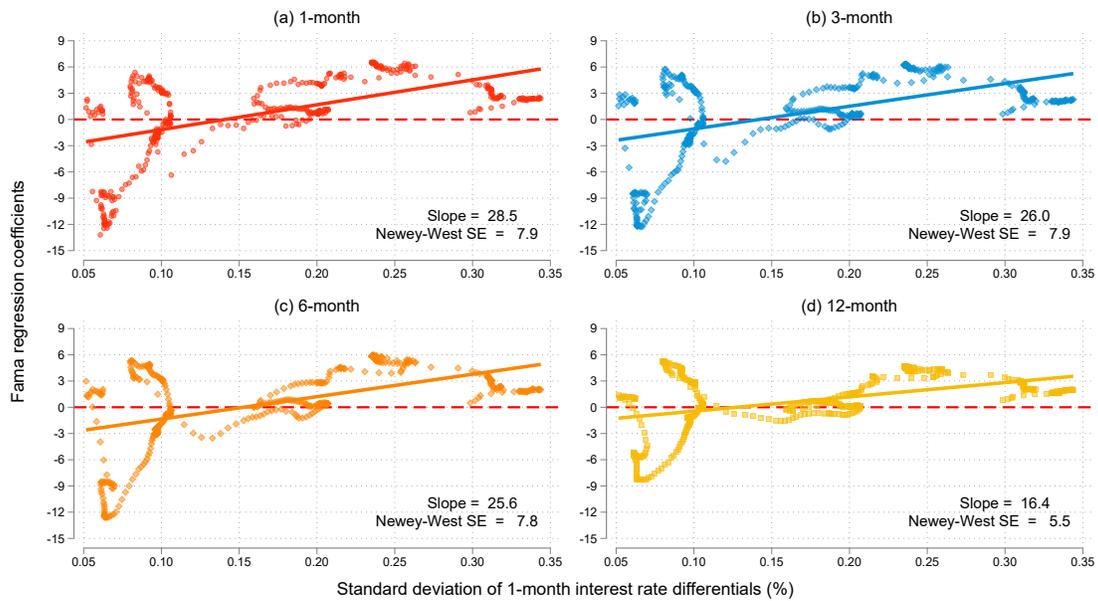

Notes: This figure shows that there is a negative relationship between the excess return coefficient estimates against the standard deviation of 1-month interest rate differentials. Each dot represents one rolling-window estimate (10 years; 120 year-month observations). Dot colors indicate exchange rate regime classifications following Ilzetzki, Reinhart and Rogoff (2019). Point estimates are computed using the same small-sample correction methodology as in Engel et al. (2022). Confidence intervals are omitted for presentation purpose.

Figure 2: Term structure of excess return premium before and after the 2008 Global Financial Crisis.
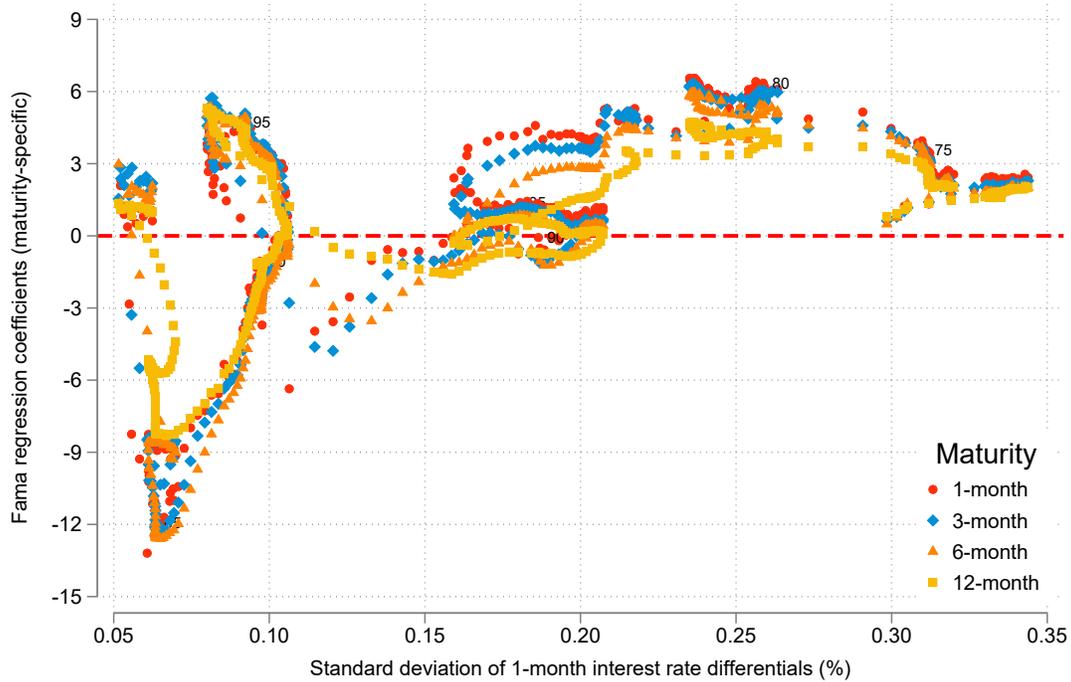

Notes: This figure plots the term structure of excess return coefficients at the 1-, 3-, 6-, and 12-month maturities against the standard deviation of 1-month interest rate differentials. Pre-1998 maturity-specific deposit rates are based on *Financial Times*. Eurocurrency rate quotations, while post-1998 observations use Bloomberg data. The regression specification follows that used in Figure 1.

Figure 3: Responsiveness of excess return coefficients to interest rate differential volatility across maturities.


Notes: This figure illustrates the maturity-specific relationship between excess return coefficients and the standard deviation of 1-month interest-rate differentials. The estimated slopes indicate that short-maturity excess returns are more responsive to interest rate differential volatility, which is a proxy for macro-financial risk, than longer maturities. Newey-West standard errors are reported.

Figure 4: Excess return coefficients under same versus opposite yield curve signs.
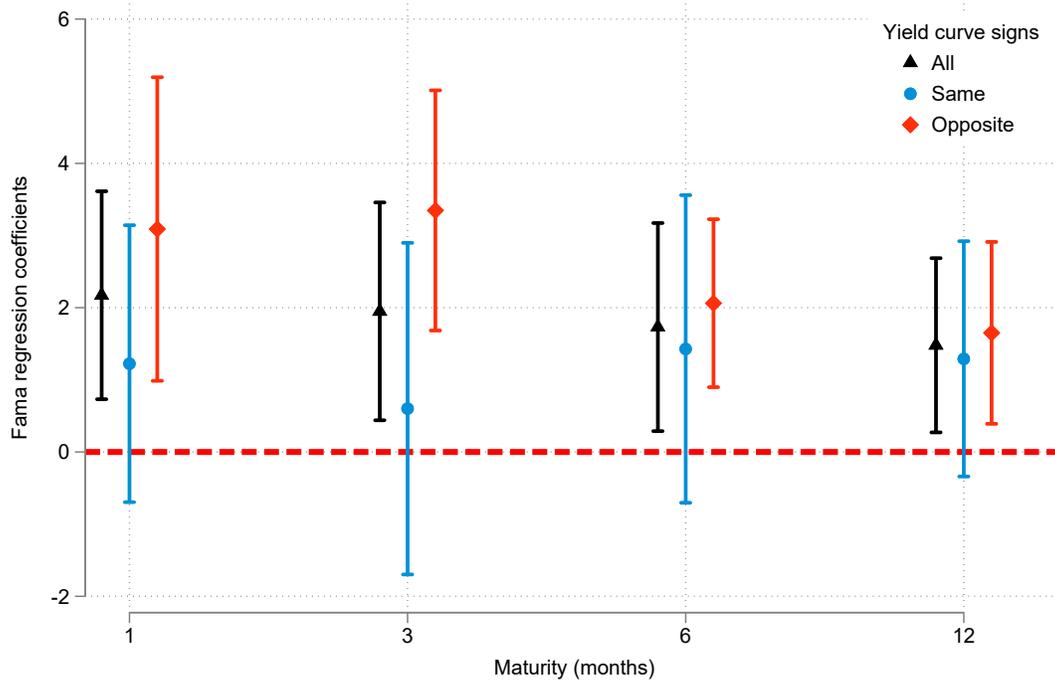
Notes: This figure shows that the UIP deviations are primarily driven by observations in which the U.S. and U.K. yield curves have opposite signs. It reports maturity-specific excess return coefficient estimates after splitting observations according to whether the U.S. and U.K. yield curves share the same or opposite signs. The yield curve slope is defined as the difference between the 12-month and 1-month Eurocurrency/LIBOR rates, both in per annum. A yield curve is upward-sloping if its slope is positive, inverted if negative, and flat when equals to 0. Newey-West standard errors are reported.

Figure 5: Excess return coefficients across yield curve sign combinations.
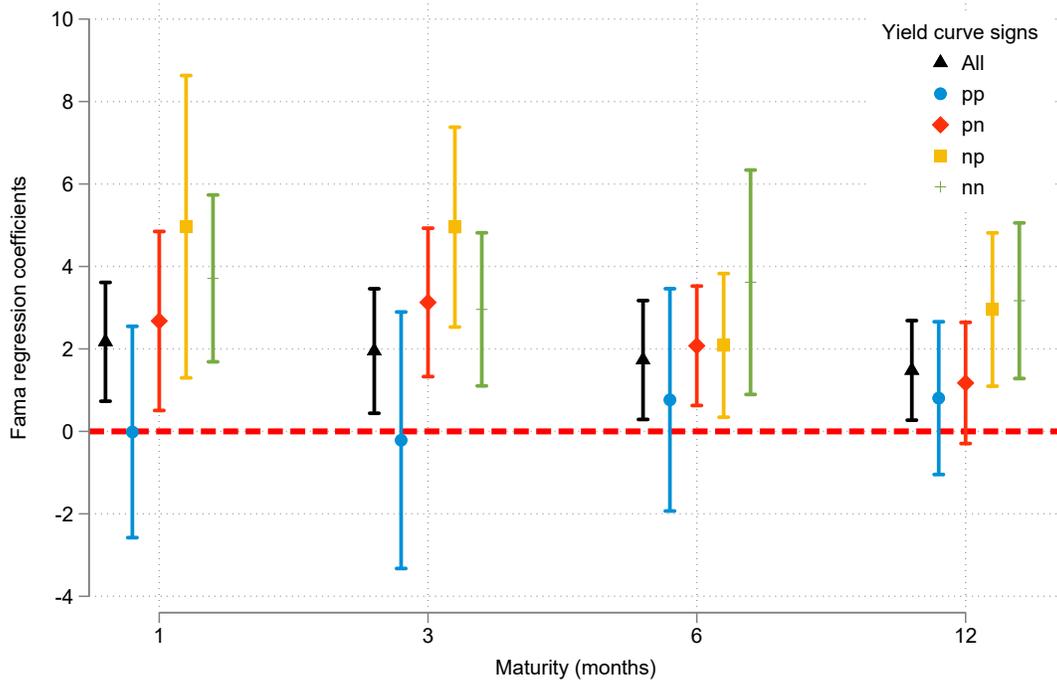
Notes: This figure shows the UIP condition tends to hold more closely during normal state when both the U.S. and U.K. yield curves are upward sloping. It also shows inverted U.S. yield curves are associated with more positive excess return. The maturity-specific excess return coefficients are computed in four yield curve sign combinations: positive-positive, positive-negative, negative-positive, and negative-negative. This pattern is consistent with the dominant role of U.S. financial conditions in global currency risk premia. Newey–West standard errors are reported.

Table 1: Summary statistics: exchange rate changes and interest rate differentials.

	#obs (1)	1-month $\Delta s_{t\to t+1}$ (2)	1-month $i_t^{*,(1)} - i_t^{(1)}$ (3)	12-month $\Delta s_{t\to t+12}$ (4)	12-month $i_t^{*,(12)} - i_t^{(12)}$ (5)
(a) All observations					
	469	-0.10 (2.95)	0.19 (0.23)	-1.19 (11.29)	2.01 (2.29)
(b) Exchange rate regimes					
Currency board	18	0.07 (1.86)	0.03 (0.17)	-0.16 (6.04)	0.58 (0.71)
Pre-ERM moving bands	219	-0.11 (3.22)	0.25 (0.28)	-1.69 (13.02)	2.53 (2.81)
ERM crawling bands	23	-0.39 (4.11)	0.51 (0.05)	-8.36 (13.22)	5.25 (0.83)
Post-ERM moving bands	100	-0.20 (2.54)	0.09 (0.10)	-0.74 (5.36)	1.00 (0.99)
Managed moving bands	96	-0.01 (2.49)	0.14 (0.10)	1.08 (11.74)	1.61 (1.14)
Freely floating	13	0.43 (3.41)	0.04 (0.02)	-1.59 (6.55)	0.13 (0.20)
(c) Yield curve signs: same vs. opposite					
Same	302	-0.19 (2.78)	0.15 (0.19)	-1.59 (11.10)	1.78 (2.08)
Opposite	152	0.08 (3.29)	0.25 (0.27)	-0.50 (12.02)	2.38 (2.61)
(d) Yield curve signs: pp, pn, np, nn					
pp	247	-0.22 (2.80)	0.13 (0.17)	-1.34 (10.56)	1.59 (1.98)
pn	116	0.19 (3.43)	0.32 (0.24)	0.37 (11.92)	2.71 (2.60)
np	36	-0.28 (2.81)	0.03 (0.24)	-3.30 (12.06)	1.32 (2.40)
nn	55	-0.05 (2.69)	0.23 (0.24)	-2.70 (13.30)	2.60 (2.29)

Notes: Notes: This table reports regime-specific summary statistics for exchange rate changes and interest rate differentials at the 1-month and 12-month horizons. In panel (b), exchange rate regime classifications follow Ilzetzki, Reinhart and Rogoff (2019). Yield-curve direction is defined by the sign of the difference between the 12-month and 1-month Eurocurrency or LIBOR rates. In panel (c), "same" indicates that the U.S. and U.K. yield curves share the same sign, while "opposite" indicates that the signs differ. In panel (d), "pp" denotes positive-positive, "pn" positive-negative, "np" negative-positive, and "nn" negative-negative yield-curve configurations. Observations with a flat yield curve are excluded; there are 15 such year-month observations out of 469 in the full sample.

5 APPENDIX FIGURES

Figure A1: Snapshot of Eurocurrency Rates from Financial Times on July 31st, 1975

EURO-CURRENCY INTEREST RATES*

July 31 1975	Sterling	U.S. Dollar	Canadian Dollar	Dutch Guilder	W.German mark	Swiss franc
†Short term ...	$7\frac{3}{4}$-$8\frac{1}{2}$	$6\frac{3}{4}$-$6\frac{1}{4}$	$5\frac{1}{2}$-$6\frac{1}{2}$	1-2	2-3	2-3
7 days notice..	$10\frac{1}{4}$-$10\frac{1}{2}$	$5\frac{5}{8}$-$6\frac{1}{8}$	6-7	$1\frac{1}{2}$-$1\frac{3}{4}$	$2\frac{5}{8}$-$2\frac{7}{8}$	$7\frac{1}{2}$-8
Month	$10\frac{1}{2}$-11	$6\frac{1}{8}$-$6\frac{5}{8}$	$7\frac{1}{4}$-$7\frac{1}{2}$	$2\frac{3}{4}$-$3\frac{1}{4}$	$3\frac{1}{2}$-$3\frac{5}{8}$	$3\frac{3}{4}$-4
Three month..	$10\frac{7}{8}$-$11\frac{5}{8}$	$6\frac{3}{4}$-$7\frac{1}{4}$	$7\frac{3}{8}$-$7\frac{7}{16}$	$3\frac{1}{4}$-$3\frac{1}{2}$	$3\frac{3}{4}$-4	$4\frac{1}{4}$-$4\frac{1}{2}$
Six months	$11\frac{5}{8}$-$12\frac{1}{4}$	$7\frac{3}{4}$-$8\frac{1}{4}$	$8\frac{1}{16}$-$8\frac{5}{8}$	$5\frac{1}{8}$-$5\frac{5}{8}$	$4\frac{5}{8}$-$4\frac{7}{8}$	$5\frac{1}{4}$-$5\frac{1}{2}$
One year........	$12\frac{1}{2}$-15	$8\frac{1}{4}$-$8\frac{3}{4}$	$8\frac{5}{16}$-$8\frac{7}{8}$	$6\frac{5}{8}$-$6\frac{7}{8}$	$5\frac{3}{4}$-6	$5\frac{3}{4}$-6

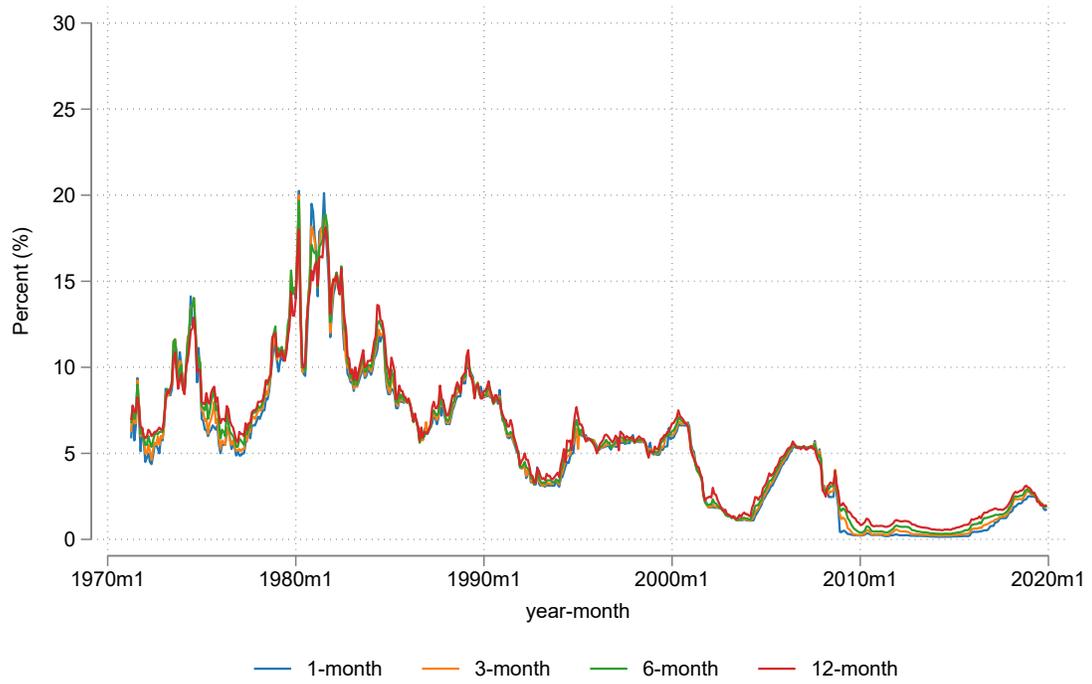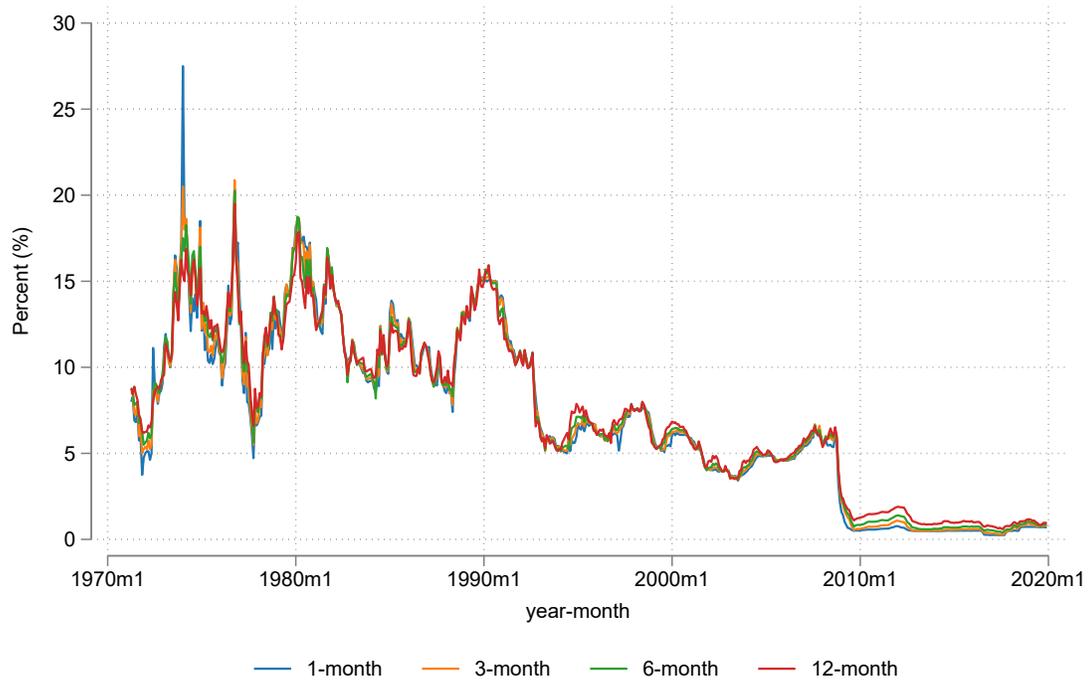Figure A2: Maturity-specific Eurocurrency/LIBOR Rates in the United States.

Figure A3: Maturity-specific Eurocurrency/LIBOR Rates in the United Kingdoms.

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