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Factors Determining Exchange Rates between Thai Baht and US Dollar as well as Thai Baht and Chinese Yuan under President Donald Trump's Administration

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Abstract

The study of factors determining exchange rates between Thai baht and US dollar as well as Thai baht and Chinese yuan under president Donald Trump's administration collects monthly time series data of the THB/USD exchange rate, the THB/CNY exchange rate, interest rate, inflation rate, foreign reserves, and net exports during the period from January 2017 to December 2020. The results from multiple regression with ordinary least squared show that a change in the interest rate differentials has a statistically significant impact on not only a change in the THB/USD exchange rate but also a change in the THB/CNY exchange rate at 0.10 level. Moreover, the inflation rate differentials have a statistically significant association with a change in the THB/USD exchange rate at 0.10 level. Additionally, a change in foreign reserves is inversely related to a change in the THB/CNY exchange rate at 0.05 level. However, net exports have no significant effect on both changes in the THB/USD and THB/CNY exchange rates.

Keywords: THB/USD, THB/CNY, Interest rate, Inflation rate, Foreign reserves, Net exports, President Trump

Introduction

After the Cold War had ended, Southeast Asian countries, including Thailand, have been perceiving USA as a source of peace and stability in international rules and norms as well as liberal international trade. However, under 4 years of President Donald Trump's administration from January 2017 to December 2020, American influence and leadership in Southeast Asia has been declined. Once Trump became the 45th US president, he withdrew USA from the Trans-Pacific Partnership (TPP), which is the largest trade deal in the world. Moreover, he employed trade actions, such as increasing tariffs, against countries that have large trade surpluses with USA. China was targeted as a major strategic competitor by Trump. Consequently, USA launched the trade war with China, intensified Freedom of Navigation Operations (FONOPs) in the South China Sea, and prohibited Chinese apps and tech firms.

The worsen US-China relationship also affected Thailand because, from 2017 to 2020, Thailand had the largest trade deficit with China and the largest trade surplus with the US. Trade deficits of Thailand with China have been increasing during Trump's administration from 517,084 million baht in 2017 to 676,043 million baht in 2019. Moreover, up to August 2020, the value of Trade deficits were 402,400 million baht. On the other hand, trade surpluses of Thailand with USA have been increasing during Trump's administration from 390,295 million baht in 2017 to 425,615 million baht in 2019. Furthermore, up to August 2020, the value of trade surpluses were 342,991 million baht. Therefore, the volatility of Thai baht against US dollar as well as the volatility of Thai baht against Chinese yuan are concerned by multinational corporations in Thailand. Knowing the determinants of exchange rate between Thai baht and US dollar and Thai baht and Chinese yuan will be beneficial to them so that they can hedge foreign exchange exposure in order to protect and reduce their cash flow uncertainty.

Literature reviews

According to theories and concepts in the area of international finance, interest rate parity (IRP), relative purchasing power parity (relative PPP), and balance of payment (BOP) can help explain exchange rate movement.

First, for interest rate parity (IRP) to be held, the interest rate differentials between any two countries have to be equal to neither forward premium nor forward discount of foreign currency (assuming no transaction costs). Thus, interest rate determines exchange rate as supported by various research papers with mixed results. For instance, Suthar (2008) uses OLS method on monthly time series data during April 1996-January 2006 and finds a significant effect of the interest rate differentials between India and the US on the rupee-dollar exchange rate. Additionally, Liew et.al. (2009) study the long-run relationship between exchange rate and its determinants by using the multivariate

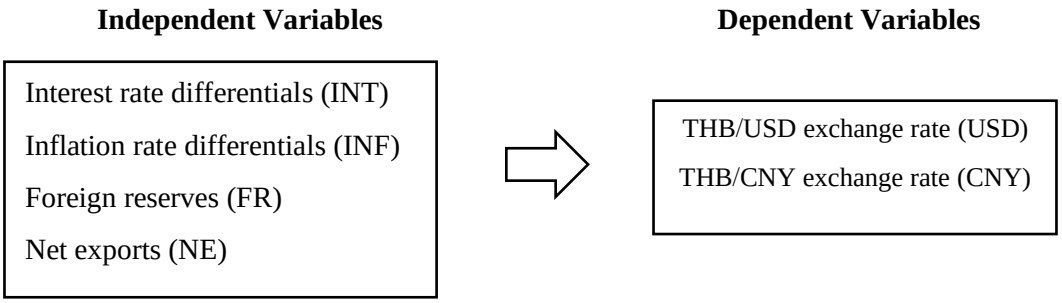
cointegration method. The result indicates that interest rates determine the exchange rate movement in Thailand. Rattanapongpinyo (2010) also analyzes monthly averaged secondary data in Thailand during 2003-2007 with multiple regression approach. The result shows the positive association between LIBOR and the THB/USD exchange rate. Recently, Sawatkamon (2019) studies factors affecting the THB/CNY exchange rate by using multiple regression and finds a positive impact of policy interest rate on the exchange rate. However, Mirchandani (2013) shows a negative correlation between interest rate and the Rupee/USD exchange rate at the significant level of 0.01. Also, Kia (2013) examines Canadian data during the period of 1972 to 2010 and finds a negative impact of the change in interest rate on the growth of the real exchange rate over the short run. Last but not least, Hsing (2016) finds that the HUF/USD exchange rate is positively related to the US treasury bill rate, but negatively associated with the Hungarian treasury bill rate.

Next, for relative purchasing power parity (relative PPP) to be held, the inflation rate differentials between any two countries have to be equal to the percentage change in the value of foreign currency in the opposite direction (assuming no transaction costs). Thus, inflation rate determines exchange rate. For example, Mirchandani (2013) shows a negative correlation between inflation rate and the Rupee/USD exchange rate at the significant level of 0.01. Moreover, Hsing (2016) finds that the HUF/USD exchange rate is positively related to the Hungarian inflation rate, but negatively associated with the US inflation rate.

Finally, balance of payment (BOP) affects the exchange rate. If there is a deficit in balance of payment, the currency value of that country will decrease. On the other hand, if there is a surplus in balance of payment, the currency value of that country will increase. In general, there are four main accounts in balance of payment, comprising of current account, capital account, financial account and foreign reserves. Nonetheless, this study focuses on only net exports from current account and foreign reserves. A lot of research papers examine whether these two factors affect exchange rate. For example, Sawatkamon (2019) studies factors affecting the THB/CNY exchange rate by using multiple regression and finds a positive impact of imports from China and a negative impact of foreign reserves on the exchange rate. Moreover, research papers that indicate the significant impact of foreign reserves on the exchange rate are Suthar (2008) (studying the rupee-dollar exchange rate), Khan (2013) (analyzing data in Pakistan), and Bouraoui and Phisuthtiwatcharavong (2015) (using the THB/USD exchange rate). Furthermore, Rattanapongpinyo (2010) analyzes monthly averaged secondary data during 2003-2007 with multiple regression approach. The result shows the inverse association between foreign reserves and the THB/USD exchange rate. Algieri (2011) also finds a negative relation between Russian real

effective exchange rate and foreign reserves.

Therefore, the study of factors determining exchange rates between Thai baht and US dollar as well as Thai baht and Chinese yuan under president Donald Trump's administration employs the interest rate differentials, the inflation rate differentials, foreign reserves, and net exports as independent variables. In addition, the conceptual framework of this study is shown below.



Objectives

The objectives of the study of factors determining exchange rates between Thai baht and US dollar as well as Thai baht and Chinese yuan under president Donald Trump's administration are as follows.

1. To examine whether the interest rate differentials, the inflation rate differentials, foreign reserves, and net exports affect the THB/USD exchange rate under Trump's administration.
2. To examine whether the interest rate differentials, the inflation rate differentials, foreign reserves, and net exports affect the THB/CNY exchange rate under Trump's administration.

Hypotheses

Referring to the literature reviews above, the hypotheses of the study of factors determining exchange rates between Thai baht and US dollar as well as Thai baht and Chinese yuan under president Donald Trump's administration are as follows.

1. Interest rate differentials are expected to have a positive relation to THB/USD exchange rate as well as THB/CNY exchange rate under Trump's administration.
2. Inflation rate differentials are expected to have a positive relation to THB/USD exchange rate as well as THB/CNY exchange rate under Trump's administration.
3. Foreign reserves are expected to have a negative relation to THB/USD exchange rate as well as

THB/CNY exchange rate under Trump's administration.

4. Net exports are expected to have a negative relation to THB/USD exchange rate as well as THB/CNY exchange rate under Trump's administration.

Methodology

The study of factors determining exchange rates between Thai baht and US dollar as well as Thai baht and Chinese yuan under president Donald Trump's administration collects monthly time series data of dependent variables, namely the THB/USD exchange rate and the THB/CNY exchange rate, and independent variables, namely the interest rate differentials, the inflation rate differentials, foreign reserves, and net exports, during the period from January 2017 to December 2020. After checking and correcting the problem of data stationary, multiple regression with ordinary least squared is used to test the data. The models employed are as follows.

$$USD_t = a + b_1INT_t + b_2INF_t + b_3FR_t + b_4NE_t + e_t$$

$$CNY_t = a + b_1INT_t + b_2INF_t + b_3FR_t + b_4NE_t + e_t$$

Once both models have no problem of multicollinearity and autocorrelation, coefficients of the statistically significant variables from those models are interpreted.

Results

The determinants of the THB/USD exchange rate

Table 1 Presents the descriptive statistics of variables in examining the determinants of the exchange rate between Thai Baht and US Dollar during President Donald Trump's Administration.

	USD	INT	INF	FR	NE
Mean	32.14738	-2.811458	-1.505951	7.063455	3.795097
Maximum	35.43000	-0.110000	-0.620000	9.772990	9.167386
Minimum	30.09650	-3.750000	-3.560000	5.900000	-3.573963
Std. Dev.	1.360696	1.126520	0.556718	1.135581	1.911992

From Table 1, during the study period, the exchange rate between Thai Baht and US Dollar has the mean of 32.15 THB/USD with the maximum of 35.43 THB/USD and the minimum of 30.10 THB/USD. The difference between Thai interest rate and US interest rate has the mean of -2.81% with the maximum of -0.11% and the minimum of -3.75%. The difference between Thai inflation rate and US inflation rate has the mean of -1.51% with the maximum of -0.62% and

the minimum of -3.56%. The mean of foreign reserves in Thailand is 7.06 billion dollars with the maximum of 9.77 billion dollars and the minimum of 5.90 billion dollars. Lastly, the mean of net export (which is exports to USA minus imports from USA) is 3.80 billion baht with the maximum of 9.17 billion baht and the minimum of -3.57 billion baht.

Table 2 Shows test for the stationary of data.

Variable	Augmented Dickey-Fuller test statistic	
	t-Statistic	Prob.
D(USD)	-4.458440	0.0008
D(INT)	-6.590526	0.0000
INF	-3.019668	0.0404
D(FR)	-6.583733	0.0000
NE	-6.518144	0.0000

According to the Augmented Dickey-fuller test statistics in table 2, USD, INT and FR are stationary at the first difference. However, INF and NE are stationary at level.

Table 3 Displays the correlation matrix among independent variables in examining the determinants of the exchange rate between Thai Baht and US Dollar.

	D(INT)	INF	D(FR)	NE
D(INT)	1.000000			
INF	-0.197188	1.000000		
D(FR)	0.495183	-0.181463	1.000000	
NE	0.249188	-0.133106	-0.037494	1.000000

As shown in table 3, none of the independent variables has the correlation outside the range of -0.8 and 0.8; therefore, there is no multicollinearity problem. All the independent variables can be employed for regression analysis.

For the initial results of the multiple regression with ordinary least squared, Prob(F-statistic) of Breusch-Pagan-Godfrey test is 0.7547, indicating no heteroscedasticity problem. On the other hand, Prob(F-statistic) of Breusch-Godfrey Serial Correlation LM test is 0.0331, indicating the problem of autocorrelation. After applying HAC standard errors & covariance (Bartlett kernel, Newey-West) to cope with the autocorrelation problem, the final model (model 1) is displayed below.

Model 1:

$$D(USD) = 0.052179 + 0.121090D(INT)^{*} + 0.127534INF^{*} - 0.267347D(FR) + 0.026564NE$$
$$(0.331855) \quad (1.958814) \quad (1.717889) \quad (-1.467944) \quad (1.114283)$$

R-squared	0.642759
F-statistic	14.75369
Prob(F-statistic)	0.000000

According to model 1, F-statistic is 14.75369 with the p-value of 0.00000 meaning that at least one independent variable significantly affects D(USD). Moreover, R-squared is 0.6428 showing that all the independent variables in this model help explain D(USD) 64.28%, the rest 35.72% can be explained by other factors. Thus, the coefficients of the statistically significant variables can be explained as follows.

A change in the interest rate differentials 1% makes a change in the exchange rate between Thai Baht and US Dollar 0.1211 THB in the same direction with the statistical significance at the level of 0.10. Additionally, 1 % difference in inflation rates between Thailand and USA makes a change in the exchange rate between Thai Baht and US Dollar 0.1275 THB in the same direction with the statistical significance at the level of 0.10.

The determinants of the THB/CNY exchange rate

Table 4 Presents the descriptive statistics of variables in examining the determinants of the exchange rate between Thai Baht and Chinese Yuan during President Donald Trump's Administration.

	CNY	INT	INF	FR	NE
Mean	4.736423	-2.348333	-1.836525	7.063455	-5.190222
Maximum	5.136500	1.640000	0.659200	9.772990	-0.129202
Minimum	4.287300	-3.850000	-6.232600	5.900000	-9.010759
Std. Dev.	0.254039	1.543419	1.545872	1.135581	1.566084

From Table 4, during the study period, the exchange rate between Thai Baht and Chinese Yuan has the mean of 4.74 THB/CNY with the maximum of 5.14 THB/CNY and the minimum of 4.29 THB/CNY. The difference between Thai interest rate and Chinese interest rate has the mean of -2.35% with the maximum of 1.64% and the minimum of -3.85%. The difference between Thai inflation rate and Chinese inflation rate has the mean of -1.84% with the maximum of 0.66% and the minimum of -6.23%. The mean of foreign reserves in Thailand is 7.06 billion dollars with the maximum of 9.77 billion dollars and the minimum of 5.90 billion dollars. Lastly, the mean of net export (which is exports to China minus imports from China) is -51.9 billion baht with the maximum of -1.29 billion baht and the minimum of 90.11 billion baht.

Table 5 Shows the test for the stationary of data.

Variable	Augmented Dickey-Fuller test statistic	
	t-Statistic	Prob.
D(CNY)	-4.333008	0.0012
D(INT)	-6.713392	0.0000
D(INF)	-6.709045	0.0000
D(FR)	-6.583733	0.0000
NE	-7.430077	0.0000

According to the Augmented Dickey-fuller test statistics in table 5, CNY, INT, INF and FR are stationary at the first difference. However, NE is the only variable that is stationary at level.

Table 6 Displays the correlation matrix among independent variables in examining the determinants of the exchange rate between Thai Baht and Chinese Yuan.

	D(INT)	D(INF)	D(FR)	NE
D(INT)	1.000000			
D(INF)	0.250554	1.000000		
D(FR)	0.491270	-0.054239	1.000000	
NE	-0.051746	0.203024	-0.050616	1.000000

As shown in table 6, none of the independent variables has the correlation outside the range of -0.8 and 0.8; therefore, there is no multicollinearity problem. All the independent variables can be employed for regression analysis.

Model 2:

$$D(CNY) = 0.001768 + 0.017622D(INT)^{*} + 0.011398D(INF) - 0.058642D(FR)^{**} + 0.000437NE$$

(0.089199) (2.014842) (1.295603) (-2.372610) (0.119295)

R-squared	0.649618
F-statistic	15.20305
Prob(F-statistic)	0.000000

This study uses multiple regression with ordinary least squared to analyze the data. Referring to model 2 as shown above, F-statistic is 15.20305 with the p-value of 0.00000 meaning that at least one independent variable significantly affects D(CNY). Moreover, R-squared is 0.6496 showing that all the independent variables in this model help explain D(CNY) 64.96%, the rest 35.04% can be explained by other factors. Furthermore, the Prob(F-statistic) of both Breusch-

Pagan-Godfrey test (which is 0.8561) and Breusch-Godfrey Serial Correlation LM test (which is 0.2123) are greater than 0.05, indicating no problem of heteroscedasticity and autocorrelation, respectively. Thus, the coefficients of the statistically significant variables can be explained as follows.

A change in the interest rate differentials 1% makes change in the exchange rate between Thai Baht and Chinese Yuan 0.0176 THB in the same direction with the statistical significance at the level of 0.10. Additionally, a change in foreign reserves 1 billion dollar makes change in the exchange rate between Thai Baht and Chinese Yuan 0.0586 THB in the opposite direction with the statistical significance at the level of 0.05.

Conclusions

The study of factors determining exchange rates between Thai baht and US dollar as well as Thai baht and Chinese yuan under president Donald Trump's administration uses monthly time series data of the THB/USD exchange rate, the THB/CNY exchange rate, the interest rate differentials, the inflation rate differentials, foreign reserves, and net exports gathered from January 2017 to December 2020. According to the implementation of multiple regression with ordinary least squared, the summary of results is displayed in table 7.

Table 7 Exhibits the statistical significance of independent variables in determining the exchange rate between Thai Baht and US Dollar as well as the exchange rate between Thai Baht and Chinese Yuan.

	D(INT)	INF	D(FR)	NE
D(USD)	(+) *	(+) *	×	×
D(CNY)	(+) *	×	(-) **	×

** shows the statistical significance at the level of 0.10*

*** shows the statistical significance at the level of 0.05*

× shows no statistical significance

From table 7, not only a change in the interest rate differentials but also the inflation rate differentials significantly determine a change in the exchange rate between Thai Baht and US Dollar. Additionally, both changes in the interest rate differentials and foreign reserves significantly determine a change in the exchange rate between Thai Baht and Chinese Yuan. Nonetheless, net exports have no effect on either a change in the exchange rate between Thai Baht and US Dollar or a change in the exchange rate between Thai Baht and Chinese Yuan.

Discussions and recommendations

During the extremely tight policies on trade between USA and China under President Trump's administration, this

study finds a positive impact of a change in the interest rate differentials on both THB/USD and THB/CNY exchange rates. An increase (decrease) in the interest rate differentials leads to an increase (decrease) in the exchange rate change, indicating Thai baht depreciation (appreciation). This finding is consistent with interest rate parity (IRP) and supported by Suthar (2008), Liew et.al. (2009), Rattanapongpinyo (2010), and Sawatkamon (2019). In addition, there is a positive impact of the inflation rate differentials on the THB/USD exchange rate, meaning that an increase (decrease) in inflation rate differentials brings an increase (decrease) in the exchange rate change. As a result, Thai baht depreciates (appreciates) against US dollar. This finding is consistent with relative purchasing power parity (relative PPP) and Hsing (2016). Lastly, there is a negative impact of a change in foreign reserves on the THB/CNY exchange rate, meaning that an increase (decrease) in a change in foreign reserves causes a decrease (increase) in the exchange rate change. As a result, Thai baht appreciates (depreciates) against Chinese yuan. This finding is consistent with the concept of balance of payment (BOP), and goes along with Suthar (2008), Rattanapongpinyo (2010), Algoeri (2011), Khan (2013), Bouraoui and Phisuthtiwatcharavong (2015), and Sawatkamon (2019).

Basing on the statistically significant findings and assuming the continuous implementation of trade war between USA and China under the 46th US president, this study practically recommends multinational corporations in Thailand to pay attention to the difference in interest rates between Thailand and USA as well as between Thailand and China, the difference in inflation rate between Thailand and USA, and the change in foreign reserves in Thailand. If the differences in interest rates between Thailand and USA as well as between Thailand and China are expected to rise, multinational corporations with net exposed short position should hedge against Thai baht depreciation by using derivatives such as forward contracts in order to buy foreign currency to cover their positions at a forward rate agreed upon today for a specified exchange date in the future.

Moreover, if the difference in inflation rates between Thailand and USA is expected to enhance, multinational corporations with net exposed short position should hedge against Thai baht depreciation by using derivatives such as forward contracts in order to buy foreign currency at a forward rate agreed upon today for a specified exchange date in the future. Additionally, if an increase in the change in foreign reserves in Thailand is expected, multinational corporations with net exposed long position should hedge against Thai baht appreciation by using derivatives such as forward contracts in order to sell foreign currency at a forward rate agreed upon today for a specified exchange date in the future. After employing derivatives to hedge against the volatility of Thai baht, multinational corporations can not only lower their foreign exchange exposure

but also minimize the uncertainty of their cash flows to the acceptable level.

Furthermore, future research may examine the determinants of the exchange rate between Thai Baht and some major currencies under substantial worldwide circumstances such as Covid-19 pandemic, high oil price, high global inflation, and Russian invasion of Ukraine. The findings can help related participants protect against or reduce the impact of the exchange rate fluctuation.

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