



CHAPTER 2 LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Literature Review

As mentioned, the long-run consistency between fiscal, monetary and exchange rate policies is required as the most crucial condition for the survival of a fixed exchange rate regime, therefore, over the past ten years there have been many literatures¹ focusing on the consequences of incompatible macroeconomic policies on the viability of the exchange rate regime by studying the effects on balance of payments in short-and long- run. Most of the studies concentrate on a small open economy in which economic agents can forecast the future decisions which will be done by policymakers. In fact, there is not much theoretical attention for balance of payments crises, however, there are some features which are common to many crises.

By apparent evidence, Paul Krugman (1979) is the first person who analysed about BoP crisis. The study, established by Krugman, refers to the circumstances which alter a balance of payments problem to the crisis. An accordance with his statement on A Model of Balance-of-Payments Crises, published in Journal of Money, Credit and Bank, Vol. 11. no. 3 (August 1979), BoP Problem is a situation when a country is gradually losing international reserves whereas the crisis is defined as a situation in which speculators attack the currency.

In Krugman's analysis, it indicates that under a fixed exchange rate regime, the excessive domestic credit creation, leading money supply overwhelms its demand, causes the occurrence of a sudden speculative attack against the currency and ultimately drives the abolishment of the fixed rate regime and adoption of a flexible exchange rate regime. He detailed the process of transformation to BoP crisis that; The negative external balance will rise up demand for

¹ Other literatures are briefly stated in "Macroeconomic Policy, Speculative Attacks, and Balance of Payments Crisis". [Speculative_Attacks_Balance_of_Payments_Crises](#) Chapter 8, 224-47 -

foreign currency to pay off the debt. Under the operation to peg the exchange rate by buying or selling foreign currency, the excessive expansion of domestic credit over the growth of domestic money demand regularly causes gradual decrease in the international reserves. While the reserves will have been depleted, the speculators will rapidly alter domestic currency to acquire foreign currency since they can anticipate the collapse of fixed rate in very nearby future. This eliminates the last proportion of reserves, then the government will have not enough reserves to stabilize the exchange rate and end the fixed exchange rate.

Krugman established nonlinear model to express the BoP crisis by studying the collapse of the fixed exchange rate, caused by speculative attack. In Krugman's point of view, a speculative attack on the international reserves is a process when investors alter the possession of their portfolios by which they acquire more foreign currency and reduce the proportion of domestic currency. The change in the composition of their portfolios depends on the change in yields, receiving when the government is no longer capable to maintain the pegged rate.

His model involves many crucial assumptions which are : This analysis is dealing with a small country producing a single composite tradable goods, and also holding purchasing power parity, then, the price of goods will set on the world market. The foreign price is fixed (unity), implied that exchange rate can be identified by the domestic price level, then the expected rate of inflation also means as the expected rate of depreciation which is assumed as exogeneous variables. Furthermore, the government is supposed to peg exchange rate by direct intervention through foreign exchange market, however, there are some constraints in pegging the rate.

In addition, the economy, existing in this model, is assumed to have fully flexible prices and wages, insuring that output always attain at the full employment. In assets market, there will be two available choices between domestic and foreign monies, both bear zero nominal interest rate. In equilibrium, domestic residents are willing to hold only

the stock of domestic money which are proportional to wealth. The total real wealth of domestic resident includes the real value of their holding of domestic money and foreign money while foreigners can not hold domestic money.

Although Krugman's analysis is able to describes the reasons why the fixed exchange rate abandonment caused by the speculative attack, due to a simplified macroeconomic model with too many assumptions employing in this model, factors, triggering a BoP crisis are incompletely analysed. Moreover, the nonlinear model is incapacity to find the solution for the time of collapse.

The later work had been done by Robert P. Flood and Peter M. Garber (1984). Both of them tried to further study, regarding to the situations in which a fixed exchange rate regime collapse. Flood and Garber indicated two situations causing the collapse of the fixed exchange rate. First is the cumulating of many small events that causes a predictable collapse of the fixed rate and the second is an unpredictable disturbance, leading to unpredictable collapse. There are two models, devised by Flood and Garber. In their studies, the original Krugman's assumption- there are only two available assets which are domestic and foreign money- was relaxed. The available assets to domestic residents in their assumption also include domestic and foreign bond, which are perfect substitutes. The government holds stock of foreign currencies to stabilize the exchange rate. The private domestic residents do not hold foreign currency since it yields no monetary services to domestic residents. Furthermore, Flood and Garber employed the concept of a shadow floating exchange rate which much more extend this model to the stochastic environments.

Flood and Garber's first simple linear model was established, aiming to analyse solution for the collapse time, under the most crucial assumption-perfect foresight. People can anticipate the collapse time. This model is able to calculate for the exact time of collapsing and the international reserves. Garber and Blanco found that apart from market fundamental, the arbitrary speculative behavior also causes the collapse of a fixed exchange rate.

As intimated earlier, the agent is supposed to know the collapse time of the fixed exchange rate, the expected rate of change of the exchange rate is always zero before the collapse of the regime. In empirical fact, the forward exchange rate, however, should be greater than the fixed rate. Flood and Garber stated an example, on “Collapsing Exchange Rate Regimes: some linear examples”, *Journal of International Economics*, volume 17, showing the weak point of their first model that “under perfect foresight, a fixed exchange rate regime can collapse without ever producing a forward discount on the collapsing currency. In a stochastic model with a random collapse time, agents behavior will produce a forward discount on a weak currency even when the exchange rate remains fixed.” This fact causes the model is not appropriate to analyse the empirical phenomenon.

Thus in their second model, uncertainty has been introduced to a discrete time model to consider the forward exchange rate for a weak currency which may undergo collapsing of the fixed regime. In this model, it bears an endogeneous probability distribution over the collapse time and also calculates a forward discount rate. This model concerns about the stochastic market fundamentals, forcing the regime collapses and supposes that agents are unforeseeable the collapse time. These led the collapse of the regime becomes random which can not be determined explicitly. Moreover, there will be a nonzero probability of the next period speculative attack, which can assist producing a forward discount of the local currency.

After this original Krugman-Flood-Garber perception, there have been many extended versions, concerning in various ways. There is a task, done by Heminio Blanco and Peter M. Garber (1986) which is also one of those versions. Blanco and Garber considered that after the regime collapse, central bank will produce the new fixed exchange rate which will be greater (devalued) than the previous rate. Garber and Blanco also built the cumulative distribution function of the probability of devaluation, aiming to predict the timing and magnitude of devaluation, forced by the speculative attack on the fixed exchange rate regime. Garber and Blanco believed that fixing exchange rate can be

done through controlling a nominal price. A government, thus, can maintain exchange rate by controlling money in the economy which they concern only the behavior of domestic credit. Therefore the recurrent devaluation implies that exchange rate stabilizing is not the primary goal of the government. In addition, the exchange rate policy has been used as an implementary in order to achieve other goals. In this analyse, Garber and Blanco assumed that changes in money market as well as domestic credit lead to change in international reserves.

Blanco and Garber expressed that the regime would shift if either one of these two events happens. The first is when the reserves reach critical lower level and the second is when the fixed exchange rate is lower than the shadow floating exchange rate. After the fixed regime collapses, the central bank would establish the new rate which must be equal or greater than the previous rate in order to stop an increase in demand for foreign money. As a consequence, the probability of devaluations has been derived from the possibility that the new exchange rate in the next period exceeds the current rate. The unconditional exchange rate and conditional exchange rate are also calculated from the probability density. Blanco and Garber also investigated other factors that do not appear but share parts of role influence the regime collapse.

This model was used to examine the Mexican experience during 1973-1982 by producing time-series estimates of the one period a head probability of devaluation, the expected new exchange rate and the confidence interval of the new exchange rate. The results were satisfied since the devaluations did occur when the probabilities reached relatively high but the expected new exchange rates were not close to the rates that materized when devaluations mattered.

In addition, to visualize Thai Baht there has been a study, Exchange Rate Determination and Speculative Attack on the Baht, 1980-1984, by Vimut Vanichareontham. The thesis tries to explain determination for Thai Baht's value, according to monetary approach. The analysis also applied the model, established by Garber and Blanco, to consider the timing of the fixed exchange rate regime collapse, being

based on speculative behavior. There was a hypothesis that “the timing and magnitude of devaluation can be predicted by studying agents’ rational speculative behavior.”

The Monthly data was applied in this model. It lied on the time interval between 1980 and 1984 when Thailand underwent three devaluations which are May and July, 1981 and November, 1984. Due to the concept of this model, the next period devaluation will occur in the situation in which the expected exchange rate for the next period is larger than the current fixed exchange rate. The expected exchange rate is calculated from the movement of the money supply, interest rate, real income, the expectation on the rate of exchange in the future.

As the result, the expected rates had been below the official rate until July, 1981. At the period of the second devaluation, the conditional expected rate did exceed the fixed rate. Since October, 1983, Baht was observed as it was overvalued, and such trend continued until the end of 1984. However, Vimut suggested to formulate the critical level of the international reserves as a function of other pre-determined variables e.g. exports or imports, instead of a constant level of critical reserves. The results of this thesis will be detailed in Chapter 4.

Conceptual Framework²

To simplify the understanding about the model establishment and its related concepts, this section is willing to provide the basic knowledge and some crucial concepts, applied in this study.

1.Exchange Rate Regimes

“Exchange rate” can be easily expressed as the price of foreign currency in terms of domestic currency. Actually, there have been a

² Concepts mainly refer to :

1. Krugman Paul and Obstfeld Maurice. *International Economics, theory and Finance*. 3d ed. Harper Collins College 1994
2. Rvenibatz, Francisco L. and Luis A. *International Finance and Open Economy*. *via* *ueconomics*.

variety of exchange rate regimes in the world. It is not only fixed, floating and hybrid exchange rate but also something which is more complicated. However, there are two extremely cases, which can be divided into freely floating exchange rate and fixed exchange rate.

A free-floating exchange rate is one of the extreme cases of the exchange rate regime, existing when the exchange rates are determined fully by the mechanism of demand and supply of domestic currency by private agents. In this system, government will not intervene through the foreign exchange markets. Thus, changes in the private demand and supply of foreign currencies act as the most essential factor that alter exchange rates but not change the level of international reserves.

Under a fixed (or pegged) exchange rate regime, the government, mostly by the central bank, have to intervene through the foreign exchange markets in order to stabilize the exchange rate within boundaries. To maintain the exchange rate within prescribed limit, the central bank will do foreign exchange operations, then, the central bank will have to hold sufficient inventories of foreign reserves to supply in the exchange market, preventing domestic currency from depreciation or appreciation. Sometimes the government must demand for foreign exchange to avoid the appreciation of domestic currency. Changes in the demand and supply of foreign currencies will, then, affect the level of the international reserves.

Moreover, there is another regime, placing between both extreme regimes. It is a controlled, or managed floating exchange rate system which will exist whenever the governments intervene through foreign exchange markets to determine the appropriate exchange rate but they do not commit themselves to maintain a fixed exchange rate. In this system, the exchange rate depends on central bank intervention, changes in the private demand and supply of foreign money, associating with changes in international reserves.

As mentioned, the exchange rate is defined as the price of foreign currency. Under a freely floating or managed-floating system, the domestic currency will depreciate (appreciate) if the price of

foreign exchange increases (decreases). While, under a fixed exchange rate regime, the domestic currency have suffered a devaluation (revaluation) whenever the central bank increases (decreases) the exchange rate,

Although Thai Baht and Mexican Peso are classified to be the managed floating exchange rate, characteristics of them are rather similar to the fixed exchange rate regime. Thai Baht has been pegged with basket of six currencies from the major trade partners - US, UK, German, Japan, Singapore and Hong Kong³. The official rate, sometimes called the mid rate, has been set daily in the morning by the central bank and floated in the foreign exchange rate market during the day according to market demand and supply and intervention of the central bank through the foreign exchange market. Recently, Bank of Thailand sells and buys Baht to the commercial banks at, respectively more and less two satang from the mid rate. But for others private agents, the deviation from the mid rate depends on types of customers.

Theoretically, in order to defend exchange rate at the satisfied mid rate, the government has to do the interventions, which appear in varied approaches. e.g. The government may directly intervene through the foreign exchange market; if demand for foreign currency is larger than its supply, the central bank has to supply foreign currency into the foreign exchange market. If not, it will lead to the depreciation of domestic currency because of an increase in the price of foreign currency. On the contradiction, if demand for foreign currency is less than its supply, the central bank has to collect foreign currency to prevent the domestic currency appreciating against the foreign currency.

In practising, there are, however, some indirect approaches, aim to stop demand for foreign currency such as by controlling the activities of the commercial banks in currencies trading. One of those is done through the repurchase market, in the sense that to eliminate the

³ Bank of Thailand does not disclose the information about foreign currencies in the basket but these six currencies are normally expected by the researchers

speculative efforts in trading currency by the commercial banks when the domestic currency tends to depreciate, the central bank will set high repurchasing rate in order to refrain bonds selling. Once the domestic currency tends to appreciate, the central bank will set the lower repurchasing rate to rise domestic money supply in the economy.

As regarding Mexican currency, the new Peso has been pegged with US dollar to maintain competitiveness as US. is the most important trade partner of Mexico. Therefore, the fixed Peso has to be often adjusted according to inflation differences between US. and Mexico. Moreover the central bank of Mexico has to intervene continually because Mexico formally accepted the obligations of Article VIII, section 2, 3 and 4 of the Fund Agreement since November 12, 1946. There is no limit to apply on access of ownership or transfer to foreign currencies so the external value is determined on the basis of supply and demand conditions whereas the official value is still pegged with US currency.

2. Short-Run and Full Equilibrium Under Fixed Exchange Rates

For simplicity, the following discussion is supposed to matter in an open small economy with fixed exchange rate regime. To visualize more clearly the process of a fixed exchange rate abandonment, this section will begin with discussion on the determination of the equilibrium in the goods and assets markets.

First, the equilibrium in the goods market is conditioned on the equality between the output of domestic goods, Y , and the aggregate demand for domestic goods, which is considered as the sum of absorption, A , and the trade balance, T . Therefore, in equilibrium.

$$Y = A + T \quad \text{-----2.1}$$

The absorption, A , consists of consumption, investment and government expenditure, represented by

$$A = C + I + \bar{G}$$

$$\begin{aligned} \bar{C} &= C_0 + aY + I_0 - bi + \bar{G} \\ &= \bar{A} + aY - bi \end{aligned} \quad \text{-----2.2}$$

when the sum of C_0 , I_0 and \bar{G} is represented by \bar{A} , autonomous absorption which does not depend on neither income nor interest rates, but depends on the government expenditures, the autonomous investment and the autonomous consumption. Investment is assumed to depend on the level of interest rate while consumption is influenced by income. The influence of income on absorption is related to the impact of additional income on consumption expenditures, showing by the marginal propensity to consume (MPC), a which $a \geq 0$. The responsiveness of absorption to the interest rate is corresponding to the responsiveness of investment to the interest rate, which is b when $b \geq 0$.

Trade balance, another combination of Y , is denoted by

$$T = \bar{T} - mY + \Phi q \quad \text{-----2.3}$$

\bar{T} is a component of the trade balance that does not depend on income and real exchange rate, named the autonomous trade balance. q is the real exchange rate, $q = (eP^*/P)$, shows the particular effects of real exchange rates on the trade balance (positive on the assumption that the Marshall - Lerner Condition⁴ is satisfied) and m is the marginal propensity to import. m and Φ are assumed to be nonnegative.

Thus,

$$Y = \bar{A} + aY - bi + \bar{T} - mY + \Phi q, \quad \text{-----2.4}$$

Solving, then yields

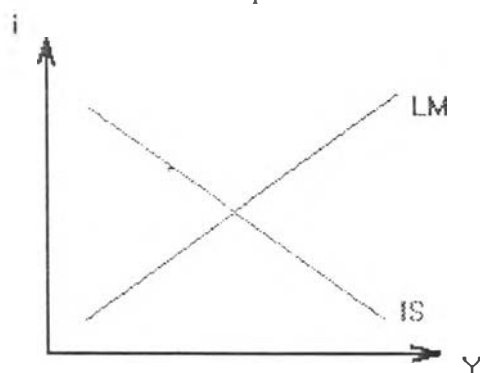
⁴ The Marshall-Lerner condition states that a domestic currency depreciation does not necessarily improve the trade balance. The less responsive exports and imports are to changes in the real exchange rate, the less likely that a currency depreciation will improve the balance of trade; on the other hand, if exports and imports are very sensitive to shift in real exchange rate, then the trade balance will improve. In a Keynesian context, if the sum of the price elasticities of demand for exports and imports is greater than 1, a currency depreciation will improve the trade balance. (From Riverabatiz, Francisco L. and Luis A., International Finance and Open Economy Macroeconomics)

$$Y = \alpha(\bar{A} + \bar{T} - bi + \Phi q) \quad \text{-----2.5}$$

$$\text{where } \alpha = 1/(s + m)$$

The equilibrium in goods market can be expressed by the IS curve as shown in Figure 2.1. Note that there are many variables, including changes in real exchange rate that shift the IS curve. For instance, if Marshall-Lerner condition holds, the devaluation will advance aggregate demand toward domestic goods by increasing price of foreign goods relatively to domestic goods. In the fixed exchange rate regime, if domestic (P) and foreign (P^*) price are exogeneously given, the real exchange rate, q , will be influenced by the control of domestic policy-makers, by mean that a domestic currency devaluation will be associated with an increase in real exchange rate while a domestic currency revaluation will be linked to a real exchange rate decrease.

Figure 2.1 Short-Run Equilibrium in the Goods and Assets Markets



Then, come up to the second equilibrium. According to Walras's law, the assets market equilibrium can be represented by money market equilibrium, which occurs when the demand for money and the money supply, are equal, stated in equation 2.6.

$$\frac{M_0}{P} = L^D(i, Y) = kY - hi \quad \text{-----2.6}$$

M_0 equal to the money supply given at any moment in time, P is the fixed price of domestic goods and $L^D(i, Y)$ represents the money demand function, k and h denote the responsiveness of money demand

to income (Y) and interest rate (i). This money market equilibrium is showed by the upward-sloping LM curve in Figure 2.1.

The LM curve represents the combinations of income and domestic interest rate that cause the money market clear while the level of the money supply is given. Changes in the money supply therefore will shift the LM curve. Because under the fixed exchange rates, the money supply is an endogeneous variable, resulting of the situation of balance of payments, the LM curve will also shift in response to the BoP.

In conclusion, points along the IS curve represent different alternatives pairs of income and interest rate, consisting with goods market equilibrium, whereas points of income and interest rate along LM curve represent the assets market equilibrium condition.

Up to this point, the equilibrium of income and interest rate can be selected from the intersection of IS-LM curve, it is one of those pairs which represents the equilibrium in internal economy, so called short-run equilibrium. Short-run equilibrium is held when the equilibrium in both the money and the goods markets are in simultaniety.

It is , however, opened economy, the external balance is the third equilibrium condition, actually represented by the balance of payments equilibrium. For convenience, the BoP(B) is assumed to equal to the sum of the trade balance and capital accounts, is then given by

$$\begin{aligned} B &= T + K \\ &= T(q, Y) + K(i - i^*) \end{aligned} \quad \text{-----2.7}$$

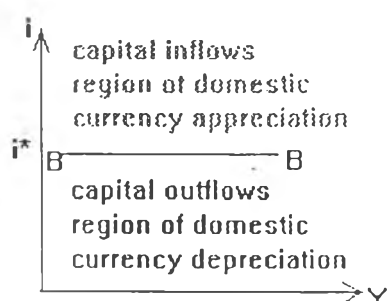
where trade balance (T) is a function of the real exchange rate(q) and domestic income(Y). K represents the capital which will be positive when capital account surplus or net capital inflows and it will be a negative K when capital account deficit or net capital outflows.

The flows of capital are related to the difference between the domestic interest rate, i , and the world interest rate, i^* . i^* is an exogenous variable because the discussion concerns only in a small economy, where the domestic financial transactions can not affect the world interest rate. This causes the domestic interest rate to be the key variable determining the capital account.

Under perfect capital mobility, means the highly integration of capital markets, the domestic economy can borrow and lend unlimited amount at any time, it wants at the common world interest rate. Similarly, foreigners can freely lend and borrow in domestic capital markets at the domestic interest rate. Arbitrage between domestic and world capital markets then guarantees an alignment of domestic and world interest rate. On the other word, the perfect capital mobility condition introduces the constraint that balanced payment is obtained at the world interest rate.

Diagrammatically, under perfect capital mobility, the external balance lies horizontally along a BoP equilibrium curve, BB , at the world interest rate i^* , as shown in figure 2.2. In the economy with the fixed exchange rate regime, if the domestic interest rate is greater than the world interest rate, the capital will flow into the economy because investors can expect for more returns, conversely, if the world rate is larger than the domestic rate, the capital will automatically flow out. While under the flexible exchange rate regime, the higher domestic rate will attract more capital inflows, then, increase demand for domestic currency and finally lead to appreciation in the domestic currency whereas the lower domestic interest rate will cause domestic currency depreciation.

Figure 2.2 Capital Flows and Balance of Payments Equilibrium

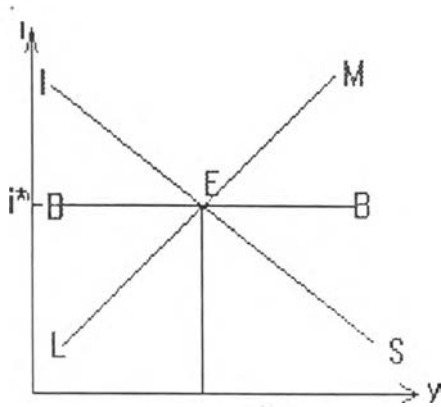


As mentioned before, short-run equilibrium; internal balance, occurs when both the goods and money markets are in equilibrium, on the given money supply. The economy's balance of payments situation⁵, thus, affects short-run equilibrium by changing the money supply.

The economy will achieve full equilibrium when money supply will be fully adjusted and will stop changing when external payments are balanced, occurring at the intersection point of the IS, LM, and BB curves, shown in figure 2.3. This means that under perfect capital mobility the equilibrium of the economy arises when there is simultaneous in short-run equilibrium and the balance of payments. In Figure 2.3 the full equilibrium of the economy occurs at E where an equilibrium domestic output equals to \bar{Y} and domestic interest rate equals to world rate. This point of equilibrium is completely specified by the money market equilibrium condition.

⁵ For the same understanding, when economists talk about a BoP surplus or deficit they usually refer to if the sum of capital and current account, is surplus or deficit.

Figure 2.3: Determination of Equilibrium Output and Exchange rate



If an economy with perfect capital mobility employs freely floating exchange rate regime, the exchange rate will automatically adjust to eliminate the BoP surplus or deficit, which frequently emerge under the fixed exchange rates regime. For instance, if an economy has a BoP deficit, consequently, demand for foreign currency will rise to pay off debts. According to law of demand, the price of foreign currency will go up which means the depreciation of local currency. While the capital outflows will reduce money supply in the economy and induce a rise in cost of money, interest rate, respectively. As results, the depreciation of domestic currency will lower price of exports, encouraging the competitiveness of export goods and increase import price which will improve the current account in long run, according to J-curve⁶. Moreover, in short run, under situation of perfect

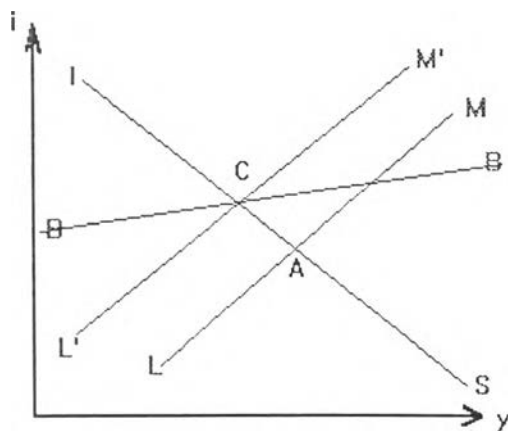
⁶ J-curve states that the Marshall-Lerner condition does not hold since the price elasticity of exports and imports are low. In long run, the lag effects of the change in exchange rate will improve BoP.

capital mobility, the increasing interest rate will attract the capital inflows as much as to offset the remaining debts.

An economy under fixed exchange rates regime with no government intervention certainly faces an automatic adjustment mechanism that tends to move the economy toward balanced payments (external balance). However, this adjustment process is different from of the flexible regime. Since it moves the economy towards the full equilibrium by adjusting the domestic money supply through the capital account. The adjustment, sometimes, leads to a temporary recession. Because the higher domestic interest rate will stagnate investment as well as the overall internal economy. However, BoP imbalance will be got rid. For example, in the same case of a BoP deficit, high domestic interest rate will stimulate capital inflows to bring the economy back to the equilibrium point after money supply fully adjusts.

To visualize clearly the case of Thailand, where the interest rate differential arises naturally, the study concerns only on high (imperfect) capital mobility.

Figure 2.4: The Short- Run and Full Equilibrium of the Economy with Imperfect Capital Mobility



In imperfect capital mobility economy, the domestic interest rate will not be constrained to equal to the world rate. A rise in domestic interest rate will attract capital inflows but not in massive amount as under perfect capital mobility. Likewise, a reduction in domestic interest rate generates capital outflows, but to a lesser degree than

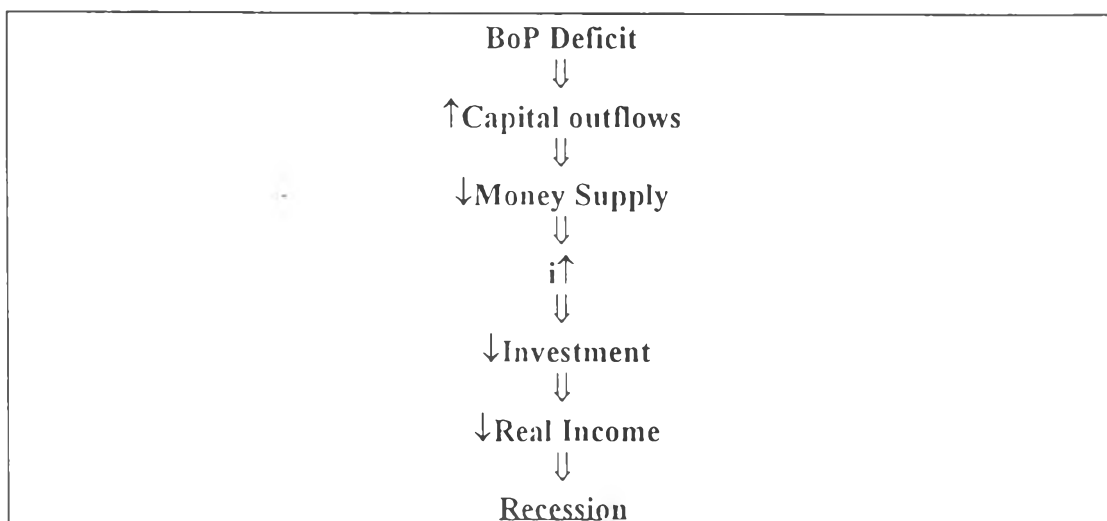
under perfect capital mobility. Then, BB curve will not lie parallel to axis x but will be positive, flat slope as demonstrated in figure 2.4.

Similarly, in economy with the flexible exchange rate, the BoP deficit results in capital outflows, which impacts both interest rate and exchange rate simultaneously. Although the higher domestic interest rate, resulting from a BoP deficit, will bring capital into the economy, it is not in such massive amounts as to require a return to the world interest rate. Furthermore the higher rate will stagnate the expansion of investment. However, in the long run, the deficit will be eliminated, due to the free floating exchange rate regime. The depreciation of domestic currency will enhance the competitiveness of export goods as well as deteriorate demand for imports, ultimately improve BoP.

Under a fixed exchange rate regime, the exchange rate cannot automatically exterminate the imbalanced payments without effects to internal balance as under the flexible regime. Thus, the central bank's actions in the foreign exchange market are corresponding to the BoP surplus or deficit. To visualize clearly, observing figure 2.4 by assuming that BoP deficits, the central bank must sell international reserves to the public, which induces the short-run equilibrium at point A move to the northwest, as the LM curve shifts to the left, in response to decrease in money base. Full equilibrium, the point which the deficit is eliminated, will occur at point C, where the IS and LM curves intersect. At point C, the domestic money supply will stop changing and the economy will attain the full equilibrium. On the other hand the process of adjustment towards full equilibrium involves increase in interest rates and decrease in income and imports which assists eliminating the trade deficit. As high capital mobility, the capital will flow in but not to such an extent as to require to sustain the economy at the original internal balance. Sometimes, the adjustment implies a protracted recession, which the government authorities find it is hard to handle. As a consequence, they prevent the operation of the automatic adjustment mechanism by sterilizing the influence of the BoP on the monetary base through the use of offsetting open-market operation. However, these sterilization operations will further the economy at a BoP disequilibrium and if the central bank does not have sufficient

foreign exchange reserves, the operation may be impossible to sustain over extended periods of time.

Chart 2.1 : Automatical Adjustment in the Economy with High Capital Mobility and the Fixed Exchange Rate Regime



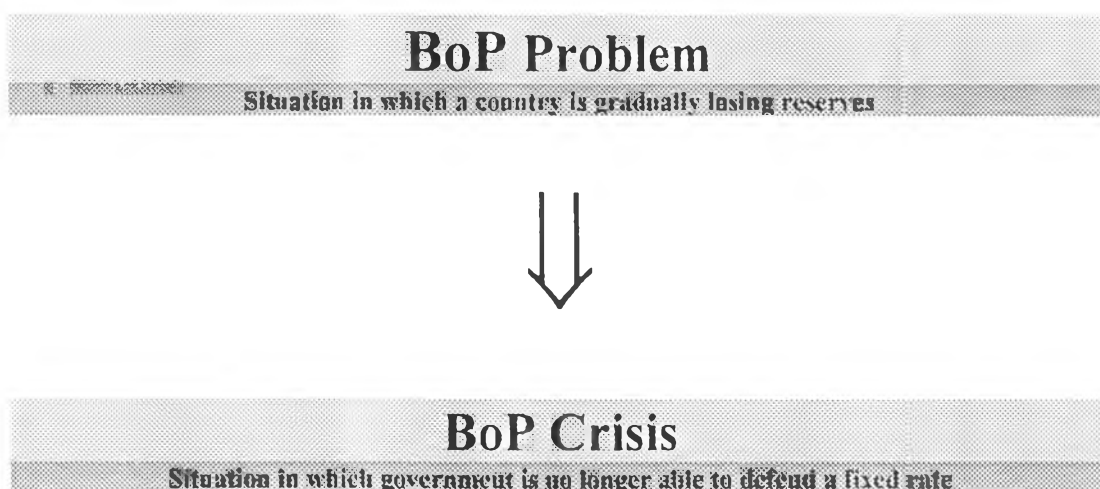
As long as the central bank does not intervene to maintain the disequilibrium in payments, a BoP deficit or surplus can only be temporary. If the central bank chooses to intervene market mechanism to prevent economic recession the external imbalance will be prolonged because if the central bank wants to sterilize the effects of the deficit on the monetary base, it has to increase domestic credit creation by exact the same amount, through purchasing bonds in the open market to offset a decrease in international reserves. The effects of sterilization operation can be illustrated graphically at Figure 2.4. The sterilization operations keep the economy at its short-run equilibrium at point A and prevent it from moving to its full equilibrium at point C. Since sterilizing the effects of the deficit on the monetary base effectively prevents any change in the domestic money supply. Therefore, the only way in which sterilization operations can be carried out over an extended period of time, in the presence of a persistent external payments disequilibrium, is that the central bank's holdings of international reserves and bonds are large enough.

3. BoP Crisis

As mentioned, if the economy faces a persistent payment deficit and the central bank chooses to sterilize by supplying the foreign exchange reserves, the payments deficit will be existed continually. Depletion of reserves, the central bank would either have to stop sterilizing or else abandon foreign exchange intervention in order to sustain the fixed exchange rate.

Excessive domestic credit growth, comparable to money demand growth, is the one reason of BoP crisis since it leads to a gradual loss of foreign exchange reserves and ultimately to an abandonment of the fixed exchange rate. Once people realize that central bank is incapable to defend the parity any longer, a sudden speculative attack against the currency will occur and force the collapse of the fixed exchange rate.

Chart 2.2 : BoP Problem and BoP crisis



The process of the transformation from to a balance of payments problem which is a situation when a country is gradually losing reserves, to a situation when speculators attack the currency, then the government is no longer to maintain fixed exchange rate, so called a balance of payments crisis, can be illustrated by Chart 2.3

Suppose BoP is deficit for a long time, the demand for foreign currency rises up in order to pay off the external debt. According to market mechanism, price for the foreign currency will rise. As long as

holding fixed exchange rate policy, the government has to intervene through the exchange market by supplying the foreign money.

Once the international reserves continually decrease, this destroys the confidence of people towards the domestic currency. Since private agents can predict that the fixed exchange rate will be relinquished very soon when there is insufficient reserves to intervene the foreign exchange market, sustaining the fixed rate. As a rational agent, then speculative attack will occur, at some point before reserves run out, by rapidly converting domestic currency to the central bank's foreign reserves stock. So this will eliminate the last portion of reserves and speed up the collapse of exchange rate since they can expect profit from the margin between post-collapse and pre-collapse exchange rates when they alter to domestic currency. The government can not stabilize exchange rate any longer and finally abandon the fixed exchange rate.

Chart 2.3 : Conditions : Fixed Exchange Rate

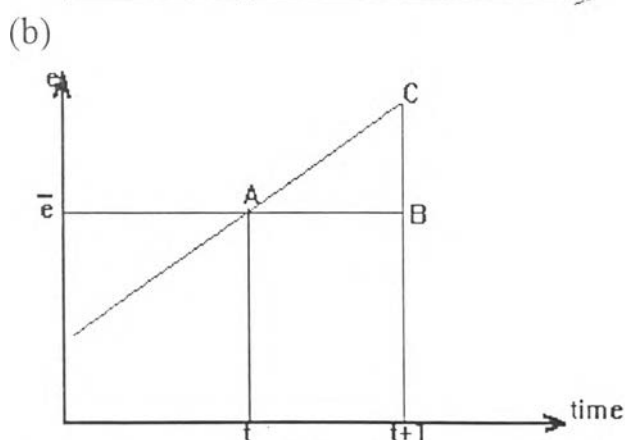
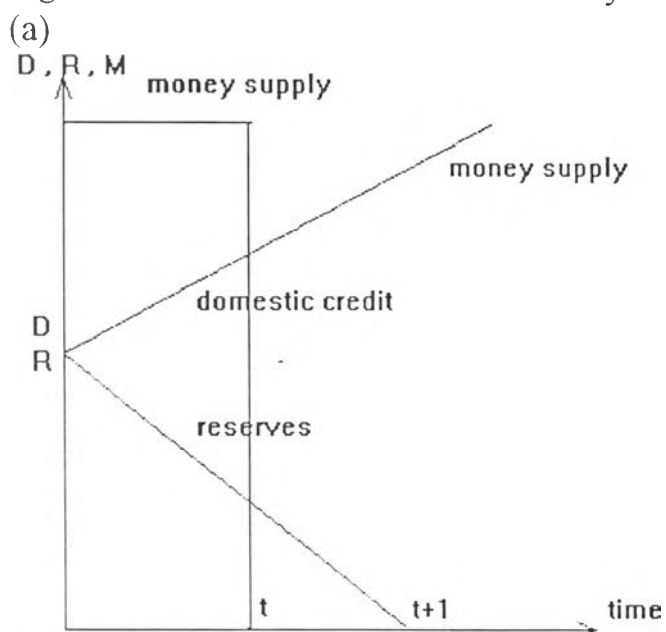


The figure 2.5(a) displays the movement of international reserves, R , domestic credit, D and the money stock, M , before and

after the shift of regime while the figure 2.5(b) demonstrates the behavior of the exchange rate. Before the fixed rate collapses at period $t+1$, despite that the money stock is constant, its composition varies since domestic credit rises and international reserves go down. At period t , before the regime changes, a sudden speculative attack starts because they can anticipate the profit margin. People alter domestic money to acquire foreign money. Capital begins to fly out. Both foreign reserves and the money stock fall at higher rate than the increase of domestic credit. Due to the lower level of reserves that trigger the regime shift, assuming to be zero, the money stock is equal to domestic credit in the post-collapse regime. The exchange rate is shown to remain constant at \bar{e} until the collapse occurs and will jump discretely since the central bank will establish the new exchange rate at point C, greater than the previous, at point B. With speculation, the transition occurs earlier, preventing a discrete change in the exchange rate from occurring. Speculators who foresee reserves running down to the critical level, avoid losses that will result from the discrete exchange rate change by attacking the currency at the point where the regime tends to collapse. Suppose, it moves along \bar{AC} .

Beneath various alternative post-collapse exchange rate regimes, which are suggested by actual experience, this paper, studying the collapsing experience of Thailand and Mexico, the central bank will devalue the currency. The new exchange rate, that is established by the central bank, is the function of stochastic state variables and unobservable, being visible only at devaluation time.

Figure 2.5 :The Process of Balance of Payments Crisis



4. Contents in Blanco-Garber Model

In the model, established by Herminio Blanco and Peter M. Garber, BoP crisis, referred to the collapse of the fixed exchange rate which occurs when either the shadow exchange rate exceeds the actual rate or the international reserves attains to the lower bound. Then, the government will establish the new exchange rate.

Concerning the viability of fixed exchange rate, it depends on relationship between the official fixed exchange rate and shadow exchange rate. It can be stated that if the shadow rate becomes more

depreciated than the fixed rate, or equivalently the reserves level attains the lower bound, the central bank will have to devalue. Since if the shadow rate exceeds the fixed rate, agents will be able to take profit from attacking the currency. According to the fixed exchange rate policy, the central bank will supply the reserves until they reach the lower bound. At that point the central bank will establish the new exchange rate which will provide an instantaneous capital gain to the speculators who attacked the reserves. Conversely, if the international reserves reach to their lower bound but an excess money supply of the domestic currency still remains at the current exchange rate, the policy maker can not avoid to devalue the domestic currency--setting the new exchange rate more depreciated (greater) than the current rate. The new exchange rate must be greater or equal to the shadow exchange rate, according to law of demand, the higher price of foreign currency will lower the demand for foreign currency. If not, it will cause the excess demand for reserves.

Formally, the time that BoP crisis begins is found at the point where the shadow floating rate, which reflects market fundamentals, is equal to the prevailing fixed rate. The shadow floating rate will move according to demand and supply of domestic currency and will be at the critical value, minimum viable exchange rate, when the foreign reserves reach its minimum level, then, the exchange rate regime is collapsed. If the shadow floating rate falls below the official fixed rate, the fixed rate regime will be viable since the speculators will not profit from purchasing the foreign money. Symmetrically, if shadow floating rate is above the fixed rate, speculators will undergo experience an instantaneous capital gain.

Since the shadow exchange rate is unobservable in actual time, thus, in this model, it is represented by the new exchange rate. Algebraically, the new exchange rate is represented by the permanent floating exchange rate (shadow exchange rate) plus some disturbance term that forces the regime collapse. It exists under the assumption that the new exchange rate should be greater than the exchange rate prevailing at collapse time in order to stop demand for foreign reserves.

Therefore, the new exchange rate implies the rate that people expect for the next period when the devaluation will be predicted. The movement of new exchange rate, in this model, is influenced by money market equilibrium in economy. If domestic money demand is less than its supply, excessive money supply will reduce domestic currency price or domestic currency depreciation, and conversely.

On the basis of the information available at the previous period, the probability of devaluation in this period can be simply expressed by the probability that the new exchange rate in this period exceeds the current fixed rate at previous period. As the new fixed rate, conditional on devaluation, is related to shadow floating exchange rate and disturbance that forces the regime collapse, more details will be further examined.