CHAPTER II

LITERATURE REVIEW

2.1 Definition of the Balance of Payments (BOP) and Exchange Rates

A balance of payments statement summarizes a country's economic transactions with all other countries during a particular time period, usually a year. There are two main parts of the BOP accounts namely the current account and the capital account. The current account of Malaysian BOP records payments for imports and exports of goods and services, plus unrequited transfers of money into and out of the country whereas the capital account records the transactions in external assets and liabilities. It consists of long-term capital flows, short-term private capital flows, and short-term capital flows associated with activity by the country's monetary authorities. Any receipts of money from abroad are regarded as credit items and are entered in the accounts with a positive sign. Any outflows of money from the country are debit items and are entered with a negative sign.

The foreign exchange rate is defined as the rate at which one currency trades for another on the foreign exchange market. It is simply the price of one currency in terms of another for example RM/US$ or alternatively US$/RM. The price can be viewed as a result of the interaction of the forces of supply and demand for the foreign currency in any particular period of time. The exchange rate will depreciate (appreciate) if the demand for domestic currency falls (rises) or the supply increases (decreases). These changes can be caused by changes in domestic prices or incomes relative to foreign ones, changes in domestic interest rates relative to foreign ones, changes in investment prospects at home compared with abroad, or the belief by speculators that the exchange rate will change.

As far as economic theory is concerned, there is a relationship between the BOP and the exchange rates with regards to a country's external balance or

external policy objectives. External objectives include such things as achieving BOP equilibrium, encouraging international trade and preventing excessive exchange rate fluctuations. Sometimes it is used more loosely to refer to merely to a total currency flow balance, which is where any current account deficit is matched by an identical capital account surplus and vice versa without the need for intervention from the reserves.

In other words external balance could be restored if the exchange rate were allowed to change according to its demand and supply of the currency. However conflict with so-called internal objectives may arise if for instance a falling exchange rate will increase the cost of imports that lead to higher inflation. A falling exchange rate would also help to boost exports but consequently result with a BOP surplus or BOP disequilibria as well as further increase in inflation. Hence in each case, the nature of the conflict faces by a country depends on the exchange rate regime adopted by a particular government of the country.

2.2 Monetary Approach to the BOP

The basic premise of the monetary approach of the BOP (MABP) is that any BOP disequilibrium is based on a monetary disequilibrium - that is, differences existing between the amount of money people wish to hold and the amount supplied by the monetary authorities. In the case when people demand for more money than is being supplied by the central bank, the excess demand would be met by inflows of money from abroad. Conversely if the central bank i.e. the Bank Negara of Malaysia is supplying more money than is demanded, the excess supply is eliminated by outflows of money to other countries. Thus the MABP analysis emphasizes the determinants of money demand and money supply since these will also determine the BOP.

2.3 Monetary Approach to the Exchange Rates

For a world with flexible exchange rates, the monetary approach to the exchange rate (MAER) is use to explain how exchange rates are allowed to

fluctuate according to the forces of demand and supply of each currency. The free market equilibrium exchange rate will occur at a point where the flow of exports are equal to the flow of imports so that no net international money flows are required. If the exchange rate remains fixed, eventually the country would run out of reserves in order to support a continuous deficit.

2.4 A Survey of the Literature

There has been a considerable amount of empirical testing of relationships in the monetary approach model. This approach has a long and distinguished history that it is viewed as a rediscovery rather than a modern innovation. One of the earliest studies written by David Hume in 1752 has indicated the early understanding of the problem. Hume's analysis is a strict monetary approach to prices and the BOP of Great Britain. A reduction in the England's money stock means a fall in the price level that would give England a price advantage over its exports. As exports rise the foreign money would pour in consequently result with increase in money supply and follow by the price level. The process will continue until the prices reach the levels of its competitors and back in equilibrium.

Most of the research conducted on the monetary approach phenomenon was found in the 1970s showing that the study was a popular research in that period. One main reason could be the emergence of the monetary economists that emphasize the significant and relative importance of the monetary approach in helping to solve macroeconomic problems such as high unemployment and increase in inflation, balance of payments disequilibrium and exchange rate fluctuations during that particular period as compared to the fiscal policy pioneered by Keynes explaining the great depression in the 1930s.

Junichi Ujiie (1978) has done work on Japan with respect to the monetary approach under the fixed exchange rates for the period of 1959 -1972. His model is:

$$BOP = a + b\ D + c\ i^* + f\ Y$$

where BOP = Balance of payments

a = constant term

D = change in domestic credit

i^* = change in foreign interest rates

Y = change in Japanese real income

b,*c*&*f* = coefficients function

If BOP is positive, there is and Official Reserve Transaction surplus while a negative number constitutes a deficit. A positive D indicates that the money supply is rising and hence the BOP is expected to move to a deficit and b to be negative. A positive sign of *c* shows that an exogenous rise in the foreign interest rate will reduce the demand for money overseas generating a potential BOP deficit overseas and hence a potential BOP surplus in Japan (the home country). The monetary approach also expects a positive sign for *f* since a rise in Y will generate greater demand for money and therefore a rise in BOP.

From carrying out various tests, Ujiie's general conclusion was that the domestic credit variable clearly performed as expected. Its b coefficient is always negative in a statistically significant sense. However he could not make any firm statements as to the signs of *c* and *f*. Hence, this test is robust with respect to the influence of changes in domestic credit and thereby the money supply, but uncertainty exists regarding the relationships of foreign interest rates and domestic income to the balance of payments. In general, the money supply does seem to have its predicted relationship with the BOP position although there is disagreement as to the influence of other included variables.

Wilford and Wilford (1977) began their analysis of the balance of payments on Mexico and the Honduras for the period 1954 - 1974 and 1950 - 1974 respectively. Their equation was:

$$\left[\frac{R}{H}\right] gR_t = \beta_1 g_t y_t + \beta_2 gP_t + \beta_3 gi_t + \beta_4 ga_t + \beta_5 \left[\frac{D}{H}\right] gD_t + U_t$$

where R = Holdings of International reserve

P = Price level

y = Income level

i = interest rate

a = domestic money multiplier = M / H

D = H - R (domestic credit)

H = high powered money

u_t = random disturbance term assumed to be normally distributed with

$E(u_t) = 0$

$E(u_t^2) = \sigma^{2u}$

$E(u_t u_{t+s}) = 0 \qquad s \neq 0$

The results he obtained conformed to the predictions of the monetary approach. The coefficients for the money multiplier and domestic credit were close to their postulated negative one values for both countries. They had proceeded further to examine the balance of payments of the two countries within the context of a world model. They did this by assuming domestic prices in a small country to be a proxy for world price and adopting the equation:

$$M(W)\ V(W) = P(W)\ Y(W)$$

where M = money supply

V = velocity

P = prices

Y = real income

W = world

They had substituted the equation above to their first model and obtained:

$$\frac{R}{H} gR = \alpha_1 \{ gY(X) - gY(W) \} - \alpha_2 gi(X) + \varepsilon_1 gM(W) + \varepsilon_2 gV(W)$$

$$- \beta_2 ga(X) - \beta_3 \frac{D}{H} gD(X)$$

They had used the United States and then ten other industrialized countries as proxies for the world. The results were that all the coefficients conformed to the

predictions of the monetary approach except the interest rate variable, which was insignificant in most cases. The poor performance was blamed on the absence of a well-developed financial market in these two less developed countries.

The monetary approach under a flexible exchange rate regime contributed an empirical study done by Jacob Frenkel (1978). Frenkel is formerly an economic counselor of the International Monetary Fund and governor of the Bank of Israel did the first study on this monetary approach. He examined this approach during the German's hyperinflation period after the World War 1 from February 1921 to August 1923. His model was:

$$\log e = a + b \log M_s + c \log E(p)$$

where e = the exchange rate (units of German marks per one US dollar)

a = constant term

M_s = German money supply

$E(p)$ = a measure of inflationary expectations in Germany

If the monetary approach has validity, *b* would be positive. If the exchange rate moves proportionately with the money supply, a stronger statement can be made that is *b* should be 1.0. The term c is also expected to be positive since greater expected price rises lead individuals to reduce their demand for money. This would generate an excess supply of money and a depreciation of the currency.

From his analysis, Frenkel found *b* to be highly significant with a value of +0.975. Thus the exchange rate depreciated proportionately with the money supply. The *c* term was also highly significant with a value of +0.591. This result is consistent and strongly supported that the exchange rate is essentially monetary phenomena. According to critics of this approach, such powerful results could be obtained due to the conditions of hyperinflation that cause prices to dominate all other influences and the money supply dominates prices to the exclusion of all other factors.

Hodrick (1978) had also conducted another empirical evidence to prove the exchange rate is a monetary phenomenon. His study was on the United States, West Germany and the United Kingdom. The exchange rate was defined in terms of the United States and the United Kingdom, and the United States and West Germany. For the US/UK exchange rate, he used monthly data from July 1922 to June 1975. Due to the problem of multicollinearity, he treated the money variables and income variables as ratios. His equation was:

$$\ln e_t = \beta_0 + \beta_1 (\ln M_t - \ln M_t^*) + \beta_2 \ln(1 + i_t) - \beta_3 \ln(1 + i_t^*) - \beta_4 (\ln y_t - \ln y_t^*) + \beta_5 [\ln (1 + j_t^*) - \ln (1 + i_t^*)]$$

where M = money supply

i = interest rate

y = income level

j* = the Europound rate

* denotes foreign country and in this case is UK

All the variables were significant except for UK interest rate and the signs were consistent with the predictions of the monetary model. However, the hypothesis that the ratio of money supplies was equal to one had to be rejected.

For his study on the US/WG exchange rate, he used the monthly data from April 1973 to September 1975. From his findings, the German income term was significant and the German interest had the wrong sign. His explanation for this is that it could be due to the capital controls used by Germany. He then continued to test the exchange rate equation in a rate-of-change form. The results were derived by testing the equation using transfer function models and he found them to be consistent with the predictions of the monetary approach.

A study on Far Eastern countries was done by Mickey Wu (1979) who conducted an empirical investigation of this approach on both Singapore's BOP and exchange rate. Since my research is similar to his study, I will explain in detail regarding his approach in deriving both the BOP and exchange rate

models. He estimated the monetary model for the balance of payments for two different time periods, which were 1966 to 1972 and 1973 to 1978. The empirical tests of the predictions of the monetary model for exchange rate were conducted firstly under the perfectly flexible exchange rate and secondly under the managed floating exchange rate. He used the period of 1973 to 1978 to analyze the monetary phenomenon of the exchange rate.

For the sake of clarity, Wu had organized his studies by presenting the general characteristics of the monetary approach to the balance of payments and exchange rates before reviewing the relevant empirical studies that have been conducted. He started with explaining the balance of payments as an essentially monetary phenomenon and proceeded next to the process of money supply and the demand for money and lastly the process of adjustment that leads the money market to equilibrium. He continued to review the general characteristics of the exchange rates as well as presented several empirical studies before concentrate on explaining the derivation of both models.

In explaining that the balance of payments is an essentially monetary phenomenon, he defined the balance of payments as changes in the "money account", that is the balance in (i) short term claims on the country held by foreign monetary authorities, (ii) the country's stock of monetary gold and (iii) the country's net fund position with the IMF. These items are recorded in the official settlements balance constitute the holdings of international reserves by the authorities of the country. With this definition, it implies that the analysis of the BOP only makes sense in an explicitly monetary model.

Since the monetary approach concentrates on the "money account", the focus is on the determinants of the supply of and demand for the stock of money. The monetary base of an open economy is made up of a domestic credit (domestic component) and international reserves (foreign component). Through implementing the monetary policies, the monetary authorities is able to control

the domestic component and hence the nominal stock of money in the country. However the real stock of money in the economy is determined by the public.

Under a system of a fixed exchange rate, any excess holdings of domestic money by the public can be discarded through converting it into goods and securities in the international market. To maintain the fixed rate, the central bank will intervene by buying the domestic currency and selling foreign exchange and thus will lead to a fall in the stock of money in the economy. It is clear that the foreign component of monetary base is used as a mechanism to stabilize the exchange rates and therefore the supply of money is endogenous to the structural system.

Although the monetary approach is concerned mainly with the long run, it does recognize the process of adjustment that leads the money market into equilibrium. In all cases of monetary approach the process of adjustment recognize three basic features to be present, which is first, the role of monetary factors, second, the model should explain the manner which disturbances cause a divergence between aggregate income and expenditure and third once stock equilibrium is attained, the international reserve flows will stop and so is the adjustment process.

The basic theoretical framework of the monetary approach to the balance of payments in a system of fixed exchange rates is applied in discussing the characteristics of the monetary approach to exchange rate theory. Wu had stated that a general definition of the exchange rate is that it is the relative price of national monies (assets). In this context, the monetary approach to the theory of exchange rate adopts an asset approach to exchange rates and the assets being national monies. The equilibrium exchange rate is determined by the asset market equilibrium. Since the exchange rate is the relative price of two monies, it is meaningful to formulate theory that the exchange rate is determined by the demand for and supplies of these monies. Explaining in this manner stresses that the exchange rate is an essentially monetary phenomenon.

The role of expectations is also very significant in exchange rate determination since expectations are informed predictions of future events. Thus changes in expectations of market participants concerning the expected return of the asset will lead to changes in the demand for the asset and hence changes in asset prices. For example if the expectations are such that the participants expect a currency to appreciate (depreciate), the increase (decrease) in demand for the currency will cause it to appreciate (depreciate), given the money stock.

In explaining the derivation of the balance of payments model, he started off by stating that the monetary authority under a fixed exchange rate had to buy or sell international reserves to maintain the official exchange rate and thus the foreign monetary base was considered to be endogenous. The buying and selling of international reserves will affect the supply of money by the following identity:

$$M \equiv a.H \text{ and thus } a \equiv M/H$$

where M = money supply

a = money multiplier

H = stock of high powered money

The stock of high powered money can be obtained from the balance sheet of the monetary authority. The D and the a variables in the equation can cause the money supply to change which will result in an outflow of reserves, other things remain constant. The stock of high powered money contains of international reserves holdings (R) and the domestic credit (D) and thus can be written as:

$$H = R + D$$

Three basic assumptions are made in order to derive to the reserve flow equation. The first assumption is that the demand for nominal money balances is a function of the price level, real income and the interest rate. In other words, this means any increase in the three variables will lead to increase in the demand for nominal balances. For example when prices of goods and services increase,

consumers will need more money to pay for the higher price of the goods, consequently more money will be demanded for the purpose.

These three variables are considered exogenous to the system since the monetary approach views the world as a closed economy and assumed that a country's price level and interest rate are world determined. It is also assumed that a country's balance of payment does not affect real output. Therefore the demand for money equation is :

$$M_t^d = \frac{P_t^{\eta_0} \cdot Y_t^{\eta_1} \cdot e u_t}{i_t^{\eta_2}}$$

where u_t is the stochastic disturbance term which is normally distributed with

$$E(u_t) = 0$$

$$E(u_t^2) = \sigma^{2u}$$

$$E(u_t u_{t+s}) = 0 \; s \neq 0$$

η_0 = price elasticity of money demand

η_1 = income elasticity of money demand

η_2 = interest elasticity of money demand

Second assumption involves the money supply, which is equal to the supply of high powered money (the monetary authority's holdings of international reserves plus domestic assets) multiplied by the money multiplier. The equation below implies that the monetary authorities have control on the stock of nominal money as it has direct control over D.

$$M = a(R + D)$$

The third assumption is that money market will be in equilibrium when the demand for and supply of money is equal as shown below:

$$M_t = M_t^d$$

and thus obtained

$$a_t (R_t + D_t) = \frac{P_t^{\eta_0} \cdot y_t^{\eta_1} \cdot e u_t}{i_t^{\eta_2}}$$

Taking the natural logs of equation for the above yields

$$\ln a_t + \ln (R_t + D_t) = \eta_0 \ln P_t + \eta_1 \ln y_t - \eta_2 \ln i_t + u_t'$$

He then differentiate the above equation with respect to time yield, rearrange the terms and substitute H = R + D, he obtained

$$\left(\frac{R}{H}\right) gR_t = \eta_0 gP_t + \eta_1 gy_t - \eta_2 gi_t - ga_t - \left(\frac{D}{H}\right) gD_t$$

From the equation above, he noted that the variables ga and gD can cause the money supply to change will result in an outflow of reserves, other things remaining constant. The same effect will also apply to the variables in the demand for money (gp, gy, gi).

To prove his empirical results, the model above was written in estimation form as shown below:

$$\left(\frac{R}{H}\right) gR_t = \beta_1 gP_t + \beta_2 gy_t + \beta_3 \left(\frac{D}{H}\right) gD_t + \beta_4 ga + \beta_5 gi_t + u_t \quad (1)$$

where R = International reserve holdings of the MAS

P = Consumer Price Index

y = Industrial Production Index

i = interest rate

D = H - R (domestic credit)

H = high powered money is defined as the reserve money of the MAS

a = domestic money multiplier = $\frac{M}{H}$

u_t = random disturbance term assumed to be normally distributed with

$E(u_t) = 0$

$E(u_t^2) = \sigma^{2u}$

$$E(u_t u_{t+s}) = 0 \qquad s \neq 0$$

The subscript t denotes time and $gx = \ln X_t - \ln X_{t-1}$ for X = R, p, Y, I, D, a.

The expected signs for the coefficients are:

$\beta_1 = \eta_0 > 0$; $\beta_2 = \eta_1 > 0$; $\beta_3 < 0$ and close to -1; $\beta_4 < 0$ and close to -1 and $\beta_5 = \eta_2 < 0$.

The ordinary least square method of estimation is used via the Economic Software Package.

Wu used equation (1) to estimate firstly the period 1966 - 1972 which Singapore was officially adopting the fixed exchange rate system. His results were:

$$\left(\frac{R}{H}\right) gR_t = 2.16gP_t + 0.438gy_t - 1.006\left(\frac{D}{H}\right) gD_t - 2.308gi_t$$

Note that the domestic money multiplier was left out of the equation because of Singapore's policy of maintaining a 100 percent reserve backing of its currency issue. Under a fixed exchange rate and because of high correlation between the money supply and the level of international reserves, one would expect the money multiplier defined as M/H to be constant. The results he obtained from the regression supported the monetary approach and the coefficients of the variables had the right signs as well as significant at least at the 5 percent level of significance.

When he tested the period from 1973 - 1978, Singapore had moved to a system of a managed floating regime in 1973. In this condition the money multiplier was added to the equation because in this kind of system, the ratio M/H may not be constant due to the intervention of the Monetary Authority in the foreign exchange market to influence the exchange rate. The results of the regression were:

$$\left(\frac{R}{H}\right) gR_t = 0.59gP_t - 0.0086gy_t - 0.93\left(\frac{D}{H}\right) gD_t - 0.76ga_t - 0.33gi_t$$

From the results above, he concluded that the explanatory power of the variables was somewhat less in this period compared to the fixed exchange rate period. The least square estimate of the income variable had the wrong sign and was insignificant at any reasonable level of significance. The explanation given was that the industrial production index was not an accurate proxy for the income term in this period. Since the reserve flow equation was derived for a system of fixed exchange rates, this was to be expected as the monetary authority can and did intervene in the foreign exchange market.

Wu's next part of analysis was to derive the model for estimating the monetary approach to the exchange rate. He started with assuming that the money demand function has the form of:

$$M_t^D = p_t Y_t^{\eta}{}_e{}^{\varepsilon i}{}_t$$

where M^D = the demand for nominal balances
p = the price level
Y = the level of real income
i = the interest rate
η & ε = parameters

Rearrange the equation and taking natural logs:

$$\log P_t = \log M_t - \eta \log Y_t + \varepsilon i_t$$

Mickey Wu had come up with several assumptions to derive to the exchange rate model, which were:

1. He assumed the foreign country's money demand has the same functional form
2. The purchasing power parity holds
3. The interest arbitrage condition holds and both countries have the same interest rate parameters
4. He assumed the exchange market is efficient and that the forward exchange rate reflects the current period's expectations of what the spot exchange rate will be next period

5. He assumed the domestic money supply is expected to increase next period and result with asset holders to expect the spot rate next period to decrease that in turn causes the forward rate to increase
6. He assumed the asset holders know the current level of money supply and formulate their beliefs the long-term growth in money supply according to some weighted sum of changes in the money supply.

Based on the assumptions discussed above, he came up with the equation below:

$$e_t = m_t - m^*_t - \frac{\eta}{1+\varepsilon} y_t + \frac{\eta^*}{1+\varepsilon} y_t^* + \varepsilon \sum_{i=0} k \; m_{t-1} - \varepsilon \sum_{i=0} k^* \; m^*_{t-i} \quad (2)$$

where e = exchange rate

m, m*= currency and demand deposits

y, y* = income variables

$\sum_{i=0} k \; m_{t-1}$ & $\sum_{i=0} k^* \; m^*_{t-i}$ = weighted sum of changes in money supply

The asterisk * denotes the foreign country

He explained the impact of each three variables under analysis on the exchange rate while the rest remained unchanged.

The money supply variables: Money supply can be treated as exogenous because in a freely fluctuating exchange rate system, the foreign component of the monetary base is assumed to be a constant. Thus if domestic money supply increases, other things being the same, the exchange rate is expected to depreciate. Since the stock of money is greater than the desired stock with the given initial demand for money, the asset equilibrium requires a higher price level. A higher price level can only be achieved by a depreciation of the exchange rate because the domestic price level is tied to the foreign price level by the exchange rate and it is assumed that the foreign price to be fixed.

The income variables: An increase in the domestic income will cause the exchange rate to appreciate because an increase in income generates an increase in the demand for money. Given the initial nominal money stock, asset equilibrium requires a lower price level, which can only be achieved through an appreciation of the exchange rate.

The expectation variables: If asset holders expect the money supply to increase in the future, their expectations are being formulated by their beliefs in the long-term growth in money supply according to some weighted sum of changes in the money supply (i.e. Σ k m_{t-1}), they would expect next period's spot rate to depreciate which in turn would cause an increase in the forward exchange rate. Given the spot rate and the foreign interest rate, this implies that the domestic nominal interest rate will increase (assume interest arbitrage) which in turn cause the demand for money to decrease and hence the spot rate to depreciate.

To perform the empirical test for the period quarter one (Q1) 1973 to quarter one (Q1) 1978, the equation (2) was written in estimation form as shown below:

$$e_t = \beta\left(\frac{m_t}{m^*_t}\right) + \beta_2 y_t + \beta_3 y_t^* + \beta_4\ m_t + \beta_5\ m_t^* + u_t \quad (3)$$

where it is expected that

$$\beta_1 > 0;\ \beta_2 = \frac{-\eta}{1+\varepsilon} < 0;\ \beta_3 \frac{\eta}{1+\varepsilon} > 0;\ \beta_4 = \varepsilon k > 0;\ \beta_5 = -\varepsilon k^* < 0.$$

The variables are defined as:

e = exchange rate, quantity of Singapore dollars per yen

m, m*= currency and demand deposits

y, y* = industrial production index

u_t = normal distributed error term

The asterisk * denotes the foreign country and in this case, it refers to Japan.

He found that the evidence did not lend support to the monetary approach. He clarified by giving two important points, which were:

1. The monetary model is a long-run equilibrium model; therefore using quarterly data may be considered short-run data and hence may not have been appropriate to use it for a long-run equilibrium.
2. The exchange rate equation was derived under the assumption of a perfect flexible exchange regime. Since Singapore is following a policy of managed floating during that period, thus the model derived may not be a very accurate description of the exchange rate system in Singapore.

Since the variables in the equation may be capturing the effects of managed floating, current or lagged changes in the money supply will yield a wrong sign in the estimation of the equation. In this case it would be erroneous to ignore the reaction functions of the monetary authorities and the asset holders when adopting a managed floating system. His correction for this was to use next period's change in money supply as a measure of expectations. Therefore instead of using m_t in the equation, he used m_{t+1} to include the asset holders' expectations.

He concluded from the findings that the results provided at least a modest empirical support for the monetary approach although the income terms were still insignificant. However, he stated that using equation (3) for estimation of the monetary approach to the exchange rate in a system of managed floating is still not appropriate.

For Wu's final part of his study, he derived another model to estimate the monetary approach of the exchange rate in the context of a managed floating system. In a system of managed floating, the foreign component of the monetary base is endogenous because the monetary authorities will allow some changes in international reserves to offset wide fluctuations in the exchange rate. Hence

the monetary authorities will allow a combination of exchange rate movements and changes in international reserves in the adjustment process.

Using the ordinary least square method of estimation is inappropriate because the estimators are inconsistent and biased due to the error term is correlated with some of the explanatory variables in the existing equation. Thus the solution will be indeterminate. To eliminate the problem, the endogeneity of m_t and gR_t must be taken into account and are included in equation (2), which yields the structural equations:

$$e_t = m_t - m^*_t - \left[\frac{\eta}{1+\varepsilon}\right] y_t + \frac{\eta^*}{1+\varepsilon} y_t^* + \varepsilon k g a_t + \varepsilon k \left[\frac{R}{H}\right] gR_t$$

$$+ \varepsilon k \left[\frac{D}{H}\right] gD_t - \varepsilon k^* m_t$$

$$m_t = \eta_0 p_t + \eta_1 y_t - \eta_2 i_t$$

$$\left[\frac{R}{H}\right] gR_t = \frac{\eta_0}{\varepsilon k} gp_t + \frac{\eta_1}{\varepsilon k} gy_t - \frac{\eta_2}{\varepsilon k} gi_t - ga_t - \left[\frac{D}{H}\right] gD_t$$

For estimating the equation above, he used the two stage least squares (2SLS) method and the computer program used was the Statistical Analysis System (SAS) computer package.

The results obtained from this model of estimation were also consistent with the predictions of the monetary model even though the domestic income coefficient did not show the right sign.

From his empirical analysis, both the BOP and exchange rate results supported the basic proposition of the monetary approach that is they are essentially monetary phenomena and the analysis should concentrate around the demand and supply of money.

The recent studies on this subject do not directly examine this approach. Therefore it is hardly any information on the empirical evidence that concentrate specifically and directly to prove the existence of monetary phenomena in the analysis of balance of payments and exchange rate studies. For example Agenor, Pierre-Richard, Bhandari, Jagdeep S, Flood and Robert (1992) had developed a simple analytical model that highlights the process leading to balance of payments crises.

Their basic framework used consists of a simple continuous time and perfect foresight model. The model is a log linear formulation that allows them to solve explicitly for the time occurrence of the crisis. They use various monetary variables such as money supply, domestic credit, foreign reserves, interest rates and the price level in their model but their main attention is how this simple analytical model lead to the balance of payments crises. They do not emphasize directly that the balance of payments crises is due to the monetary problem.

The analysis revealed some major policy implications for macroeconomic policy under a fixed exchange rate regime. The balance of payments crises may be resulted from the equilibrium outcome of maximizing behavior by rational agents faced with inconsistent monetary and exchange rate policies rather than the result of exogenous shocks. Measures such as foreign borrowing and capital controls may temporarily enhance the viability of a fixed exchange rate but will not prevent the ultimate collapse of the system if fundamental policy changes are not implemented.

Ikoba, Nyatepe, Akorlie and Owoye (1996) examine the interrelationships between the current account, the budget balance and the real exchange rate changes in 6 sub-Sahara African countries during the period 1960 - 1991. A vector autoregression (VAR) model is used to analyze the interrelationships between the current account, the budget balance and the real exchange rate. Their results suggest that external factors such as terms of trade and foreign

income were as important as domestic policy mistakes in causing real exchange rate misalignment in the sub-Saharan Africa.

Fratzscher (1998) did a study on the subject of why currency crises are contagious on both the Latin American Crisis and the Asian Crisis. He presented an analysis and comparison of the Latin American and Asian crises before presented a basic model of the currency crises and their underlying causes. Various internal and external imbalances made both Mexico in 1994 and Thailand in 1997 natural targets for speculators and thus the crises in these two countries came not unexpected. The question that remains controversial is through which transmission channels the Mexican and the Thai crises spread to other emerging markets. The countries that were affected most by the Mexican crisis were Argentina and Brazil whereas the Thai crisis spread to the Southeast Asian countries such as Malaysia and Philippines.

From his analysis the evidence support the hypothesis that both crises were contagious in affecting other emerging economies. Based on his findings, he found that it was not a currency misalignment and excessive current account deficits that cause the transmission of the crisis. Unhealthy financial and banking sectors are shown to have contributed significantly to the severity of the financial crises and finally the two crises was based on contagion that had nothing to do with the strength of the economic fundamentals of affected countries.

At the home front, Obiyathulla (1998) has come up with a discussion linking between a currency crisis and a banking crisis and causes of the crises. He explains that the same factors had caused both the currency and banking crises. The Malaysia's case, it was a set of expansionary, rapid growth strategies characterized by loose monetary policies. Over the seven-year period preceding the currency crisis, there was rapid growth in all the three monetary aggregates namely the M1, M2 and M3. The banking system simply intermediated these into credit growth. The result was excessive credit growth leading to an over-leveraged real sector; asset inflation and an over extended banking system.

Given the pegged exchange rate regime with the factors discussed earlier combined with relative interest and inflation differentials meant that the ringgit was vulnerable. Based on his explanation, it is somehow has emphasized that the currency crisis experienced by Malaysia is a monetary phenomenon.

There are also scholars that explain in general the theoretical framework regarding the phenomena of exchange rate (currency) and balance of payments crises. A good example is written by Appleyard and Field (1995) in their books explaining in detailed theoretically the framework on the monetary approach of the balance of payments and exchange rate. Melvin (1992) also gives in his book a simple theoretical explanation on the monetary approach of the balance of payments and exchange rate. One thing common with all these studies is that their main focuses is on the supply of and demand for money that is the forces causing a balance of payments disequilibrium and exchange rate fluctuations.

2.5 Summary of the Literature Review

The main discussion in the literature review is explaining the balance of payments and exchange rate problems are essentially a monetary phenomenon. Based on the various studies and findings on this topic, there is a lot of evidence that proves this phenomenon. Although most of the findings were done in the late 1970s as compared to the 1990s, the emphasis on the monetary approach is still highly significant in explaining the financial crisis faced by the American Latin in 1994 and the Asian in 1997.