EXCHANGE MARKET PRESSURE IN IDENTIFYING CURRENCY CRISIS AND ITS EFFECTIVENESS IN MONETARY POLICY IN SELECTED ASIAN COUNTRIES

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By

TEY SHEIK KYIN

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirement for the Degree of Doctor of Philosophy

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

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April 2018

Chair: Associate Professor Lee Chin, PhD
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The occurrence of the currency crisis has increased due to the growth of globalisation and the emergence of the integrated international financial market. Hence, the recent crisis justifies the requirement for the policymakers to comprehend the contagion to avoid and manage the widespread of a future crisis, particularly for Asian countries which aim towards a more comprehensive regional monetary and financial integration with the world. Thus, this study examined the various transmission mechanisms that propagated and amplified the shocks from one country to another country in Asia, motivated by the financial crisis turbulence in Asian countries and the doubts of optimal responses for the crisis. In particular, this study also investigated the transmission of global shock between economies that focus on 'trade' and 'financial' linkages and the relationship between currency crisis and monetary policy in four countries, namely Indonesia, Korea, Malaysia and the Philippines. In contrary to the literature, this study attempted to analyse the impacts of specific actions or policies on individual countries which can provide insights for each sample country with different macroeconomic fundamentals. In addition, this study also dated the currency crisis with more sophisticated statistical tests and methods, such as Extreme Value Theory (EVT). Apart from that, this study applied the Structural Vector Autoregressive (SVAR) models to analyse the effectiveness of monetary policy in decreasing currency pressure. In fact, the findings of the study provide valuable implications for the policy authorities. Thus, in this study, the main findings are: (1) more flexible currency is associated with higher volatility; (2) the higher degree of trade openness assists to amplify the impact of shocks in the economy; (3) the currency crisis is transmittable among major trade partners and/or competitors; (4) the economic fundamental is related to the incidence of currency crisis and supports the first-generation model of speculative attacks; (5) the responses of the currency pressure to monetary policies shocks are varied between Asian financial crisis and global financial crisis; and (6) the monetary policy stances are ineffective in decreasing currency pressure. Since the results revealed that the crisis is transmitted through trade linkage, policy authorities should be more cautious in pursuing external

liberalization and deregulating the market. Thus, to prevent the initiation of a currency crisis, the policy authorities should pursue the policy that lead to macroeconomic stability such as budget balance.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

TEKANAN PASARAN PERTUKARAN DALAM MENGENALPASTI KRISIS MATA WANG DAN KEBERKESANAN DALAM DASAR MONETARI DI NEGARA-NEGARA ASIA TERPILIH

Oleh

TEY SHEIK KYIN

April 2018

Pengerusi: Profesor Madya Lee Chin, PhD
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Kemunculan krisis mata wang telah meningkat berikutan pertumbuhan globalisasi dan pasaran kewangan antarabangsa bersepadu. Oleh itu, pembuat dasar perlu mengelakkan penularan krisis di masa depan, terutamanya bagi kes negara-negara Asia yang lebih tertumpu kepada integrasi monetari dan kewangan selaras dengan negara-negara lain. Oleh itu, kajian ini bertujuan untuk mengkaji pelbagai mekanisme penghantaran kejutan dari satu negara ke negara lain di Asia. Khususnya, kajian ini juga menyiasat penghantaran kejutan global antara ekonomi yang tertumpu kepada hubungan 'perdagangan' dan 'kewangan' serta hubungan antara krisis mata wang dan dasar monetari di empat negara, iaitu Indonesia, Korea, Malaysia dan Filipina. Bertentangan dengan kesusasteraan, kajian ini berusaha untuk menganalisis impak polisi dan tindakan spesifik bagi negara individu, justeru, berfungsi sebagai sampel untuk negara yang mempunyai dasar makroekonomi yang berbeza. Di samping itu, kajian ini juga menggunakan ujian dan kaedah statistik yang lebih canggih, seperti Teori Nilai Extreme (EVT), untuk mengumpul tempoh krisis berlaku. Selain itu, kajian ini menggunakan model Autoregressive Vector Struktur (SVAR) untuk menganalisis keberkesanan dasar monetari dalam mengurangkan tekanan mata wang. Penemuan kajian ini dapat memberikan implikasi berharga kepada pembuat dasar – penemuan utama adalah: (1) mata wang yang lebih fleksibel dikaitkan dengan volatiliti yang lebih tinggi; (2) tahap keterbukaan perdagangan yang lebih tinggi membantu meningkatkan kesan kejutan dalam ekonomi; (3) krisis mata wang boleh dipindahkan antara rakan dagangan utama dan / atau pesaing; (4) asas ekonomi adalah berkaitan dengan kejadian krisis mata wang dan menyokong model serangan spekulatif generasi pertama; (5) tindak balas tekanan mata wang terhadap kejutan dasar kewangan berbeza dengan krisis kewangan Asia dan global; dan (6) instrumen dasar monetari tidak berkesan dalam mengurangkan tekanan mata wang. Memandangkan hasil kajian membuktikan kewujudan krisis adalah melalui hubungan perdagangan, pembuat dasar harus lebih berhati-hati dengan dasar berkaitan keadaan pasaran dan liberalisasi luaran. Pihak berkuasa perlu memberi tumpuan kepada

polisi yang mencadangkan kestabilan makroekonomi, seperti bajet seimbang, sebagai langkah pencegahan permulaan krisis mata wang.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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AFC	Asian Financial Crisis
AIC	Akaike Information Criterion
ARCH	Autoregressive Conditional Heteroscedasticity
ARDL	Autoregressive Distributed Lag
BIS	Bank for International Settlements
BNM	Bank Negara Malaysia
BSP	Bangko Sentral ng Pilipinas
DC	Domestic Credit Growth
DF-GLS	Dickey-Fuller Generalized Least Squares
DI	Changes in Domestic Interest Rate
DOT	Direction of Trade
DSGE	Dynamic Stochastic General Equilibrium Modeling
DUSFFR	Changes in Domestic United States Federal Fund Rate
DUSP	United States Inflation
DUSY	United States Output Growth
DY	Output Growth
E	Exchange Rate
ECM	Error Correction Model
ECOWAS	Economic Community of West African States
EMP	Exchange Market Pressure
EVT	Extreme Value Theory
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
H-L	Hormer-Lemeshow test
HQ	Hannan- Quinn Information Criterion
I	Interest Rate
I.I.D	Independent and Identically Distributed
IIS	Impulse Indicator Saturation
IMF	International Monetary Fund
IRFs	Impulse Response Functions
LM	Lagrange Multipler
LR	Likelihood Ratio
M	Money Stock
MENA	Middle East and North Africa
MSE	Mean Square Error
N-W	Newer-West Test
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
PPP	Purchasing Power Parity
Q-Q	Quantile-Quantile
R	Reserve
RER	Real Exchange Rate
SDR	Special Drawing Right
SEACEN	South East Asian Central Banks
SIC	Schwarz Information Criterion

SVAR	Structural Vector Autogeression
2SLS	Two Stage Least Squares
UIP	Uncovered Interest Parity
US	United States
VAR	Vector Autoregression
VECM	Vector Error Correction Model
VD	Variance Decomposition

CHAPTER 1

INTRODUCTION

Since 1990s, the world had experienced several recessions, which included the European Monetary System Crisis (1992–1993), the Mexican Crisis (1994–1995), the Asian Crisis (1997–1998), the Global Financial Crisis (2007–2008), and the recent Eurozone Sovereign Crisis (2009). These recessions were associated with large exchange rate volatility that led to significant damages to the financial systems and real sectors.[1] Thus, currency crisis (or a discrete devaluation of the domestic currency), is defined as a sharp increase of pressure on the foreign exchange market due to the large depreciation of exchange rates and a sharp reduction of foreign reserve. These predicaments have been attributed to the intervention of monetary authorities in defending their currencies (IMF, 1998; Edison, 2000; Burnside *et al.* 2007; Qin and Liu, 2014) and turbulence in the foreign exchange market.

Financial crises affect a particular economy and that of other countries. For example, the Asian region was adversely affected by the East Asian financial crisis which erupted in the middle of 1997 after Thai baht was hit by a massive speculative attack. As a result, the confidence of Thai market diminished together with that of the neighbouring economies, including Indonesia, South Korea, Malaysia, and the Philippines. Between June and December 1998, the East Asian region currencies came under strong pressure to depreciate. For instance, Indonesian rupiah deflated the most by 70 per cent against the US dollar, followed by the Philippines peso, South Korea won, and Malaysian ringgit (25 per cent to 34 per cent). These devaluations marked notable impacts such as the decrease in GDP growth, decline in investment proportion and increase in unemployment rate.[2] In 2008, the export market in the Asian region was once again hit by a global financial crisis centred in the United States. As a result, many affected countries showed double-digit declines in exports which resulted in a decrease in industrial production. Furthermore, the GDP growth dropped significantly to negative and stock price declined, causing volatility in the currency exchange rate in at least six Asian economies (Chhibber *et al*., 2009).[3] Subsequently, in September 2008, the Lehman Brother worsened the global financial market which weakened further the Asian currencies. At the end of 2008, the Korean won depreciated the most, together with the Indonesian rupiah, the Malaysian ringgit, and the Philippines peso. As a result, Asian currencies averagely fell within 4 to 15 per cent against the US dollar (Guinigundo, 2011).

Exchange rate stabilisation through foreign exchange market intervention is one of the most important monetary policies to survive such crises.[4] With today's increased degree

[1]Higher exchange rate volatility appears to increase the risk and uncertainty in international transaction and therefore adversely affect trade (Rahmatsyah *et al*., 2002; Poon *et al.*, 2005; Fang *et al*., 2009; and Hayakawa and Kimura, 2009), productivity growth (Aghion *et al.*, 2006; and Yoshitomi, 2007) and excess credit (Arratible *et al.*, 2010).

[2] See Corsetti *et al.* (1998), IMF (1998), and Radelet and Sachs (1998).

[3] Six Asian economies are Korea, Malaysia, Thailand, Hong Kong, Singapore and Taiwan.

[4]Foreign exchange market intervention is any transaction or announcement by a government or monetary authority that is intended to influence the value of an exchange rate. Foreign exchange market intervention can

of financial integration, exchange rate stabilisation promotes growth, encourages employment and also ensures the stability of a financial system. In addition, Chhibber *et al.* (2009) discovered that deploying monetary policies has been considered the first remedy to survive the turmoil when a crisis results in the asset market declines, exchange rate depreciation, and domestic credit crunch.

Moreover, conventional policymakers suggested that an increase in interest rate is essential to stabilize the exchange rate depreciation and to curb the inflationary pressure. Besides, it also assists in preventing many adverse economic consequences. As such, many affected monetary authorities followed the prescriptions of International Monetary Fund (IMF) by presenting a belt-tightening budget under the strong pressure to depreciate and failed currency defences in the wake of the Asian financial crisis. Nevertheless, the conventional policies have been challenged following the failure of high-interest-rate policy to stabilize the exchange rate to a desirable level.[5] Critics argued that the rise in the domestic interest not only failed to stem capital flight but also raised default probabilities and weakened the financial institutions.[6] Rising interest rate transformed currency crises into full-blown financial recessions and into crises of the real economy (Wong *et al.,* 2005). Therefore, many economists recognized such inaccurate policy responses to the deep recessions that befell many Asian countries, particularly Indonesia, South Korea, and Malaysia. Based on these points, several studies concluded that the optimal responses for crisis and a depreciated currency were loose monetary policy.[7]

On the other hand, easing monetary policies is another option for recovery. Such an option is a measure demonstrated by some Asian countries in 2009, particularly by reducing interest rate and/or expanding the flow of credit to the private sectors. The strategy was considered to encourage recovery, as the responses had increasingly decoupled the Asian economies from the US downturn despite some economies, underwent tight monetary stance.[8] Nevertheless, Malaysia prevailed[9] and maintained its interest rate despite assertions that the Bank Negara Malaysia (BNM) should have tightened the monetary policy. In contrary, Kawai *et al.* (2012) argued that easing monetary policy appeared to work reasonably well in economies that have a relatively tight policy stance. Nevertheless, such an effect remained inconclusive in other studies (Krueger, 2009; Kannan *et al.*, 2009; and Chen, 2012) which discovered that such an outcome appeared ambiguous in both "crises" and "normal" times. From a monetary policy perspective, it is crucial for monetary authorities to comprehend: (i) the condition prevailing in the international currency market and the forces driving the currency, (ii)

be either sterilization or unsterilization. Sterilization offsets the effects of foreign exchange reserve changes on domestic monetary base. Meanwhile, unsterilization does not offset the effects of foreign exchange intervention on domestic monetary base. It results changes in domestic monetary base equal to foreign exchange reserve changes.

[5]Nevertheless, still have studies support conventional wisdom raising interest rates is helping in strengthening the currency during Asian financial crisis (Basurto and Glosh, 2000; Dekle *et al*., 2002; Miller *et al*., 2005,2006; and Cho and Kasa, 2008).

[6] See Furman and Stiglitz (1998), Radelet and Sachs (1998), Pakko (2000), Ohno *et al.* (1999), Wong *et al.* (2005) and Huang *et al.* (2007).

[7] See Furman and Stiglitz (1998), Gertle *et al.* (2007) and Bergman and Hassan (2008).

[8] See Takagi (2009)

[9] See Bank Negara Malaysia Annual Report (2009).

different factors result in various implications for the economy and (iii) the effectiveness of macroeconomic policies in stabilizing and strengthening the currency.

Between the 1960s and 1990s, Korea, Indonesia, Malaysia, and the Philippines were still unable to totally decouple from financial crises despite the economies of these countries grew faster than other regions. For instance, the Asian Financial Crisis (AFC) (1997–1998) severely affected these four economies. As a result, these countries were forced to reform their exchange rate regimes and enter an IMF rescue package (except Malaysia).

1.1 Causes of Crises

The first generation and the second generation models have been used to determine the causes of financial crises. These two standard models emphasize the macroeconomic and financial fundamentals as the determinants of a currency crisis (Glick and Rose, 1999). Nevertheless, the first generation model suggests that the economies with weak fundamentals are prone to speculative attacks. On the other hand, the second generation model suggests that the crisis might be the result of the inconsistency between domestic macroeconomic policies and an exchange rate regime. Thus, attributed speculative attacks to the trade-off encountered by the government between domestic macroeconomic objectives and the maintenance of a fixed exchange rate arrangement.

Nevertheless, the limitations of the first and second generation models seemed to surface in the recent financial crises. For one thing the recessions were regional phenomena in which the tension encountered in one country transmitted to other countries and caused systematic instability.[10] Such financial upheavals that move rapidly across borders is referred to as third generation model (also known as *contagion*).

Contagion denotes how the integration of countries increases their exposure to foreign speculative attacks. Currency crisis can transmit through a few channels, such as common shocks, trade links, and financial links. Meanwhile, common shocks refer to a slowdown in world aggregate demand that alters the commodity prices. A bilateral exchange rate between major world economies can simultaneously affect the economies of several countries and thus causes a crisis. On the other hand, trade links suggest that international trade can transmit from one country to a trade partner through a fall in its import demand. In addition, when two countries compete in a third foreign market for similar products, a devaluation of one country's exchange rate reduces the international price competitiveness of the other country. As a result, other countries also devalue their currencies.

The third channel of transmission crisis is the financial linkage. During a crisis, international financial institutions had enforced tougher requirements for the loan, and such a measure may cause financial liquidity problems. Hence, such institutions propagate crises. For instance, banks and institutional investors play a role in spreading

[10] See Walker (1998).

a crisis from one country to another. Furthermore, following the crisis in one country, the international investors were inclined to shift their portfolios by selling assets to hedge their position and putting further a downward pressure in asset values in the inflicted countries which can propagate the initial shock.

Nevertheless, arguments have surmounted on how crises transmit across borders. One strand was of the view that with increased integration, domestic investors are offered a greater opportunity to diversified risks, which enable a country to access the world pool of resources and hence raise economic growth rates. On the other hand, another strand argued that a greater degree of financial integration without capital control causes open economies more prone to crises and bearing the effects of contagion.

1.2 Exchange Market Pressure

The exchange market pressure (EMP) index has been widely adopted as an indicator[11] to investigate the effectiveness of monetary policies. Such tool measures the extent of currency pressure by ascertaining the magnitude of money market disequilibrium that arises from excessive international supply or demand of domestic currency.[12] Based on previous studies, three EMP models have been generally adopted. The first EMP model was introduced by Girton and Ropers (1977) who assigned equal weights to the exchange rate and foreign reserve changes. Thus, EMP can be easily constructed by concluding exchange rate and reserve changes with this model. Girton and Roper (1977) stated that EMP can be measured quantitatively by forming a summary statistic from observed changes in the exchange rate and foreign exchange reserves of the domestic central bank. Apart from that, this tool also allows the condition of the foreign exchange market to be monitored on the basis of policy decision. The second EMP model was introduced by Weymark (1995, 1998), who proposed a parameter (conversion factor) standing for the relative weights of the exchange rate changes and intervention change in the EMP index. Weymark (1997) formalized Girton and Roper's (1977) concept by establishing the EMP as the tool excess demand for a currency in international exchange market that would have been required to remove this excess demand in the absence of exchange market intervention, given the expectation generated by exchange rate policy actually implemented (p.109). The third EMP model was introduced by Eichengreen *et al.* (1995) who propounded a linear combination of the interest differential, the percentage changes of both bilateral exchange rates, and exchange reserves. The weights assigned to these components were apportioned to equalize the conditional volatilities. Nevertheless, these three EMP models have been criticized for their impetuous assumptions on the weighting scheme.

[11]EMP index are also used by IMF as one of five indicators to measure the financial stress (Balakrishnan *et al.*, 2009).

[12] Crisis occurs when there is an abnormally large international excess demand for a currency; therefore the nature way to characterize exchange market condition is to develop an analytically sound measure of the total international excess demand for a currency (Eichengreen *et al.*, 1995; and Weymark, 1998).

1.3 Background of Four Selected Countries' Degree of Integration, Exchange Rate Arrangement, and Policy Responses

Prior to 1997, East Asian countries had experienced rapid economic growth and structural change that were mainly associated with export-led industrialization (Jomo, 2005). For instance, some countries like Indonesia, Malaysia, the Philippines, Singapore, and Thailand, Korea, Hong Kong, and Japan were the tiger economies which have maintained their fiscal surpluses and kept their monetary expansion at an optimum level and controlled inflation.

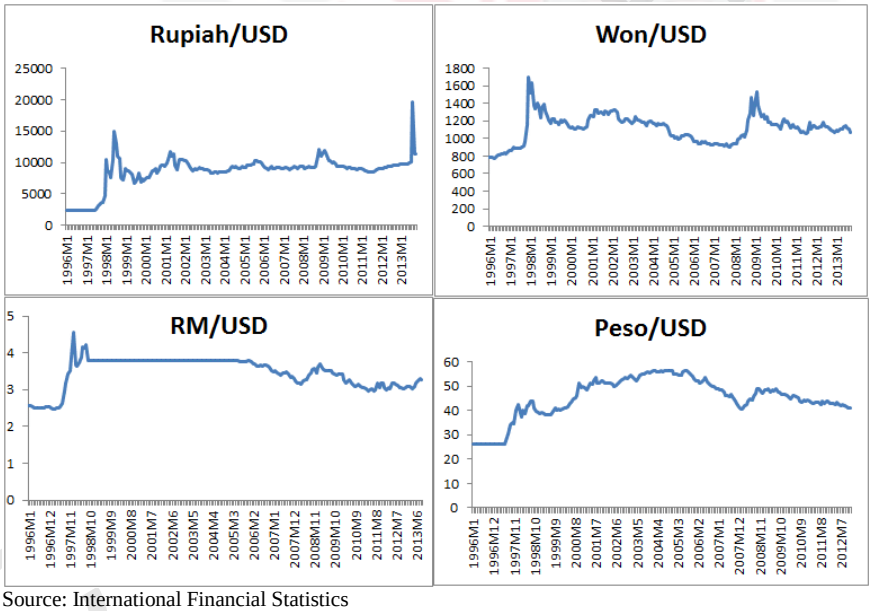
Based on Table 1.1, these economies noted an average GDP growth of 5.5 per cent between 1985 and 1996, indicating a low unemployment rate and a higher ratio of exports. Nevertheless, they were rapidly affected by the Asian Financial crisis which erupted in Thailand in the mid-1990s. Moreover, based on Table 1.1, it showed that the Indonesian economy was the most severely hit by the Asian financial crisis as its GDP growth sunk from 4.7 per cent to -13.1 per cent. On the other hand, the GDP growth of Malaysia also dropped from 10.0 per cent to -7.8 per cent, whereas Korea's GDP growth rate collapsed from 5.8 per cent to -5.7 per cent. In addition, the GDP growth of the Philippines decreased from 5.2 per cent to -0.6 per cent. Figure 1.1 illustrated the official exchange rate against the US dollar for Indonesia (rupiah/USD), Korea (won/USD), Malaysia (RM/USD), and the Philippines (peso/USD). It showed that Indonesian rupiah depreciated the most by 70 per cent against the US dollar, followed by the Philippines peso, South Korean won, and Malaysian ringgit, which fell in the range from 25 per cent to 34 per cent (as shown in Figure 1.1)

To deal with the Asian financial crisis, Indonesia sought IMF assistance and was granted an SDR7.338 billion stand-by arrangement to (1) support the country's macroeconomic stabilization and structural reform programme, (2) keep the budget in surplus, and (3) establish a tight monetary policy (BNM, 1999). Thus, the Bank Indonesia swapped a managed floating exchange rate regime for a free-floating system. Nevertheless, it would intervene to stabilize the exchange rate during the periods of abnormal exchange rate fluctuation. Similar to Indonesia, Korea abandoned the band and allowed won to float in December 1997. Therefore, the initial policy response of Korea was to increase interest rate prior seeking the IMF's assistance (SDR 15.5 billion), World Bank (US Dollar $10 billion), and Asian Development Bank (US Dollar $4 billion) for structural reforms (BNM, 1999). The Korean Programme aimed to reduce the external current account deficit, establish international reserves, and contain inflationary pressures through a tighter monetary and fiscal adjustment.

Table 1.1: Macroeconomics Indicators in East Asian Countries

	HK	ID	JP	KR	MY	PH	SG	TH
GDP growth (annual per cent)								
1985	0.8	2.5	6.3	7.7	-1.1	-7.3	-0.7	4.6
1990	3.8	7.2	5.6	9.8	9.0	3.0	10.0	11.2
1996	4.3	7.8	3.1	7.6	10.0	5.8	7.5	5.7
1998	-5.9	-13.1	-1.1	-5.5	-7.4	-0.6	-2.2	-7.6
2000	7.7	4.9	2.8	8.9	8.9	4.4	8.9	4.5
Unemployment rate (percentage of the total labour force)								
1985	3.2	2.1	1.6	4.0	6.9	6.1	4.3	3.7
1990	1.3	2.5	2.1	2.5	5.1	8.1	-	2.2
1996	2.8	4.0	3.3	2.0	2.5	7.4	3.6	1.1
1998	4.6	5.5	4.1	6.8	3.2	9.4	3.4	3.4
2000	4.9	6.1	4.7	4.4	3.0	11.2	6.0	2.4

Notes: HK is Hong Kong, ID is Indonesia, JP is Japan, KR is Korea, MY is Malaysia, PH is the Philippines, SG is Singapore and TH is Thailand.
Sources: World Development Indicators



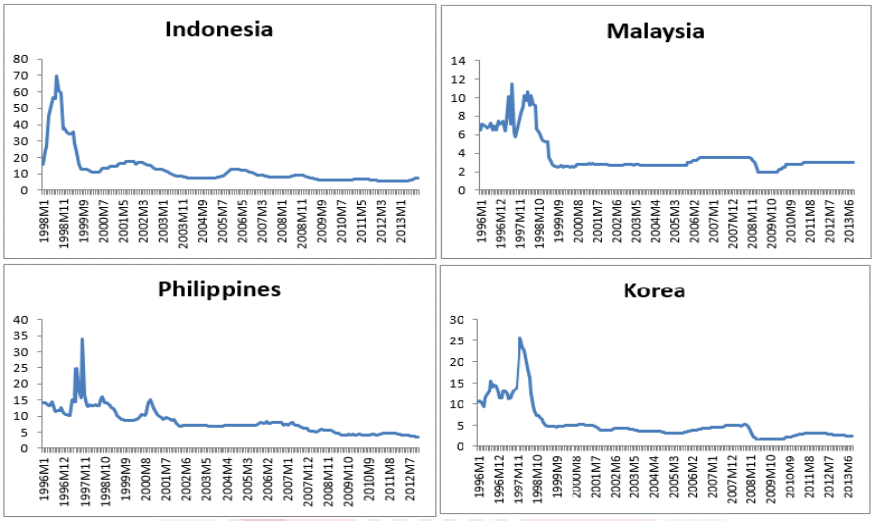
Source: International Financial Statistics

Figure 1.1: Official Exchange Rates against US Dollar

The Philippines complied with IMF's prescription by raising interest rates and reducing monetary growth. As a result, the central bank's overnight borrowing rate rose dramatically and interbank rates escalated from 40 to 60 per cent. At the end of 1998, the peso began to strengthen and monetary tightening persisted. In contrary, Malaysia refused IMF's assistance. In fact, Malaysia imposed the capital control instead of opening the economy to stop currency speculation. As a result, BNM fixed ringgit at

RM3.80 against the US dollar and tightened fiscal and monetary policies by way of raising its interbank overnight rate and government spending.

In the wake of the crisis, IMF's prescriptions were to urge bank closures, reduce the government expenses, and induce higher interest rates. According to IMF (2000), the latter measure aimed to stabilize the currency and assist in restoring financial stability.[13] Nevertheless, many economists agreed that the initial IMF programs for Thailand, Indonesia, and South Korea were ill-conceived. In fact, such programs had transformed an initial currency crisis into a full-blown financial recession (Radelet and Sachs, 1998 and Ohno *et al*, 1999). Thus, this was the possible reason for the four economies to adopt the prescription only for a brief period (Figure 1.2).



Source: OECD, Bank Negara Malaysia, Bangko Sentral ng Pilipines, and Bank of Korea

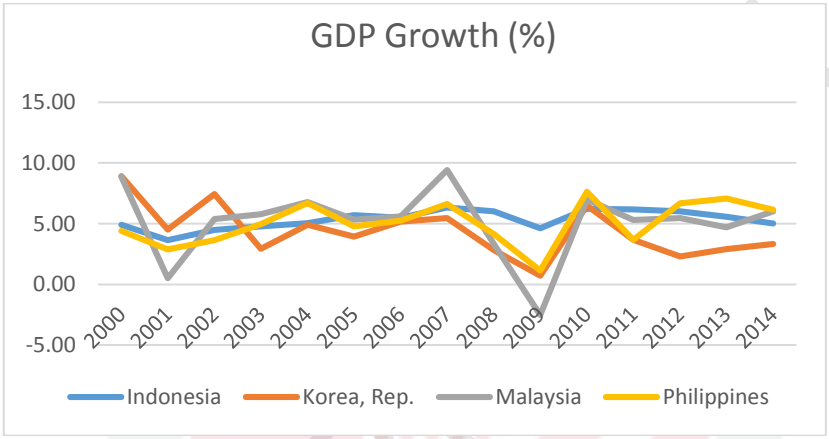
Figure 1.2: Policy Rate/Money Market Rate

Between 2008 and 2009, East Asian economies were severely affected by shocks and contagion from the global financial crisis which erupted in the United States. Asian exports dropped by beyond one third and the Asia stock prices tumbled for more than 30 per cent (Keat, 2009). In the fourth quarter of 2008, Indonesia, Malaysia, Korea, and the Philippines came under heavy pressure and maintained a depreciation trend (Figure 1.2). As a result, the growth of the four economies declined by an average of 3.1 per cent. In early 2009, Malaysia's GDP growth decreased and turned negative (see Figure 1.3).

Almost all economies adopted the easing monetary policy by reducing its policy rate and fiscal stimulus. Nevertheless, some Asian economies still embraced the approach in dealing with the Global Financial Crisis despite the doubts that the tightened policy had exacerbated the crisis (Takagi, 2009). For instance, the Bank Indonesia cut its policy rate

[13] There are some studies support IMF prescriptions; such as Dekle *et al.* (2002) and Basurto and Glosh (2000).

gradually from 9.50 per cent to 6.5 per cent, whereas the Philippines reduced the proportion by cumulative 175 basis point and decreased the reserve requirement from 21 per cent to 19 per cent. On the other hand, between October 2008 and February 2009, the Bank of Korea responded rapidly by lowering its benchmark interest rate by 3.25 points, and to the lowest point (2 per cent) from May 1999 onwards (Kim, 2014). Nevertheless, BNM decided to maintain its interest rate. Hence, it reduced (1) the figure by 150 basis points to 2 per cent between December 2008 and February 2009 and (2) the statutory reserve requirements by 300 basis points (BNM, 2009). Such prompt fiscal and monetary stimuli appeared to work reasonably well, with the GDP growth of Indonesia, Korea, the Philippines, and Malaysia by increasing on average 5.8 per cent in 2010.



Sources: Worldbank.org

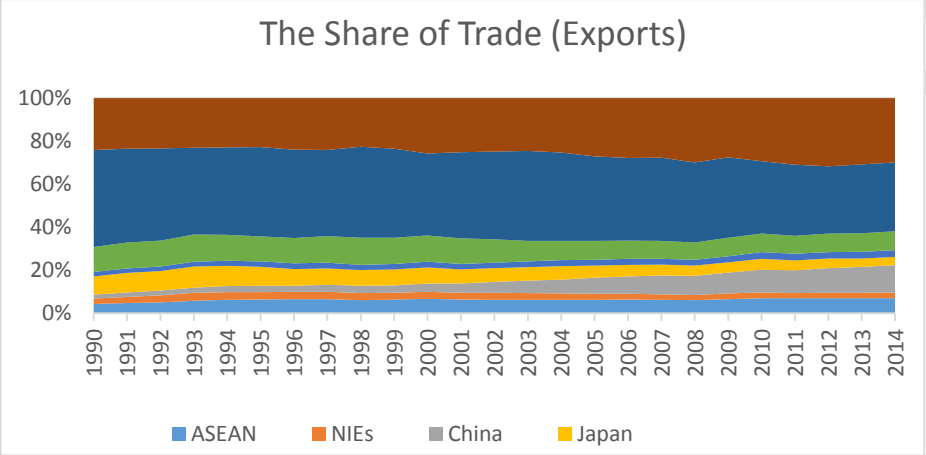
Figure 1.3: Gross Domestic Growths from the Year 2000 to 2014

1.3.1 Economic Integration Trend in Indonesia, Korea, Malaysia, and the Philippines

Since the 1990s, many Asian economies have become steadily more integrated into the world economy. Figure 1.4 illustrated that the Asian's share in total global trade continuously increased, with the United States and European Union economies remaining as the most important markets. The increasing trade openness ratio (as shown in Figure 1.5) in Indonesia, Korea, Malaysia and the Philippines also indicated that these countries had gradually become more open and relied heavily on trade. The ratios of trade to GDP have increased steadily despite the overall decrease in recent years in these four economies.

The rising trade integration of the Asian economies into the world economy has also been accompanied by greater international financial assimilation. The FDI openness and international debt securities by the residence of the issuer are the indicators for financial openness published by Asia Development Bank (as shown in Figure 1. 6). FDI openness ratio showed that the inward FDI stock of a country expressed as a percentage of nominal GDP in the dollar for four East Asian economies was relatively low. This indicated that

financial integration in four East Asian economies remained low despite it increased after the Asian financial crisis. Meanwhile, Figure 1.6 explained the international debt securities by the residence of the issuer and the amounts of outstanding debt securities issued internationally by the residents of a country which indicated an increasing trend or the amount of financing tapped from the international market are increasing. This also indicated that degrees of financial integration in these four economies are increasing gradually, the same as trade integration.



Sources: IMF- DOT

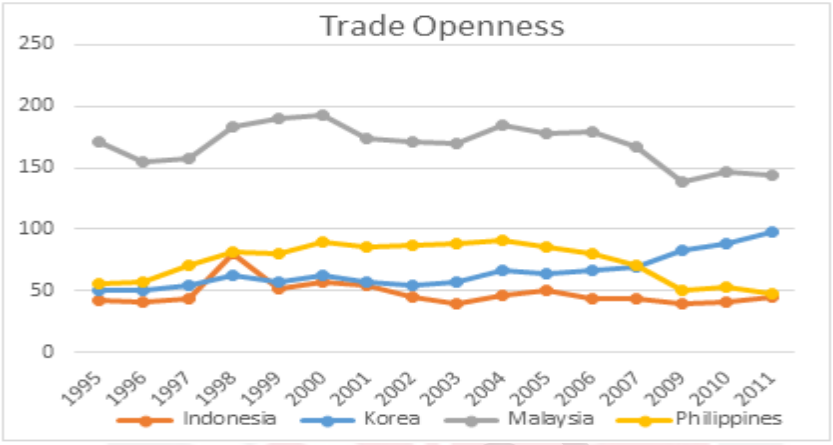
Figure 1.4: Trade Share of Asia in the World

Since 1997, Asian countries sought global integration with higher financial and trade openness to strengthen financial cooperation.[14] Towards the end, the Asian economies seemed to have pursued external liberalisation by minimizing trade tariffs and deregulating their financial market. Furthermore, the Asian economies have undertaken various cooperative initiatives for trade and finance, such as free trade agreements, the Chiang Mai Initiatives, The Economic Review and Policy Dialogue, and Asian Bond Market Initiatives (Kawai, 2007). To manage the consequence of integration, the regional intergovernmental cooperation efforts were significantly intensified through a range of formal agreements and informal measures. The FDI regulatory restrictiveness index (FDI index) of selected countries (Figure 1.7) supported this view which suggested that Indonesia, the Philippines, and Malaysia have gradually removed their capital control since 1997's crisis.[15]

Figure 1.6 showed the FDI openness in Indonesia and Malaysia declined during the 2008–2009 global financial crisis. This indicated that the global financial turmoil has caused some Asian economies, namely Indonesia and Malaysia, to take some "protective"

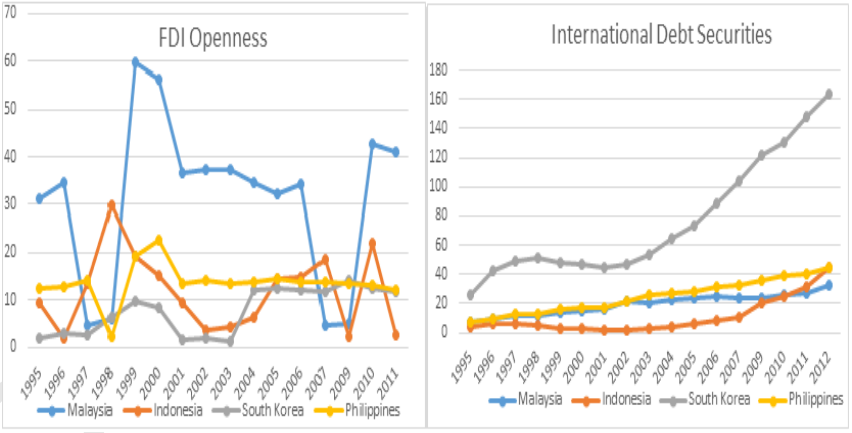
[14] As indicated by the discussion on the Chang Mai Initiative and on the Asian bond market.
[15] Malaysia imposed capital controls in 1998. The government fixed ringgit's value at 3.80 ringgit to the dollar ; imposed tight limits on transfers of capital abroad by residents in Malaysia and froze all foreign portfolio investment from being taken out of the country for 12 months. Malaysia began loosening some of the control on capital in 1999.

measures and lower the degree of regional financial integration in East Asia. For example, Indonesia encouraged the servants to purchase the local products and introduced import restrictions on 500 products. On the other hand, the Malaysian government banned the hiring of foreign workers in factories, stores, and restaurants.[16]



Sources: IMF- DOT

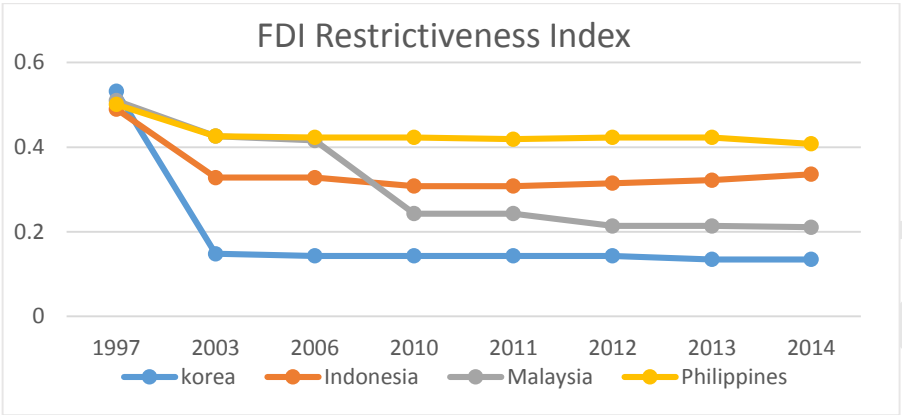
Figure 1.5: Trade Openness for Four East Asian Economies



Sources: Asian Development Bank

Figure 1.6: FDI Openness and International Debt Securities by Residence of Issuer in Four Asian Economies

[16] See Jakarta post (2009).



Sources: OECD

Figure 1.7: FDI Restrictiveness Index

1.4 Problem Statements

The frequent occurrences of financial crises have attracted the researchers' interest in developing an effective initial warning device and a single index to identify the existence of speculative attacks on currency. EMP index is widely used as an indicator of crisis to identify the presence of speculative attack (successful attack and unsuccessful attacks[17]) on currency or currency crisis. The past studies defined the period of currency crisis when there is a large value of EMP indices and the measure of EMP exceeds a certain threshold such as two or three standard deviations above EMP means. Nevertheless, such threshold has largely been in an arbitrary process.

This study intended to define the threshold level with a more objective statistical method, the Extreme Value Theory (EVT). EVT which exploits information in the tails of the series provides a framework to examine the behavior of the tails of a distribution. Hence, it enables this study to apply extreme observations to measure the density in tails and build a statistical model for the speculative attack.[18] The literature suggested that the threshold typically identified from a large deviation of EMP index from its mean varies from 1.5 to 3.0 standard deviation above its mean (Eichengreen *et al.*, 1996; Kaminsky and Reinhart. 1999; Edison, 2000; Bubula and Otker-Robe, 2003; Krznar, 2004; Van Poeck *et al.*, 2007; Martines-Ruiz and Nogues-Marco, 2009; Gunsel *et al.*, 2010; and Caglayan *et al.*, 2010). Several scholars examined (1) the accuracy of the conventional method in capturing the true dispersion of given EMP series or (2) its potential to underestimate the frequency of speculative attacks. The use of mean and standard deviation approach to obtain extreme observation is based on the assumption that a series of EMP is well behaved and normally distributed. Nevertheless, the components of EMP are speculative series and usually display non-normal behaviour with excess kurtosis and asymmetry (Jasen and De Vries, 1991). Therefore, in general, EMP is unlikely to follow

[17] When there is an unsuccessful attack, the pressures have been rebuffed by loss in reserves.
[18] For more comprehensive, detailed and technical introduction, see De Haan and Ferreira (2006) and Embrechts *et al.* (1997).

a normal distribution density function (Pozo and Amuedo-Dorantes, 2003; Pontines and Siregar, 2008 and Guru and Sarma, 2013). Thus, the arbitrary choices of threshold in attaining extremely large values of EMPs become even more inappropriate. In other words, the arbitrary choice of crisis-identification threshold and the underlying prior assumptions are problematic.

Furthermore, despite regional integration is considered an appropriate response to the global financial crisis (ECOWAS commission, 2009), such a measure has proved to open the way for the crisis, as well as amplify price volatility and financial crisis morbid ability (Roubini and Mihm, 2010). Some economies such as Indonesia and Malaysia had stepped back from their openness during the Global Financial Crisis. Thus, they appeared to temporarily lower their level of openness and resonate their agreement that crises can be exacerbated through international economic linkages. Thus, these views have questioned the effectiveness of reducing the exposure of a country to international trade and finance in preventing the risks and enhancing the stability. To answer this query, this study investigated the contagion effect and the transmission of global shock between economies that focus on trade linkage and financial linkage.

IMF's prescriptions, including the implementation of a tight monetary policy, had been adopted by the selected countries to stabilize the currency and restore financial stability. Nevertheless, numerous studies argued that economies turned into a deep recession in 1998 partially due to inaccurate policy responses (Ohno *et al.*, 1999; and Wong *et al.*, 2005). Thus, a significant policy support would be required to decrease the pressure if the currency pressure in the exchange market is large with an increasing trend. Thus, this prevented the economy from entering a deep and prolonged recession. An inaccurate policy response or no policy support exacerbates the crisis and leads to economies' struggle for years. The question of this study surfaced as to whether easing monetary policy was the optimal response for crisis and towards understanding this perplexity. Thus, this study examined the influence of monetary variables on EMP.

1.5 Objectives of the Study

To examine monetary policies and crises, this study proposed an exchange market pressure model by structuring an EMP index for the Philippines, Malaysia, Indonesia, and South Korea. The specific objectives are as follows:

1. To determine the threshold level of EMP that differentiates a crisis from non-crisis episodes.
2. To investigate the transmission of global shock between economies that focus on trade linkage and financial linkage.
3. To examine the impact of monetary variables on EMP.

1.6 Significance of the Study

EMP is the latest model [19] utilized to characterize the exchange rate condition. It measures the extent of pressure in the exchange market and provides a measure of the volume of intervention essential to achieve any desired exchange rate target. Apart from that, EMP is also extensively used as an indicator of crisis particularly to identify the presence of a speculative attack on the currency. The common way to identify a crisis is by arbitrarily designating a certain threshold to define a recession episode. Nevertheless, this process and its assumptions inherent in the use of mean and standard deviation are considered inappropriate as this process fails to predict the accuracy of currency crises.

The obscurity of the arbitrary threshold method may also question the validity of estimating the likelihood of speculative attacks with the crisis episode with the EMP index. Therefore, the present study intended to examine and determine a threshold level that can ascertain the number of currency-pressure episodes with a more objective statistical method which explains the likelihood for the predicament to occur with values of explanatory variables.

The recent Asian and global financial crises justify the significance for policymakers to comprehend contagion to avoid and manage the widespread of a future crisis. Policymakers, particularly in the Asian region, continue their movements towards deeper regional monetary and financial integration. Hence, this study attempted to analyze the role of the channels of contagion, particularly trade and financial linkages on currency crisis. The findings can be used to propose possible transmission channels for crises.

Government intervention or crisis management is crucial in the onset of crisis or during the economic slowdown. An accurate policy support can assist in reducing the pressure and preventing the economy from entering a deep and prolonged recession. Thus, this study examined the role of monetary policy in decreasing the pressure and which monetary policy stance (domestic credit or interest rate) is more efficient in managing the pressure.

Last but not least, this study attempted to analyze the impacts of specific actions or policies with individual countries, instead of researching the effects of general actions or policies with a number of individual countries in literature. Therefore, the findings can provide a comprehensive overview of a respective country with various macroeconomic fundamentals and valuable policy implications.

[19] The two most common exchange rate models are the monetary approach to balance-of-payments and the monetary approach to exchange rate determination. For more detail, see Kemp (1975); and Neely and Sarno (2002).

1.7 Organization of the Thesis

The study is organized as follows: (i) Chapter two reviewed the previous theoretical and empirical studies relating to exchange market pressures, (ii) Chapter three presented the theoretical framework used in this study to measure EMP and the econometric methodology adopted to examine degree of intervene, as well as the relationship between monetary policy and exchange market pressure, (iii) Chapter four presented and discussed the empirical results of the analysis and the interpretation of the results, and (iv) Chapter five summarized the major findings of the study and the policy implication.

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