CHAPTER III

HYPOTHESES AND RESEARCH METHODOLOGY

3.1 Hypothesis

Based on the previous literature and findings, the hypothesis is as follows:

The balance of payments and currency crisis is a monetary phenomenon

From the above statement, two sets of hypothesis testing will be conducted:

1. The first test will be on BOP,

    The null hypothesis is:

    H_0: The BOP is not a monetary problem

2. The second test will be on the exchange rate,

    The null hypothesis is:

    H_0: The exchange rate is not a monetary phenomenon

3.2 Research Methodology

3.2.1 Data collection techniques

To complete this study, the following research methods were adopted. The information and data gathering were obtained primarily based on the source of secondary data. These data are collected through the use of sequencer, which is made available in the Zaaba Library as well as from the yearly reports of Bank Negara and Ministry of Finance. The Bank Negara's website was also surfed for further and recent information including searching for some clarifications about certain data.

3.2.2 Data period

The types of data will be an annually data of about twelve years from the period 1986 until 1997. This kind of data is considered as time series data which a set of observations on the values that a variable takes at different times. The twelve years analysis should be appropriate and adequate because the period is long enough to predict and accommodate changes in the studied variables. The samples of variables chosen were based from the discussion in the literature review by various researchers.

As mentioned before the sources of data collected will be from the Ministry of Finance Annual Reports and the Bank Negara's Annual Reports and its website. These sources of data should be the most reliable and trustworthy since both Ministry of Finance and the Bank Negara are directly connected with the supply of the relevant information besides being the government bodies that are responsible for inputting these data.

The summary of the relevant data from 1986 until 1997 to be collected is as follows:

X_1 = International Reserves of Malaysia (billions of RM)

X_2 = Reserve Money of Malaysia (billions of RM)

X_3 = Money Supply in Malaysia (currency + demand deposits)

X_4 = Industrial Production Index in Malaysia

X_5 = Consumer Price Index in Malaysia

X_6 = Exchange Rate defined as RM / Yen

X_7 = Interest Rate in Malaysia

X_8 = Money Supply in Japan (currency + demand deposits)

X_9 = Industrial Production Index in Japan

X_{10} = Consumer Price Index in Japan

Detailed information on each data gathered is shown in the appendix 1 until appendix 10. The Japan's data is specifically for the analysis of the Exchange

rates since Malaysia is considered to be the home country and Japan is the foreign country. Taking this into consideration, the exchange rate is defined as the relative price of the Japanese Yen. Moreover Malaysia is closely involved with the Japanese market as it exports to Japan is the third largest (1998 - 10.5%) while its spending on imports is the highest (1998 - 19.6%).

3.2.3 Theoretical framework and analysis

For explaining the theoretical framework, the analysis is divided into two sections, which are:

A. Empirical analysis of the monetary approach to the BOP using the reserve flow equation

B. Empirical analysis of the monetary approach to the exchange rate using the exchange rate equation

Two empirical analyses are used because the analysis of the BOP examine the changes in international reserves (inflows and outflows) as a result of changes in the independent variables whereas the exchange rate studies the movement of the currency (depreciate or appreciate) due to the changes in the independent variables. The independent variables for both analyses are also different. The independent variables for BOP are price level, income, interest rates, domestic credit and money multiplier. The exchange rate independent variables are home and foreign currency, money supply of the home and foreign country that is from their currency circulation and demand deposits and finally both countries' income level (i.e. the industrial production index).

A. Empirical Analysis of the Balance of Payments (BOP)

The monetary approach to the BOP emphasizes that a country's BOP, while reflecting real factors such as income, tastes, or factor productivity, is essentially a monetary phenomena. This means the analysis of the BOP is centered on the determinants of the supply and demand for the stock of money.

Therefore in this case, the term BOP refers to the official settlements balance and is defined as the rate of change in the holdings of international reserves by the authorities in the country.

To perform the empirical tests of the predictions of the monetary approach to the BOP, the reserve flow equation is used. This is so since the balance of payments can be defined as the flow of international reserves per unit of time and when it achieves equilibrium, the value must be equal to zero. Thus any inflows and outflows of international reserves are symptoms of disequilibrium between actual and desired stocks of money. These flows represent a stock-adjustment disequilibrium phenomenon that must be transitory in nature. The flows will cease once it reaches equilibrium. The monetary approach maintains that in order for policy measures to affect the BOP, hence they must affect the supply and demand for money.

Based on the discussion in the literature review, the final form of the equation is shown below to perform the empirical tests:

$$\left[\frac{R}{H}\right] gR_t = \beta_1 gP_t + \beta_2 gy_t + \beta_3 \left[\frac{D}{H}\right] gD_t + \beta_4 ga + \beta_5 gi_t + u_t^4 \quad (1)$$

where   R = International reserve holdings

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 Monetary Authority

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

For the purpose of the analysis the industrial production index is used to represent the real income of the country. The rational explanation is Malaysia

has concentrated more on manufacturing sector as its main production or income to the country in the 1980s as compared to the agricultural sector previously.

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 random disturbance term above or also known as the error term represents all those factors that affect the international reserves but are not taken into account explicitly.

The subscript t denotes time and gx = $\dfrac{d \log x}{dt}$ where x = R, d, y, p, i, a and the logs are to the base e.

β_1 = price elasticity of demand

β_2 = income elasticity of demand

β_3 = domestic credit variable

β_4 = money multiplier

β_5 = interest elasticity of demand

The expected signs of the regression coefficients for the independent variables are:

$\beta_1 > 0, \quad \beta_2 > 0, \quad \beta_3 < 0, \quad \beta_4 = -1 \quad$ and $\quad \beta_5 = -1.$

The ordinary least square method of estimation is used via the SPSS software package.

B. The Empirical Analysis of the Exchange Rates

For the purpose of performing empirical tests of the predictions of the monetary approach to the exchange rate with respect to Malaysia, I will divide the analysis into two parts. Part 1 the exchange rate analysis equation is based on the assumption that the exchange rate system is a perfectly flexible regime.

31

Part 2 on the other hand, the equation will be amended to take into account that Malaysia was adopting the managed floating system during the period of 1986 to 1997. In this case if the same equation were used, it would be erroneous since the variables may be capturing the effects of managed floating.

Part 1: The Exchange Rate Equation Under A Perfect Flexible System

To examine the empirical results of the exchange rate, based on the discussion in the literature review, the exchange rate equation is:

$$e = \beta_1 \left(\frac{m_t}{m^*_t} \right) + \beta_2 y_t + \beta_3 y_t^* + \beta_4 \ m_t + \beta_5 \ m_t^* + u_t$$

where it is expected that

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

The variables are defined as:

e = exchange rate, quantity of RM 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.

Part 2: The Exchange Rate Equation and Managed Floating System

Based on the discussion in the literature review, the existing or present exchange rate equation used is inadequate and may not apply to a managed floating system. Under a system of perfectly flexible exchange rates, the money supply is exogenous to the system because of the change in international reserves is zero. A simple reason is that in this type of system, the monetary authorities acting on behalf of the government is not allowed to intervene.

Therefore using the simultaneous equation as explained in the literature review, the models are:

$$e_t = m_t - m^*_t - \frac{\eta}{1+\epsilon} y_t + \left(\frac{\eta^*}{1+\epsilon}\right) y_t^* + \epsilon k g a_t + \epsilon k \frac{R}{H} g R_t$$

$$+ \epsilon k \left[\frac{D}{H}\right] g D_t - \epsilon k^* m_t$$

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

$$\left(\frac{R}{H}\right) g R_t = \frac{\eta_0}{\epsilon k} g p_t + \frac{\eta_1}{\epsilon k} g y_t - \frac{\eta_2}{\epsilon k} g i_t - g a_t - \left(\frac{D}{H}\right) g D_t$$

The variables are defined as:

e = exchange rate, quantity of Malaysia RM per dollar

m, m* = currency and demand deposits

y, y* = industrial production index

i = the interest rate

η & ϵ = parameters

The analysis for the above equation uses the two least square method of estimation on the equation that is available in the SPSS computer package.

As a reminder all equations were extracted from Mickey Wu's for the reason that this study is more or less similar to Mickey's research except his was on Singapore during the period of 1966 until 1978 whereas this research is on Malaysia from the period 1986 up to 1997. The Malaysian case is similar to Singapore in the sense that they were both having a managed floating exchange rate regime and Mickey Wu has developed the formulas based on this type of exchange rate regime. For a detailed explanation, refer to the literature review on how he derived the equations.

3.3   Data Analysis Techniques

The procedure for analyzing the data is through the usage of the Statistical Package for the Social Sciences (SPSS). The first equation, the analysis on the monetary approach of the Balance of Payments will be estimated using the multiple regression technique. A similar technique will also be used to estimate for the first part of the equation of the monetary analysis of the Exchange Rate. However for the second part of the analysis when the exchange rate is of the managed floating system, this will be estimated using the Regression technique but adopting the two stage least squares method (2SLS).