Exchange Rate Risk Premium in Vietnam

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Abstract: This study characterises the exchange rate risk premium in the context of a small open economy with a controlled floating exchange rate regime. The empirical analysis applies the time-varying coefficients Bayesian structural vector autoregressive (TVC-BSVAR) model on data from the Vietnamese economy over a sample period from February 2012 to February 2019. The evidence shows that the risk premium varies over time, and increases with inflation and foreign direct investment capital inflows, but decreases with output growth and credit growth. The TVC-BSVAR model displayed highly accurate forecasting performance, accounting for nearly 94% of risk premium in a case study using the US dollar forward selling contract.

Keywords: Exchange rate, risk premium, vector autoregression, Vietnam
JEL classification: E44, F21, F31

1. Introduction

The existence of exchange rate risk premium is important for both policymakers and foreign exchange market traders. For policymakers, the risk premium may influence the effectiveness of market intervention policies, such as forward contracts and open market operations. For foreign exchange market traders, the risk premium creates the opportunity for trading profits on foreign currency, such as the US dollar in the Vietnamese interbank market.

Because of financial globalisation, the exchange risk premium is becoming more and more crucial for macroeconomic stability in both advanced and developing economies. In particular, Obstfeld, Ostry and Qureshi (2019) showed that the exchange rate is one channel for an open economy to absorb shocks from the world economy. Rey (2016) stressed the dilemma between the exchange rate regime and the domestic financial condition. Specifically, an economy can only choose one of two objectives from the free floating exchange rate regime and the stability of the domestic financial market. As highlighted by Engel (2014), however, the literature on risk premium and its application on foreign exchange intervention is relatively scant, especially for those economies without a flexible exchange rate regime. This research gap motivates the current empirical investigation.

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The current paper characterises the exchange rate risk premium for an economy with a controlled floating exchange rate regime. Vietnam is a small, open, developing economy with a high economic growth rate. Its exchange rate market is on the transitional pathway from a fixed exchange rate regime to a free floating one. Thus, the findings from this study can provide new insights on the mechanism of exchange rate risk premium.

The empirical analysis applies the time-varying coefficients Bayesian structural vector autoregressive (TVC-BSVAR) model on data from Vietnam's economy over a sample period from February 2012 to February 2019. The evidence shows that the risk premium varies over time, and increases with inflation and foreign direct investment capital inflows, but decreases with output growth and credit growth. The risk premium is then used to analyse the central bank's foreign market intervention policy through forward selling contracts. It is found that when the risk premium varies over time, the effectiveness of the intervention policy is reduced. This is because the forward exchange rate is not an unbiased predictor of the future spot exchange rate. Hence, stabilising economic growth is a priority for effective implementation of foreign exchange market intervention.

This study relates to the strand of literature on exchange rate risk premium. From a macroeconomic standpoint (see Mark, 1995; Engel, 2016), the risk premium is related to consumption growth, which can be derived from a general equilibrium model of a consumption-based asset pricing model. Accordingly, the currency serves as one tool of smoothing consumption fluctuation over time. From a finance standpoint (Fama, 1984; Svensson, 1992), the risk premium deviates from the no-arbitrage condition, and is one compensation for holders of foreign currency. Domestic households can diversify their consumption risk by holding one portfolio of domestic bonds denominated in domestic currency and foreign bonds denominated in foreign currency.

However, risk premium in the aforementioned papers is analysed within the free floating exchange rate regime. The interaction between the foreign exchange market and central bank policy is not mentioned. Because of this, the current paper examines risk premium in the context of a controlled floating exchange rate regime, using Vietnam as a case study. Accordingly, the exchange rate is driven by both market forces as with the free exchange rate regime and central bank policy. We record that the economic growth rate is much more important than the credit supply, a tool used by the State Bank of Vietnam (SBV), Vietnam's central bank, in determining the risk premium.

This paper also contributes to the literature on international macro-finance (for a survey, see Brunnermaier & Sannikov, 2014). Bernanke and Gertler (1989) found the higher net worth of a firm reduces agency cost induced by asymmetric information, then, raises the investment. Thus, net worth acts as a channel for the transmission of shock on macroeconomic variables over a business cycle. Farhi and Maggiori (2018) argued that the supply of government bonds needs to be large enough for the bonds to be safe and serve as reserve assets. The current work complements these papers by emphasising the liquidity of the banking system as a key driver of the foreign exchange market. This liquidity can be financed by foreign capital inflows, also called foreign direct investment (FDI) inflows, and domestic monetary supply. The empirical results show that less FDI inflows and/or higher credit growth can support a lower exchange rate risk premium.

This paper is closely related to the literature on foreign exchange market intervention. Adler and Mano (2021) showed that the accumulation of large foreign asset positions by many central banks through sustained and heavy foreign exchange intervention can reduce domestic output by 0.3%–1.2% per year. Chang (2019) highlighted that the sterilised 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. The current work complements this finding by focusing on the forward contract as one technical tool for the central bank to drive the equilibrium exchange rate. The forward exchange rate can be an unbiased predictor of the future spot exchange rate only if the risk premium does not exist. Because this assumption does not hold, the effectiveness of forward contracts thus depends on the determinants of risk premium such as economic growth rate and FDI inflows.

The remainder of this paper is organised as follows. Section 2 provides a brief introduction to the monetary and exchange rate policies in Vietnam. The methodology used in this study is elaborated on in Section 3. Section 4 presents the empirical evidence on the determinants of risk premium, and discusses foreign exchange intervention as one application of risk premium. Lastly, Section 5 concludes the paper.

2. Monetary and Exchange Rate Policy in Vietnam

Monetary policy is closely related to exchange rate policy in the Vietnamese economy. According to the Law on the State Bank of Vietnam (Vietnam National Assembly, 2010), the objective of monetary policy is to stabilise the value of domestic currency, and is realised by manipulating the inflation rate. By controlling the inflation rate, monetary policy also contributes to stabilising the macroeconomic environment as well as the foreign exchange rate and money markets, and helps stimulate economic growth. While the objective of monetary policy is stated clearly by the legal system in Vietnam, there is no such consensus on the objective of exchange rate policy. In practice, exchange rate policy has four main objectives in the Vietnamese economy: nominal exchange rate stability, inflation control, fostering competitiveness and maintaining an appropriate trade balance, and facilitating the transition to a developed foreign exchange market (Nguyen & Nguyen, 2009).

The exchange rate policy in the Vietnam depends on the exchange rate regime at that time. Following Nguyen et al. (2010), these regimes can be categorised based on classification by the International Monetary Fund (IMF). The crawling bands regime was applied during 1989–1990, 1997–1998 and 2008–2015. During crawling band periods, the SBV releases an official exchange rate (USD/VND) based on the inflation rate, interest rate, balance of payment and the exchange rate on the black market. Commercial banks are then allowed to set their own exchange rates within a specified range of the official exchange rate. The greatest acceptable range was seen during October 1997–August 1998, and smallest was seen during December 2007–March 2008, at ±10% and ±0.75%, respectively.

The conventional fixed peg arrangement regime was applied during 1994–1996 and 1999–2000. During conventional fixed peg arrangement periods, the official exchange rate is based on the exchange rate in the interbank market. Commercial banks are then

allowed to set their own exchange rates within a specified range of the official exchange rate. The largest acceptable range was seen during November 1996, and smallest was seen during 1999–2000, at ±1% and ±0.1%, respectively.

Other regimes have also been implemented, including the multiple exchange rates regime before 1989, the pegged exchange rate within horizontal bands during 1991–1993, and the crawling peg during 2001–2007.

Since January 2016, Vietnam has followed the controlled floating exchange rate regime, in accordance with Decision No 2730/QD-NHNN issued by the SBV on December 31, 2015 (State Bank of Vietnam, 2015). The SBV releases an official exchange rate based on four factors: (i) the weighted-average exchange rate in the interbank market, (ii) the macroeconomic environment such as the inflation rate and economic growth rate, (iii) the objective of the monetary policy, and (iv) the fluctuation of eight currencies in the international foreign exchange markets, which account for most of trading value of goods and services (US dollar (USD), Euro (EUR), Japanese yen (JPY), Chinese yuan (CNY), Singapore dollar (SGD), Republic of Korea's won (KRW), Thai baht (THB), and New Taiwan dollar (TWD)).

Compared with the previous regimes, the controlled floating exchange rate regime is featured by a market-driven exchange rate policy. Specifically, the SBV adjusts the official exchange rate according to the difference between the supply and demand for the foreign currency in the foreign exchange market. Commercial banks are currently allowed to trade foreign currency at an exchange rate within ± 3% of the official exchange rate.

As with the previous exchange rate regimes, the SBV commits to intervening in the foreign exchange market to ensure fluctuations in the exchange rate in the interbank market stay within the approved range. Moreover, the SBV uses the forward contract to drive the equilibrium exchange rate. This contract follows market forces to adjust the exchange rate and was not implemented in the previous regime.

In sum, Vietnam's exchange rate policy has seen a shift from the use of administrative tools to the use of market force (supply and demand for foreign currency) tools. Since the implementation of the controlled floating exchange rate regime in January 2016, the annual average inflation rate has decreased drastically to less than 4% per year, compared with the high inflation pre-2016, with the highest value being 23.1% in 2018. This trend is taken into account in our empirical model, which is presented in the next section.

3. Methodology

This section provides a brief discussion on the methodology of this study, covering the framework, data and model specification.

3.1 Concept and Measurement

The exchange rate premium of maturity (τ) at time t is measured by the deviation from uncovered interest rate parity (UIRP) (for a survey, see Engel, 2014):

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

whereby, $Rvnd_t(\tau)$ is the interbank interest rate on deposits denominated in the Vietnam Dong (VND) of maturity (τ) at time t; $Rusd_t(\tau)$ is interbank interest rate on deposits denominated in the United States Dollar (USD) of maturity (τ) at time t; $Ln(S_{t+\tau})$ is the log value of interbank exchange rate (VND/USD) at time ($t + \tau$), denoted by $S_{t+\tau}$; $Ln(S_t)$ is the 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 varies over time. The risk premium on a 3-month maturity, the focal analysis of this paper, decreases gradually from February 2012 to June 2015, before rising again steadily to about 1.8% in November 2015. Subsequently, it fluctuates around a mean of 0.17% until September 2018. There are two notable observations: the risk premiums of different maturities tend to move closely together over time, and the risk premium for longer maturities exhibits a higher mean and standard deviation. The above features of risk premium for Vietnam yield the following implication: the exchange rate risk premium varies over time, and is correlated across different time maturities.

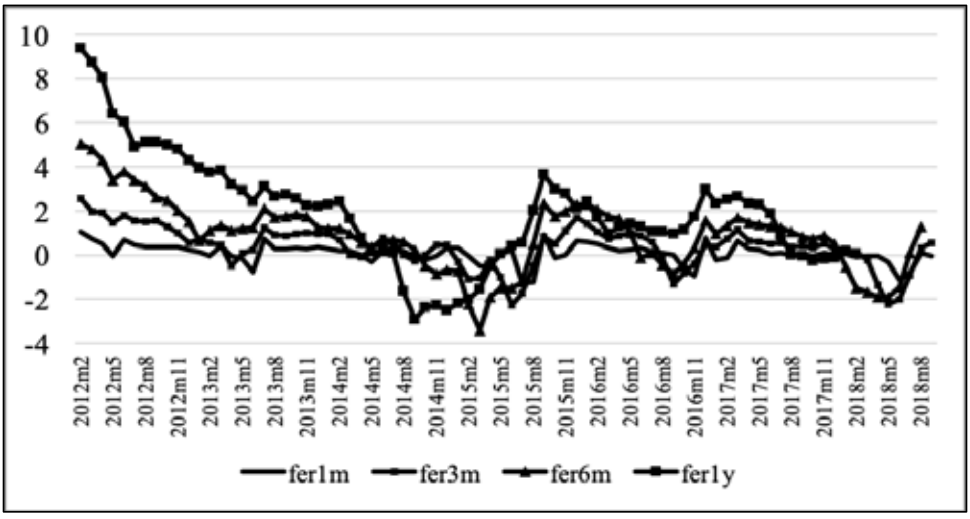

Figure 1. Exchange rate risk premium by maturities (%)
Note: The exchange rate premium for 1 month (fer1m), 3 months (fer3m), 6 months (fer6m), and 1 year (fer1y)
Source: Reuters database.

3.2 Data Description

The time series data collected for the empirical analysis covers the sample period from February 2012 to February 2019, yielding 85 monthly observations. The list of variables includes the inflation rate (*mcpi*), output growth rate (*gip*), foreign direct investment inflows (*fdi*) and liquidity supply (*gcredit*). The inflation rate is the month-over-month growth rate of the consumer price index. The proxy for output growth rate is the month-over-month growth rate of industrial output value. The FDI inflows are measured by the disbursed quantity of foreign direct investment in billions of USD. These variables

are on monthly frequency and collected from the database of the Vietnam General Statistics Office. The liquidity supply is the month-over-month growth rate of credit by banking system to the economy, sourced from the SBV.

The interest rates on VND and USD-deposits are the daily averaged values in the interbank market, on different maturities of 1 month, 3 months, 6 months and 1 year. The exchange rate is the quantity of Vietnam Dong per one unit of USD (VND/USD). These variables, sourced from Reuters database, are on daily frequency. They are then averaged over one month to obtain the monthly values.

Table 1 provides the descriptive statistics on the time series data, with the standard deviations for all variables showing rich variations for exploring the exchange rate risk premium. Table 2 presents the unit root test for the main variables, namely inflation rate, output growth rate, credit supply growth rate, FDI inflows, and exchange rate risk premium. The null hypothesis of a unit root is strongly rejected for all variables; hence they are included in the empirical model.

Table 1. Descriptive statistics

Variable	Number of observation	Mean	Standard deviation	Minimum	Maximum
Panel A: Macroeconomic variables					
Inflation rate (%)	85	0.294	0.438	−0.53	2.20
Output growth rate (%)	85	1.744	8.392	−22.30	31.90
Credit supply growth rate (%)	85	1.159	0.904	−0.81	3.99
Foreign direct investment inflows (billion USD)	85	1.217	0.465	0.10	2.60
VND/USD exchange rate	85	21919.72	838.178	20830.19	23346.46
Panel B: Interest rate on VND deposit					
Interest rate on 1-month-VND-deposit (%)	87	4.332	1.918	1.60	13.39
Interest rate on 3-month-VND-deposit (%)	87	5.222	1.948	2.51	13.50
Interest rate on 6-month-VND-deposit (%)	87	5.730	1.983	3.52	13.50
Interest rate on 1-year-VND-deposit (%)	87	6.241	2.082	4.58	13.50
Panel C: Interest rate on USD deposit					
Interest rate on 1-month-USD-deposit (%)	87	1.642	0.551	0.91	2.83
Interest rate on 3-month-USD-deposit (%)	87	2.155	0.541	1.36	3.32
Interest rate on 6-month-USD-deposit (%)	87	2.483	0.510	1.70	3.48
Interest rate on 1-year-USD-deposit (%)	87	2.957	0.622	2.06	4.11

Table 2. Dickey-Fuller unit root test

Variable	Test statistic	p-value
Inflation rate (*mcpi*)	−6.284	0.000
Output growth rate (*gip*)	−12.735	0.000
Credit supply growth rate (*gcredit*)	−10.296	0.000
Foreign direct investment inflows (*fdi*)	−7.263	0.000
Exchange rate risk premium (*fer3m*)	−3.500	0.008

Notes: The null hypothesis is that the variable contains a unit root, and the alternative hypothesis is that the variable is generated by a stationary process. The critical values at 10%, 5% and 1% levels of significance are −2.586, −2.903 and −3.532, respectively.

3.3 Model Specification

This study employs time-varying coefficients Bayesian structural vector autoregression (TVC-BSVAR) model to analyse the exchange rate risk premium in Vietnam, as it is suitable for studying changing regimes of economic fundamentals. As shown in Figure 2, the output growth rate tends to fluctuate around a stable mean and variance. After the implementation of the controlled floating exchange rate regime in January 2016, both the mean and variance of the inflation rate reduces substantially. The exchange rate risk premium, however, has a lower mean with a higher standard deviation. The TVC-BSVAR model has been employed by Cogley and Sargent (2002) for analysing the switching

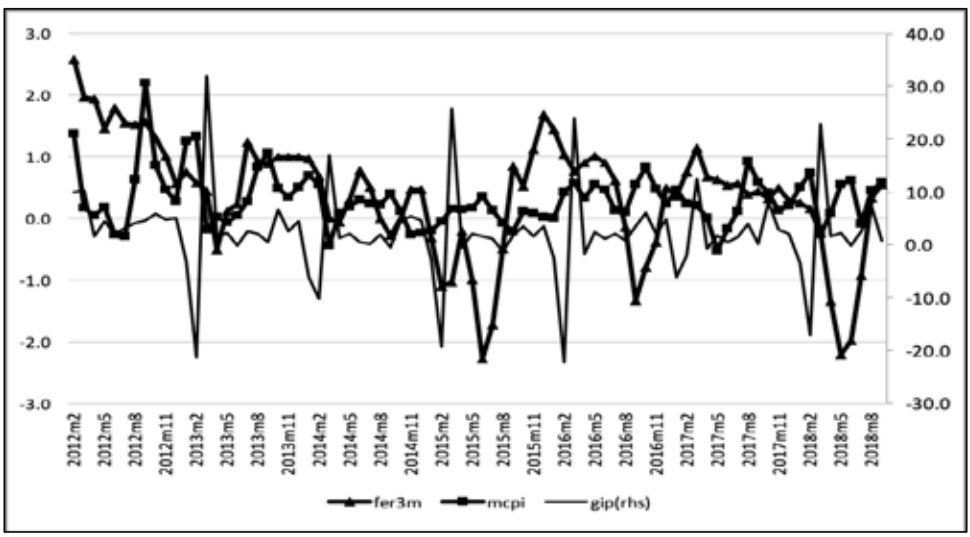

Figure 2. Exchange rate risk premium on 3-month maturity, output growth rate and inflation rate

Notes: Exchange rate risk premium on a 3-month maturity (*fer3m*, %) is computed based on data from the Reuters database. The output growth rate (*gip* or *ygip*, %) and inflation rate (*mcpi*, %) are from the Vietnam General Statistics Office.

regime of economic fundamentals of the US after World War II, and by Primiceri (2005) for examining monetary policy in the US.

D'Agostino, Gambetti and Giannone (2013) showed that the TVC-BSVAR model can improve upon the forecast made by standard VAR models. This advantage is crucial in the study of exchange rate risk premium, as it can influence the effectiveness of foreign exchange market intervention policy by the central bank. To reiterate, the TVC-BSVAR model can capture the switching regime of macroeconomic fundamentals to produce accurate forecasting results.

The TVC-BSVAR model can be expressed as:

$$y_t = A_{1,t}y_{t-1} + A_{2,t}y_{t-2} + A_{3,t}y_{t-3} + \varepsilon_t \quad (2)$$

where lag order of 3 is selected based on the Akaike information criterion (AIC). y_t = ($mcpi_t$, gip_t, fdi_t, $gcredit_t$, $fer3m_t$) is a 5x1 vector of endogenous variables, namely the inflation rate ($mcpi_t$), output growth rate (gip_t), FDI 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. ε_t = ($\varepsilon_{1,t}$, $\varepsilon_{2,t}$, $\varepsilon_{3,t}$, $\varepsilon_{4,t}$, $\varepsilon_{5,t}$) is a vector of residuals following a multivariate normal distribution:

$$\varepsilon_t \sim N(0,\Sigma) \quad (3)$$

The VAR coefficients are assumed to follow the autoregressive process:

$$\beta_t = \beta_{t-1} + \upsilon_t,\ \upsilon_t \sim N(0,\Omega) \quad (4)$$

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 $\beta = \{\beta_1,\ldots, \beta_T\}$, the covariance matrix (Ω) for the shocks on the dynamic process, and the residual covariance matrix (Σ). This study employs the orthogonalised impulse responses with the Cholesky decomposition of the residual covariance matrix. For convenience, all estimations are executed using the Bayesian estimation, analysis and regression (BEAR) toolbox, developed by Dieppe, Legrand and Van Roye (2016).

4. Empirical Results

This section first presents the estimation results for the determinants of exchange rate risk premium, followed by the analysis of the effectiveness of foreign exchange market intervention policy. The analysis closes with a case study on the USD forward selling contract in November 2018.

4.1 Determinants of Exchange Rate Risk Premium

The estimation results for TVC-BSVAR are summarised in Figure 3. From the impulse response function, the key findings can be summarised as follows. First, a higher inflation rate causes macroeconomic instability, as it raises the uncertainty in the foreign exchange market, hence pushing up the exchange rate risk premium. Second, an increase of the output growth rate raises the expected rate of return on foreign

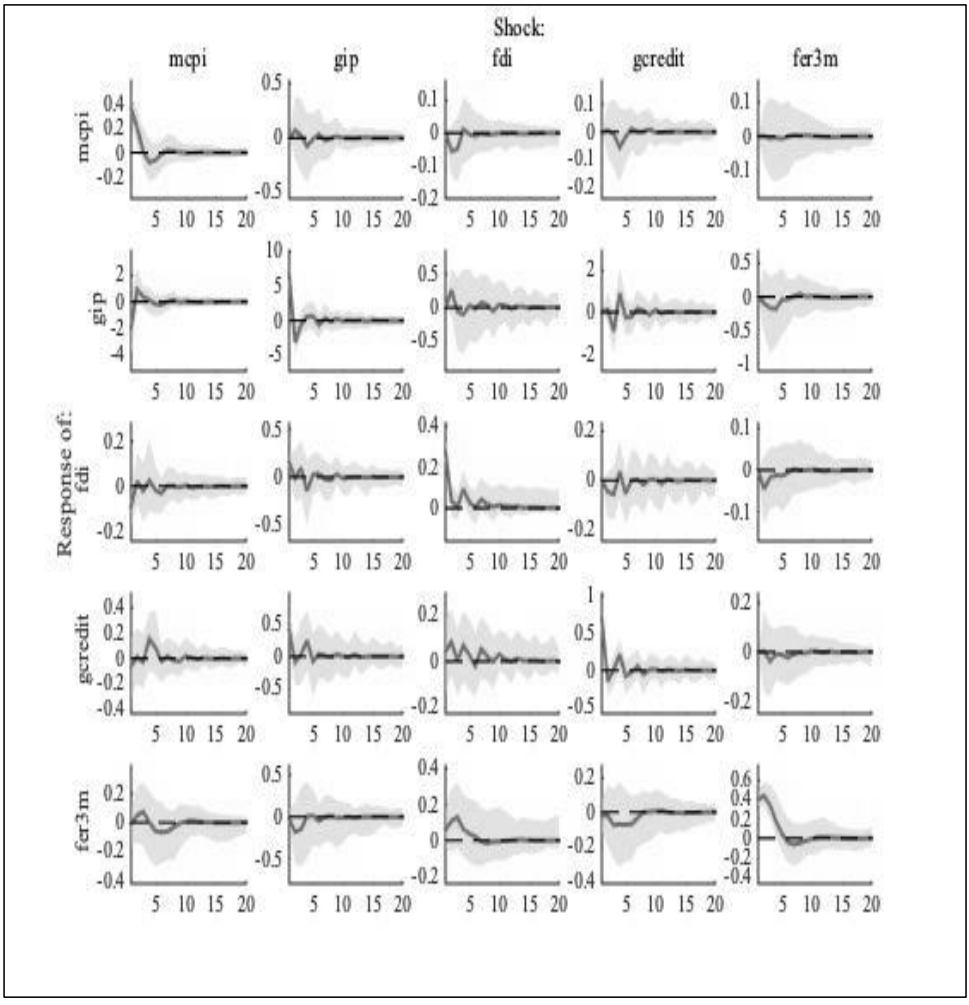

Figure 3. Impulse response function
Note: The impulse response function is generated from the TVC-BSVAR model.

currency trading. This also reduces the macroeconomic uncertainty, hence lowering the risk premium. Third, an increase in FDI inflows reduces the supply of foreign currency and reduces domestic capital investment. Because the domestic currency is under pressure to depreciate, the risk premium increases. Fourth, a higher credit growth rate tends to raise the interest rate, reducing the domestic currency depreciation. This reduces uncertainty, hence decreasing the risk premium in the foreign exchange market. In sum, a higher exchange rate risk premium is associated with a surge in inflation, a decrease of output growth, an increase of FDI, and a lower credit growth rate.

Figure 4 shows the forecast error variance decomposition. In particular, a 1% increase in the exchange rate risk premium can be explained by a combination of

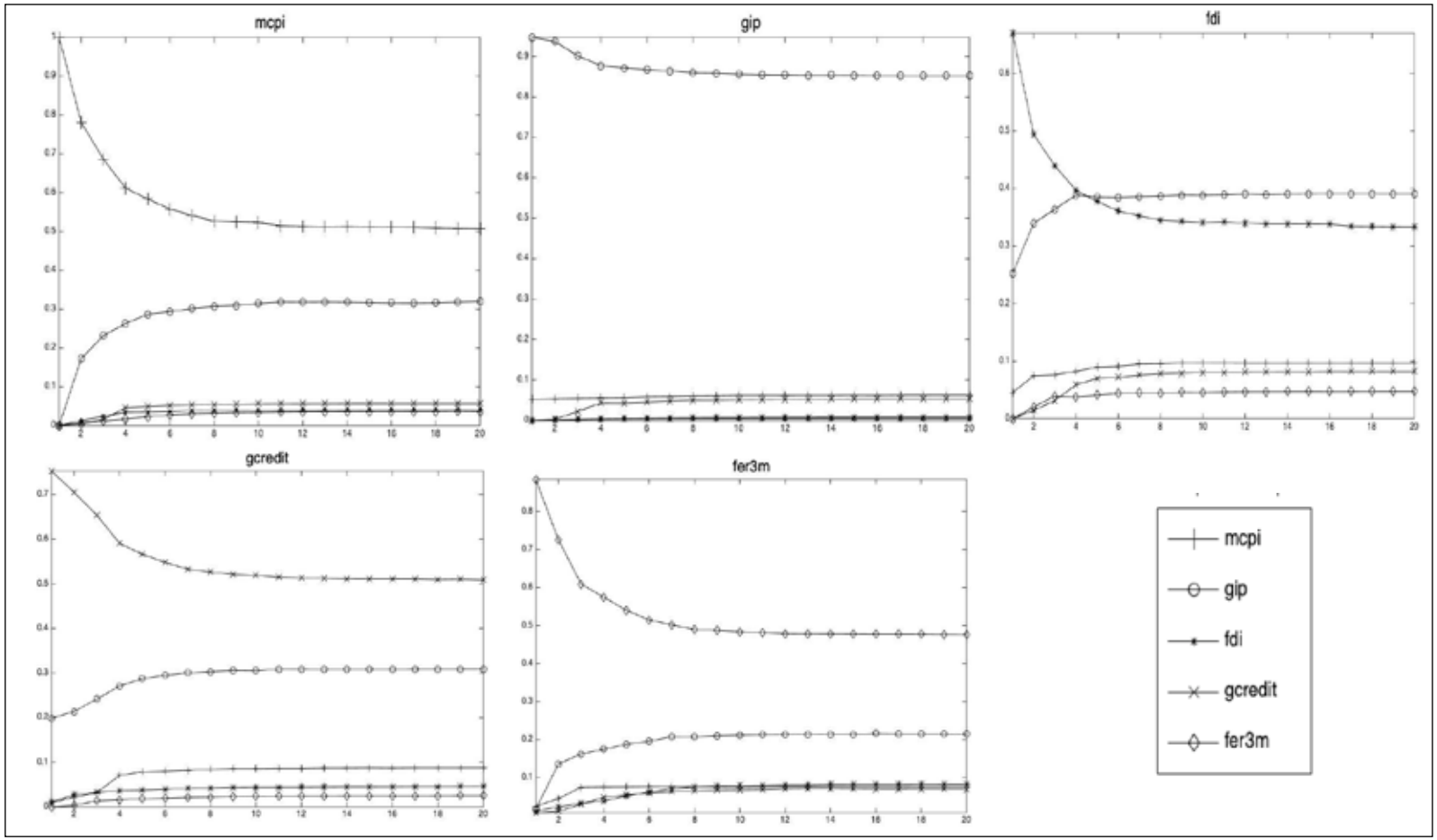

Figure 4. Forecast variance decomposition

Note: The variance decomposition is generated from the TVC-BSVAR model.

output growth rate, inflation rate, FDI and credit growth rate. Among these variables, the output growth plays the most important role since it accounts for the highest share of the forecasting value of risk premium, with its share increasing even more for a further horizon. The inflation rate is also important, but its share tends to hold constant over the time horizon after five months. Therefore, evidence suggests that stabilising output growth is the most crucial step in dealing with exchange rate risk premium.

The empirical analysis in this section also uncovers some interesting results. First, FDI inflows can exert a positive impact on the economy through different channels. The impulse response function shows that capital inflows reduce the inflation rate and raise the output growth. Thus, FDI inflows can stabilise the macroeconomic environment. Second, the influence of credit growth rate on other macroeconomic variables is quite modest in the Vietnamese economy. The forecast variance decomposition shows that credit growth affects the forecasted values of inflation rate, FDI inflows, and risk premium to a small degree, but has no significant impact on output growth.

4.2 Foreign Exchange Intervention

This subsection analyses an intervention by the SBV in the foreign exchange market using the USD forward selling contract. This analysis is an empirical application of the exchange rate risk premium.

4.2.1 Forward Contract

$F_t(\tau)$ is defined as the forward exchange rate of a forward contract issued at time t and matured at time $(t + \tau)$. Rewriting the exchange rate risk premium (Equation (1)) yields:

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

The covered interest rate parity implies the equilibrium state between the interest rates, the current spot exchange rate and the 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 contract to hedge against the exchange rate risk. At equilibrium, the net profit of investing the same amount of money in domestic currency is equal to that when investing in foreign currency.

$$Rvnd_t(\tau) - Rusd_t(\tau) = Ln(F_t(\tau)) - Ln(S_t) \quad (6)$$

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

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

Three possible cases exist. 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 a 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 to the forward

rate: $S_{t+\tau} < F_t(\tau)$. Third, with a negative risk premium ($fer_t(\tau) < 0$), the domestic currency depreciates too much and becomes higher than the forward rate: $S_{t+\tau} > F_t(\tau)$. If the risk premium varies over time, it can be zero, positive or negative. Therefore, the existence of a time-varying exchange rate risk premium can reduce the effectiveness of the forward exchange rate as a predictor of the future spot exchange rate.

4.2.2 Case Study: USD Forward Selling Contract in November 2018

This empirical application employs the exchange rate risk premium (Equation (7)) to analyse the effectiveness of the SBV's market intervention policy. The SBV issued a USD selling forward contract at end of November 2018, maturing at end of January 2019. Thus, the time maturity of the contract was approximately 3 months. First, we assume that it is currently November 2018. The forward rate is 23462 VND/USD and the spot exchange rate at end of November 2018 is 23324 VND/USD. This implies $F_t(\tau)$ = 23462 VND/USD and S_t = 23324 VND/USD. The next step is to forecast the exchange rate risk premium. Specifically, the data sample from February 2012 to August 2018 is used to forecast the risk premium in November 2018. The future spot exchange rate is computed from Equation (7).

The TVC-BSVAR model fits the data quite well. The model forecasts the risk premium of 3-month maturity on November 2018 as $fer_t(\tau)$ = 1%, with τ = 3 months. According to Figure (5), the 3-month exchange rate risk premium may increase gradually from 0.32% in August 2018 to 0.67% in September 2018, before climbing to 1% in November 2018. Referring to the actual data, the 3-month risk premium is 0.54% in September 2018, and 1.06% in November 2018. Thus, the estimated value of the 3-month exchange rate risk premium (1%), accounts for 94% of the realised risk premium in November 2018 (1.06%). In brief, the forecasting value is very close to the realised value of risk premium.

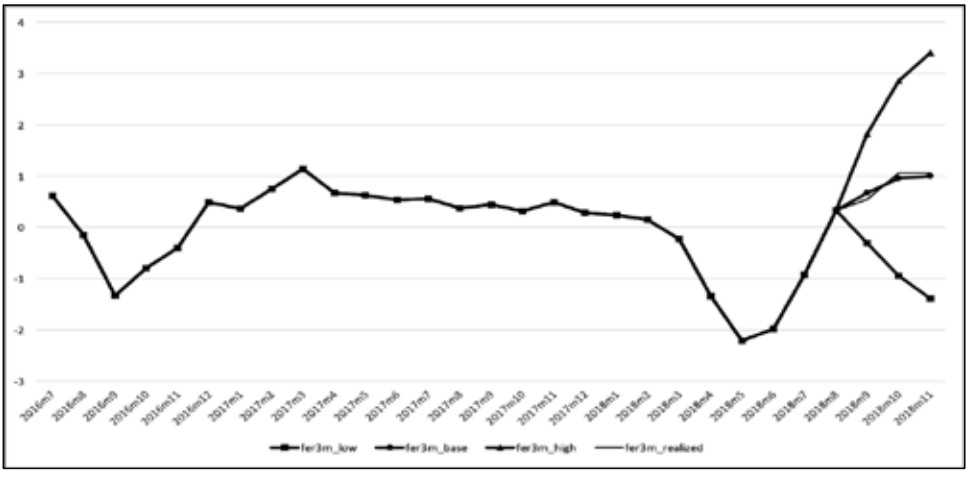

Figure 5. 3-month exchange rate risk premium forecasting
Note: The estimated results are derived from the TVC-BSVAR model.

Table 3. Exchange rate risk premium in November 2018 using alternative methods

Method (1)	Forecasted value (2)	Realised value (3)	Difference (2) − (3)
SVAR	2.61	1.06	+1.55
BVAR	1.46	1.06	+0.40
Average	0.37	1.06	−0.69
TVC-BSVAR	1.00	1.06	−0.06

Note: The forecasted value is generated using alternative methods: namely structural vector autoregression (SVAR), Bayesian vector autoregression (BVAR) and taking the time series average (Average).

Table 3 illustrates the robustness check on the forecasting exchange rate risk premium in November 2018 by comparing different forecasting methods. First, the structural vector autoregression model (SVAR), which is a reduced version of the current TVC-BSVAR model, provides the forecasted value of 2.61%, which is far from the realised value of 1.06%. Second, the Bayesian vector autoregression model (BVAR) records the forecasting value of 1.46%, which is closer to the realised value. Third, using the averaged value over time shows the forecasting value at 0.37%, which is quite far from the realised value. Compared with the above three methods, the TVC-BSVAR forecast of 1.0% is closest to the realised value.

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

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

The existence of risk premium reduces the effectiveness of the intervention policy. In the model, the exchange rate attains 23228.76 VND/USD at end of January 2019, which is far less than the forward exchange rate of 23462 VND/USD. Referring to the actual data, the exchange rate is 23199 VND/USD at the end of January 2019. Therefore, the data are consistent with the model by indicating an appreciation, instead of depreciation of VND.

5. Conclusion

This study conducts an empirical analysis on the exchange rate risk premium of VND/USD in the interbank market in Vietnam. The results show that the exchange rate risk premium varies over time. Further analysis reveals that it increases with inflation and foreign direct investment inflows, but decreases with output growth and credit growth.

The results have important policy implications. First, the State Bank of Vietnam's market intervention using forward contracts may fail to meet its target exchange rate. In fact, the existence of the exchange rate risk premium prevents the spot exchange rate from moving gradually to the target rate given by the USD forward contract. Second, stabilising output growth is a most crucial step to take in dealing with exchange rate risk

premium. This prescription is applicable to Vietnam and other developing economies with a controlled floating exchange rate regime.

The paper can be extended in several directions. For example, the model can incorporate the foreign reserve to account for the credibility of the central bank in stabilising the fluctuation of the exchange rate. This is important for developing economies under the regime of controlled floating exchange rate. The empirical analysis can also be extended as a panel to include other economies, such as those in the Association of Southeast Asian Nations (ASEAN), which have a greater degree of economic integration.

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