Tracing Exchange Rate Volatility: The Case of Indochina

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Abstract

The general aim of this paper is to examine the effectiveness of Exchange Market Pressure (EMP) index in tracing the presence of economic crises sufficiently. The index was unveiled by Girton and Roper (1977) to assist policy makers in responding conclusively when severe compressions on currencies emerge. Hence, by selecting Indochina countries namely Cambodia, Lao People's Democratic Republic (PDR), Myanmar and Vietnam as the case study, it would provide better acumens on how these small open economies maintain and stabilize their exchange rates and keeping other macroeconomic variables under control through policy responses. By computing the EMP index based on the methods by Eichengreen et al. (1996), Sachs et al. (1996) and Kaminsky et al. (1998), we monitories and predict the future pace of the Indochina foreign exchange markets. Based on our findings, there are several signals of EMP and its impact over the sample period. Besides that, the plots of EMP index allow us to witness Indochina's quick recovery from these crises through its policy responses. These findings indicate the effectiveness of EMP index as the early warning system in detecting the market pressure of Cambodian Riel, Lao Kip, Burmese Kiat, and Vietnamese Dong especially during the episodes of crises through the different exchange rate regime.

Keywords: Exchange Market Pressure, Indochina.
JEL classification: F30, F31, F33, C3

1. Introduction

The world economy is currently having anxiety on the possibility of engaging another global crisis relapse as global debts level are getting higher compare to 2008 and facing the risk of dollar based monetary system breakdown. On that account, we witness an upsurge of literature in uncovering the crises sources and policy measures mostly on highly developed

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regions or emerging markets as these economies are the backbones of the global economy. However, it is also crucial to not lose sight in monitoring the economic performance of the low-income countries especially in the East Asian region the Indochina economies namely, Cambodia, Laos, Myanmar and Vietnam since there are strong investment and trade relationships between these two groups of Asian countries due to Indochina's strategic geographical location that have benefited the Indochina countries to be invested by Asian economies for its low-wage economies. Hence, it is important for these Indochina countries to be aware and have effective preventive measures on managing their foreign exchange market in order to sustain their economic growth and financial stabilization despite being the less developed countries in the East Asia region since each of the Indochina economies have come a long way to reach its current state through their courageous acts in transitioning to market-oriented system in the late 1980s with a mission of overcoming macroeconomic imbalances and slow growth through by liberalizing their economies and financial markets.

Owing to the motivation above, this paper attempt to investigate the presence of economic crises by adopting one of the '*famous*' modelling tool used to capture the currency's densities is the exchange market pressure (EMP) index using Indochina as the case study. The index was unveiled by Girton and Roper (1977) to assist policy makers in responding conclusively when severe compressions on currencies emerge. Nevertheless, many notable empirical literatures[1] (see for example, Aizenman and Hutchison, 2012 and the references therein) suggest that EMP index has the ability to trace crisis symptoms sufficiently that allows government and policymakers to undertake effective pre-emptive measurements. We will also trace on how this index constructed can be interpreted as an effective "*signalling system*" as it would tell us whether Cambodian riel, Lao Kip, Burmese Kiat and Vietnamese dong were subjected to extensiveness market pressure before, during and the aftermath periods of the crises.

Ever since the absconding of the French colonialism in the 1950s, Cambodia, Myanmar, Lao PDR and Vietnam, or better known as Indochina had undergone intensified economic reformation in the late 1980s and also early 1990s in order to achieve macroeconomic stability and promote the countries' economic growth. Despite been categorized as low income countries, the macroeconomic stability of all four countries have improved over the years where the momentum growth rates experienced by these countries have been consistently ranging from 6 to 8 percent, decline in public debt and fiscal deficits are below 6 percent. Hence, the economy development of Indochina has been gaining the center of attention for being the next frontier in solidifying Asian's economic gravity which makes it more worthwhile to yield a closer look at these countries internal structure and market condition.

The remainder of this study is structured as follow. Section 2 provides the theoretical consideration of EMP and some relevant literatures. Section 3 discusses the methodology as

[1]These notable contributions have indeed enriched the empirical literature when one of major suspect was the exchange rate volatility[1]as being the key transmission of the financial meltdown.

well as the data utilized in the analysis while section 4 reports the empirical findings. Lastly, Section 5 concludes.

2. Exchange Market Pressure: Theory and Related Literature

After the collapsed of Bretton Woods system, Girton and Roper (1977) introduced the concept of exchange market pressure (EMP) through the combination of monetary approaches to the balance of payment and exchange rate. Literally, *exchange market pressure* measures the total excess demand for a currency in international markets as the exchange rate change would have been required to remove this excess demand in the absence of exchange market intervention, given the expectations generated by the exchange rate policy actually implemented (Weymark, 1995). Hence, EMP is formulated based money demand and money supply functions.

We follow Bahmani-Oskooee and Bermstein (1997) in providing the theoretical intuition behind derivation of the EMP model. First, equilibrium in the money market requires that

$$M^d = M^s \tag{1}$$

where M^d is the demand for nominal balances and M^s is the supply of nominal money. In return the demand for and supply of nominal money is outlined by Equation 2 and 3:

$$M^d = kPY \tag{2}$$

$$M^s = m(R + D) \tag{3}$$

where P is the domestic price level, Y is the real output, m is the money multiplier and (R + D) is the monetary base (R as net foreign assets is the foreign component of the monetary base and D as the domestic credit is the domestic component). Then, to derive the EMP model we formulate the PPP theory as in Equation 4:

$$E = P^* = P \tag{4}$$

where E[2]is the spot exchange rate, P^* is the foreign price level and P is the domestic price level. By substituting Equation 2 and 3 into 1 yields

$$kPY = m(R + D) \tag{5}$$

Next we substitute for P its equivalent from Equation 4, i.e., $P^*=E$. Thus, we have

$$k(P^* = E)Y = m(R + D) \tag{6}$$

[2] In this case, E is defined as number of units of foreign currency per unit of domestic currency.

If we assume the fraction of nominal income people hold in the form of cash, i.e., k to be constant, Equation 6 could be rewritten in the form of percentage changes as

$$p^* - e + y = a + r + d \tag{7}$$

where p^* is the percentage change in foreign price level; e is percentage change in E; y is the percentage change in Y; a is the percentage change in m; $r = \Delta R/(R + D)$; and $d = \Delta D/(R + D)$. Rearranging the terms in Equation 7 results in the exchange market pressure model as below:

$$r + e = p^* + y - a - d \tag{8}$$

Equation 8 states that for a given p^*, y, and a, an increase in domestic credit creation d will result in a one-to-one decrease in foreign reserves and an equal proportionate depreciation of domestic currency.

In order to decide the amount of pressure been captivated either by e and r, Girton and Roper (1977), Connolly and Silveira (1979) and Bahmani-Oskooee and Shiva (1998), recommend to comprise a variable $Q = (e - 1)/(r - 1)$ in the right-hand side of Equation 8. If more of the pressure is absorbed by exchange rate depreciation relative to loss of reserves, Q will carry a significant and positive coefficient, while a significant and negative Q implies more pressure is absorbed by the loss of reserve. However, insignificant coefficient indicates monetary authority is unresponsive to the components of EMP.

$$r + e = p^* + y - a - d + Q \tag{9}$$

Over time, this model has been developed, with weights assigned to each EMP component (see for example, the work by Eichengreen et al., 1996; Sachs et al., 1996 and Kaminsky et al., 1998) to improve the basic model of Girton and Roper (1977). These authors shared similar opinion on the inclusion of interest rate as the third necessary component for the modelling and computation of the EMP index. In their paper, Eichengreen et al. (1996) argued that the interest rate hikes were also central bank's response to speculative attacks. The idea here is that, since interest-rate hikes have been part of central banks' responses to speculative attacks, interest rates are one way of capturing pressures in the foreign-exchange market.By incorporate these three components (exchange rate, international reserves and interest rate) into a single index it is often termed as a model-independent approach; most widely-used method, reflecting its potential ability to capture specific factors affecting the currency pressure.

Looking into the empirical literature, the model has been applied to a wide range of countries, with most studies focusing on the bilateral exchange rate against the US dollar**.** For instance, Sireger et al. (2010) examine the evidence of local currency against USD and its severity during the sub-prime crisis of 2007-2009 of the South East Asia Central Banks (SEACEN) countries. Their findings suggest that SEACEN countries were affected by the sub-prime crisis and the demise of Lehman Brothers had left most of the Asian currencies under severe

depreciations especially the Malaysian ringgit, the Thai baht, the Korean won, the Indonesian rupiah and the Singapore dollar. Meanwhile, Bertoli et al. (2010) suggests that existing EMP-based crisis indicators may not be well suited for the study of currency crises in emerging countries, as they lead to a questionable selection of crisis episodes and suggests that emerging countries are much less crisis-prone than developed countries.

We do acknowledge the limitation of adopting any single EMP measurement (like most the literature cited above) especially in the identification of crisis episodes which also portray in the work of Pontines and Siregar (2008) and Bertoli el al. (2010). In what follows, this paper adopt the arrays of measurements by Eichengreen et al. (1996), Sach et al. (1996) and Kaminsky et al. (1998) for Cambodia and Vietnam. This would provide a much clearer picture on the extent of EMP in Indochina while promote consistency of the empirical results for prudent policy implication.

3. EMP Measurements and Data Description

According to Siregar et al. (2010) and McFarlene (2010) the arrays of EMP measurements proposed by Eichengreen et al. (1996), Sach et al. (1996) and Kaminsky et al. (1998) are much suitable in fully capturing periods of currency crisis as they provide information on speculative pressure on a currency. In this paper, the US is used as our reference country. Based on Eichengreen et al. (1996), Sach et al. (1996) and Kaminsky et al. (1998), each country's series is constructed as follows:

3.1 Eichengreen et al. (1996)

The exchange market pressure index of Eichengreen et al. (1996) [$EMP_{E,t}$] is expressed as:

$$EMP_{E,t} = \frac{1}{\sigma_e}\left(\frac{\Delta e_t}{e_t}\right) - \frac{1}{\sigma_r}\left(\frac{\Delta r_t}{r_t} - \frac{\Delta r_{US,t}}{r_{US,t}}\right) + \frac{1}{\sigma_i}\left[\Delta\left(i_t - i_{US,t}\right)\right] \tag{10}$$

where e_t is the unit of country currency per U.S dollar in period of t, r_t is the international reserves, $r_{US,t}$ indicates international reserves for US, i_t and $i_{US,t}$ are the domestic interest rate and US interest rate in period of t respectively. Meanwhile, the parameter of σ_e is the standard deviation (SD) of the relative change in the exchange rate $\left(\frac{\Delta e_t}{e_t}\right)$; σ_r is the SD of the difference between relative changes in foreign reserves in domestic and the reference country $\left(\frac{\Delta r_t}{r_t} - \frac{\Delta r_{us,t}}{r_{us,t}}\right)$; σ_i the SD of the nominal interest rate differential $\left(i_t - i_{US,t}\right)$.

3.2 Sachs et al. (1996)

The exchange market pressure index of Sachs et al. (1996) [$EMP_{S,t}$] is expressed as follows:

$$EMP_{S,t} = \frac{\frac{1}{\sigma_e}}{\left(\frac{1}{\sigma_e}+\frac{1}{\sigma_r}+\frac{1}{\sigma_i}\right)}\left(\frac{\Delta e_t}{e_t}\right) - \frac{\frac{1}{\sigma_r}}{\left(\frac{1}{\sigma_e}+\frac{1}{\sigma_r}+\frac{1}{\sigma_i}\right)}\left(\frac{\Delta r_t}{r_t}\right) + \frac{\frac{1}{\sigma_i}}{\left(\frac{1}{\sigma_e}+\frac{1}{\sigma_r}+\frac{1}{\sigma_i}\right)}\left(\Delta i_t\right) \quad (11)$$

where e_t is again the unit of country currency per U.S dollar in period of *t*; r_t the international reserves in period *t*; i_t domestic interest rate in period *t*; σ_e is the SD of the rate of change in exchange rate $\left(\frac{\Delta e_t}{e_t}\right)$; σ_r the SD of the rate of change in reserves $\left(\frac{\Delta r_t}{r_t}\right)$ and σ_i is known as the SD of the change in the nominal interest rate $\left[\Delta i_t\right]$.

3.3 Kaminsky et al. (1998)

The exchange market pressure index of Kaminsky et al. (1998) [$EMP_{K,t}$] is expressed as follows:

$$EMP_{K,t} = \frac{\Delta e_t}{e_t} - \frac{\sigma_e}{\sigma_r}\left(\frac{\Delta r_t}{r_t}\right) + \frac{\sigma_e}{\sigma_i}\left(\Delta i_t\right) \quad (12)$$

where e_t is again the unit of country currency per U.S dollar in period of *t*; r_t the international reserves in period *t*; i_t domestic interest rate in period *t*; σ_e is the SD of the rate of change in exchange rate $\left(\frac{\Delta e_t}{e_t}\right)$; σ_r the SD of the rate of change in reserves $\left(\frac{\Delta r_t}{r_t}\right)$ and σ_i is known as the SD of the change in the nominal interest rate $\left[\Delta i_t\right]$.

Evidently, Eichengreen et al. (1996), Sachs et al. (1996) and Kaminsky et al. (1998) have proposed different computations of EMP index as shown in equations (10 – 12) where they have different precision weights scheme. First, Eichengreen et al. (1996) uses the inverse of each component's variance as the corresponding weights to equalize the volatilities since the volatilities of reserves, exchange rates and interest differentials are very different which helps to prevent any one of the components from dominating the index. Furthermore, if a component has higher variance a lower weight would be assigned to it and vice-versa. Second, Sachs et al. (1996) calculated each weight in the EMP index with respect to standard deviations of all components included instead of using only standard deviation of the respective component to avoid the dominance of the most volatile variable. Third, Kaminsky et al. (1998) modified the original model by Eichengreen et al. (1996) where the interest rate differential is rather replace by relevant interest rate in the country analyzed. Moreover, the weights on the reserves and interest rate terms are the ratio of the standard error of the percentage change of the exchange rate over the standard error of the percentage change of reserves and the interest rate differential respectively (Stavarek, 2007).

It is clear that Eichengreen et al. (1996), Sachs et al. (1996) and Kaminsky et al. (1998) do not apply equal weights in constructing EMP index. According to Li et al. (2006), it would be incorrect to impose the same weights in measuring the EMP index since each country has different economy structure and different sensitivities of exchange rate changes with respect to interest rate and reserve changes. In this sense, the concern raise in the literature would be minimized.

3.4 Data Source

All the variables are monthly data (in millions of US dollar) obtained from *International Financial Statistics* (IFS) of the International Monetary Fund (IMF) and the US is used as our foreign counterpart.

4. Empirical Results

Figure 1 shows the arrays of EMP measurements plotted for the Indochina countries. There are few annotations which worth to be highlighted especially during the crises period for each study.

4.1 Cambodia

Figure 1.1, 1.2 and 1.3 displayed an extreme and wobbly fluctuation of EMP during the period from 1994 and 1995 where during the third quarter of 1994; the EMP indices were under serious buying pressures which later were altered by high selling pressure after entering the first quarter of 1995. Despite that, EMP indices were mostly under negative level which signpost that Cambodia riel was appreciating against dollar, low inflation rate and large reserves. This was endorsed by the success of the political and economic reform undergone by the government in the late 1993 after the Cambodian government realize the importance of refurbishing economic growth and financial stability after experiencing the legacy of war and wreckage.

Besides that, there was a sudden increase in EMP indices in mid-1997, for instance Figure 1.1 shows that EMP indices rose from 0.3 percent in July 1997 to 5 percent in October 1997. This was caused by the awake of regional crisis and political unrest chaos (upheaval of Cambodia's first prime minister) initiated the globule in country's currency and investment flows. However, the Cambodian riel fell less precipitously than other Asian currencies because of the extensive dollarization of the Cambodian economy. In 1999 after the formation of a second coalition government, the government enforced several fiscal measurements in helping to boost the government revenue, one of the measurements were called value-added tax (VAT) which were designed to tax imported products (Sok et al., 2001).

As for global financial crisis, only Figure 1.1 display much obvious hike and magnitude of EMP indices during the crisis period while Figure 1.2 and 1.3 remained in much firm volatility. Looking at the illustrated EMP indices in Figure 1.1, the global financial crisis spill over effects finally took place when the EMP experienced a sudden rise of 6 percent in third

quarter of 2009. Cambodia economy is practically vulnerable to the crisis's external shock since the United States market is Cambodia's main exporter in garment exports. Besides that, the slowdown in Cambodia economic activities in 2009 was also caused by the sudden hike of inflation rate in mid-2009. Due to the deterioration in Cambodia's macroeconomic performance in 2009, Cambodia government turn to fiscal and monetary policies to warrant the country's financial solidity. In facing the counterattack of the subprime crisis, the government enforced their first fiscal policy by increasing the country's public spending on infrastructure, agricultural, transportation and social safety nets.

Figure 1: Trends of the EMP indices

CAMBODIA	LAO PDR
Figure 1.1: Eichengreen et al. (1996)	**Figure 1.4: Eichengreen et al. (1996)**

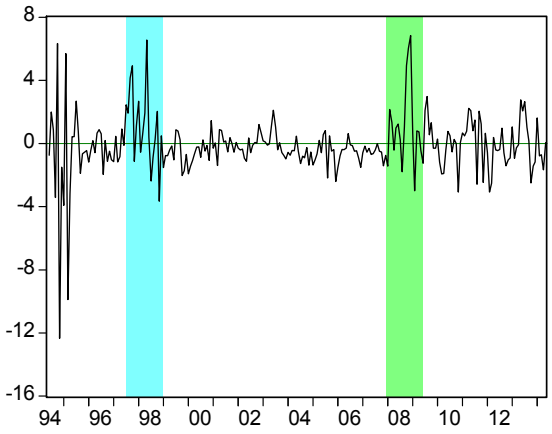
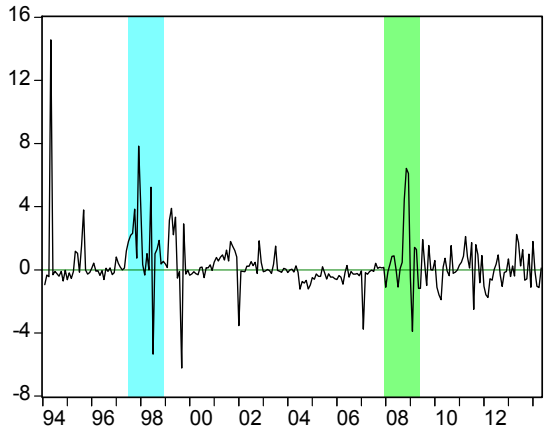

	

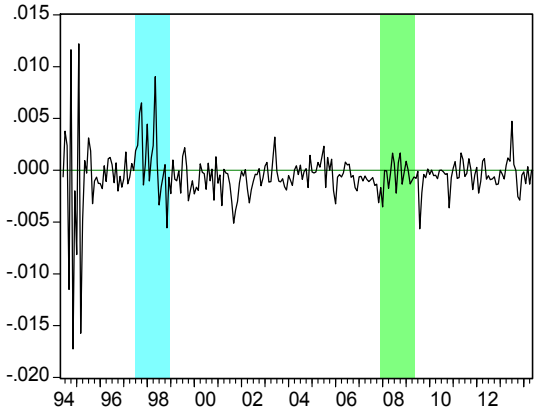
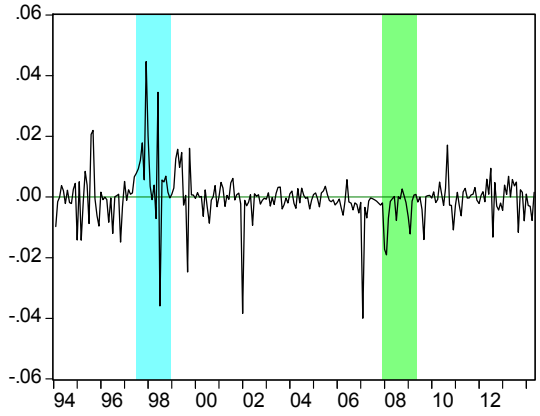
Figure 1.2: Sachs et al. (1996)	**Figure 1.5: Sachs et al. (1996)**
	

Figure 1.3: Kaminsky et al. (1998)

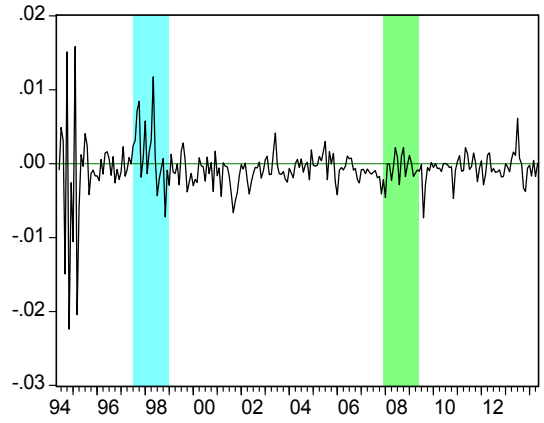
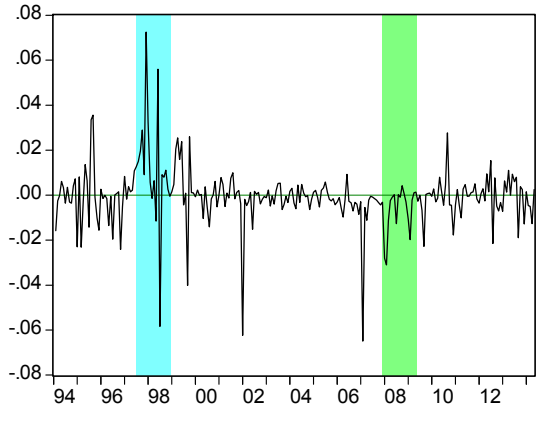


Figure 1.6: Kaminsky et al. (1998)



Note: indicates the period of Asian financial crisis while indicates the period of Subprime crisis.

4.2 Lao People's Democratic Republic (PDR)

Looking at Lao's EMP indices, the figures show that the country was experiencing intense positive EMP indices during 1997 Asian crisis period despite there were reports that claimed Laos was not badly affected by the financial crisis as compared to bigger Asian economies. Through the EMP illustrations, it clearly shown that Lao PDR was vulnerably affected by the crisis since Lao Kip was rocked by the exchange rate volatility due to its close link to the Thai Baht where the domestic currency lost 70 percent of its value against the dollar between July 1997 and June 1998 (Okonko-Iweala et al., 1999). In addition, the country couldn't entirely escape from the economic downturn due to its weak currency and high inflation since Lao PDR was heavily relied on the region for export market and having large foreign savings which led to massive outflow in foreign investment and banking system. By the end of 1998, the government managed to temper the regional financial crisis impact through major domestic policies response to stabilise the economy.

Besides that, Figure 1.4 shows that in the late 2008 Lao PDR was experiencing high selling pressure. This was attributed by the effects of fuel and price crisis that happened in 2008 which later followed by the impact of global financial crisis. As compared to Asian financial crisis, Lao PDR weathered the global financial crisis quickly since the country's export was in great shape which helps the country to recover quickly.

Figure 1: (Continued)

MYANMAR	VIETNAM
Figure 1.7 Eichengreen et al. (1996)	**Figure 1.10: Eichengreen et al. (1996)**

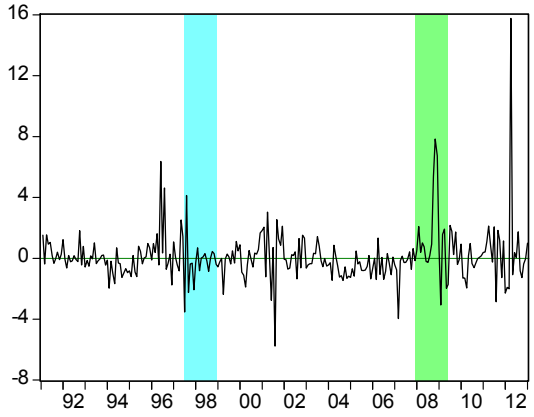
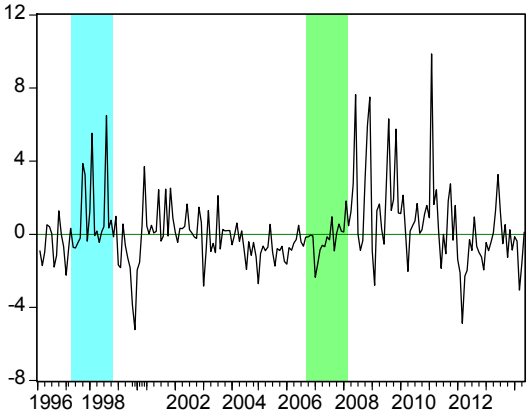

	

Figure 1.8: Sachs et al. (1996)	**Figure 1.11: Sachs et al. (1996)**

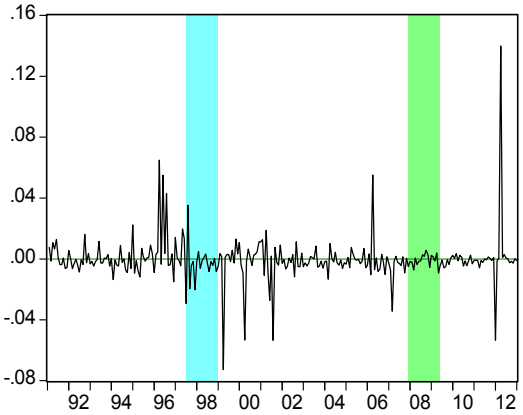
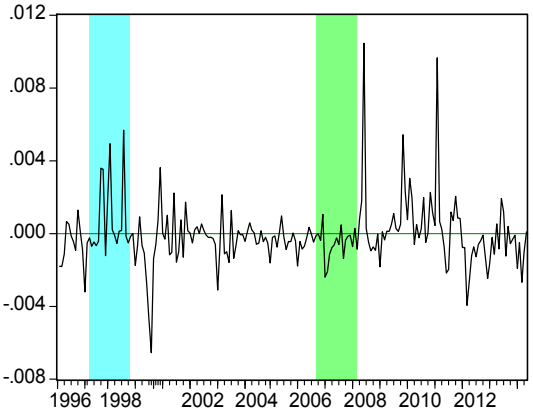
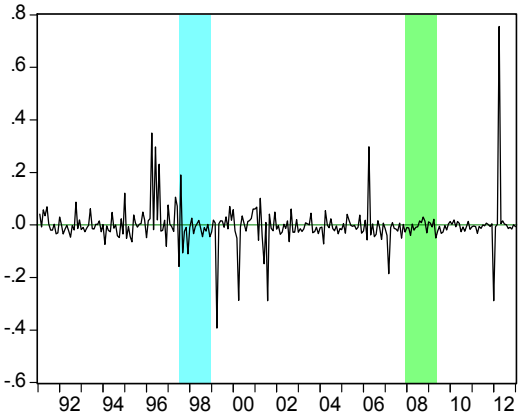
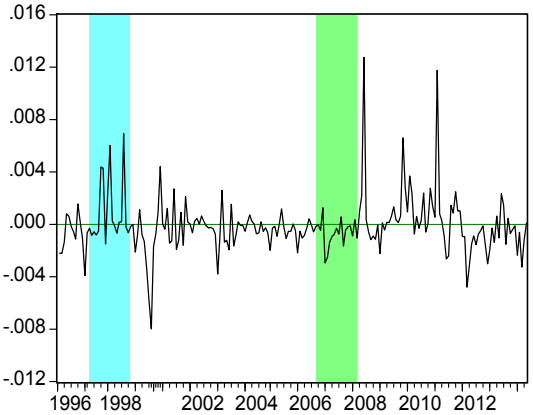

	

Figure 1.9: Kaminsky et al. (1998)	**Figure 1.12: Kaminsky et al. (1998)**
	

Note: indicates the period of Asian financial crisis while indicates the period of Subprime crisis.

4.3 Myanmar

Following the meltdown of the Thai Baht in June 1997, most of the Asian exchange rate fell into instant depreciation which led to a surge in inflations, slowdown in economic growth and financial market instability. Unexpectedly, Myanmar was one of the few that received limited impact of the crisis which reflected in Figure 1.7, 1.8 and 1.9 as the figures display a much stable and manageable volatility of EMP compared to the rest of Indochina countries during the regional financial crisis. This was attributed by the adoption of new administrative measures to reduce the demand of foreign exchange, including a tightening of import controls and revocation of the foreign exchange licenses of private banks (see more, Gordon et al., 1999).

However, in 2008 Figure 1.7 pointed out the country was suffering from intense currency depreciation, high interest rate and low reserves as the EMP reached the peak of nearly 8 percent in the early 2009. This was caused by external shock of the economic, political, food and environment (Cyclone Nargis)crisis that occurred in 2008. In addition, Figure 1.7, 1.8 and 1.9 show similarities where EMP was making a large fluctuation as it reached at its highest peak in 2012 due to pre and after effects of intense national elections that result a drastic and biggest currency reformation done by the President, Thein Sien where he demolished the 35 years of fixed exchange rate with a managed float regime in order to strengthen Kyat and weaken the grip of black market.

4.4 Vietnam

Figures 1.10 – 1.12 also revealed that, Vietnam was affected by the regional financial crisis in 1997 and 1998 when EMP indices were facing severe selling pressure (dong was depreciating and less competitive) especially in 1998[3] since the crisis had weakened most Asian currencies which caused Vietnam's FDI and exchange reserves to reduce rapidly. Based on UNCTAD (1999) report, Vietnam's FDI dropped from US$ 2.95 billion in 1997 to US$1.90 billion in 1998. To curb the fluctuation of the currency and increase the country's FDI, The Vietnamese government immediately responded to the crisis through macro policy measures. In order to increase FDI inflows into Vietnam, the government came out with a regulation where the policy was drafted to remove a large number of restrictions on foreign investments and streamlining registration procedures. In 1999, the State Bank of Vietnam (SBV) reintroduced a narrow band mechanism to contain exchange rate market volatility and eliminate rapid exchange rate movements where the official Vietnamese dong rate is set by the SBV through a process which the official rate can move with the interbank market rate, but the interbank cannot deviate beyond a bad set around the official rate (Joiner, 2006).

[3] According to Kato (1999), the crisis impact on the Vietnamese dong was smaller compared to SEATE's currencies and was kept at the pre-crisis level throughout 1997, reflecting the fixed exchange rate system in Vietnam but it was devalued twice in 1998 by a total of 16 percent.

Through these macro interventions the EMP indices were on a manageable stage after 1999 (refer to Figures 1.10 – 1.12).

Nevertheless, the eruption of global crisis in 2007/2008 gave further external shock to Vietnam's economy in 2009. Before the global crisis, Vietnam's economy was already facing macroeconomic instability in 2007. According to Le (2009), the economy has been suffering from twin deficits (fiscal and trade deficit) and surging inflation where inflation has been in double digits since 2007 and peaking at 28.32 percent in August 2008, the fiscal deficit accounted for 4.5 to 5 percent of GDP in 2008 while trade deficit reached US$17.5 billion (or over 20 percent of GDP), a level that signals vulnerability to a sudden drop in external demand.

The crisis' external shocks had caused the country's public investment and exportsdemand to drop significantly. As for the impact on exchange rate, the Vietnamese dong against US dollar was significantly depreciating during the second half of 2008 was caused by the widening current account deficit and rapid inflation plus the stock market slump (Pham, 2009). Hence, Figure 1.10 shows that during the second quarter of 2008 EMP indices were under pressure of depreciating. Besides that, another reason behind the hike of EMP was because the SBV had increased the benchmark interest rate on Vietnamese dong three times in the first half of 2008, boosting benchmark rate from 8.25 percent to 14 percent per annum on 11 June 2008 (Le, 2009). Later, EMP indices decreased immediately in reaching negative level when it entered the last quarter of 2008 that showed the Vietnamese dong was appreciating. This was attributed by the SBV fiscal and monetary policy responses (Government's Resolution No. 10/2008/NQ-CP) to control inflation and currency from deteriorating further, to stabilize the economy and achieve sustainable growth.

However, Figure 1 illustrated another downward pressure occurred on Vietnamese dong from the third quarter of 2009 until 2010 where the EMP indices were relatively high and volatile and later reached the highest peak of selling pressure on December 2010. There are two causes behind these sudden shocks. The first reason was, the monetary authority had devalued the dong in November 2009 and February and August 2010, amid concern the nation will run short on foreign capital needed to fund a trade deficit, which reached $1 billion in January, according to preliminary government figures (Bloomberg 2011). Secondly, the highest peak of EMP indices by the end of 2010 was because Vietnam's economy (trade and capital flows) was deeply affected by the Euro crisis since European countries are Vietnam's main economic partner.

The Euro debt crisis had strong effects on FDI flows to Vietnam where the share of European FDI in Vietnam decreased from 18 percent of total registered FDI in Vietnam in 2009 (US$21.48 billion) to 11 percent of total (US$14.7 billion) in 2011 (Mai, 2012).

5. Conclusion

In this paper, we construct the EMP index and used to trace the presence of extreme market pressures for the selected Indochina economies with the emphasis of the economic crises. The inference drawn from the three different index models confirm several signals of EMP especially around crises periods. Also, one could observe Cambodia and Vietnam's quick recovery from these crises identified which characterized through its appropriate policy responses during the turbulent times. Our findings confirm that EMP index is an effective signaling tool due to its ability in models and tracing crisis symptoms. This would be useful for government to make effective pre-emptive measurements. Looking ahead, managing and understanding the intensity of exchange rate volatilities is indeed an important national agenda.

Acknowledgement: The authors gratefully acknowledges financial support from Universiti Malaysia Sarawak (UNIMAS) Geran Penyelidikan Khas (Top Down) 03(TD04)/1054/2013(02). The usual disclaimer regarding errors and omissions applies.

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