
Munich Personal RePEc Archive

Time-Varying Exchange Rate Risk Premium

D.M.Nguyen, Anh and Dai Hung, Ly

Vietnam National University, Hanoi.

June 2019

Online at https://mpra.ub.uni-muenchen.de/94600/
MPRA Paper No. 94600, posted 20 Jun 2019 14:05 UTC

Time-Varying Exchange Rate Risk Premium

Anh D. M. Nguyen*and Ly Dai Hung†

June 20, 2019

Abstract

We characterize the exchange rate risk premium on the context of a small open economy with controlled floating exchange rate regime. The data set includes 100 observations on case of Vietnam over 01/2011-04/2019. The risk premium is varying over time. And it is determined by output growth rate, inflation rate, foreign capital inflows and liquidity supply. As one application, the existence of time varying risk premium reduces the effectiveness of foreign exchange market intervention by forward contract.

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

JEL Classifications: F15, F36, F43.

*Email: anguyen@lb.lt. Economics Department, Bank of Lithuania and Faculty of Economics, Vilnius University, Vilnius, Lithuania

†Email: hunglydai@gmail.com. VNU International School, Vietnam National University, Hanoi, Vietnam. Address: 144 Xuan Thuy street, Cau Giay district, Ha Noi city, Viet Nam.

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. However, as Engel (2014) states, 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 determined by the economic growth rate, inflation rate, foreign capital inflows, and liquidity supply. 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 a perfect 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. The exchange rate risk premium can be approached by two line of research. 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 (1976), the risk premium is one compensation for holders of foreign currency. With this viewpoint, 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, examine 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. The economic growth rate is much more important than the credit supply on determining the risk premium liquidity supply.

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 their 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 a perfect 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 paper also complements the literature on the international 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 (2016), the supply of government bonds needs to be large enough for the bonds to be safety,

and serve as reserve assets. Our paper complements these papers by emphasizing the liquidity of banking system as 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 a more liquidity, such as more FDI inflows, huger credit supply, can support a lower exchange rate risk premium.

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 (**??**) concludes the paper.

2 Framework

2.1 Concept and Measurement

According to Engel (2014), the exchange rate premium of maturity (τ) is computed by the deviation from Uncovered Interest Rate Parity (UIRP):

$$fer_t(\tau) = Rvnd_t(\tau) - Rusd_t(\tau) + Ln(vnd/usd)_{t+\tau} - Ln(vnd/usd)_t \qquad (1)$$

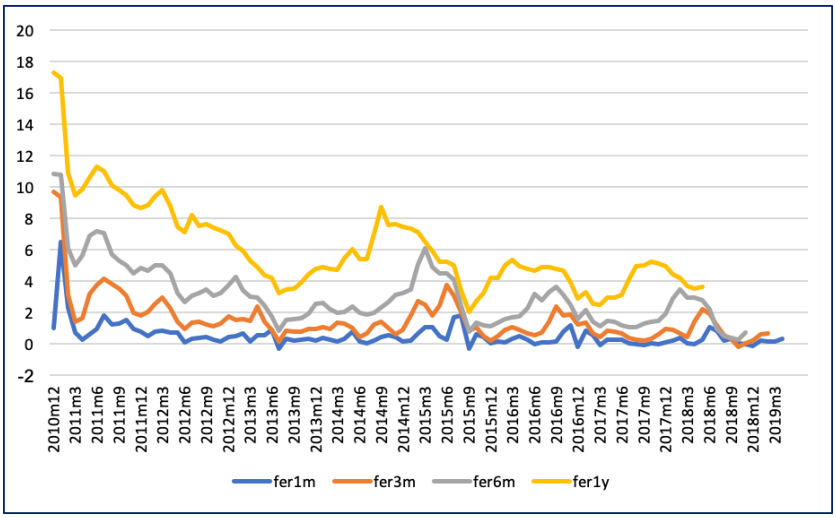
whereby, $Rvnd_t(\tau)$: inter-bank interest rate on VND-deposits of maturity (τ); $Rusd_t(\tau)$: inter-bank interest rate on USD-deposits of maturity (τ); $Ln(vnd/usd)_{t+\tau}$: log value of interbank exchange rate (VND/USD) at time point ($t+\tau$); $Ln(vnd/usd)_t$: log value of interbank exchange rate (VND/USD) at time point (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 01/2011 to 06/2013, before raising against steadily to about 4% in 05/2015. Then, it fluctuates around a mean of 1.55% until 04/2019. Moreover, the risk premium of different maturity tends to move close together over time. And from 09/2013, the premium on the further maturity can serve as indicator for the premium on the shorter maturity. For

instance, the 1-year premium increases to get 8.7% on 09/2014, a peak since 09/2013, while the 3-month premium attains a its peak of 3.9% since 09/2013 on 06/2015. In brief, 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 time maturity in Vietnam.*

Figure 1: Exchange Rate Risk Premium by Maturity (%)



2.2 Data Description

The data covers 100 monthly observations for Vienam from 01/2011 to 04/2019. The macro economic variables include the inflation rate, the output growth rate, foreign capital inflows and liquidity. The inflation rate is the month-over-month growth rate (on %) of consumer price index. The proxy of output growth rate is the year-on-year growth rate of industrial output value. The foreign direct investment inflows (FDI) These variables are on monthly and from the database of Vietnam General Statistic Office. Moreover, the liquidity is measured by the month-over-month credit growth rate, which is from State Bank of Vietnam.

The interest rates are on the VND and USD-deposits on the interbank market, on different maturity time including 1 month, 3 month, 6 month and 1 year. The exchange

rate is the ratio of Vietnam Dong over US dollar (VND/USD). These variables are on daily and explored from Reuters database. Then, they are averaged over month to have the monthly variables.

Table 1: Descriptive Statistics

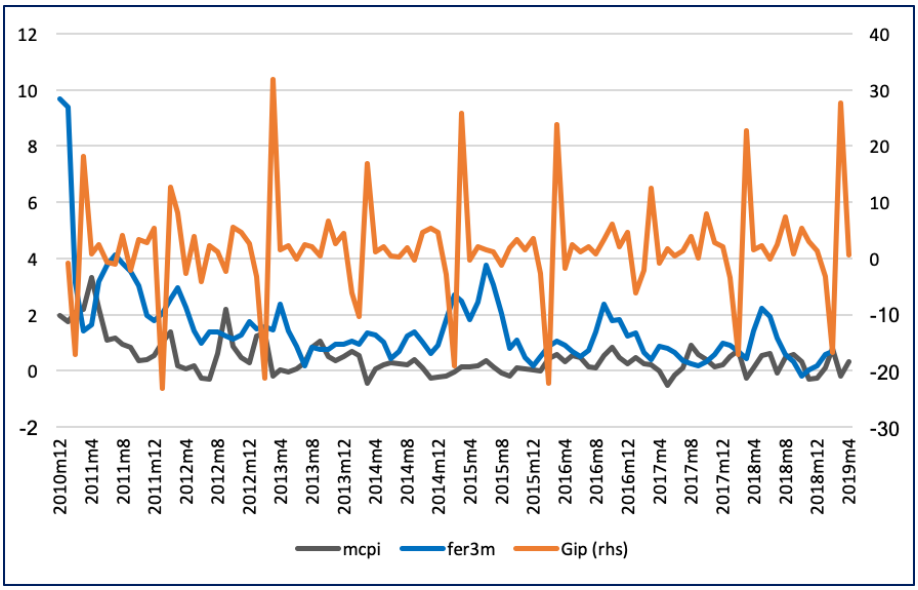
Variable	Obs	Mean	Std. Dev.	Min	Max
Inflation Rate (%) (mcpi)	100	.4291	.6267829	-.53	3.32
Output Growth Rate (%) (gip)	100	1.683612	8.926442	-23.16324	31.90213
Credit Supply Growth Rate (%) (gcredit)	100	1.1126	.9383304	-2.07	3.99
Foreign Capital Inflows (billion USD) (fdi)	100	1.1806	.4562358	.1	2.6
VND/USD Exchange Rate (bankrate)	100	21788.39	906.8236	19503.74	23346.46
Interest Rate on 1-month-VND-deposit (%) (rvnd1m)	100	5.5242	3.577506	1.6	13.5
Interest Rate on 3-month-VND-deposit (%) (rvnd3m)	100	6.2983	3.335485	2.51	13.5
Interest Rate on 6-month-VND-deposit (%) (rvnd6m)	100	6.7409	3.21137	3.52	13.5
Interest Rate on 1-year-VND-deposit (%) (rvnd1y)	100	7.185	3.128568	4.58	13.5
Interest Rate on 1-month-USD-deposit (%) (rusd1m)	100	1.6814	.5344988	.91	2.83
Interest Rate on 3-month-USD-deposit (%) (rusd3m)	100	2.2257	.5434425	1.36	3.32
Interest Rate on 6-month-USD-deposit (%) (rusd6m)	100	2.5547	.5132043	1.7	3.48
Interest Rate on 1-year-USD-deposit (%) (rusd1y)	100	3.0753	.6566497	2.06	4.11

Table 1 reports the descriptive statistics on the time series sample. The inflation rate has a mean of 0.43% with a standard deviation of 0.62%. The output growth rate has a higher mean (1.68%) and a higher standard deviation (8.92%). The credit supply growth rate also has a higher mean of 1.11 with a higher standard deviation of 0.93. The foreign capital inflows have a mean of (1.42) billion USD with a standard deviation of (1.62) billion USD, while the VND/USD exchange rate has mean of (21788) VND with a standard deviation of (906) VND. For the interest rates on the interbank market, the 1-month deposit on VND has mean of (5.52%) with a standard deviation of (3.57%). 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. As shown on Figure (2), the economic fundamentals are changing over time. While the output growth rate tends to keep its mean and deviation over time, the inflation rate has reduces substantially both mean and deviation after the implementation of new exchange rate regime on 01/2016. This tendency is also applied for the case of exchange rate risk premium. Cogley and Sargent (2001) and Primiceri (2005) show that the TVC-VAR is suitable on the case of changing regime of economic fundamentals.

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. On short, the TVC-VAR can capture the switching regime of macroeconomic fundamentals and forecasting results in case of Vietnam.

3 Evidence

3.1 Exchange Rate Risk Premium Determination

Figure 3: Impulse Response Function

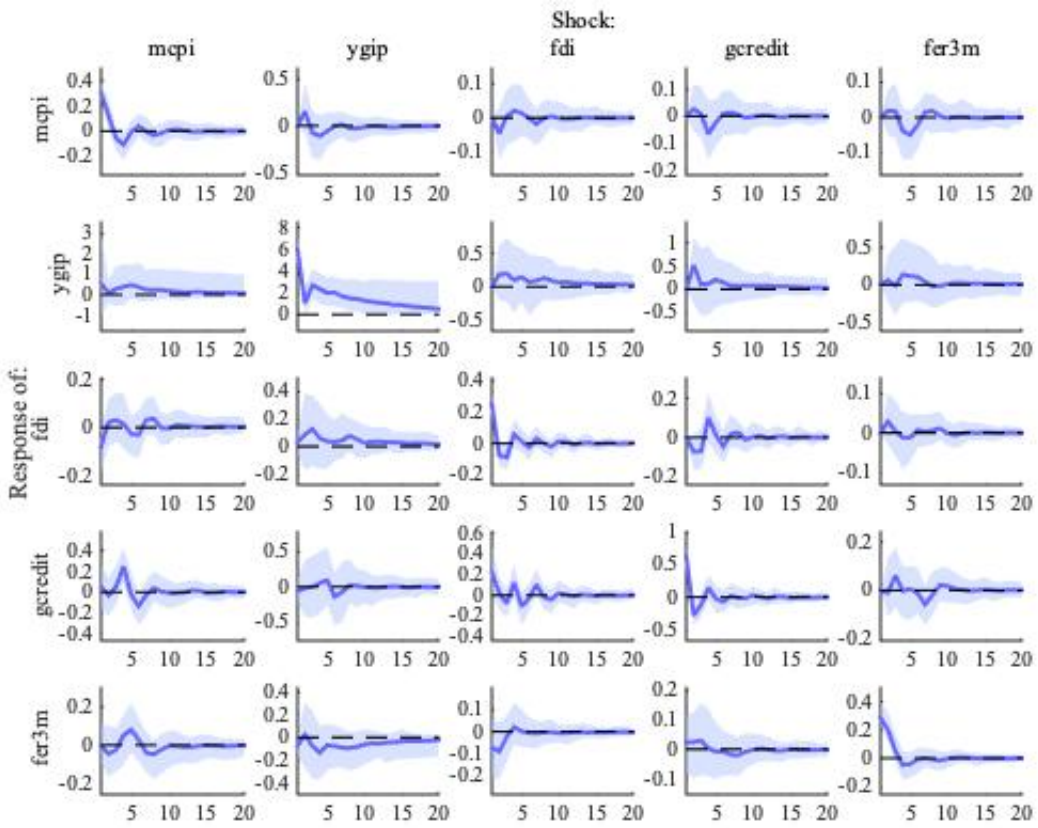


Figure (3) shows the impulse response function. A higher inflation rate results on the macroeconomic instability, which raises the uncertainty on the foreign exchange market, pushing up the exchange rate risk premium. A decrease of output growth rate reduces the expected rate of return on the foreign currency trading, and also results on the macroeconomic uncertainty. This raises the risk premium. A decrease of FDI reduces the supply of foreign currency, and also reduces the domestic capital investment. Then, the domestic currency is under pressure to be depreciate, which

raises the risk premium. A thinner liquidity tends to reduce the interest rate, results on the domestic currency depreciation. This raises the uncertainty, then the risk premium on the foreign exchange market. Therefore, the exchange rate risk premium can go up for a surge of inflation; a decrease of output growth; a reduction of FDI; a thinner liquidity.

Figure 4: Forecast Variance Decomposition

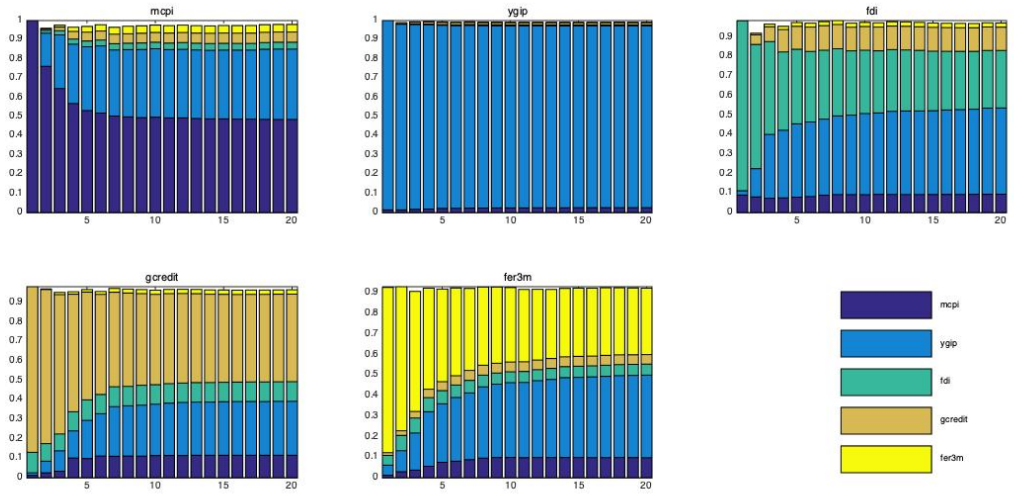


Figure (4) shows the forecast error variance decomposition. In particular, 1% increase on the exchange rate risk premium can be explained the combination of output growth rate, inflation rate, FDI and credit growth rate. The output growth plays the most important role. And the share accounted by this variable goes up for a further horizon.

3.2 Foreign Exchange Intervention with Forward Contract

The exchange risk premium (FER_t) (on units of domestic currency) differs the current forward exchange rate (F_t) and expectation of future spot exchange rate ($E_t(S_{t+1})$).

$$F_t = E_t(S_{t+1}) + FER_t$$

Using the rational expectation hypothesis, ($E_t(S_{t+1}) = S_{t+1}$, and with some manipulation, we have:

$$\frac{F_t - S_t}{S_t} = \frac{S_{t+1} - S_t}{S_t} + \frac{FER_t - S_t}{S_t} = \frac{S_{t+1} - S_t}{S_t} + fer_t$$

whereby, we define $fer_t \equiv \frac{FER_t - S_t}{S_t}$ as the exchange rate risk premium on percentage. Note that this variable is exactly measured by the formula (1). Then, we have:

$$\frac{S_{t+1} - S_t}{S_t} = \frac{F_t - S_t}{S_t} - fer_t \tag{2}$$

Therefore, the value of exchange rate risk premium determines the discrepancy between future spot and forward exchange rate. We have following cases:

a No risk premium ($fer_t = 0$): the future spot exchange rate is equal to the forward exchange rate.

b Positive risk premium ($fer_t > 0$): the future spot exchange rate is less than the forward exchange rate: $S_{t+1} < F_t$.

c Negative risk premium ($fer_t < 0$): the future spot exchange rate is more than the forward exchange rate: $S_{t+1} > F_t$.

On the case (a) without the risk premium, the forward exchange rate is an unbiased predictor of the future spot exchange rate, as implied by unbiasedness hypothesis. On the case (b) with positive risk premium, 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. On the case (c) with negative risk premium, the domestic currency depreciates too much to be higher than the forward rate. Therefore, the existence of exchange rate risk premium reduces the effectiveness of forward exchange rate as a predictor of future spot exchange rate. We summarize the result on the following implication.

Implication 2. *For time-varying risk premium, the future spot exchange rate is unknown, which makes the result of market intervention to be unforeseeable.*

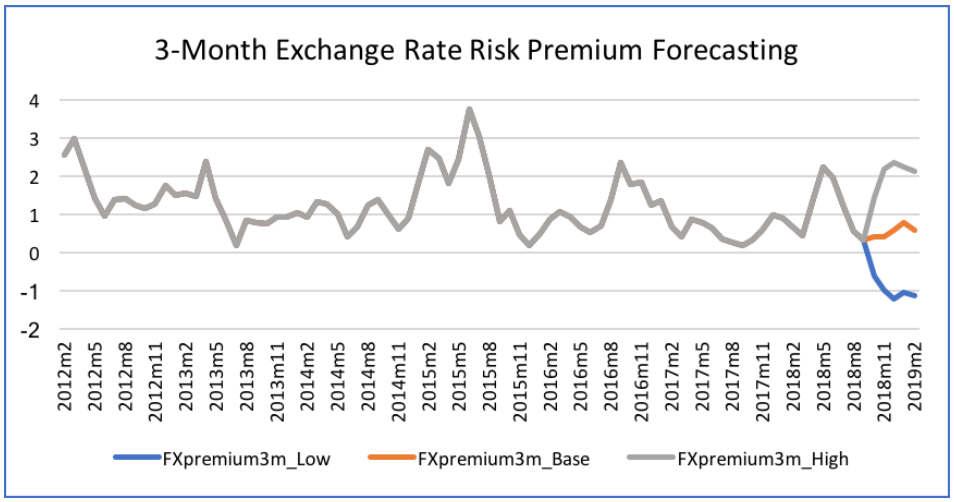
3.3 Case Study: Forward USD Selling Contract in 11/2018

We employ the exchange risk premium (2) to analyze the effectiveness of State Bank of Vietnam (SBV)'s market intervention policy by selling forward contract of 3-month maturity. The SBV's forward contract issued at end of 11/2018, maturing at end of 01/2019. Assume that we are on 11/2018 and forecast the future spot exchange rate on 01/2019.

The forward rate is 23462 VND/USD, the spot exchange rate at end of 11/2018 is 23324 VND/USD. Therefore, we have: $F_t = 23462$ VND/USD; $S_t = 23324 VND/USD$.

Our model estimates the risk premium on 3-month maturity is $fer_t = 0.41\%$. In particular, in Figure (5), the 3-month exchange rate risk premium may increase gradually from 0.31% on 09/2018 to 0.77% on 01/2019, before decreasing to 0.59% on 02/2019.

Figure 5: 3-Month Exchange Rate Risk Premium Forecasting



By using equation (2), the expected depreciation rate and corresponding future spot exchange rate at the end of 01/2019 are as following:

$$\begin{aligned} \frac{S_{t+1} - S_t}{S_t} &= \frac{23462 - 23324}{23324} - 0.41\% = 0.18166\% \\ S_{t+1} &= 23366.37(VND/USD) \end{aligned}$$

Our model implies that the SBV's forward contract may raise the exchange rate at end of 01/2019, but not so much to match its forward rate at 23462. In fact, the exchange rate at end of 01/2019 is 23199 VND/USD, which is far less than the forward exchange rate at 23462 VND/USD. Thus, the realized risk premium is 1.12%. Our estimation, however, still implies the existence of positive risk premium as on the data. Moreover, the estimated value, 0.41%, accounts for 36.60% of realized value, 1.12%, of risk premium.

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: increasing on inflation, decreasing on output growth and foreign direct investment capital, but quite neural to the credit growth.

Our results can have important policy implications. First, the Vietnam central bank's market intervention by 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.

References

Adler, Gustavo, and Rui C. Mano. "The cost of foreign exchange intervention: Concepts and measurement." Journal of Macroeconomics (2018).

Bernanke, Ben, and Mark Gertler. "Agency costs, net worth, and business fluctuations." The American Economic Review (1989): 14-31.

Brunnermeier, Markus K., and Yuliy Sannikov. "A macroeconomic model with a financial sector." The American Economic Review104.2 (2014): 379-421.

Chang, Roberto. **Foreign Exchange Intervention Redux**. No. w24463. National Bureau of Economic Research, 2018.

Cogley, Timothy, and Thomas J. Sargent. "Evolving post-world war II US inflation dynamics." NBER macroeconomics annual 16 (2001): 331-373.

D'Agostino, Antonello, Luca Gambetti, and Domenico Giannone. "Macroeconomic forecasting and structural change." Journal of applied econometrics 28.1 (2013): 82-101.

Engel, Charles. "Exchange rates and interest parity." Handbook of international economics. Vol. 4. Elsevier, 2014. 453-522.

Engel, Charles. "Exchange rates, interest rates, and the risk premium." American Economic Review 106.2 (2016): 436-74.

Fama, Eugene F. "Forward and spot exchange rates." Journal of monetary economics 14.3 (1984): 319-338.

Fama, Eugene F. "Forward rates as predictors of future spot rates." Journal of Financial Economics 3.4 (1976): 361-377.

Farhi, Emmanuel, and Matteo Maggiori. A Model of the International Monetary System. No. w22295. National Bureau of Economic Research, 2016.

Rey, Hélène. Dilemma not trilemma: the global financial cycle and monetary policy independence. No. w21162. National Bureau of Economic Research, 2015.

Mark, Nelson C. "On time varying risk premia in the foreign exchange market: An econometric analysis." Journal of Monetary Economics 16.1 (1985): 3-18.

Primiceri, Giorgio E. "Time varying structural vector autoregressions and monetary policy." The Review of Economic Studies 72.3 (2005): 821-852.

Obstfeld, Maurice, Jonathan D. Ostry, and Mahvash S. Qureshi. "Trilemma redux: New evidence from emerging market economies." blog post 11 (2017).

Svensson, Lars EO. "The foreign exchange risk premium in a target zone with devaluation risk." Journal of International Economics 33.1-2 (1992): 21-40.