Dance of Rates: Insights into Uncovered Interest Rate Parity in Ukraine

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Research justification

Motivation

An important topic in international finance, that has not been yet covered for the Ukrainian economy.

Research question

Does the evidence suggest that the validity of uncovered interest rate parity in Ukraine under a flexible exchange rate regime diverges from findings in other economies?

Hypothesis

The relation between the change in the UAH exchange rate and Ukraine/US interest rates is consistent with UIP.

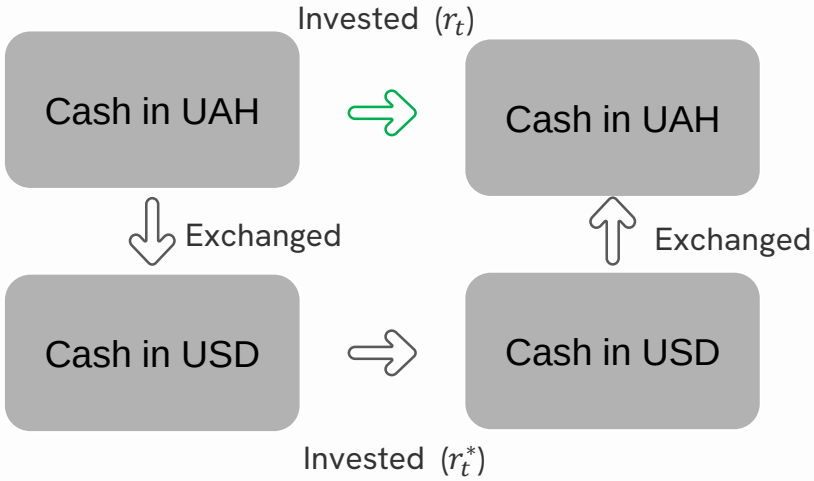
The concept of uncovered interest rate parity

- The interest differential is on average equal to the expected exchange rate change.

$$1 + R_t = (1 + R_t^*)\frac{E_t(S_{t+\Delta})}{S_t}$$

$$\Delta s = r - r^* + (risk_{premia})$$

- Theoretical outcome: countries with high interest rates should, on average, have their currencies depreciating.



“Forward and spot exchange rates” by E. Fama (1984)

Fama puzzle (forward premium anomaly): empirical relation between depreciation rate and interest rate differential is negative rather than positive.

- Domestic currency appreciates when domestic nominal interest rates exceed foreign interest rates.

Additional findings:

- forward exchange rates are biased predictors of future spot exchange rates;
- the forward premium (the difference between the forward rate and the current spot rate) consists of two components: the expected change in the spot rate and a risk premium.

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

“The new Fama puzzle” by M. Bussiere et al. (2022)

- The bivariate relationship between ex-post depreciation and interest differentials is subject to breaks. Specifically, when the sample is limited to the more recent period characterized by near-zero interest rates (post-2008 financial crisis), the forward premium predicts exchange rate changes in the correct direction.
- Risk proxies like the VIX (CBOE volatility index) have some explanatory power, but they do not fully account for the observed changes.
- Uncovered interest parity regressions estimated using survey data are less indicative of breaks.

M. Bussiere et al. The new Fama puzzle. *IMF Economic Review*, 70:5451-486, April 2022.

“Uncovered interest rate parity in Central and Eastern Europe: convergence and the global financial crisis” by F. Filipozzi (2012)

- Generally, the UIP condition is not supported for CEE countries (except Romania).
- Coefficient estimates are unstable and depend on the choice of sample. The explanatory power of regressions drops dramatically after the global Financial crisis.
- The VIX exhibits substantial explanatory power for some of the studied economies. This suggests that global risk factors have a considerable impact on the liquidity of financial markets and the arbitrage processes underlying the UIP.

F. Filipozzi et al. Uncovered interest rate parity in Central and Eastern Europe: convergence and the global financial crisis. *Discussions on Estonian Economic Policy: Theory and Practice of Economic Policy*, 20(1), December 2012.

Data

Data criteria:

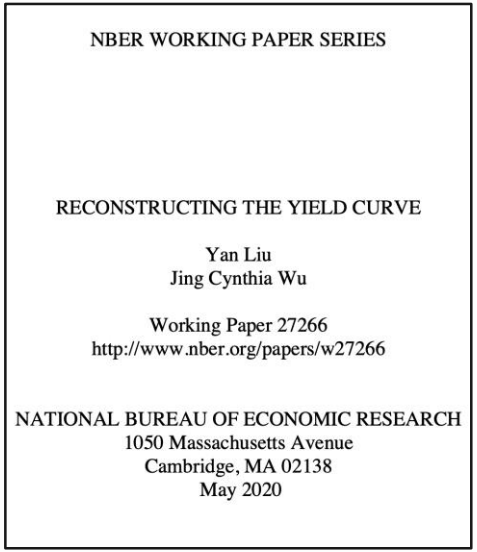
1. Real-world relevance
2. Analysis suitability

Studied period:

December 2015 – February 2022. Weekly frequency.

Zero coupon rate is the optimal measure of interest rates.

- Nelson-Siegel model for Ukrainian interest rate based on NBU parameters (link).
- Non-parametric kernel-smoothing model for US interest rate (link).



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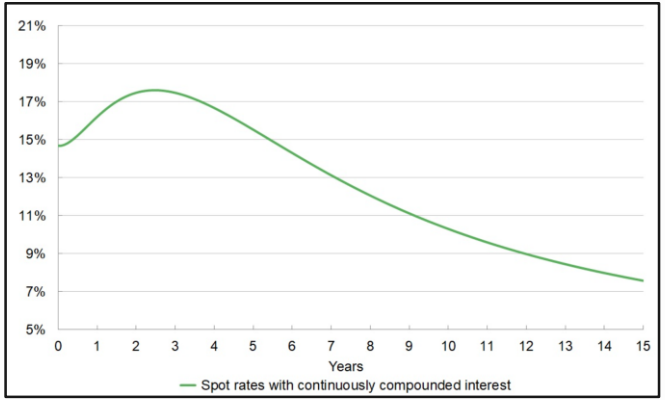
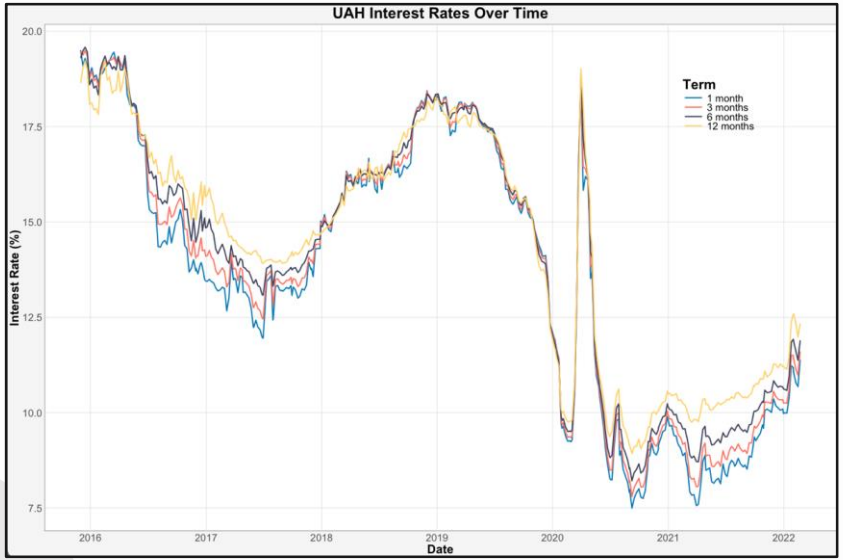
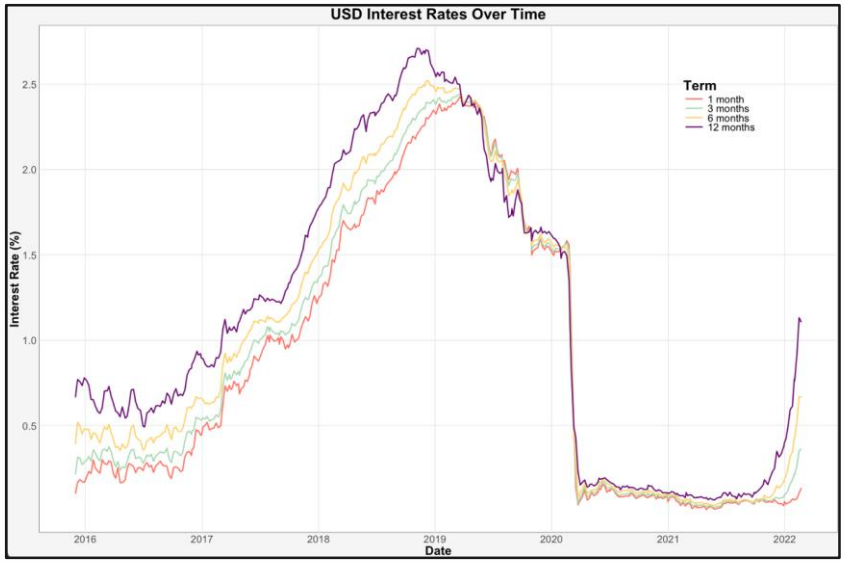


Data description

- The direction of movement of interest rates coincides only for specific periods.
- Maturities: 1, 3, 6, 12 months. Observations for each maturity.
- The spreads between different maturities vary greatly.





Methodology

$$(s_{t+\Delta} - s_t) = \alpha + \beta(r - r^*)_t + e_t,$$

Key assumptions

1) Free capital mobility (transaction costs are negligible)
2) Risk neutrality (liquidity, maturity, default)
3) Unbiased expectations

Results

Horizon	α	(s. e.)	β	(s. e.)
1-month	1.427*	0.628	-1.106.	0.574
3-month	3.156**	1.166	-0.809*	0.349
6-month	3.715*	1.618	-0.457.	0.238
12-month	2.271	2.492	-0.06	0.179

Key observations

1) Betas are not equal to 1, instead rather negative.
2) Betas are moving towards 0 as the investment horizon increases.
3) Alphas are significant and positive.
4) Coefficients are close to Fama's (1984) estimates.

Results

How do the interest rates affect exchange rate differential separately?

$$(s_{t+\Delta} - s_t) = \alpha + \beta_1 r_t + \beta_2 r_t^* + e_t,$$

Horizon	α	(s. e.)	β_1	(s. e.)	β_2	(s. e.)
1-month	1.310*	0.635	-0.165	0.219	-0.067	0.052
3-month	2.872*	1.168	-0.556	0.382	-0.130	0.094
6-month	3.395*	1.610	-0.909.	0.482	-0.122	0.126
12-month	2.605	2.433	-2.124***	0.598	0.105	0.180

Key observations

1) Slope coefficients for UAH rates are significantly negative for longer investment horizons and insignificant for shorter ones (UIP predicts 1).
2) Slope coefficients for USD rates are statistically insignificant (UIP predicts -1).
3) Large intercepts persist

GLS model

Although the stationarity condition is satisfied,

- The Durbin-Watson test shows high autocorrelation;
- According to the Breusch-Pagan test, heteroscedasticity is present for some investment horizons.

The Generalised Least Squares (GLS) model could address both issues.

- AR(1) correlation structure for errors has been chosen.

Horizon	α	(s. e.)	β	(s. e.)
1-month	3.370**	1.555	-2.855**	1.398
3-month	9.752**	3.595	-2.309**	0.773
6-month	8.492**	3.945	-1.037**	0.457
12-month	13.617*	6.934	-0.681***	0.221

Results. Introducing risk premia component

$$(s_{t+\Delta} - s_t) = \alpha + \beta(r - r^*)_t + \gamma * VIX + e_t,$$

Horizon	α	(s. e.)	β	(s. e.)	γ	(s. e.)
1-month	4.445**	1.695	-2.902*	1.452	-0.671.	0.402
3-month	9.656**	3.541	-2.132**	0.799	-0.119	0.144
6-month	8.425*	3.941	-0.785.	0.467	-0.183*	0.080
12-month	13.745*	6.742	-0.598***	0.224	-0.068.	0.036

Key observations

1) The effect of risk premia variable introduction (VIX) is very mild but has unexpectable direction.
2) Risk proxy has low explanatory power.

Conclusions

Results showed that uncovered interest rate parity does not hold in Ukraine for the observed period.

The risk premia component (VIX proxy) failed to explain the Fama puzzle for Ukrainian economy.

Data frequency

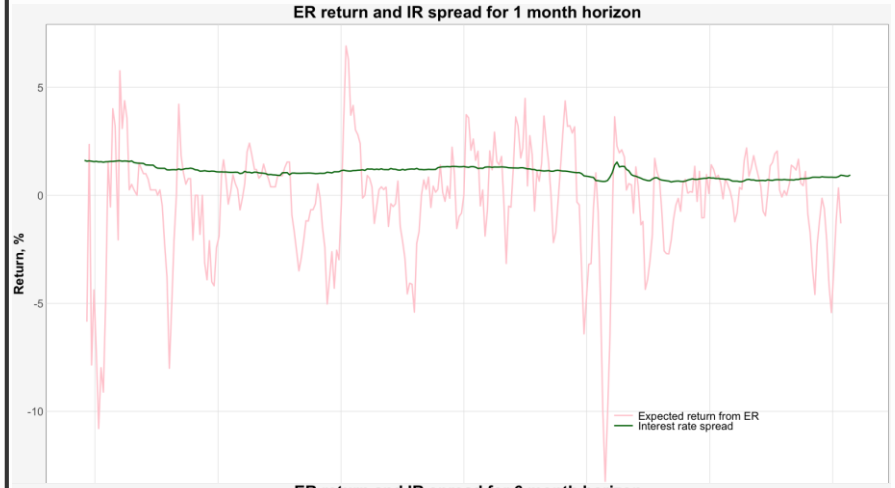
Weekly data is uncommon in the literature. Presumably, less frequent data can show different relationships.

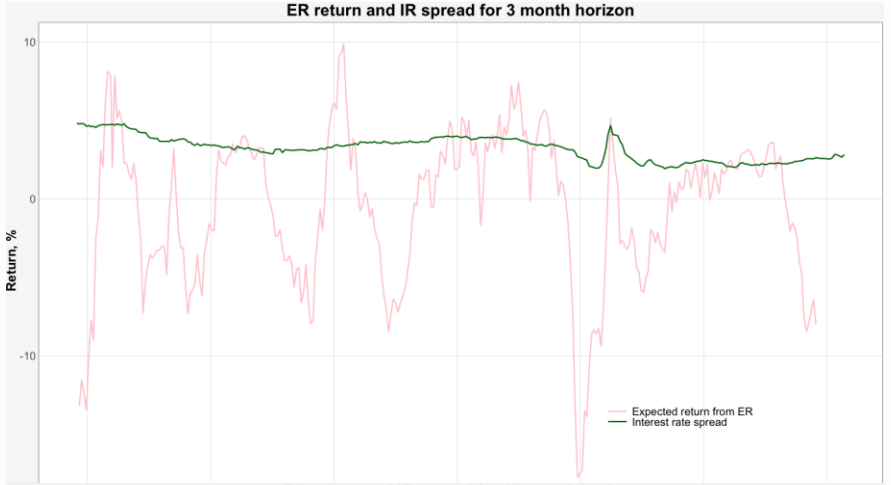
Structural breaks

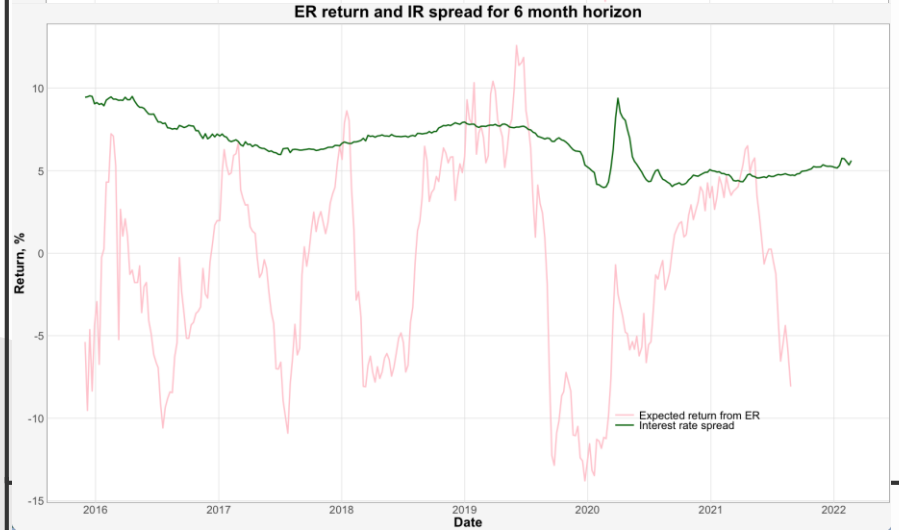
UIP is expected to hold better for specific periods. Regime switching model should be considered.

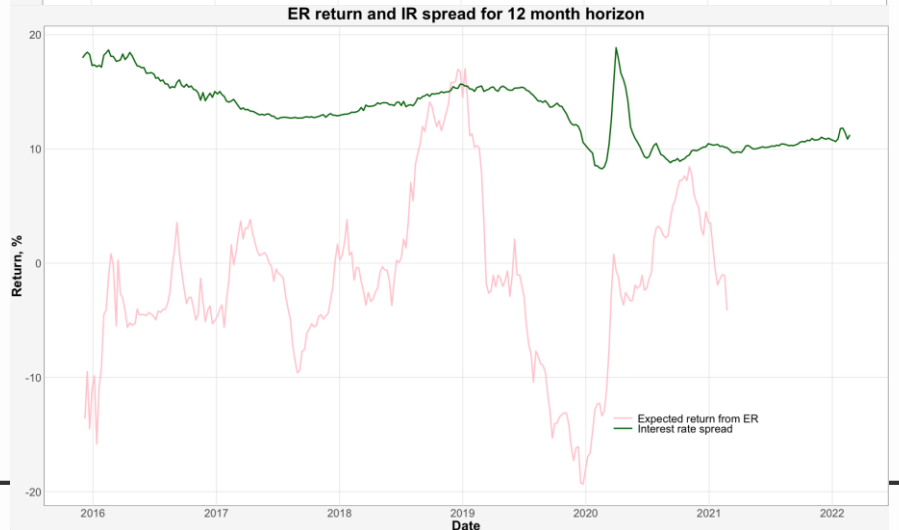
Thank you for your attention!

Do you have any questions?


ER return and IR spread for 1 month horizon
Return, %
5
0
-5
-10
Expected return from ER
Interest rate spread


ER return and IR spread for 3 month horizon
Return, %
10
0
-10
Expected return from ER
Interest rate spread


ER return and IR spread for 6 month horizon
Return, %
10
5
0
-5
-10
-15
2016
2017
2018
2019
2020
2021
2022
Date
Expected return from ER
Interest rate spread


ER return and IR spread for 12 month horizon
Return, %
20
10
0
-10
-20
2016
2017
2018
2019
2020
2021
2022
Date
Expected return from ER
Interest rate spread

Descriptive statistics of studied variables

FX returns, %				
Term	Min	Max	Mean	Median
1 month	-7.627	12.696	0.215	-0.248
3 months	-10.651	15.213	0.460	-0.489
6 months	-9.479	14.550	0.588	-0.226
12 months	-15.117	20.453	1.225	1.948
Interest rate spreads, %				
Term	Min	Max	Mean	Median
1 month	0.616	1.617	1.055	1.087
3 months	1.921	4.815	3.202	3.349
6 months	3.980	9.541	6.486	6.692
12 months	8.260	18.870	13.120	13.350