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Dynamic Effects of Exchange Rates and Foreign Price Inflation: Evidence from Thai

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Abstract: In an attempt to maintain a stable exchange rate and price level in Thailand given shocks from the United States, China, Euro Area, and Japan; the top five trading partners of Thailand, this study employs the system equations of VAR model techniques. Results show that the interest rates, demand shocks, and foreign prices affect the stability of the Thailand exchange rates and price levels. More so, empirical evidences validate the existence of unidirectional causality between Thailand exchange rate and domestic (as well as foreign) price inflation.
Keywords: Prices; Inflation; Exchange Rates; Interest Rate; Dynamic Effects.

INTRODUCTION

Moderate inflation is acceptable for sustainable economic growth. An export-oriented economy such as Thailand considers her prices and exchange rate as crucial factors that determine how well the economy proceeds. Thai Baht rates with other currencies are inevitably important due to the high degree of openness in Thailand. Thus, it has become a reoccurring target of the Bank of Thailand (BOT) to maintain a stable inflation and exchange rate. The 2008 global economic crisis prompted Thailand to rethink its exchange rate and export-import to restore her economy after the severe downturn. Every economy seeks to have a steady growth and rapid development even in the faces of shocks (both internal and external shocks).

Economic shocks are inevitable for any economy however, economies still have to develop and implement policies that suggest steady growth and development even in the face of economic shocks. Trading across borders has been shown to foster rapid growth and development in economies and this forms the building block for theoretical facts o Comparative Advantage [1], Absolute Advantage [2], Heckscher-Ohlin model, etc. To model trade between two economies, the exchange rate and price relationship is defined as:

$$e = \frac{\varepsilon P^*}{P} \qquad (1)$$

e denotes the nominal exchange rate, ε is the real exchange rate, P is the domestic price while P^* is foreign. For a given Real Exchange Rate, the growth rate of the nominal exchange rate is the difference between foreign and domestic inflation rates, shown in (2).

$$\frac{1}{e}\Delta e = \frac{1}{\varepsilon}\Delta\varepsilon + \pi^* - \pi \qquad (2)$$

Where π^* the price growth rate (inflation rate) is in the foreign economy, π is the domestic price growth rate (inflation rate). This suggests that the monetary authorities, both domestic and abroad, play significant roles in managing the exchange rates and prices through understanding the dynamics and adjusting monetary policies variables to establish stability. While studying this Pass-Through (impact) of Exchange Rates and Import Prices to Domestic inflation in some industrialised economies, McCarthy(2007)[1] discovered that import prices and exchange rates as external factors have significant effects on the domestic level of inflation (using both PPI and CPI) over the post-Bretton wood era. The pass-through effect is somewhat stronger in economies, which have a higher import share. This finding suggests that there are other predetermined factors that affect the domestic prices since the impact of import prices and the exchange rate are modest on the domestic price levels and secondly, global economic shocks that affect the exchange rates and import prices also affect the domestic prices in industrialised economies.

[1] Jonathan McCarthy's original work on pass-through effect was in 1999 and later published in the eastern economic journal in 2007.

Burstein & Gopinath [3] presented a framework to interpret this relationship which generates insensitivity of prices to exchange rate changes through variable markups. Both under flexible and rigid prices for partial equilibrium and general equilibrium frameworks. In addition to this, the anticipated exchange rate depreciation through the supply channel has a limited effect on inflation and output growth. On the other hand, unanticipated exchange rate fluctuations appear to be more significant than anticipated fluctuations, and impose a variety of effects on inflation and output growth across developing countries, drawing a sample from 33 developing economies [4].

Examining the pass-through effects of exchange rate changes on East Asian domestic prices, empirical results show that the pass-through effect from exchange rate to domestic prices is low[5]. Goldberg & Campa [6] compared the source of price stability for 21 OECD countries and discovered that border prices of traded goods are highly sensitive to exchange rates, but the CPI and the retail prices of the goods are stable. Philippe Bacchetta [7] tried to explain the reason behind the pass-through effect of exchange rates to consumer prices being lower relative to import prices, and discovered that the local distribution cost is a significant reason the pass-through effect is small on Consumer Prices. It is a known fact that the pass-through effect of exchange rate changes to consumer prices is much lower than that of import prices. The reason for this phenomenon is partly due to the local distribution costs as a complementary explanation based on the optimal pricing strategy of the firms. Considering a model in which foreign exporting firms sell intermediate goods to domestic firms which assembles the intermediate goods and sells the final goods to the consumers and faces significant competition from other domestic firms, they would prefer to sell in their local currency while the exporting firm prefers to sell in the exporter's currency. Therein, leading to a zero pass-through effect on the consumer price while the pass-through effect on the import price is complete[8].

Evidence from 23 OECD countries shows that there exist a partial pass-through effect on the exchange rate to import prices in the short run, mostly with the manufacturing industries while it evens out in the long run. Moreso, countries with higher volatile exchange rate have higher pass-through elasticities[9]. Goldberg & Knetter [10] noted that common-currency relative prices are highly correlated with exchange rates between the regional markets, which implies that incomplete pass-through effect is a result of third-degree price discrimination. They also added that distance matters for segmentation of markets across borders. Conditioned on price changes between the average Dollar price on the exchange rate against the average Non-Dollar prices, has significantly different pass-through effects which are 25% and 95% respectively[11]. Retail prices affect the exchange rates which is felt significantly for traded goods rather than non-traded goods.

Studying the transmission rates from the exchange rate movements to import prices over 15 years reveals a higher transmission in the short run relative to the long run. Although this is incomplete and differs across industries, the effect is high. However, in the long run, the effect is high and close to one[12]. In addition, there exists a co-integration relationship between stock prices and the exchange rate with a strong feedback relationship in some Asian economies. This was observed using data from South Korean, Hong Kong, Malaysia, Singapore, Taiwan, and Thailand[13].

Literature basically examined pass-through effects from foreign prices to domestic prices and the exchange rate and vice versa, but they often used the US Dollar to proxy the foreign price without considering if the local economy trades with the United States and the trade proportion with the United States. To bridge this gap, this paper examines the nature of trade between the domestic economy (Thailand) and other foreign economies in order to capture the significant and appropriate foreign price to use instead of literally assuming the US Dollars as the foreign price. Secondly, the paper examines the direction of causality that exists among these foreign prices, exchange rates, and domestic price.

Overview of Exchange Rate and Price Stability in Thailand

According to the Thailand Trade and Economic Indices (TEI) in June 2016, there has been a 0.38% year on year inflation rate which is as a result of increases in the prices of clothing and footwear, recreation and education, food prices and so forth. Hence the swings in the level of inflation and exchange rates in Thailand. For example, in July 2009 the inflation rate in Thailand was negative (-4.38%) whereas, it was as high as 24.56% in June 1980. These swings and more made her monetary authority pay more attention towards making adequate policies that will stabilise the price levels and the official exchange rate. The former Governor of Bank of Thailand, Prasarn Trairatvorakul, stated in 2012, that the lowering of the inflation rate target from 3.5% to 3.3% was due to the Global Economic slowdown, particularly from the U.S.A, which is accompanied by the declining oil price and other sources of energy. Furthermore, he sets a 3% policy rate, which was deemed appropriate towards boosting their economy[2]. The current Governor Veerathai Santiprabhob, in his speech captioned 'Monetary Policy and Financial Sector Development Policy[3] noted explicitly that the Bank of Thailand would remain focused on mitigating short-term excessive exchange rate volatility, whilst expecting a positive

[2] See http://www.asean-china-center.org/english/2012-07/03/c_131692576.htm
[3] See http://www.bis.org/review/r151229a.htm

inflationary rate in 2016, which has in the past been in negative territory. He also noted that the current increase in the price level of Thailand is due to the rising prices of petroleum and food supplies. The trend of the CPI and exchange rate of Thailand is shown in Figure 1.

Figure 1 depicts the fluctuations that have existed in the levels of the consumer price index (right axis) and the exchange rate (left axis) in Thailand. According to exchange rate theory, a rise in the foreign price level would accompany currency appreciation of the domestic country. This means a positive change in the value of the Thai Baht with respect to the the foreign currency during inflationary pressure periods. Yet the Thai Baht appreciated and inflation remained stable from 2002 to 2007. This might be a result of factors other than the change in the exchange rate, such as capital inflows during the decade. Subsequent appreciation of the Baht led to the rise in inflation in 2008. In 2010, the Baht appreciated and Thai inflation rate began rising. This change in the relationship between exchange rate and inflation might arise from the fragility of foreign currencies, which puts pressure on the exchange rate, along with the economic slump in the year 2008. Afterwards, inflation increased as a result of the stimulus packages from the Thai government. However, due to the price changes of food supplies accompanied by the global petroleum price fall towards the end of 2015 led to the positive inflation in 2016.

Before this crisis, Thailand's economy was growing by 6.3% on average under the Thaksinomics policy. Thailand was able to pay off its debt to the IMF in 2003, and in 2009 Thailand experienced a negative growth rate of 2.3%, per capita GDP decreased, poverty level increased, etc. After the global financial crisis, the average growth rate of Thailand's economy became 2.5%. The Yellow Shirt and People's Alliance for Democracy reconvention and efforts during this period to boost the economy of Thailand led to the year-on-year GDP growth rate of about 6.5% and after this incidence, Thailand has been growing gradually even in the faces of some political and economic shocks in Thailand. Thailand trades with the USA and other Asian countries (mostly those in same Economic Integration with Thailand like ASEAN, APEC, and others.). Thus, the price growth level in the USA and other Trade Partners with Thailand has a pass-through effect on the Thai exchange rate.

The US and Thailand established trade relations in 1832 and signed the Treaty of Amity and Commerce in 1833 thus formalising diplomatic relations centred on Trade and Friendship between them. In addition, both economies are part of the signatories to the 1954 Manila Pact of the former Southeast Asia Treaty Organization (SEATO) in 1977.[4] In 2003, U.S and Thailand established the Bilateral Free Trade Agreement (FTA), which boosted the trade between these two economies since its inception. In as much as the United States – Thailand Free Trade Agreement was suspended in 2006 by the World Trade Organization (WTO) due to some political reasons, the United States and Thailand have been trading partners till date[5]. In 2015, the total export of Thailand was 214.38 billion US Dollars with 23.742 billion US Dollars to China, 24.058 billion US Dollars to the U.S.A, 25.504 billion US Dollars to European countries and 20,076 billion US Dollars to Japan[6] (see Figure 2**)**. In the same year, the total import of Thailand stood at 202.65 billion US Dollars with 41.066 billion US Dollars from China, 13.864 billion US Dollars from the USA, 25.164 billion US Dollars from European countries and 31.236 billion US Dollars from Japan[7] (see Figure 3**)**. The ASEAN economies that are trade partners to Thai do not use a common currency, therefore; it will be complex to factor in ASEAN economies currency (foreign currency) impact on Thailand economy. However, the US is the second top exporting country and third importing country for Thailand while China is the first top exporting and importing country[8].

China, U.S.A, Japan, and European countries jointly contribute over 51% and 50% of total Thai Export and Import while ASEAN contributes 25.7% and 20% respectively. In addition, the government of Thailand maintains a regulatory framework that harnesses investments and trade and does not restrict the flow of resources. These are evidences of significant trading relationships between these economies. This paper therefore seeks to study the dynamics that exist amongst exchange rate, domestic and foreign price levels in other to establish the roadmap towards achieving the price and exchange rate stability of the Bank of Thailand.

MODELS AND RESULTS DISCUSSIONS

Macroeconomic variables are influenced by past and present variations and shocks, which could be explained by the Vector Auto-Regressive (VAR) System equations. We model along the distributional chain[9] of factors that

[4] See http://www.state.gov/r/pa/ei/bgn/2814.htm
[5] See "Thailand: Background and U.S. Relations by Emma Chanlett-Avery, Ben Dolven, and Wil Mackey (July, 2015)"
[6] See http://www.thaiwebsites.com/imports-exports.asp
[7] See http://www.thaiwebsites.com/imports-exports.asp
[8] http://globaledge.msu.edu/countries/thailand/tradestats
[9] The chain structure of our model is similar to that of McCarthy (2000), Clark (1999), Christiano at el (1997) and Blanchard (1983)

significantly affect the prices and exchange rate over a given period. In the absences of any simultaneity bias, VAR estimates still maintain the BLUE properties. Therefore, the equations (unrestricted VAR) of interest in the system are as follow:

$$\pi_t = \propto_1 + \sum_{i=1}^{k} \emptyset_{1i}\Delta\pi_{t-i} + \sum_{i=1}^{k} \delta_{1i}\Delta\pi_{t-i}^{q} + \sum_{i=1}^{k} \theta_{1i}\Delta e_{t-i}^{q} + \sum_{i=1}^{k} \vartheta_{1i}\Delta i_{t-i} + \sum_{i=1}^{k} \gamma_{1i}\,\varepsilon_{t-i}^{d} + \sum_{i=1}^{k} a_{1i}\,\varepsilon_{t-i}^{s} + \omega_1 FINCRIS_t + u_{1t} \quad (3)$$

$$\pi^q{}_t = \propto_2 + \sum_{i=1}^{k} \emptyset_{2i}\Delta\pi_{t-i} + \sum_{i=1}^{k} \delta_{2i}\Delta\pi_{t-i}^{q} + \sum_{i=1}^{k} \theta_{2i}\Delta e_{t-i}^{q} + \sum_{i=1}^{k} \vartheta_{2i}\Delta i_{t-i} + \sum_{i=1}^{k} \gamma_{2i}\,\varepsilon_{t-i}^{d} + \sum_{i=1}^{k} a_{2i}\,\varepsilon_{t-i}^{s} + \omega_2 FINCRIS_t + u_{2t} \quad (4)$$

$$e^q{}_t = \propto_3 + \sum_{i=1}^{k} \emptyset_{3i}\Delta\pi_{t-i} + \sum_{i=1}^{k} \delta_{3i}\Delta\pi_{t-i}^{q} + \sum_{i=1}^{k} \theta_{3i}\Delta e_{t-i}^{q} + \sum_{i=1}^{k} \vartheta_{3i}\Delta i_{t-i} + \sum_{i=1}^{k} \gamma_{3i}\,\varepsilon_{t-i}^{d} + \sum_{i=1}^{k} \theta_{3i}\,\varepsilon_{t-i}^{s} + \omega_3 FINCRIS_t + u_{3t} \quad (5)$$

where q denotes foreign economies (USA, China, Euro Area, and Japan), π_{t-i} is lag values of inflation in Thailand, π_{t-i}^{q} is lag values of inflation in country q, e_{t-i}^{q} is lag values of logged Thai official exchange rate with country q, i_{t-i} is lag values of Thailand's short-term interest rate, ε_{t-i}^{d} is lag values of Thailand demand shock, ε_{t-i}^{s} is lag values of Thailand supply shocks, and $FINCRIS_t$ = 1 if year > 2007; and 0 otherwise. The dataset spans from 2000 January to June 2015. Supply shocks are identified as the dynamics of oil price. Thailand is an oil producing economy and global oil price swings result in shocks in the output level of the economy via significant changes in the production cost, price levels, and Thailand revenue. While the demand shocks are identified as the output gap of Thailand after controlling for the contemporaneous effect of the supply shocks[10]. The output gap is derived by taking the deviations of the logarithmic value of the Real GDP of Thailand from a constant, linear and quadratic trend. Hence, the shocks are modelled in (6) and (7).

$$\pi^{oil}{}_t = E_{t-i}(\pi^{oil}{}_t) + \varepsilon^s{}_t \quad (6)$$

$$\tilde{y}_t = E_{t-i}(\tilde{y}_t) + a_1\varepsilon^s{}_t + \varepsilon^d{}_t \quad (7)$$

Information Criteria (AIC) that minimise the Mean Square Error (MSE) of the system informs the choice of optimal lag length for our system of equations to produces the least square estimates. To test for a structural break in our model, the $FINCRIS$ variable is introduced into the system. The restricted VAR model would be the case where $\omega_1 = \omega_2 = \omega_3 = 0$. The LR test statistic is used to justify that there is no significant structural break and thus the restricted model was estimated.

The contemporaneous correlation test (Table 3) shows that there is no obvious or significantly high correlation between each paired variables in the system. Figure 7 shows how the exchange rate responds to: self-shocks (first column), Thailand inflation (second column), and foreign inflation (third column). This arrangement is consistent for all the foreign economies which are represented in rows. The vertical axes are the hypothesised true values of the shocks and each chart is title with the impulse variable. The first row shows the result from the US model while the second, third, and fourth rows are from China, Euro Area, and Japan models respectively. A unit percent shock in the impulse variables affects the response variable (Thailand exchange rate) differently with respect to the models (foreign economies). This impact is shown until the eighth month into the future before these shocks are completely absorbed (stabilize). The significance of these responses to shocks are assessed on a 5% test size. The self-shock of Thai exchange rate from each country's model show similar pattern of losing its pressure starting from the first month. This shocks evens out by the second month, except for China and Japan until the fourth month. The models' IRF also shows that fluctuations in the price levels of Thailand are not significantly felt immediately in her exchange rate levels until the second month when this effect becomes significant and stabilizes afterwards. In addition, considering the price fluctuations from abroad to Thailand exchange rate appreciation or depreciation, the effect of inflation or deflation shocks in the price levels from these foreign economies are almost not significantly felt in Thailand exchange rate. This is as expected and it empirically validates the fact that the consistent plan of the BOT in maintaining a stable exchange rate has been robust and effective. These shocks are also internalized up to the fourth month. In sum, the impulse response function charts, shows that fluctuations in Thailand's exchange rate is largely determined my its own-shock; form the implementations of the monetary policies of the BOT, and by the domestic prices. This suggests that the possible sure ways to maintain a stable exchange rate in Thailand are through robust monetary policies and domestic price mechanism. This is backed by the significance of supply shocks impulses on the Thai exchange rate. The Cholesky variance comparison (Table 7) further

[10] See McCarthy (2000) on "Pass-Through of Exchange Rates and Import Prices to Domestic Inflation in some Industrialised Economies"

explains the proportion of the variations in the exchange rate with respect to shocks in the system of equation variables. For the first eight months, the self-shocks explains on average 96% of the variations in the level of Thai exchange rates whereas, the rest 4% is explained by the other covariates in the system. Thus, validating the findings from the IRF.

Figure 8 shows how Thailand's inflation rate responds shocks following the same order with that of Figure 7. The declining pressure of shock in the first month is also observed for the case of Thailand inflation level. This shock is significantly felt until the second month before it fissile out. The US and Euro Area model show that the shocks from inflations in the US and Euro Area is significantly felt in the Thai price level during the second month. Whereas, inflations in China is also significant during the fifth month, from the China model. This finding suggests that of a truth, these foreign inflations are challenging in maintaining price stability in Thailand. While the BOT makes monetary policies and manage her exchange rates, she should further take into recognition; the level of inflation in these economies as any price shocks from them is capable of distorting the price level stability. Furthermore, the IRF of Thai domestic price level on impulses from Thai exchange rate with the four-modelled economies shows significant impacts. This validates the earlier finding that the inflation level in these economies affects the price level of Thailand through the exchange rates fluctuations. These conform to theoretical underpinnings as shown in equations [1] and [2]. More so, the Cholesky variance comparison explains the proportion of the variation in the Thai inflation level with respect to shocks in other variables in the system (Table 8). The proportion of variations in the Thai inflation rate in a period owing to the shocks in each of the variables in the system. The percentage of variation owning to self-Thai-inflation shocks is about 90%. The Demand Shocks, foreign prices, and exchange rates in turn explain greater proportion of the remaining 10% over the course of the first eight months. The Cholesky comparison reaffirms the ordering of the variables in our system of equations that for the Thai economy. Foreign prices are more likely to influence the levels of Thailand's exchange rate and inflation rate, but the reverse is not necessarily the case. In addition, these exchange rate levels in turn, statistical influence the domestic price level inflation of Thailand and the reverse is not necessarily the case. It is also important to note that the residuals are normally distributed. Thus, the inference is valid.

To validate our argument of directional causality, the paper employs the Granger Causality modeling techniques bivariate VAR model. The results are in Table 10 and decisions made are on a 5% size of test. From the tests, there are empirical evidences that foreign price levels granger-cause (unidirectional) both Thai domestic price inflation and the exchange rate correspondingly. More so, the Thai exchange rates with these foreign economies granger-cause (Undirectional) the domestic price inflation of Thailand and both are without feedbacks.

Appendix

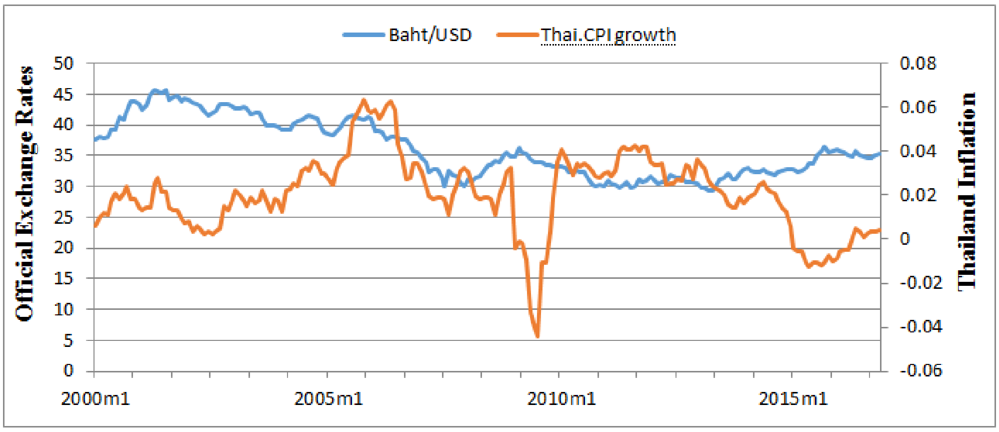

Fig-1: Thai Inflation (as a fraction) and Official Exchange Rate (per US Dollar)

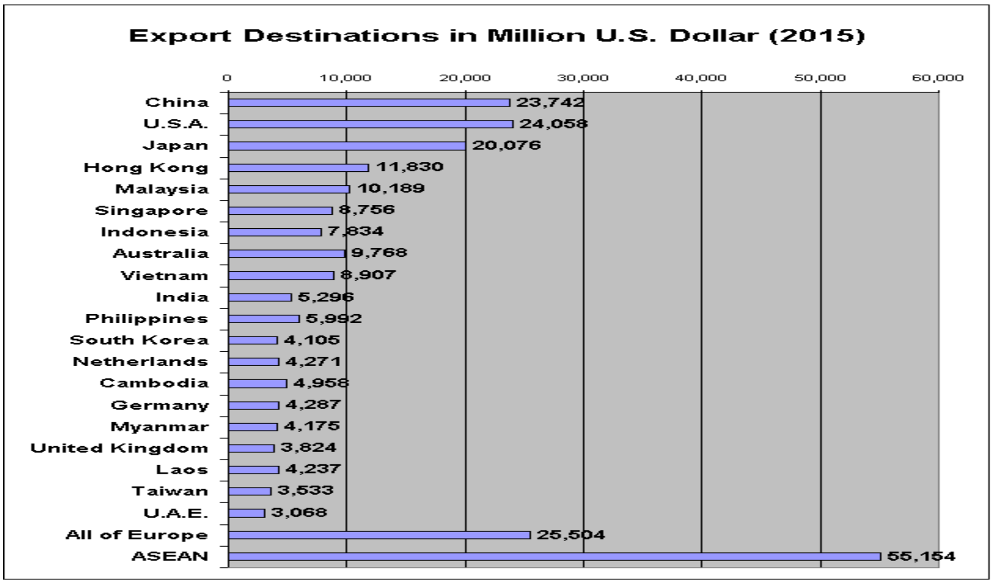

Fig-2: Thailand Export composition for 2015

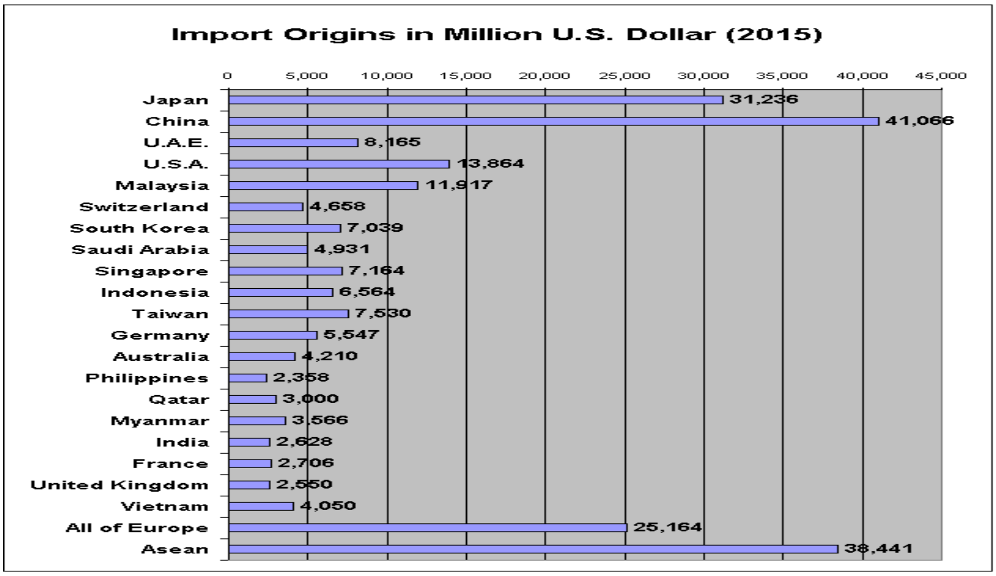

Fig-3: Thailand import composition for 2015

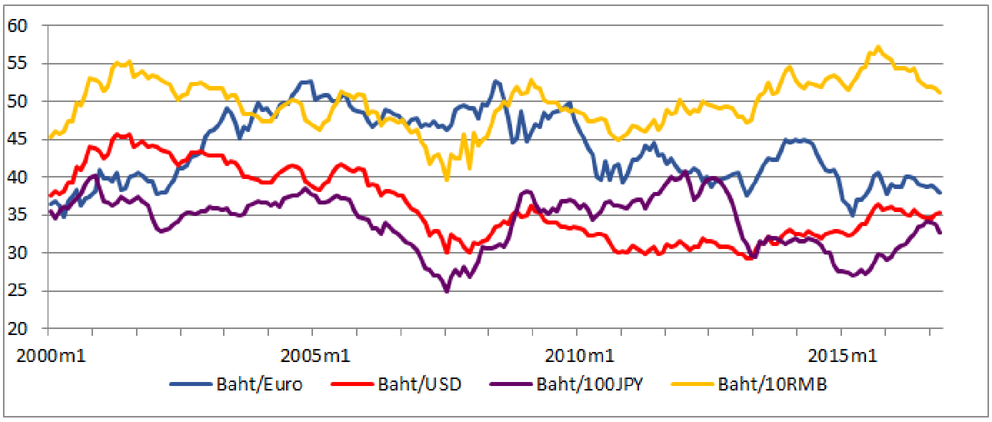

Fig-4: Time plot of the Thai nominal exchange rate per country

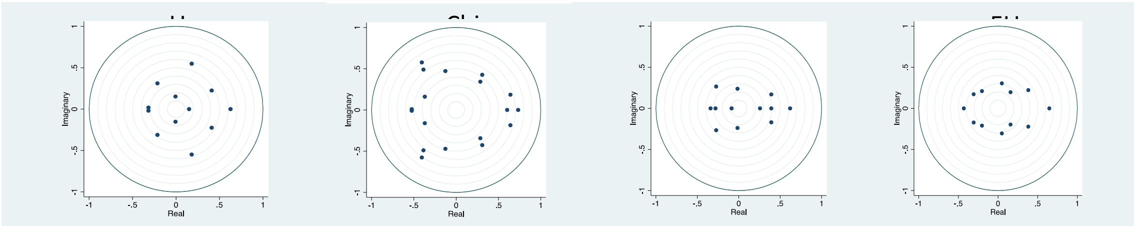

Fig-5: System Stability Chart

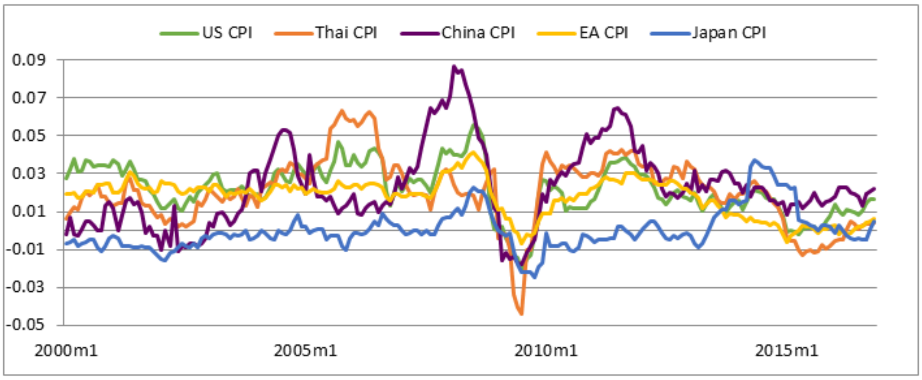

Fig-6: Time plot of CPI growth rate (as a fraction) in the countries of interest

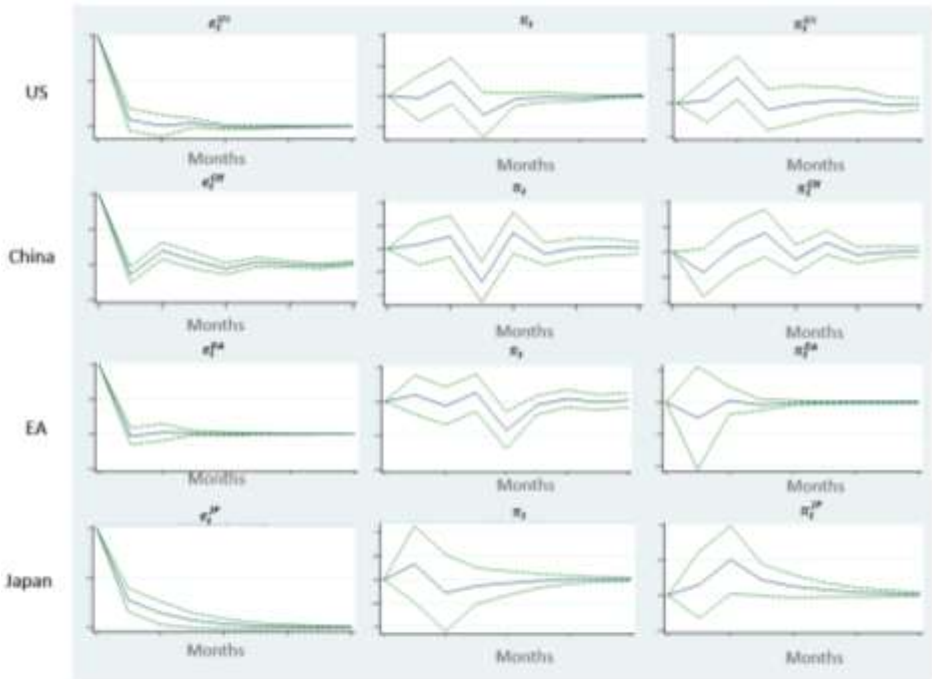

Fig-7: Thai exchange rate (USD, RMB, and Euro & JPY) responses given shocks

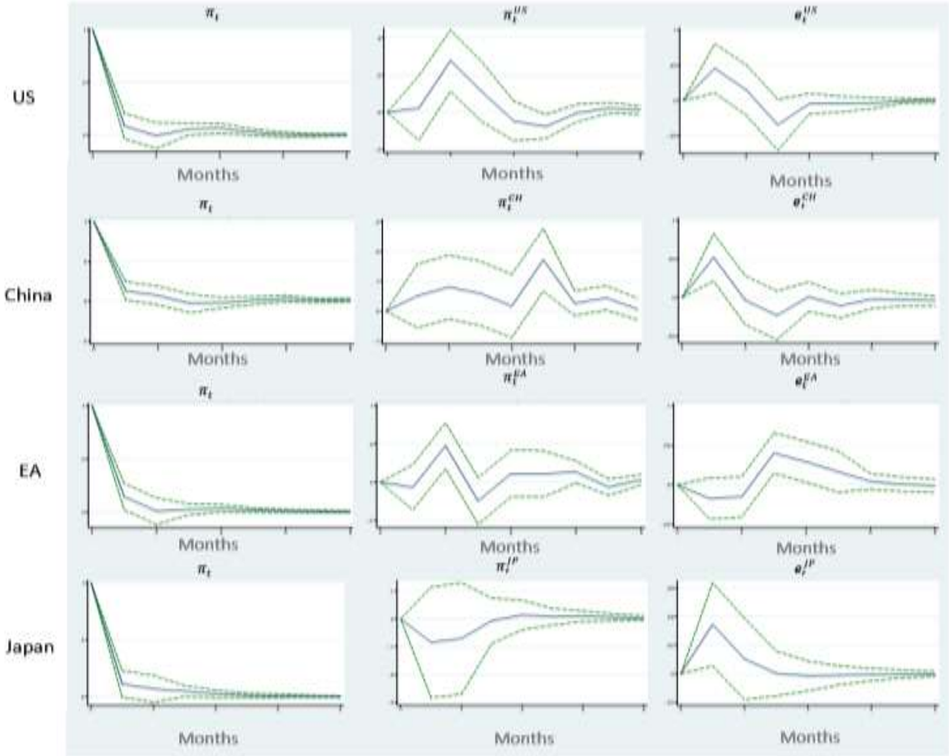

Fig-8: Thailand inflation rate responses given shocks

Table-1: Variables sources

Variables	Sources
Monthly Real GDP (in baht)	*World Bank*
Real oil price (in 2000baht)	*MacroTrend LLC*[11]
Exchange Rates(baht/foreign currencies)	*Fusion Media Limited*[12]
Consumer Price Indexes	*Countries Economic Indicator*[13]
Interest Rate (overnight, %)	*Bank of Thailand*

Table-2: Data Statistical Properties

Variable	Mean	Standard Deviation	Minimum	Maximum	Observation
π_t	0.0205	0.178	-0.438	0.0631	203
π_t^{US}	0.0218	0.0134	-0.021	0.056	203
π_t^{CH}	0.0225	0.0212	-0.18	0.087	203
π_t^{EU}	0.0176	0.010	-0.007	0.041	203
π_t^{JP}	0.0001	0.0106	-0.025	0.0371	203
e_t^{US}	3.577	0.128	3.376	3.822	203
e_t^{CH}	1.601	0.0668	1.375	1.744	203
e_t^{EU}	3.772	0.105	3.547	3.964	203
e_t^{JP}	-1.078	0.109	-1.387	-0.898	203
i_t	2.254	1.015	0.96	4.95	203
$\hat{\varepsilon}_t^s$	0.00	6.594	-29.574	18.82	200
$\hat{\varepsilon}_t^d$	0.00	0.000865	-0.00255	0.00183	200

[11] see https://macrotrends.dpdcart.com/
[12] see https://www.investing.com/currencies/usd-thb-historical-data
[13] see http://www.gdpinflation.com/search/?q=euro

Table-3: Contemporaneous Correlation Matrix

US	Variable	π_t	π_t^{US}	e_t^{US}	i_t	$\hat{\varepsilon}_t^s$	$\hat{\varepsilon}_t^d$
	π_t	*1.00*					
	π_t^{US}	*0.70*	*1.00*				
	e_t^{US}	*-0.04*	*0.19*	*1.00*			
	i_t	*0.51*	*0.47*	*-0.22*	*1.00*		
	$\hat{\varepsilon}_t^s$	*0.05*	*-0.05*	*-0.14*	*-0.00*	*1.00*	
	$\hat{\varepsilon}_t^d$	*0.00*	*-0.06*	*0.02*	*0.09*	*0.00*	*1.00*
China	Variables	π_t	π_t^{CH}	e_t^{CH}	i_t	$\hat{\varepsilon}_t^s$	$\hat{\varepsilon}_t^d$
	π_t	*1.00*					
	π_t^{CH}	*0.38*	*1.00*				
	e_t^{CH}	*-0.43*	*-0.53*	*1.00*			
	i_t	*0.51*	*0.29*	*-.43*	*1.00*		
	$\hat{\varepsilon}_t^s$	*0.05*	*0.13*	*-0.24*	*.00*	*1.00*	
	$\hat{\varepsilon}_t^d$	*-0.00*	*-0.01*	*-0.03*	*.09*	*0.00*	*1.00*
EU	Variables	π_t	π_t^{EU}	e_t^{EU}	i_t	$\hat{\varepsilon}_t^s$	$\hat{\varepsilon}_t^d$
	π_t	*1.00*					
	π_t^{EU}	*0.61*	*1.00*				
	e_t^{EU}	*0.33*	*0.29*	*1.00*			
	i_t	*0.51*	*0.44*	*0.21*	*1.00*		
	$\hat{\varepsilon}_t^s$	*0.05*	*0.01*	*0.10*	*0.00*	*1.00*	
	$\hat{\varepsilon}_t^d$	*-0.00*	*-0.10*	*0.04*	*0.09*	*0.00*	*1.00*
Japan	Variables	π_t	π_t^{JP}	e_t^{JP}	i_t	$\hat{\varepsilon}_t^s$	$\hat{\varepsilon}_t^d$
	π_t	*1.00*					
	π_t^{JP}	*0.06*	*1.00*				
	e_t^{JP}	*0.29*	*0.46*	*1.00*			
	i_t	*0.51*	*0.23*	*0.25*	*1.00*		
	$\hat{\varepsilon}_t^s$	*0.05*	*0.13*	*0.00*	*0.00*	*1.00*	
	$\hat{\varepsilon}_t^d$	*-0.01*	*-0.03*	*0.11*	*0.09*	*0.00*	*1.00*

Table-4: Unit-Root Test

Variable	Test Statistics	5% critical value	Conclusion
$\boldsymbol{\pi_t}$	*-3.578*	*-4.80*	π_t *is I(1)*
$\Delta\boldsymbol{\pi_t}$	*-12.734*	*-4.80*	
$\boldsymbol{\pi_t^{US}}$	*-4.604*	*-4.80*	π_t^{US} *is I(1)*
$\Delta\boldsymbol{\pi_t^{US}}$	*-10.017*	*-4.80*	
$\boldsymbol{\pi_t^{US}}$	*-3.287*	*-4.80*	π_t^{CH} *is I(1)*
$\Delta\boldsymbol{\pi_t^{CH}}$	*-5.819*	*-4.80*	
$\boldsymbol{\pi_t^{EU}}$	*-3.867*	*-4.80*	π_t^{EU} *is I(1)*
$\Delta\boldsymbol{\pi_t^{EU}}$	*-8.387*	*-4.80*	
$\boldsymbol{\pi_t^{JP}}$	*-3.896*	*-4.80*	π_t^{JP} *is I(1)*
$\Delta\boldsymbol{\pi_t^{JP}}$	*-12.382*	*-4.80*	
$\boldsymbol{e_t^{US}}$	*-3.855*	*-4.80*	e_t^{US} *is I(1)*
$\Delta\boldsymbol{e_t^{US}}$	*-13.765*	*-4.80*	
$\boldsymbol{e_t^{CH}}$	*-4.039*	*-4.80*	e_t^{CH} *is I(1)*
$\Delta\boldsymbol{e_t^{CH}}$	*-7.678*	*-4.80*	
$\boldsymbol{e_t^{EU}}$	*-4.069*	*-4.80*	e_t^{EU} *is I(1)*
$\Delta\boldsymbol{e_t^{EU}}$	*-14.542*	*-4.80*	
$\boldsymbol{e_t^{JP}}$	*-3.997*	*-4.80*	e_t^{JP} *is I(1)*
$\Delta\boldsymbol{e_t^{JP}}$	*-10.912*	*-4.80*	
$\boldsymbol{i_t}$	*-3.682*	*-4.80*	i_t *is I(1)*
$\Delta\boldsymbol{i_t}$	*-5.469*	*-4.80*	
$\boldsymbol{\hat{\varepsilon}_t^s}$	*-14.457*	*-4.80*	$\hat{\varepsilon}_t^s$ *is I(0)*
$\boldsymbol{\hat{\varepsilon}_t^d}$	*-4.961*	*-4.80*	$\hat{\varepsilon}_t^d$ *is I(0)*

Table-5: Lag Order Selection

		Lags		
Models	***1***	***2***	***3***	***4***
USA	-26.323	-26.390*	-26.381	-26.260
China	-24.852	-24.817	-24.878*	-24.775
EU	-26.605	-26.711*	-26.577	-26.499
Japan	-25.789	-25.913*	-25.734	-25.620

Table-6: LR Statistics

Models	*LR statistic*	*Chi Square Statistic (5%)*	*Conclusion*
USA	4.35	12.6	No structural break
China	3.60	12.6	No structural break
EU	7.97	12.6	No structural break
Japan	2.94	12.6	No structural break

Table-7: Exchange Rate Variance Comparison

US(Months)	π_t	π_t^{US}	e_t^{US}	i_t	$\hat{\varepsilon}_t^s$	$\hat{\varepsilon}_t^d$
1	*0*	*1.30*	*98.00*	*0*	*0*	*0.70*
2	*0.25*	*1.33*	*97.75*	*0.59*	*0.00*	*1.35*
3	*1.81*	*2.91*	*90.11*	*2.90*	*0.00*	*2.45*
4	*2.52*	*2.91*	*87.02*	*4.21*	*1.12*	*2.20*
8	*2.37*	*3.44*	*86.74*	*4.21*	*1.34*	*2.20*
China	π_t	π_t^{CH}	e_t^{CH}	i_t	$\hat{\varepsilon}_t^s$	$\hat{\varepsilon}_t^d$
1	*0.20*	*0.05*	*99.72*	*0*	*0.05*	*0*
2	*1.20*	*1.08*	*95.54*	*1.12*	*1.29*	*1.15*
3	*3.10*	*1.53*	*90.63*	*1.20*	*1.29*	*3.64*
4	*3.10*	*1.80*	*88.22*	*1.37*	*1.50*	*4.10*
8	*3.27*	*2.33*	*87.09*	*1.40*	*1.50*	*4.50*
EU	π_t	π_t^{EU}	e_t^{EU}	i_t	$\hat{\varepsilon}_t^s$	$\hat{\varepsilon}_t^d$
1	*2.50*	*0*	*97.5*	*0*	*0*	*0*
2	*2.50*	*0.15*	*93.14*	*2.37*	*1.85*	*0*
3	*2.50*	*0.20*	*92.51*	*2.37*	*1.50*	*0.22*
4	*2.50*	*0.52*	*92.51*	*2.30*	*1.67*	*0.46*
8	*2.51*	*1.50*	*92.51*	*2.14*	*1.67*	*0.46*
Japan	π_t	π_t^{JP}	e_t^{JP}	i_t	$\hat{\varepsilon}_t^s$	$\hat{\varepsilon}_t^d$
1	*0.63*	*0*	*99.03*	*0.10*	*0*	*0.27*
2	*1.91*	*0.09*	*95.72*	*0.10*	*1.32*	*0.25*
3	*1.90*	*0.16*	*95.72*	*0.25*	*1.44*	*0.31*
4	*1.90*	*0.22*	*95.72*	*0.25*	*1.44*	*0.31*
8	*1.90*	*0.41*	*95.44*	*0.81*	*1.44*	*0.31*

Table-8: Domestic Inflation Variance Decomposition

US(Months)	π_t	π_t^{US}	e_t^{US}	i_t	$\hat{\varepsilon}_t^s$	$\hat{\varepsilon}_t^d$
1	*100*	*0*	*0*	*0*	*0*	*0*
2	*91.53*	*0.31*	*1.70*	*0*	*1.36*	*2.92*
3	*86.57*	*2.84*	*1.81*	*1.19*	*1.56*	*5.31*
4	*81.09*	*2.87*	*2.63*	*1.33*	*4.24*	*7.73*
8	*79.10*	*3.85*	*2.63*	*1.51*	*5.10*	*7.10*
China	π_t	π_t^{CH}	e_t^{CH}	i_t	$\hat{\varepsilon}_t^s$	$\hat{\varepsilon}_t^d$
1	*100*	*0*	*0*	*0*	*0*	*0*
2	*91.01*	*1.80*	*1.81*	*1.03*	*1.32*	*2.42*
3	*86.30*	*2.44*	*3.90*	*1.72*	*1.67*	*4.15*
4	*82.56*	*2.60*	*3.90*	*1.80*	*4.21*	*4.15*
8	*82.56*	*3.09*	*3.32*	*1.79*	*4.35*	*4.20*
EU	π_t	π_t^{EU}	e_t^{EU}	i_t	$\hat{\varepsilon}_t^s$	$\hat{\varepsilon}_t^d$
1	*100*	*0*	*0*	*0*	*0*	*0*
2	*96.43*	*0*	*0*	*1.19*	*1.10*	*1.00*
3	*92.05*	*2.68*	*0.57*	*1.21*	*1.62*	*2.40*
4	*91.09*	*2.14*	*0.57*	*1.36*	*1.62*	*2.60*
8	*91.09*	*2.14*	*1.30*	*1.36*	*1.62*	*2.71*
Japan	π_t	π_t^{JP}	e_t^{JP}	i_t	$\hat{\varepsilon}_t^s$	$\hat{\varepsilon}_t^d$
1	*100*	*0*	*0*	*0*	*0*	*0*
2	*92.30*	*1.01*	*1.50*	*1.64*	*1.30*	*2.23*
3	*88.41*	*2.33*	*1.93*	*2.19*	*1.42*	*4.20*
4	*84.22*	*2.33*	*1.87*	*2.19*	*5.34*	*3.91*
8	*83.05*	*2.68*	*1.87*	*2.10*	*5.40*	*4.46*

Table-9: Granger Causality Test

Null	*lag*	*p − value*	*Conclusion*
π_t^{US} does not cause e_t^{US}	*2*	*0.027*	*Causality*
e_t^{US} does not cause π_t^{US}	*2*	*0.183*	*No Causality*
π_t does not cause π_t^{US}	*3*	*0.148*	*No Causality*
π_t^{US} does not cause π_t	*3*	*0.007*	*Causality*
e_t^{US} does not cause π_t	*4*	*0.047*	*Causality*
π_t does not cause e_t^{US}	*4*	*0.476*	*No Causality*
π_t^{CH} does not cause e_t^{CH}	*3*	*0.000*	*Causality*
e_t^{CH} does not cause π_t^{CH}	*3*	*0.281*	*No Causality*
π_t does not cause π_t^{CH}	*3*	*0.153*	*No Causality*
π_t^{CH} does not cause π_t	*3*	*0.459*	*No Causality*
e_t^{CH} does not cause π_t	*4*	*0.021*	*Causality*
π_t does not cause e_t^{CH}	*4*	*0.088*	*No Causality*
π_t^{EU} does not cause e_t^{EU}	*1*	*0.733*	*No Causality*
e_t^{EU} does not cause π_t^{EU}	*1*	*0.429*	*No Causality*
π_t does not cause π_t^{EU}	*3*	*0.399*	*No Causality*
π_t^{EU} does not cause π_t	*3*	*0.049*	*Causality*
e_t^{EU} does not cause π_t	*4*	*0.013*	*Causality*
π_t does not cause e_t^{EU}	*4*	*0.883*	*No Causality*
π_t^{JP} does not cause e_t^{JP}	*2*	*0.298*	*No Causality*
e_t^{JP} does not cause π_t^{JP}	*2*	*0.457*	*No Causality*
π_t does not cause π_t^{JP}	*2*	*0.135*	*No Causality*
π_t^{JP} does not cause π_t	*2*	*0.028*	*Causality*
e_t^{JP} does not cause π_t	*3*	*0.064*	*Causality*
π_t does not cause e_t^{JP}	*3*	*0.228*	*No Causality*

CONCLUSION

In nutshell, this work sets out to establish the road map towards achieving Thailand exchange rate and price stability by exploring the relationships between them as well as Thailand's trade relationships with her partners. The IRF and Cholesky's VD shows that monetary policies in Thailand which results to self-shock in the level of exchange rates and price inflations are largely important towards maintaining stability. Foreign inflation from China, US, the Euro Area, and Japan affect both the Thailand domestic price level and the exchange rate of Thai Baht. In addition, the Thai Baht exchange rates exert significant influences on the domestic price levels of Thailand.

These findings suggests the direction of periodic or dynamic causal impact from foreign inflation to the Thai exchange rate and price inflation which was further validated using the bi-variate granger causality techniques. Therefore, to maintain stable exchange rate and price level in Thai, her monetary policies; which are capable of resulting to autonomous (self) shocks in the levels of exchange rate and price inflation, should be treated with caution as implementation of spurious policies will have great distorting impact on the levels of inflation and exchange rate in Thailand. In addition, foreign inflations from China, US, Euro Area, and Japan also exert significant influence on Thai Baht exchange rate and price inflations.

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