Print ISSN: 2288-4637 / Online ISSN 2288-4645
doi:10.13106/jafeb.2021.vol8.no7.0121

COVID-19 Pandemic: Impact on Thai Baht Exchange Rate*

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Received: March 20, 2021 Revised: May 22, 2021 Accepted: June 01, 2021

Abstract

This study investigates the impact of the COVID-19 pandemic on exchange rates of the top ten currencies according to their trading value with Thailand by employing a regression analysis. Data includes daily number of COVID-19 cases – confirmed, new, deaths – and exchange rates against Thai Baht – CNY, JPY, USD, MYR, SGD, VND, IDR, AUD, HKD, TWD – which cover the period from January 2, 2020 to December 15, 2020. Results show that the confirmed cases of COVID-19 in Thailand relate to changes in all exchange rates; CNY, MYR, SGD, VND, AUD, and TWD have depreciated in relation to the THB, whereas JPY, USD, IDR, and HKD have appreciated. Furthermore, the new cases and deaths of COVID-19 have similar associations with almost all exchange rates. Deprecation of the JPY, USD, VND, HKD, and TWD in relation to the THB is due to new cases, on the contrary the MYR, IDR, and AUD have appreciated. Likewise, the JPY, USD, VND, and HKD have depreciated, but the CNY, MYR, SGD, and AUD have appreciated in relation to the THB owing to deaths cases. The study findings provide useful knowledge to manage an exchange rate risk for business and could help policymakers to improve the efficiency of exchange rate.

Keywords: Exchange Rate, COVID-19, Thai Baht, Thailand

JEL Classification Code: F30, F31, F65, N25

1. Introduction

The coronavirus disease 2019 (COVID-19) is a novel disease caused by the SARS-CoV-2 virus (Sivakanthan, Pan, Kim, Ellenbogen, & Saigal, 2020), which first occurred at the end of December 2019. Shortly afterward, the World Health Organization (WHO) declared a pandemic due to the dramatic increase in number of infected cases around the world. At the time of writing (December 15, 2020), the total number of confirmed cases and deaths worldwide has reached a staggering 73.19 million and 1.63 million, respectively. In order to control the spread of COVID-19, governments of many countries have employed a range of lockdown-type tools (Just & Echaust, 2020), such as international travel controls, border shutdowns, city lockdown, and suspension/ closures of business. However, success in containing the spread led to an economic contraction globally, for instance, the business sector decided to reduce production and employment, there was a decline in stock market liquidity (Zaremba, Aharon, Demir, Kizys, & Zawadka, 2021), high investment risk, and stock price fluctuation.

In Thailand, the daily addition of confirmed COVID-19 cases and deaths cases rapidly increased during April to May 2020. At present, total deaths still remain below 60 from May, even though the COVID-19 infections have increased since the beginning of December 2020. According to the situation of COVID-19, the Thai government imposed strict measures to control the spread of inflection, which had severe impacts on the economy; in the third quarter of 2020, the gross domestic product (GDP) fell by 6.4% (Office of the national economic and social development council, 2020), non-performing loans (NPLs) to total loans increased by 3.13%, unemployment grew by 1.9%, and household debt to GDP expanded by 86.6% (Bank of Thailand, 2020a).

As mentioned above, the objective of this study is to assess how the ongoing COVID-19 pandemic affects

***Acknowledgments:**
The author would like to thank Mr. Cory Tyler Brathall for proofreading the article and provide language help.

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exchange rate volatility. Table 1 shows the list of top ten countries according to the scale of trading value with Thailand, including Chinese yuan (CNY), Japanese yen (JPY), US dollar (USD), Malaysia ringgit (MYR), Singapore dollar (SGD), Vietnamese dong (VND), Indonesian rupiah (IDR), Australian dollar (AUD), Hong Kong dollar (HKD), and Taiwan dollar (TWD), respectively. Hence, the variables of this study are the exchange rate of ten currencies and the number of COVID-19 cases in Thailand.

The findings of this study could provide useful knowledge for investors to manage exchange rate's risk during a period of COVID-19 crisis, and could help policymakers to improve the efficiency of exchange rate. The remainder of this study is organized as follows. Section 2 summarizes a review of the literature. Then, the data and research methodology are described in Section 3. Section 4 presents the empirical results. Section 5 provides discussion. Section 6 summarizes the main conclusions.

2. Literature Review

2.1. Definition of Systematic Risk

Systematic risk refers to the risk that influences a large number of assets (Jordan & Miller, 2009) – risk is the uncertainty event that changes the actual outcome (Jones, 2014) or investment's return (Lum, 2003) – which the systematic risk could not reduce by diversification (Mayo, 2004).

According to the definition of systematic risk, it is clear that the COVID-19 pandemic is a systematic risk as every country is facing volatility since the onset of the COVID-19 pandemic (Amar, Belaid, Youssef, Chiao, & Guesmi, 2021). Additionally, economies and financial markets are under immense stress due to the pandemic (Rizwan, Ahmad, & Ashraf, 2020).

2.2. The Context of the COVID-19 Pandemic

The study on COVID-19 outbreak has started to increase rapidly since the second quarter of 2020; previous studies and recent working papers have investigated the impact of COVID-19 pandemic on financial markets from different perspectives, which can be categorized into four groups.

The first group focuses on the impact of the COVID-19 pandemic on the stock market. Amar et al. (2021); Baek, Mohanty, and Glambosky (2020); Bheenick, Do, Hu, and Zhong (2020) found that stock market volatility has been connected with the COVID-19 pandemic especially in Asian emerging markets (Topcu & Gulal, 2020). In addition, an unexpected increase in COVID-19 cases had a negative impact on stock returns (Ashraf, 2020; Just & Echaust, 2020; Sherif, 2020; Xu, 2021), therefore it seems investors displayed herding behavior when the market was declining (Chang, McAleer, & Wang, 2020).

The second group investigated the impact of COVID-19 on the bond market. Gubareva (2020) found that credit risk increased due to the COVID-19-triggered repricing of default risk. According to the theory of the relationship between risk and returns, Keown (2013) explained that higher level of risk is associated with higher returns, which relates to the study of Sene, Mbengue, and Allaya (2021) who examined the Eurobonds yields in the context of COVID-19 and found the daily reports of confirmed cases led to increases in yields.

The third group studied the effect of the COVID-19 outbreak on the forex market. Narayan, Devpura, and Wang (2020) found the Japanese yen had depreciated in relation to US dollar due to the COVID-19. Wei, Luo, Huang, and Guo (2020) found supporting evidence that the instability of the Chinese yuan exchange rate is impacted by the COVID-19 outbreak. Additionally, the efficiency of forex markets

Table 1: Thailand's Top Ten Trading Partners (Unit: Million THB)

Rank	Country	Currency	Trade Value	Export	Import	Trade Balance
1	China	CNY	2,264,908	840,717	1,424,191	–583,475
2	Japan	JPY	1,430,755	647,968	782,786	–134,818
3	United States	USD	1,410,583	976,711	433,871	542,840
4	Malaysia	MYR	533,015	243,639	289,375	–45,736
5	Singapore	SGD	493,701	274,483	219,218	55,265
6	Vietnam	VND	469,499	312,815	156,684	156,131
7	Indonesia	IDR	384,998	221,157	163,841	57,316
8	Australia	AUD	380,581	283,352	97,229	186,123
9	Hong Kong	HKD	378,022	321,573	56,450	265,123
10	Taiwan	TWD	345,680	107,337	238,343	–131,007

Source: Thailand Ministry of Commerce (2020).

during the COVID-19 event declined which was driven by investors' fear (Aslam, Aziz, Nguyen, Mughal, & Khan, 2020).

The last group explored how the daily cases of COVID-19 affect the cryptocurrency market. Iqbal, Fareed, Wan, and Shahzad (2020) found that new cases of both infections and deaths affected all cryptocurrencies negatively. Nevertheless, Mnif, Jarboui, and Mouakhar (2020) argued that the cryptocurrency market efficiency was positively impacted by COVID-19.

2.3. Conceptual Framework

Based on a guideline from the literature review, a few previous studies intended to explore the impact of COVID-19 pandemic on exchange rates, but there is no one studies in case of Thailand. Thus, mainly contribution through this study attempts to examine the relationship between the number of COVID-19 cases and exchange rates in Thailand, which the conceptual framework of this study is shown in Figure 1.

3. Research Method and Data

3.1. The Data

The present study uses daily time-series data of exchange rate and number of COVID-19 cases in Thailand, which comprises 232 observations during the period from January 2 to December 15, 2020. With regard to exchange rate, the top ten currencies were selected according to the scale of trading value with Thailand – CNY, JPY, USD, MYR, SGD, VND, IDR, AUD, HKD, and TWD – was conducted from the Bank of Thailand (2020b) and expressed in direct quotes (amount of Thai baht per unit of foreign currency). Data on COVID-19 cases were obtained from the Thailand ministry of public health (2020), including number of confirmed cases (C), new cases (N), and deaths cases (D).

3.2. The Model

In order to explore the interactions between the COVID-19 pandemic and exchange rate, this study employs the regression model, which can be written as equation (1).

$$\begin{aligned} EX_t = {} & \gamma_0 + \gamma_1 \left(\text{COVID-19}_C\right) + \gamma_2 \left(\text{COVID-19}_N\right) \\ & + \gamma_3 \left(\text{COVID-19}_D\right) + \varepsilon_t \end{aligned} \quad (1)$$

Where EX_t is the exchange rate of ten currencies (CNY, JPY, USD, MYR, SGD, VND, IDR, AUD, HKD, TWD), COVID-19 is the number of COVID-19 cases (Confirmed, New, Deaths), γ_0 is the constant term, γ_1, γ_2, γ_3 are the regression coefficients, and ε_t is stochastic error term.

4. Results

4.1. Summary Statistics

The analysis begins with a descriptive analysis. Table 2 presents summary statistics of all variables include median, mean, standard deviation, skewness, and kurtosis. Over the sample period, the mean exchange rate for CNY is 4.5992, JPY is 29.7116, USD is 31.5202, MYR is 7.5543, SGD is 22.9674, VND is 0.1349, IDR is 2.2693, AUD is 21.8991, HKD is 4.0854, and TWD is 1.0616. The average number of daily additional COVID-19 confirmed, new, and deaths cases is 2,475.56, 11.99, and 41.06, respectively. In terms of skewness, all exchange rates are negative except for USD, IDR, and HKD. Likewise, the COVID-19 confirmed and deaths cases are negatively skewed with the exception of new cases, which is positively skewed. All variables have negative kurtosis value except IDR, TWD, and COVID-19 new cases.

4.2. Correlation Matrix

The result from correlation matrix shows that the coefficient of correlation is lower than 0.80, which means there is no multicollinearity problem or no linear relationship between independent and dependent variables, as show in Table 3. Therefore, all variables could be employed for regression analysis.

4.3. Regression Analysis

This section reports empirical results from the regression model, which indicates that the COVID-19

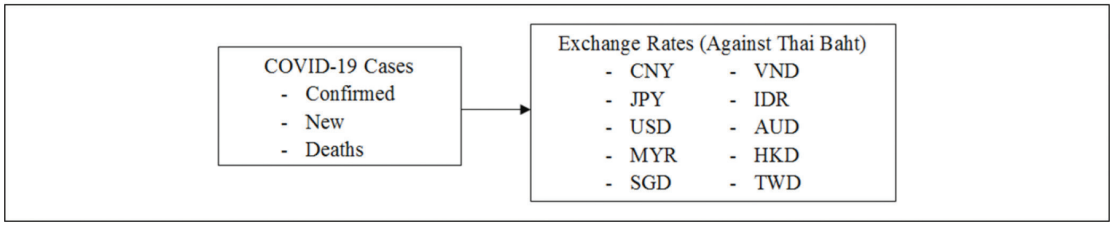

Figure 1: Conceptual Framework

Table 2: Summary Statistics

Variables	Obs.	Median	Mean	Std. Dev.	Skewness	Kurtosis
Exchange Rates						
CNY	232	4.6091	4.5992	0.0979	–0.2562	–0.9897
JPY	232	29.8732	29.7116	0.7257	–0.6530	–0.0056
USD	232	31.4215	31.5202	0.7231	0.2867	–0.3438
MYR	232	7.5544	7.5543	0.0965	–0.4568	–0.3749
SGD	232	22.9340	22.9674	0.2413	–0.0092	–0.8913
VND	232	0.1349	0.1349	0.0026	–0.1073	–0.5225
IDR	232	2.2652	2.2693	0.0695	0.1369	0.2989
AUD	232	21.8479	21.8991	0.9167	–0.4343	–0.3555
HKD	232	4.0759	4.0854	0.0941	0.2418	–0.3084
TWD	232	1.0637	1.0616	0.0218	–0.8295	0.2790
COVID-19 Cases						
Confirmed	232	3.148.50	2.475.56	1.474.47	–0.883	–0.943
New	232	4.50	11.99	24.60	3.490	12.018
Deaths	232	58.00	41.06	25.48	–0.899	–1.119

Table 3: Correlations Matrix

Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1	Confirmed	1												
2	New	–0.1	1											
3	Deaths	0.98*	–0.23*	1										
4	CNY	0.48*	0.33*	0.35*	1									
5	JPY	0.46*	0.37*	0.42*	0.65*	1								
6	USD	–0.07	0.55*	–0.07	0.28*	0.72*	1							
7	MYR	–0.23*	0.20*	–0.31*	0.53*	0.21*	0.26*	1						
8	SGD	0.30*	0.20*	0.24*	0.75*	0.62*	0.39*	0.77*	1					
9	VND	–0.04	0.47*	–0.03	0.29*	0.74*	0.99*	0.27*	0.43*	1				
10	IDR	–0.49*	–0.62*	–0.38*	–0.61*	–0.66*	–0.42*	–0.11	–0.48*	–0.39*	1			
11	AUD	0.71*	–0.47*	0.72*	0.28*	0.03	–0.48*	0.06	0.36*	–0.41*	–0.07	1		
12	HKD	–0.01	0.55*	–0.01	0.30*	0.75*	0.99*	0.24*	0.41*	0.99*	–0.45*	–0.44*	1	
13	TWD	0.65*	0.37*	0.59*	0.82*	0.87*	0.57*	0.24*	0.66*	0.60*	–0.70*	0.23*	0.61*	1

Note: *Correlation is significant at the 0.05 level.

confirmed cases have relationship with every exchange rate. However, the COVID-19 new cases have relationship with the JPY, USD, MYR, VND, IDR, AUD, HKD, and TWD (insignificantly with the CNY and SGD). Similarly, the deaths cases have a relationship with the CNY, JPY, USD, MYR, SGD, VND, AUD, and HKD, whereas insignificantly with the IDR and TWD.

Additionally, results of the regression analysis in Table 4 also show the direction of the relationship between COVID-19 cases and exchange rate, which indicates the

Table 4: Regression Analysis

Variables		Constant	Confirmed (C)	New (N)	Deaths (D)	R^2
1	CNY (Sig.)	4.5136	0.0003* (0.000)	–0.0003 (0.176)	–0.0133* (0.000)	0.5887
$EX_{CNY} = 4.5136 + 0.0003\ (COVID\text{-}19_C) – 0.0133\ (COVID\text{-}19_D)$						
2	JPY (Sig.)	28.9009	–0.0005* (0.008)	0.0183* (0.000)	0.0433* (0.000)	0.4145
$EX_{JPY} = 28.9009 – 0.0005\ (COVID\text{-}19_C) + 0.0183\ (COVID\text{-}19_N) + 0.0433\ (COVID\text{-}19_D)$						
3	USD (Sig.)	31.2054	–0.0017* (0.000)	0.0304* (0.000)	0.1033* (0.000)	0.5436
$EX_{USD} = 31.2054 – 0.0017\ (COVID\text{-}19_C) + 0.0304\ (COVID\text{-}19_N) + 0.1033\ (COVID\text{-}19_D)$						
4	MYR (Sig.)	7.5956	0.0002* (0.000)	–0.0009* (0.005)	–0.0116* (0.000)	0.2512
$EX_{MYR} = 7.5956 + 0.0002\ (COVID\text{-}19_C) – 0.0009\ (COVID\text{-}19_N) – 0.0116\ (COVID\text{-}19_D)$						
5	SGD (Sig.)	22.8273	0.0003* (0.000)	0.0002 (0.763)	–0.0148* (0.000)	0.1787
$EX_{SGD} = 22.8273 + 0.0003\ (COVID\text{-}19_C) – 0.0148\ (COVID\text{-}19_D)$						
6	VND (Sig.)	0.1338	0.0000* (0.000)	0.0001* (0.000)	0.0004* (0.000)	0.4819
$EX_{VND} = 0.1338 + 0.000006\ (COVID\text{-}19_C) + 0.0001\ (COVID\text{-}19_N) + 0.0004\ (COVID\text{-}19_D)$						
7	IDR (Sig.)	2.3564	–0.0001* (0.001)	–0.0018* (0.000)	0.0010 (0.187)	0.7005
$EX_{IDR} = 2.3564 – 0.0001\ (COVID\text{-}19_C) – 0.0018\ (COVID\text{-}19_N)$						
8	AUD (Sig.)	21.1386	0.0016* (0.000)	–0.0244* (0.000)	–0.0685* (0.000)	0.7289
$EX_{AUD} = 21.1386 + 0.0016\ (COVID\text{-}19_C) – 0.0244\ (COVID\text{-}19_N) – 0.0685\ (COVID\text{-}19_D)$						
9	HKD (Sig.)	4.0338	–0.0002* (0.000)	0.0040* (0.000)	0.0136* (0.000)	0.5509
$EX_{HKD} = 4.0338 – 0.0002\ (COVID\text{-}19_C) + 0.0040\ (COVID\text{-}19_N) + 0.0136\ (COVID\text{-}19_D)$						
10	TWD (Sig.)	1.0313	0.0000** (0.063)	0.0004* (0.000)	0.0001 (0.604)	0.6151
$EX_{TWD} = 1.0313 + 0.0000\ (COVID\text{-}19_C) + 0.0004\ (COVID\text{-}19_N)$						

Note: *significant at the 0.05 level; **significant at the 0.10 level.

Table 5: Direction of Relationship

Variables	CNY	JPY	USD	MYR	SGD	VND	IDR	AUD	HKD	TWD
Confirmed	+	–	–	+	+	+	–	+	–	+
New	N/A	+	+	–	N/A	+	–	–	+	+
Deaths	–	+	+	–	–	+	N/A	–	+	N/A

Note: $^{+}$is positive relationship; $^{-}$is negative relationship, N/A is no relationship.

appreciation or depreciation of exchange rate, as can be summarized in Table 5.

1) The confirmed cases are associated with depreciation of the CNY, MYR, SGD, VND, AUD, and TWD (positive relationship), whereas it correlates with the appreciation of the JPY, USD, IDR, and HKD (negative relationship).
2) The new cases associated with the depreciation of the JPY, USD, VND, HKD, and TWD (positive relationship); conversely, it correlates with the appreciation of the MYR, IDR, and AUD (negative relationship).
3) COVID-19 deaths cases are associated with the depreciation of the JPY, USD, VND, and HKD; on the other hand, it correlates with the appreciation of the CNY, MYR, SGD, and AUD (negative relationship).

5. Discussion

With the above findings, COVID-19 situation in Thailand lead to both positive and negative impact on Thai baht exchange rate, which the result are in line with Wei et al. (2020) who studied the effects of the Chinese yuan exchange rate before and during COVID-19 event, which they found

the changes in RMB related to the COVID-19 outbreak. The findings are similar to the previous studies that found the COVID-19 pandemic, not only impact on exchange rate, but it also led to instability in stock return (Ashraf, 2020; Just & Echaust, 2020; Sherif, 2020; Xu, 2021), credit risk (Gubareva, 2020), and cryptocurrency returns (Iqbal et al., 2020). Additionally, this finding implied that depreciation and appreciation of the CNY, JPY, USD, MYR, SGD, VND, IDR, AUD, HKD, and TWD (in relation on the THB) caused by COVID-19 confirmed cases, new cases, and deaths cases which in the line with Narayan et al. (2020), who found the COVID-19 infects cases and deaths cases affected the Japanese yen against US dollar.

6. Conclusion

It seems that the COVID-19 pandemic has disrupted countries around the world, in particular as an economic shock, therefore this study set out to examine the relationship between the number of COVID-19 cases in Thailand and the exchange rate for ten major currencies (CNY, JPY, USD, MYR, SGD, VND, IDR, AUD, HKD, and TWD) against Thai baht.

To summarize, the results show that: Firstly, confirmed cases have association with all exchange rates – CNY, MYR, SGD, VND, AUD, and TWD have depreciated (positive relationship), although the JPY, USD, IDR, and HKD have appreciated (negative relationship). Secondly, the new cases have association with almost all exchange rates except for the CNY and SGD – the JPY, USD, VND, HKD, TWD have depreciated (positive relationship), while the MYR, IDR, and AUD have appreciated (negative relationship). Lastly, COVID-19 deaths have association with almost all exchange rates with the exception of the IDR and TWD – the JPY, USD, VND, HKD have depreciated (positive relationship), though the CNY, MYR, SGD, and AUD have appreciated (negative relationship).

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