Chapter 1

INTRODUCTION

1.1 Background

Since 1966, the monetary environment in Indonesia has been mostly characterised by policies aimed at raising foreign reserves, depreciating exchange rates and keeping low inflation rates. Inflation rates (measured by the GDP deflator) were on average of 8.6 per cent during last 15 years, a great success compared to the inflation rate of 600 per cent in 1965 inherited from the old regime (Nasution 1983, p. 1). The ratio of current account deficit to GDP has been kept at 1.5 to 3.5 per cent as a result of devaluing or depreciating strategy, and foreign exchange reserves have frequently been at approximately five months import needs (The Minister of Trade, 1994).

During the oil boom in the 1970s, monetary policies were characterised by heavy direct credit controls. As the domestic economy experienced buoyant oil revenues both through the balance of payments and the government budget, the banking system found themselves with excess reserves and therefore it was easier to give more loans. Combined with fixing domestic interest rates below international rates, credit ceilings during that time proved that the central bank was able to reduce the potential expansionary effect of the balance of payments surplus on the money stock, and therefore reduce the inflation rate (Lane et al. 1993, p. 145). The role of the balanced budget in that time in moderating the inflation rates, however, could not be ignored. Having the bulk of oil revenues, the fiscal authority, who was subject to the balanced budget constraint, deposited the oil money in the banking system which was known as hidden money to sterilise the monetary impact of the balance of payments (Nasution 1983, p. 37). Allocation of a large portion of government budget to develop the agricultural sector and for basic physical and social infrastructure stimulating growth kept the moderate inflation rates (16.7 per cent) compared to period 1965-1973 (34 per cent). Accumulation of foreign exchange reserves together with lowering the inflation rates became the main concerns in that time (Lane et al. 1993, p. 137).

Financial decontrol began in 1980s when oil revenues fell. Because oil revenues became unstable, financial and monetary policies have been designed to mobilise domestic financial resources and promote their efficient use. A major financial reform was initiated in June 1983, involving removal of interest rate and credit ceilings for state bank operations and introduction of new instruments of monetary control in 1984 and 1985. A new set of financial measures was further introduced in October and December 1988 aimed at enhancing financial sector efficiency and developing capital markets. Monetary management in 1980s was adopted to control inflation, curb exchange rate speculation, attract capital from abroad and protect foreign exchange reserves. As oil revenues became erratic in 1980s, government expenditures were also sharply curtailed, partly by rephasing large, capital-intensive projects in May 1983. A major tax reform was initiated, starting in January 1984 to raise domestic revenues and decrease dependency on oil revenues and foreign borrowing. Follow-up steps were also taken to strengthen tax administration. During the period 1980-1990, Government lowered the inflation rate (measured by the CPI) to on average 8.57 per cent compared to the rate of 17.2 per cent in 1970-1980.

Being a part of those measures, exchange rate policies have been adopted to increase competitiveness of non-oil products to offset unstable oil revenues. The rupiah was devalued three times, 50.60 per cent in 1978, 43.54 percent in March 1983 and 45.87 per cent in September 1986. The exchange rate has been made more flexible since March 1983 by shifting from the adjustable peg to a crawling managed float. These policies were intended to give the central bank more ability to control the money supply and to boost non-oil exports, and since September 1986 the monetary authorities took a continual depreciation strategy of nominal exchange rate of roughly no more than 5 per cent per annum which has kept the real effective exchange rate roughly unchanged. The shifting role of non-oil sectors compared to oil sector in trade balance during 1986s up to 1993 may be due to the success of this depreciation strategy. Supporting the exchange rate policy, some trade policies have also been introduced to get wider access in international trade.

To some extent, those measures successfully restored macro economic stability while protecting economic growth during the 1970s and 1980s. Considering the relative success of past monetary experiences, the Minister of Trade on the seminar 'Indonesia Update' (Canberra, 1994) stated that the government will continue to manage the economy prudently. Currency depreciation will be kept at not less than 5 per cent per year, inflation at levels not higher than 5 per cent, and the current account deficit at

around 2 per cent of GDP. Further careful management of monetary policies through money supply and exchange rate management will be conducted in the future in line with fiscal policies to encourage economic growth.

1. 2 Research Problem

In theoretical ground, controllability and reliability of money are two crucial issues in adopting monetary stabilisation policy. According to Treadgold (1990, p. 16), controllability refers to the extent to which selected monetary aggregates are capable of being controlled by the monetary authority and the means by which control is exerted, while reliability refers to the extent to which these aggregates are reliably (i.e. possess close and systematic relationships with) linked to the ultimate target variables of macro economic policy.

Indonesia is a small open economy where development in its balance of payments will affect the domestic economy. A study by Leod (1993, p. 106), for instance, indicated that beside the government budget, the balance of payments has been one of the dominant causes of changes in the money base. Furthermore, unlike many developing countries, Indonesia has been the most open economy in terms of capital movements (Thorbecke 1992, p. 93) in which domestic interest rates should adjust to world interest rates. In this circumstance the money supply becomes demand determined and it is unlikely that monetary authorities alone can fully control the money supply especially in the long run.

Assuming exogeneity of money, conventional wisdom suggests that controllability of money will depend on the stability of the demand for money. Some studies, Boediono (1985) for example, suggested that the demand for money in Indonesia was stable. A well defined and stable demand for money function, as Treadgold (1990, p. 18) noted, however, is not a sufficient condition for monetary policy to have predictable effects on ultimate target variables such as inflation, employment, real output and balance of payments. Treadgold noted that the money supply in this circumstance may be an endogenous variable governed by the behaviour of the demand for money. As a consequence, to give a high degree of money reliability, efforts to influence the demand for money become crucial. As Otani (1991) argued, the government budget can be used to influence the demand for money through domestic credit creation. A contractive government budget, for instance, can reduce domestic credit creation and therefore result in excess demand for money and vice versa. This policy becomes crucial in the success of accumulating foreign reserves conducted by the

central bank through which the government would also plan to depreciate exchange rate as a part of stabilisation policy.

For the case of Indonesia, the balanced budget applied has had important role for the success of monetary policy. A similar view can be found in Leod (1993, p. 106) that in the lack of stability in money growth there was relative importance of government budget policies, the balance of payments, and interest rates in monetary outcomes. In exchange rate targeting, a contractionary policy of money market transactions conducted by the central bank alone would not likely be able to damp the expansion of the money base due to the monetary impact of a balance of payment surplus without being partially offset by a contractive government budget. The conduct of monetary authority to control the money supply then has always been influencing the demand for money by taking advantage of the role of the government budget. This implementation has become a continual pattern of monetary policy in Indonesia since 1970s when Indonesia implemented the rough instruments of monetary policy and through the 1980s even though the financial environment has been indirectly controlled by introducing money market instruments.

Reliability and ability to control money is also related to the choice of exchange rate management. In the case of the stabilisation program in Indonesia, recent doubts about the controllability and reliability of money under the current managed floating exchange rates came to the surface pointing conflicting targets and inability to conduct sterilisation. In 1970s when the managed floating tended to be pegged to the US dollar, often exchange rates targeting became a victim of price targeting. In November 1978, for example, the rupiah was devalued at about 50.6 per cent to maintain a stable price and international competitiveness. The more recent experiences in 1980s, the rupiah was also devalued twice in March 1983 and September 1986. After September 1986, the monetary authority took a continual depreciation strategy with the cost of a likely increase in price levels.

Fane (1994, p. 8) argued that adopting a managed float both for raising the central bank's foreign reserves while maintaining the competitiveness of non-oil exports through depreciation strategy would be useless. Fane suggested to stop trying to keep down the real exchange rate continuously along with managed nominal depreciation to accumulate foreign assets and domestic debts. Instead, he suggested a floating exchange rate combined with a tight monetary policy. His objection was that the managed floating rate should be put under friction both in international capital mobility and in the setting of domestic nominal wages and prices. As an example, Fane argued that although there

were high interest rates and foreign asset accumulation combined with a low domestic credit and money supply at the end of 1991, these sterilised actions could not occur in 1992 with the signs of an increase in the money supply and prices.

A more recent study by Pangestu (1994, p. 6), however, indicated the contrary argument from Fane's study. Pangestu implicitly gave a reason why Fane's scenarios could occur if there was evidence of strong domestic demand. During mid 1993 up to the first quarter of 1994, Pangestu noted that there were unstable capital flows. Huge capital inflows caused by net foreign assets to expand by Rp. 5.2 trillion in the five months to February 1994. Three months later, however, net foreign assets even declined more by Rp. 7.3 trillion, contributing to a huge decrease in base money by 19 percent in the fourth quarter of 1993 and 22 per cent in April 1994. At the same time there was an extension in domestic credit by central bank contributing to a large decrease in base money form 22 per cent in the fourth quarter of 1993 to 14 percent in March 1994. By these Pangestu proved that the central bank was able to control the money supply by offsetting the impact of these other factors on base money through the issuance of SBI (Bank Indonesia Certificates).

1. 3 Objectives of the Study

Based on the background given above an attempt to study the behaviour of some macro aggregates under the monetary stabilisation policy with both fixed and managed floating exchange rates is proposed. The study will look at the interrelationship between the money supply, foreign reserves, exchange rates, prices and other related variables. A monetary model of an open economy will be used here based on the monetary approach to the balance of payments with the starting point of the disequilibrium condition in the money market. Fiscal variables will also be included in the model to capture the role of the monetary impact of the government budget through domestic credit creation. Based on the monetary approach to the balance of payments, the objectives of this dissertation are as follows:

1. to construct a simple open monetary model based on the monetary approach to the balance of payments, test and estimate the model;

2. to recommend some relevant policies affecting monetary stabilisation.

Given the results, it is hoped to be able to give clear insights into the behaviour of some macro economic aggregates under the monetary stabilisation program and

hopefully guidance for monetary policy. This study may show us whether or not a conflict exists between exchange rate and price targeting. Given the changing role of the monetary authority, it may also give us an insight into whether fiscal policy has been put behind monetary policy or it is still at the front and how they are well coordinated.

1.4 General Theoretical Framework

In terms of policy contexts, the monetary approach to the balance of payments suggests that the monetary authority have some degree of control over the level of international reserves through the management of the composition of the monetary base, international reserves and domestic credit. To some extent the monetary authority can sterilise the impacts of the flows in the balance of payments. In the extreme case, this approach also suggests that the use of free floating exchange rate will give a wide capability of monetary authority to control the money supply.

Studies by Park (1985) of South Korea and Sa-Ngarmangkang (1986) of Thailand gave two examples that the monetary approach to the balance of payments provides a very useful theoretical and empirical framework. A few monetary variables included in the model made it simple and feasible for the analysis especially in the light of the economic structure and data available in these countries. As they proved, the monetary approach also provided useful policy implications.

1. 5 Outline of Remaining Chapters

Chapter two will review general economic performances and policies in Indonesia during the period 1971 to 1992. Chapter three provides the theoretical framework and review of some relevant literature on the monetary approach to the balance of payments. In chapter 4, the monetary model for Indonesia is developed. In this chapter careful attention will be given both to the nature of the exchange rate equation and the role of the monetary impact of the government budget. Chapter five will discuss the method of estimation and analyse the empirical results. Finally, conclusions including summary, policy implications and suggestion for further study will be provided in chapter six.

Chapter 2

An Overview of Macro Economic Performance, 1971-1992

2. 1. Gross Domestic Product

In 1992, Indonesia's nominal GDP was Rp. 255,089 billion with a per capita GDP of US$ 693.70. From 1970 to 1990, average growth of Real Gross Domestic Product (GDP) measured by the GDP deflator was 6.5 % per year, with the highest rate of growth of 7.2 % achieved in the 1970s when oil prices were high and the lowest of 5.8 % when oil prices fell in the 1980s (Table 2.1). Measured by the consumer price index, real GDP for the same periods grew higher magnitudes i. e. 8.64 %, 10.13 % and 5.99 % per year. Although real GDP measured by the CPI has a more volatile pattern, but it has better predictive power than real GDP measured by the GDP deflator since the first followed a similar pattern to nominal GDP (figure 2.1). Since the CPI is related to the costs of living of consumers, generally, those facts suggest that the government has successfully managed demand expansion to promote GDP growth without serious inflationary problems. This has been noted by Sundrum (1986, p. 66) pointing events for the period of 1968 to 1981, and as the data suggests, it has been relevant afterwards.

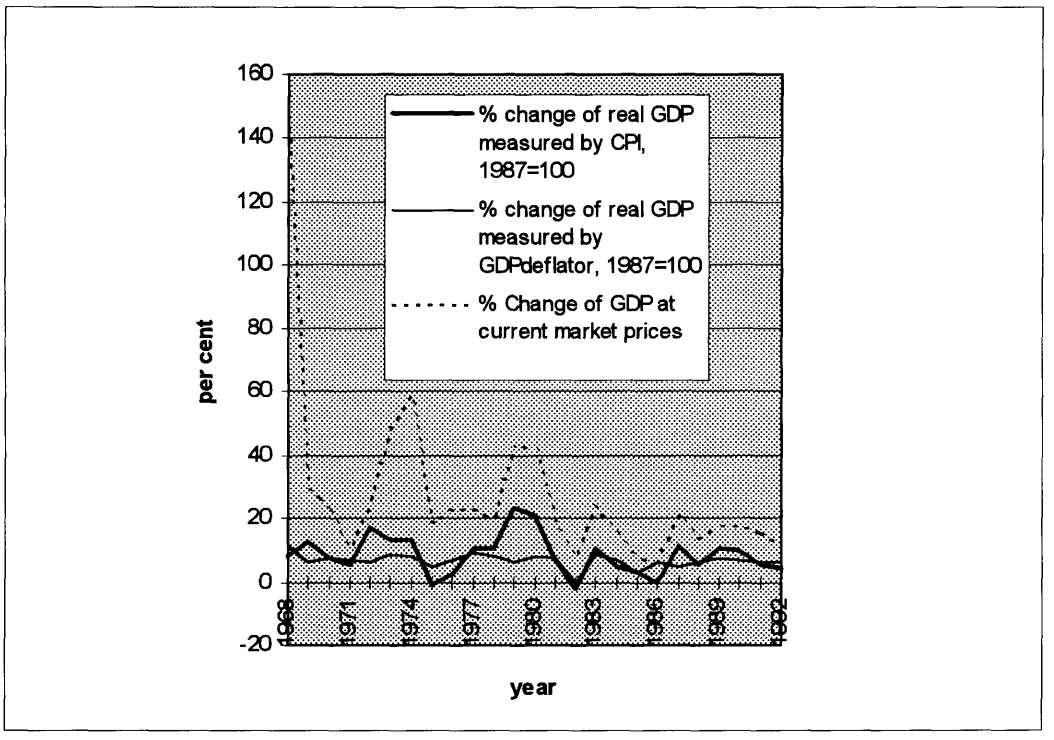
Table 2.1

Gross Domestic Product (GDP), 1967 - 1992

year	GDP at current market prices (billion rupiahs)	Changes of GDP at current market prices (per cent)	GDP at constant CPI, 1987=100 (billion rupiahs)	Changes of GDP at constant CPI, 1987=100 (per cent)	Changes of GDP at constant GDP deflator, 1987=100 (per cent)
1967	894.632		23917.44		
1968	2212.522	147.3108	25847.52	8.0697	11.3152
1969	2868.459	29.6466	29008.33	12.2287	6.1678
1970	3524.71	22.8782	31177.23	7.4768	7.3539
1971	3874.84	9.9336	32842.64	5.3418	6.9756
1972	4816.11	24.2918	38324.99	16.6928	6.294
1973	7126.039	47.9625	43274.93	12.9157	8.6633
1974	11299.5	58.5664	48803.82	12.7762	7.6782
1975	13341.4	18.0707	48400.48	-0.826	5.0203
1976	16321.4	22.3365	49400.85	2.0669	6.9071
1977	20084.39	23.0556	54748.23	10.8245	8.9743
1978	24002.49	19.5082	60520.8	10.5438	7.7262
1979	34344.71	43.0881	74486.24	23.0754	6.1574
1980	48913.5	42.4193	89887.75	20.677	7.9358
1981	58421.3	19.438	95648.44	6.4088	7.4232
1982	62646.49	7.2323	93683.44	-2.054	-0.35
1983	77622.99	23.9064	103840	10.8414	8.8094
1984	89884.99	15.7969	108861.9	4.8362	6.792
1985	96997	7.9123	112169.2	3.0381	2.6481
1986	102683	5.862	112089.9	-0.071	5.8006
1987	124817	21.5557	124817	11.3543	4.885
1988	142105	13.8507	131525.4	5.3746	5.805
1989	167158	17.6299	145382.5	10.5357	7.3416
1990	196920	17.8047	159385.6	9.632	7.0101
1991	227136	153443	168284.2	5.583	6.38
1992	255089	12.3067	175798.6	4.4653	5.7981
The average of annual changes (1970-80)				10.1304	7.2442
The average of annual changes (1980-90)				5.98960	5.8274
The average of annual changes (1970-90)				8.64100	6.4691

Sources: 1) IMF, International Financial Statistics; various issues
2) World Bank, World Tables, 1993

Figure 2.1
GDP growth, 1968-1992



Source: Table 2.1

Table 2.2 summarises the sources of growth from the demand side point of view (all in real terms based on the GDP deflator). It can be seen from this table that total consumption (private and government) has been the main source of GDP growth in the last 15 years. In the 1980s, almost two thirds (3.8 % out of 5.8 %) of GDP growth was derived from total consumption with its contribution rising to 68.6 per cent (4.6 % out of 6.7 %) in 1990s. This reflects the large share of total consumption (63 per cent in the 1990s) in the composition of GDP. Low inflation rates in both periods enabled consumer demand to be high. The contribution of Gross Domestic Investment (GDI) was approximately 44 per cent of GDP growth in the 1980s. Its decline to about 27 percent in 1990's was mostly due to the government attempting to cool down an overheating economy by tightening monetary policy in 1991. Because of this, domestic investment fell in 1992 and 1993. The contribution of resource balance (net exports and imports of goods and non factor services) to growth was negative in the 1980s mainly because of falling export revenues from oil and gas, but becomes positive after 1990 because of rising revenues from non-oil exports.

Table 2.2
Contribution to Growth of real GDP, 1980-1993 (%)

	Year		
	1980-1990	1990-1993	1980-1993
Total Consumption	3.8	4.6	4.1
Gross Domestic Investment	2.5	1.8	2.3
Resource Balance	-0.5	0.3	-0.4
Gross Domestic Product	5.8	6.7	6.0

Source: World Bank, World Tables, 1993

Sources of GDP growth can also be attributed to the developments in the supply side. Modifying the Cobb-Douglas production function, Sundrum (1986, p. 57) proposed three components of growth; effect of labor growth, effect of capital growth and effect of technical progress. Combinations of the first two will attribute to either the widening of capital or the deepening of capital. The widening of capital refers to a proportionate growth of capital and growth in employment keeping both labor productivity and technology constant. The deepening of capital refers to a rise in labor productivity due to the increase in capital per worker keeping the growth of employment and technology constant. Technical progress represents the improvement of labor skills, more efficient allocation of resources and better organisation of production. Due to the difficulties to separate these two effects, Sundrum combines the deepening of capital and labor productivity to be technical progress components measured by an incremental output-capital ratio (ICOR) in per capita terms. Based on his finding, the contribution of the growth of employment and widening of capital to the GDP growth increased from 1.85 % out of 7.90 % in the period 1967-73 to 3.24 % out of 7.51 % in the period 1973-81. For the same periods, the contribution of capital deepening to GDP growth also increased with a faster growth than the capital widening which were 1.24 % out of 7.90 % and 3.99 % out of 7.51 % respectively. A dramatic decrease of ICOR in contributing to GDP growth occurred from 4.81 % out of 7.90 % in the period 1967-73 to 0.28 % out of 7.51 % in the period 1973-81. This decreased ICOR suggested an increase in the productivity and a better efficiency of investment. For the period 1980-91, however, the contribution of ICOR to GDP growth was 4.7 % out of 5.6 % (World Bank, 1992) indicating a deterioration both in productivity and efficiency compared to 1973-81.

In terms of sectoral growth, the share of agriculture in GDP has steadily declined and that of industry increased over the last two decades (Table 2.3). Growing at an annual real growth rate of 4.8 percent from 1965 to 1973 and 2.8 percent from 1990 to 1993, agriculture's share declined from 38.2 percent in 1973 to 18 percent in 1993. Within the agricultural sector, the growth of food output was the highest, especially rice. This enabled Indonesia to achieve food self-sufficiency in 1984, a turning point from being the largest rice importing country in 1970s. In the same period, the share of industry increased from 12.6 per cent to 42 per cent with the average of annual real growth rates of 15.2 per cent in 1965-1973 and 8.6 percent in 1990-1993. Within the sector, the growth of manufacturing was the most rapid at 14.7 percent from 1973 to 1980 and 9.9 percent from 1990 to 1993. The principal products of the manufacturing sector are consumer goods, including processed food and beverages, tobacco products, textiles and garments, and electrical appliances. Production of intermediate goods such as chemicals, cement, glass, fertilisers, plywood, machinery, and basic metal products has also markedly increased in recent years.

Table 2.3

Growth and Distribution of GDP by Main Sector, 1965-1993 (%)

	Share of GDP (current prices)					Growth(1987=100)			
Sectors	'65	'73	'80	'90	'93	65'-73'	73'-80'	80'-90'	90'-93'
Agriculture	56	38.2	24.0	21.8	18	4.8	3.8	3.2	2.8
Industry	12.6	26.5	41.7	40.2	42	15.2	7.3	5.8	8.6
of which manufacturing	*(8.4)*	*(10.6)*	*(13.0)*	*(19.5)*	*(21)*	*(9.0)*	*(14.7)*	*(12.2)*	*(9.9)*
Services	31.4	35.2	34.3	38.0	40	5.0	10.1	6.8	7.2
GDP	100	100	100	100	100	6.6	7.2	5.8	6.8

Source: World Bank, World Development Report, various issues

Accompanying the changes in the structure of production, the structure of employment opportunities has also changed. In 1971, the agricultural sector employed 64.2 per cent of the work force which declined to 49.9 per cent in 1990. The number of those working in the industrial and service sectors has exceeded the number which have left the agricultural sector. This was achieved by targeting the agricultural sector in the early development plans.

The emphasis of the first three Five-Year Development Plans (1969/1970-1983/1984) was placed on the agricultural sector in order to achieve food self sufficiency. The greater portion of the government investment budget was allocated to the development of agricultural infrastructure such as irrigation, roads, agricultural extension, etc. Government also emphasised the expansion of supporting industries having backward linkages such as fertilisers and forward linkages to agriculture such as agricultural processed industries. In consequence, agricultural production and productivity of workers have increased. This enabled labor to move from agriculture to industry without a significant reduction of production. Subsequently, in the Fourth and Fifth Plans (1984/1985-1994/1995) the emphasis was shifted to the industrial sector, particularly export-oriented and labor-intensive industries which rapidly expanded output. These policies at the same time made possible the structural change from an oil-sector dominated economy to one relying on manufactures. The share of the non-oil sector has risen from 82 per cent in 1970 to almost 90 per cent in 1993. The contribution of non-oil exports to total exports increased from less than one third in 1980 to almost three fourths in 1993.

The economic success under Soeharto's government was not without bitter experiences coming from both domestic and international influences. A closer look at the GDP growth experiences in 1975, 1982, 1985 and 1986 as shown in the table 2.1 may give clear examples. Economic stagnation in industrialised countries due to the 1973 energy shock combined with continued high prices of food and other agricultural products spread rapidly throughout the rest of the world including Indonesia (Nasution 1983, p. 11). Recession in industrialised countries affected Indonesia adversely in two ways; initially through the fall in the demand for and prices of the country's traditional export commodities and more importantly through the depressed oil demand and the fall in oil prices. In 1974/75 when Indonesia experienced large oil revenues, the state oil company, Pertamina, faced a debt of about $ 10.0 billion which was about one third of Indonesian GNP. Due to its size and wide ranging operations, the Pertamina crisis had a detrimental effect on economic growth because a large part of limited foreign exchange reserves flew out overseas. As consequences of world recession and the Pertamina crisis, real GDP growth measured by the GDP deflator in 1975 decreased from 7.6 % in 1974 to 5 % in 1975. Because the government was heavily dependent on foreign sources, including oil revenues, to finance its budget, this crisis also reduced the ability of the government to curb the CPI so that the growth of real GDP was -0.826 % in 1975.

The worldwide recession continued to the early 1980s affecting the domestic economy through the prices of and demand for traditional Indonesian exports, mainly agricultural products (Thorbecke 1992, p. 40). As consequences, real GDP growth measured by both the CPI and the GDP deflators showed negative growth of -2.054 % and -0.35 % respectively. The terms of trade for the country's non-oil exports fell by about 12 % between 1979/80 and 1982/83, while non-oil exports earnings declined from a peak of $ 6.2 billion to $ 3.9 billion during the same time-span. Earnings from oil and LNG exports dropped from $ 10.6 billion in 1981/82 to $ 7.2 billion in 1982/83. The ratio of the current account balance to GNP decreased from 4 % in each of the three years preceding 1981/82 to -3.6 % that year and -8.4 % in 1982/83. Real GDP growth measured by the GDP deflator was 2.6 % in 1985 after being 6.8 % in 1984. Another example, the September 1986 devaluation caused an increase in consumer prices leading to a negative growth of real GDP, measured by the CPI, of -0.071 %.

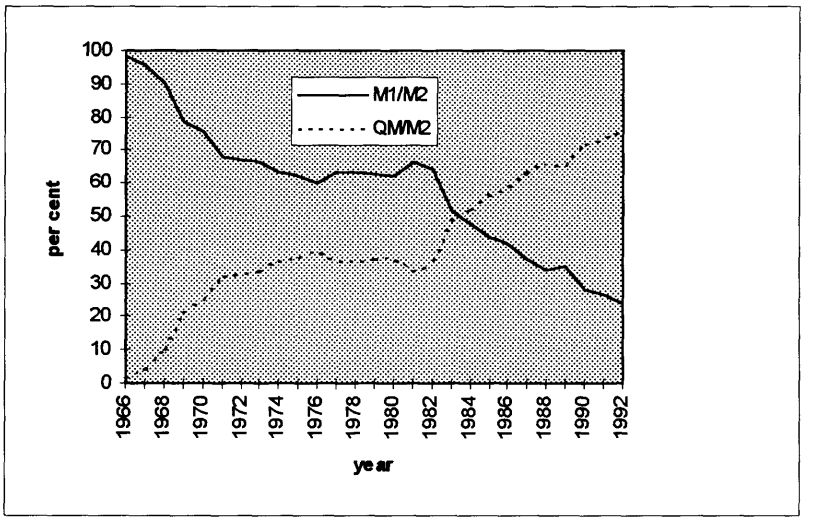
2.2 Money Supply

Both narrow and broad definitions of money supply are used in Indonesia. The narrow money supply (M1) consists of currency in the public's hand plus demand deposits. The broad money supply (M2) consists of M1 plus quasi money (QM) or time and saving deposits. In Indonesia, M2 is called economic liquidity. Generally speaking, M1 refers to transaction motives, while QM refers to speculative motives. For the case of developing countries like Indonesia, however, a transaction motive category should be questioned since people may also use M1 for speculative purposes (Ghatak 1981, p. 26) such as buying gold, real estate and other unproductive items. Following successful economic growth, development in monetary sector showed a changing pattern in the public use of money (figure 2.2). Throughout the time under study, the portion of M1 to M2 has a decreasing trend, while the portion of QM to M2 has an increasing trend.

As can be seen from figure 2.2, for the period from 1966 to mid-year 1983, the ratio M1/M2 is greater than the ratio QM/M2. In 1966, for example, almost 98 % of money was M1 and 2 % was QM. The situation changed when the government introduced indirect money market instruments. As a part of 1983 financial deregulation policy, government introduced SBI (Bank Indonesia (BI) certificates) in January 1984 as a money

market instrument for contractionary monetary management when the BI sells them (Lane et al. , 1993). The SBI is a short-term liability of Bank Indonesia with thirty and ninety day maturities. One year later, the government also introduced SBPU as a money market instrument for expansionary monetary management. The SBPU is essentially a short-term security issued by a business or bank which the BI is ready to buy at a discount from the banks via PT Ficorinvest, a Bank Indonesia owned discount house. Introducing the SBI and the SBPU has fostered indirect financing in the domestic economy. It was not surprising that years following mid 1983, the ratios M1/M2 and QM/M2 showed the opposite pattern. In 1992, for instance, the ratio M1/M2 was only 22 % while the ratio QM/M2 was 78 %.

Figure 2.2
Ratio M1/M2 and QM/M2



Source: IMF, International Financial Statistics, various issues (calculated)

From 1966 to mid 1983, the ratio M1/GDP was slightly greater than the ratio QM/GDP. After mid 1983, however, these ratios showed the opposite pattern. For the same year, the ratio M1/GDP was 16.38 while the ratio QM/GDP was 51.35 and the ratio M2/GDP was 67.73. The pattern of those indicators would suggest that the economy had steadily become more monetised. Because a larger part of money for the period after mid 1983 was in the form of QM, and the ratio QM/GDP also showed an increasing trend, means that the monetary sector and the real sector have been closely related. In 1960, Gurley and Shaw (Nasution 1990, p. 28) pointed out that the size of financial system would depend both on economic progress and the extent to which the financial system can

intermediate between surplus units and deficit units. A closer relation between the monetary sector and the real sector is the case after 1983 implying a higher reliability of money policy.

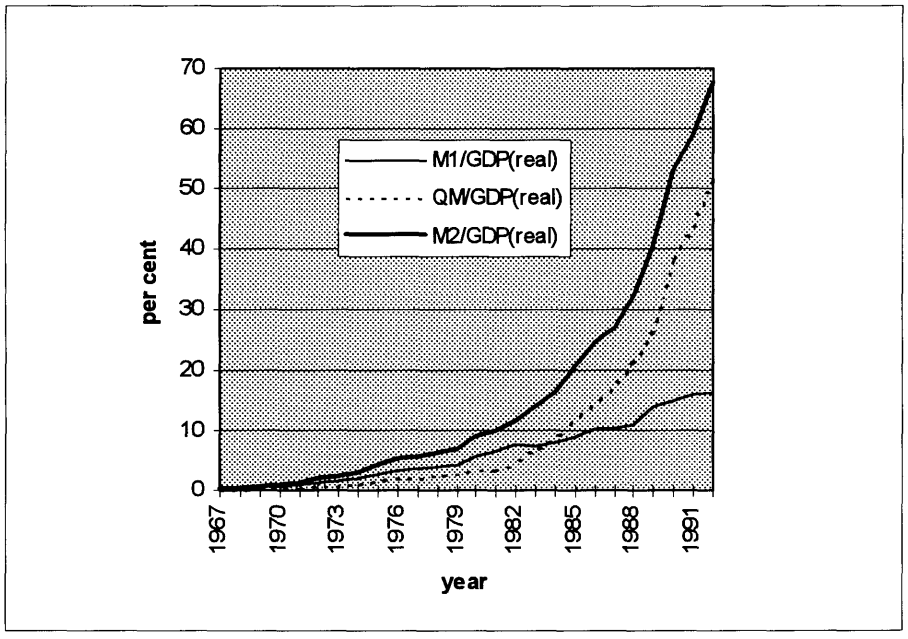
Table 2.4

Ratio Money to GDP, 1967-1992 (ratios)

year	M1/GDP(real)	QM/GDP(real)	M2/GDP(real)
1967	0.21499	0.009407	0.224397
1968	0.44956	0.0472	0.49676
1969	0.632232	0.17202	0.804252
1970	0.802509	0.256918	1.059427
1971	0.971907	0.452156	1.424063
1972	1.236791	0.603784	1.840574
1973	1.550551	0.787754	2.338305
1974	1.930996	1.118355	3.049351
1975	2.632825	1.580769	4.213594
1976	3.240835	2.145712	5.386547
1977	3.665872	2.109657	5.775529
1978	4.112635	2.371086	6.483721
1979	4.453172	2.655524	7.108696
1980	5.576955	3.399796	8.976751
1981	6.768537	3.377996	10.14653
1982	7.600063	4.220597	11.82066
1983	7.29584	6.830702	14.12654
1984	7.882463	8.594375	16.47684
1985	9.025648	11.63777	20.66342
1986	10.37649	14.25998	24.63647
1987	10.1789	16.98487	27.16377
1988	10.94238	21.04613	31.98851
1989	14.14132	26.11525	40.25657
1990	14.94426	38.15337	53.09763
1991	15.86186	43.21084	59.0727
1992	16.38295	51.35082	67.73377

Source: IMF, International Financial Statistics, various issues (calculated)

Figure 2.3
Ratio Money to GDP, 1967-1992 (per cent)



Source: Table 2.4

2.3 Velocities of Money

Following economic growth and changing patterns of using money, all velocities of money for the period of 1969 to 1992, in general, showed systematically declining patterns (figure 2.4). The velocity of M1 mostly stayed between 8 %and 13 % after experiencing a peak of about 26 % in 1968 (table 2.5). For the period 1967 to mid 1983, the velocity of QM has always been greater than the velocity of M1. However, this was not the case for the period after mid 1983. With a declining pattern, the velocity of M1 was greater than the velocity of QM. A lower pattern of QM velocity after mid 1983 gives insight that financial development is characterised by the longer terms of financial instruments.

Table 2.5

Velocities of Money, 1967-1992

year	v1 (ratios)	v2 (ratios)	v3 (ratios)	% changes in v1	% changes in v2	% changes in v3
1967	24.30075	690.8355	23.47499			
1968	26.39926	306.2314	24.30408	8.63557	-55.6723	3.53177
1969	19.14859	92.38194	15.86099	-27.4654	-69.8326	-34.7394
1970	16.25789	54.22631	12.50784	-15.0962	-41.302	-21.1408
1971	13.61026	33.90061	9.711378	-16.2852	-37.4831	-22.3577
1972	12.14349	25.35462	8.210911	-10.7769	-25.209	-15.4506
1973	12.44723	24.90316	8.29912	2.501216	-1.78058	1.074281
1974	14.00707	25.48664	9.039238	12.53159	2.342982	8.918041
1975	12.03717	20.35457	7.56401	-14.0636	-20.1363	-16.3203
1976	11.35283	17.88549	6.944686	-5.68522	-12.1303	-8.18777
1977	11.13325	18.13489	6.898296	-1.93413	1.394447	-0.66798
1978	10.67726	18.53474	6.774623	-4.09574	2.204877	-1.79281
1979	11.83076	20.12582	7.450854	10.80333	8.584299	9.981817
1980	11.74394	19.43325	7.320189	-0.73391	-3.44118	-1.75369
1981	10.17172	18.58479	6.573793	-13.3874	-4.36602	-10.1964
1982	9.216785	17.43813	6.029789	-9.38817	-6.16989	-8.27535
1983	10.56383	14.05323	6.030609	14.61508	-19.4109	0.013612
1984	11.12645	10.92893	5.513402	5.325911	-22.2319	-8.57637
1985	10.37124	8.656582	4.718327	-6.7875	-20.7921	-14.4208
1986	9.439945	7.072319	4.043195	-8.97957	-18.3013	-14.3087
1987	10.25781	6.713479	4.05777	8.663849	-5.07387	0.36048
1988	10.48861	5.814325	3.740688	2.250068	-13.3933	-7.81419
1989	9.565277	5.092554	3.323254	-8.80324	-12.4137	-11.1593
1990	8.874668	3.987123	2.751125	-7.21996	-21.7068	-17.2159
1991	8.993348	3.402073	2.468333	1.337295	-14.6735	-10.2791
1992	9.19339	3.130099	2.335071	2.224335	-7.99435	-5.39886
Averaged changes (%): 1970-1980				-3.89406	-11.5414	-6.15432
Averaged changes (%): 1980-1990				-1.72249	-13.391	-8.48606

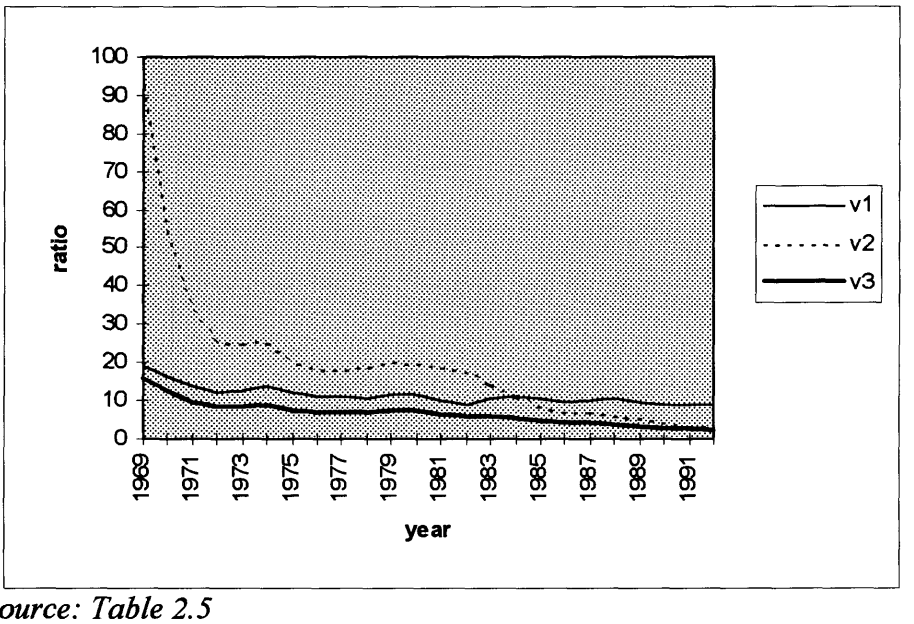
Source: IMF, International Financial Statistics, various issues (calculated)

Notes : 1) $v_i = \dfrac{GDP_t}{1/2(M_{i,t} + M_{i,t-1})}$

2) v1, v2, v3 = velocities of M1, QM, M2

To be effective monetary targeting, however, requires a relatively small variation in v in conjunction with an ability to accurately control/predict money supply for the definition chosen for targeting (Moore et al. 1992, p. 129). In this regard, M1 would be the best variable to target in terms of v (table 2.5). Targeting both QM and M2 would seem of limited use because of the large variations in their velocities following deregulation since 1983.

Figure 2.4
Velocities of Money



Source: Table 2.5
Notes: v1, v2, v3 = velocities of M1, QM and M2

2.4 Sources of Change in M2

Based on the monetary survey statistics of the IMF (1994), movements in M2 follow an identity which is related positively to net foreign assets (R), net domestic credit (D) and negatively to net other items (NOI). Taking proportions of their components to M2 as a share relationship, overtime, there has been a negative correlation between the ratio R/M2 and D/M2 (table 2.6 and figure 2.5). A nice property of this pattern is, therefore, that an increase in foreign assets may be the result of squeezing domestic credit.

Table 2.6

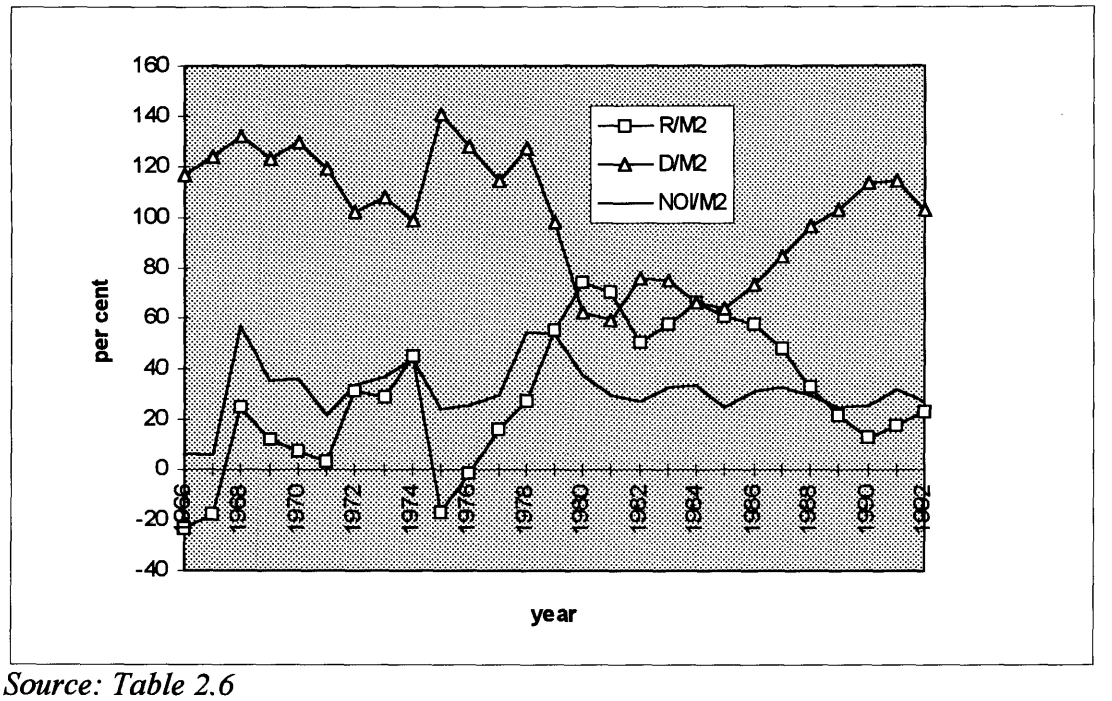
Sources of Money, 1966-1992 (Nominal)

year	M2 (billion rupiahs)	Net Foreign Assets (R) (billion rupiahs)	Domestic Credit (D) (billion rupiahs)	Net Other Items (NOI) (billion rupiahs)	R/M2 (per cent)	D/M2 (per cent)	NOI/M2 (per cent)
1966	22.55	-5.18	26.35	1.38	-22.9712	116.8514	6.119734
1967	53.67	-9.57	66.36	3.12	-17.8312	123.6445	5.813304
1968	128.4	32.1	169.3	73	25	131.8536	56.85358
1969	233.3	27.6	287.4	81.7	11.83026	123.189	35.01929
1970	330.3	23.3	426.9	119.9	7.054193	129.2461	36.30033
1971	467.7	13.5	556.7	102.5	2.886466	119.0293	21.91576
1972	705.4	220.9	720.5	236	31.31557	102.1406	33.4562
1973	1011.9	295.3	1089.5	372.9	29.18273	107.6687	36.85147
1974	1488.2	661	1477.4	650.2	44.41607	99.27429	43.69036
1975	2039.4	-343.4	2873.1	490.3	-16.8383	140.8797	24.04138
1976	2661	-50	3397	686	-1.87899	127.6588	25.77978
1977	3162	500	3608	946	15.81278	114.105	29.91777
1978	3924	1061	4986	2123	27.03874	127.0642	54.10296
1979	5295	2943	5206	2854	55.58074	98.31917	53.89991
1980	8069	6031	5054	3016	74.74284	62.63478	37.37762
1981	9705	6838	5759	2892	70.45853	59.34055	29.79907
1982	11074	5613	8434	2973	50.68629	76.16038	26.84667
1983	14669	8419	11069	4819	57.39314	75.45845	32.85159
1984	17937	11942	11978	5983	66.57747	66.77817	33.35563
1985	23178	14106	14799	5727	60.85944	63.84934	24.70878
1986	27615	15919	20329	8633	57.64621	73.61579	31.262
1987	33905	16206	28739	11040	47.79826	84.76331	32.56157
1988	42073	13751	40835	12513	32.68367	97.0575	29.74116
1989	58526	12568	60564	14606	21.47422	103.4822	24.95643
1990	84630	10659	95896	21925	12.59482	113.3121	25.90689
1991	99410	17283	114002	31875	17.38557	114.6786	32.06418
1992	119075	27987	123164	32076	23.50367	103.434	26.93764

Source : IMF, International Financial Statistics, various issues

Figure 2.5

Sources of Money Growth, 1966-1992 (per cent)



Source: Table 2.6

Notes: 1) R/M2 = ratio net foreign assets (R) to M2
2) D/M2 = ratio domestic credit (D) to M2
3) NOI/M2 = ratio net other items (NOI) to M2

Despite the oil boom in 1973/1974 the ratio R/M2 decreased from 44.42 % in that year to -16.84 % in 1975. This was blamed on the 1975 Pertamina debt crisis (section 2.1). For the years from 1974 to 1981, excepting the Pertamina crisis in 1975, the domestic economy enjoyed buoyant oil revenues both through the balance of payments and the government budget. For this period, real economic growth was on average 7.24 %. This improved the ratio R/M2 to -1.88 % in 1976. R/M2 further increased to 15.81 % in 1977. The banking system found themselves with excess reserves and therefore it was easier to give more loans and therefore gave an easy way for inflationary pressure (Lane et al. 1993, p. 141). As the domestic interest rate was lower than overseas rate and the openness of capital movements, excess reserves encouraged capital flight (Sundararajan 1988, p. 328). In November 1978, fears of, devaluation also further spurred incentives to hold excess liquidity in foreign currency. As consequence, the ratio R/M2 further increased to 27.04 % in 1978 and to 74.74 % in 1980.

To curb the inflationary effects of this oil boom in 1974/1975, Indonesia applied direct credit controls to all banks as the main tool of controlling domestic monetary growth. A financial scene with widespread use of subsidised credit schemes and interest rate controls occurred during this period. Moving on the opposite direction from R/M2, the ratio D/M2 in 1975 was at 140.87 % and decreased to 127.66 % in 1976 and to 114.11 % in 1977. Credit controls actually caused a larger accumulation of surplus funds in the banking system, especially by state banks, and left the public lacking liquidity. To avoid the possibility of increasing inflation as after the 1978 devaluation, the system of centralised control was maintained. D/M2 further decreased to 59.34 % in 1981 (figure 2. 4).

Due to negative growth in real income of -2.05 % and a decline foreign exchange earnings from oil in 1982, a series of measures were implemented to boost non-oil exports and reduce the dependency of economic growth on oil revenues. The government perceived that the system of credit and interest-rate controls and extensive refinancing by Bank Indonesia had become a hindrance to growth and efficiency of the financial system (Lane 1993, p. 147). As a major part of the 1983 financial deregulation, the government reduced its direct control of the economy by deregulating the financial sector through reducing restrictions on the allocation of bank credit and state bank interest rates. The central bank introduced a new mechanism of monetary control that would rely principally on open-market operations complemented by a system of new rediscount facilities (Sundararajan 1988, p. 329). As Sundararajan noted, the reasons for implementing the open-market operations were that accumulation of foreign assets in the banking system outside the central bank appreciated the domestic currency and therefore reduced external competitiveness, the growing important of deregulation would also pose a problem of controlling the money supply and prices in the long run.

To minimise the possibilities mentioned above, in January 1984 the central bank (Bank Indonesia) introduced the Bank Indonesia Certificates (SBI). The SBIs offerred assets as a substitute for foreign assets in the liquid asset portfolios of banks and allowed the central bank to absorb or inject reserves to restore control over the system's lending capacity. The SBIs are Bank Indonesia's own debt issued once a week with maturities of 30 and 90 days, in bearer form, and in denomination of Rp. 50 million, Rp. 250 million, and Rp. 1,000 million. Open-market sales of SBIs in exchange for domestic money will decrease the money supply and appreciate the nominal exchange rate. The SBIs were

mainly intended for contractionary monetary policy. When Bank Indonesia purchases SBIs, however, the money supply will increase. In addition, open-market sales of SBIs in exchange for foreign assets will also accumulate foreign assets in the central bank and increase the money supply leading to depreciation in the nominal exchange rate. As the SBIs are the Bank Indonesia's own debt with a fixed maturity, then were not actually suitable for commercial bank's liquidity purposes. In February 1985, therefore, Bank Indonesia introduced a money market instrument called the SBPU which were promissory notes issued by commercial banks, including promissory notes issued by customers in connection with borrowing from banks or nonbank financial institutions (NBFIs) in connection with interbank borrowing. The SBPUs were, therefore, intended for expansionary monetary policy through credit creation when Bank Indonesia purchased them from banks or NBFIs.

Following the introduction of SBPUs and reduced restrictions on credit allocation as mentioned above, there was an increased trend in the ratio D/M2 from 1984 to 1990. In 1984, for example, the ratio D/M2 was 66.78 %, it increased to 73.62 % in 1986. It increased to 84.76 % in 1987, 97.05 % in 1988, and reached a peak of 114.68 % in 1991. Because Bank Indonesia's open-market purchases of SBPUs outweighed their open-market sales of SBIs, M2 increased and R/M2 decreased. R/M2 decreased from 66.58 % in 1984 to 60.85 % in 1985. It further decreased to 57.65 % in 1986, 47.8 % in 1987, 32.68 % in 1988, and reached a low point of 12.59 % in 1990. For the period 1990 to 1992, however, there was an increased trend in R/M2 and a decreased trend in D/M2. Similar to the period before 1983, a negative relationship between net foreign assets (R) and net domestic credit (D) was also found for the period after the 1983 deregulation.

In short, one of the distinctive features of the period, except for 1980-81, was that domestic credit D took the largest part of M2. In other words the ratio D/M2 was always greater (dominant) than R/M2, except for 1980-81. It is, therefore, worth comparing these changes to developments in the uses of money discussed above. As mentioned before, from 1966 to mid of 1983, M1/M2 was greater than QM/M2. After mid 1983, these two ratios show the opposite pattern (figure 2.2). This suggests two different patterns of domestic credit developments in terms of financial intermediation. Prior to 1983, domestic credit activities were more direct in nature. On the other hand, domestic credit activities after 1983 were more indirect in nature following the developments in the money market. Concerning economic stability, these developments have reduced price variability from the demand side as suggested by the declining velocity of M1 above.

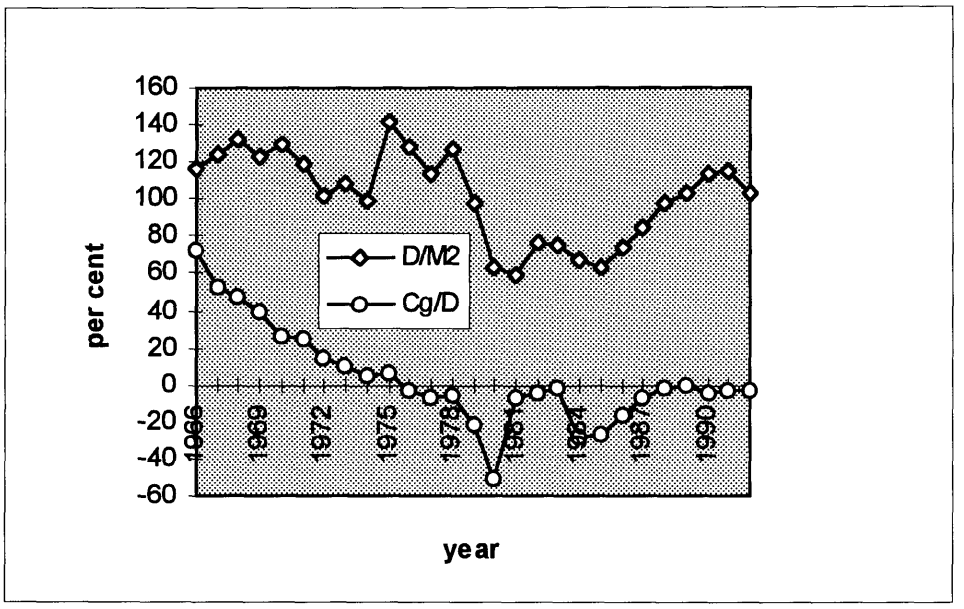
2.5 Government Budget

A part of domestic credit (D) is related to the fiscal authority. In the monetary survey statistics, this is summarised in the column heading entitled "net claims on government" (Cg). This is a liability of the fiscal authority to the banking system due to its budget deficit (BD). By definition, Cg is a source of money supply growth through domestic credit creation (D). Because Cg is considered to be liabilities of the fiscal authority to the banking system, a positive Cg means that the fiscal authority is a net borrower from the banking system, and a negative Cg means that the fiscal authority is a net lender to the banking system. A positive Cg will mean that the fiscal authority is running a budget deficit financed by the banking system. A negative Cg means a surplus government budget which is raised either through domestic sources (GDR) such as taxes or through foreign sources (GFR) such as foreign borrowing (GFB) and oil revenues (GOR). To see the role of Cg in domestic credit creation (D), they are simply taken as the ratio Cg/D.

From 1966 to mid 1975, Cg/D was positive. In 1966, for example, Cg/D was about 73.13 % representing a large deficit in the government budget (table 2.7 and figure 2.6). This ratio became zero in mid 1975. After mid 1975, this ratio was always zero or negative with the lowest ratio achieved at -50.16 % in 1980. Compared to figure 2. 4, it is clear that Cg/D has a similar pattern to D/M2. This suggests that net claims on government (Cg) has a significant impact not only on domestic credit creation (D) but also on M2. In 1966, for instance, both Cg/D and D/M2 were relatively high at 73.13 % and 116.9 % respectively. From 1968 to 1974, a decrease in Cg/D from 47.37 % in 1968 to 5.04 % in 1974 was accompanied by a decrease in D/M2 from 131.85 % in 1968 to 99.27 % in 1974 (table 2.6). For the period 1978 to 1980, a huge decrease in Cg/D from -5.76 % to -50.16 % caused a huge decrease in D/M2 from 127.06 % to 62.63 %. For the period 1984-1992, both Cg/D and D/M2 increased.

Figure 2.6

Domestic Credit, Net Claims on Government and Money Supply,1966-1992



Source: IMF, International Financial Statistics, various issues (calculated)
Notes : 1) D/M2 = ratio domestic credit (D) to M2
2) Cg/M2 = ratio net claims on government (Cg) to M2

It is worth noting from figure 2.6 that a decrease in Cg from 1966 to 1984 squeezed domestic credit creation and therefore reduced the domestic component of M2. Since D/M2 was negatively related to R/M2, it suggests that a decrease of Cg caused an increase in foreign assets, R, by squeezing domestic credit creation. As mentioned above, during this time the economy enjoyed buoyant oil revenues both through the balance of payments and the government budget. The fiscal authority who was subject to the balanced budget constraint deposited oil revenues and foreign borrowing with the banking system. These were known as hidden money to sterilise the monetary impact of the balance of payments (Nasution 1983, p. 37). During that time, accumulation of foreign exchange reserves and lowering inflation rates also became the fiscal authority's main concerns. As mentioned before, during that time the central bank also imposed direct credit controls on all banks as the main tool for controlling domestic monetary growth. The events of 1971-1977 during which the fixed exchange rate regime applied (table 2.9) are a nice example of how the fiscal authority and the monetary authority were well coordinated.

Table 2.7

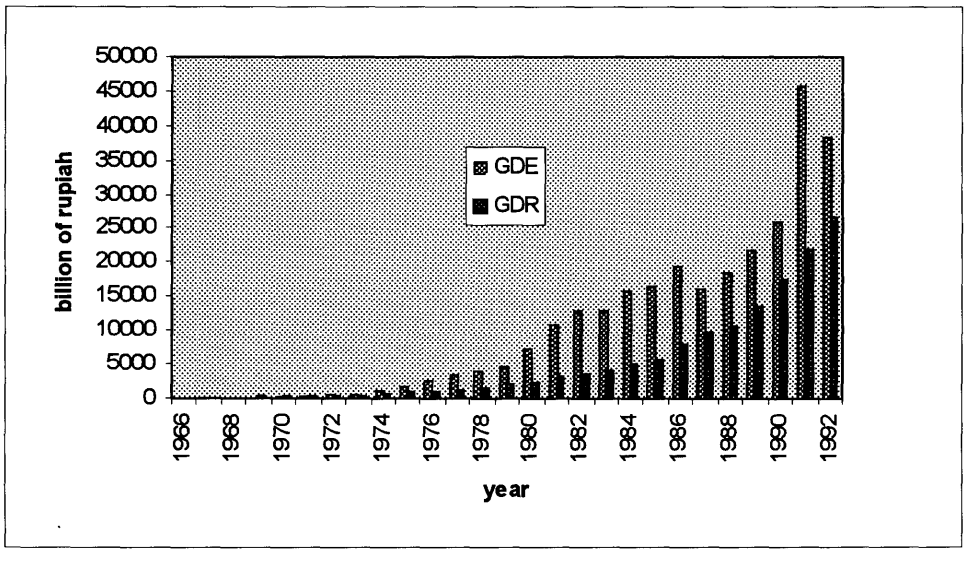
Government Budget and Net Claims on Government, 1966-1992 (Nominal)

year	Net Claims on Government to Domestic Credit (billion rupiahs)	Government Domestic Expenditures (billion rupiahs)	Government Domestic Revenues (billion rupiahs)	Government Foreign Revenues (billion rupiahs)	Government Foreign Expenditures (billion rupiahs)
1966	73.13093				
1967	52.20012		52.826	32.149	
1968	47.37153		124.242	68.787	
1969	39.80515		161.736	127.1073	
1970	25.90771	334.67	265.8768	205.662	
1971	24.21412	423.13	275.8	189.2	34.7
1972	14.39278	491.4	315.5	248	53.6
1973	10.67462	672.72	391.7	356.7	63.6
1974	5.042642	1082.56	623.1	547.6	81.7
1975	6.894991	1884.03	780.6	1205.1	93.9
1976	-3.47365	2624.1	992.8	1740.7	106.2
1977	-6.54102	3486.04	1286.6	2403.2	198.2
1978	-5.75612	4051.8	1586.7	2722.1	253.9
1979	-21.1871	4728.92	1957.4	3344.2	570.4
1980	-50.1583	7369.67	2437.2	5640.7	706.1
1981	-7.51867	10895.33	3207.4	8513.5	820.8
1982	-3.74674	12928.4	3584.8	10336.8	989.6
1983	-2.31277	13071.8	4247.9	10110.4	1284.2
1984	-27.6674	16122.1	4912.5	13402.6	2188.9
1985	-27.5289	16523	5475	13908	2858
1986	-16.9069	19382	8109	14716	3443
1987	-7.18188	16200	9803	12090	5691
1988	-2.00073	18573	10756	16205	8385
1989	-0.62909	21878	13477	19518	11112
1990	-4.50175	26071	17488	20681	12094
1991	-2.63592	45947	21834	27617	3503
1992	-3.2477	38445	26546	25448	13547

Source: World Tables, various issues

The budget deficit (BD) as the source of domestic credit creation through Cg consists of domestic and foreign components. The domestic component of the budget deficit is the difference between the government domestic expenditures (GDE) and the government domestic revenues (GDR). Government domestic expenditures are government outlays that are spent domestically, divided into routine (operating) expenditures, excluding interest debt repayment overseas, and development (investment) expenditures. Government domestic revenues are raised from domestic sources through taxes. The foreign component of the budget deficit is the difference between the government foreign revenues (GFR) and the government foreign expenditures (GFE). Government foreign revenues consist of foreign borrowing and oil revenues. Government foreign expenditures consist of interest debt repayment overseas. Table 2.7 below summarises these variables in nominal terms. Graphical devices also are presented in figures 2.7 and 2.8.

Figure 2.7
Government Domestic Budget, 1966-1992 (Nominal)



Source: Table 2.7

Notes: 1) GDE = Government Domestic Expenditures
2) GDR = Government Domestic Revenues

Both from table 2.7 and figure 2.7, nominal GDE seems to grow over time with some exceptions. Following steady growth since 1971, GDE achieved a first peak at Rp. 19,382 billion in 1986. Due to lower oil revenues and an attempt to reduce the inflationary

impact of the September 1986 devaluation, the fiscal authority reduced GDE to Rp. 16,200 billion in 1987. After 1987, GDE gradually increased and achieved its peak at Rp. 26,071 billion in 1990. A dramatic expansion of GDE occurred during 1990/1991. In 1991, GDE was Rp. 45,947 billion which was a 76.24 % increase from 1990. GDE was reduced to Rp. 38,445 billion in 1992 to dampen inflation pressures. In terms of the rate of growth (table 2.8), GDE had a 27.98 % annual growth for 1976-1984. When oil revenues declined in the 1980s, substantial fiscal adjustments were made. On the expenditure side, spending was tightened by freezing civil service salaries for three years and reducing large capital-intensive and import-intensive investments. As consequence, for 1984-1992 GDE had lower average annual growth of 11.41 % compared to 27.98 % for 1976-1984. On the other hand, GDR throughout the period showed a steady growth. From 1976 to 1984 GDR grew annually on average 22.83 %. Having introduced the value added tax in 1984 as counter to declining oil revenues, GDR grew a bit faster at 23.03 %. Although GDR grew faster than GDE, in levels, GDE has always been greater than GDR. This suggests that, by definition, the budget has always been in deficit.

Table 2.8

Growth of Government Budget (per cent)

year	Percentage growth of Government Domestic Expenditures	Percentage growth of Government Domestic Revenues	Percentage growth of Government Foreign Revenues	Percentage growth of Government Foreign Expenditures
76-84	27.984	22.83208	34.59342	45.9227
84-92	11.4148	23.03432	12.26911	54.57391

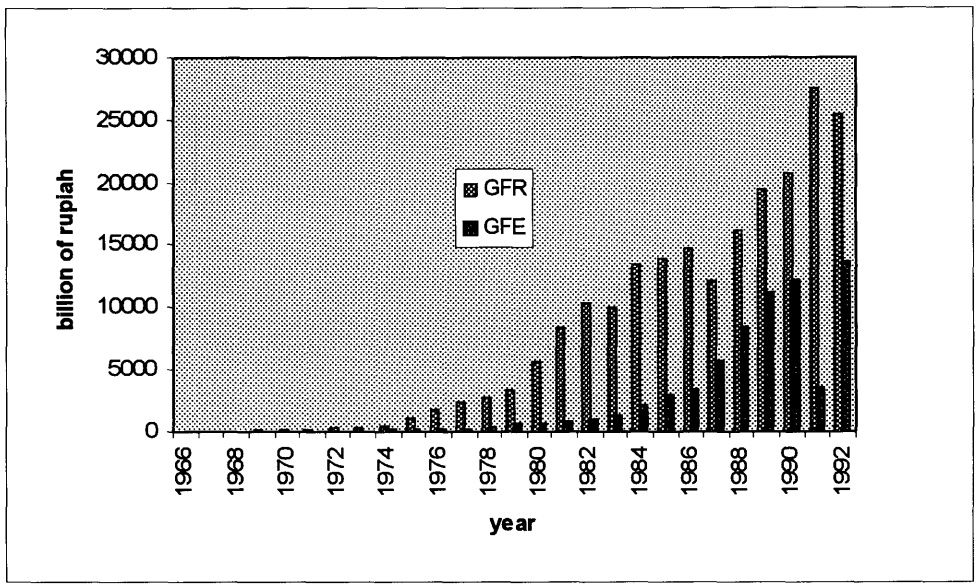
Source : Table 2.7

GFR in nominal terms has grown with some fluctuations in particular years. Despite some domestic and external shocks, Indonesia was lucky in always having easy access to concessional aid from a variety of sources (Thorbecke 1992, p. 49). Throughout the time under study, except in 1983, 1986 and 1992, GFR has grown at a decreasing rate. From 1976 to 1984, when oil revenues were ample, GFR on average grew at 34.59 %.

From 1984 to 1992 when oil revenues declined, GFR had a slower average annual growth of 12.27 %.

Figure 2.8

Government Foreign Revenues and Expenditures, 1966-1992 (Nominal)



Source: Table 2.7

Notes: 1) GFR = Government Foreign Revenues

2) GFE = Government Foreign Expenditures

From 1976-1984 GFE grew at an average annual rate of 45.92 % which was greater than GFR growth. From 1984 to 1992, GFE grew at an average annual rate of 54.57 % representing an increase in government foreign debt repayments. Although GFE has a faster average annual growth than GFR, in nominal terms, GFR has always been greater than GFE. As figure 2.7 and figure 2.8 imply throughout the period, the fiscal authority has been covering the domestic component of its budget deficit through foreign sources, particularly foreign borrowing. It is apparent that balanced budget in the Indonesian context does not necessarily mean tax revenues equals to expenditures. Put another way, the budget deficit does not necessarily imply printing money since the government covers its domestic deficit through foreign sources.

2. 6 Economic Stability

By economic stability we mean is stability of inflation, external competitiveness and a sound trade account position. All these have been important in underpinning the performance of the Indonesia's economy during the last 15 years (The Minister of Trade, 1994).

2. 6. 1 Inflation rates and exchange rates

The bad inflationary experiences during the 1960s has been widely documented. Due to the economic mismanagement and political turmoil, inflation in 1966 achieved 600 % (Nasution 1983, p. 1). For the periods of stabilisation after 1960s, the average annual inflation rate gradually decreased (see figure 2.9). The domestic inflation rate measured by the percentage change in the consumer price index (CPI) on average was 17.20 % for the period 1970-80. It decreased to 8.57 % in the period 1981-90. Measured by the percentage change of the wholesale price index (WPI), the domestic inflation rate for the period 1980-90 was 9.36 % which was higher than that measured by the CPI (table 2.9). Both measures, however, were below 10 per cent due to prudent macro economic management and careful fiscal and monetary policies (The Minister of Trade, 1994).

Due to the 1974 oil boom, the inflation rate measured by the CPI increased to 40.60 % from 6.22 % in 1971. The combination of fixing domestic interest rates below international rates and credit ceilings for the period 1974-1982, during which the balance of payments was in surplus due to the 1974 oil boom, proved that the central bank was able to reduce the potential expansionary effect of the balance of payments surplus on the money supply, and therefore reduce the inflation rate (Lane et al. 1993, p. 143).

Domestic inflation rates are also influenced by managing prices of essential goods and services such as food through BULOG (National Agency for Logistics market operations), gasoline, electricity, and water. Allocation of a large portion of the government budget to develop the agricultural sector and basic physical and social infrastructure to stimulate growth also helped keep moderate inflation rates.

Table 2.9

Inflation and Exchange Rates, 1966-1992

year	e (rupiahs)	e(CPI*/CPI) (rupiahs)	% Δ CPI (Indonesia)	% Δ CPI* (USA)	% Δ e	Δ inflation
(1)	(2)	(3)	(4)	(5)	(6)	(7)=(4)-(5)
1966	85					
1967	235					
1968	326	1165.132	128.8437	4.217651	38.7234	124.6261
1969	326	1063.209	15.52004	5.414584	0	10.10546
1970	378	1141.851	14.32992	5.89523	15.95092	8.434692
1971	415	1252.383	4.358979	4.256098	9.78836	0.102881
1972	415	1214.68	6.51201	3.305481	0	3.206529
1973	415	984.6273	31.03808	6.220264	0	24.81781
1974	415	777.5696	40.60266	11.03526	0	29.5674
1975	415	712.761	19.05463	9.131711	0	9.922922
1976	415	628.7811	19.85917	5.736966	0	14.1222
1977	415	603.0153	11.03645	6.486463	0	4.549988
1978	625	904.2761	8.109309	7.647486	50.60241	0.461823
1979	627	868.1993	16.2605	11.26616	0.32	4.99435
1980	626.8	834.7723	18.01695	13.50932	-0.0319	4.507633
1981	644	842.9404	12.24452	10.31564	2.744097	1.928874
1982	692.5	878.9281	9.48146	6.160551	7.531056	3.32091
1983	994	1164.824	11.78713	3.212462	43.53791	8.574667
1984	1074	1188.635	10.45503	4.317168	8.04829	6.137867
1985	1125	1231.176	4.730531	3.561138	4.748603	1.169393
1986	1641	1726.746	5.936943	1.859035	45.86667	4.077907
1987	1650	1650	9.161129	3.740466	0.548446	5.420663
1988	1731	1666.369	8.0438	4.0097	4.909091	4.0341
1989	1797	1704.038	6.418045	4.826857	3.812825	1.591188
1990	1901	1768.152	7.454724	5.397867	5.787423	2.056857
1991	1992	1767.815	9.245128	4.234593	4.786954	5.010534
1992	2062	1753.728	7.50624	3.029096	3.514056	4.477144

Source : IMF, International Financial Statistics, various issues (calculated)

Notes : 1) e = nominal exchange rate (Rp/ US $ 1)

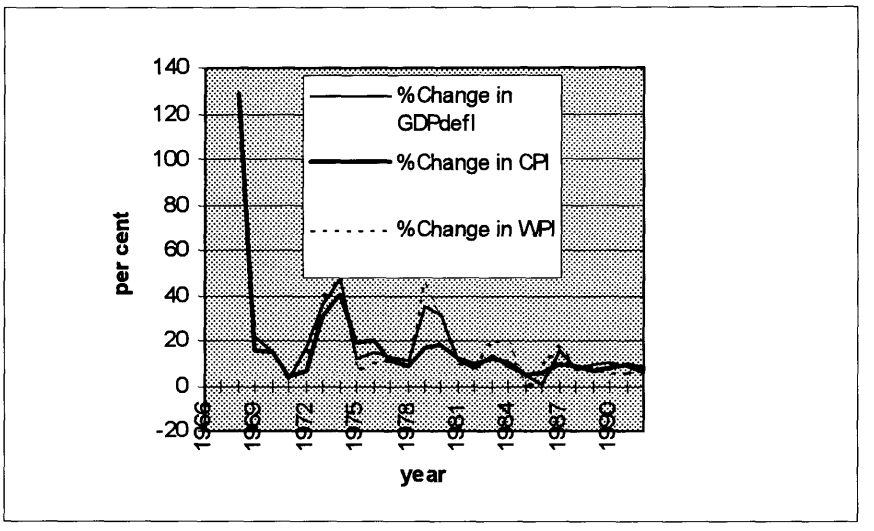
2) e(CPI/CPI) = real exchange rate*

3) CPI, CPI= domestic and foreign (US) consumer price indexes respectively*

4) Δ = difference operator

5) % Δ CPI, % Δ CPI= domestic and foreign inflation rates respectively*

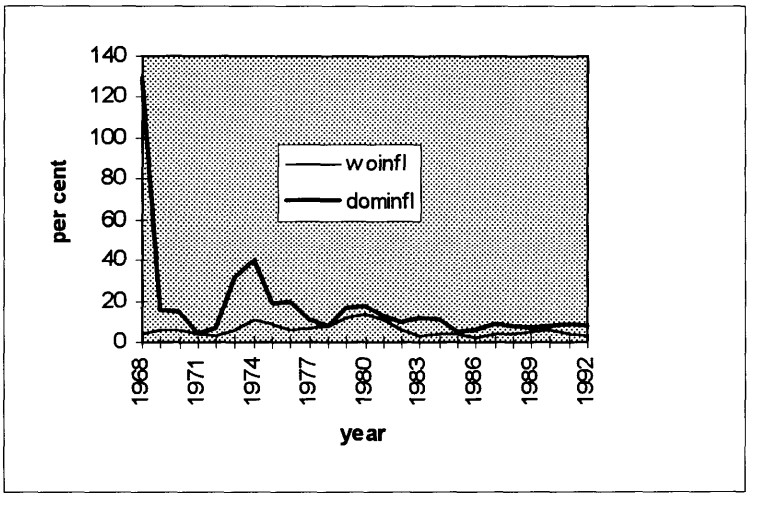
Figure 2.9
Inflation Rates



Source: IMF, International Financial Statistics, various issues (calculated)

Compared to foreign inflation rates (% change in the US's CPI) from 1971 to 1992, the domestic inflation rate (% change in the Indonesia's CPI) was higher with the highest difference of 29.57 % in 1974 (see table 2.9 and figure 2.10).

Figure 2.10
Inflation Rate Differential



Source: Table 2.9

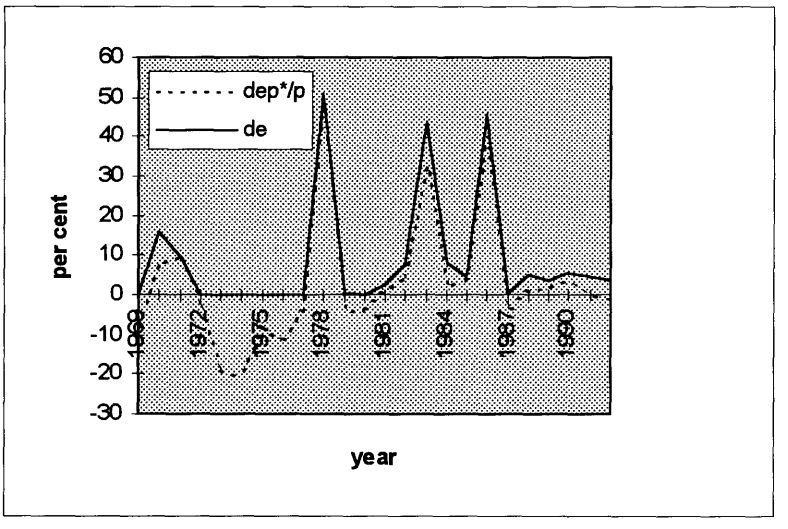
Notes: 1) woinfl = world (USA) inflation measured by USA's CPI

2) dominf= domestic inflation measured by Indonesia's CPI

It is widely acknowledged that there is a close relationship between prices and exchange rates. From 1968 to 1977 Indonesia adopted a fixed exchange rate regime whereby the rupiah was fixed to the US dollar at the mid-rate of Rp. 326/US $ 1 for the period 1968-1969 and Rp. 415/US $ 1 for the period 1971-1977. Since then the government has adopted a managed float system (table 2.9). In accordance with the pattern of foreign and domestic price differentials, a depreciation of nominal exchange rate has been followed by a similar pattern in the real exchange rate (figure 2.11). Such a relationship would suggest an effort to increase external competitiveness.

Figure 2.11

The Growth of Real and Nominal Exchange Rates



Source: Table 2.9 (calculated)

Notes : 1) dep/p = percentage growth of real exchange rate*

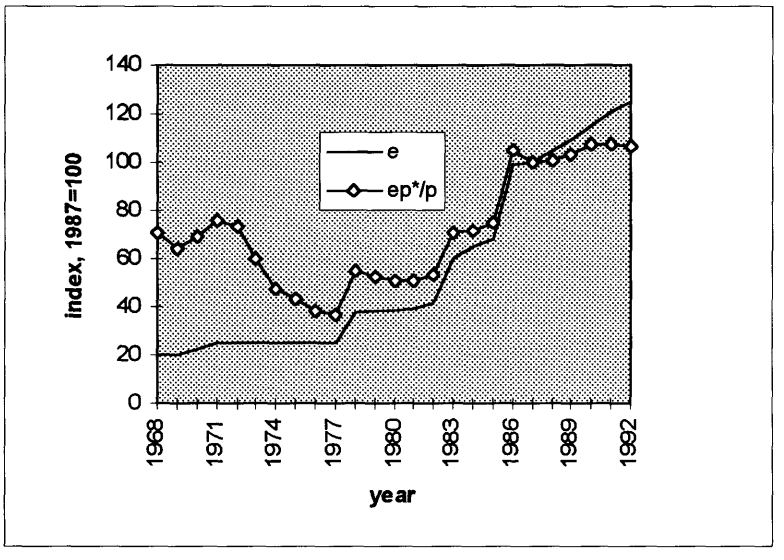
2) de = percentage growth of nominal exchange rate

From 1972 to 1977, when the fixed exchange rate regime applied, Indonesia had its worst experience in terms of external competitiveness (figure 2.11). It was clear that high domestic prices due to the oil boom were the cause. In order to adjust its balance of payments and to increase non-oil exports competitiveness, Indonesia devalued the rupiah three times in 1978, 1983 and 1986 (figure 2. 11). In 1978, while keeping a 0.46 % inflation differential, the rupiah was devalued by a 50.60 % followed by a 49.96 % depreciation in the real exchange rate (table 2.9). In 1983, at a 8.57 % inflation differential, the rupiah was devalued by 43.54 % followed by a 32.53% depreciation in the

real exchange. In 1986, at a 4.07 % inflation differential, the rupiah was devalued by 45.87 % followed by a 40.25 % depreciation in the real exchange rate.

The last devaluation in 1986 helped the economy adjust to the terms of trade shock caused by sharp decline in oil export revenues (Thorbecke 1992, p. 43). Since the 1986 devaluation Bank Indonesia has sought to maintain the competitiveness of the rupiah by a crawling peg mechanism which has produced a slight depreciation in the real exchange rate. The policy of gradual depreciation has contributed to Indonesia's rapid non-oil export growth (The Minister of Trade, 1994).

Figure 2.12
Nominal and Real Exchange Rates



Source: Table 2.9
Notes : 1) e = nominal exchange rate
2) ep/p = real exchange rate*

In terms of index levels, the nominal exchange rate and the real exchange rate tend to move in the same direction (see figure 2.12). For the period 1968-1987 the nominal exchange rate was greater than the real exchange rate. This indicated that the influence of the domestic price was more dominant in determining the nominal exchange rate. After 1987, the real exchange rate was greater than the nominal exchange rate. This suggests the dominance of foreign price levels in determining the nominal exchange rate.

2. 6. 2 Trade Account

The value of Indonesia's exports has increased 33 times since 1970, an average annual rate of growth of 16.4 per cent. The value of non oil exports has increased 38 times at an annual average of 17.2 per cent (table 2.10). Today, manufactures account for almost two-thirds of non-oil export revenues, focusing on four main products: plywood, garments, textiles and footwear. The trend of total export value growth from 1989 to 1993 is 13.8 per cent. Whereas oil and gas exports were the main source of foreign exchange in the 1980's they have become less important in 1990s due to declining prices.

Non-oil exports grew strongly 1989 to 1992. Until very recently, plywood exports enjoyed rising prices while their volume remained almost constant. In addition to good prices, the expansion of non-oil exports during the last 5 years has been due to relocation of production of labor-intensive manufactures such as garments, textiles and footwear to Indonesia and availability of raw materials in the case of plywood.

Table 2.10
Composition of Exports by Main Categories at Current Market Prices
(US $ million)

Years	Oil+Gas	% Change	Non-oil	% Change	Total	% Change
1970	346	-	709	-	1,108	-
1980	15,743	-	6,166	-	21,909	-
1989	8,676	-	13,483	-	22,159	-
1990	11,069	27.6	14,606	8.3	25,675	15.9
1991	10,895	-1.6	18,247	24.9	29,142	13.5
1992	10,671	-2.1	23,296	27.7	33,967	16.6
1993	9,745	-8.7	27,078	16.2	36,823	8.4
Trend 1988-93	2.0		20.5		13.8	
Ratio 93/70	28.2		38.2		33.2	
Growth 70-93	15.6		17.2		16.4	

Source: Central Bureau of Statistics

As can be seen from table 2.11, imports of capital goods grew rapidly during 1989-1993 period reflecting rising investment expenditures. Their value doubled from 1989 to 1991 but declined slightly through the end of 1993. Imports of raw materials almost doubled during these five years growing at an average annual rate of 13.9 per cent.

Table 2.11

Composition of Imports By Economic Categories at Current Market Prices, 1989-1993 (US $ million)

Description	1989	1990	1991	1992	1993
Consumption	688.6	876.9	958.4	1,212.8	1,146.1
Raw materials	11,905.5	14,893.1	17,233.8	18,700.1	20,034.8
Capital goods	3,765.5	6,067.0	7,676.6	7,366.7	7,146.9
Total imports	16,359.6	21,837.1	25,868.8	27,279.6	28,327.8

Source: Central Bureau of Statistics

2. 7 Summary

From 1970 to 1990, average growth of Real Gross Domestic Product (GDP) measured by the GDP deflator was 6.5 % per year, with the highest rate of growth of 7.2 % achieved in the 1970s when oil prices were high and the lowest of 5.8 % when oil prices fell in the 1980s. From the demand side point of view (all in real terms based on the GDP deflator), total consumption (private and government) has been the main source of GDP growth in the last 15 years. Sources of GDP growth can also be attributed to the developments in the supply side. The contribution of the growth of employment and widening of capital to the GDP growth increased from 1.85 % out of 7.90 % in the period 1967-73 to 3.24 % out of 7.51 % in the period 1973-81. For the same periods, the contribution of capital deepening to GDP growth also increased with a faster growth than the capital widening which were 1.24 % out of 7.90 % and 3.99 % out of 7.51 % respectively. A dramatic decrease of ICOR in contributing to GDP growth occurred from 4.81 % out of 7.90 % in the period 1967-73 to 0.28 % out of 7.51 in the period 1973-81. This decreased ICOR suggested an increase in the productivity and a better efficiency of investment. For the period 1980-91, however, the contribution of ICOR to GDP growth was 4.7 % out of 5.6 % (World Bank, 1992) indicating a deterioration both in

productivity and efficiency compared to 1973-81. In terms of sectoral growth, the share of agriculture in GDP has steadily declined and that of industry increased over the last two decades (Table 2.3).

Following successful economic growth, development in monetary sector showed a changing pattern in the public use of money (figure 2.2). Throughout the time under study, the portion of M1 to M2 has a decreasing trend, while the portion of QM to M2 has an increasing trend. From 1966 to mid 1983, the ratio M1/GDP was slightly greater than the ratio QM/GDP. After mid 1983, however, these ratios showed the opposite pattern. The pattern of those indicators would suggest that the economy had steadily become more monetised. Because a larger part of money for the period after mid 1983 was in the form of QM, and the ratio QM/GDP also showed an increasing trend, means that the monetary sector and the real sector have been closely related. A closer relation between the monetary sector and the real sector is the case after 1983 implying a higher reliability of money policy. Following economic growth and changing patterns of using money, all velocities of money for the period of 1969 to 1992, in general, showed systematically declining patterns (figure 2.4). To be effective monetary targeting requires a relatively small variation in v in conjunction with an ability to accurately control/predict money supply for the definition chosen for targeting. M1 would be the best variable to target in terms of v (table 2.5). Targeting both QM and M2 would seem of limited use because of the large variations in their velocities following deregulation since 1983.

Based on the monetary survey statistics of the IMF (1994), movements in M2 follow an identity which is related positively to net foreign assets (R), net domestic credit (D) and negatively to net other items (NOI). Taking proportions of their components to M2 as a share relationship, overtime, there has been a negative correlation between the ratio R/M2 and D/M2 (table 2.6 and figure 2.5). A nice property of this pattern is, therefore, that an increase in foreign assets may be the result of squeezing domestic credit. For the period 1974-82, credit controls actually caused a larger accumulation of surplus funds in the banking system, especially by state banks, and left the public lacking liquidity. This period was also characterised by a large accumulation in net foreign assets. One of the distinctive features of the period, except for 1980-81, was that domestic credit D took the largest part of M2. In other words the ratio D/M2 was always greater (dominant) than R/M2, except for 1980-81. This suggests two different patterns of domestic credit developments in terms of financial intermediation. Prior to 1983, domestic credit activities were more direct in nature. On the other hand, domestic credit activities

after 1983 were more indirect in nature following the current developments in the money market. Concerning the economic stability, these developments have reduced price variability from the demand side as suggested by the declining velocity of M1 above.

A part of domestic credit (D) is related to the fiscal authority. In the monetary survey statistics, this is summarised in the column heading entitled "net claims on government" (Cg). A positive Cg will mean that the fiscal authority is running a budget deficit financed by the banking system. A negative Cg means a surplus government budget which is raised either through domestic sources (GDR) such as taxes or through foreign sources (GFR) such as foreign borrowing (GFB) and oil revenues (GOR). Although GDR grew faster than GDE, in levels, GDE has always been greater than GDR. This suggests that, by definition, the budget has always been in deficit. Although GFE has a faster average annual growth than GFR, in nominal terms, GFR has always been greater than GFE. As figure 2.7 and figure 2.8 imply throughout the period, the fiscal authority has been covering the domestic component of its budget deficit through foreign sources, particularly foreign borrowing. It is apparent that balanced budget in the Indonesian context does not necessarily mean tax revenues equals to expenditures. Put another way, the budget deficit does not necessarily imply printing money since the government covers its domestic deficit through foreign sources.

By economic stability we mean stability of inflation, external competitiveness and a sound trade account position. All these have been important in underpinning the performance of the Indonesia's economy during the last 15 years. The domestic inflation rate measured by the percentage change in the consumer price index (CPI) on average was 17.20 % for the period 1970-80. It decreased to 8.57 % in the period 1981-90. These were below 10 per cent due to prudent macro economic management and careful fiscal and monetary policies. Compared to foreign inflation rates (% change in the US's CPI) from 1971 to 1992, however, the domestic inflation rate (% change in the Indonesia's CPI) was higher with the highest divergence of 29.57 % in 1974 (see table 2.9 and figure 2.10). It is widely acknowledged that there is a close relationship between prices and exchange rates. In accordance with the pattern of foreign and domestic price differentials, a depreciation of nominal exchange rate has been followed by a similar pattern in the real exchange rate (figure 2.11). Such a relationship would suggest an effort to increase external competitiveness. The last devaluation in 1986 helped the economy adjust to the terms of trade shock caused by sharp decline in oil export revenues (Thorbecke, 1992). Since the 1986 devaluation Bank Indonesia has sought to maintain the competitiveness of

the rupiah by a crawling peg mechanism which has produced a slight depreciation in the real exchange rate. The policy of gradual depreciation has contributed to Indonesia's rapid non-oil export growth (The Minister of Trade, 1994). The value of Indonesia's exports has increased 33 times since 1970, an average annual rate of growth of 16.4 per cent. The value of non oil exports has increased 38 times at an annual average of 17.2 per cent (table 2.10).

Chapter 3

THE MONETARY APPROACH TO THE BALANCE OF PAYMENTS

3.1 Introduction

Frenkel and Johnson (1977, p. 21), contend that the term 'The balance of payments' refers to items that are 'below the line' in overall balance of payments which must balance exactly due to the the principle of double entry accounting. Unlike the elasticity and absorption approaches, the MABP is a theory of the overall balance of payments (Dernburg 1989, p. 261). A balance of payments surplus/deficit, therefore, refers to the net balance of the accounts which reflects the monetary impact of a transactions recorded in international reserves movements. As Dernburg noted, therefore, the balance sheet of the domestic banking system becomes the centrepiece of the monetary analysis. This does not imply that only monetary factors are important, but it does stress the importance of the money market (Crystal, K.A. and Price, Simon 1994, p. 103).

The theory emphasises the relationship between the balance of payments, and/or the exchange rate, and divergences between the supply of and demand for money (Coghlan 1980, p. 238). Citing Coghlan, if the exchange rate is fixed, the monetary authority can only control domestic credit, and the quantity of foreign reserves and the supply of money become endogenously determined. In the case of floating exchange rates, foreign reserves are given, the money supply is determined by the domestic credit and therefore the monetary authority can fully control the money supply, and the exchange rate changes in order to restore equilibrium. Under a managed float,

disequilibrium adjustment in the money market is shared through the balance of payments and exchange rate changes (Connolly 1978, p. 9).

The MABP predicts that changes in economic variables will affect the balance of payments and exchange rate through their impact on the demand for and supply of money balances (Levä cic 1990, p. 180). This implies that the MABP is categorised as a stock adjustment approach stemming from the fact that a necessary condition for either or both a disequilibrium in the balance of payments and the exchange rate is some initial difference between the public's actual and demand money holdings. Citing Frenkel and Johnsons's exposition, Sassanpour (1984, p. 127) stated that, in the long run, the size of a nation's money stock must be consistent with the demand to hold that stock.

3.2 The Monetary Approach Under Fixed Exchange Rates

A clear, graphical device for discussing the MABP may be found in Dernburg (1989, p. 260). Descriptions below are adopted from Dernburg, otherwise they are cited. According to Dernburg, the MABP makes no attempt to separate the current from the capital accounts, but look instead to the overall balance of payments. Under fixed exchange rates, the balance of payments surplus equals the increase in foreign exchange reserves (ΔR). Assuming the money multiplier equals one, the foreign exchange reserves equation is written as follows,

$$\Delta R = \Delta M^s - \Delta D \tag{3.1}$$

Equation 3.1 states that the increase in reserves (ΔR), and therefore the balance of payment (BOP) surplus, equals the difference between the increase in the money stock (ΔM^s) and the rise in domestic credit (ΔD). Assuming the demand for money (M^d) as $M^d = L(Y, P, i)$ and taking its total differential will result in,

$$\Delta M^d = L_y \Delta Y + L_p \Delta P - L_i \Delta i \tag{3.2}$$

where, Y = income

P = price level

i = interest rate

$L_y > 0$, $L_p > 0$, $L_i < 0$ (partial derivatives)

Imposing monetary equilibrium requires $\Delta M^s = \Delta M^d$, and therefore substituting equation 3.2 into 3.1 will result in,

$$\Delta R = L_y \Delta Y + L_p \Delta P - L_i \Delta i - \Delta D \qquad (3.3)$$

Equation 3.3 is the fundamental balance of payments equation in the monetary approach. As equation 3.3 implies, an increase in real income will increase the demand for money and therefore increase the foreign reserves meaning a surplus in the balance of payments. If the price level increases, so does the demand for money leading to an increase in foreign reserves meaning a balance of payments surplus. An increase in the interest rate will decrease demand for money causing a deficit in the balance of payments and therefore a reserve loss. An increase in the domestic credit will cause a deficit and a reserve loss. These results are contradict Keynesian conclusions. The later suggests that an increase in the real income will cause an increase in import leading to a deficit in the balance of payments, a rise in the interest rate will attract foreign capital increasing foreign reserves, and a higher price level will reduce competitiveness reducing export and raising import so that the balance of payments goes into deficit.

The MABP suggests that an increase in the demand for money can be fulfilled either through the expansion of domestic credit or through an increase in reserves. As the MABP contends, under a fixed exchange rate regime, keeping domestic credit constant, changes in the money supply must come either from balance of payments deficits or surpluses. For example, an excess demand for money, keeping domestic credit constant, should be satisfied by an accumulation of reserves translating into an increase in the money supply as the central bank buys foreign reserves. As a consequence, an excess demand for money is associated with a balance of payments surplus, and the later will increase the money supply. An excess supply of money is associated with a balance of payments deficit, and the later will decrease the money supply to meet its desired level. Neither a surplus nor a deficit will last long since the demand for money is the demand for a certain stock. A balance of payments surplus, for instance, brings an increase in the money supply interpreted as a money stock adjustment, and will reduce the excess demand for money and therefore, equilibrium will be restored.

If the demand for money is satisfied by an expansion of domestic credit through an open-market purchase of domestic securities by the monetary authority, this will cause an excess supply of money and a deficit in the balance of payments as money holders diversify their excess balances by buying goods and financial assets. As the

deficit causes a loss of reserves, the money supply will shrink as the monetary authority sells foreign exchange and the supply of money goes back into balance with the demand for money, eliminating the deficit. This means that the increase in the domestic assets of the banking system is exactly offset by a reduction in foreign reserves, so there is no net change in the money supply.

Therefore, a permanent deficit or surplus in the balance of payments implies a continual expansionary or contractionary domestic monetary policy. If these policies are discontinued, the balance of payments will find its equilibrium.

3.2.1 Global Monetarism Under Fixed Exchange Rates

Global monetarism suggests three assumptions about how interest rates, price levels, and income levels are determined in the monetarist world. The assumptions of global monetarism are as follows.

Perfect Capital Mobility

Global monetarists assume that financial assets are perfect substitutes. One implication of this assumption is that domestic open market operations involving the purchase and sale domestic assets for money will have the same impact as purchasing and selling foreign assets. Purchasing domestic assets will increase domestic credit *(D)* and so the money supply *(M)*. Purchasing foreign assets will increase foreign reserves *(R)* and the money supply *(M)*. It follows that open market operation and exchange rate stabilisation are identical.

Perfect substitute ability implies that investors are indifferent between domestic and foreign assets, therefore perfect substitute ability implies perfect international capital mobility. Consequently, changes in supplies of domestic and foreign assets have no impact on their prices. Under fixed exchange rates, therefore, the domestic interest rate is equal to and determined by the world interest rate since the interest parity condition with zero expected depreciation/appreciation holds (Krugman, 1988).

Perfect arbitrage and the Law of One Price

Perfect arbitrage in commodity markets equalises prices in all markets. If the domestic market is small relative to the world market, then domestic prices *(P)* are largely determined by world prices *(P*)*. One implication of the law of one price is that the real exchange rate *(E)* is constant; that is $E=eP^*/P$ (Dornbush 1990, p. 761), can not be permanently changed (*e* is nominal exchange rate). With a fixed exchange rate, the equilibrium domestic price can change only as the consequence of a change in the world price. Applied to price levels as a whole, the law of one price implies that the domestic price level is determined by the world price level.

According to Krugman (1988), the law one price underlies the theory of purchasing power parity (PPP). The law one price applies to an individual commodity, while the PPP theory applies to the general price level, which is a composite of the prices of all commodities that enter into a typical consumption basket. If the law of one price holds for all commodities individually, prices and exchange rates should be well predicted by PPP. In this regard, the cheaper prices of country's goods compared to the prices of similar goods produced abroad tend to push the demand for domestic goods up, and vice versa. The PPP asserts that the economic forces behind the law of one price tend to equalise the cost of living in all countries. In other words, the PPP argues that the exchange rate movements primarily reflect divergent rates of inflation.

Supply-Determined National Income

Global monetarists assume flexible prices and wages to guarantee that the economy equilibrates automatically at full employment. Automatic adjustment occurs throughout the labor market, commodity market, and money market. Under competitive market conditions, unemployment in the labor market creates competition among laborers causing a fall in money wages and reducing real wages. As real wages go down, firms increase employment and output generating an increase in income. The later stimulates an increase in consumption. Since the marginal propensity to consume is less than one, an excess supply of output in commodity market exists. This causes the price level to fall. Due to a lower price level, real quantity of money goes up lowering interest rates and expanding investment. This is called the Keynes effect. A low price level increases the real value of government financial assets held by the private sector causing wealth to increase. A rise in wealth leads to a rise in consumption thereby adding to aggregate expenditure. This is called the real balance effect. Since these mechanisms continue to work to raise income and employment, as long as excess

supply continues in the labor market, the economy will tend to return automatically to full employment. It follows that in the monetarist world, aggregate expenditure expansion cannot raise the equilibrium level of real income. Such increases can come about only through the expansion of aggregate supply as caused by growth factors such as a growing labor force, capital stock, and advances in technical progress that raise the productivity of both labor and capital.

3.2.2 Foreign exchange and domestic money market equilibrium under a fixed exchange rate

The discussion so far has not yet explained why in fixing the exchange rate, adjustment should go through the foreign reserves or the balance of payments. The interest parity condition, which is a condition that equates the expected return (interest rate) on deposits of any two currencies when expressed in the same currency (Krugman, 1988), may help to show the reasons. Since the interest parity condition involves simultaneous equilibrium both in foreign exchange and money markets, both of them will be discussed briefly in the context of fixed exchange rates. The descriptions below are adopted from Krugman (1988) otherwise they are cited. To begin with, let the uncovered interest parity condition can be expressed as follows:

$$i = i^* + [(e^e - e)/e] \tag{3.4}$$

where, i = domestic interest rate

i^* = foreign interest rate

e = actual exchange rate (the price of one unit of foreign currency in terms of domestic currency)

e^e = expected exchange rate

$(e^e - e)/e = Exp(\frac{\Delta e}{e}) = Exp(\dot{e})$ is expected rate of depreciation of domestic currency

Δ = the difference operator

Assuming no risk premium, the uncovered interest rate parity simply states that the domestic interest rate must be equal to the foreign interest rate plus the expected rate of depreciation of domestic currency. The foreign exchange market is in equilibrium when the covered interest rate parity condition holds. When the exchange rate is fixed at e^o and market participants expect it to remain fixed, the expected rate of domestic currency depreciation is zero. The covered interest parity condition therefore implies that e^o is today's equilibrium exchange rate only if,

$$i = i^* \tag{3.5}$$

Because no exchange rate change is expected, participants in the foreign exchange market will be indifferent between holding domestic and foreign currency deposits only if these offer the same interest rate. To ensure equilibrium in the foreign exchange market when the exchange rate is fixed at e^o, the central bank must therefore hold i equal to i^*.

To hold the domestic interest rate equal to the foreign interest rate, the central bank's foreign exchange intervention must adjust the money supply so that the foreign interest rate equates aggregate real domestic money demand and the real money supply, written as follows,

$$\frac{M^s}{P} = L(i^*, Y) \tag{3.6}$$

Given prices (P) and real output (Y), the above equilibrium condition tells what the money supply (M^s) must be if a fixed exchange rate is consistent with asset market equilibrium.

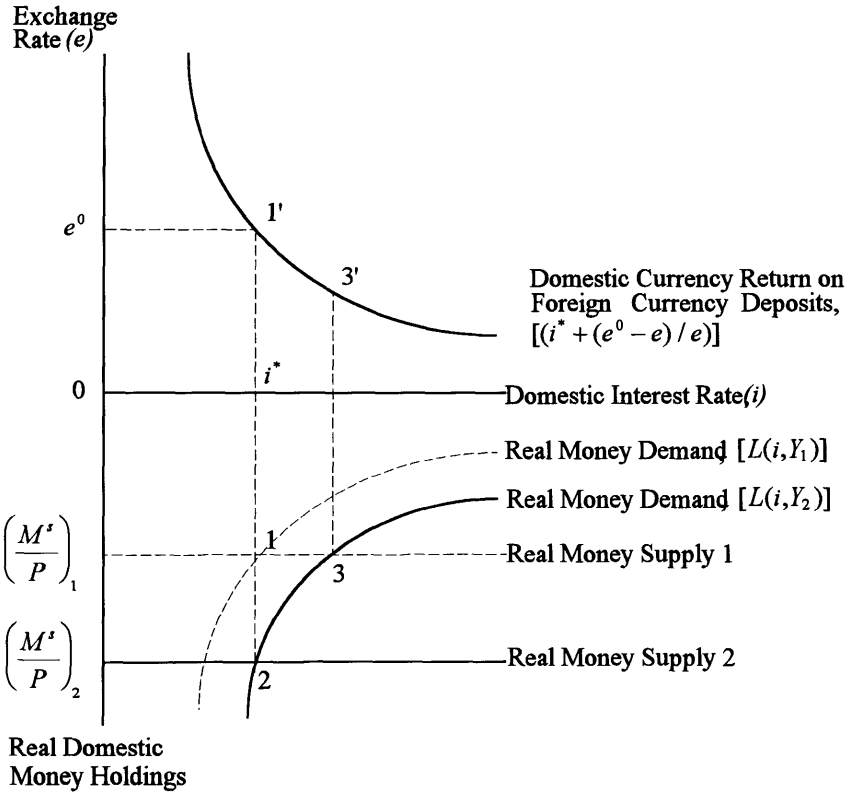
When the central bank intervenes to hold the exchange rate fixed, it is automatically adjusting the domestic money supply so that money market equilibrium is maintained with $i = i^*$. A rise in real output (Y), for example, raises the demand for domestic money, and the later tends to push the domestic interest rate above the foreign rate. Traders in the foreign exchange market will perceive that domestic currency deposits offer a higher rate of return, and begin to bid up the price of domestic currency in terms of foreign currency. To prevent home currency appreciation, the central bank must intervene in the foreign exchange market by buying foreign assets. These foreign asset purchase eliminate the excess demand for money because the central bank issues money to pay for the foreign assets it buys and thus automatically increases the money supply until asset markets are again in equilibrium with $e = e^o$ and $i = i^*$. In the absence of central bank intervention, the exchange rate would appreciate from e^o. The central bank intervention by buying foreign assets and selling domestic currency therefore increases the money supply and prevents any excess money demand from pushing the home interest rate above the foreign interest rate.

The mechanism of exchange rate fixing can be pictured using a diagrammatic tool. Figure 3.2 below shows the simultaneous equilibrium of the foreign exchange and

domestic money markets when the exchange rate is fixed at e^o and is expected to remain fixed. It is assumed that the exchange rate is the price of one unit foreign currency in terms of domestic currency. Thus a rise in the exchange rate is a depreciation and a fall in the exchange rate is an appreciation.

Figure 3.1

Assets market equilibrium with a fixed exchange rate, e^o



Source: Krugman (1988, p. 472).

Money market equilibrium is initially at point 1 in the lower part of the figure 3.1. The diagram shows that for a given price level P and a given national income level Y_1, the real money supply must equal $(M^s/P)_1$ when the domestic interest rate i equals the foreign rate i^*. The upper part of the figure shows the equilibrium of the foreign exchange market at point 1'. If the expected future exchange rate is e^0, the interest parity condition holds when $i=i^*$ only if today's exchange rate also equals e^0.

To see how the central bank must react to macroeconomic changes in order to hold the exchange rate at e^0, let there is an increase in real output. A rise in the real output from Y_1 to Y_2 raises the demand for real money holdings at every interest rate, thereby shifting the aggregate money demand function in figure 3.2 downward from $L(i,Y_1)$ to $L(i,Y_2)$. Without the central bank action, the new money market equilibrium would be at point 3. Because the domestic interest rate is above i^* at point 3, the currency would have to appreciate to bring the foreign exchange market to equilibrium at point 3'.

The central bank can not allow this appreciation of the domestic currency to occur if it is fixing the exchange rate; so it will buy foreign exchange. The increase in the central bank's foreign assets is accompanied by an expansion of the domestic money supply. The central bank will continue to purchase foreign assets until the domestic real money supply has expanded to $(M^s/P)_2$. At the resulting money market equilibrium (point 2 in the figure), the domestic interest rate again equals i^*. Given this domestic interest rate, the foreign exchange market equilibrium remains at point 1' with the equilibrium exchange rate still equals to e^0.

This section implies that, *during the period of money stock adjustment*, foreign assets or reserve accumulation and therefore balance of payment surplus are accompanied by an increase in the money supply, and the exchange rate should depreciate until the desired (fixed) exchange rate target is achieved.

3.3. The Monetary Approach Under Flexible Exchange Rates

As discussed above, disequilibrium in the money market under fixed exchange rates is adjusted through balance of payments surpluses or deficits and therefore it predicts reserve accumulation or loss. It happens since the monetary authority must intervene the foreign exchange market to keep the exchange rate constant. Under the pure flexible exchange rate, the central bank does not intervene the foreign exchange market so that the money supply is independent of the balance of payments. It may give way for the central bank to have complete power to control the domestic part of money supply. Disequilibrium in the money market is eliminated through changes in prices and the nominal exchange rate. An increase in the growth rate of domestic credit causing an excess supply of money results in an equiproportionate depreciation of the home currency (Connolly 1978, p. 9). The balance of payments equation is, therefore, designed to predict movements in the exchange rate.

Following Dernburg (1989, p. 289), the key assumptions needed to construct a monetarist flexible exchange rate model are as follows:

- *Asset market equilibrium*

  Portfolios adjust instantaneously to disequilibrium. Domestic and foreign financial assets are perfect substitutes. This implies uncovered interest parity condition holds (see equation 3.4),

$$i = i^* + Exp(\dot{e}) \tag{3.7}$$

  where, i = domestic interest rate
  i^* = foreign interest rate (exogenous)
  e^e = expected exchange rate
  e = actual exchange rate (the price of one unit of foreign currency in terms of domestic currency)

  $(e^e - e)/e = Exp(\frac{\Delta e}{e}) = Exp(\dot{e})$ is expected rate of depreciation of domestic currency
  $Exp(.)$ = the expectation operator
  Δ = the difference operator

  The domestic interest rate is in equilibrium when it is equal to the foreign interest rate plus the expected rate of depreciation/appreciation, or in other words, the expected rate of depreciation/appreciation of the local currency must equal the difference between the domestic and the foreign rate of interest.

- *Goods market equilibrium*

  Domestic and foreign goods are perfect substitutes which flexible prices determined in competitive markets implying there is effectively only one good, or all goods are tradables. Therefore, the law one price, and PPP, at equilibrium real exchange rates must hold. Recalling subsection 3.2.1,

$$E=eP^*/P \tag{3.8}$$

where, E = real exchange rate

e = nominal exchange rate measured as one unit of foreign currency in terms of domestic currency

P^*= foreign price level (exogenous)

P = domestic price level

the law one price suggests that changes in the right hand side of equation 3.8 do not change the real exchange rate (E). Since E does not change, the only matter under the law one price is,

$$P = eP^* \tag{3.9}$$

Equation 3.9 suggests that, under the law one price, the equilibrium domestic price level of a particular commodity equals the foreign price of the same commodity adjusted by the nominal exchange rate. One may take natural logarithms of both sides of equation 3.9, i.e. ,

$$\hat{p} = \hat{e} + \hat{p}^* \tag{3.10}$$

where, $\hat{p} = \ln p$

$\hat{e} = \ln e$

$\hat{p}^*$= $\ln p^*$ (exogenous)

$\wedge$ = the natural logarithm (ln) operator

As the PPP theory suggests, variables P and P^* in equation 3.9 can be used as proxies for domestic and foreign inflation rates since individual prices will not deviate from general prices as long as the law one price holds (Krugman, 1988). Expressing all variables in terms of rates of growth and taking natural logarithms, an alternative expression of equation 3.9 is,

$$\Pi = \varepsilon + \Pi^* \tag{3.11}$$

where, $\Pi = \Delta \ln P = \dfrac{\Delta P}{P}$ is domestic inflation rate

$\varepsilon = \Delta \ln e = \dfrac{\Delta e}{e}$ is the rate of local currency depreciation

$\Pi^* = \Delta \ln P^* = \dfrac{\Delta P^*}{P^*}$ is foreign inflation rate (exogenous)

which is the log-log (double log) model of equation 3.8. Rearranging terms,

$$\varepsilon = \Pi - \Pi^* \tag{3.12}$$

Equation 3.12 states that under the PPP, the rate of depreciation of the home currency must be equal to the difference between the domestic and foreign inflation rates in order to meet the fixed equilibrium of the real exchange rate.

- *Money market equilibrium*

Suppose the demand for money is of the explicit form,

$$\frac{M^d}{P} = Y^{\alpha} e^{-\beta i} \tag{3.13}$$

where, e is the exponential. Imposing the equilibrium condition in the money market $\frac{M^s}{p} = \frac{M^d}{P}$, and taking natural logarithms, equation 3.13 can be written as follows,

$$\hat{m} - \hat{p} = \alpha\, \hat{y} - \beta\, i \tag{3.14}$$

where, $\frac{M^s}{P}$ = real money supply

$\frac{M^d}{P}$ = real money demand

M = nominal money stock

$\hat{m} = \ln M$, the natural logarithm of the nominal money stock (exogenous)

$\hat{p} = \ln P$, the natural logarithm of the price level

$\alpha = \frac{\Delta M / M}{\Delta Y / Y}$, the income elasticity of the demand for money

$\beta = \frac{\Delta M / M}{\Delta i}$, the interest semielasticity of the demand for money with respect to the rate of interest

i = interest rate

Putting equations 3.7, 3.10 and 3.14 together in table 3.1 gives a preliminary reflection to consider the basic monetarist exchange rate model (Gärtner, 1993),

Table 3.1
The basic monetarist exchange rate model (continuous time)

the asset market equilibrium :	$i = i^* + Exp(\dot{e})$	(3.7)
the money market equilibrium :	$\hat{m} - \hat{p} = \alpha\, \hat{y} - \beta\, i$	(3.14)
the goods market equilibrium :	$\hat{p} = \hat{e} + \hat{p}^*$	(3.10)

3.3.1 A stationary (full employment) economy

Following Gärtner (1993, p. 112), in a stationary economy exchange rate expectations do not play a crucial role. All markets are in permanent equilibrium and in equilibrium the exchange rate expectation, $Exp(\dot{e}) = 0$. The exchange rate equation can be found by substituting equation 3.7 into equation 3.14 and the resulting equation into equation 3.10,

$$\hat{e} = \hat{m} - \alpha\, \hat{y} + \beta\, i - \hat{p}^* \qquad (3.15)$$

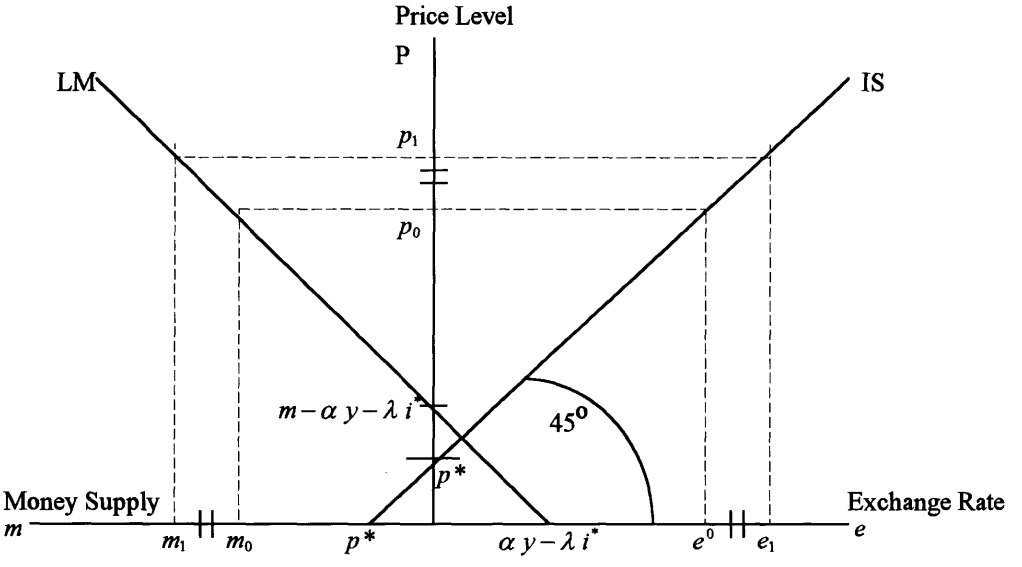
Equation 3.15 states that at each point in time the exchange rate exactly reflects the difference between the domestic equilibrium price level, $\hat{p}$ (where $\hat{p} = \hat{m} - \alpha\, \hat{y} + \beta\, i$) and the foreign price level, $\hat{p}^*$. It happens since the PPP theory and the quantity theory of money stand behind it.

Figure 3.2 below may illustrate key properties of the monetary exchange rate model graphically. The left hand quadrant shows the equilibrium locus of the monetary sector for a given (exogenous) real output supply in a stationary environment (see equations 3.14 and 3.7). For given values of $\hat{y}$ and i the monetary sector can only remain in equilibrium if the real money supply remains constant. This condition is graphically represented by a straight line with unit slope. The right hand quadrant shows the equilibrium schedule for goods market which results from equation 3.10. Equilibrium in goods market requires a constant real exchange rate which, again, may be represented by a straight line with unit slope.

A nominal domestic money supply m_0 produces a domestic price level p_0 and an exchange rate of e^0. Since both equilibrium conditions possess unity slope, the graph visualises the extreme homogeneity properties of the monetarist exchange rate model. If the money supply increase from m_0 to m_1 the price level rises and the exchange rate depreciates by the same percentage rate from p_0 to p_1 and e^0 to e_1, respectively. The graph also can be used to trace the consequences of exogenous shocks; for example, an increase of the foreign price level p^* moves the goods market equilibrium line to the left, thus appreciating the exchange rate while leaving the price level unchanged.

Figure 3.2

Basic monetarist exchange rate model in a stationary economy



Source: Gärtner (1988, p. 113)

3.3.2 An inflationary economy

Gärtner (1993, p. 114) notes, relaxing the stationary economy assumption by introducing an inflationary/growing economy in the monetarist exchange rate model produces a less straightforward and less familiar insights. Even with market clearing, however, as Gärtner argues, it is not necessary to impose a stationary exchange rate expectation. Without postulating $Exp(\dot{e})=0$, equation 3.15 can be rewritten as follows,

$$\hat{e} = \hat{m} - \alpha\,\hat{y} + \beta\, i + \beta\, Exp(\dot{e}) - \hat{p}^* \qquad (3.16)$$

Unlike equation 3.15, equation 3.16 incorporates a self-fulfilling prophecy of the foreign exchange market. In the short run, the market may believe in the wrong equilibrium exchange rate, but in the long run, wrong expectations are corrected.

Assume that money demand abroad is determined in the same way as money demand at home,

$$\hat{m}^* - \hat{p}^* = \alpha\, \hat{y}^* - \beta\, i^* \tag{3.17}$$

Then equations 3.14, 3.10 and 3.17 are combined yielding,

$$\hat{e} = \hat{m} - \hat{m}^* - \alpha\,(\hat{y} - \hat{y}^*) + \beta\,(i - i^*) \tag{3.18}$$

Equation 3.18 is a fundamental monetarist exchange rate model stating that the exchange rate is not determined by how fundamental variables develop in absolute terms, but how they move relative to the respective variable abroad. Therefore, the domestic currency may appreciate despite inflationary money growth, as long as the foreign central banks pursue an even more inflationary policy.

Incorporating equation 3.7, one can replace the interest differential on equation 3.18 by expected depreciation yielding another version of the monetarist exchange rate equation,

$$\hat{e} = \hat{m} - \hat{m}^* - \alpha\,(\hat{y} - \hat{y}^*) + \beta\; Exp(\dot{e}) \tag{3.19}$$

If the PPP holds, the real exchange rate must be constant, and therefore, the expected rate of depreciation must equal to the expected inflation differential,

$$\hat{e} = \hat{m} - \hat{m}^* - \alpha\,(\hat{y} - \hat{y}^*) + \beta\,[Exp(\dot{\Pi}) - Exp(\dot{\Pi}^*)] \tag{3.20}$$

Finally, considering that the economy remains in permanent equilibrium, and that in this equilibrium incomes are at their full employment levels $\bar{y}$ and $\bar{y}^*$, and inflation rates equal the rate of money growth, one can replace expected inflation rates by expected money growth,

$$\hat{e} = \hat{m} - \hat{m}^* - \alpha\,(\hat{\bar{y}} - \hat{\bar{y}}^*) + \beta\,[Exp(\hat{m}) - Exp(\hat{m}^*)] \tag{3.21}$$

Equation 3.21 states that, despite flexible prices, the exchange rate may respond more than proportionally to a money supply increase; namely if a money supply increase today generates expectations of another money supply increase tomorrow.

Postulating $dE(\hat{m})/d\hat{m} > 0$, then in this spirit the exchange rate effect of a money supply increase, equation 3.21 becomes,

$$\frac{d\hat{e}}{d\hat{m}} = 1 + \beta \frac{dE(\hat{m})}{dm} > 1 \qquad (3.22)$$

Expression 3.22 is called the magnification effect of Bilson and must not be confused with the overshooting effect of Dornbusch (Gärtner 1993). As the money supply increases, the overshooting effect refers to a temporary overreaction of the nominal exchange rate as compared to its equilibrium value. The overshooting effect occurs since it is assumed that in the short run commodity prices are sticky and the PPP would hold in the long run (Dernburg 1989, p. 291). In contrast, the magnification effect occurs with perfectly flexible goods prices, constantly cleared goods market and a constant real exchange rate (Gärtner 1993, p. 118).

3.4 The Monetary Approach Under Managed Float Exchange Rates

Under fully flexible exchange rates the monetary authority (the central bank) takes no action in the foreign exchange market. Far from buying or selling foreign exchange at a fixed price, the monetary authority does not conduct any foreign exchange transactions. More commonly, however, the monetary authority intervenes in the foreign exchange market to lesser or greater extent to influence the exchange rate for several reasons. The main reason is probably the belief that many capital flows represent merely unstable expectations and that induced movements in exchange rates move production in the economy in an erratic fashion. Secondly, the central bank may attempt to move the real exchange rate in order to affect trade flows. The third reason arises from the effects of the exchange rate on domestic inflation (Dornbusch 1990, p. 786).

With fixed exchange rates, the nominal money supply adjusts to demand via payments imbalances, while with flexible exchange rates the demand for money adjusts to the nominal supply via changes in the exchange rate. In the managed float system both the demand and the supply of money adjust to achieve equilibrium (Connolly 1978, p. 9).

The demand for money of Cambridge approach:

$$M^d = kPy \qquad (3.23)$$

The money nominal supply identity (from 3.1) with multiplier (A):

$$M^s = A(R+D) \tag{3.24}$$

The law of one price (the PPP if it is applied for whole prices) :

$$P = eP^* \tag{3.25}$$

Substituting equation 3.9 into 3.23, and equations 3.23 and 3.1 into $M^s = M^d$,

$$A(R+D) = keP^*Y \tag{3.26}$$

taking logarithms of both sides, differentiating with respect to time, and ignoring constant (k) results in,

$$\frac{dA}{dt}\frac{1}{A}+\frac{dR}{dt}\frac{1}{(R+D)}+\frac{dD}{dt}\frac{1}{(R+D)}=\frac{de}{dt}\frac{1}{e}+\frac{dP^*}{dt}\frac{1}{P^*}+\frac{dY}{dt}\frac{1}{Y} \tag{3.27}$$

simplifying and rearranging notations in equation 3.27,

$$r - er = p^* + y - d - a \tag{3.28}$$

where, $r = \frac{dR}{dt}\frac{1}{(R+D)}$ is the change in the foreign reserves as the proportion of the money stock

$er = \frac{de}{dt}\frac{1}{e}$ is the percentage depreciation (if negative)

$p^* = \frac{dP^*}{dt}\frac{1}{P^*}$ is the world rate of inflation

$d = \frac{dD}{dt}\frac{1}{(R+D)}$ is the change in domestic credit as proportion of the money stock

$a = \frac{dA}{dt}\frac{1}{A}$ is the money multiplier

Following Connolly (1978, p. 10), equation 3.28 is a type of an exchange market pressure model suggesting that any excess supply of money can be relieved either by an exchange rate depreciation, or a loss in foreign reserves, or some combination of these two under a managed floating exchange rate system. A growth in the domestic credit causing a rise in growth in the money supply will result in a reserve loss and the proportional depreciation in the home currency. An increase in the foreign inflation rate results in an excess demand for money leading to a proportional appreciation of domestic currency and an inflow of foreign reserves. A rise in real domestic income will also cause an excess demand for money which lead to a proportional appreciation of domestic currency and an inflow of foreign reserves. It is worth concluding that an excess supply of money will depreciate the home currency and lose foreign reserves, while an excess demand for money keeping the domestic credit constant will result in a rise in foreign reserves and an appreciation of the home currency.

To judge the effectiveness of intervention, it is necessary to make a distinction between sterilised and nonsterilised intervention (Dornbusch 1990, p. 764). In the case of sterilised intervention the central bank, for example, buys foreign exchange, issuing domestic money, but at the same time the central bank conducts an open market sale securities reducing the domestic money. In the sterilised case, therefore, the home money supply is kept unchanged. Since the nominal exchange rate can change only if the money stock changes, there is no change in the nominal exchange rate in the case of sterilised intervention. In contrast, the nominal exchange rate changes only if the monetary authority conducts nonsterilised intervention as discussed in the pervious paragraph.

The Scenario given above is under money market equilibrium. Allowing for disequilibrium in the money market will suggest a slightly different result. Assume that the disequilibrium money market is characterised by stock adjustment and that actual holdings of money balances adjust with a lag to difference between the desired holdings in the current period and the actual holdings in the previous period (Otani, I., Sassanpour, C. 1991, p. 144),

$$M_t = \lambda(M_t^d - M_{t-1}) \tag{3.29}$$

where, $M_t = M^s$ = the actual holdings of money balances in the current period

M_{t-1} = the actual holdings of money balances in the previous period

M_t^d = the desired holdings of money balances in current period

$0<\lambda<1$ = the coefficient of adjustment

Equation 3.29 states that if current demand exceeds actual holdings in the previous period, the public adjusts its holdings by adding to its balances, and vice versa.

Recalling equation 3.1 that $M^s = A(R+D)$, equation 3.29 becomes,

$$A(R+D) = \lambda(M_t^d - M_{t-1}) \tag{3.30}$$

Substituting equation 3.9 into 3.23 and the resulting equation into equation 3.30 yields

$$A(R+D) = \lambda(keP^*Y - M_{t-1}) \tag{3.31}$$

simplifying

$$A(R+D) = \lambda keP^*Y - \lambda M_{t-1} \tag{3.32}$$

Taking logarithms of both sides, differentiating with respect to time, and ignoring the constants λ and k results in,

$$\frac{dA}{dt}\frac{1}{A}+\frac{dR}{dt}\frac{1}{(R+D)}+\frac{dD}{dt}\frac{1}{(R+D)}=\frac{de}{dt}\frac{1}{e}+\frac{dP^*}{dt}\frac{1}{P^*} + \frac{dY}{dt}\frac{1}{Y}-\frac{dM_{t-1}}{dt}\frac{1}{M_{t-1}} \tag{3.33}$$

Simplifying and rearranging notation results in,

$$r - er = p^* + y - m_{t-1} - d - a \tag{3.34}$$

where, $m_{t-1} = \frac{dM_{t-1}}{dt}\frac{1}{M_{t-1}}$

Equation 3.34 is extension of equation 3.28 added with m_{t-1}. Recalling that equation 3.28, has been interpreted that an excess demand for money, keeping domestic credit constant, will result in a rise in foreign reserves and an appreciation. Unlike equation 3.28, equation 3.34 suggests that an appreciation of the home currency does not necessarily occur when there is an excess demand for money because stock adjustment

of the money supply will prevent the home currency from appreciating. Based on equation 3.34, if there is an excess demand for money, the public will adjust its holdings by adding to its balances so that money stock will increase. As the stock of money increases the home currency tends to depreciate. An important conclusion based on equation 3.34 is, therefore, that an excess demand for money, keeping domestic credit constant, will result in foreign reserve accumulation and, to some extent, may depreciate the home currency.

3.5 Stabilisation policy under fixed exchange rates

In a small economy under a regime of fixed exchange rates, in the global monetarism model, it is believed that the domestic price level is mainly determined in the world market and thus is beyond the control of the domestic monetary authority. Policy to stimulate an underemployed economy by expanding the money supply, for example, will useless. In this instance, an increase in money supply will lower the domestic interest rate and raise real income. A lower domestic interest rate compared to the foreign rate, however, will bring about a capital outflow while a higher real income will result in an increase in imports. These processes will worse both the capital and current accounts and therefore the balance of payments goes into deficit (Swoboda, A.K. 1972, p. 164). To finance this deficit the monetary authority must sell reserves in foreign exchange market in exchange for domestic money.

Selling foreign reserves then will reduce the stock of money until the balance of payments deficit is eliminated. The money supply is returned to its initial level and the economy goes back to its initial equilibrium level as well. Monetary policy for a small open economy under fixed exchange rates therefore does not affect economic activity, such as real income and interest rates, since the money supply is endogenously determined. The monetary authority under the fixed exchange rates can only influence the balance of payments position. These all suggest that there are limits to the use of monetary policy as counter cyclical device in an open economy under fixed exchange rates.

On the other hand, the effectiveness of fiscal policy under fixed exchange rates depends on the degree of capital mobility (Swoboda, A.K. 1972, p. 166-167). In a situation where the capital mobility is relatively imperfect, fiscal policy will have a little effect on income. In contrast, when the capital is perfectly mobile, fiscal policy has a full open economy multiplier effect on income. As Mundell (1962, p. 70-79) suggests, this leads to the issue of the monetary-fiscal policy mix in that monetary policy should

be used for external balance under a regime of fixed exchange rates, while fiscal policy should be assigned to internal balance.

3.6 Stabilisation under flexible and managed float exchange rates

Recalling subsection 3.2.1, due to the Keynes effect, monetary growth will increase income in the short run and lower interest rates thereby increasing investment. In the long run with flexible prices, after anticipated prices are adjusted to actual prices, the rate of growth of the money supply has little effect on real output since the level of unemployment returns to the natural rate of unemployment (Cuthberson, K. 1979, p. 10). As equation 3.29 suggests then if the increase in the domestic price level is greater than in foreign prices without the monetary authority's intervention in the foreign exchange market, the nominal exchange rate will depreciate. Therefore monetary policy under a flexible regime will determine the exchange rate. Since money supply is independent of foreign reserves, the monetary authority will have full power to determine the money supply. Therefore stabilising domestic prices and nominal exchange rates are a matter of managing the domestic money supply.

As mentioned before, under the managed float regime, monetary policy will affect both a country's balance of payments position and its nominal exchange rate. Following Vane and Thompson (1979, p. 183), the degree of the monetary authority's intervention would determine the effects of monetary policy. If the monetary authority intervenes heavily in the exchange rate then the effectiveness of monetary policy would be similar to that in a fixed regime and determine the position of reserves. On the other hand, if the authority intervenes in the foreign exchange market only to smooth out fluctuations in the exchange rate, then monetary policy would help to influence the exchange rate.

Chapter 4

MODEL SPECIFICATION FOR INDONESIAN ECONOMY

4. 1 Introduction

The model proposed in this study is borrowed from Otani and Sassanpour (1991) with few modifications. Their model originally emphasised the role of monetary, exchange rate and wage policies in influencing key macro economic variables, including output, prices and foreign reserves for Singapore's case for the period 1979-86. Disequilibrium in the money market plays a key role in the model. Otani and Sassanpour introduce wage behaviour and wage policies and explicitly incorporate an exchange rate reaction function. The model uses the monetary approach to the balance of payments. The exchange rate reaction function captures the possibility of using the fixed and free floating exchange rates. The government budget surplus is assumed to describe the real situation in Singapore since the late 1960s augmented by savings generated by the social security scheme (Central Provident Fund) and government-controlled financial institutions (for example, the Post Office Savings Bank), which have been deposited in government accounts with the Monetary Authority of Singapore (MAS). Consequently, as Otani notes, government financial operations have drained liquidity from the banking system, creating persistently tight liquidity conditions.

Due to the important role of the government budget and similarity in using different exchange rate regimes given in Otani's model, it is adopted for the Indonesian case with some modifications since Indonesia is basically a deficit country whose balanced budget is supported mainly by foreign borrowing and whose current account is in deficit most the time. For the case of Indonesia whose continual growth in domestic credit, a persistent balanced budget applied since 1966 may have been reducing the

monetary impact of domestic credit creation in curbing the inflation rate. This policy, probably, would also give an easy way for the monetary authority to target external balances such as raising foreign reserves and depreciating exchange rates, under the current managed float. This study, therefore, is intended to examine causal links and transmission processes between key macro economic variables described by a simple open monetary model, particularly, to see the movements of foreign reserves, the exchange rates, prices, real output and government revenue and expenditure. The model in section 4.3 tries to give a crude framework showing that monetary policy conducted to raise net foreign assets and to depreciate the nominal exchange rate will be a success if the government through its budget is capable of raising revenues both from domestic and foreign sources. A formal test of the soundness of the model will be conducted in chapter five.

4. 2 Theoretical Specification of the Model

The model consists of eight equations and three identities with 30 variables which consist of 11 endogenous variables and 19 predetermined (exogenous and lagged) variables. The following symbols may be found elsewhere in the model, and if they are not explained they should be self explanatory after they are mentioned in this section. Subscripts of small letters of *t* and *t-1* imposed on variables stand for current and previous values of those variables. A lag operator (Δ) will stand for the difference between the values of the current and the previous periods. Natural logarithms will be specified by "ln". If the true signs and other mathematical operators such as the natural logarithms and lag operator are not specified by words, they will explicitly be stated in the equations.

4. 2. 1 Foreign Reserves

Under a fixed exchange rate regime, as the monetary approach to the balance of payments suggests, a lack of liquidity in the domestic financial system will cause accumulation of foreign assets to eliminate the domestic excess demand for money as long as there is no significant increase in domestic credit. A clear proposition may be found in Otani (1991, p. 144) beginning with the disequilibrium condition in the money market.

Following Otani, the actual holding of real money balances (money supply) in the current period $(M / P)_t$ follows a partial adjustment mechanism, expressed in natural logarithms,

$$\Delta \ln(M/P)_t = k[\ln(M/P)_t^d - \ln(M/P)_{t-1}] \quad (4.1)$$

where k is the coefficient of adjustment and is expected to be positive and less than unity and Δ is the first difference operator. The model says that the log of actual holdings of real money balances $(M/P)_t$ adjust according to the difference between the log of desired holdings of real money balances (demand for money) in the current period $(M/P)_t^d$ and the log of actual holdings of real money balances in the previous period $(M/P)_{t-1}$. The reason behind this equation is that if the log of desired holdings of real money balances in the current period exceeds the log of actual holdings of real money balances in the previous period, the public adjusts its holdings by adding to its balance and vice versa.

The log of desired holdings of real balances in the current period $(M/P)_t^d$ is formulated as functions of log of current real income (Y_t) and the current domestic real interest rate (rd_t), with the latter measuring the opportunity cost of holding money. The equation for the desired holding of real money balances in natural logarithm (ln) is,

$$\ln(M/P)_t^d = \alpha_0 + \alpha_1 \ln Y_t - \alpha_2 (rd)_t \quad (4.2)$$

where α_1 represents the income elasticity of money demand and α_2 is the change in $\ln(M/P)_t^d$ when the rd_t changes.

In theory, the actual holdings of real money balances (money supply), $(M/P)_t$ follows an identity which consists of net foreign assets *(R)* and domestic assets *(D)*. In practice, however, the money supply identity does not actually consist of net foreign assets *(R)* and domestic assets *(D)*, but it also includes net other items *(NOI)*. For the case of Indonesia, a large portion of net other items is import deposits surrendered by importers to the central bank through authorised banks which have foreign transactions, and they reduce domestic liquidity. Referring to the money supply identity, therefore, changes in the stock of money are equal to the sum of changes in net foreign assets *(R)* and changes in net domestic assets *(D)* minus changes in net other items *(NOI)* in the banking system. Assuming the money multiplier equals one, the money supply identity can be written as follows,

$$\Delta M_t \equiv \Delta R_t + \Delta D_t - \Delta NOI_t \quad (4.3)$$

Expressing the variables in real terms taking natural logarithms about the sample means, equation 4.3 can be rewritten as,

$$\Delta \ln(M/P)_t = m_0 + m_1 \Delta \ln(R/P)_t + m_2 \Delta \ln(D/P)_t - m_3 \Delta \ln(NOI/P)_t \quad (4.4)$$

where $m_1 = (\overline{R}/\overline{M})$, $m_2 = (\overline{D}/\overline{M})$ and $m_3 = (\overline{NOI}/\overline{M})$ are, respectively, ratios of the sample means of net foreign assets, net domestic assets (net domestic credit) and net other items to the money supply.

Substituting equations (4.2) and (4.4) in equation (4.1) and solving for foreign reserves *(R/P)* results in,

$$\begin{aligned} \Delta \ln(R/P)_t = {} & (k\alpha_0 - m_0)/m_1 + (k\alpha_1/m_1)\ln Y_t - (k\alpha_2/m_1)(rd)_t \\ & - (k/m_1)\ln(M/P)_{t-1} - (m_2/m_1)\Delta \ln(D/P)_t \\ & + (m_3/m_1)\Delta \ln(NOI/P)_t \end{aligned} \quad (4.5)$$

From equation (4.5), it is clear that the demand (desired holdings) components of real money balances are captured by the first two variables on the right hand side of equation (4.5) which are $(\ln Y_t)$ and $(rd)_t$. Based on equation (4.5), therefore, it can be inferred that reserve accumulation ($\Delta \ln(R/P)_t$) will occur as long as the excess demand for money in the previous period ($\ln(M/P)_{t-1}$) is left unsatisfied at the beginning of the period and is not met by the creation (growth) of domestic credit during this period ($\Delta \ln(D/P)_t$). An increase in real income *(lnYt)* tends to increase public spending, and the demand for real money balances leading to an increase in foreign reserves. Unlike real income, an increase the domestic real interest rate $(rd)_t$ meaning a higher cost of holding money, will decrease the demand for real balances and reduce foreign reserves. The logic behind this proposition is based on the monetary approach to the balance of payments conclusion that the perfect substitutability of the domestic and foreign components of the money supply implies that open (domestic) market operations and exchange rate stabilisation transactions are essentially identical (Dernburg 1989, p. 271). Perfect substitutability of the domestic and foreign components of money supply implies that under fixed exchange rates, any disequilibrium in the domestic money market should be adjusted through the foreign component of money supply through which an excess demand for money leads to a surplus in the balance of payments. Therefore money supply should increase to meet its excess demand. An excess money supply on the other hand will result in a deficit in the balance of payments reducing the money supply to accommodate a low demand for money.

Assuming money market disequilibrium in the short run, an increase in net foreign assets (reserves) implies an increase in the money supply to meet an excess demand for money. As equation (4.5) implies, stock adjustment is assumed occur in one lag period during which an increase in the money supply will result in an increase in foreign reserves as long as there is no increase in domestic credit or at least the growth of domestic credit is not larger than the growth of foreign reserves. One advantage in the lag adjustment of Otani's model is that increasing foreign reserves may also capture an increase in the money supply and the later will depreciate nominal exchange rates. By doing that, a strict fixed exchange rate model can be relaxed moving to the managed float model by letting foreign reserves, nominal exchange rates and price levels be endogenously demand determined implying that, unlike the fixed exchange rates, the effect of disequilibrium in the money market will be felt through the balance of payments, the exchange rates, or prices.

As equation 4.5 implies, for the case of Indonesia, reserve accumulation will also occur due to an increase in the net other items *(NOI)* which mostly consists of import deposits. During the period of study, importers were required to make an interest-free deposit with foreign exchange banks in the amount of 40 % of the amount of letters of credit when they are opened (Sumardi 1984, p. 21). In the monetary survey statistics, *NOI* is specified as the monetary liabilities of banking system reducing domestic liquidity (M2). Assuming substitutability between domestic and foreign components of money, therefore, an increase in *NOI* will mean a decrease in the domestic component of the money supply leading to an excess demand for money will cause an increase in the foreign assets of the banking system.

4. 2. 2 Exchange Rates

The Indonesian exchange rate system has been categorised as a managed float although there were few variations of the official mid-rates which were Rp 425 = $ 1 and Rp 625 = $ 1 from 1970 to 1983 (Garnaut 1979, p. 20). De facto as Garnaut noted, however, before 1983 the regime should be defined as an adjustable peg to the dollar and since 1983 as a managed float with the crawling peg system. Under the managed crawling peg, the nominal exchange rate is depreciated at a rate roughly equal to the price differential between a country and its trading partners (Dornbusch 1990, p. 761). This system therefore guarantees that the real exchange rate remains unchanged because depreciation offsets price differentials, i.e.,

$$E = e\frac{P^*}{P} \tag{4.6}$$

where E is the real exchange rate, and e is the nominal exchange rate (defined as the price of one unit foreign currency in terms of domestic currency). P^* is foreign prices and P is domestic prices. Rearranging equation (4.6) in terms of nominal exchange rate, then,

$$e = E\frac{P}{P^*} \qquad 4.7)$$

Under a managed float, changes in the nominal exchange rate are assumed to be function of the gap between the authority's level of desired nominal exchange rate in the current period (e_t^d) and the actual nominal rate in the previous period (e_{t-1}), written as follows,

$$\Delta \ln e_t = \phi(\ln e_t^d - \ln e_{t-1}) \qquad (4.8)$$

where (ϕ) is the adjustment coefficient and is expected to have a positive sign and to be less than unity. Since e is defined as the price of one unit foreign currency in terms of domestic currency, then an increase in e means depreciation and a decrease in e means appreciation.

By relaxing the stationary environment, at least in the short run, exchange rate expectations captured in (e_t^d) play a crucial role and are considered to have non-zero values in determining the growth of nominal exchange rates (Gärtner 1993, p. 114). Furthermore, Gärtner notes that in a growing economy, despite flexible prices, the growth in nominal exchange rates may not necessarily have the extreme homogeneity property in line with the growth in money supply. This means that increases in the money supply and therefore price levels do not necessarily cause the same percentage growth in nominal exchange rates.

The desired level of the nominal exchange rate (e_t^d) in a given period is set by authorities by taking into consideration the ratio of foreign assets to total assets at the end of the preceding period. Referring to identity (4.3), an increase in foreign assets relative to domestic assets *(R/D)* reflects the sale of domestic currency by the monetary authority leading to an increase in the money supply *(M)*. The price of domestic money will fall as indicated by an increase in the nominal exchange rate *(e)* which means depreciation. Since net other items (*NOI)* has a negative impact on the money supply *(M)* substituting for the foreign assets *(R)* and the later has a positive impact on (*M)*, therefore, a net increase in the ratio (*R/NOI)* represents an increase in money supply (*M)*

leading to a depreciation in the nominal exchange rate *(e)*. The desired level of the nominal exchange rate is also assumed to respond to price differentials in order to keep the real exchange rate fixed (see equation (4.7)) with the lagged nominal exchange rate as an anchor. These price differentials may be replaced by inflation rate differentials between the domestic inflation rate (Π) and the foreign inflation rate (Π_f) as a proxy to represent a premium or discount on the domestic currency or to represent the expected rate of change in the nominal exchange rate. To capture consumer behaviour and to simplify the analysis, the price differential is measured by the rate of change in consumer price indexes in Indonesia and the United States which is one of the most important countries in Indonesian trade. Therefore the level of the nominal exchange rate desired by the central bank may be written as follows,

$$\ln e_t^d = \beta_0 + \beta_1 \ln(R/D)_{t-1} + \beta_2 \ln(R/NOI) + \beta_3[(\Pi - \Pi_f)_t + \ln e_{t-1}] \qquad (4.9)$$

Equation (4.9) has three properties. Firstly, the coefficient β_1 represents the degree of intervention conducted by the central bank. If, say, β_1 is closer to zero and β_3 is closer to unity then the role of purchasing power parity is greater which means that the exchange rate system tends to be a managed float which is floated more freely and vice versa. The reason is that if purchasing power parity (PPP) holds, this suggests that there will be a continual adjustment in the nominal exchange rate to maintain a constant ratio between national price levels (Turner 1993, p. 135). Since the PPP can only hold with competitive markets (Krugman 1987, p. 381), both domestic prices and the exchange rate will also be endogenously determined by market forces, and therefore it is plausible to say that when β_3 is closer to unity, the exchange rate system tends to float freely. Secondly, E in equation (4.7) is replaced by *(R/D)* in equation (4.9) to show the intervention policy conducted by the central bank to keep the real exchange rate (E) constant. Therefore, if the coefficient β_3 is zero, then β_1 is closer to unity and the equation will mostly be affected by the intervention policy which means that the exchange rate system will be a managed float. Thirdly, as the consequence of the first two, the equation may capture both the extreme cases, the fixed and free floating exchange rate regimes. As consequence, this model can be applied to Indonesia which experienced a change from an adjustable peg system to a managed crawling peg system in 1983.

Substituting equation (4.8) into (4.9), a dynamic adjustment of the exchange rate can be written as follows,

$$\begin{aligned} \Delta \ln e_t = {} & \phi\beta_0 + \phi\beta_1 \ln(R/D)_{t-1} + \phi\beta_2 \ln(R/NOI) \\ & + \phi\beta_3(\Pi - \Pi_f)_t + \phi(\beta_3 - 1)\ln e_{t-1} \end{aligned} \qquad (4.10)$$

This functional relationship is the authority's reaction function and reflects foreign reserve management policy involving the factors as shown in equation (4.10). A positive/negative sign of $\phi\beta_3$ suggests that the price differential tends to move the exchange rate downward/upward which is depreciating/appreciating. If both $\phi\beta_1$ and $\phi\beta_2$ are positive and significant it suggests that the monetary authority is trying to prevent the nominal exchange rate from appreciating to maintain external competitiveness.

Surprising policy implications for a small country like Indonesia may be drawn from equations (4.5) and (4.10). If equation (4.10) shows a fixed exchange rate due to heavy intervention by the monetary authority ($\phi\beta_1$ is closer to 1), the first implication is that policies designed to affect the balance of payments are unnecessary and, in the long run, useless (Siegel 1982, p. 465). As Siegel notes, they are unnecessary because the automatic operation of the international adjustment mechanism eventually corrects the balance of payments, and they are useless because the public's demand for money, not the policies of the monetary authority, that will determine the international allocation of money. The second implication is that under fixed exchange rates, the monetary authority cannot control the domestic money supply. On the other hand, if purchasing power parity has a significant impact on the nominal exchange rates (in equation (4.10)), $\phi\beta_3$ is closer to 1, then, to choose an inflation rate that differs from the world inflation rates (say to improve competitiveness) requires a country to adopt a flexible exchange rate. The reason is that, under a fixed exchange rate regime, domestic inflation will be determined by world inflation and, therefore, it is out of the control of the monetary authority. To get more control over the money supply and prices, it is required to apply a more flexible exchange rate system. As this study suggests, fiscal policy through the government budget may have a significant impact in helping the monetary authority control the money supply through domestic credit creation even in a managed float regime.

4. 2. 3 Prices

With a small open monetary model, there is a need to capture changes both in export and import prices. Variations in the wholesale price index *(Pw)* as a representation of tradeable goods, therefore, are assumed to be functions of changes in import prices *(Pm)* and export prices *(Px)* denominated in the domestic currency as follows,

$$\Delta \ln(Pw)_t = w_0 + w_1 \Delta \ln(Pm)_t + w_2 \Delta \ln(Px)_t \qquad (4.11)$$

where w1 and w2, respectively, measure the contributions of import prices and export prices to changes in wholesale prices *(Pw)*. Both *Pm* and *Px* are exogenously determined in the world market and adjusted by the exchange rate [*Pm=Pm*e and Px=Px*e*]. The equation for the consumer price index is written as follows,

$$\Delta \ln P_t = \gamma_1[\ln(M/P)_{t-1} - \ln(M/P)_t^d] + \gamma_2 \ln(Y/Ytr)_t + \gamma_3 \Delta \ln(Pw)_t \qquad (4.12)$$

Due to the openness of the economy, any divergence between the consumer price index (which is an index price of non tradeable goods) as a proxy of the domestic rate of inflation $(\Delta \ln P_t)$ and the wholesale price index (which is an index price of tradeable goods) is assumed to be caused mainly by the changes in the prices of non traded goods reflecting responses of domestic money demand and money supply conditions. The reason is that, by applying Say's law (Siegel 1982, p. 245-246), an excess supply of domestic liquidity $(\ln(M/P)_{t-1} - \ln(M/P)_t^d > 0)$ causes an excess demand for non traded goods and therefore and increase in their prices. To capture the effect of a real shock on the domestic rate of inflation, it is assumed that it responds to an excess of real output above its potential level. The potential output path is proxied by the semi-log trend values of actual output *(Ytr=e^{yo+gT})*. *e* stands for exponential operator. *yo* is initial level of real output. *g* is the growth rate of real output, and *T* is time trend. The reason for choosing the semi-log trend is that the real GDP is a flow variable where its rate of change must be measured per unit of time, not over time like as for stock variables (Thomas, 1989). Due to the openness of the economy, the rate of change in the wholesale price index *(Pw)* is also included as an explanatory variable to capture the positive influence of traded goods prices on the consumer price index. Substituting equation (4.2) into equation (4.12) results in:

$$\begin{aligned}\Delta \ln P_t = {} & -\gamma_1\alpha_0 + \gamma_1 \ln(M/P)_{t-1} - \gamma_1\alpha_1 \ln(Y)_t \\ & + \gamma_1\alpha_2(rd)_t + \gamma_2 \ln(Y/Ytr)_t + \gamma_3 \Delta \ln(Pw)_t \end{aligned} \qquad (4.13)$$

Considering both tradeable and non-tradeable goods or domestic and foreign influences due to the openness of the economy, equation 4.13 suggests that if a depreciation strategy captured in equation 4.10 causes an improvement in external competitiveness, it would increase the actual level of real gross domestic product *(Y)* above its potential level. A further consequence is that it would curb the domestic rate of inflation as long as the growth in money supply is managed in a moderate manner. Therefore there will be no conflict between exchange rate targeting and price targeting.

Because the wholesale price index (*Pw*) includes the import price index adjusted by the exchange rate, reducing imports may help in lowering the domestic rate of inflation.

4. 2. 4 Real Output

The openness of the Indonesian economy means that the world demand for Indonesia's output (Y_t^d) is influenced by world real income (Y_t^*) and the real exchange rate $(e.P^*/P)_t$ as indicator of external competitiveness. Thus the world demand function for Indonesia's output can be written in log form as

$$\ln Y_t^d = \lambda_1 + \lambda_2 \ln Y_t^* + \lambda_3 \ln(e.P^*/P)_t \tag{4.14}$$

In the short run, the current supply of real output (Y_t^s) is assumed to adjust to the difference between the log of world demand for output (Y_t^d) and the log of actual supply of real output in the previous period (Y_{t-1}^s). It is also assumed that the changes in Y_t^s depend on the degree of utilisation of the capital stock which is proxied by the real value of bank credit extended to the private sector $(Cps/P)_t$. Changes in the supply of real output in the short term can be expressed as

$$\Delta \ln Y_t^s = \delta_1(\ln Y_t^d - \ln Y_{t-1}^s) + \delta_2 \ln(Cps/P)_t \tag{4.15}$$

where $\Delta \ln Y_t^s = \ln Y_t^s - \ln Y_{t-1}^s$, δ_1=coefficient of adjustment and $1/\delta_1$=speed of adjustment. Combining equations (4.14) and (4.15) yields an expression for the short run equilibrium of real output :

$$\begin{aligned}\ln Y_t^s = {} & \delta_1 \lambda_1 + \delta_1 \lambda_2 \ln Y_t^* + \delta_1 \lambda_3 \ln(e.P^*/P)_t \\ & + (1-\delta_1)\ln Y_{t-1}^s + \delta_2 \ln(Cps/P)_t\end{aligned} \tag{4.16}$$

Short run equilibrium output does not necessarily occur at full employment. In a longer perspective when full employment level has been achieved, the supply of real output is fixed so that (in log form) $\ln Y_t^s = \ln Y_{t-1}^s$. Substituting this specification into equation (4.16) and rearranging the terms will result in:

$$\ln Y_t^s = \lambda_1 + \lambda_2 \ln Y_t^* + \lambda_3 \ln(e.P^*/P)_t + \frac{\delta_2}{\delta_1} \ln(Cps/P)_t \tag{4.17}$$

Unlike equation (4.16), equation (4.17) suggests that given the short run demand for real output, the supply expansion of real output in the long run can only adjust through the growth factor represented by $(\delta_2/\delta_1)\ln(Cps/P)_t$. Dernburg (1989, p. 273)

notes that growth factors such as capital stock, labor force, and technical progress that raise the productivity of both labor and capital will increase the supply of real output. Real domestic credit extended to the private sector as a proxy for the capital stock, therefore, is still included in equation (4.17). It is an empirical matter whether the growth in real output is affected by the short run or long run components. If the coefficient δ_2/δ_1 is/is not significantly different from zero while the λ_2 and λ_1 are not/are, the model will suggest a full employment output/underemployment. It is possible, of course, that all coefficients can be significant.

4. 2. 5 Domestic Assets

To capture the monetary impact of the government budget in domestic credit creation, the monetary sector as represented by the money supply identity (identity (4.3)) can be completed by defining an identity for the net domestic assets *(D)* of the banking system. The change in *D* is equal to the change in the stock of credit to the private sector and the change in net domestic credit to the government *(Cg)*,

$$\Delta D_t \equiv \Delta(Cps)_t + \Delta(Cg)_t \tag{4.18}$$

Changes in net credit to the government *(ΔCg)* are specified as the identity of the monetary impact of the government budget on the domestic economy where the government budget is decomposed into domestic and foreign components (Cawley 1982, p. 192). The identity for changes in net credit to government is written as,

$$\Delta(Cg)t = (GDE_t - GDR_t) - (GFR_t - GFE_t) \tag{4.19}$$

The right hand side of identity (4.19) expresses the government budget. The first bracket on the left hand side of identity (4.19) represents the domestic deficit in the government budget which is the difference between government domestic expenditures *(GDE)* and government domestic revenues *(GDR)*. The second bracket represents the foreign deficit of government budget which is the difference between government foreign revenues *(GFR)* and government foreign expenditures *(GFE)*.

Government domestic expenditures *(GDE)* consist of operating (current or routine) expenditures excluding debt repayment, interest repayment and other foreign expenditures *(GFE)*. Therefore *GDEs* are considered as a component of domestic aggregate demand. Government domestic revenues *(GDR)*, on the other hands, are raised through non-oil taxes and other domestic sources and therefore have the impact

of reducing domestic purchasing power. Clearly, the magnitude in the first bracket of the right hand side of (4.19) reflects a net impact of government budget spending and financing in the domestic economy. This could either inflationary or deflationary depending on its signs. A greater *GDE* over *GDR* means a larger domestic budget deficit and tends to increase domestic money creation with an inflationary effect, and vice versa.

Government foreign revenue *(GFR)* is the sum of government foreign borrowing *(GFB)* and oil revenues *(GOR)*,

$$GFR \equiv GFB + GOR \tag{4.20}$$

Since government foreign revenue is originally received in the form of foreign currency, it does not increase domestic aggregate demand until they are effectively spent in the domestic economy (in the form of domestic money). The government foreign expenditures on the other hand will reduce the aggregate demand of domestic economy. A greater *GFR* over *GFE* means a net transfer of foreign sources to the government budget and results in reducing domestic money creation through *Cg*. The opposite condition will lead to an increase in domestic money creation. Putting together *GFR* and *GFE*, the magnitude in the second bracket on the right hand side of (4.19) will also have inflationary or deflationary impact on the domestic economy depending on its sign.

Interested readers may find that one of the factors influencing Indonesia's current account deficit is a high *GFE*, while its merchandise account gives a surplus measure. It is also worth noting that since 1966 the government has been using *GFR* components as a cushion to finance its budget deficit to avoid printing money through the central bank. *GFR*, particularly foreign borrowing, has been deposited mostly in the central bank as hidden money to sterilise the monetary impact of the balance of payments in 1970s (Nasution 1983, p. 37). As Leod (1993, p. 122) argued, this indicates an important role of the government budget in monetary stabilisation in Indonesia.

Parikh et al. (1985, p. 411) were the first to suggest treating net domestic credit to the government *(Cg)* in (4.19) as an equation rather than an identity to analyse the money creation due to the budget deficit as they found an inconsistency between the monetary and government accounts in Indonesia. More specifically, they argued that the budget deficit does not necessarily equal changes in the money supply. Adopting their argument with a little difference in model specification, it is suggested to perceive the relation in (4.18) as an equation, written as follows,

$$\ln(Cg)_t = \vartheta_0 + \vartheta_1(\ln GDE_t - \ln GDR_t) - \vartheta_2(\ln GFR_t - \ln GFE_t) + \vartheta_3 \ln(Cg)_{t-1} \quad (4.21)$$

Equation 4.21 suggests that net claims on government or net credit to government *(Cg)* will increase/decrease in line with increases in the domestic deficit/surplus of the budget. As the domestic budget deficit tends to increase *Cg* by printing money, it will increase domestic credit creation, the money supply and inflation. If the government wishes to moderate the inflation rate, the budget deficit should be minimal. A low budget deficit may also let the domestic money market face its excess demand for money. A contractionary government budget can reduce the monetary impact of an expansionary monetary policy conducted by the monetary authority when the later is trying to raise foreign reserves and depreciate the nominal exchange rate. As equation 4.21 suggests, if the government is not capable of reducing its domestic deficit through increasing domestic revenues *(GDR)*, a plausible solution is to raise revenues from foreign sources *(GFR)*.

4. 2. 6 Government finances

Since 1966 the government has been following a balanced budget policy as a tool of economic stabilisation in line with economic growth. A balanced budget in Indonesia's context means that government foreign borrowing *(GFB)* is used as a complement to the government saving *(GS)* to provide finance for investment (capital or development) expenditures *(GDI)* and not for consumption purposes (current, operating or routine expenditures). The greater *GS* is, the less need for *GDI* to be financed by *GFB*, and vice versa. In the long run, the government is assumed to have intention of raising government saving in order to decrease dependency on foreign borrowing. In the short run, however, foreign sources *(GFB)* are still needed to finance investment expenditures *(GDI)*. Changes in *GFB* therefore are determined by the following relationship,

$$\ln GFB_t - \ln GFB_{t-1} = \omega_0 + \omega_1(\ln GDI_t - \ln GFB_{t-1}) - \omega_2 \ln GS_t \quad (4.22)$$

or,

$$\ln GFB_t = \omega_0 + \omega_1 \ln GDI_t + (1-\omega_1)\ln GFB_{t-1} - \omega_2 \ln GS_t \quad (4.23)$$

As development process never ends, government domestic investment *(GDI)* will continue to increase, and as long as the government saving is not able to finance *GDI*,

government foreign borrowing *(GFB)* is needed and the later captured in government foreign revenues *(GFR)* has a negative impact on net credit to government *(Cg)*.

Government domestic revenues *(GDR)* are raised through domestic taxes and other non oil receipts specified as a log-linear function of real income *(Y)*. Taking first differences of the log of *GDR* yields

$$\Delta \ln GDR_t = \varsigma_0 + \varsigma_1 \Delta \ln(Y)_t \tag{4.24}$$

Equation 4.24 suggests that real domestic growth will have a positive impact on the growth of government domestic revenues.

4. 3 Statement of the Model

The statement of the model below consists of eight equations to be estimated. The order of the equations would indicate the channel through which the variables work within each equation and to all equations. The working of the model is explained in section 4.4.

4. 3. 1 Equations

Foreign Reserves (equation 4.5):

$$\begin{aligned}\Delta \ln(R/P)_t = {} & (k\alpha_0 - m_0)/m_1 + (k\alpha_1/m_1)\ln Y_t - (k\alpha_2/m_1)(rd)_t \\ & -(k/m_1)\ln(M/P)_{t-1} - (m_2/m_1)\Delta \ln(D/P)_t \\ & +(m_3/m_1)\Delta \ln(NOI/P)_t\end{aligned}$$

Exchange Rate (equation 4.10):

$$\begin{aligned}\Delta \ln e_t = {} & \phi\beta_0 + \phi\beta_1 \ln(R/D)_{t-1} + \phi\beta_2 \ln(R/NOI) \\ & +\phi\beta_3(\Pi - \Pi_f)_t + \phi(\beta_3 - 1)\ln e_{t-1}\end{aligned}$$

Wholesale Prices (equation 4.11):

$$\Delta \ln(Pw)_t = w_0 + w_1 \Delta \ln(Pm)_t + w_2 \Delta \ln(Px)_t$$

Consumer Prices (equation 4.13):

$$\Delta \ln P_t = -\gamma_1\alpha_0 + \gamma_1 \ln(M/P)_{t-1} - \gamma_1\alpha_1 \ln(Y)_t + \gamma_1\alpha_2 (rd)_t + \gamma_2 \ln(Y/Ytr)_t + \gamma_3 \Delta \ln(Pw)_t$$

Real Output (equation 4.17):

$$\ln Y_t^s = \lambda_1 + \lambda_2 \ln Y_t^* + \lambda_3 \ln(e.P^*/P)_t + \frac{\delta_2}{\delta_1} \ln(Cps/P)_t$$

Net Credit to Government (equation 4.21):

$$\ln(Cg)_t = \vartheta_0 + \vartheta_1 (\ln GDE_t - \ln GDR_t) - \vartheta_2 (\ln GFR_t - \ln GFE_t) + \vartheta_3 \ln(Cg)_{t-1}$$

Government Foreign Borrowing (equation 4.23):

$$\ln GFB_t = \omega_0 + \omega_1 \ln GDI_t + (1-\omega_1) \ln GFB_{t-1} - \omega_2 \ln GS_t$$

Domestic Government Revenue (equation 4.24):

$$\Delta \ln GDR_t = \varsigma_0 + \varsigma_1 \Delta \ln(Y)_t$$

4. 3. 2 Identities

Money Supply (identity 4.3):

$$\Delta M_t \equiv \Delta R_t + \Delta D_t - \Delta NOI$$

Domestic Credit (identity 4.18):

$$\Delta D_t \equiv \Delta(Cps)_t + \Delta(Cg)_t$$

Government Foreign Revenues (identity 4.20):

$$GFR \equiv GFB + GOR$$

4.3.3 Definition of variables and data sources

The model in section 4.3.1 is a system of equations. The variables in the system consist of endogenous and predetermined variables. Endogenous variables are those whose values are determined within the model. Predetermined variables are those whose values are determined outside the model. Predetermined variables consist of exogenous, current as well as lagged, and lagged endogenous variables (Gujarati, 1988). The data comes from three sources:

A: International Monetary Fund, *International Financial Statistics,* Washington
B: Biro Pusat Statistik, *Indikator Ekonomi*, various issues
C: World Bank, *World Tables*, various issues

Annual data are used for the period of 1971-1992. The consumer price index is used to deflate all nominal variables. The consumer price index and U.S. real GDP are used as proxies for world prices and world income because the U.S. is one of Indonesia's major trading partners. Both endogenous and predetermined variables including in the sources follow.

Endogenous variables:

R Net foreign assets of the banking system (Source A)
P Consumer price index (Source A)
e Nominal effective exchange rate (Source A)
Pw Wholesale price index (Source A)
Y Real GDP (Source A)
Cg Net claims on the government (Source A)
GFB Government foreign borrowing (Source B & C)
GFR Government foreign revenues (Source B & C)
GDR Domestic government revenue (Source B & C)
M Broad money (currency plus demand deposits plus quasi money) (Source A)
D Domestic credit (Source A)

Predetermined variables (exogenous and lagged variables):

rd Three-month interbank real deposit rate (Source A)
Px Export price index (Source A)
Pm Import price index (source A)

Y^*	Real GDP in the United States of America (Source A)
P^*	Consumer Price Index in the United States of America (source A)
Ytr	Semi-log trend of domestic real output, $Ytr = e^{yo+gT}$
Cps	Outstanding bank credit to the private sector (Source A)
NOI	Net Other Items (Source A)
GDE	Government domestic expenditure including net lending (Source B & C)
GFE	Government foreign expenditures (Source B & C)
GDI	Government domestic investment (Source B & C)
GFR_{t-1}	Government foreign revenues in the previous period (Source B & C)
GS	Government saving (Source B & C)
GOR	Government oil revenues (Source B & C)
$(M/P)_{t-1}$	Real broad money in the previous period (Source A)
$(R/D)_{t-1}$	The ratio of foreign asset to domestic assets in the previous period (Source A)
e_{t-1}	Nominal exchange rate in the previous period (Source A)
Y_{t-1}	Real GDP in the previous period (Source A)
$(Cg)_{t-1}$	Net claims on the government in the previous period (Source A)

4. 4 Working of the Model

The model conforms with the various formulations of the monetary approach to the balance of payments in that foreign reserve accumulation occurs as long as the demand for money is not satisfied by increases in net domestic assets (equation 4.5). Excess demand for money can arise from the government's contractionary financial operations through its budget. A contractionary government budget can be financed by combinations of domestic and foreign sources, and therefore limit money creation through domestic credit (equation 4.21 and identity 4.18). Therefore, a minimal budget deficit would let the money market faces its excess demand for money. The later will stimulate foreign reserve accumulation (equation 4.5).

Foreign reserve accumulation reflects the monetary authority's foreign exchange purchases from commercial banks increasing the money supply, and therefore would cause the exchange rate to depreciate or prevent the exchange rate from appreciating(equation 4.10). This effect would reinforce the direct influence of rising foreign prices on traded-goods prices (equation 4.11), which would in turn increase

domestic consumer prices at a faster pace if they were rising, or decrease them at a slower pace if they were falling (equation 4.13).

As long as there is not a conflict with the inflation rate, $\Delta \ln P$, a depreciation in the nominal exchange rate, e, would improve external competitiveness, $e.P^* / P$, and improve growth performance, Y (equation 4.17). Higher real output, would increase the demand for money and reduce the pressure on domestic prices (4.13). Thus the direct impact of exchange rate changes on prices would be counteracted by the influence of output, and the net impact would depend on the relative size of the relevant coefficients.

Developments in real output has implication for government revenue, *GDR* (equation 4.24). *GDR* and *GFR* will grow inversely with net credit to the government (equation 4.21) and therefore will reduce domestic credit creation. It is also clear that increases in *GFB* and *GOR* captured by *GFR* (identity 4.20) have an important role in reducing the need for creation of domestic money (equation 4.21) and therefore accumulation of the foreign assets would occur (equation 4.5).