Chapter 2

Literature Review

As far as monetary economics discussion is concerned, the most important aspect may lie in the puzzling phenomena of which there is an observed positive correlation between the nominal money stock and the real output. If such holds true, this suggests that the monetary authority can influence the real output. However, before one gets too optimistic about the potential of manipulating the money stock, one must, of course, entertain the possibility that there may, in fact be no correlation between the nominal stock of money and real output but, instead another variable that is correlated to real output. In any case, it could be the reverse, with the changes in output actually the cause of changes in the money stock. Although it has been long known that money stock and the nominal value of economic activity are positively correlated, it is also widely recognized that no degree of positive association between money and income can by itself prove that variation in money actually causes variation in income **(Sims, 1972).** In this respect, money may react passively or very reliably to fluctuations in income.

There has been much evidence linking the change in money to somewhat "lead" the change in income in some sense. Although it is widely recognised that no degree of positive association between money and income can by itself prove that variation in money causes variation in income, few would deny any causal influence of money on income. However, there are leading exponents of the monetarist approach who are

ready to admit that there is clear evidence of the influence of business change on the quantity of money. In this case, if current value of the GNP or GDP provide a good index for business conditions, then there may be some reservations on the argument of changes in money affecting output. As such, using distributed lag regressions (for instance, the method of vector autoregression) and treating both money and income as exogenous variables may be the best approach in understanding their correlation.

As far as monetary policy is concerned, an important pre-requisite for operating a policy framework around monetary targets, is a stable and predictable demand for money. However, for developing countries like ASEAN countries, they are likely to see a continuing instability of money growth, economic activity and the price levels since there had been extensive reforms in the financial markets in the last two decades. In this respect, financial deregulation has brought about large changes in what could be used as money thus effectively also inflicting major changes in monetary policy.

In essence, measures that promote financial market development could result in the introduction and deepening of markets for new and more attractive financial assets like money market paper and bonds thus causing gradual portfolio shifts away from monetary assets, possibly reducing the predictability aspect of money demand. In practice, failure to allow for changes in money demand following financial reform could result in a monetary policy that is either tighter or looser than those planned before the reforms are implemented **(Dekle and Pradhan, 1997).** Thus the existence of a stable and predictable relationship between monetary aggregates, economic activities, prices and interest rates is crucial in the formulation of monetary policy.

Gavin and Kydland (1999), also pointed out in their study of US data that the various monetary changes in the post-1980 era led to dramatic changes in the variance and correlation of M1 and other monetary variables. However, **Lucas (1994)** pointed out that in his study, the puzzling mystery surrounding monetary theory, in the sense that the observed persistence of money holdings even in the face of fluctuations in income and the nominal interest rates. The apparent "stickiness" of the money demand is observed even though money balances were completely flexible in his model. However, in the case of ASEAN countries, the case of money demand unpredictability may be more substantial since these economies had been undergoing major structural and economic adjustments, especially in the last two decades.

In the aftermath of the Asian currency crisis, many questions were asked pertaining the significance and appropriateness of the kind of monetary policies that were exercised during the crisis period. In any event, the priority of economic policymaking then, especially on the monetary side, was to reestablish the currency stability after the large collapse. This is especially true for countries like Indonesia, whereby corporate balance sheet considerations highlighted the need to reverse the overly depreciated currencies through firmer monetary policy making.

2.1 What is Money?

In a very general sense, the traditional conception of money may be succinctly summarized by the axiom that "money is what money does" **(Perryman, 1983).** However, in practice, every one of us is familiar with money since we use them virtually everyday. However, the effect of changes in the money supply on

macroeconomic variables such as the rate of inflation, the rate of unemployment and the level of output are matters of deep concern. One reason for this is that there is no completely watertight physical or legal definition of money. In any event, at the most basic level, money can be thought of as anything generally acceptable to others as a means of payment. In this respect, when economists speak of the "demand for money", they are, in fact, asking about the stock of assets held as cash, checking accounts, and closely related assets, specifically not generic wealth or income. Hence, the interaction between the demand for money and the supply of money provides the link through which the monetary authorities can affect output and prices.

2.1.1 Commodity Money versus Fiat Money

A good that everyone accepts in payment for goods is called commodity money. Essentially, commodity money is considered a good with intrinsic value that serves as a medium of exchange. On the other hand, fiat money is a nearly costlessly produced commodity (we assume that government can produce them costlessly but it cannot be produced or counterfeited by anyone else) that cannot by itself, be used in consumption and also not a promise to anything, that can be used in consumption or production. Pieces of paper distinctively marked by the government generally served as fiat money **(Champ and Freeman, 1994).**

2.1.2 Issues in Counting Money

The choice of definition of monetary variables, for analysis or policies, depends on the purpose of the study, the institutional structure of the economy and of course, also

on the available data. Inevitably, financial assets are a vast array of types hence the definition of which of these financial assets is classified, as money can proved to be crucial, i.e. the difference between narrow and broad measures of money. Narrow money can also be defined as currency plus demand deposits while broad money is comprised of narrow money plus quasi-money, time and saving deposits **(Dekle & Pradhan, 1997).** Central banks around the world defined several measures of money since there is no universally accepted method of defining monetary aggregates thus the definition vary from country to country. According to **Thygesen (1971)**, the "narrow" measure of money is labelled as M1, (it is defined as currency outside banks and demand deposits with commercial banks) while the "broad" measure (also known as M2) consists of M1 plus all time deposits with commercial banks. Meanwhile, **Tseng and Corker (1991),** defines the "broad money" as "narrow money" plus time and savings deposits (quasi money). However, in theory, the attention is usually centred on M1 because it is the supply of money most directly under the control of the central bank and also the fact that it is through the banking system that monetary policy most directly has its impact. For instance, M2 includes monetary aggregates that are not directly under the central bank. One difficult issue for devising money supply measures in places like developing countries lies in the size of the informal money market. Most measures of the money supply – whether broad or narrow – cover only financial institutions. For instance, rough estimates of the Bank of Thailand suggest that in the mid 1980s, between 7 to 16 percent of private sector savings was not held by the formal banking system but rather, circulating through the chit funds **(Page, 1993).**

2.1.3 The Total Money Supply

The stock of fiat money in a reserve requirement economy is called the monetary base. Assuming that there is none held outside the bank, the money supply would be the total nominal stock of deposits at banks. According to Champ and Freeman (1994), if the money supply in period t (again assumed that no money is held as currency) is defined as $(M1)_t$, and the stock of fiat money is denoted by M_t , then their relationship can be shown as;

$$M_t = \gamma.(M1)_t \qquad (2.1)$$

with γ = the reserve requirement

Since γ is less than1, an increase in the money base will cause the money stock to increase by $1/\gamma$ times of the increase in the monetary base. Hence, the monetary base is sometimes known as the stock of high-powered money while the ratio of the money supply to the monetary base $(1/\gamma)$ is known as the money multiplier.

2.2 Monetary Policy

According to the standard economic textbook IS-LM model, monetary policy operates through the liability side of the banks' balance sheets: when the central bank tightens monetary policy by draining reserves from the banking system, the noteworthy consequence is a fall in the money stock. The fall in money stock will subsequently lead to a rise in the interest rates and a fall in the national income. Likewise, an expansionary monetary stance will result in a vice-versa effect. In essence, the increase in the interest rates due to the restrictive monetary policy will increase the demand for financial assets and reduce aggregate demand (especially for investment).

A study by **Kashyap, Stein and Wilcox (1993)** suggests that shifts in the monetary policy seem to alter the mix of loans and commercial paper, and the induced shifts in this mix seem to affect investment.

However, **McKinnon (1973)** and **Shaw (1973)**, pointed out that restrictive monetary policy (through the increase in interest rates) may not be contractionary after all since, in financially repressed markets, the higher interest rates will induce more savings which in turn, increase the supply of credit available for the financing of investment or/and working capital. The neo-structuralists, in contrast, disagree with this view since the validity of savings effect appears to be in suspect and instead they cited that there are structural impediments (e.g. inefficient financial intermediation) to higher investments even if there are high savings. In essence, when the money supply is increased, reserves are increased and the bank's assets – its holdings of Treasury bills and its loan portfolio are increased. However, money and credit (loans) do not have to move in tandem because banks can decide to increase their holdings of Treasury bills rather than making additional loans. Basically, credit availability theories focus on how and when the central bank's actions can induce or discourage loans by the banks. In this respect, the problem that could exist is that during deep recessions, even if the banks were willing to lend at lower interest rates, firms may still shy away from borrowing for investments because the real rate of interest may be high. Besides, during recessions, the default rate is likely to be higher hence banks are more likely to be contended with settling for a lower return by investing in a less risky Treasury bills. In any case, the bank's net worth may have already been greatly reduced by defaults on earlier loans thus again, the banks are discourage to increase loans. Besides, banks are also reluctant to lend to firms which were previously getting loans

from other banks that went bankrupt because they may not have the full information of these firms thus to avoid the problem of moral hazard/adverse selection, these banks are unlikely to lend to them (the firms).

In any event, an alternative monetary view is that independent effects actually come from the asset side of the banks' balance sheets (for instance, from bank loans). According to this view, there are some borrowers for whom non-bank sources of credit do not represent a perfect substitute for bank loans. Thus, when tight monetary policies shrinks the size of the banking sector, it reduces the overall supply of loans to these "bank dependent" borrowers so as a result, investment and aggregate demand fall by more than can be accounted for by, the conventional money channel **(Kashyap, Stein and Wilcox, 1993).** According to a study by **Bernanke and Blinder (1988)** and **Christina Romer and David Romer (1990),** their conclusions point to the following: When the Fed tightens monetary policy, the money stock falls almost immediately; bank loans also fall but with a significant lag: the decline does not begin to show up for 6 – 9 months. Output falls with a lag also and indeed seems to move roughly contemporaneously with loans. However, just because a fall in the output coincides with a fall in the loans does not establish that the former was caused by the latter. In this case, it may be possible that the entire output response to the policy tightening was due to the conventional money channel and that the fall in the quantity of loans simply reflects a decrease in loan demand and not a reduction in loan supply **(Kashyap, Stein and Wilcox, 1993).** In addition, according to them, in order for monetary policy to affect the economy through the lending channel, two conditions must be satisfied. First, banks must view loans and securities as imperfect substitutes on the asset side of their balance sheets, so that monetary tightening does

indeed reduce the supply of bank loans. Second, loans and non-bank sources of finance must also be imperfect substitutes for firms on the liability side of their balance sheets, so that reduce loan supply has real effects.

Freeman and Kydland (2000), following the business cycle analysis of **Kydland and Edward C. Prescott (1982)**, calibrated their model to meet long-run features of the U.S. economy. However, their model also included monetary features, which were then subjected to the technology level following a random process like that observed in the U.S. data. Their model's predicted business-cycle frequency correlation (of both real and nominal variables), are then compared to those of the U.S. data. One of their findings was that M1 was positively correlated with real output.

However, according to **Champ & Freeman (1994)**, although the total money stock is positively correlated to real output, this may merely state that as the money stock increases, so does real output. Hence, this may not be a statement of causality. In any event, even though the change in the total money stock preceded the change in real output, we cannot infer that it caused the change. Ultimately, correlation, or even precedence, may not imply causality[1]. However, **Champ and Freeman (1994)** acknowledge that based on data, changes in real output are positively correlated with changes in the total nominal money stock. According to them, since the changes in the total nominal money stock occur before the changes in the real output, thus changes in the money can be used to explain changes in the real output.

[1] See Edward Leamer (1985) and Thomas Cooley and Stephen LeRoy (1985)

2.2.1 Money Stock and Interest Rate Targets

The monetary authorities cannot simultaneously set both the interest rate and the stock of money at any given target levels that it may choose **(Dornbusch, Fischer and Startz, 1998)**. Suppose the relevant authorities want to set the interest rate at i* and the initial money stock is at a level M* (note: the demand for money curve is given by LL). They can move the money supply function around but it cannot move the money demand function around. It can only set the combinations of the interest rate and money supply that lie along LL. At interest rate i*, it can have money supply M_0/P. At the target money M*/P, it can have interest rate i_0 . But it cannot have both M*/P and i*. (Refer to Figure 2.1)

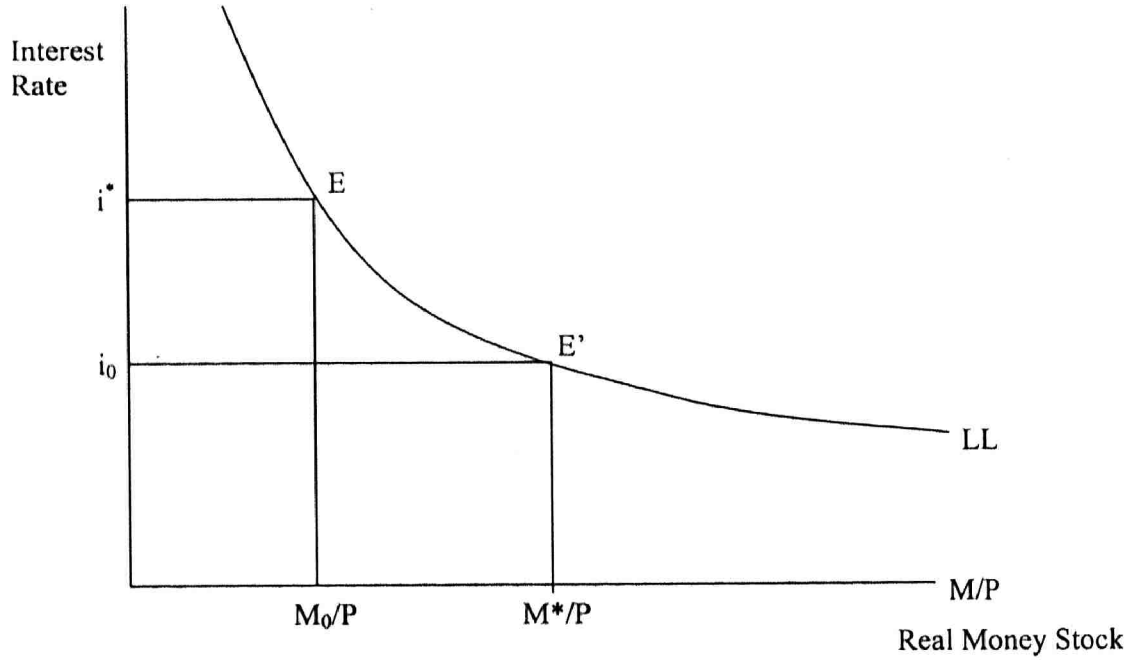

Fig. 2.1

In this context, this point can be stated as: When the monetary authorities decides to set the interest rate at some given level and keep it fixed, it will lose control over the money supply. If the demand for money curve were to shift, the authorities would

have to supply whatever amount of money that was demanded at the pegged interest rate. In essence, the monetary authorities can more accurately control interest rates than the money stock. The monetary authorities set the money supply, through open market operations and this pins down the location of the LM curve. If the authorities know the exact position of the IS and LM curves, then there will be no difference whether the monetary authorities sets the money base target or sets the interest rate in their monetary practices.

The most important theme in monetary economics simply involves the various competing views about the impact, if any, of changes in monetary variables on other economic variables. For instance, how do monetary changes affect output and employment and their rates of growth, real wages, profits, inflation and so on? In this case, the position that is taken on these issues will depend on the point of view that is adopted about whether money is exogenous or endogenous, whether interest rates or the monetary base should be regarded as the relevant monetary control vehicle **(Smithin, 1994).**

In terms of the transmission mechanism of monetary policy, a change in the real money supply will eventually lead to a change in the national output. However, there are 2 critical links between the change in the real balances (i.e. the real money stock) and the ultimate effect on income. In essence, the change in real balances will lead to a change in the interest rates while this change in the interest rates must lead to a change in the aggregate demand. Only through this two linkages that changes in the real money stock will affect the level of output in the economy. However, if the

portfolio imbalances[2] do not lead to significant changes in the interest rates (for whatever reason), or if spending does not respond to changes in the interest rates, then there may not exist a link between money and output **(Dornbusch, *et al*, 1998).**

In the case of interest rate versus money stock targets, Keynesians prefer to control the rate of interest in order to stabilize investment. In this respect, Keynesians have traditionally emphasized that the demand for money is likely to be dependent on interest rates. Thus, the economic principles which dictates that it is the nominal interest rates that determines the equilibrium between the demand and supply of money and the fact that the money demand is determined by the rate of interest – are called the Keynesian monetary theory. Thus, according to this, an increase in the money supply will shift the supply of money curve to the right and it will intersect with the demand for money curve at a lower interest rate (Refer to Figure 2.2). However, the change in the interest rates due to the increased (or decreased in the money supply) depends on the elasticity of the money demand curve. If the demand curve is inelastic, then the increase in the money supply at a given level of income will lead to a small decrease in the interest rates (Figure 2.3).

With the fall in the interest rates, investments will increase thus leading to an increase in the income via the multiplier effect. However, if the demand curve is inelastic (which is often the case during deep recessions), then the fall in the interest rates will be minimal. As the interest rates here refer to the nominal interest rates, this mechanism works if there are no inflationary expectations thus rendering the nominal

[2] Portfolio disequilibrium explains that, at the prevailing interest rate and level of income, people are holding more money than they want. This in turns causes portfolio holders to attempt to reduce their money holdings by buying other assets hence altering asset prices and yields. In short, this changes the interest rates.

as the real interest rates. Investments are likely to be influenced only by the real interest rates. Hence the increased in investments will lead to an increase in the aggregate expenditure which will ultimately lead to an increase in the aggregate demand curve. The increase in aggregate demand leads to an increase in the national income (output). However, the increased national income will also lead to an increase in the money demand. Referring to figure 2.2 again, after the government increased money supply to M_1 the interest rate falls to r_1. However, the increased in the national output (income) will lead to an increase in the demand for money. Thus, the money demand curve will shift to the right (D_{mo} to D_{m1}). Ultimately, interest rate will rise again (Refer to Figure 2.4).

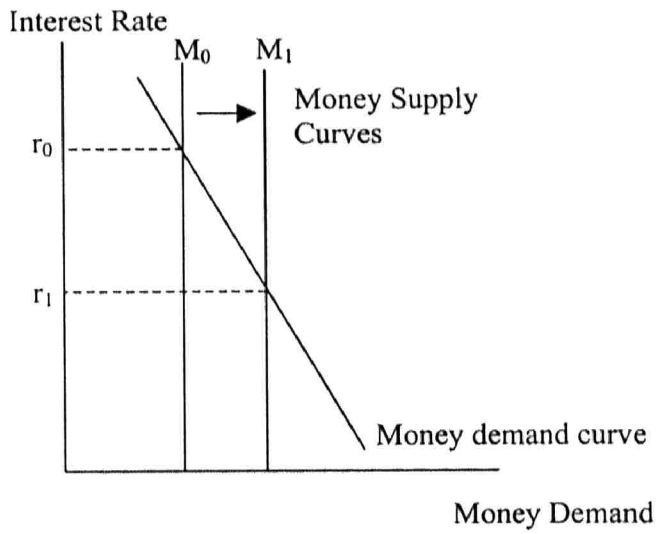

Fig. 2.2

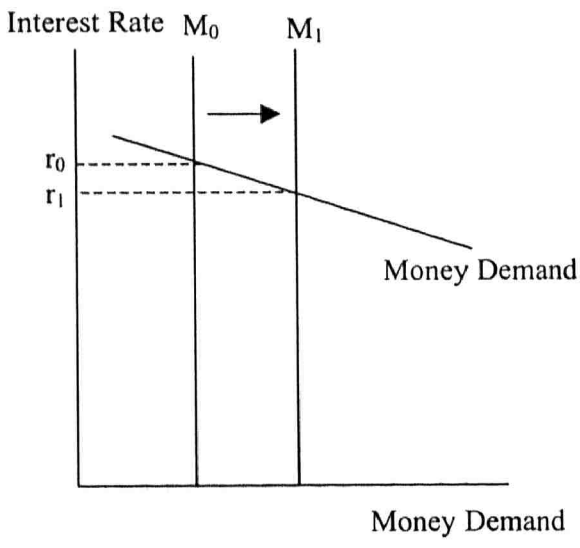

Fig. 2.3

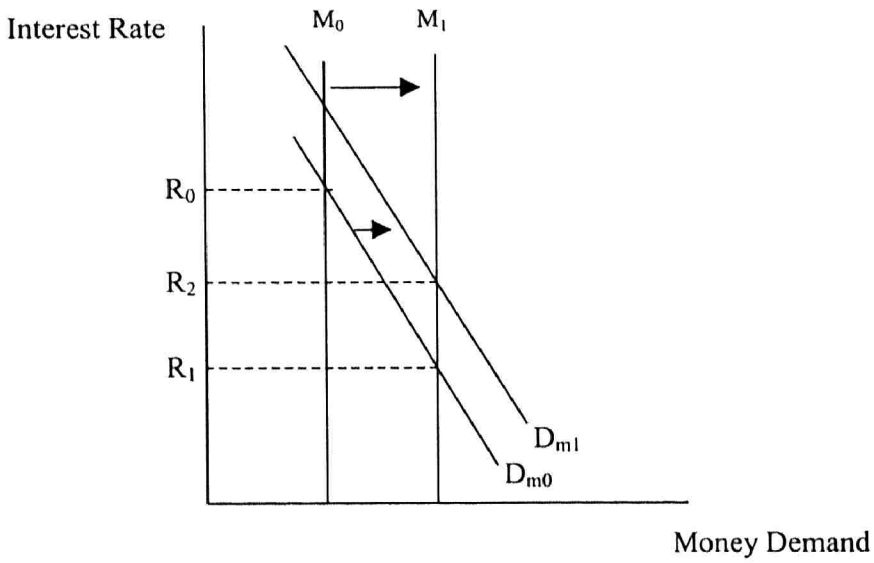

Fig. 2.4

Friedman, on the other hand, proposed a simple policy of controlling the rate of growth of the money supply in order to stabilise the economy. Essentially monetarists operate with the perception that the demand for money does not depend at all on interest rates. Thus, the demand curve for money is totally inelastic. In the quantity theory of money, given that the velocity of money is constant, the increase in the money supply is simply reflected in a proportionate increase in income.

$MV = PQ$, thus given that V is constant, $M = k(PQ)$ with $k = 1/V$

(M = money supply, V = velocity of money, P = price level and Q = output)

Monetarists emphasise that there is in fact, a systematic and predictable relationship between the money supply and the level of national income (output). Hence, monetarists believe that there is a clear solution to economic policy: let the money supply grow at the rate of growth of full employment output, for instance, if output grows at 3%, and the central bank increases money supply by 3%, the price level will remain unchanged. The price level will rise only when the growth of money is faster than the growth of output.

In essence, there is no correct rule of which of the two alternatives to follow. The choice between such alternative intermediate targets may be analysed by explicitly introducing uncertainty into the standard IS-LM model. If the IS-LM curves were known, then the choice for interest rate targeting versus the money supply targeting would have been insignificant, as both would be equivalent. Thus pegging the interest rate at a certain level is the same as adjusting the money supply to keep LM intersecting with IS at the desired interest rate level.

However, the problem arises when the IS and LM curves shift unpredictably. When this happens, output is unlikely to end up at the targeted level. If the authorities could change the money supply, then the LM can shift. In this respect, assume that the LM curve is unstable due to the unpredictability of money supply. In this case, assuming that the IS curve is stable and income deviates from its targeted level mainly due to the shifts in the LM curve [$LM(M_1)$ and $LM(M_2)$], then the income level will deviate between Y_1 and Y_2. [Note: When the authorities set the money supply, they do not know what the interest rate will be, hence the LM curve could be $LM(M_1)$or $LM(M_2)$]. Thus, in this case, it may be better if the authorities set the interest rates instead the money supply so that the targeted income level of Y_0 could be achieved (Refer to Fig. 2.5)

Next, assume that the IS curve is unpredictable and moves between IS_1 and IS_2.and the target level of income is Y_0. The LM curve when authorities fix the money supply is labelled as $LM(M_0)$ while the LM curve when the authorities fix the interest rate is denoted by $LM(r_0)$. From Fig. 2.6, the output stays closer to Y_0 if money supply targeting is employed, $LM(M_0)$ compared to when the interest rate targeting is used,

$LM(r_0)$. (When the IS curves moves between IS_1 and IS_2, the former regime saw the income level fluctuating between Y_1 and Y_2 while the latter caused the income to fluctuate between Y_3 and Y_4). Thus, if the deviation of income stems from the unpredictability of the IS curve, then monetary targeting is more useful to ensure the deviation in the income level is not too far from the targeted income level.

However, if the authorities know the positions of the IS and LM curve, then it wouldn't make a difference whether it is fixing the interest rate or the money supply. However, in practice, the positions of the IS and LM curves are not known with absolute precision, and in the short-run the difference between setting interest rates and setting the money supply is critical **(Dornbusch *et al*, 1998).**

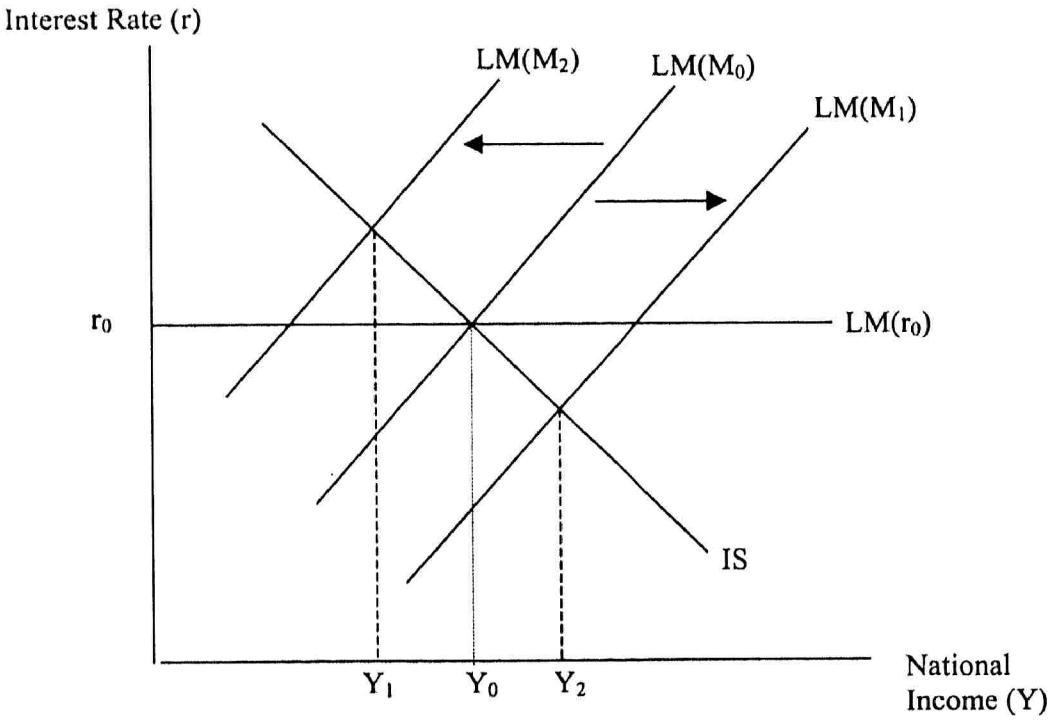

Fig. 2.5

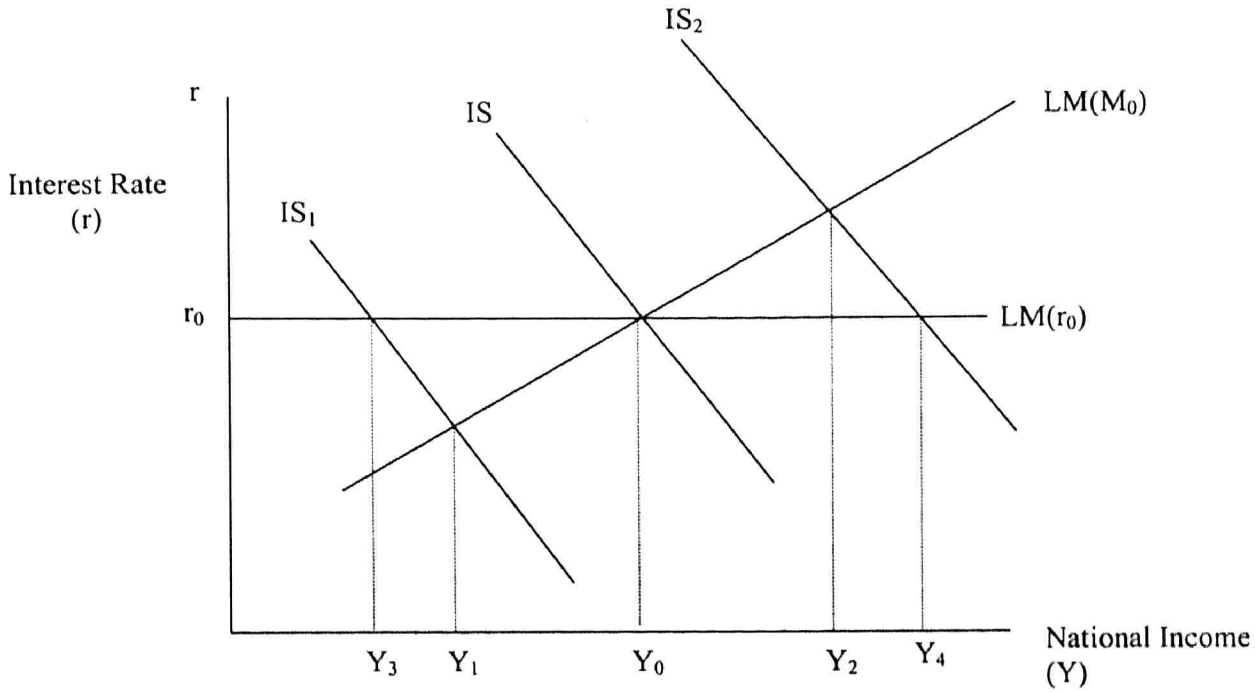

Fig. 2.6

In any event, the use of interest rates as the main mechanism of monetary control does comes with some potentially serious problems. Firstly, although the central bank can control the general level of interest rates, it cannot control differentials between rates on deposits and rates on other assets/liabilities, notably the loan/deposit spread **(Miller and Sprenkle, 1980; Curtbertson, 1993; Chowdhury *et al*, 1989)**. Besides, lags between changes in interest rates and in response of either monetary or wider economic variables are long and variable. In addition, increases in interest rates cause immediate dismay to large segments of the population (i.e. recent house buyers on variable-rate mortgages or small businessmen who rely on bank credit). Thus, this may be politically a bad move as against such patent unpopularity, the economist or central banker cannot state with any confidence how any level of interest rates will affect the monetary aggregates or the economy over any particular period.

2.2.2 Targeting the Monetary Base

Essentially the monetary authorities can control the monetary base exactly, and if this were the main task, then it would be fairly easy for the monetary authorities to accomplish their aim. However, this approach may entail the problem of completely missing the ultimate of other targets. In this context, the unpredictable changes in the money multiplier and velocity may break the tight link between the money base and the nominal GDP.

2.3 Monetary Policy and Interest Rates

The real rate of interest is by definition, the difference between the nominal interest rates and the expected rate of inflation. Thus, $r = i - \pi^e$, (2.2)
an equation known as the **Fischer** identity. Essentially, the change in inflation resulting from the change in money growth is reflected one-for-one in the nominal interest rate, a hypothesis known as the Fisher effect.

To provide relative price stability, variations in interest rates have to be avoided by the monetary authorities. Otherwise, the monetary authorities may try to restore equilibrium through their variation whenever there is monetary disequilibria. Suppose there is an inflationary gap, the Central Bank should support a rise in interest rates to reduce the growth of money while a recession should be complemented with a fall in the interest rates in the hope of stimulating a dwindling economy. Such is the transmission of monetary policy via the interest rate channel working through the conventional IS-LM framework.

According to **Cencini (1995)**, the arguments of increasing interest rates in the wake of an inflationary gap between money and output has to be looked at from the perspective of trying to distinguish between the supply and demand for money. He argues that as far as available income is concerned, it is obvious that interest rates cannot modify its amount. In essence, an increase in interest rates will probably reduce the demand for loans and create difficulties for debtors, but the income already created will remain unaltered. The impact of the increase in the interest rates would have been making bank debts more expensive hence discouraging entrepreneurs, which leads to a fall in the demand for money. Ultimately, firms will reduce their production, which will also lead to a reduction in the quantity of money. However, this process is not met with a corresponding decrease in inflation since the contraction of money had already been offset by an equivalent reduction in current output.

2.3.1 The Relationship between Interest Rates and Exchange Rates

In the light of the recent currency crisis, there is a need to look at the relationship between the interest rates and exchange rates. Tight monetary policy is necessary to support the exchange rate and curb inflationary pressures, thus in short, higher interest rates make speculation more expensive by increasing the cost of shorting the domestic currency. In addition, higher interest rates increase the return that an investor obtains from investing in the country and in the long-run, the higher interest rates may affect the exchange rate by reducing absorption and improving the current account **(Goldfajn and Baig; 1998, *a Working Paper of the International Monetary Fund*).** Basically, such approach has monetary policy working through the exchange rate channel. For instance, a tight monetary policy will lead to interest rate differential

between the domestic money market and the international money market, which in turn affects the capital flow. Ultimately this will affect investment and output.

However, some economists like **Jeffrey Sachs (1998)**, believe that high interest rates would not have stabilized the currencies in the case of the Asian crisis. He added that it is entirely possible that in the unique conditions of the midst of a financial panic, raising interest rates could in fact, have the perverse effect of actually weakening the currency. In fact, many have questioned the desirability of monetary policy in raising the interest rates to support the exchange rate. Hence, although high interest rates may eventually stabilize the exchange rate, the costs may be very high. The trade-off in embracing an overly tight monetary policy is usually identified with issues like a large recession, unemployment, financial system bankruptcies, credit crunch and corporate failures. In this respect, letting the exchange rate to float freely may be the best option considering all the potential implications of an overly tight monetary policy. However, there are also costs that are involved in having a depreciated currency. As **Goldstein (1998)** puts it, when market participants lose confidence in a currency and attach a high probability to further falls, it is difficult to induce them to hold the currency without higher interest rates. In addition, halting a free fall of the currency takes on added importance when banks or corporations in the crisis countries have large foreign currency obligations coming due in the short term.

For instance, **Eichenbaum and Evans (1995)** investigate the effects of shocks to U.S. monetary policy on exchange rates. According to their results, a contractionary shock to U.S. monetary policy leads to persistent, significant appreciations in the U.S. nominal and real exchange rates. It short, in their finding, a contractionary shock in

the U.S. monetary policy is followed by sharp, persistent increases in the U.S. interest rates, and sharp, persistent decreases in the spread between foreign and U.S. interest rates. In addition, they also found that the maximal effect of a contractionary monetary policy shock on U.S exchange rates is not contemporaneous; instead the dollar continues to appreciate for a substantiate amount of time, hence contradicting the conventional rational expectations models. It appears to be also inconsistent with the hypothesis of uncovered interest rate parity[3]. In conclusion, a shock to the U.S. monetary policy is thus, associated with persistent expected "excess returns".

2.3.2 Real output, Short-term and Long-term nominal interest rates

Ben S. Bernanke and Alan S. Blinder (1992) have demonstrated a strong correlation between measures of the short-term nominal interest rate and the real output. However, the traditional text-book theoretical models link long-term real rates with output and it is also generally presumed that there is at best an imperfect link between short nominal rates and long real rates. In a study by **Fuhrer and Moore (1995)**, they estimated an unconstrained vector autoregression (using U.S. data) in order to characterize the dynamic interactions among short-term rates, inflation and real output. According to them, they found that the long real rate and the short nominal rate behave remarkably alike. From their study, they concluded that real output is strongly negatively correlated with the short-term nominal rate. In quarterly data since 1965, real output was found to be strongly negatively correlated with the short-term nominal rate. However, when they construct the expected long-term real rates from an unconstrained vector autoregression for inflation, the 3-month Treasury bill rate

[3] According to this hypothesis, the larger interest rate differential induced by a contractionary U.S. monetary policy shock should be offset by expected future depreciations in the dollar.

and real output, they found that the long-term real rate looking like the bill rate. Consequently, they found that the long real rate also explains the output quite well.

2.4 Inflation Targeting: Another Variation to Monetary Policy

Additionally, the country may contemplate the inflation targeting policy. Basically, inflation targeting framework for monetary policy is adopted in certain countries due to their unsatisfactory experience with the monetary base targeting or the fixed exchange rate policies. In essence, the central bank forecasts the future path of inflation rate; with the difference between the forecast and target determines the required adjustment of the monetary policy instrument. Hence, the monetary authorities would reduce the money growth whenever inflation appears to be developing. Inflation targeting has, in recent years attracted increasing attention around the world, with the concept first emerged in New Zealand back in the late 1980's. Since then, Canada, the United Kingdom, Finland, Sweden, Australia and Spain all have adopted this approach since then.

The use of inflation targets may also be seen as a further step in the evolution of monetary policy strategies adopted by central banks. In fact, one of the main reasons for adopting inflation targets is to enhance the credibility of monetary policy. The instability of money demand functions (in part due to financial liberalization) in the inflation targeting countries in recent years has raised the possibility that there may be a more stable relation directly between inflation and short-term interest rates, compared to the relationship between short-term interest rates and the monetary aggregates **(Debelle, 1997).** Inflation targeting regimes are able to accommodate

shocks in the demand for money while also having a more direct influence of inflation expectation than its monetary targeting counterpart. At a more general level, inflation targeting framework seeks to reconcile the conflict between credibility and flexibility that is inherent in the choice of the exchange rate/monetary regime **[Frankel (1995), Edwards and Savastano (1999)]**. Focusing on the final goal of an inflation target avoids the potential loss of credibility from frequent changes to an intermediate target (like a monetary aggregate). In addition, inflation targets are easily monitored/visible and can also served as an anchor for inflation expectations.

In essence, increased transparency about the formulation of monetary policy is an essential ingredient of inflation targeting. Such transparency is especially important given the nature of an inflation targeting – where the monetary authorities' inflation forecast is used as an intermediate target **(Svensson, 1996)**. With exchange rate or monetary aggregate as an intermediate target, the public (including market participants) can assess whether the monetary policy is on track through the examination of current data. With inflation targets, however, any judgement of the appropriateness of policy relies on understanding the determinants of future inflation and how the authorities view these determinants **(Lane, T. & Samiei, H., 1997)**. In this respect, inflation targeting appears to be dependent on the dissemination of the data on the basis of which the monetary authorities arrive at their policy decisions.

However, there appears to be certain setbacks in this particular regime. Firstly, such a policy may eliminate the monetary authorities' ability to smooth fluctuations in real output and employment. For instance, in the face of an adverse supply shock (in which prices are raised and output falls) inflation targeting may lead the monetary

authorities to reduce the money supply at a time when the economy is already sliding into a recession.

2.5 The Mundell Fleming Model

The simplest assumptions pertaining capital movements are that there are no barriers to capital mobility: the case of capital mobility. Ideally, when there are limited barriers to investment, risk neutral investors are most likely willing to make large changes in their portfolios in response to small rate-of-return differences. Thus, perfect capital mobility implies that if there were any difference in the expected rate of return between domestic and foreign assets, investors would put all their wealth into the asset with better yields. The expected rate of return on foreign assets in terms of domestic currency is the foreign interest rate plus any expected increase in the price of foreign currency. However, if the investors do not expect the exchange rate to change, then the expected rate of return is simply equal to the foreign interest rate.

$$i = i^{*} \tag{2.3}$$

where i^{*} = the foreign interest rate.

2.5.1 The Flexible (Floating) Exchange Rate Regime

With a floating exchange rate, the aggregate demand is determined by the LM and IS curve which takes into consideration that the expected rate of return is equal to the foreign interest rates. In short, the system takes the equation (2.3) thus the LM and IS curves becomes as follows:-

The LM curve

$M/P = L(i^*, Y)$, (2.4)

($L_{i^*} < 0$ and $L_y > 0$)

M = money supply, P = price level, Y = national income

The IS curve

$Y = E(Y, i^* - \pi^e, G, T, \varepsilon P^*/P)$ (2.5)

π^e= expected inflation, G = government expenditure, T= tax, $\varepsilon P^*/P$ = the real exchange rate (the price of foreign goods in units of domestic goods), P = local price, P^*= foreign price, E = planned expenditure, Y = national income, ε = exchange rate

$0 < E_Y < 1$, $E_{i^* \cdot \pi^e} < 0$, $E_G > 0$ and $E_T < 0$

Since an increase in $\varepsilon P^*/P$ raises planned expenditure, the IS sloped upwards while the LM curve is vertical as the exchange rate does not affect the money demand.

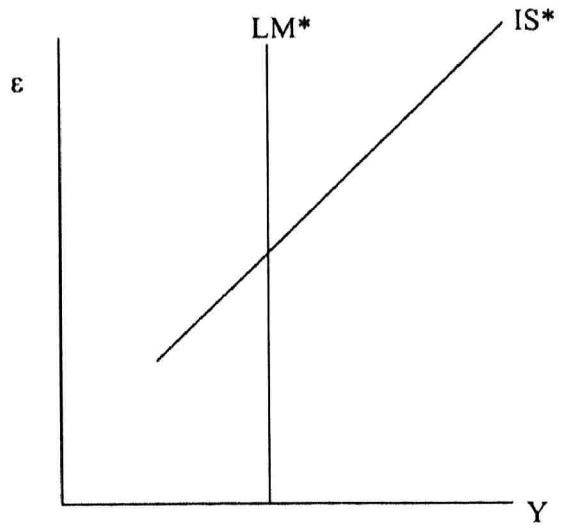

Fig. 2.7

Basically, in a flexible exchange rate regime, an increase in nominal money stock will lead to the LM curve shifting to the right (refer to Fig. 2.8). This will lead to a fall in the local interest rates thus the interest rate differential will favour the international

rates and assuming perfect capital mobility, there will be unlimited capital outflows. Such will lead to a downward pressure on local currency. From Fig. 2.7, an increase in the money supply will shift the LM curve to the right thus intersecting the IS curve at a higher exchange rate (local currency depreciated). The depreciated local currency will however, increased net exports and so, the IS curve will shift to the right thus leading to an even higher output (Y').

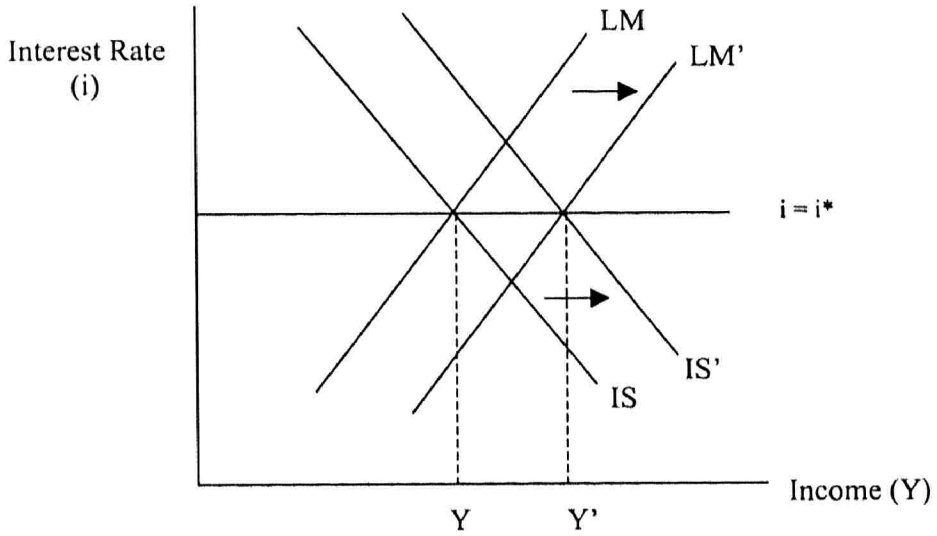

Fig 2.8

With a flexible regime with capital mobility, the authorities will again have monetary control but in this case, the monetary conditions abroad pose a great concern to the domestic monetary authorities (for a small economy). For instance, a tightening of monetary policies abroad would lead to a downward pressure on the exchange rate and upward pressure on domestic prices unless domestic monetary policy is also contracted. In any case, although the monetary authorities have increased control over domestic monetary conditions with the increased liberalisation (capital flow and

flexible exchange rates) there is still the need to coordinate monetary policy with exchange rate policy.

2.5.2 The Fixed Exchange Rate

If the exchange rate is pegged at some level ε^*, thus

$$\varepsilon = \varepsilon^* \tag{2.6}$$

In this case, the money supply becomes endogenous rather than exogenous. This is because, if the government is going to ensure a fixed exchange rate, it must stand ready to buy or sell the domestic currency at the rate of ε^*. Such is the case that it cannot independently set the money supply M but rather, it has to make constant adjustments to ensure that the exchange rate remains at ε^*.

Thus, according to the Mundell-Fleming model with a fixed exchange rate (refer to Figure 2.9), the LM equation in equation (2.4) can be neglected as it only serve to determine the money supply M. Disturbances in the money market have no effect on Y for a given P. For instance, a rise in the demand for money will lead only to an increase in the money supply. The aggregate demand for this particular model is therefore made up from the following:-

- LM curve - $M/P = L(i^*, Y)$
- IS curve - $Y = E(Y, i^* - \pi^e, G, T, \varepsilon P^*/P)$
- $\varepsilon = \varepsilon^*$

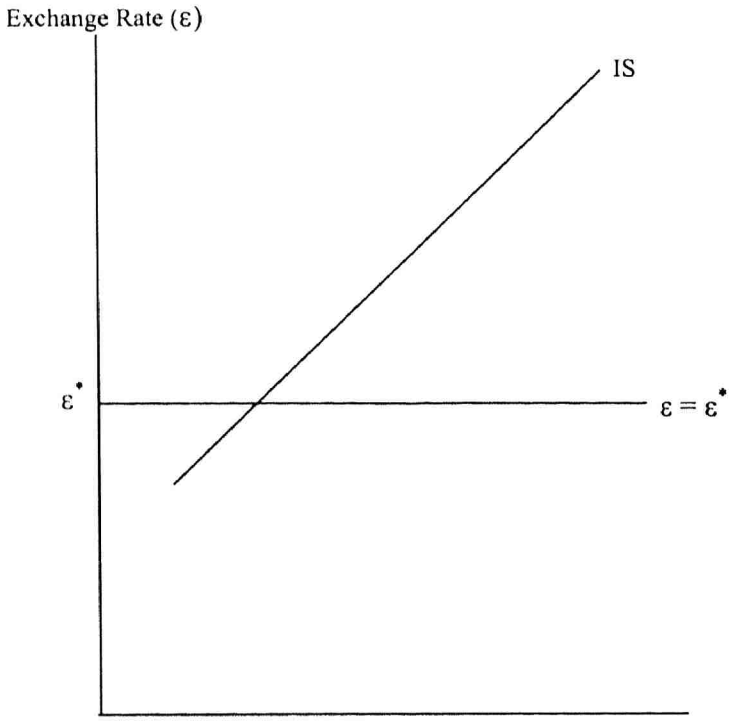

Fig. 2.9

Although the exchange rates and international capital flows provide additional transmission channels in an open economy, however, with fixed exchange rates, the monetary authorities are not in full control of the money supply. This is because the control of the money supply under the fixed exchange rate would be hampered by international capital mobility which, will prevent the domestic interest rates from deviating substantially from international levels. For example, a contractionary monetary policy (reduction in money supply) will lead to an increase in the domestic interest rates. But the interest rates increase will lead to an increased in capital inflow, which will lead to an increase in the money supply and a fall in the interest rates.

2.5.2.1 Devaluation as a Policy Instrument

In any case, with a fixed exchange rate, the exchange rate can by itself act as a policy instrument. For instance, if a country opts to devalue its currency, this can stimulate net exports and thus, increased aggregate demand. This can happen since in equation (2.6), a devaluation in the exchange rate (an increase in ε^*) will lead to a rise in the national income (aggregate demand). The increase in the aggregate demand is due to an increase in net exports.

2.5.3 Imperfect Capital Mobility

The assumptions of perfect capital mobility may be considered overly simplified since that if there exists transactions costs or the desire to diversify, investors may not put all their wealth into a country's assets in response to small changes in the interest rates. The model of an imperfect capital mobility assumes that the capital flows depend on the difference between domestic and foreign interest rates. Capital flows (CF) in this case, can take the form of an equation,

$$CF = CF(i - i^*) \qquad (2.7)$$

The aggregate demand side of this model comprises:-

LM Curve: $M/P = L(i^*, Y)$

IS Curve: $Y = E^D(Y, i^* - \pi^e, G, T) + NX(Y, i^* - \pi^e, G, T, \varepsilon P^*/P)$

$E^D( )$ = the domestic resident's planned expenditure, while $NX( )$= net exports

Since the capital flows should equal (and also opposite) the value of the net exports, we can substitute it for the net exports in the IS curve. Thus, the IS curve in this model becomes

IS Curve: $Y = E^D (Y, i^* - \pi^e, G, T) - CF(i - i^*)$ (2.8)

Since the interest rate affects Y in equation (2.8) through the domestic expenditure and the net exports (or the capital flows), the IS curve in this model (imperfect capital flow) is flatter than the conventional IS curve (Refer to Figure 2.10). In the case of a perfect capital mobility, the IS curve is flat at $i = i^*$.

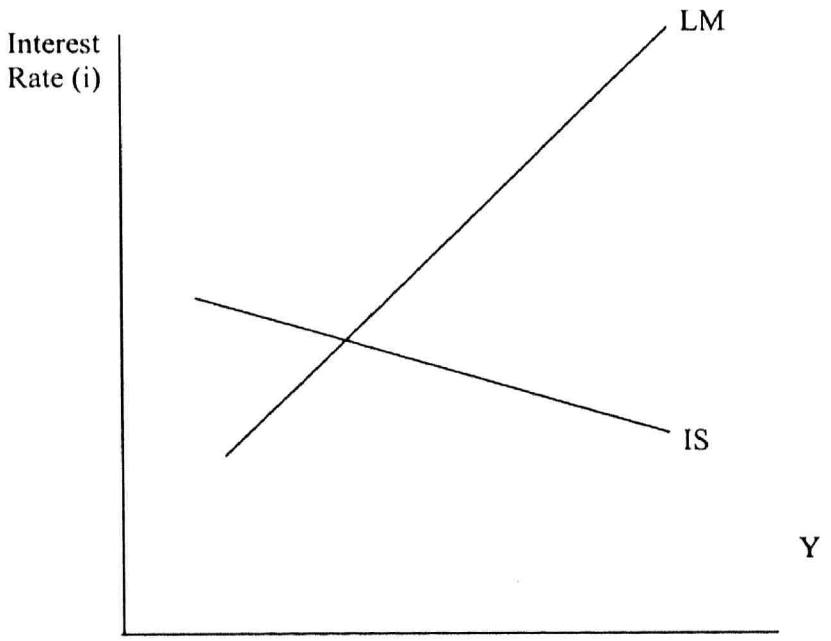

Fig 2.10

2.6 The theory of "overshooting"

In essence, in the concept of "overshooting" can be termed as a situation where the initial reaction of a variable to a shock is greater than its long run response. For instance, a restrictive monetary policy, which leads to a rise in the interest rates, will lead to a capital inflow. However, the inflow of capital may appreciate the external value of the home currency so far that the future expected depreciations just offset the interest differential.

In the Mundell-Fleming model, it assumes that the exchange rate expectations are static. Since static expectations are not rational, investors with static expectations are in fact, making systematic errors in his/her exchange rate forecasts. However, if investors form their expectations from by using all available information, they are considered having rational expectations. In this respect, under the fixed exchange regime, investors have static expectations – thus rational, but in contrast, the flexible exchange rate regime is likely to render the expectations as non-static. When expectations are not static, perfect capital mobility no longer necessarily implies that the domestic and foreign interest rates to be equal. In this case, the interest rates differences must be offset by expectations of exchange rate movements. In a simplified form, the equation would be;

$$i = i^{*} + E[\varepsilon(t)]/\varepsilon(t) \qquad (2.9)$$

From the equation (2.11), under the perfect capital mobility, interest rates differences, $i - i^{*}$ must be offset by expectations of exchange rate movements, $E[\varepsilon(t)]/\varepsilon(t)$. Thus, the domestic interest rates (i) can only exceed the foreign interest rates (i^{*}) only if the domestic currency is expected to depreciate at a rate equal to the interest rate differential. Hence, the possibility of an expected exchange rate movements associated with interest rate differences gives rise to the possibility of exchange rate overshooting **(Dornbusch, 1976).**

For instance, assume that the central bank initiates a contractionary monetary policy. Thus, the country's interest rates will rise above those of other countries. Thus, there will be a rush of capital inflows into the country. Thus the country's currency will appreciate. In this context, the question will be that when will the short run

equilibrium be reached? The answer lies in the arguments that the rise in the country's external currency value must be large enough that investors expect it to fall in value subsequently, thus offsetting the interest rate differentials.

From equation (2.9), if the monetary expansion reduces the interest rates, then the equation will imply that the expectations of the exchange rate movements be negative. Thus if $i < i^*$, investors will only hold domestic assets if they expect the domestic currency to appreciate. However, in this context, this will mean that the domestic currency is worth less than it will be in the long run; that is, it must have depreciated by so much at the time of the monetary shock that it has overshot its expected long run value. Basically the important feature of the adjustment process is that the movement rate of the exchange rates and prices are not the same. For instance, expansionary monetary policy will lead to a fall in the interest rates but although the exchange rate adjusts immediately, prices only adjust gradually.

Basically, once the restrictive monetary policy is employed, the interest rate will decline thus leading to all investors going for the foreign currency to obtain the higher-yielding foreign assets. As this will not lead to an equilibrium, the price of the domestic currency is eventually bid down until it is sufficiently below its expected long-run level that the expected appreciation just balances the lower interest rate on domestic assets. In the case when the IS equation is assumed to hold continuously, an increase in the money supply may no longer necessarily reduces the interest rates.

2.7 Monetary Policy in the Mundell-Fleming model

In the Mundell-Fleming model, under conditions of capital mobility and flexible exchange rates, a small country can conduct an effective monetary policy, at least in the short-run. In particular, the exchange rate can prove to be an effective channel for the transmission of monetary changes to an increase in aggregate demand and output. In this respect, the exchange rate may be the only effective channel as the interest rate may not be critical since the monetary expansion can actually lead to an increase in the interest rate. However, in the long run, the inflation that is induced by the output expansion serves to reduce real balances and thereby return interest rates, relative prices and real income to their initial level.

Basically the implications stems from the differences in adjustment speeds in the goods and assets markets. It is the assumption that exchange rates and assets markets adjust faster relative to the assets markets that ensures the dynamic aspects of the exchange rate's role in the monetary policy. However, it is during the adjustment process that the rising prices may be accompanied by an appreciating exchange rate thus the trend behaviour of exchange rates stands potentially in strong contrast with the cyclical behaviour of the exchange rates and prices.

In essence, the effect of monetary policy on interest rates and exchange rates is significantly affected by the behaviour of the real output. If the real output is fixed, the monetary expansion will lower the interest rate and overshoot the depreciation of the exchange rate in the short run while if the real output is variable and responds to aggregate demand, then the changes on the two variables due may be dampened.

Although the exchange rate may still depreciate, it may not overshoot and interest rate may actually rise!

Since the possibility of the short-run output adjustments can dampen the exchange rate movements and possibly reverse the interest rate effects of the monetary expansion. Since in the very short-run the output does not adjust instantaneously (with the adjustments confined only to the assets markets), thus the interest rates will decline while the exchange rate will overshoot. Thus, if the output adjust sluggishly to aggregate demand, the monetary policy will be effective through both the interest rate and exchange rate channel.

2.8 The Significance of Capital Controls

The recent Asian currency crisis has, to a certain extent awakened a renewed interest in the use of capital controls. As far as capital controls are concerned, in some countries, the structure of controls appears to be a legacy of the past while in others capital controls are actively used as instruments of macroeconomic and structural policy. In such regards, the design and planning of capital account liberalization would require the knowledge of factors that have generally led to the regulation or deregulation of components of the capital account. **Alesina, Grilli, and Milesi-Ferretti (1994)** and **Grilli and Milesi-Ferretti (1995)** found that capital controls are more likely to exist in countries with fixed or managed exchange rate regimes, lower per capita incomes, larger government as a ratio to GDP, less independent Central Banks and larger current account deficit.

Generally speaking, there appears to be a number of different motivations for maintaining controls on capital movements. Firstly, capital controls have often been associated as a one of the instruments for balance of payments and macroeconomic management. However, although the exchange controls appeared to be a rationale decision for countries carrying a weak balance of payments, the evidence that such controls have protected the balance of payments in developing countries against an outflow of funds, have been weak **(Johnston and Ryan, 1994).**

Capital controls are also sometimes linked to the objective of protecting a fixed exchange rate regime. For instance, during the recent currency crisis, Malaysia resorted to the use of capital controls. Then, the heavily devalued/unstable Ringgit had led to an outflow of portfolio funds. Thus, with the Ringgit was pegged at 3.80 per US dollar, the Malaysian government resorted to a wide range capital and exchange controls in their bid to stabilize short-term capital flows.

Of course, there are many other reasons for countries to engage in capital controls. Some of them include underdeveloped financial markets and regulatory systems, prudential reasons, the economic size (larger countries have more opportunities as far as investment diversification, hence less incentive to open their capital account), and the overall openness of the economy. In any event, the use of capital controls can be useful and effective in certain circumstances. Even in today's globalised financial world, there are examples of successful use of capital controls, notably the experience of Chile, or to a certain extent, Malaysia which have demonstrated that the need for a role for capital controls. In addition, China's isolation from the recent crisis have also given somewhat some intellectual credence to the proponents of capital account

restrictions. However, before one gets carried away, there remains some scepticism in this rationalization. For one, there is some trade-off between macro-stabilization (from the use of those controls) on one hand and the cost of capital/growth (which will stand well above world rates) on the other. For example, **Edwards (1999)** found that in the recent Chile experience, the controls on outflows have not been effective but the controls of inflows have probably led to liabilities of longer maturities thus increasing the cost of capital.

2.9 Central Bank Independence

There are many theories which suggests that inflation is related to variables like the costs of inflation, policymaker's ability to commit, and many other non-quantifiable variables which are rather hard to be measured. In this respect, one recent non-monetary determinant of inflation that has gained much attention recently is the independence of the central bank. According to **Alesina (1988)**, central bank independence provides a measure of the delegation of policymaking to conservative policymakers. In essence, the greater the independence of the central bank, the greater the government's ability to delegate policy to individuals. The independence of a central bank can be measured by factors like how its governor and board are appointed and dismissed, whether there are any government representative on the board and whether the government posses the power to override the bank's decisions.

Although there are some studies which has revealed the negative relation between inflation and central bank independence **(Alesina, 1988)**, others like **Cukierman (1992)** found a much weaker relationship, if any between inflation and central bank

independence in developing countries. Basically, the weaknesses of studies which advocate the negative relationship between these variables is the fact that the central bank independence is negatively related to inflation doesn't mean that they are related. A simple negative correlation need not imply causation; countries which have an underlying aversion to inflation may also likely to establish independent central banks to ensure that the inflation is kept under control. **Posen (1993)**, argues that countries with a dominant financial sector will have a stronger political opposition to inflation, thus they are more likely to create more independent central banks to fight against inflation.

Loungani and Sheets (1997) meanwhile, show that the association between central bank independence holds in transition economies although **Fuhrer (1997)** argues that central bank independence has little power explaining cross-country differences in inflation, once additional macroeconomic variables (i.e. unemployment and interest rates) are included.