Exchange Rate Risk Premium in Vietnam

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Abstract

We characterize the exchange rate risk premium on the context of a small open economy with controlled floating exchange rate regime. The risk premium is varying over time, and is increasing on inflation, decreasing on output growth, increasing on foreign direct investment capital inflows, and decreasing on the credit growth. The model can account for nearly 94% of risk premium on case study of USD forward selling contract in 11/2018. The evidence is based on a Time-Varying-Coefficients VAR model on a data set covering 85 observations over 02/2012-02/2019 in Vietnam.

Keywords: Exchange Rate Premium, Foreign Exchange Intervention, Forward Contract.

JEL Classifications: F15, F36, F43.

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1 Introduction

The existence of exchange rate risk premium is important for both policy makers and foreign exchange market traders. For the policy makers, the risk premium may affect the effectiveness of market intervention policy, such as forward contract, Open Market Operations. For the traders, the risk premium creates the opportunity to explore the profit on trading foreign currency, such as USD in Vietnam interbank market.

Within the financial globalization context, the exchange risk premium is becoming more and more crucial for the macroeconomic stability in both advanced and developing economies. In particular, Obstfeld, Ostry and Qureshi (2017) show that the exchange rate is one channel for one open economy to absorb the shocks from world economy. Recently, Rey (2015) stresses the dilemma between the exchange rate regime and the domestic financial condition. As Engel (2014) states, however, the literature on the risk premium, and its application on foreign exchange intervention is quite small, especially for the economy without flexible exchange rate regime. An our paper aims to fill into this research gap.

The current paper characterizes the exchange rate risk premium on one economy with controlled floating exchange rate regime. The risk premium is varying over time, and is increasing on inflation, decreasing on output growth, increasing on foreign direct investment capital and decreasing on credit growth. Then, we employ the risk premium to analyze the foreign market intervention policy by forward selling contract issued by the central bank. When the risk premium is varying over time, the effectiveness of

that policy is reduced, since the forward exchange rate is not an unbiased predictor of future spot exchange rate. In brief, stabilizing the economic growth is a priority to implement the foreign market intervention.

Our paper belongs to the literature on the exchange rate risk premium. With macroeconomic approach, such as Mark (1985) and Engel (2016), the risk premium is related to the consumption growth, which can be derived by a general equilibrium model of consumption-based asset pricing model (CAPM). Accordingly, the currency serves as one tool of smoothing consumption fluctuation over time. With finance approach, Svensson (1992) and Fama (1984), the risk premium deviates from the no-arbitrage condition, and is one compensation for holders of foreign currency. Domestic households can diversify the consumption risk by holding one portfolio of domestic bonds denominated on domestic currency, foreign bonds denominated on foreign currency.

On these aforementioned paper, the risk premium is analyzed within the free floating exchange rate regime. Thus, the interaction between the foreign exchange market and central bank policy is not mentioned. Our paper, however, examines the risk premium on the controlled floating exchange rate regime. Within this context, the exchange rate is driven by both market forces as on free exchange rate regime and central bank policy. We show that the economic growth rate is much more important than the credit supply, a tool used by central bank in Vietnam, on determining the risk premium.

The paper makes also contribution on the literature on the interna-

tional macro-finance, for a survey on Brunnermeier and Sannikov (2014). On Bernanke and Gertler (1989), a higher net worth of a firm reduces the agency cost induced by asymmetric information, then, raises the investment. Thus, the net worth is the channel for the transmission of a shock on macroeconomic variables over business cycle. On Farhi and Maggiori (202016), the supply of government bonds needs to be large enough for the bonds to be safety, and to serve as reserve assets. Recntly, Hung (2020) shows that the financial integration can lead to accumulation of foreign safe assets in the economy which experiences a positive productivity shock. Our paper complements these papers by emphasizing the liquidity of banking system as a key driver of the foreign exchange market. The liquidity can be financed by the foreign capital inflows and the domestic monetary supply. Our results show that less FDI inflows and/or higher credit growth can support a lower exchange rate risk premium.

The paper is closedly related to the literature on the foreign market intervention. On Adler and Mano (2018), the accumulation of large foreign asset positions by many central banks through sustained and heavy foreign exchange intervention can reduce domestic output by the range of 0.3-1.2 percent per year. On Chang (2018), the sterilized intervention may have real effects on the domestic output if it changes the net credit position of the central bank with respect to financial intermediaries. Our paper complements theirs by focusing on the forward contract as one technical tool for central bank to drive the equilibrium exchange rate. The forward exchange rate can be an unbiased predictor of future spot exchange rate

only if the risk premium does not exist. Therefore, the effectiveness of forward contract depends on the value of determinants of risk premium such as economic growth rate and foreign capital inflows.

The following section (2) presents the framework with data and model for the exchange rate risk premium. Section (3) presents the empirical evidence on the determinants of risk premium, then discuss the foreign exchange intervention as one application of risk premium. Finally, section (4) concludes the paper.

2 Framework

2.1 Concept and Measurement

The exchange rate premium of maturity τ at time t is measured by the deviation from Uncovered Interest Rate Parity (UIRP) (see Engel (2014) for a recent survey):

$$fer_t(\tau) = (Rvnd_t(\tau) - Rusd_t(\tau)) - (Ln(S_{t+\tau}) - Ln(S_t)) \qquad (1)$$

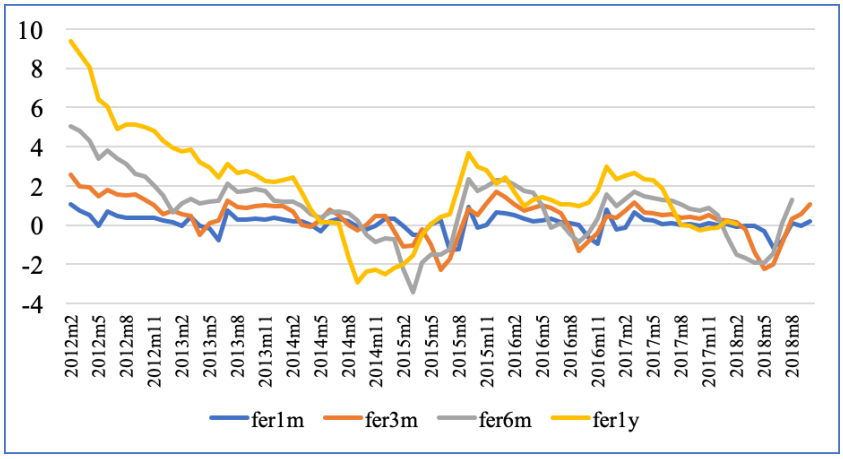
whereby, $Rvnd_t(\tau)$ is inter-bank interest rate on VND-deposits of maturity (τ) at time t; $Rusd_t(\tau)$ is inter-bank interest rate on USD-deposits of maturity (τ) at time t; $Ln(S_{t+\tau})$ is log value of interbank exchange rate (VND/USD) at time $(t+\tau)$, denoted by $S_{t+\tau}$; $Ln(S_t)$ is log value of interbank exchange rate at time t, denoted by S_t.

Figure (1) illustrates the exchange rate risk premium by different maturity time periods. The common feature is that the risk premium is varying

over time. The risk premium on 3-month maturity, our focal analysis, decreases gradually from 02/2012 to 06/2015, before raising against steadily to about 1.8% in 11/2015. Then, it fluctuates around a mean of 0.17% until 09/2018. Moreover, the risk premium of different maturity tends to move closely together over time. And the risk premium with further maturity tends to have higher mean and standard deviation. We summarize the features of risk premium on the following implication.

Implication 1. *The exchange rate risk premium is varying over time, and is correlated across different time maturities in Vietnam.*

Figure 1: Exchange Rate Risk Premium by Maturity (%): 1 month (fer1m), 3 months (fer3m), 6 months (fer6m), and 1 year (fer1y).



2.2 Data Description

The data is a time-series sample, covering 85 monthly observations for Vienam from 02/2012 to 02/2019. It includes inflation rate (mcpi), output growth rate (gip), foreign capital inflows (fdi) and liquidity supply (credit).

The inflation rate is the month-over-month growth rate (on %) of consumer price index. The proxy of output growth rate is the month-over-month growth rate of industrial output value. The foreign direct investment inflows are measured by the disbursed quantity of foreign direct investment on billion USD. These variables are on monthly and from the database of Vietnam General Statistic Office. Moreover, the liquidity supply is the month-over-month growth rate (on %) of credit by banking system to the economy. This data is from State Bank of Vietnam.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Inflation Rate (%) (mcpi)	85	.2940929	.438503	-.53	2.2
Output Growth Rate (%) (ygip)	85	1.744706	8.39221	-22.3	31.9
Credit Supply Growth Rate (%) (gcredit)	85	1.159882	.9047961	-.81	3.99
Foreign Capital Inflows (billion USD) (fdi)	85	1.217647	.4650234	.1	2.6
VND/USD Exchange Rate (bankrate)	85	21919.72	838.1781	20830.19	23346.46
Interest Rate on 1-month-VND-deposit (%) (rvnd1m)	87	4.332529	1.918982	1.6	13.39
Interest Rate on 3-month-VND-deposit (%) (rvnd3m)	87	5.222184	1.948267	2.51	13.5
Interest Rate on 6-month-VND-deposit (%) (rvnd6m)	87	5.73092	1.983423	3.52	13.5
Interest Rate on 1-year-VND-deposit (%) (rvnd1y)	87	6.241379	2.082902	4.58	13.5
Interest Rate on 1-month-USD-deposit (%) (rusd1m)	87	1.642874	.5515916	.91	2.83
Interest Rate on 3-month-USD-deposit (%) (rusd3m)	87	2.155747	.5418178	1.36	3.32
Interest Rate on 6-month-USD-deposit (%) (rusd6m)	87	2.483793	.5104108	1.7	3.48
Interest Rate on 1-year-USD-deposit (%) (rusd1y)	87	2.957356	.6221259	2.06	4.11

The interest rates on VND and USD-deposits is the daily averaged values in the interbank market, on different maturity time including 1 month, 3 month, 6 month and 1 year. The exchange rate is the quantity of Vietnam Dong per one unite of USD (VND/USD). These variables are on daily and explored from Reuters database. Then, they are averaged over month to have the monthly values.

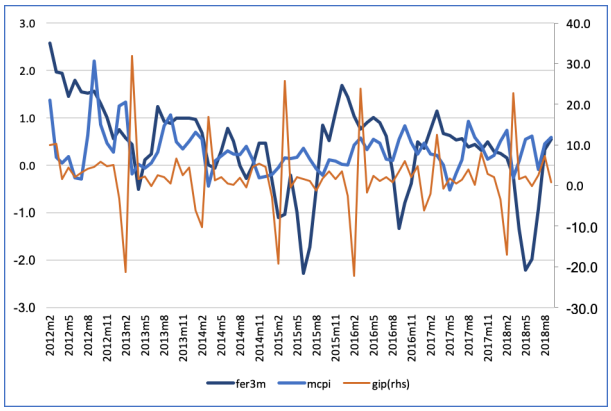
Table 1 reports the descriptive statistics on the time series sample. The inflation rate has a mean of 0.29% with a standard deviation of 0.43%. The output growth rate has a higher mean (1.74%) and a higher standard deviation (8.39%). The credit supply growth rate also has a higher mean of 1.15 % with a higher standard deviation of 0.90 %. The foreign capital inflows have a mean of 1.21 billion USD with a standard deviation of 0.46 billion USD, while the VND/USD exchange rate has mean of 21919 VND with a standard deviation of 838 VND. For the interest rates on the interbank market, the 1-month deposit on VND has mean of 4.33% with a standard deviation of 1.91%. The deposit on VND with further maturity (3 months, 6 months and 1 year) both have higher mean and lower standard deviation than the 1-month-VND-deposit interest rate. Similarly, for the interest rate on the USD-deposit, further maturity deposit also have higher mean associated with lower standard deviation. In brief, the data set offers rich variation for exploring the exchange rate risk premium.

2.3 Empirical Specification

We employ Time-Varying Parameters VAR (TVC-VAR) method to analyze the exchange rate risk premium in Vietnam. The method is suitable on the case of changing regime of economic fundamental. As shown on Figure (2), the output growth rate tends to be fluctuate around a stable mean and variance. After the implementation of new exchange rate regime on 01/2016, both the mean and variance of inflation rate reduces substantially. The exchange rate risk premium, however, has lower mean with higher

standard deviation. Recently, Cogley and Sargent (2001) employs the TVC-VAR to analyze the switching regime of economic fundamental of United States (US) after World war II, and Primiceri (2005) uses the similar method to access monetary policy in US. With a TVC-VAR model, Hung (2020) also analyzes the output-inflation trade-offs when the foreign capital inflows matters in Vietnam.

Figure 2: Exchange Rate Risk Premium on 3-month maturity (fer3m, %), Ouput Growth Rate (gip,%), and Inflation Rate (mcpi, %)



Moreover, the TVC-VAR method can improve upon the forecast made by standard VAR models, as suggest by D'Agostino, Gambetti and Giannone (2013). This advantage is crucial to analyze the exchange rate risk premium, which can affect the effectiveness of foreign market intervention policy by central banks. In brief, the TVC-VAR is potential to capture the switching regime of macroeconomic fundamentals and to produce accurate forecasting results in case of Vietnam.

The TVC-VAR model can be expressed as:

$$y_t = A_{1,t}y_{t-1} + A_{2,t}y_{t-2} + A_{3,t}y_{t-3} + \epsilon_t \tag{2}$$

$y_t = (mcpi_t, ygip_t, fdi_t, gcredit_t, fer3m_t)$ is a 5x1 vector of endogenous data, including the inflation rate ($mcpi_t$), output growth rate ($ygip_t$), foreign capital inflows (fdi_t), credit supply growth rate ($gcredit_t$) and 3-month exchange rate risk premium ($fer3m_t$). Each of $(A_{1,t}, A_{2,t}, A_{3,t})$ is a matrix of dimension 5x5. $\epsilon_t = (\epsilon_{1,t}, \epsilon_{2,t}, \epsilon_{3,t}, \epsilon_{4,t}, \epsilon_{5,t})$ is a vector of residuals following a multivariate normal distribution.

$$\epsilon_t \sim \mathcal{N}(0, \Sigma) \tag{3}$$

The VAR coefficients are assumed to follow the autoregressive process:

$$\beta_t = \beta_{t-1} + \nu_t, \nu_t \sim \mathcal{N}(0, \Omega) \tag{4}$$

The covariance matrix Ω is assumed to be a random variable endogenously determined by the model.

The parameters of interest to be estimated include the VAR coefficients $\beta = \{\beta_1, ..., \beta_T\}$, the covariance matrix Ω for the shocks on the dynamic process, and the residual covariance matrix Σ. For convenience, the estimation is based on The Bayesian Estimation, Analysis and Regression toolbox (BEAR), developed by Dieppe, Legrand, and Van Roye (2016).

3 Evidence

We first investigate the determinant of risk premium, then analyze the foreign market intervention, accounting for the existence of time-varying risk premium. The analysis closes with a case study on 11/2018.

3.1 Exchange Rate Risk Premium Determination

Figure (3) shows the impulse response function. A higher inflation rate results on the macroeconomic instability, which raises the uncertainty on the foreign exchange market, pushing up the exchange rate risk premium. An increase of output growth rate raises the expected rate of return on the foreign currency trading. This also reduces the macroeconomic uncertainty, and lowers the risk premium. More FDI inflows reduce the supply of foreign currency, and reduces the domestic capital investment. Then, the domestic currency is under pressure to be depreciate, which raises the risk premium. Higher credit growth rate tends to raise the interest rate, reducing the domestic currency depreciation. This reduces the uncertainty, then decreases the risk premium on the foreign exchange market. In brief, the exchange rate risk premium goes up for a surge of inflation; a decrease of output growth; an increase of FDI; a lower credit growth rate.

Figure (4) shows the forecast error variance decomposition. In particular, 1% increase on the exchange rate risk premium can be explained the combination of output growth rate, inflation rate, FDI and credit growth rate. Among these variables, the output growth plays the most important role by accounting for the highest share on the forecasting value of risk premium. And this share even goes up for a further horizon. The inflation rate is on the secondly important role, but its share tends to constant over the time horizon after 5 months. Therefore, the evidence suggests that stabilizing output growth is most crucial to deal with exchange rate risk premium.

Figure 3: Impulse Response Function

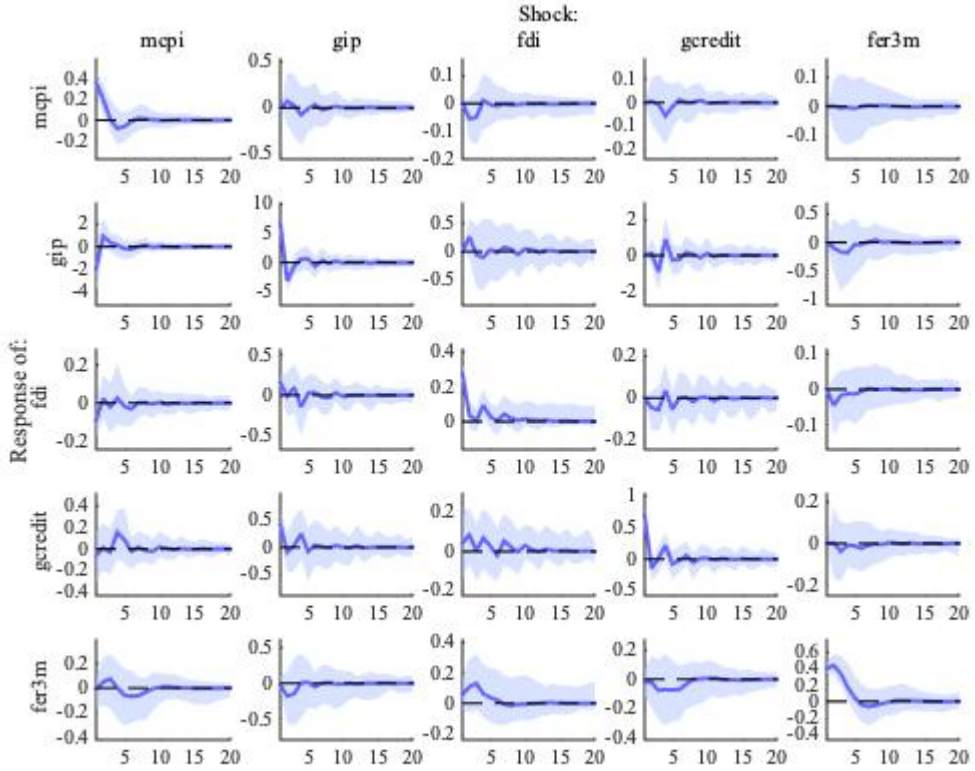
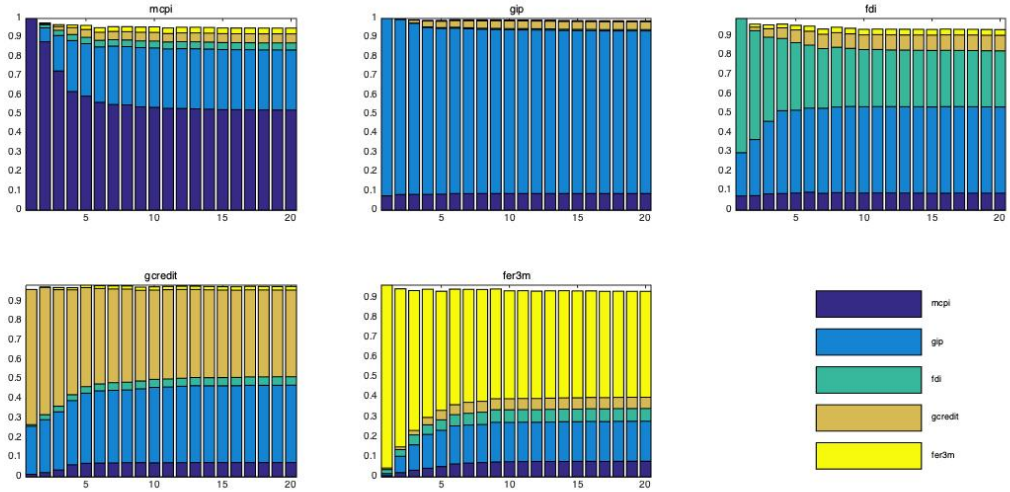


Figure 4: Forecast Variance Decomposition



The evidence also uncovers some interesting results. First, the foreign capital inflows can exert positive impact on the economy by different channels. The impulse response function shows that the capital inflows reduce the inflation rate, raise the output growth. Thus, the FDI inflows can stabilize the macroeconomic environment. Second, the role of credit growth rate toward other macroeconomic variables is quite modest in Vietnam economy. The forecast variance decomposition shows that the credit growth has a quite small contribution on the forecasted value of inflation rate, foreign capital inflows and risk premium, but an unsignificant impact on that of output growth.

Next, we employ the risk premium to investigate the effectiveness of foreign exchange intervention policy.

3.2 Foreign Exchange Intervention

3.2.1 Forward Contract

Let's call $F_t(\tau)$ as the forward exchange rate of a forward contract issued at time t and matured at time $(t+\tau)$. By rewriting the exchange rate risk premium (1), we have:

$$Rvnd_t(\tau) - Rusd_t(\tau) = Ln(S_{t+\tau}) - ln(S_t) + fer_t(\tau) \tag{5}$$

The covered interest rate parity implies that the equilibrium state between the interest rates, the current spot exchange rate and forward exchange rate. In particular, the interest rate parity is said to be covered when the no-arbitrage condition is satisfied with the use of a forward con-

tract to hedge against the exchange rate risk. At equilibrium, the net profit of investing a same amount of money on domestic currency is equal to that on foreign currency.

$$Rvnd_t(\tau) - Rusd_t(\tau) = Ln(F_t(\tau)) - Ln(S_t) \tag{6}$$

By combining (5) and (6), and taking log approximation, $Ln(x) = Ln(1 + (x-1)) \approx (x-1)$, we have:

$$Ln(\frac{S_{t+\tau}}{S_t}) = Ln(\frac{F_t(\tau)}{S_t}) - fer_t(\tau) \Rightarrow \frac{S_{t+1} - S_t}{S_t} = \frac{F_t(\tau) - S_t}{S_t} - fer_t(\tau) \tag{7}$$

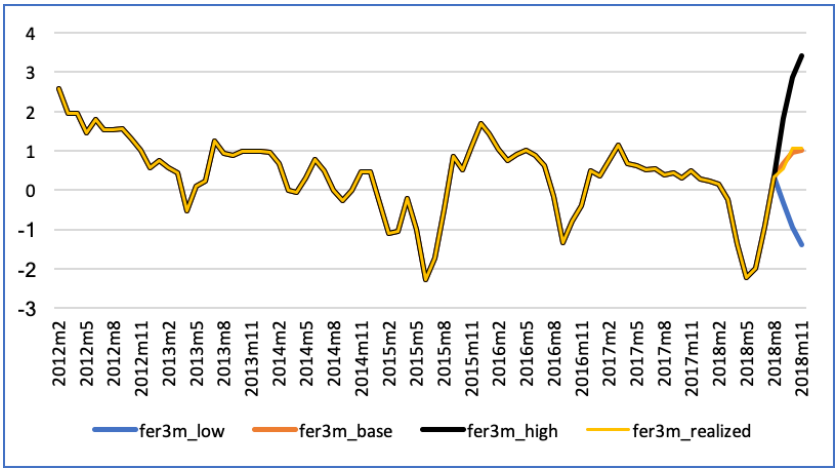
We have following three cases. First, without the risk premium ($fer_t(\tau) = 0$), the forward exchange rate is an unbiased predictor of the future spot exchange rate, as implied by unbiasedness hypothesis: $S_{t+\tau} = F_t(\tau)$. Second, with positive risk premium ($fer_t(\tau) > 0$), the forward exchange rate can still serve as a driver of the future spot exchange rate, but the domestic currency does not depreciate enough to be equal the forward rate: $S_{t+\tau} < F_t(\tau)$. Third, with negative risk premium ($fer_t(\tau) < 0$), the domestic currency depreciates too much to be higher than the forward rate: $S_{t+\tau} > F_t(\tau)$. If the risk premium is varying over time, it can be zero, positive or negative. Therefore, the existence of time-varying exchange rate risk premium can reduce the effectiveness of forward exchange rate as a predictor of future spot exchange rate.

3.2.2 Case Study: USD Forward Selling Contract in 11/2018

We employ the exchange risk premium (7) to analyze the effectiveness of State Bank of Vietnam (SBV)'s market intervention policy. The SBV is-

sues an USD selling forward contract at end of 11/2018, maturing at end of 01/2019. Thus, the contract can be consider with a maturity of 3 months. First, we assume that we are on 11/2018. The forward rate is 23462 VND/USD, the spot exchange rate at end of 11/2018 is 23324 VND/USD. Then, we have: $F_t(\tau) = 23462$ VND/USD; $S_t = 23324 VND/USD$. Next, we forecast the exchange rate risk premium. In details, we use the data sample from 02/2012 to 08/2018, to forecast the risk premium on 11/2018. Then, we use (7) to compute the future spot exchange rate.

Figure 5: 3-Month Exchange Rate Risk Premium Forecasting



The model fits the data quite well. Our model forecasts the risk premium of 3-month maturity on 11/2018 is $fer_t(\tau) = 1\%$, with $\tau = 3$ months. In Figure (5), the 3-month exchange rate risk premium may increase gradually from 0.32% on 08/2018 to 0.67% on 09/2018, before climbing to 1% on 11/2018. In data, the 3-month risk premium is 0.54% on 09/2018, and 1.06% on 11/2018. Then, the estimated value, 1%, accounts for 94% of realized risk premium, 1.06%, on 11/2018. In brief, the forecasting value

is very close to the realized value of risk premium.

By using equation (7), the expected depreciation rate and corresponding forecasting future spot exchange rate at the end of 01/2019 are:

$$\frac{S_{t+1} - S_t}{S_t} = \frac{23462 - 23324}{23324} - 1\% = -0.41\% \Rightarrow S_{t+1} = 23228.76 \qquad (8)$$

The existence of risk premium reduces the effectiveness of intervention policy. In the model, the exchange rate attains 23228.76 VND/USD at end of 01/2019, which is far less than the forward exchange rate at 23462 VND/USD. In the data, the exchange rate is 23199 VND/USD at the end of 01/2019. Therefore, the data is consistent with the model by showing an appreciation, in stead of depreciation of VND. In brief,

4 Conclusion

We carry out the empirical analysis on the exchange rate risk premium in VND/USD on the interbank market in Vietnam. The exchange rate risk premium is varying over time. Moreover, it depends on the economic fundamentals by being increasing on inflation, decreasing on output growth, increasing on foreign direct investment capital inflows, and decreasing on the credit growth.

Our results can have important policy implications. First, the Vietnam central bank's market intervention by the forward contract may face struggle to meet its target exchange rate, because of time-varying risk premium. Second, stabilizing output growth is most crucial to deal with exchange rate risk premium.

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