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Do Professional Forecasters Follow Uncovered Interest Rate Parity?

Abstract

Not according to our data. We use two data sets to test whether professional forecasters follow uncovered interest rate parity (UIP) when making their exchange rate predictions both based on point prediction and direction. We find that professional forecasters generally do not follow UIP across a range of currencies and horizons. Given the prevalence of the UIP condition in our international macro models, these results reiterate the importance of finding the drivers for these deviations.

JEL-Codes: F310, F370.

Keywords: focus economics, Bloomberg Survey, exchange rates.

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1 Introduction

One fundamental relationship in international macroeconomics and finance is the non-arbitrage condition between interest rates and exchange rate expectations. Specifically, the return earned by investing 100 US Dollars in a US deposit for three months should be the same as the expected return when exchanging 100 USD into foreign currency today, placing the foreign currency into an equivalent foreign deposit account for three months and exchanging the foreign currency back into USD at the end of the three month period using the expected exchange rate. This non-arbitrage condition is uncovered interest rate parity (UIP). More formally,

$$E(s_{t+1}) - s_t = i_{t,X} - i_{t,USD}$$
(1)

where $E(s_{t+1})$ is the log of the expected spot exchange rate in three month's from period t denoted as foreign per USD, s_t is the log of the current spot exchange rate, $i_{t,X}$ is the foreign interest rate earned when depositing money for the next three months and $i_{t,USD}$ is the corresponding US deposit interest rate.¹

The literature has found mixed results when testing whether this condition holds. Fama (1984) famously showed that this condition does not hold ex post. Specifically, when replacing the expected exchange rate with the realized one, he found the coefficient to be negative, leading to the forward premium puzzle. More recent estimates find the coefficient to be insignificant in many cases (e.g. Engel et al. (2022) and Zigraiova et al. (2021)) or slightly positive but below unity (e.g. Baillie et al. (2023)). Tests of equation 1 using survey expectations are more scarce. The literature using surveys of professional forecasters often find that the unity coefficient cannot be rejected in line with UIP (e.g. Frankel and Froot (1987), Ito (1990), Cuestas et al. (2015)). We want to follow the survey literature and test whether professional forecasters follow UIP for a wide set of exchange rates both in terms of direction

¹This non-arbitrage condition assumes that there are no transaction costs and that the risk of the two investment strategies is identical.

and in terms of magnitude.

As we find clear departures from equation 1, we seek to identify the potential drivers of these deviations. Specifically, we test whether it was ex post optimal to follow UIP by repeating the Fama regression and testing some assumptions to make the Fama regression valid for testing UIP. Testing these assumptions also allows us to assess the role of risk premia (e.g. see Avdjiev et al. (2019) and Cerutti et al. (2021)). We further access whether interest rates should be weighted differently based on the prediction errors. After running the baseline regressions based on the average predictions of professional forecasters, we check whether the results are any different when looking at individual forecasts.

The remainder of the paper is structured as follows: The next section describes our data followed by some UIP tests using the average point predictions. Next we present our directional results and check what insight can be gained by looking at individual forecasters. In the last section we conclude.

2 Data

We start with a description of our data set. We collected historical data for three month interest rates and exchange rates for the US, the Euro Area, the UK, Japan, Australia, Canada, Colombia, South Africa, Hungary, Poland and Sweden and matched them with exchange rate predictions collected by Focus Economics. The forecast data availability varies by country, summarised in table 1 and the dataset is quarterly, covering the period from 2009 to 2024. This extensive dataset enables us to test UIP for the currency pairs EUR/USD, GBP/USD, USD/JPY, AUD/USD, USD/CAD, USD/COP, USD/ZAR, EUR/HUF, EUR/PLN, and EUR/SEK, both at the average and individual forecaster level.

In addition, we collect quarterly data from Bloomberg that allows us to test UIP for the currency pairs EUR/USD, USD/CHF, USD/PLN, GBP/USD, USD/CAD, USD/JPY and USD/CAD from 2006 to 2022. The number of forecasters for each currency pair is considerable.

FE	No of Forecasters	Bloomberg	No of Forecasters
ARS	57	CAD	99
AUD	33	CHF	122
BRL	60	EUR	159
CAD	35	GBP	135
CNY	59	JPY	132
COP	47	PLN	64
EUR	78	TRY	57
INR	42	Total	175
JPY	52		
MXN	56		
ZAR	31		
TRY	42		
GBP	51		
HUF	40		
PLN	42		
SEK	26		
Total	258		

Table 1: Number of forecasters

3 Point forecast test of UIP

We start with the test whether the average predictions by professional forecasters are in line with UIP by estimating equation 1 directly. Specifically, we estimate

$$E(s_{t+1}) - s_t = \alpha + \beta(i_{t,X} - i_{t,USD}) + \varepsilon_t.$$
⁽²⁾

The results are presented in Table 2, with columns 1 and 2 showing the coefficient on interest rate differentials and its standard error. The significance starts are expressed in terms of their difference from unity, as unity indicates perfect alignment with UIP. We find that the coefficients are significantly different from unity for almost all currency pairs, independent of the survey used (this contrasts with Frankel and Froot (1987) for example). One interesting pattern is that developing countries tend to have lower than optimal coefficients while developed countries tend to have coefficients higher than unity.

Next, we want to check whether actual exchange rate changes followed UIP. This is one way to test whether it was optimal for forecasters to follow UIP. If the actual change has a very different coefficient from unity, it might be optimal to ignore the non-arbitrage condition and instead follow the empirical coefficient. In order to test this, we estimate the excess returns test or forward premium test by Fama (1984). Instead of interest rates matching the expected exchange rate returns, this test checks whether interest rates match the realized exchange rate returns. That is, we run the regression

$$s_{t+1} - s_t = \alpha + \beta(i_{t,X} - i_{t,USD}) + \varepsilon_t, \tag{3}$$

As shown in columns 3 and 4 of Table 2, while fewer coefficients are significantly different from unity, the pattern between developing and developed countries is the same as for UIP. That is, developing countries tend to have smaller coefficients than developed ones. Note that while the unity coefficient cannot be rejected for most developed countries, neither can $\beta = 0$ be rejected for most of them. Those estimates are in line with Engel et al. (2022), who found that since the regression by Fama (1984), the coefficients have changed from negative to insignificant.

3.1 Efficiency of Point Forecasts

In this section, we want to address two additional efficiency question of UIP deviations. The first one tests whether the interest rate differences can predict forecast errors. If deviating from UIP is not optimal for forecasters, the prediction errors should be correlated with the

	(1)	(2)	(3)	(4)	(5)
Currency	Avg Coef	SE	Fama Coef	SE	Obs
ARS	0.505***	0.027	0.743**	0.110	44
AUD	2.083^{***}	0.408	2.610	2.006	44
CAD	2.629^{**}	0.818	9.330**	3.571	44
CNY	0.162^{***}	0.268	-0.582***	0.389	44
COP	0.962	0.460	-3.227**	1.690	44
EUR	3.400^{***}	0.607	1.247	2.672	44
JPY	2.660^{***}	0.606	3.611	1.660	40
MXN	2.092^{**}	0.553	-6.301***	1.951	43
ZAR	1.807^{*}	0.480	-0.457	3.415	37
TRY	0.213^{***}	0.237	0.755	0.372	44
GBP	3.223^{***}	0.779	1.105	3.147	44
HUF	0.014^{***}	0.055	-0.474***	0.494	44
PLN	0.044^{***}	0.158	0.118	0.858	44
SEK	0.964	0.832	3.206	2.422	43
$\mathrm{CHF}^{\#}$	2.018^{***}	0.376	-1.310*	1.267	63
$\mathrm{PLN}^{\#}$	0.518	1.172	1.524	1.351	40
$GBP^{\#}$	1.898^{**}	0.426	1.430	1.573	68
$\mathrm{EUR}^{\#}$	2.023^{***}	0.337	0.905	1.714	63
$CAD^{\#}$	1.752	0.790	5.211^{*}	2.316	41
$\mathrm{TRY}^{\#}$	0.165^{***}	0.320	0.087^{***}	0.264	40
JPY#	2.579**	0.632	0.677	1.249	59

Table 2: Average forecasters

Note: The table shows time-series regressions with Newey-West standard errors; *p<0.1; **p<0.05; ***p<0.01 in terms of difference from unity. # Bloomberg Survey.

interest rate difference. We hence run the regression

$$E(s_{t+1}) - s_{t+1} = \alpha + \beta(i_{t,X} - i_{t,USD}) + \varepsilon_t.$$
(4)

The results are shown in the first two columns of Table 3. With four exceptions, prediction errors cannot be explained by placing the suboptimal weight on interest rate differences. This finding suggests that, broadly, the correct weight is applied to the interest rate differentials and deviations from unity do not cause predictable biases.

Second, we want to test an assumption used in the Fama regression. In order for the

Fama regression to test UIP, it is necessary to assume that $E_t(s_{t+1} - s_t) = s_{t+1} - s_t + \nu_t$ and $cov(\nu_t, (i_{t,X} - i_{t,USD})) = 0$. Otherwise, the regression coefficients become biased. Equation 3 is thus a joint test whether UIP holds and the markets place the appropriate weight on the interest rate differential. However, since we ν_t can be calculated ex post, we can directly test the latter condition by regressing

$$F_{t,t+1} - s_{t+1} = \alpha + \beta(i_{t,X} - i_{t,USD}) + \varepsilon_t.$$
(5)

where $F_{t,t+1}$ is the forward rate for period t+1 in period t. Testing whether $\beta = 0$ can also be used to assess the presence of credit risk premia. Unlike the approach in Du et al. (2018), there is no need to construct risk measures here. Assume that the risk free interest rate differential is an unbiased predictor of the exchange rate. Further assume that USD credit risk is zero but EUR credit risk is very large. Then Euro interest rates would be substantially larger and the interest rate parity condition becomes a biased predictor of the exchange rate and $\beta \neq 0$. As the results in columns 3 and 4 of Table 3 show, $\beta = 0$ cannot be rejected for most currency pairs, in line with the results found in Du et al. (2018) about credit risk playing only a minor role in deviations from CIP. This is particularly the case for developed countries, as several developing countries appear to have a bias. Note that a risk premium argument for most countries only makes sense for the currencies with a positive coefficient as this is in line with the USD investment having a lower risk.

Taken together, the ex post regressions show that deviations from UIP do not generally lead to larger prediction errors and are not predominantly driven by risk premia. In turn, one can infer that interest rates play a larger role for exchange rate predictions in developed countries than in developing countries, as the coefficients were broadly larger than unity for in column one of Table 2 for developed and smaller than unity for developing countries. This is because they were neither generally too large or small based on column one of Table 3.

	(1)	(2)	(3)	(4)	(5)
	Efficient	SE	CIP	SE	Obs
ARS	-0.239**	0.103	-0.013***	0.140	44
AUD	-0.527	2.163	-1.626	2.008	44
CAD	-6.702*	3.443	-8.247***	3.560	44
CNY	0.744	0.453	1.165	0.451	44
COP	4.189**	1.714	4.328^{*}	1.715	44
EUR	2.153	2.509	-0.241	2.673	44
JPY	-0.952	1.720	-2.570**	1.644	40
MXN	8.393***	2.139	7.576***	1.975	43
ZAR	2.263	3.489	1.315	3.432	37
TRY	-0.542	0.408	0.203^{**}	0.378	44
GBP	2.119	3.352	-0.094	3.143	44
HUF	0.487	0.489	0.484	0.494	44
PLN	-0.074	0.961	1.112	0.932	44
SEK	-2.241	2.748	-2.262	2.405	43
$\mathrm{CHF}^{\#}$	3.328^{**}	1.371	2.290	1.269	63
$\mathrm{PLN}^{\#}$	-1.006	2.269	-0.536	1.327	40
$\mathrm{GBP}^{\#}$	0.468	1.540	-0.567	1.620	68
$\mathrm{EUR}^{\#}$	1.119	1.683	-0.013	1.740	63
$CAD^{\#}$	-3.459*	1.867	-4.120**	2.320	41
$\mathrm{TRY}^{\#}$	0.078	0.527	0.893	0.262	40
JPY [#]	1.902	1.711	0.410	1.210	59

Table 3: Efficient Forward Rates

Note: The table shows time-series regressions with Newey-West standard errors; *p<0.1; **p<0.05; ***p<0.01. # Bloomberg Survey.

4 Directional forecast test of UIP

We have seen in the previous section that professional forecasters do not follow UIP with their point forecasts. Indeed, their point forecasts often predict much larger changes than implied by the respective interest rates. At the same time, trading profits largely depend on whether the direction is correctly predicted, rather than whether the exact magnitude is correctly predicted. As a result, testing whether the direction is in line with UIP might be a more relevant test.

For quite a few currency pairs, the interest rates difference always predicts an appreciation (or depreciation) which precludes the use of certain standard tests like Pesaran and Timmer-



Figure 1: Prediction Accuracy vs. prediction in line with UIP (FE)

mann (1992), Anatolyev and Gerko (2005) or Burgi (2024) and have to restrict ourselves to showing the proportions.

To assess whether forecasters follow UIP, we plot two sets of graphs for each data set. The first one plots the mean (absolute) prediction error against whether the prediction was in line with UIP. As the left-hand side plots in Figures 1 and 2 show, forecasters deviate substantially from UIP and predicting in line with UIP might increase the absolute prediction error. The right-hand side plots in Figures 1 and 2 show, how often the correct direction was predicted against whether the prediction was in line with UIP. Interestingly while the absolute prediction error increases suggesting that following UIP for point prediction accuracy is a bad idea, the directional accuracy increases implying that following UIP is a good idea for getting the direction right. In both cases, there is a lot of noise and hence these implications should be taken with a grain of salt.



Figure 2: Prediction Accuracy vs. prediction in line with UIP (BBG)

5 Individual Forecasters

While our baseline results are indicative that forecasters do not follow UIP, they might be driven by some outliers. As a result, we will now look at the distribution for individual forecasters to ensure that the average results hold at the individual level as well.

5.1 Point Forecasts

First, we run individual level regressions and look at the distribution of coefficients. We include only those forecasters who have made at least 10 predictions in our sample period. We report the individual coefficients as histograms (and kernel densities) in Figures 3 and 4. For both surveys, the peak in the distribution is around the unity coefficient and one could conclude that UIP broadly holds. However, when we look at the standard errors of the OLS regressions, we find that a substantial number of coefficients are significantly different from

unity.² We included black circles in the two figures for each currency pair that is statistically significantly different from unity at the 5% level. For the Bloomberg sample, there are 170 of 432 forecasts significantly different while for the Focus Economics sample, there are 202 of 371 forecasts. This means that more than 45% of forecasts are not in line with UIP on average and a strong deviation of the non-arbitrage condition. While this might seem a weaker result than for the average coefficient in Table 2, the 5% threshold might be overly generous. After all, a non-arbitrage condition should hold exactly all the time aside from transaction costs. Indeed, a forecast following UIP exactly should have a coefficient of unity and a standard error of 0. As a result, deviations at the relatively lenient 5% threshold show that there are substantial and clear deviations from UIP.

5.2 Directional Forecasts

Next, we look at the directions of the predictions at the individual level. We repeat the earlier exercise on the direction of the average prediction for each individual forecaster with at least 6 predictions.³ As for the average forecasts, we plot how closely a forecast follows UIP against the mean absolute prediction error and the percentage of correctly predicted directions in Figures 5 and 6.

Compared with the Figures for the average prediction, the individual predictions exhibit considerably more noise. Several forecasts in the Focus Economics dataset closely follow UIP in terms of direction, whereas this is rarely observed in the Bloomberg dataset. This is due to the currencies covered as almost all of them are developing countries with forecasts for USD/ARS always being in line with UIP for all forecasters in the sample. The positive correlation between following UIP and the point prediction error or directional accuracy is

²Since there are many gaps in the forecasts at the individual level, we cannot use Newey-West standard errors.

 $^{^{3}}$ We experimented with several thresholds for both directional and point forecasts and the results are qualitatively the same.





The figure plots a histogram and kernel density of the UIP coefficient for individual forecaster OLS regressions. In addition, the coefficients that are significantly different from unity are shown individually.





The figure plots a histogram and kernel density of the UIP coefficient for individual forecaster OLS regressions. In addition, the coefficients that are significantly different from unity are shown individually.



Figure 5: Prediction Accuracy vs. prediction in line with UIP (FE)



Figure 6: Prediction Accuracy vs. prediction in line with UIP (BBG)

more noisy than for the average predictions and dependent on which exact observations are included or not. Overall, the directional results further demonstrate that forecasts do not generally align with UIP.

6 Conclusion

We assessed whether professional forecasters follow uncovered interest rate parity (UIP) when making exchange rate predictions. We found strong evidence against this. In fact, some forecasters predict almost exclusively the opposite of UIP, raising important questions about the alternative models they may be using, such as carry trade strategies, and whether UIP holds more generally in practice. Given that professional forecasters are at the forefront of exchange rate predictions, these deviations from UIP have significant implications for international finance modeling.

While UIP is theoretically robust, its practical application in exchange rate forecasting is limited. The inconsistencies we observed highlight the need for a more nuanced approach to modelling exchange rates, one that takes into account the variability in forecasting methods and the potential influence of factors beyond interest rate differentials. While a detailed exploration of these questions lies beyond the scope of this paper, our findings provide insights that contribute to narrowing down these issues and suggest avenues for future research in improving the accuracy and applicability of exchange rate prediction models.

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