ANALYZING THE COVERED INTEREST PARITY DEVIATIONS IN VIETNAM BY USING THE POOLED MEAN GROUP METHOD

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Abstract

Vietnam's foreign exchange market is developing and perfecting over time, it is more and more closely linked with world economies, create various types of trading in the foreign exchange market, including covered interest arbitrage (CIA). Along with fluctuations in domestic and foreign exchange rates and interest rates, policy makers will set up appropriate strategies, policies and solutions to increase the level of covered interest arbitrage to correct for covered interest rate parity (CIP). However, in order to better understand Interest Rate Parity (IRP), not only is there a relationship between exchange rate and interest rates, but according to previous studies, there are macroeconomic factors that also affect the covered interest parity. By using the Pooled Mean Group (PMG) method to estimate the weekly data sample of 5 currencies of the US, China, Korea, Japan and European countries (USD, CNY, KRW, JPY, EUR) in 2019, I conclude that the foreign exchange market in Vietnam exists interest rate parity deviations.

Keywords: *Foreign exchange market, CIA, interest rate parity, PMG method.*

1. Introduction

The foreign exchange market is a highly traded market, globally connected via the Internet, and is also the largest speculative market. Therefore, it is very sensitive to infomation as well as economic and political events taking place in the world such as: political situation, inflation rate, unemployment rate, production index,... This will create many opportunities for different types of businesses, such as covered interest arbitrage. Interest rate arbitrage is investing abroad to enjoy higher interest rates but with hedging against exchange rate risk through forward contracts. For the market to reach equilibrium, there must be a large enough amount of covered interest arbitrage (CIA) that such solutions involve the theory of interest rate parity (IRP), in this state. The difference between the forward rate and the spot rate is properly offset by the interest rate differential between the two countries and it does not create any opportunity for covered interest arbitrageurs. The market reaching a state of interest rate parity will bring benefits to businesses and investors, although it is not possible to implement CIA to make a profit, at this time, the interest rate

will accurately reflect the market's price, so businesses will not be able to make profits. Businesses will not have to fear that they have to raise capital at a higher interest rate than its true value. The Vietnam interbank market was established in 1994 and the rapid development of the foreign exchange market due to the use of the Internet for transactions means that the foreign exchange market in Vietnam is increasingly connected. closely with foreign markets, especially developed countries. Due to the connection, the exchange rate and interest rate movements of currency pairs for the Vietnamese dong are more and more volatile and more sensitive than before, which means that the CIP deviation is more volatile more . With the research objective is to test the existence of covered interest rate parity (CIP) and the relationship of hedging interest rate parity with macroeconomic factors, the author uses the Pooled Mean Group method for regression for weekly datasets of 5 countries and regions that are the main trading partners with Vietnam (US, China, Japan, Korea and EU) in 2019.

2. Method

2.1. Literature review
Theory of Interest rate parity

When market forces render interest and exchange rates no opportunity for covered interest arbitrage, we are in a state known as Interest Rate Parity (IRP). In this equilibrium, the difference between the forward and spot rates between the two currencies is offset by the difference in the interest rates of the two countries. If investors want a higher rate of return from investing abroad, there is a rebalancing effect as investors pay more per unit of foreign currency (the spot rate) and receive less per unit of the pre-sold foreign currency (the forward rate). Note that a forward rate greater than the spot rate will receive a premium and smaller will represent a discount.

The relationship between the premium (or discount) of a foreign currency and the interest rate based on this currency under the IRP can be determined as follows: Let us consider an investor who conducts a covered interest arbitrage, this investor's rate of return from covered interest rate arbitrage is determined as follows: $r_t = (1+i_f)(1+p)-1$

With: $p = \dfrac{F}{S} - 1$

S : spot rate of foreign currency

F : forward rate when converting foreign currency to local currency

i_f: Foreign deposit interest rate

If interest rate parity exists, then the rate of return from covered interest arbitrage will be equal to the domestic interest rate: $r_f = i_h$

With r_f is yielding business received from interest rate differences have preventive and i_h is the domestic interest rate.

Review of the literature

The origin of Covered Rate Parity (CIP), first articulated by Keynes (1923) during the period of floating exchange rates after World War I, was the fundamental building block of International Finance Economic. Most of the research papers by authors around the world study the CIP deviation in 3 periods: before, during and after the 2008 global financial crisis (GFC). Before the Global Financial Crisis (GFC), for several decades, the Interest Rate Parity deviation was quite small, even close to zero, but as the number of research papers increased, and As we discover more, that relationship seems to be broken when GFC occurs. The CIP deviation due to the volatility of the Global Financial Crisis is not surprising. What has been more puzzling is CIP continues going wrong after the GFC. This phenomenon becomes important at least for these 3 reasons. First, this could be the evidence of financial market conflicts or unintended policy consequences that could potentially lead to inefficient resource allocation. Second, it could lead to a change in the way that macroeconomic policies (especially monetary policies) propagate across borders. Third, CIP bias can be explained by asset valuations in the world, where financial intermediation constraints are random and potentailly binding (Du et al., 2019).

The research paper of Eugenio et el. (2019) analyzes the impact of interest rate differential and forward-spot rate differential along with macro-financial factors determinants to CIP deviation in the US. By using some techniques such as split-sample analysis, OLS regression, and instrumental variable regression (IV regression), the authors have draw the conclusion that the CIP deviation in the US occurs not only during the GFC crisis but also in the post-crisis period and on macroeconomic factors such as US dollar strength and foreign exchange market liquidity had a very strong explanatory role for the CIP deviation.

After reviewing previous research papers, the author found that very few studies on interest rate parity deviation in Vietnam market; In addition, with the research method of the previous authors, the research results do not show that the short-term and long-term relationships are expressed through the long-term relationships cointegration system. In this research, I am not only interested in the existence of CIP deviation, activities affecting exchange rate fluctuations and the relationship between macroeconomic factors and CIP deviation in the future. In the case of the Vietnamese economy, the author also considers the short-term and long-term relationships of macroeconomic factors and exchange rate differences. Therefore, the author wants to consider and test the effects of exchange rate and interest rate fluctuations along with the influence of macro-financial determinants.

2.2. Data and Research methods
Data

In this research, I use the data of 5 coins, respectively CNY, USD, KRW, JPY and EUR in 2019 , of which Japan is one of the countries where the currency safe havens. The paper uses the daily spot and forward rates of Euro currencies, US dollars, Japanese yen, Korean won and Chinese yuan for the Vietnamese dong from Investing.com website. The reason why the authors chose these currencies is because the above countries and regions are major trading partners for Vietnam. In addition, the author does not use 2020 data because of the strong impact of the COVID-19 pandemic.

Research methods

Eugenio et al. (2019) have used regression methods instrumental variables (IV regression) for panel data and OLS regression for time series data. Instrumental variable regression (IV regression) is not an effective endogeneity remedy like Generalized Method of Moments and Pooled Mean Group, however both GMM and IV regression have common limitations that are estimation results requires uniform parameters between panel units; in addition, neither IV regression nor GMM can show short-term and long-term dynamics for the model through co-constraints. end. In addition, one of the reasons to choose Pooled Mean Group is that the data type has a big difference between N and T. In the case of N>T, GMM is an effective method for estimation; however, with the weekly data set where there are only 5 currency pairs (T>N) in this study, the efficiency of the estimation results will be weaker. To overcome the above limitations, in this study, I propose to use PMG. Pooled Mean Group regression model was developed by Pesaran and Smith (1995), Pesaran (1997); Pesaran et al.(1999).

By using the PMG method and based on the research of Avdjiev et al. (2017), the proposed research model is as follows:

$$(f_{t,t+n}-s_t) = \alpha_s + \beta_s (r_{t,t+n}-r^*_{t,t+n}) + \delta_s \, VNDINDEX_t + \gamma_s \ln(VIX_t) + \eta_s(LIQ_t) + \varepsilon_{st} \qquad (1)$$

With:

- $f_{t,t+n}$ -s_t is the difference between the forward and spot rates;

- $r_{t,t+n}$ -$r^*_{t,t+n}$ is the difference between Vietnam interbank interest rates (VNIBOR) compared to foreign interbank rates;

- VNDINDEX is a trade-weighted VND index;

- $\ln(VIX)$ is VIX index (an index measuring general volatility in the stock market);

- LIQ is the liquidity of the foreign exchange market calculated by the difference between the bid and ask prices.

3. Results

Table 1: Descriptive statistics of variables in the model

Variable	Observations	Mean	Standard deviation	Min	Max
FS	180	-35.0083	52.0972	-193.5098	4.1780
rr*	180	1.6041	0.9563	-0.8204	3.9859
VNDINDEX	180	2.3205	0.0085	2.3121	2.3409
lnVIX	180	2.7686	0.2452	2.0037	3.3112
LIQ	180	53.0629	71.0017	0.0024	246.0143

Source: Calculation from research data

Research data consists of 180 observations, representing 36 trading weeks of 5 currency pairs. A larger mean of r-r* is greater than 0 that throughout 2019 Vietnam's interbank rates were generally higher than the interbank rates of the currencies under study. Due to the difference between the exchange rates of currency pairs against Vietnam, F-S and LIQ have high volatility, meanwhile, VNDINDEX and lnVIX have low volatility.

Table 2: Correlation coefficient matrix

	F-S	r-r*	VNDINDEX	lnVIX	LIQ
F-S	1.0000				
r-r*	0.1818	1.0000			
VNDINDEX	-0.0312	-0.1604	1.0000		
lnVIX	-0.0180	-0.0943	0.1891	1.0000	
LIQ	-0.5728	0.0586	-0.0242	-0.0315	1.0000

Source: Calculation from research data

The correlation coefficient matrix table show a preliminary view of the correlation between the variables in the model; between the dependent variable and the independent variable. The correlations of the variables are consistent with the research hypothesis, so the author can conduct the study with the selected data sample size. However, the results from the above correlation coefficient matrix table cannot help me evaluate and draw final conclusions.

To perform the stationarity test for panel data, I use the Levin-Lin-Chu (2002) unit root test for the dependent variable and the variables in the model. In addition, the author uses the cointegration test of Pedroni (1999, 2004).

Table 3: *Summary table of unit root tests*

Out	p-value
FS	0.0000
rr*	0.8340
VNDINDEX	0.0883
lnVIX	0.0514
BID-ASK	0.0278

Source: Calculation from research data

Table 4: *Table of results of testing the cointegration*

Pedroni test	Statistics	p-value
Modified Phillips-Perron t	-2.3967	0.0083
Phillips-Perron t	-10.6686	0.0000
Augmented Dickey-Fuller t	-10.1760	0.0000

Source: Calculation from research data

Therefore, using the PMG estimation models will be suitable for this research data that is not homogenous in terms of stop order of panel units as well as cointegration phenomenon.

Table 3: Estimation results

	[1]	[2]	[3]	[4]
LONG-RUN				
r-r*	0.0680***	0.0519***	0.0559***	0.0530***
	[9.04]	[6.96]	[7.71]	[7.34]
VNDINDEX		-0.810***	-0.792***	-0.794***
		[-3.16]	[-3.26]	[-3.33]
lnVIX			0.0126*	0.0138*
			[1.65]	[1.85]
LIQ				-0.002
				[-1.24]
SHORT-RUN				
__ec	-0.914***	-0.965***	-0.976***	-0.971***
	[-4.33]	[-3.99]	[-3.92]	[-3.87]
D.r-r*	33.13	31.58	28.53	30.37
	[0.91]	[0.90]	[0.84]	[0.91]

D.VNDINDEX		-1000.3	-860	-873.6
		[-1.26]	[-1.01]	[-1.02]
D.lnVIX			6.916	6.711
			[0.27]	[0.26]
D.LIQ				-0.129
				[-0.63]
_cons	-22.42	-20.48	-20.11	-19.67
	[-1.59]	[-1.42]	[-1.42]	[-1.41]
N	175	175	175	175

*p<0.1, ** p<0.05, *** p<0.01

Source: Calculation from research data

The table of results estimated by PMG method is divided into two main parts: short-run dynamics (short-run) and long-term dynamics (long-run). Specifically, in the short term, the variable ec is statistically significant at 1% and has a negative estimation coefficient, which proves the existence of cointegration. In addition, with an estimate of ec of -0.97 - which has an absolute value close to 1 and the study uses weekly data, this means that the rate of adjustment to long-run equilibrium is fast, specifically, It is possible that if the independent variables in the model change by 1 percent, the forward and spot exchange rate differential will self-adjust to 97 percent equilibrium in one week. In the long run, most of the variables are statistically significant except for the LIQ variable, the impact of these variables is also consistent with my expectation; specifically, if r-r* increases by 1 percent, FS will be adjusted up by 5.3% at 1% significance level, VNDINDEX will increase by 1 unit, then FS will adjust down by 79.44% at 1% significance level, variable lnVIX increases by 1 percent. 1 unit, the FS will be adjusted up by 1.38% with a significance level of 10%. By comparing the regression results of 4 models, I can check the robustness of the estimator sign. Specifically, in the long term, the estimated coefficient of interest rate difference is positive and less than 1 in statistically significant cases, VNDINDEX has negative estimation coefficient in all cases with statistical significance, the estimated coefficient of lnVIX is positive in both cases. In addition, the equilibrium adjustment speed of all cases is close to the absolute value of 1, so all cases in the pre-crisis period have a fast rate of adjustment to equilibrium.

4. Discussion and Conclusion

Thanks to the strong progress in the integration process, the foreign exchange market in Vietnam is also developing rapidly, and covered interest rate parity is an issue that investors are increasingly concerned about. However, to be able to consider the size of the covered interest rate parity, I use the PMG method to estimate the results along with the use of different types of tests to check the reliability of the results. Pooled Mean Group estimation method. Based on the research results presented above, it can be seen that interest

rate differentials have a positive impact on forward and spot exchange rate differentials, most of the macroeconomic factors are significant. Statistical significance and impact on the forward and spot exchange rate difference in the long term and not in the short term, the emergence of the COVID-19 epidemic has changed the macro-financial factors and changed the change their impact on the interest rate parity. In general, during the year, the Vietnamese foreign exchange market did not reach covered interest rate parity. Causes the continuation of interest parity rate deviation began from the policies of the government for the foreign exchange market.

5. References

1.   Akram, Q. F., Rime, D., & Sarno, L. (2008). Arbitrage in the foreign exchange market: Turning on the microscope. *Journal of International Economics*. 76(2), 237-253.

2.   Arsov, I., Moran, G., Shanahan, B., & Stacey, K. (2013). OTC Derivatives Reforms and the Australian Cross-currency Swap Market. Reserve Bank of Australia Bulletin.

3.   Avdjiev, S., Du, W., Koch, C., & Shin, H. S. (2017). The dollar, bank leverage and the deviation from covered interest parity. BIS Working Paper

4.   Du, W., Hébert, B., & Wang Huber, A. (2019). Are intermediary constraints priced? NBER Working Paper 26009.

5.   Du, W., Tepper, A., & Verdelhan, A. (2018). Deviations from Covered Interest Rate Parity. *Journal of Finance*. 73(3), 915-957.

6.   Eugenio M. Cerutti, Maurice Obstfeld, Haonan Zhou (2019). Covered Interest Parity Deviations: Macrofinancial Determinants. Working Paper No. 19/14.

7.   Keynes, J. M. (1923). A Tract on Monetary Reform. London: Macmillan.

8.   Pesaran H. and R. Smith, 1995. Estimating Long-Run Relationships from Dynamic Heterogeneous Panels. *Journal of Econometrics*, 68, 79-113.

9.   Pesaran H., 1997. The Role of Econometric Theory in Modeling the Long Run. *Economic Journal*. 107, 178-191.

10. Pesaran H., Y. Shin, and R. Smith, 1999. Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. *Journal of the American Statistical Association*. 94, 621-634.