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DETERMINANTS OF THE MONEY STOCK IN TRINIDAD & TOBAGO (1969-1979) AND THE PROBLEM OF CONTROL

by

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The continuing debate between the Post-Keynesians and the Monetarists in recent years has led to increasingly greater interest in the determination of the money supply process, and the nature of the relationship between money and such magnitudes as prices, income and employment. To some extent this situation is the result of a growing recognition on the part of policy makers of the inadequacy of conventional Keynesian-based approaches and policies in controlling or predicting economic behaviour. The increasing number of empirical work in the field[1] has no doubt also had an effect by challenging long-held views and intuitive relationships. To be sure the main points of differences between the two schools are subject to a great deal of controversy. There are certain points, however, which stand out. Perhaps the most distinguishing feature of the Monetarists' position is the emphasis placed on controlling the growth of monetary aggregates rather than interest rates or money market conditions which tend to be favoured by the post-Keynesians. Money is not un-important in the latter's analysis, though its role and importance are perceived differently. This focus on money has naturally led to fundamental questions about the real ability of

* Both the author's papers in this volume have benefitted from suggestions made by my colleague W. Joefield-Napier.

the monetary authorities to control the money stock. While in some analyses the latter is treated as an exogenous variable (i.e. under the control of the monetary authorities) others proceed on the assumption that the money supply at any point in time, (be it in a closed or open economy), is the result of the portfolio decisions of the monetary authority (the Central Bank), the commercial banks and the public. Observers who share this latter view feel that the best approach to the study of the money supply process is through a general portfolio model based explicitly on the inter-dependence of the various sectors.[2] While recognising the importance of such an approach, the inadequacy of data, lack of computational facilities and the time constraint, the first and second in particular, often militate seriously against this type of exercise.

In this paper our objective is a limited one. Our main intention here is to explore (with the aid of certain simple models) some of the more immediate factors affecting the determination of the money stock in Trinidad and Tobago in recent years, and to examine in a tentative way the behavioural implications for controlling or forecasting the money stock by the monetary authority. In the final part of the paper we examine the use and relevance of some of the more conventional instruments of monetary control in Trinidad and Tobago within the framework of a cash-base model.

Money Supply Theory

Textbook presentations of the money supply in a situation where the liabilities of both the monetary authority and the commercial banks are used as money, tend to centre around the so-called 'money or deposit multiplier'. Under a fractional reserve system (i.e. a system where bank reserves are less than 100%) the reserves of the banking system can supply a 'multiple' of deposits. If (r) represents the minimum ratio of reserves to deposits, the maximum amount of deposits (D) that could be created would be equal to the reciprocal of the reserve requirement (r) times the amount of reserves. If the system were operating at its minimum reserve ratio a unit increment in its holding of reserves would be associated with an increase in its deposits amounting to $\frac{1}{r}$. This latter formulation is based on a common ratio for all deposits. However, where different types of deposits have different reserve requirements this situation can easily be accomodated within the conventional multiplier.

The theory outlined above is based on a number of simple assumptions, two of which needs to be mentioned here. One is that the banks operate on the basis of a constant reserve ratio i.e. banks do not hold excess reserves. A second major assumption is that there is no 'cash drain' i.e. the public holds a fixed quantity of cash irrespective of the increase or decrease in the volume of deposits. This latter assumption tends to be relaxed in a slightly more sophisticated version of this theory which assumes

that the public maintains a fixed proportion between money held in currency and money held in bank deposits. If (c) represents this fixed proportion, the public will increase its holdings of currency by (c x D) for any increase in total bank deposits (D). In this version the multiplier is given as $\frac{1}{r+c}$ where (r) is the banks' cash ratio and (c) is the public's currency ratio.

Simplistic and mechanical as this deposit multiplier theory may appear, it has been widely used in models seeking to determine the factors affecting the total money stock. One of the more modern versions employs the concept of base or high-powered money which is generally defined as any asset which can be used as money or as a basis for creating money. The formulation proceeds as follows.[4]

Given

M = money supply
H = high powered or base money
R = bank reserves (notes and coin in till plus deposits with the Central Bank)
C = currency held by the non-bank public
D = bank deposits

(1) M = C+D
(2) H = C+R

The behavioral equations are:

(3) C = cM (where c is the ratio of currency held by the non-bank public to total money)

and (4) R = rD (where r is the reserve ratio).

Since $H = cM+rD$ and $D = M(1-c)$

H can be written as $H = cM+r(1-c)M$

Dividing through by M yields

$$\frac{H}{M} = c+r(1-c) \text{ which can be written as}$$

$$(5)\quad M = \frac{H}{c+r(1-c)}$$

$$\text{or}\quad M = \frac{1}{c+r(1-c)}\ H$$

$$\text{or}\quad M = mH \text{ where } m = \frac{1}{c+r(1-c)}$$

The multiplier used by Friedman and Schwartz (F&S)[5] is essentially a reformulation of this multiplier equation in a form which allows us to measure the impact of the 'proximate determinants' on the money supply process Using the foregoing definitions of M, H, R, C, and D we can write:

$$(6)\quad M = D+C$$

$$(7)\quad H = C+R$$

$$(8)\quad \frac{M}{H} = \frac{D+C}{C+R}$$

Dividing numerator and denominator in (8) by C and then multiplying by $\frac{D}{R}$ we obtain

$$(9)\quad M = \frac{\frac{D}{R}\left(1+\frac{D}{C}\right)}{\frac{D}{R}+\frac{D}{C}}\ H$$

If we use 'r' for the deposit ratio $\left(\frac{D}{R}\right)$, and 'c' for the deposit currency ratio $\left(\frac{D}{C}\right)$ we can write (9) as

$$(10)\quad M = \frac{\frac{1}{r}\left(1+\frac{1}{c}\right)}{\frac{1}{r}+\frac{1}{c}}$$

$$(11)\quad = \left[\frac{1+r}{r+c}\right] H$$

$$(12)\quad = mH$$

where $m = \left[\frac{1+r}{r+c}\right]$

Equation (12) is similar to Equation (5)[6], though as pointed out earlier, the former was conceived not only to provide a link between base money and the money supply, but to derive an idea of the impact of each of the proximate determination on the money supply. Essentially, however, both provide a very mechanistic interpretation of the money supply process.

The formulations given above do not exhaust the variety of the money base models which have been developed to explain the money supply process. One approach favoured by Brunner and Meltzer (B&M) takes the form of a linear equation[8] in which the factors underlying the monetary behaviour of banks and the public are specified and explicitly built into the money supply function. Specifications are made with respect to both the narrow and broad definitions of money. In Equations (13) and (14), M^2 represents a concept of money which includes time deposits while M^1 excludes

$$(13)\quad M^2 = m_o + m^2 (B+L) - m^2 a_1 C_o + m^2 a_2 T_o - m^2 V_o^d \quad (i)$$

$$(14)\quad M^1 = n_o + m^1 (B+L) - m^1 a_1 C_o - (1-m^1 a_2) T_o - m^1 V_o^d \quad (i)$$

The symbols m_o and n_o are constants, while m^2 and m^1 are the respective money multipliers structured to show the influence of various factors (.e.g. monetary base, reserve requirements, currency "spillover" rates, etc.) on the money stock. The narrow money multiplier (m^1) is presumed to be smaller than (m^2) "because time deposits generated in the multiplier process are excluded from the monetary stock". The term(B+L) is referred to as the 'extended monetary base' where B is the monetary base (i.e. the amount of money issued by the government sector) and L is the cumulated sum of changes in required reserves attributable to changes in requirement ratios and the distribution of existing demand deposits between classes of banks with different requirements ratios. C and T represent the respective demand functions for currency and time deposits by the public. These are assumed to depend on monetary wealth (i.e. money stock plus time deposits), non-monetary wealth and pertinent costs and yield entities. The expression V_o^d (i) introduces the dependence of the money stock on interest raties (i) operating via the banks' desired cash asset position.

There is some discussion in the literature as to whether a single equation provides an adequate framework of study. A common contention is that a complete market description requires both a demand and supply function.[9] Others argue that the single supply

equation is neither a supply function nor a demand function, but rather is an equilibrium statement. The basis for this contention is that it often includes nothing about the willingness of banks to supply deposits or the willingness of the monetary authorities to supply currency or reserves. Against this it is argued that even if the single equation approach is not a genuine supply function it does focus on some of the main variables affecting the money supply process, very often within an implicit theoretical framework. The Friedman - Schwartz approach, for example, views high-powered money as "a pool" into which banks dip to meet reserve requirements and to obtain desired excess reserves. The public also draws on this pool for currency. Banks and the public thus compete for use of the limited amount of a high-powered money provided by monetary authorities. By definition (H = R+C) the entire pool is always claimed.

The moving force of this money supply process involves the response of banks to a discrepancy between desired and actual excess reserves. Monetary actions increasing the quantity of 'H' cause the actual level of excess reserves to be greater than the desired level, given existing financial conditions. Banks acquire earning assets, increasing their deposits, and reducing their actual excess reserves to desired levels. This process is partially offset by the higher levels of currency and reserves needed to maintain the desired ratios due to the increase in deposits. Changes in the money stock also result from changes in either of the ratios with

no change in the quantity of high-powered money. This process is further complicated by the fact that the ratios are interrelated".[11] Some of the same types of reasoning can be said to underlie the Brunner-Meltzer approach outlined above, where surplus excess reserves is also seen to play a crucial role. One of the major differences between the two approaches, however, is that while the B&M multipliers are empirical relationships estimated by statistical procedures the F&S multiplier is definitional.[12]

Determinants of the Money Supply

As indicated earlier, one of the major issues of contention between monetarists and non-monetarists relates to the extent to which the monetary authorities can directly control the nominal money stock, and hence on the extent to which the latter can be treated as an instrument variable in formulating objectives and policies. On the basis of certain explicit premises one can arrive at certain judgements which may be useful for particular purposes. The question, however, is essentially an empirical one. In the following section we try to get some indication of the main determinants of money supply change in Trinidad and Tobago in recent years and at the same time provide some insights into the behaviour of the determinants themselves. First, however, we attempt to put the importance of the determinants' behaviour in some kind of policy perspective.

The simplicity of the monetary base model makes it attractive as a framework for both controlling and forecasting the money supply. This can be readily seen from the equation form of the model which can be written as

$$(15)\quad M = mH$$

where M = money stock,

m = the multiplier,

and H = base or high-powered money.

Clearly if 'm' were constant, the money stock could be controlled through manipulation of base or high-powered money, assuming that the latter were under the control of the central bank. In this connection it is necessary to point out that the multiplier as defined above is neither unique nor constant. Depending on how one defines deposits we can get a series of multipliers. Constancy would depend on the behaviour of the currency and reserves ratios. In some situations the ratios may be relatively stable in the short run allowing the authorities to assume a high degree of stability in the figures. But one cannot take this for granted, particularly if the multiplier can change in response to factors beyond the control of the central bank. The public not only determines the ratio of their currency holdings to deposits, but this ratio itself may be subject to wide fluctuations even in the short run. As far as the commercial banks are concerned the central bank may be able to determine the legal reserve ratio, but the actual ratio that the banks observe rests heavily on the policies

of the banks themselves. The simple deposit multiplier outlined very early in the paper assumes that the banks are always 'loaned-up' i.e. they quickly translate any gain in reserves into earning assets. In practice banks may choose to keep reserves beyond their legal requirements for a variety of reasons, even while observing a profit maximising constraint. The level of the excess reserves may be subject to great fluctuations, and this would undoubtedly affect the value of the multiplier.

With respect to the use of the monetary base model for forecasting purposes, this not only rests on the ability of the authorities to forecast the value of the multiplier with a high degree of accuracy, but on two assumptions which are the subject of a great deal of controversy. One, which we have previously mentioned, is that the base is under the control of the authorities, and the other is that there is a 'tight' relationship between base, bank reserves and the money supply. With respect to the first, some observers contend that since the liabilities of the central bank account for a significant proportion if not all of the base, either as money used by the public or as a basis for the creation of deposits, the central bank should have no difficulty in controlling the level of the base. Others, however, tend to treat the base as an endogenous variable that responds to income changes, rather than as one directly or entirely under the control of the central bank. This latter view can be more easily appreciated if the base is analysed from both a 'use' and a 'source' perspective. If we

assume that the base is confined to the central bank's monetary liabilities then the elements on the asset's side of the bank's balance sheet can be taken as the moving force in changes in the base. As we shall see later, not all these elements are under the control of the central bank.

The official publications of most countries tend to carry a table showing some of the broad factors affecting changes in the money supply over given periods of time, The table (which is highly favoured by such institutions like the World Bank and the IMF) is a simple balance sheet presentation without pretensions to any particular theoretical framework. In this section we shall try to get a more precise idea of the contribution of certain factors to money supply change in Trinidad and Tobago over the 1969-79 period. The approach used is that of Friedman and Schwartz, but we shall also demonstrate the possibilities of a modified monetary base model in explaining and predicting changes in the supply of money.

The Friedman-Schwartz multiplier given in Equation Eq.(9) as

$$M = \frac{\frac{D}{R}\left(1 + \frac{D}{C}\right)}{\frac{D}{R} + \frac{D}{C}} \cdot H$$

can easily be manipulated to enable us to measure each factor's proportional contribution to monetary growth.[15] Based on quarterly data the respective contributions of the determinants to changes in the money supply in Trinidad and Tobago over the 1969-79 per

are given in Table I. This exercise was carried out with respect to both the narrow and broad definitions of money. The former (M_1) consisted of currency in circulation plus private (bank) demand deposits, while the latter (M_2) was defined as M_1 plus bank savings and time deposits. An examination of Table I shows that generally high-powered money (H) has had a positive and highly significant effect on the expansion of the money supply, whether it is the narrow or broad version. Changes in the banks deposit-reserve ratio 'b' have produced both contractionary and expansionary effects over the period. The contribution of the public deposit-currency ratio 'p' to the growth of the narrow money stock has generally been positive, but in recent years the indications are that its role has been of an offsetting nature with respect to the determination of the broad money supply. The inter-action effects, with occasional exceptions, have tended to be smaller than the other factors, but seem to work in either direction.

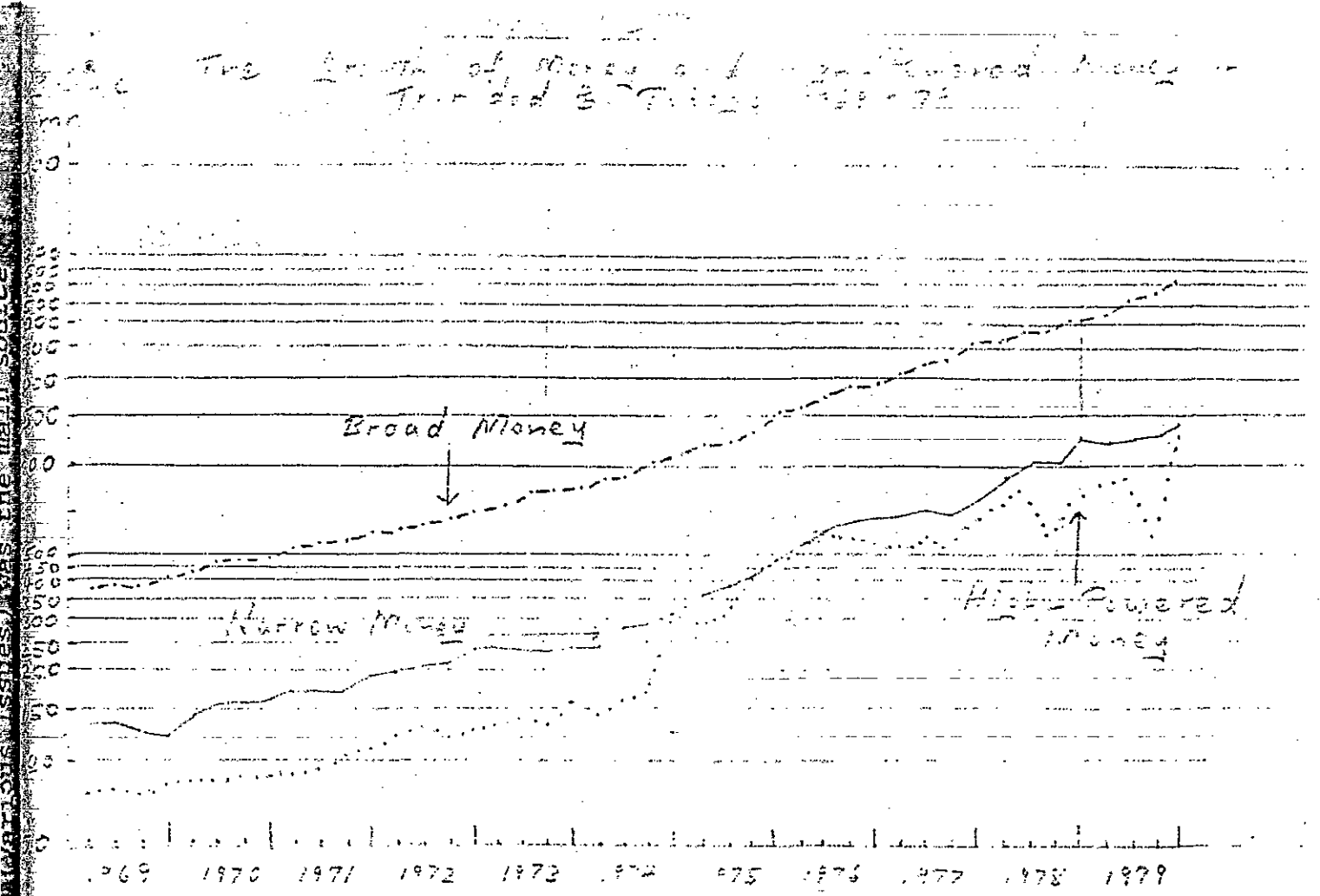
The above findings with respect to the three determinants H, b, and p bear out the points made earlier with respect to the difficulties that are likely to arise in controlling or predicting the money stock within a monetary base framework. High powered money tends to be affected by a number of factors, some internal and some external. In the former category, one can put central bank credit to the government[16] and commercial banks. In the latter, of course, is the whole gamut of influences that affect the external assets of the monetary authority. Besides the current

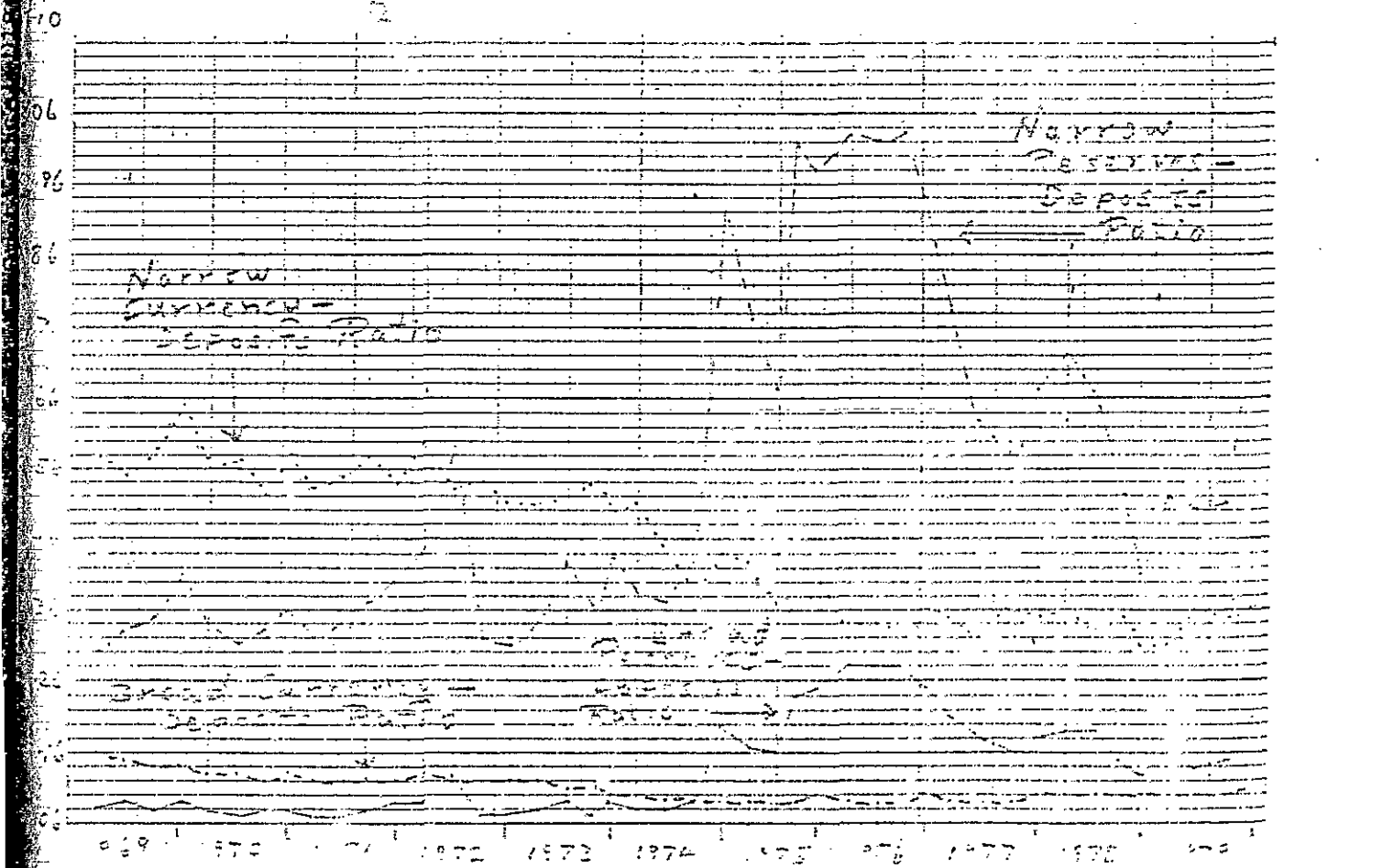
TABLE I

Percentage Contribution of 'Proximate Determinants' to Money Supply 1969-1979.

Period	Narrow Money (M_I)					Broad Money (M_2)					% Change in M_1	% Change in M_2
	H	b	p	b/p Inter-action	Sum of Effects	H	b	p	b/p Inter-action	Sum of Effects		
1969/70	80.7	8.3	13.5	0.2	102.7	49.3	17.3	32.8	-1.4	100.8	12.8	21.6
1970/71	108.4	-15.8	1.8	0.0	94.4	92.2	-6.2	12.5	-0.1	98.4	17.2	21.4
1971/72	134.9	-31.7	2.3	0.0	105.5	126.9	-28.2	3.2	0.2	102.1	21.8	22.8
1972/73	59.0	21.8	11.9	1.0	93.7	38.9	26.8	29.9	1.5	97.1	11.2	18.0
1973/74	179.2	-87.5	17.4	-6.1	103.0	158.4	-43.7	15.6	-2.8	127.5	19.4	21.9
1974/75	175.2	-76.6	5.3	4.2	108.1	222.8	-131.1	2.4	4.9	99.0	45.3	34.0
1975/76	121.9	-22.3	0.8	-0.8	99.6	162.9	-62.7	-0.2	0.0	100.0	49.0	34.8
1976/77	-17.9	224.9	0.0	-106.5	100.5	-19.2	122.6	-1.9	-1.1	100.0	27.2	25.1
1977/78	64.5	33.9	0.9	0.4	99.7	76.4	26.0	-2.7	-0.8	99.4	35.5	29.0
1978/79	87.7	119.6	-3.1	-127.6	76.6	84.4	-5.7	-9.7	-3.8	65.2	26.1	27.2
1969/79	104.3	-9.6	15.6	-2.8	107.5	106.2	-13.5	8.5	-2.6	98.6	906.5	868.5

Data used for each [illegible] based on end of quarter average [illegible]


Broad Money
Narrow Money
High-Powered Money
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979


Narrow Currency-Deposits Ratio
Narrow Reserve-Deposits Ratio
1969
1972
1973
1974
1977

account items, government and private sector capital transactions also affect movement in foreign reserves and ultimately the cash base. Thus while it may be possible for the central bank (with the collaboration of the government) to exercise some degree of control on the internal factors, the bank acts more or less in a passive capacity with respect to balance of payments transactions. In the developed countries domestic assets (particularly Government Securities) held by the central bank tend to heavily outweigh the other items on the assets (source) side of its balance sheet, and this may explain why some observers tend to view high-powered money as an endogenous variable easily manipulable by the authorities in response to movements in other variables. Where foreign assets are the dominant item (as is the case in most developing countries), this clearly reduces the capacity of the authorities for controlling the money stock. Although the central bank may have the authority and the instruments for controlling or offsetting an undesirable level of liquidity brought on by external factors, technical and political considerations could exert a deep influence on the outcome of such efforts. As we shall see later, the absence of a well-knit money and capital market considerably limits the use of some of the major tools of monetary control.

The question of Government's attitude towards the control of money is intimately related to the dilemma of attaining a number of different objectives at the same time within certain constraints. The trade-off in any situation is not a simple

exercise. The weight attached to the different objectives, however, would tend to differ from one context to the other. While questions such as liquidity and inflation, for example, are not unimportant in a developing context, the need to create jobs, provide social services and develop the physical infrastructure may assume overriding importance. In such circumstances monetary policy tends to be relegated to a subsidiary role leaving the budget itself to cope with domestic price conditions and the social and economic consequences that flow therefrom. Food subsidies, larger pensions, rapidly increasing wages and salaries etc., become an integral part of the anti-inflation armoury. The dilemma here is that some of these very measures tend to feed the inflationary process by inducing expansions in the money stock.

In order to gain some insight into the relative effects of certain chosen variables on high-powered money (H) over the 1969-79 period, we undertook a regression exercise, the results of which are shown in Equations (16) to (19). Equation (16) shows the relationship between (H) and the current account balance (CAB). In this equation R^2 is low (only 20%) and additionally the low value of the D.W. statistic indicates positive auto-correlations in the residual term. When we used the overall balance of payments (BOP) as the regressor there was an improved fit (see Equation 17). The R^2 was, however, still low being only 29%. In Equation (18) in addition to the current account balance (CAB) we included three variables representing movements in commercial banks net foreign

(16) $H = 75.824 + 0.228\ CAB$

(48.393) (0.153)

$R^2 = 0.20$

D.W. = 1.26

(17) $H = 21.710 + 0.185\ BOP$

(59.861) (0.096)

$R^2 = 0.29$

D.W. = 1.60

(18) $H = -112.674 - 0.057\ CAB - 1.033\ CNFA + 0.864\ NPCT - 0.268\ NGCT$

(78.461) (0.125) (1.317) (0.354) (0.218)

$R^2 = 0.87$

D.W. = 1.56

(19) $H = -33.220 + 0.136\ CAB - 1.878\ CNFA + 0.557\ NPCT - 0.0006\ NGCT + 0.134\ NCBG$

(101.813) (0.204) (1.466) (0.431) (0.311) (0.114)

$R^2 = 0.90$

assets (CNFA), net private capital transactions (NPCT), and net government capital transactions (NGCT). These variables together 'explain' 87% of the changes in H. The coefficients of the CAB, CNFA and NGCT are all negative with high standard errors. Net private capital transactions (mainly direct investment) has had a positive effect on 'H'. When we add 'Net Central Bank Credit to Government' (NCBG) to the explanatory variables included in Equation (18), the signs of CNFA, NPCT nand NGCT remain as before, but that of the CAB variable becomes positive. The addition of the new NCBG variable increased the R^2, but the positive sign appears to be in conflict with the evidence which indicates that in recent years net central bank credit to government has generally exerted a contractionary effect on the money supply. One reason for the unexpected result may be the presence of multicollinearity between the balance of payments variables and NCBG. This possibility would also, of course, affect the value of the coefficients.

From the above discussions, it would appear then that the balance of payments variables have generally had a positive impact on the expansion of high-powered money. The impact of the private capital account has been particularly significant. By using the current account balance as an aggregate variable, however, we have tended to conceal the effects of individual items. The trade balance, for example, which is a crucial factor in the country's external account has tended to be partially offset or exacerbated by the outflows of investment income, as can be seen

from the following figures:-

	1969	1973	1974	1975	1976	1977	1978	1979
Trade Balance $mn.	+ 35	-143	+823	+954	+922	+1,191	+965	+936
Net Investment Income $mn.	-137	-171	-576	-589	-700	-1,056	-837	-677
Net Private Capital Inflow $mn.	+127	+ 62	+260	+409	+240	+ 344	+305	+633

If we were to take the trade account as an individual variable and set off investment income outflows against private capital inflows, the relative impact of the latter on the base would obviously diminish.

When all items are taken into account the country has had an overall surplus in its balance of payments in every year since 1974. In the five years prior to 1974, there were four deficits. The recent performance is largely due to developments in the oil sector the earnings from which have been used to finance the fiscal deficits in the non-oil sector. The monetisation of foreign exchange in recent years has been the key element in the expansion of the monetary base and ultimately, as we have seen, the money supply. Figures relating to the domestic budget deficits and the balance of payments deficits of the non-oil sector for recent years have been estimated by the Central Bank as follows:

	1973	1974	1975	1976	1977	1978	1979
Domestic Budget Deficit $mn.	166	265	408	764	1,026	1,118	1,906
Balance of Payments Deficits of the Non-oil Sector$mn	241	48	299	725	877	1,060	1,694

The net impact on bank reserves depends critically on the extent of foreign leakage.

As indicated earlier, if the multiplier were always the same, the main influence of money change would originate entirely in changes in base money. In fact text book presentation of the money supply process, as we pointed out earlier, often assumes it to be constant. Policy decisions also often to be made on the assumption that in the short term the ratios that comprise the multiplier tend to remain fairly stable. A common (if naive) approach often used in predicting money supply is to first derive the average of the multiplier over some past period and on the basis of this manipulate the base to attain some money stock target. A major problem here, of course, is that the process of changing the base itself can induce countervailing changes in the multiplier as both the banks and the public re-act to the new situation by adjusting their portfolio composition. We may point out here that with respect to forecasting the money stock the assumption of constancy is not so much the issue as the ability to predict the multiplier with some degree of accuracy. In the following section we propose to examine in some detail the behaviour of the multiplier

over a period of time and then try to gauge the impact of the respective ratios on money stock.

Bourne[17] has made a useful distinction between the ex-post multiplier and the ex-ante multiplier while pointing out that the two might not be the same empirically. The ex-post multiplier is derived by dividing the money stock at any point in time by the monetary base (high-powered money) at the same point in time. The ex-ante multiplier is calculated from the bank and public's asset ratios at any given point in time. In Table 2 we present the average expost multiplier (both with respect to the broad and narrow money stock) alongside three versions of the ex-ante multiplier over the 1969-79 period, The annual figures appearing in the Table, it should be noted, represent end of quarter averages. An examination of the coefficients shown in Table 2 indicates that the multiplier has certainly not been constant, but in fact has shown a tendency to fluctuate from one period to another. The narrow ex-post multiplier (col. 1(a)) averaged 1.50 for the period, but the annual average coefficients ranged between 1.00 and 1.74. The average for the broad ex-post multiplier was 4.69 with lower and upper limits of 2.97 and 5.78 respectively. The value of the coefficient of variation for the latter group was 0.21 and this exceeded that of the first group by a small margin (0.02). With respect to the ex-ante multiplier, a few points are worth noting. Firstly, it is noticeable that the Friedman-Schwartz coefficients approximate the values of the ex-post multipliers.[18]

TABLE 2

Average Values[1] of Multiplier, 1969-79

Year	(1) Ex Post $\frac{M}{H}$ Narrow (a)	(1) Ex Post $\frac{M}{H}$ Broad (b)	(2) $\frac{1}{c+r(1-c)}$ Narrow (a)	(2) $\frac{1}{c+r(1-c)}$ Broad (b)	(3) $\frac{1}{c+r'(1-c)}$ Narrow (a)	(3) $\frac{1}{c+r'(1-c)}$ Broad (b)	(4) Friedman-Schwartz $\frac{1+r}{r+c}$ Narrow (a)	(4) Friedman-Schwartz $\frac{1+r}{r+c}$ Broad (b)
1969	1.69	4.91	1.37	4.55	1.28	4.04	1.70	4.91
70	1.74	5.44	1.42	5.13	1.33	4.66	1.74	5.44
71	1.71	5.52	1.42	5.32	1.32	4.82	1.71	5.52
72	1.62	5.28	1.37	5.02	1.33	4.72	1.62	5.28
73	1.67	5.78	1.42	5.46	1.39	5.32	1.67	5.77
74	1.54	5.47	1.38	5.36	1.34	5.13	1.54	5.47
75	1.12	3.68	1.10	3.66	1.09	3.59	1.12	3.68
76	1.00	2.97	1.01	2.94	0.99	2.90	1.01	2.97
77	1.35	3.92	1.29	3.89	1.25	3.90	1.34	3.89
78	1.49	4.14	1.40	4.06	1.36	3.82	1.49	4.14
79	1.59	4.44	1.39	4.04	1.31	3.73	1.48	4.11
Average for Period	1.50	4.69	1.32	4.49	1.27	1.24	1.49	4.65
SD	0.28	1.01	0.17	0.91	0.15	0.82	0.28	1.00
CV	0.19	0.21	0.13	0.20	0.12	0.19	0.19	0.21

1. Based on end of quarter data.

SD = standard deviation.

CV = coefficient of variation.

The F&S average narrow multiplier for the period differ by about 0.01 from the ex-post value, while the broad version differ by 0.04 Both groups have the same coefficient of variation. The more conventionally defined multiplier shown in column (2) yielded lower values than those of the ex-post multipliers. The coefficient of variation (particularly that relating to the narrow version) are smaller than those of the ex-post multiplier. The multiplier given in column (3) incorporates Bourne's suggestion[19] that the leakage through the banking system can best be caught by incorporating the banks' foreign assets in their reserves.[20] The notation (r') represents this particular concept. The values obtained through this approach are even less than those yielded by the conventional formula used in column (2) making this a relatively poor forecasting instrument.

Variations in the money multiplier stem from two sources: (a) changes in the public currency ratio and (b) changes in the banks reserve ratio. The currency ratio can be calculated in terms of currency held by the public to total money (currency in circulation plus bank deposits), or in relation to deposits. We have used the latter method in this paper. The symbols used have the same meaning as before:

C = currency held by the public

D_1 = demand deposits (adjusted)

D_2 = D_1 plus time and savings deposits

R = reserves of the commercial banks

FA = banks' foreign assets

TABLE 3

Average Values[I] of Currency and Reserve Ratios, 1969 - 1979.

Period	$\frac{C}{D_I}$	$\frac{C}{D_2}$	$\frac{R}{D_1}$	$\frac{R}{D_2}$	$\frac{R+FA}{D_1}$	$\frac{R+FA}{D_2}$
1969	0.59	0.15	0.35	0.08	0.47	0.12
70	0.56	0.13	0.33	0.08	0.43	0.10
71	0.55	0.12	0.36	0.08	0.46	0.10
72	0.54	0.12	0.42	0.09	0.48	0.10
73	0.51	0.11	0.39	0.08	0.42	0.08
74	0.45	0.09	0.53	0.11	0.56	0.04
75	0.39	0.09	0.86	0.20	0.87	0.21
76	0.34	0.09	1.00	0.27	1.01	0.28
77	0.34	0.09	0.66	0.18	0.69	0.18
78	0.34	0.10	0.57	0.16	0.61	0.18
79	0.35	0.10	0.57	0.16	0.64	0.19
Average for Period	0.45	0.11	0.55	0.14	0.60	0.15
SD	0.10	0.02	0.23	0.06	0.21	0.06
CV	0.22	0.18	0.42	0.43	0.35	0.40

I. based on quarterly data

SD = Standard Deviation

CV = Coefficient of Variation.

The ratios are shown in Table 3. An examination of the coefficients of variations (CVs) indicates that all ratios have experienced a fairly high degree of variability. The CV for the ratio of currency to demand deposits was 0.22 as compared to 0.18 for the ratio which has total deposits in the denominator.[21] The CVs relating to the banks reserve ratios were even higher. The conventional ratios R/D_1 and R/D_2 have CVs of 0.42 and 0.43 respectively. The less conventional reserve ratios which include foreign assets in the numerator have slightly lower CVs.

An examination of Table 3 shows that there was a downward trend in both currency ratios (but particularly the currency/demand deposits ratio) over the 1969/79 period. The variation in these ratios is mainly a behavioural phenomenon reflecting the public's response to movements in certain factors and changing circumstances. As Bourne has shown, given the limitations on data, it is not an easy matter to get a quantitative idea of the effects of various factors on the currency ratio, even over very short periods. We can, however, speculate on the direction in which certain factors are likely to affect the public's holdings of currency in relation to bank deposits or other financial assets. One factor that is likely to have a downward effect on the currency ratio is the availability of alternative forms for holding money and the rate of return associated with these various assets. A major influence here would be the growth and spread of banking facilities. In Trinidad and Tobago the increase in the number of

bank offices in the post-war period has no doubt played a significant role in the development of banking habits and in encouraging the use of the bank money. The number of bank offices grew from 8 in 1950 (79,480 persons per office) to 72 in 1968 (12,223 persons per office).[22] In 1979, there were over 100 bank offices in existence giving a rough ratio of one office for every 11,000 persons. The growth of income is also likely to affect the currency ratio, though some observers contend that the direction of the effect would depend on whether this growth is associated with an increase or decrease in the equality of the distribution of income.[23] Since it is believed that higher income groups tend to hold a smaller proportion of their money balances in the form of currency, an increase inequality would tend to have a downward effect on the ratio and vice versa. The data we have on the distribution of income in Trinidad and Tobago (particularly for recent years) is far from satisfactory in terms of providing very clear trends, The available evidence, however, indicates that the distribution is highly skewed.[24] Another factor that undoubtedly has an influence on the public's holdings of currency is the movements taking place in the general price level. One of the most noticeable features of economic life in Trinidad and Tobago in recent years has been the steady and upward movement in prices[25] at a rate that must exert a certain degree of influence on economic behaviour.

The effects of inflation are not all in the same direction. One of the more well known features of the inflationary process is a shift from monetary to real assets. This would tend

to put a downward pressure on the currency ratio. There are other phenomena associated with inflation, however, which may have an opposite effect. One of these stem from the attempt to evade personal income tax. "By swelling the monetary value of a given real income, inflation has the effect of increasing the real burden of personal income tax. This may induce people to evade the tax. Since it is easier to conceal transactions financed in currency rather than deposits, people may be induced to rely more heavily on currency for payments, if they want to evade the heavier tax burden".[26]

It is clear from the above discussion that the spectrum of factors which affect the currency ratio is a very broad one. Though the quality of the data with respect to some of the influences we have been able to identity theoretically is far from satisfactory, we shall nevertheless attempt to get some indication of their quantitative impact on the currency ratio. In this type of exercise a variety of functional forms can be utilised. For instance, in a study done some years ago on the currency ratio in the United States, Cagan used a double logarithmic function with three explanatory variables specified as follows:[27]

$$\log C/M = f(\log X_1, \log X_2, \log X_3)$$

where C/M = currency ratio

X_1 = expected net interest paid on deposits

X_2 = expected real per capita income

X_3 = the percentage of personal income taxed.

Cagan admitted that while the logarithmic form of the function may not give the best possible fit, it was used because it permits elasticities to be measured easily. Bourne on the hand used a straight forward linear functional form to analyse the same phenomenon in his study of the Jamaican monetary system.[28] The latter author's approach seems more appropriate for our purposes and we shall therefore use a similar specification.

Based on a priori considerations we regressed both the narrow currency ratio (i.e. the ratio of currency in circulation to demand deposits) and the broad ratio (i.e. the ratio of currency in circulation to total deposits) on certain selected variables for which data were available. The ratio used for each year was derived from average end of quarter proportions. Interest rates (IR) were represented by the rates payable on three months fixed deposits, income (PC) by per capita GNP and the rate of inflation (IF) by movements in the retail price index. The number of bank offices (BO) was used to gauge the effects of the availability of banking facilities to the public. From our earlier discussions we would expect all the signs of the estimated coefficients of the explanatory variables to be negative. The sign in Equations 20 and 25 does not support this a priori reasoning, and furthermore it should be noted that the relationship between the dependent and explanatory variables is extremely weak. The inclusion of per capita income appears to be a crucial variable in explaining movements in both the narrow and broad currency ratios. PC alone explains 88% of the variation in the NCR and 48%

in the BCR. The expected sign associated with PC conforms to a priori expectations in all the specifications involving the narrow ratio. While the signs associated with the variables relating to inflation and the spread of bank offices support our earlier hypothesis of a downward effect on the currency ratio by these two factors, their presence does not significantly improve the R^2 associated with equations 23 and 24. This is quite unlike the case with respect to the broad ratio where the addition of BO adds 12% to the R^2 and IF a further 8%. It should be noted that the inclusion of each of these two latter variables has the effect of changing the sign of the income coefficient from negative to positive. The value, however, remains extremely small.

(20) NCR = 0.355 + 0.017 IR
(0.138) (0.024)

R^2 = 0.05

D.W. = 0.18

(21) NCR = 0.604 - 0.00004 PC
(0.022) (0.000004)

R^2 = 0.88

D.W. = 0.56

(22) NCR = 0.542 + 0.011 IR - 0.00004 PC
(0.052) (0.008) (0.000004)

R^2 = 0.90

D.W. = 0.80

(23) NCR = 0.578 + 0.011 IR - 0.00003 PC - 0.0005 BC
(0.327) (0.009) (0.00001) (0.004)

(24) NCR = 0.600 + 0.009 IR - 0.00003 PC
(0.327) (0.009) (0.00001)
- 0.0006 BO - 0.0002 IF
(0.004) (0.0002)

R^2 = 0.92
D.W. = 1.26

(25) BCR = 0.091 + 0.003 IR
(0.027) (0.005)

R^2 = 0.04
D.W. = 0.36

(26) BCR = 0.130 - 0.000005 PC
(0.009) (0.000002)

R^2 = 0.48
D.W. = 0.53

(27) BCR = 0.118 + 0.002 IR - 0.000005 EC
(0.023) (0.004) (0.000002)

R^2 = 0.50
D.W. = 0.61

(28) BCR = 0.302 + 0.003 IR + 0.000001 PC - 0.002 BO
(0.127) (0.003) (0.000005) (0.002)

R^2 = 0.62
D.W. = 0.75

$$(29)\quad BCR = \underset{(0.121)}{0.313} + \underset{(0.003)}{0.002\ IR} + \underset{(0.000005)}{0.000002\ PC} - \underset{(0.001)}{0.002\ BO} - \underset{(0.00009)}{0.0001\ IF}$$

$$R^2 = 0.70$$

$$D.W. = 1.317$$

As far as the reserve ratios are concerned there are two sets of factors which influence their movements. One is legal and the other is behavioural (i.e. the behaviour of the banks towards excess reserves). Changes in legal requirements in Trinidad and Tobago have been quite infrequent. The minimum reserve ratio of 5% (of total deposits) set in 1966 did not change until February, 1973 when it was increased to 7%. This latter figure was increased again in November 1974 to 9% where it has remained since. In addition to legal reserves the banks have (since 1967) been required to hold (on a voluntary basis) secondary reserves (amounting to not less than five per cent of deposit liabilities) as a cushion to assist them in maintaining their liquid position and in meeting their reserve requirements. Secondary reserves can take the form of Treasury Bills, Special Deposits[29] with the Central Bank and Government Securities having up to one year maturity. Altogether, therefore, the banks are required to hold 14% (9+5) of their

TABLE 4

Liquidity Position of Commercial Banks, 1976-79 (% of Total Deposit Liabilities[1])

End of Period	Legal Reserve Position[2]		Liquidity Position				
	Required	Actual[3]	Required[4]	Actual	Deposits	(of which) Special Deposits	Treasury Bills
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1976							
IV Qr	9.0	9.0	14.0	31.1	(9.0)	(17.6)	(4.4)
1977							
I Qr	9.0	9.1	14.0	26.0	(9.1)	(13.1)	(3.7)
2 "	9.0	9.1	14.0	22.0	(9.0)	(9.7)	(3.2)
3 "	9.0	9.1	14.0	19.9	(9.1)	(7.1)	(3.8)
4 "	9.0	9.0	14.0	23.1	(9.0)	(10.0)	(4.2)
1978							
I Qr.	9.0	9.1	14.0	24.0	(9.1)	(10.4)	(4.5)
2 "	9.0	9.0	14.0	24.8	(9.0)	(11.5)	(4.3)
3 "	9.0	9.2	14.0	19.2	(9.2)	(6.3)	(3.7)
4 "	9.0	9.2	14.0	17.6	(9.2)	(4.4)	(4.0)
1979							
I Qr	9.0	9.2	14.0	20.8	(9.2)	(7.9)	(3.7)
2 "	9.0	9.5	14.0	18.6	(9.5)	(5.6)	(3.5)
3 "	9.0	9.2	14.0	18.8	(9.2)	(6.3)	(3.3)
4 "	9.0	9.0	14.0	24.3	(9.0)	(12.2)	(3.1)

1. Average balance over reserve period adjusted for inter-and intra-bank cheques
2. The legal reserve requirements is computed on the basis of average deposit liabilities in the four preceding consecutive weeks ending with last Wednesday; each reserve period lasts one week.
3. Average balance over reserve period.
4. The required liquidity position comprises legal reserve requirement plus secondary reserves of 5%. The latter must be held in Treasury Bills, Special Deposits, and Government securities of up to one year's maturity.

Source: Central Bank, Annual Reports, Various Issues.

while the actual reserve position (col. 2) of the banks taken together deviated little from the required position (col. 1), actual liquidity (col. 4) was generally far in excess of required liquidity (col. 3). One of the key factors in this situation is the item 'Special Depsoits' which has played an accomodating role in the absence of an insufficient amount of government securities to absorb available bank funds. Since there are no minimum or maximum limits governing the holding of Special Deposits, the banks have been able to use this item freely to suit their operational needs, particularly in view of the fact that required legal deposits and government securities have tended to satisfy almost 100% of liquidity requirements.

The banks' attitude towards excess reserves (actual - required) is conditioned by a number of factors. One of the most important of these arise from the need to hold contingency funds to deal with unusual developments in respect of clearing balances, currency withdrawals, speculative reserves, etc. If we assume banks to be profit-maximising institutions, there will be a desire on their part to minimise the holding of non-income earning (or relatively low-income) earning assets. Very often, however, banks operate on positions that are not in accordance with their desired portfolio structure.[30] There can be many reasons for this. One is the insufficiency of favoured investment outlets within existing legal constraints. Another is the well known problem of the inability of borrowers to meet the lending criteria used by the banks. In this connection policies can vary widely depending on

how the institutions perceive the risk situation and reconcile this to the loss of earnings resulting from their holdings of excess reserves or liquid assets.

Many of the factors that affect the behaviour of the banks' reserve ratio are not easily quantifiable. As an exploratory exercise, however, we decided (on the basis of average annual data) to regress the ratio of acutal reserves to total deposits (R) on certain variables which we feel exert some influence on the portfolio behaviour of the banks. The explanatory variables chosen were the Prime Rate (PR), the Discount Rate (DR), the Treasury Bill Rate (TR) and the Loans/Deposit ratio (LD). The positive sign before the Prime Rate coefficient in Equations (30) to (34) supports a priori reasoning which leads us to expect a direct relationship between the PR variable and variations in the reserve ratio. To the extent that the PR represents the cost of funds to borrowers an increase would have the effect of curtailing public borrowing while a decrease would have the opposite effect. Such decisions on the part of the public, of course, have corresponding repercussions on the reserve position of the banks. Since lending rates tend to move in the same direction as changes in the discount rate we should also expect a direct relationship between the latter and the reserve ratio. The positive sign associated with the DR variable supports this view. The Treasury Bill is an attractive liquid asset for commercial banks since it not only pays interest, but can be used as collateral for borrowing from the Central Bank. In this context, we can expect movements in the Treasury Bill Rate

to exert a certain amount of influence on the volume of cash holdings. The negative sign associated with the TR variable meets our expectation. The inverse relationship between the loans/deposit ratio and the cash ratio seems to follow logically from the portfolio structure of the banks. An expansion of bank lending inevitably exerts a downward influence on cash holdings, while a contraction of loans would tend to have a reverse effect.

As can be seen in Eq. (30), the Treasury Bill Rate alone explains 31% of the variation in the reserve ratio. When we include the Prime Rate and the Discount Rate variables, the R^2 increases by only 7%. The addition of the Loans-Deposit ratio to the other three explanatory variables has a significant effect not only on the coefficient of determination, but on the D.W. statistic as well. Together, the four variables explain 65% of the variation in the reserve ratio. This result, however, has to be seen against the fairly high standard error associated with the DR coefficient, and to a lesser extent with those of the PR and TR variables.

$$(30)\quad R = \underset{(0.083)}{0.297} - \underset{(0.019)}{0.038\ TR}$$

$$R^2 = 0.31$$

$$D.W. = 1.004$$

$$(31)\quad R = \underset{(0.407)}{0.030} + \underset{(0.023)}{0.015\ PR} + \underset{(0.07)}{0.020\ DR} - \underset{(0.021)}{0.034\ TR}$$

$$R^2 = 0.38$$

$$D.W. = 1.08$$

$$(32)\ R = \underset{(0.352)}{0.283} + \underset{(0.024)}{0.046\ PR} + \underset{(0.058)}{0.036\ DR} - \underset{(0.017)}{0.028\ TR} - \underset{(0.004)}{0.008\ LD}$$

$$R^2 = 0.65$$

$$D.W. = 1.79$$

Modified Versions of the Cash-Base Model

There are a number of criticisms which can be levelled against the cash-base model. From a forecasting point of view perhaps the most important of these is the mechanistic and static nature of the simple version of the monetary-base equation. Oyejide[31] has suggested that this shortcoming can be overcome to some extent by incorporating the role of expectations in the analysis. By assuming that the relevant monetary variable which is desired is a theoretical magnitude that is not directly observable and then relating the desired to the observed values via an appropriate partial adjustment process, he modifies a generalised cash-base model (Equation 33) to make the money stock (M_t) at any given period dependent on high-powered money (H_t) in that period and money in the previous period (M_{t-1}) (Eq. 34), and then explores the implications of a situation where the money stock in the present period (M_t) is dependent on high-powered money in the present period (H_t) and reserves (R_{t-1}) and currency (C_{t-1}) respectively in the past period (Eq. 35).

Eq. (33) $M_t = m_o + m_1 H_t$

m_o = constant

m_1 = multiplier

Eq. (34) $M_t = k_o + k_1 H_t + k_2 M_{t-1}$

k_o = constant

k_1 and k_2 = multipliers

Eq. (35) $M_t = Z_o + Z_1 H_t + Z_2 R_{t-1} + Z_3 C_{t-1}$

Z_o = constant

Z_1, Z_2 and Z_3 = multipliers.

Using quarterly data we have estimated these equations for Trinidad and Tobago using both the narrow and broad money concepts. The results are presented in Tables 5 and 6. For each equation we have an alternative form in which we have included three dummy variables (DV_2, DV_3 and DV_4) representing the second, third and fourth quarters respectively in order to remove the influence of seasonal variations. An examination of the equations in model I in Tables 4 and 5, shows that high-powered money explains about 90% of the variation in M. The inclusion of the dummies not only tend to produce a slight improvement in the R^2, but also appears to increase the value of the multiplier. The standard error (S.E.) of the multiplier (the coefficient of H) is significant, but those of the dummies are not. Model 2 which includes lagged money as an explanatory variable seem to have greater explanatory powers than Model 1, if we are to judge from the value of the R^2 which is around 99%. The inclusion of the dummies does not appear

TABLE 5

Regressions with Narrow Money (M_n) as the Dependent Variable.

Model I.

(33a) $M_n = 30.248 + 1.306\ H$ $\quad R^2 = 0.899$

$\quad\quad (31.171)\ \ (0.069)$ $\quad D.W. = 0.85$

(33b) $M_n = 14.124 + 1.311\ H + 17.639\ DV_2 + 46.629\ DV_3 + 6.766\ DV_4$

$\quad\quad (46.378)\ \ (0.070)\ \ (56.81)^2\ \ (56.795)^3\ \ (57.094)$

$R^2 = 0.901$

$D.W. = 0.82$

Model 2

(34a) $M_n = -2.790 + 0.041\ H + 1.042\ M_{-1}$

$\quad\quad (9.619)\ \ (0.042)\ \ (0.029)$

$R^2 = 0.992$

$D.W. = 3.08$

(34b) $M_n = -12.654 + 0.045\ H + 1.038\ M_{-1} + 18.811\ DV_2 - 10.696 DV_3 + 31.799 DV_4$

$\quad\quad (12.803)\ \ (0.039)\ \ (0.027)\ \ (15.200)\ \ (15.269)\ \ (15.342)$

$R^2 = 0.994$

$D.W. = 2.97$

TABLE 5 (cont'd)

Model 3

(35a) $M_n = -82.073 + 0.151\ H + 0.073\ R_{-1} + 3.941\ C_{-1}$

(9.579) (0.075) (0.091) (0.166)

$R^2 = 0.994$

D.W. = 2.155

(35b) $M_n = 94.059 + 0.121\ H + 0.090\ R_{-1} + 4.011\ C_{-1} + 19.782\ DV_2 - 4.667\ DV_3 + 31.727 DV_4$

(11.996) (0.074) (0.089) (0.160) (13.302) (13.815) (13.945)

$R^2 = 0.994$

D.W. = 1.92

TABLE 6

Regression with Broad Money (M_B) as the Dependent Variable

Model I

(33c) $M_B = 205.412 + 3.550\ H_B$ $\quad R^2 = 0.912$

(77.906) (0.170) $\quad$ D.W. = 0.91

(33d) $M_B = 159.897 + 3.565\ H_B + 30.754\ DV_2 + 150.664\ DV_3 + 20.609\ DV_4$

(114.888) (0.173) (140.719) (140.691) (141.433)

$R^2 = 0.916$

D.W. = 0.84

Model 2

(34c) $M_B = -7.105 + 0.162\ H_B + 1.026\ M_{B-1}$ $\quad R^2 = 0.998$

(11.555) (0.076) (0.022) $\quad$ D.W. = 2.7

(34d) $M_B = -16.478 + 0.128\ H_B + 1.035\ M_{B-1} + 14.702\ DV_2 - 6.367\ DV_3 + 29.396\ DV_4$

(15.693) (0.077) (0.022) (18.666) (18.963) (18.786)

$R^2 = 0.998$

D.W. = 2.7

TABLE 6 (cont'd)

Model 3

$$(35c)\quad M_B = \underset{(21.585)}{-79.304} + \underset{(0.169)}{0.667\ H} + \underset{(0.206)}{0.142\ R_{B-1}} + \underset{(0.374)}{9.939\ C_{B-1}}$$

$R^2 = 0.996$

D.W. = 1.119

$$(35d)\quad M_B = \underset{(29.259)}{117.922} + \underset{(0.174)}{0.675} + \underset{(0.208)}{0.118\ R_{B-1}} + \underset{(0.373)}{9.986\ C_{B-1}} + \underset{(31.783)}{40.948\ DV_2} + \underset{(32.993)}{29.726\ DV_3} + \underset{(32.347)}{72.590\ DV_4}$$

$R^2 = 0.996$

D.W. = 0.978

to affect the R^2 significantly and only in Equation (34b) is the fourth dummy significant. In model 2 the coefficients relating to M_{-1} are all significant, while those of H except in Eq. (5) are not. The explanatory power of Model 3 is as high as Model 2. Both lagged reserves and lagged currency (like lagged money in Model 2) has a positive influence on the money supply. The coefficients of lagged reserves, however, are not significant. Of the dummy variables, only that of the fourth quarter is statistically significant.

It is widely regarded that one of the major tests of a good model is its ability to predict. In Tables 7 and 8 we show the predicted values of the narrow and broad money supply (from 1976 IV Qr. - 1979 IV Qr.) using the three models we discussed and compare these with the actual money stock. The percentage deviation of predicted money from actual money is shown in Table 8. An examination of this Table shows that the deviations for Models 2 and 3 generally tend to be smaller than those for Model 1. It is interesting to note that the forms which include the seasonal dummies are generally associated with smaller deviations than the forms without. In other words they tend to give better predictions.

The Relevance of Traditional Control Techniques

Earlier in the discussions we saw the money stock (M) as the product of the money multiplier (m) and high-powered or base-money (H). It is clear from this equation that changes in the money supply can come about as a result of changes in either 'm'

TABLE 7

Actual Narrow Money Compared to Predicted Money, 1976-79

End of Period (Qtr.)	Actual Money (M_B) $mn.	Predicted Money (M_1)					
		Model 1		Model 2		Model 3	
		Eq. (1)	Eq. (1a)	Eq. (2)	Eq. (2a)	Eq. (3)	Eq. (3a)
1976							
4	669.8	864.8	845.0	700.4	722.9	680.5	700.2
1977							
1	695.1	792.9	779.7	719.0	709.4	737.6	728.1
2	802.1	775.9	780.3	744.5	753.6	739.3	749.1
3	785.0	740.7	773.9	854.9	834.0	792.3	779.0
4	881.8	871.3	851.6	841.3	863.3	855.7	876.2
1978							
1	927.0	971.9	959.3	945.5	935.8	969.0	958.7
2	1,052.1	1,052.8	1,058.2	994.0	1,004.1	1,032.9	1,042.1
3	1,044.5	913.1	946.9	1,120.7	1,099.6	1,098.6	1,088.7
4	1,262.9	939.2	919.8	1,113,2	1,134.7	1,120.8	1,145.3
1979							
1	1,256.2	1,077.6	1,065.5	1,345.7	1,335.0	1,234.9	1,226.2
2	1,300.5	1,103.8	1,109.3	1,339.2	1,347.5	1,261.3	1,273.6
3	1,370.4	909.2	943.0	1,378.9	1,356.9	1,410.5	1,405.5
4	1,480.1	1,631.4	1,614.5	1,433.7	1,452.0	1,544.0	1,528.7

TABLE 8

Actual Broad Money Compared to Predicted Money, 1976-79

End of Period (Qtr.)	Actual Money (M_B)	Model 1		Model 2		Model 3	
		Eq. (4) 6	Eq. (4a) 6	Eq. (5) 8	Eq. (5a) 8	Eq. (6) 9	Eq. (6a) 9
1976							
4	1,983.8	2,473.9	2,417.3	2,055.8	2,070.8	2,005.1	2,041.1
1977							
1	2,058.1	2,278.7	2,241.8	2,123.8	2,111.9	2,134.5	2,098.6
2	2,229.9	2,232.5	2,226.3	2,197.7	2,201.6	2,137.5	2,143.9
3	2,347.6	2,136.7	2,249.9	2,368.8	2,354.0	2,264.6	2,260.9
4	2,542.6	2,491.7	2,435.2	2,507.2	2,525.8	2,454.9	2,496.5
1978							
1	2,699.1	2,765.1	2,730.3	2,719.8	2,708.1	2,758.3	2,726.9
2	2,902.8	2,985.2	2,982.1	2,889.9	2,892.2	2,935.2	2,944.9
3	2,951.7	2,605.3	2,720.3	3,082.0	3,068.6	3,068.5	3,066.0
4	3,290.2	2,676.3	2,620.5	3,135.5	3,157.6	3,135.3	3,178.8
1979							
1	3,415.0	3,052.6	3,019.1	3,499.6	3,491.6	3,453.7	3,426.8
2	3,598.9	3,123.6	3,121.1	3,631.2	3,638.3	3,521.2	3,533.3
3	3,843.5	2,594.7	2,709.8	3,795.9	3,788.5	3,855.8	3,858.0
4	4,204.8	4,557.9	4,510.0	4,135.9	4,147.9	4,349.1	4,326.1

TABLE 91

Percentage Deviation of Predicted Money from Actual Money, 1976-1979

End of Period (Qtr.)	Narrow Money						Broad Money					
	Eq.(1)	Eq.(1a)	Eq.(2)	Eq.(2a)	Eq.(3)	Eq.(3a)	Eq.(4)	Eq.(4a)	Eq.(5)	Eq.(5a)	Eq.(6)	Eq.(6a)
1976												
4 Qtr.	29.1	26.1	4.6	7.9	1.6	4.5	24.7	21.8	3.6	4.4	1.1	2.9
1977												
1 Qtr.	14.1	12.2	3.4	2.0	6.1	4.7	10.7	8.9	3.2	2.6	3.7	1.9
2	- 3.4	- 2.7	- 7.2	- 6.1	- 7.8	-6.6	0.1	- 0.?	-1.5	-1.3	-4.2	-3.9
3	- 5.7	- 1.4	8.9	6.2	0.9	-0.8	- 9.0	- 4.?	0.9	0.?	-3.5	-3.7
4	- 1.2	- 3.4	- 4.6	- 2.1	- 3.0	-0.6	- 2.0	- 4.2	-1.4	-0.7	-3.5	-1.2
1978												
1 Qtr.	4.8	3.5	2.0	0.9	4.5	3.4	2.4	1.1	0.8	0.3	2.2	1.0
2	0.0	0.6	- 5.6	- 4.6	- 1.8	-1.0	2.8	2.7	-0.5	-0.4	1.1	1.4
3	-12.6	- 9.4	7.3	5.3	5.2	4.2	-11.7	- 7.7	4.4	4.0	3.9	3.9
4	-25.6	-27.2	-11.9	6.7	-11.3	-9.3	-18.7	-20.4	-4.7	-4.0	-5.7	-3.4
1979												
1	-14.2	-15.2	7.1	6.3	- 1.7	-2.4	-10.6	-11.6	2.5	2.2	1.1	0.3
2	-15.1	-14.7	2.9	3.6	- 3.0	-2.1	-13.2	-13.3	0.9	1.1	-2.2	-1.8
3	-33.7	-31.2	0.6	- 1.0	2.9	2.6	-32.5	-29.5	-1.2	-1.4	0.3	0.4
4	10.2	9.1	- 3.2	- 1.9	4.3	3.3	8.4	7.2	-1.6	-1.4	3.4	2.9

or 'H' or both. The multiplier, of course, is derived from the currency and reserve ratios, and is therefore affected by the behaviour of the public and the banks. Assuming 'H' to be fixed, a reduction in the currency or reserve ratio would have the effect of increasing the value of the multiplier while an increase in these ratios would have the opposite effect. The main influences on high-powered money, as we saw earlier, have been movements in the balance of payments and central bank's net credit to government. Advances by the central bank to the commercial banks can also affect the supply of base money. As we shall see later, this latter factor has been of negligible importance in Trinidad and Tobago in recent years in view of the liquidity position of the banking system and the tendency of the banks to borrow from each other to correct liquidity positions. As channels through which the central bank can influence 'H', it is debatable whether we can regard the autonomous items of the balance of payments and Central Bank credit to Government as policy instruments which can be actively used by the Central Bank for affecting the money stock.[32] Both are a reflection of certain primary factors (or objectives) to which the Bank responds more or less passively. Borrowing by government from the central bank is dictated by fiscal needs, while changes in foreign assets are largely determined by broad economic considerations and performance.

The scope for control, therefore, narrows down to policies and instruments which affect the multiplier, and in cases where the Central Bank provides accomodation to the commercial

banks manipulating the terms of such accomodation. The traditional instruments can, therefore, be divided into two groups:[33] those operating on the demand side (i.e. those aimed at affecting the behaviour of the public and the bank) and those operating on the supply side (i.e. those whose objectives is to change the level of reserve money). Certain techniques operate through both channels.

Open Market Operations

Open market operations have evolved to become the most potent instrument for affecting the cash reserves of commercial banks in the advanced market economy countries. It is a flexible tool and can be used continually to bring about even small changes in the cash position of banks in an upward or downward directions. Though central banks in developing countries are generally empowered to undertake open market operations, conditions generally do not favour the use of this instrument as a means of monetary control. In most cases the securities market is in a very incipient stage of development. A necessary pre-requisite for successful open market operations is the existence of an active and broad securities market-broad in the sense of having a large number of buyers and sellers and a wide range of securities. This requirement relates directly to the frequency and scope of operation that may be necessary to affect the cash-deposit ratio of the banks without severly disturbing the prices of securities or the interest rates

Open market operations has so far not been used for influencing the banking system in Trinidad and Tobago. The main reason appears to be the unsatisfactory state of the securities market.[34] Attempts are being made to foster a local money and capital market, though one could hardly at this stage describe it as sufficiently active or broad. Government debt policy has so far played the most important part in the growth (of if one likes the deepening) of this market. Treasury Bills outstanding increased from $57 million at the end of 1969 to $101 mn at the end of 1979. Outstanding medium and long term internal debt, taken together grew from $146 million to $536 million over the same period. With respect to the Treasury Bill, the holding of this instrument tends to be highly concentrated in the banking system as can be seen in Table 10. As afar as the holding of medium and

TABLE 10

Holders of Treasury Bills Outstanding, 1969-1979

End of Period	Treasury Bills Outs. $mn.	Percentage Held By			
		Central Bank	Comm. Banks	Public Funds	Other
1969	57.0	50.7	38.9	-	10.4
70	73.6	28.1	49.6	14.4	7.9
71	80.8	-	96.9	-	3.1
72	99.8	38.0	61.6	-	0.4
73	102.8	54.0	43.9	1.5	0.6
74	97.2	-	99.4	-	0.6

TABLE 10 (cont'd)

End of Period	Treasury Bills Outs. $mn	Percentage Held By			
		Central Bank	Comm. Banks	Public Funds	Other
1975	101.2	-	81.6	10.4	8.0
76	101.2	-	71.3	28.6	0.1
77	101.2	-	83.9	15.8	0.3
78	101.2	-	83.9	15.8	0.3
79	101.2	-	100.0	-	-

Source: Central Bank, Statistical Digest, Various Issues.

long term Government Securities are concerned, the commercial banks feature less prominently, though there is still a high degree of concentration. Of the $536mn / long term debt outstanding at the end of 1979, 17.7% were held by commercial banks, 14.7% by the national insurance Board, 20% [35] by the life insurance companies, In addition to government securities, the growth of the capital market has been helped by the occasional appearance of share issues made by a small number of public companies.

The relative scarcity or absence of non-government instrument has placed a heavy burden on government securities in meeting a number of different functions, and this places further restrictions on the scope for open market operations. Under existing legislation commercial banks and other financial institu-

tions have certain obligations to meet with respect to liquidity or local assets requirements. In order to provide eligible assets Government has often had to issue securities even when its fiscal position did not warrant this. From the Government's point of view there are cost implications in servicing an unnecessary debt, but this does not concern us here. To the extent that financial institutions have barely enough securities to meet their legal requirements, there exists a pressure to hold such instruments to maturity regardless of the rate of return. While in such circumstances attempts by the Central Bank to sell securities (i.e. reduce the reserves of the banks) may encounter little difficulty, buying securities to encourage an expansion in the money supply may meet with a limited response. A great deal would depend on the portfolio position of the banks at the particular point in time.

There is a final point worth making with respect to the use of open-market operations as an instrument of monetary control in a thin market. In developing countries it is often difficult to separate monetary and fiscal policy from long term development policy. In these countries, public borrowing is not only a means for absorbing liquidity from the system, but is an integral part of the whole savings - investment process. In this connection, if government's borrowing ability is not to be impaired, the need to avoid actions and policies which could discourage the orderly growth of the local capital market would appear to be an essential consideration.

Reserve Requirements

The original purpose of compelling commercial banks to keep a certain proportion of their deposits in reserves was to protect depositors i.e. to ensure that the banks were in a position to meet currency withdrawals of their clients. It was subsequently found that changing the reserve/deposit ratio constituted a direct and powerful tool for affecting the money supply. This is accomplished in two ways. A decrease in the ratio, for example, releases a certain amount of reserves which can be used to increase deposits. Such a decision, of course, would also have the effect of increasing the multiplier thus enhancing the impact on the money stock for any increase in the reserve base. An increase in the reserve ratio would tend to work the other way.

Though changes in reserve requirements have certain obvious attractions as a tool of monetary control, it is not a frequently used instrument either in developed or developing countries. One of the major arguments against it is that it is both blunt and relatively inflexible compared to open market operations. Another is that it is difficult to bring about small changes in the reserve base by changing the ratio. Questions have also been raised about its efficacy in a situation where banks tend to keep excess reserves or are accustomed to seeing large fluctuations in their reserve ratios. Too frequent use of this instrument may lead to a situation where banks are able to anticipate the directions and quantum of change in the ratio and thus make the necessary adjustments required to reduce or blunt the desired impact

on their operations. There are, of course, other considerations arising from the use of reserve requirements which the authorities cannot afford to ignore. Generally reserve requirements are applied only to commercial banks, and this obviously puts them at a disadvantage vis a vis other financial institutions who escape any costs involve in portfolio adjustments when the ratio is increased. Largely because of these considerations some legislation specify the limits within the ratio can change and even the frequency of change within given periods.

The cash reserve ratio has rarely been used in Trinidad and Tobago as an instrument of monetary control. Since 1966 the ratio has only been changed on two occasions. The present ratio of 9% of deposits liabilities has been in effect since 7th November, 1974. As indicated earlier the banks are also required to observe a liquidity ratio which now comprises the legal reserve of 9% and a secondary reserve of 5% made up of Treasury Bills, Special Deposits and Government Securities of up to one year's maturity. This 14% liquidity ratio has been in effect since November, 1974, when it was increased from 12%. It is worth pointing out that with the exception of the legal cash ratio the respective eligible assets are not specified either in terms of relative proportions or in relation to deposit liabilities. The present specifications is extremely flexible in that it permits the liquidity requirements beyond the legal cash reserve to be met with any one asset or any combination of elible assets. In this situation Special Deposits

could be run down to zero if the holding of Government Securities measure up to the required liquidity requirements. Under existing arrangements the Bank could not manipulate the reserve assets individually if it wanted to provide a back up to the cash ratio without using the overall liquidity lever.

Bank or Re-discount Rate

The use of this technique of monetary management derives from the traditional function of the central bank as lender of last resort to the commercial banks. Changes in the discount rate affect credit conditions in two ways. The first is the cost effect. An increase in the bank rate is intended to increase the cost of borrowing and ultimately to discourage an expansion in credit. A decrease is used to attain the opposite effect. The second channel operates through the so-called 'announcements effect'. Even when changes in the discount rate have no direct impact on the cost of funds, there may still be an effect on the plans of borrowers and lenders, which may be altered in line with the desired intentions of the authorities.

In the developed countries changes in the Bank Rate tend to be followed by changes in other market rates. One reason for this stems from the fact that an unsatisfactory response from the banks can elicit other stronger measures which the central bank is in a position to use. A second explanation derives from the fact that since the commercial banks in those countries operate on very thin margins they tend to turn regularly to the central

bank as a source of funds.

It is often argued that in a situation where commercial banks do not borrow from or discount at the central bank on a regular basis, the use of the discount mechanism will have a limited application. Even where this is the case, however, the banks may feel themselves morally obliged to support the policies of the central bank by changing their rates in the required direction. Between the end of 1966 and 1973 the Central Bank of Trinidad and Tobago changed its discount rate seven times. In most instances the commercial banks re-acted by adjusting their prime rates, even though their dependence on Central Bank resources is limited. Whether these changes had any impact on the volume of lending, it is difficult to gauge. Until the early 1970's the Bank apparently changed the discount rate mainly for announcement purposes, and this is evident to some extent in the following statement:

> "While the effectiveness of the local discount rate as a regulator has been questioned in the past on the grounds that it is not an effective price of funds to the commercial banks who do little borrowing from the Central Bank, it has been accepted as a reflection of the Central Bank's assessment of monetary and financial needs of the economy."36

Since July 1973, the discount rate has remained unchanged, and rather than this being the policy required by existing conditions, it is more likely a reflection of the feeling that changes in discount rate carry little or no significance in the circumstances that have prevailed in the post-1973 period.

Ceilings on Bank Credit and Selective Credit Controls"

"Ceilings on aggregate bank credit affect total liquidity directly, as opposed to affecting the product of the money multiplier or reserve money individually. Since ceilings may force banks to hold excess reserves they could impinge directly on the multiplier."[37] Selective credit controls on the other hand are concerned with the distribution of bank loans to the various sectors (or among various purposes), formulated against the objectives of governmental policy.

Section 42 of the Trinidad and Tobago Central Bank Act empowers the Bank (with the approval of the Minister of Finance) to "impose control in respect of the volume terms and conditions upon which credit may be made available to all or any sectors of the economy, when in its judgement the imposition of such controls is necessary to restrict or prevent an undue expansion of credit." Such controls can be extended both to banks and non-banks financial institutions. Until quite recently the Bank relied mainly on the prescription of guidelines with respect to the minimum downpayment and maximum repayment period for instalment credit related to the purchase of motor cars and certain household durables. Moral suasion was apparently used to encourage the flow of funds to priority sectors. This approach may have had some limited impact on the banks, but in recent years it had become clear that the allocation of resources favoured by the banks was not in accord with the wishes of the authorities. On the 5th November, 1979, the Central Bank gave an explicit directive to the effect that

"the amount of credit that each commercial bank should extend to individuals for non-business purposes should not exceed twenty-five per cent of the increase over the total amount of credit extended by such a bank as at 30th September, 1979". The effect of this regulation on the operation of the commercial banks in the period immediately following its institution is difficult to assess. In its 1979 annual report, the Central Bank noted that in the last quarter of 1979 the value of business loans outstanding actually fell and although the value of non-business loans increased by a relatively small amount it nonetheless exceeded the net increase in total loans and advances outstanding. The Bank advanced two possible explanations for this situation. One stemmed from the possibility that commitments for non-business loans had already been made by banks before the issue of the guidelines on November 5th. The other was based on the argument that the scope of adjustment was complicated by the unpredictably high repayment of outstanding loans and advances by a few large business clients of the banks.[38]

The aim of selective credit regulation is to change the preference function of the banks who are explicitly asked to restrict the volume of consumer loans and to expand their credit for productive purposes. Given the lack of specificity with respect to the latter aspect, the banks are still left with a wide range of areas over which to distribute their credit. Alternatively, of course, they can accumulate reserves, if prospective borrowers in the productive sectors do not meet the required credit-worthiness

standards. The net cost of funds would no doubt tend to influence the extent to which this latter option is pursued. There is another important point worth noting here. Since consumer lending is associated with a relatively high rate of return, lending institutions not covered in the directive will thus be placed in a more favourable position vis à vis the commercial banks. The activities of the non-bank institutions could well frustrate the intentions of the authorities to the extent that a reduction of total consumer spending is desired.

Control of Interest Rates

By controlling interest rates paid on deposits or charged on loans, the authorities can influence the behaviour of both the banks and the public, and ultimately the value of the multiplier. Though the Central Bank Act was amended in 1978 to allow the Bank (through the country's President) to fix interest rates, this authority has so far not been used. The Bank's approach to the issue of interest rates is far from clear. One of the main factors behind the interest rate amendment is reported to have been concern with the cost of credit. Loans rates not only continue to be high, but there appears to be a widening spread between these rates and the real rate of return to depositors.

Moral Suasion

Moral Suasion is not a control device in the sense of having a de jure identity. It generally refers to use of appeals and consultations by the Central Bank as a means of influencing

the commercial banks to adjust their behaviour or policies in some desired way. Though the technique relies on voluntary cooperation, it is often the most effective in situations where the use of some of the more traditional tools may be highly circumscribed.

Moral Suasion is often used in reference to a wide range of bank variables (e.g. lending rates, interest rates paid on deposits, allocation and terms of credit, etc.) and therefore affect both reserve money and the multiplier. As indicated earlier, the Trinidad and Tobago Central Bank has relied on moral suasion as one of the major means of influencing bank behaviour. It would appear from recent development that it has not proved as effective as the authorities would like, and this is manifested to some extent in the decision in 1978 to amend the Central Bank Act to permit the Bank to set interest rates and the more recent decision to lay down specific selective control guidelines. Nevertheless in view of the limited scope for the use of the other techniques described, moral suasion remains one of the more practical means of affecting bank conduct.

Concluding Remarks

Naive presentations of the money supply process in the literature convey the view that central banks have complete control over the money stock. This is done by taking certain behavioural variables as stable or constant and by implicitly or explicitly assuming a closed economy framework. The process, as we have seen, is much more complex than this. It is worth repeating

here that the control of the money supply does not rest on having an unchanging multiplier. The ability to predict movements in its components is crucial to the exercise. In an open economy perhaps the more important question surrounds the ability of the central bank to control base money. Different types of issues present themselves here depending on the nature of the economy and the institutional characteristics. Some economists, for example, argue that in a fixed exchange rate situation capital movements responding to interest rate changes tend to offset the latter's impact on the money stock. This view assumes that capital flows are highly sensitive to international interest rates differentials. In developing countries the relevance of traditional institutional set-up raises questions of the technical ability of the authorities to exercise influence over the level of liquidity prevailing in the economy at any point in time. In these economies, however, where fiscal policy tends to be dominated by develop ntal objectives rather than liquidity considerations, Government's revenue/ expenditure activities tend to have a crucial effect on the money supply. The availability of foreign exchange enhances the spending power of the government, but it is the rate at which the foreign exchange is monetised that largely determines the rate of growth of base money.

As indicated in the paper the extra-ordinary expansion in the money supply in Trinidad and Tobago in recent years has come about largely as a result of the financing of fiscal deficits in the non-oil sector by foreign exchange earned in the oil sector.

The consequences of this type of situation are quite different from one where expenditure is financed by the printing of money without the backing of foreign assets. Whereas in the latter case the increased demand for goods and services pressing against limited domestic supplies tends to result in a rapid increase in domestic prices, (at least in the short run), in the former the pressure can be eased by allowing greater accessibility to imports. In order to encourage greater local production or to conserve foreign exchange, however, the authorities may find it necessary to restrict imports directly or indirectly, and to the extent that domestic suppliers cannot provide an adequate response to the demand situation inflationary tendencies are re-inforced. Measures intended to alleviate the problem may serve only to compound it by inducing further increases in the money supply. We should add that while an open policy on imports may have a contractionary effect on the monetary base, it does not necessarily resolve the inflation problem. A great deal would depend on the prices of foreign goods, be they intermediate or final products.

FOOTNOTES

1. Two important studies in this respect which have influenced other investigations are M. Friedman and A.J. Schwartz, A Monetary History of the United States, 1867 - 1960 (Princeton: Princeton University Press, 1963); and Phillip Cagan, Determinants and Effects of Changes in the Stock of Money, 1875 - 1960 (New York: Colombia University Press, 1965).

2. See, for example, A. Oyejide, "Critique of the Money Multiplier Approach to Money Supply Determination: A Theoretical Extension and Some Empirical Tests," N.J.E. & S.S, Vol. 16, No.2, July, 1974.

3. For an excellent presentation of this theory see A.D. Bain, The Control of the Money Supply (Harmondsworth: Penguin Books Ltd., 1978) pp. 32-50.

4. See Victor Argy, "The Impact of Monetary Policy on Expenditure, with Particular Reference to the United Kingdom", IMF Staff Papers, Vol. 16, 1969.

5. Op. cit., Appendix B.

6. It would be observed that F & S use the reciprocal of the conventional currency and reserve ratios. It is also worth noting that while some writers define the currency ratio in relation to deposits (demand or total), others prefer total money in the denominator. In the context of the multiplier analysis the distinction does not appear to hold any significance.

7. See Karl Brunner and A.H. Meltzer, "Some Further Investigations of Demand and Supply Functions for Money", The Journal of Finance, May 1964.

8. Brunner and Meltzer have also experimented with a non-linear hypothesis in which the money stock and interest rate emerge from the inter-action of the public's asset supply to banks and the bank's portfolio adjustment. See "Some Further Investigations.....", op. cit.

9. See, for example, J.J. Horton Jr., "Is there a Money Supply Function?" Quarterly Review of Economics and Business, Vol. 9, Summer, 1969.

10. L.E. Gramley and S.B. Chase, Jr., "Time Deposits in Monetary Analysis", Federal Reserve Bulletin, Vol. 51, No. 10 (Oct., 1965).

11. See L.C. Andersen, "Three Approaches to Money Stock Determination", Review, Federal Reserve Bank of St. Louis, August, 1968.

12. Ibid.

13. Ibid.

14. See Oyejiede, op. cit

15. If $b = \frac{D}{R}$, and $p = \frac{D}{C}$

Equation (9) can be written as

$$(1)\quad M = \frac{H.\ b(1+p)}{(b+p)}$$

Taking log. of (I) and differentiating with respect to time yields:

$$(2)\quad \log M = \log H + \log b + \log (1+p) - \log (b+p)$$

$$(3)\quad \frac{1}{M}\frac{dM}{dt} = \frac{1}{H}\frac{dH}{dt} + \frac{p}{b(b+p)}\frac{db}{dt} + \frac{(b-1)}{(1+p)(b+p)}\frac{dp}{dt}$$

Equation (3) shows changes in the money stock can be split into changes in H, b and p. The last term in Eq. (2) shows that the interaction between b and also has an effect.

Over discrete periods of time the effect of each determinant can be approximated by holding two determinants constant at their initial values while allowing the third to take on its observed rate of change.

The total change in log M between two time points t_o and t_1 is $\Delta \log M = \log M_1 - \log M_o$

Effect of ΔH $= \Delta \log M\ (b = b_o,\ p = p_o)$

$= \log H_1 - \log H_o$

Effect of Δb $= \Delta \log M\ (H = H_o,\ p = p_o)$

$= \log b_1 - \log b_o$

$- \log (b_1 + p_o) + \log (b_o + p_o)$

Effect of Δp $= \Delta \log M\ (H = H_o,\ b = b_o)$

$= \log (1+p_1) - \log (1+p_o)$

$- \log (b_o + p_1) + \log b_o + p_o)$

Inter-action of b and p $= - \log (b_1 + p_1) + \log (b_1 + P_o) +$

$\log (b_o + p_1) - \log (b_o + p_o)$

16. The term 'central bank credit to government' as used in this paper covers direct advances as well as resources made available through the purchase of securities.

17. C. Bourne, "The Determination of Jamaican Money Stock: 1961-1971", SES, Dec., 1976.

18. Cf. Bourne, Ibid.

19. Ibid.

20. Bourne rationalises this procedure by assuming that the banks' reserve holdings and investment in foreign assets affect the value of the multiplier in the same manner, in the sense that they both represent investible funds which are not loaned out to resident economic enterprises, and thereby do not result in equivalent-valued deposit creation.

21. With respect to the currency ratio, Bourne found a much more stable situation in Jamaica. The coefficient of variation for the narrow ratio was 0.07 as compared to 0.16 for the broad ratio. The CVs for the reserve ratios were high (0.26 with demand deposits in the denominator and 0.19 when total deposits was taken), but relatively smaller than the coefficients for Trinidad.

22. Central Bank of Trinidad and Tobago, A History of Banking and Currency in Trinidad and Tobago, 1974, p. 15.

23. See, for example, J.O. Khazzoom, The Currency Ratio in Developing Countries (New York: Praeger, 1966), p. 36.

24. The share of the lowest 50% of households dropped from 19.2% in 1957/58 to 15.5% in 1971/72 but increased to 19% in 1975/76. The share of the top 19% increased from 33.3% in 1957/58 to 37.8% in 1971/72 but is estimated to have decreased to 31.4% in 1975/76. See Winston Dookeran, "The Distribution of Income in Trinidad & Tobago (1957-76)", Unpublished Paper, Dept. of Economics, U.W.I. St. Augustine.

25. Between 1969 and 1972 retail prices (as reflected in the Retail Price Index) increased on average by 4.4% per annum. Between 1973 and 1979, however, the comparable figure was 14.6%.

26. Khazzoom, op. cit.

27. Phillip Cagan, "The Demand for Currency Relative to the Total Money Supply", Occasional Paper No. 62, National Bureau of Economic Research Inc., 1958.

28. Bourne, op. cit.

29. Interest is payable on these deposits.

30. The term 'surplus reserves' is used by some writers to describe the difference between 'desired reserves' and 'actual reserves'.

31. op. cit.

32. See B.B. Aghevli et al., "Monetary Policy in Selected Asian countries", IMF Staff Papers, Dec., 1979.

33. Ibid.

34. See E. Bobb (Deputy Governor of the Central Bank of Trinidad and Tobago), "Some Aspects of Monetary Policy in Trinidad and Tobago", Central Bank's Quarterly Economic Bulletin, Vol. III., No. IV, Dec., 1978.

35. Estimated.

36. Central Bank, 1969 Annual Report, p. 10.

37. B.B. Aghevli et al., op. cit.

38. See the 1979 Central Bank Annual Report, p. 25.