CHAPTER V

MONEY, OUTPUT AND PRICES : INDIAN EXPERIENCE

I.   RM and Money Supply :

        Having  examined  the behaviour of Reserve  Money,  its
composition and sources, we are now in a position to analyse  the
composition  and  sources of total money supply  [M3]  in  India,
during 1970-71 to 1989-90.   In India broad money [M3] is made  up
of :

        M3 =  [i] Currency with the public            [C]

            +  [ii] Other deposits with RBI           [OD]

            +  [iii] Demand deposits with banks        [DD]

            +  [iv] Time deposits with banks           [TD]


            M3 = C + OD + DD + TD ...............[5.I]

    RM =  [i] Currency with the Public            [C]

        + [ii] Other deposits with RBI            [OD]

        +[iii] Cash with Banks                    [CR]

        + [iv] Bankers deposits with RBI          [BR]

            RM = C + OD + CR + BR ..............[3.II]

# Graph 5.1



Ratio of Currency with Public to DD+TD

64

# Graph 5.2



Ratio of CB+BDRPI to DD-TD

CB+DBFEI/DD+TD

Year
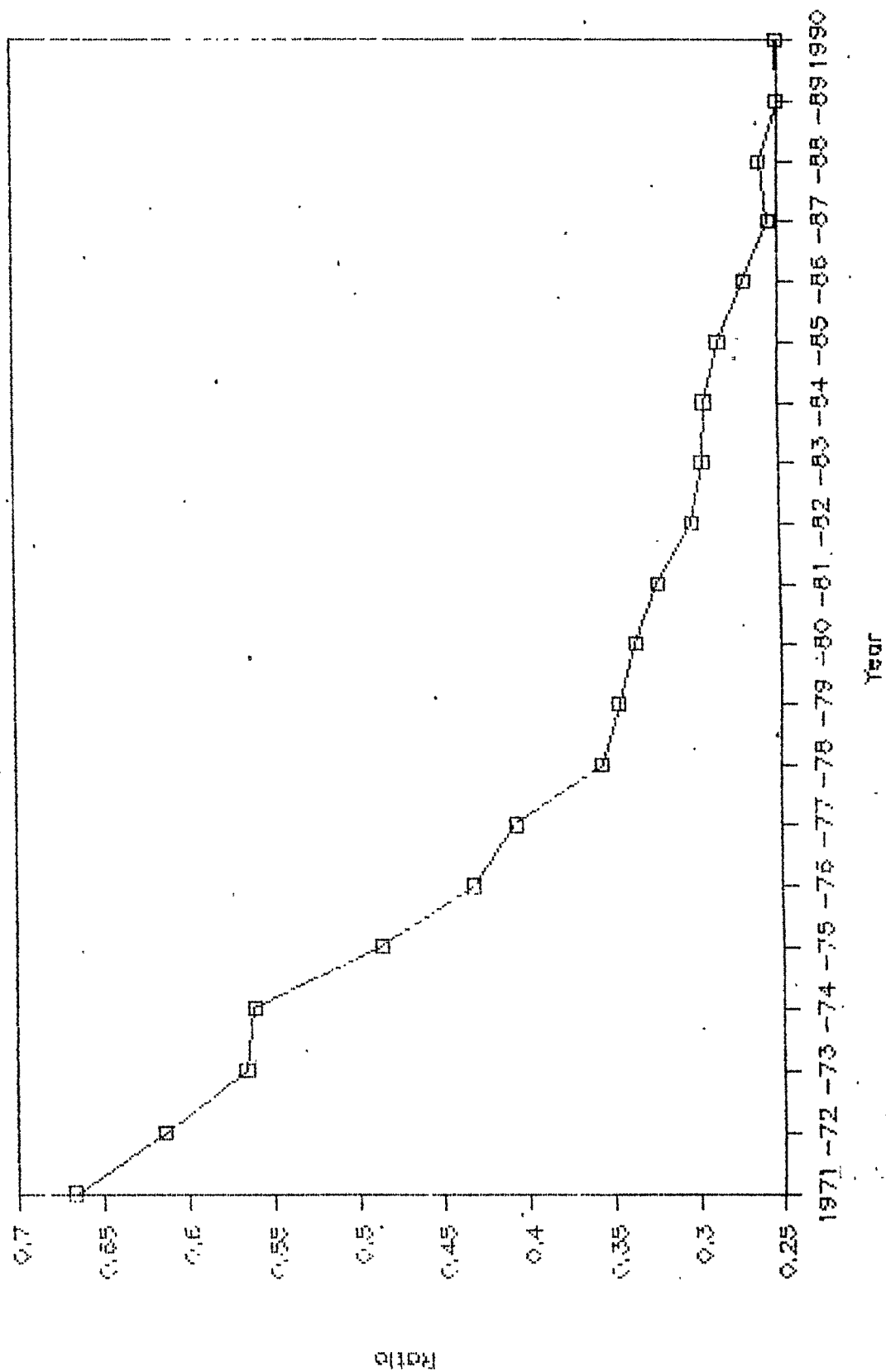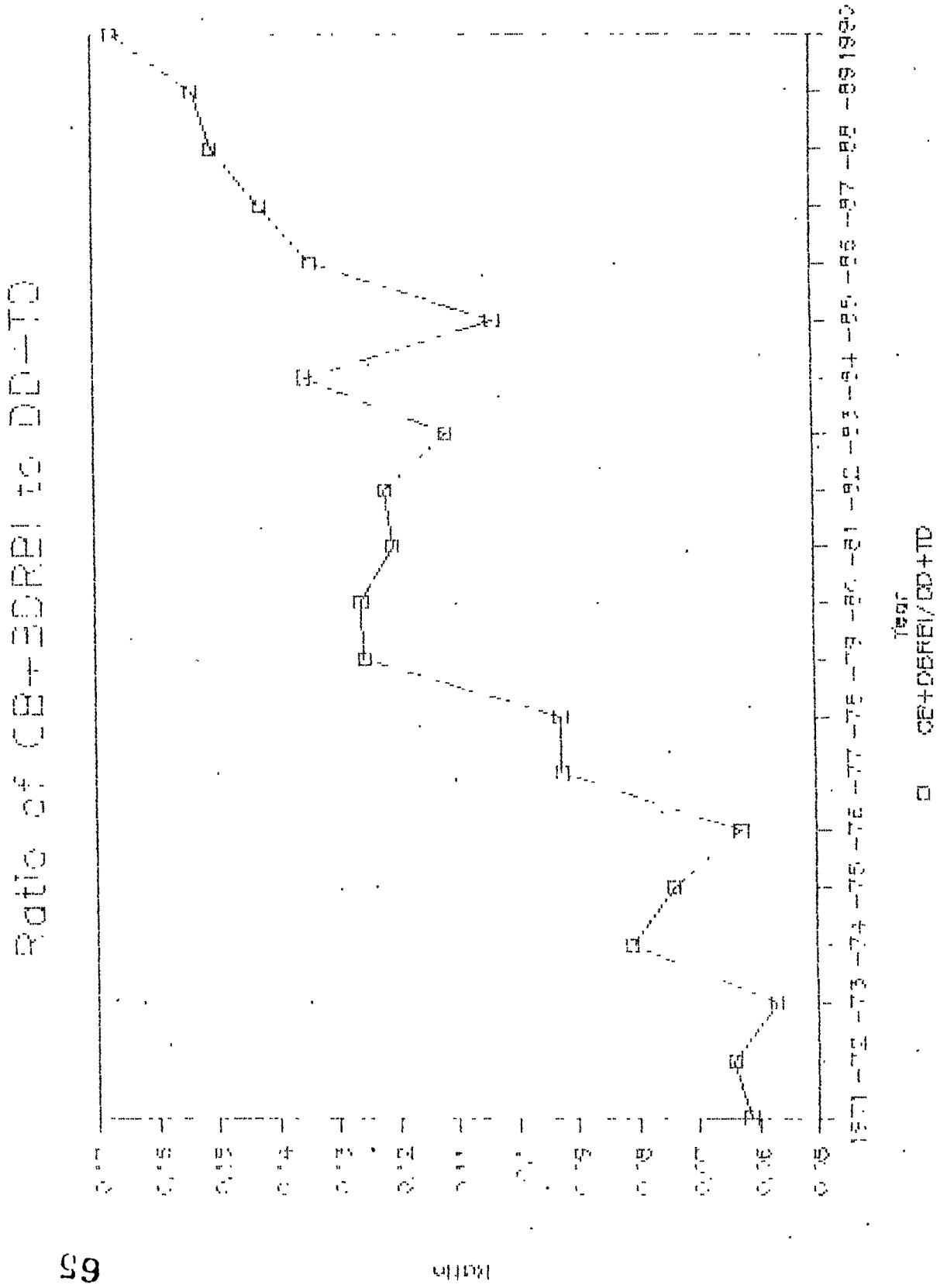
Graph 5.3

Some Important Ratio (c, t, r)

$$t = \frac{TD}{DD+TD}$$

$$c = \frac{C}{DD+TD}$$

$$r = \frac{CR+BDR}{DD+TD}$$

Ratio

99
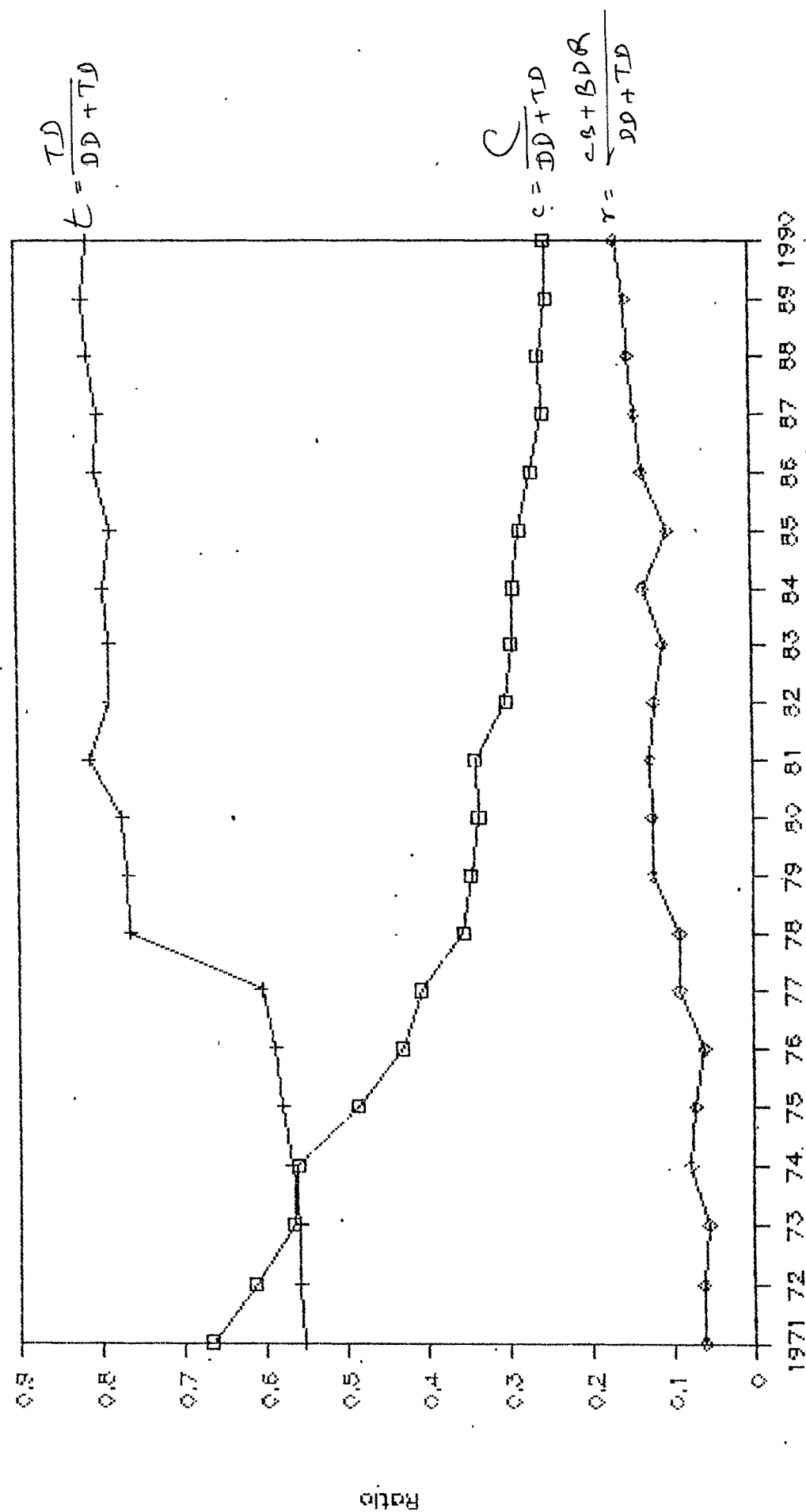
Comparing 5.I & 3.II [M3 & RM], we find that the first two components, namely currency with the public and other deposits with the RBI are common to both the equations. Hence, it is the quantity of reserves [cash with Banks + Bankers' deposits with RBI] which determines the Deposit money with banks [Demand deposits + Time deposits]

Thus, the quality of reserve money as "High Powered" money is considered to be the proximate determinant of deposit money. [ Graph 5·2 ]

In that case the determinant, called deposit money multiplier "dm", can be estimated from the following equation :

$$[TD + DD] = do + dm [CR + BR] \dots \dots \dots \dots .[5.II]$$
$$or, \quad TDL = do + dm [CBR]$$

Where TDL = TD + DD, and

CBR = CR + BR

The estimated value of "dm" is 2.59 for the period 1970-71 1989-90.

$$TDL = -3820.56 + 2.59 \ CBR$$
$$(-3.96) \quad (32.09)$$
$$\text{t-value} \quad \text{t-value}$$
$$R^2 = 0.997 \quad DW = 1.39$$

Which explains that with per unit change in RM, deposit money changes by 2.59 Units. [ Graph 5·3 ]

Table 5.1    RM - Money Supply Inter-relationship.

| As on the Last Friday of March | (Rs. Crore) | | | | |
|---|---|---|---|---|---|
| | RM | M3 | M3/RM | Change in RM | Change in M3 |
| 1971 | 4814 | 10958 | 2.276 | | |
| 1972 | 5380 | 12690 | 2.359 | 566 | 1732 |
| 1973 | 6015 | 15033 | 2.499 | 635 | 2343 |
| 1974 | 7260 | 17571 | 2.421 | 1245 | 2538 |
| 1975 | 7387 | 19457 | 2.634 | 127 | 1886 |
| 1976 | 7732 | 22286 | 2.882 | 345 | 2829 |
| 1977 | 9798 | 27279 | 2.784 | 2066 | 4993 |
| 1978 | 10941 | 32906 | 3.007 | 1143 | 5627 |
| 1979 | 14083 | 39890 | 2.832 | 3142 | 6984 |
| 1980 | 16465 | 46801 | 2.842 | 2382 | 6911 |
| 1981 | 18788 | 55358 | 2.946 | 2323 | 8557 |
| 1982 | 20463 | 62426 | 3.051 | 1675 | 7068 |
| 1983 | 23110 | 72868 | 3.153 | 2647 | 10442 |
| 1984 | 28824 | 85899 | 2.981 | 5714 | 13031 |
| 1985 | 31477 | 101957 | 3.239 | 2653 | 16058 |
| 1986 | 37858 | 118338 | 3.126 | 6381 | 16381 |
| 1987 | 44813 | 140633 | 3.138 | 6955 | 22295 |
| 1988 | 53296 | 162660 | 3.052 | 8483 | 22027 |
| 1989 | 62377 | 192085 | 3.079 | 9081 | 29425 |
| 1990 | 77591 | 230950 | 2.967 | 15214 | 38865 |

Based on Annexure 3 and 4.

The increase in RM over 1970-71 to 1989-90 on annual trend basis exhibits relatively slower growth than the growth in M3. During the period, RM increased at the rate of 14.58 per cent, while M3 grew at the rate of 16.08 per cent per annum on

annual trend basis. Though there is marginal difference in their growth rates, they have moved in the same direction exhibiting consistency. After 1980-81, the relative ratio has remained more or less constant. This supports our contention that long run money multiplier is constant. M3/RM ratio was 2.28 in the year 1970-71, it rose to 2.88 by 1975-76 and further went up to 2.95 in the year 1980-81. Then it remained constant around 3 [three] throughout the decade 1980-81 to 1989-90. In 1989-90 the ratio was 2.97.

What could be more instructive in this relationship is to identify the mechanism where by changes in RM brings about changes in M3.

We have already expressed the functional relationship between RM and money supply. We can also estimate the rate of change in money supply from the rate of change in reserve money. Since the RM is expressed functionally as change in [RBCG, RBCB, RBCC, GCL, BRCF & RBNNL], we may easily derive through substitution the money supply equation. These behavioral relations are expressed as under.

$$MS = f[RM] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots[3.I]$$

$$\Delta MS = f[\Delta RM].. \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots[5.III]$$

$$\Delta MS = F[\Delta RBCG, \Delta RBCB, \Delta RBCC, \Delta GCL, \Delta BRCF$$
$$\Delta RBNNML].. \quad \ldots \quad \ldots \quad \ldots \quad \ldots[5.IV]$$

The above behavioural relationship, were statistically examined to support our contention. The outcome is as under

[i] M3 = - 2233.71 + 3.096 RM
                (-2.11)        (93.23)
                t-value        t-value

$R^2$ = 0.998          DW = 1.29

Which reveals that unitary change in RM on an average brings about 3.09 units change in M3.

[ii] $\Delta$M3 = 1806.23 + 2.55 $\Delta$RM
                   (1.99)      (15.20)
                   t-value     t-value

$R^2$ = 0.93     DW = 2.90

On annual change basis the above estimate states that 1 unit annual change in RM leads to 2.55 units annual change in M3, which is less than the average change [3.09].

[iii] When M3 and RM relationship was estimated in double log form, the outcome stated the elasticity of M3 with respect to RM to be almost unity [1.09] implying that the multiplier effect was stable, which strongly supports our contention about the stability of "m" multiplier.

[iv] Change in M3 estimated on the basis of variation in net RBI credit to government showed a strong positive impact. The final change in M3 due to a unit change in RBI credit to government was to 2.597 units on the basis of our estimates.

$\Delta$M3 = 2025.19 + 2.597 $\Delta$ RBCG
               (1.48)       (9.77)
               t-value      t-value

$R^2$ = 0.85          DW = 2.15

[v] Further, for investigation purpose, we went into the detail to know the influence of BD on M3. The estimated result states that unit change in BD leads to 2.83 unit change in M3 on annual change basis. Which very storngly supports our centention that it is the budgetary defict requirement of the government which causes major changes in money supply.

$$M3 = \underset{\substack{(2.02)\\ t\text{-value}}}{2700.02} + \underset{\substack{(9.59)\\ t\text{-value}}}{2.83} \; BD$$
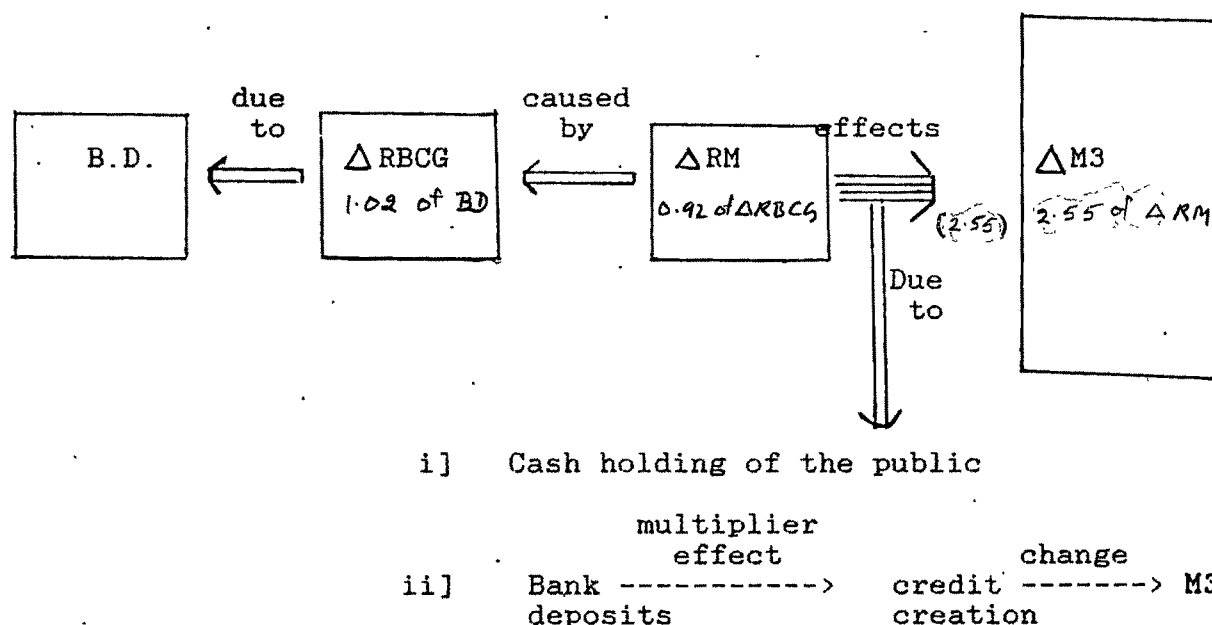
$$R^2 = 0.844 \qquad DW = 1.94$$

As it is made evident that change in RM is mainly caused by the **net RBI credit to government**. The increased RM latter on either comes to the public in the form of their currency holding and/or flows to the banks in the form of bank deposits. Higher cash deposits with banks enable them to go for more credit creation, depending upon the demand for credit in the system. It is to be noted that in Indian context with an administered structure of interest rates with varying rates of interest for different activities to be financed, demand for credit has remained highly flexible. The rates of interest charged on some activities are well below the market rates and demand for credit at those rates of interest is highly elastic. Thus an increase in bank deposits with commercial and co-operative banks enable them to extend more credit to the rest of the economy and that too in multiple way, depending upon the nature of monetary policy that the monetary authority would be following.

The   principle beneficiaries of these credit   expansion
are :

[i] Government; [ii] Commercial Sector and   [iii] Foreign Sector.

It   is in the vary process of financing sectoral   needs
of the economy that the money supply [M3] has changed   considera-
bly.

The   following chart at a glance indicates. the   forward
and backward linkages of change in RM   with respect to   variables
considered in the analysis.

| | due to | | caused by | | effects | |
|---|---|---|---|---|---|---|
| B.D. | ⇐ | △RBCG<br>$1.02$ of BD | ⇐ | △RM<br>$0.92$ of △RBCG | ⟶<br>$(2.55)$ | △M3<br>$2.55$ of △RM |

Due
to
⇓

i]    Cash holding of the public

                    multiplier
                     effect                    change
        ii]    Bank -----------> credit -------> M3
               deposits           creation


A   sizeable   increase in money supply,   accompanied   by
some changes in its composition, demands a thorough   investgation
about its effect on the economy in real terms and monetary terms,
i.e. in terms of output and prices.

## II. Money, Output and Prices :

Among economists, there is no unanimity on how changes in money supply ultimately affect the real economy. The classical view that a change in money supply results into changes in the price level by equi-proportional manner and the Keynesian theory that full impact is seen only on output under condition of less than full employment, represent two extreme outcomes between which the real system normally lies. In a realistic approach, the mechanism linking the quantity of money with money income must be able to differentiate between its impact on output and prices. [Real and monetary impact]

The inter-action between money, output and prices can be summarised in one equation i.e. the demand function for real money balances as follows :

$$M/P = f[ RI, i]$$

Where M stands for nominal money held by the public, P for price level, RI for real income and i for interest rate. In this equation, nominal money balances held by the public are deflated by the general price level [Price Index] and the real money balances are treated as function of real income and return on alternative financial assets.

Assuming that demand function for money is stable and the influence of interest rate is not much significant, the

demand function for money can be re-stated in the form of price equation as follows :

$$P = a - bRI + cM$$

Which implise that, an increase in real output depresses the price level and an increase in money supply raises the price level.

In what follows, we would like to examine statistically, the impact of change in money supply over output and prices, based on Indian economy's experience during 1970-71 to 1989-90.

The main linkages in our study are as follows. As already shown [Chapter III] the stock of money varies endogenously through the feed back from reserve money which changes to accomodate fiscal deficits. The price level is determined by money supply and output. The output is influenced, among other factors, by changes in real money supply and its sectoral allcoation.

Real Net National Product [RNNP] increased at trend rate of 3.81 per cent per annum during 1970-71 to 1989-90. The rate of increase in RNNP had been sufficiently high during the second decade as compared to the first decade. The annual trend rate of growth during 1980-81 to 1989-90 was 5.81 percent compared to 2.42 percent during 1970-71 to 1979-80.

ble 5.2   Money Output and Prices Behaviour.

| ar | M3 | Net National Productio | Real Net National Production | Price Index | % Annual Increase in | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | M3 | Net National Productio | Real Net National Production | Price Index |
| | | (Rs. Crore) | | | | | | |
| 970-71 | 10958 | 36362 | 36362 | 100 | | | | |
| 971-72 | 12690 | 38583 | 36537 | 105.6 | 15.81 | 6.11 | 0.48 | 5.6 |
| 972-73 | 15033 | 42382 | 36473 | 116.2 | 18.46 | 9.85 | -0.17 | 10.04 |
| 973-74 | 17571 | 52241 | 37395 | 139.7 | 16.88 | 23.26 | 2.53 | 20.22 |
| 974-75 | 19457 | 61194 | 34988 | 174.9 | 10.73 | 17.14 | -6.44 | 25.19 |
| 975-76 | 22286 | 64531 | 37301 | 173 | 14.54 | 5.45 | 6.61 | -1.09 |
| 976-77 | 27279 | 69408 | 39302 | 176.6 | 22.4 | 7.56 | 5.36 | 2.08 |
| 977-78 | 32906 | 79671 | 42880 | 185.8 | 20.63 | 14.79 | 9.1 | 5.21 |
| 978-79 | 39890 | 85255 | 45885 | 185.8 | 21.22 | 7.01 | 7.01 | 0 |
| 979-80 | 46801 | 92314 | 42424 | 217.6 | 17.32 | 8.28 | -7.54 | 17.11 |
| 980-81 | 55358 | 110484 | 42940 | 257.3 | 18.28 | 19.68 | 1.22 | 18.24 |
| 981-82 | 62426 | 128457 | 45665 | 281.3 | 12.77 | 16.27 | 6.35 | 9.33 |
| 982-83 | 72868 | 141331 | 48971 | 288.6 | 16.73 | 10.02 | 7.24 | 2.59 |
| 983-84 | 85899 | 165818 | 52474 | 316 | 17.88 | 17.32 | 7.15 | 9.49 |
| 984-85 | 101957 | 184354 | 54478 | 338.4 | 18.69 | 11.18 | 3.82 | 7.09 |
| 985-86 | 118338 | 206491 | 58696 | 351.8 | 16.07 | 12.01 | 7.74 | 3.96 |
| 986-87 | 140633 | 228708 | 60827 | 376 | 18.84 | 10.76 | 3.63 | 6.88 |
| 987-88 | 162660 | 257961 | 63631 | 405.4 | 15.66 | 12.79 | 4.61 | 7.82 |
| 988-89 | 192085 | 310015 | 71219 | 435.3 | 18.09 | 20.18 | 11.93 | 7.37 |
| 989-90 | 230950 | 346994 | 72095 | 481.3 | 20.23 | 11.93 | 1.23 | 10.57 |

sed on Annexure - 4 and 5
al Net National Production = NNP/PI.

The money supply [M3] increased at a trend rate of
16.08 per cent per annum during 1970-71 to 1989-90. It rose at
16.03 in the first decade [1970-71 to 1979-80] and marginally
less at 15.97 percent during the second decade [1980-81 to
1989-90]. In this regard, as stated in the earlier chapter, Re-

serve Bank credit to government was the most important source of reserve money expansion. Changes in foreign exchange assets have also been important in some years during the mid seventies. The rapid rise in M3 during 1970-71 to 1989-90 can be attributed to rise in Bank's demand and time liabilities [DTL] at a more rapid rate 17.56 on trend basis which in turn changed the composition of broad money to a sizeable extent. DTL used to constitute around 60 per cent of total M3 in the year 1970-71, which went upto 80 percent in the year 1989-90. [ Annexure 1 and 2]

The inlfation rate, as measured by the wholesale price index, was 8.04 percent on an annual trend basis during the period 1970-71 to 1989-90. There were erratic year to year fluctuations in the annual rate of inflation ranging from a fall in 1976 to an increase to 20 percent or more in some years. The average annual trend rate of inflation was around 8.47 percent during 1970-71 to 1979-80 and slightly less 6.64 percent during 1980-81 to 1989-90. [ Table 5.2] .

With around 4 percent average annual growth in RNNP, there had been a notable rise in the rate of saving during the period of our study. The gross saving rate increased from around 15 per cent in the sixties to around 22 percent in seventies and stayed around 21 percent in eighties. Private and public sector investment showed a significant improvement. Infact, the real capital stock in the economy increased at the rate of 5 percent per annum during this period. Still we experienced a high rate of inflation [8 percent plus] on annual trend basis.

The increase in real income, other things remaing same, necessiates an increase in the demand for real money balances and so long as money supply expands to this extent, there is no increase in price level.. On the basis of above analysis, the Indian economy's experience during the period of our study reveals that along with increase in real output, the increase in money supply was more rapid, and hence the outcome was continous inflationary pressure witnessed by the economy, which is very clear from the following table :

Table 5.3 Index of Money Output and Prices

| Year | Real Output | Real Money Stock | Prices |
|------|-------------|------------------|--------|
| 1970-71 | 100 | 100 | 100 |
| 1971-72 | 100.48 | 109.66 | 105.6 |
| 1972-73 | 100.31 | 118.06 | 116.2 |
| 1973-74 | 102.84 | 114.78 | 139.7 |
| 1974-75 | 96.22 | 101.52 | 174.9 |
| 1975-76 | 102.58 | 117.55 | 173 |
| 1976-77 | 108.09 | 140.96 | 176.6 |
| 1977-78 | 117.93 | 161.62 | 185.8 |
| 1978-79 | 126.19 | 195.92 | 185.8 |
| 1979-80 | 116.67 | 196.27 | 217.6 |
| 1980-81 | 118.09 | 196.34 | 257.3 |
| 1981-82 | 125.58 | 202.51 | 281.3 |
| 1982-83 | 134.68 | 230.41 | 288.6 |
| 1983-84 | 144.31 | 248.07 | 316 |
| 1984-85 | 149.82 | 274.95 | 338.4 |
| 1985-86 | 161.42 | 306.97 | 351.8 |
| 1986-87 | 167.28 | 341.32 | 376 |
| 1987-88 | 174.99 | 366.16 | 405.4 |
| 1988-89 | 195.86 | 402.69 | 435.3 |
| 1989-90 | 198.27 | 437.89 | 481.3 |

Based on Annexure 4 and 5.

By indexing the real output,[2] real money stock[3] and prices, we can have a fair comparision amongst these variables. The relative changes in the Indices reveal that changes in real money stock have stronger influence over prices than on output. A 338% rise in real Money stock leads to 382% rise in price level where the variation in real output was only 98%.

To have a peroper prospective of linkages of M3 with RNNP and PL, we need to find out the elasticities between these macro variables.

[i] Money and Output

$$RNNP = f[M3] \ldots \ldots \ldots \ldots \ldots \ldots [5.V]$$

$$\log RNNP = \underset{\substack{(50.09) \\ \text{t-value}}}{8.186} + \underset{\substack{(15.75) \\ \text{t-value}}}{0.237} \log M3$$

$$R^2 = 0.93 \qquad DW = 0.57$$

[ii] Money and Prices

$$PL = f[M3] \ldots \ldots \ldots \ldots \ldots [5.VI]$$

$$\log PI = \underset{\substack{(0.209) \\ \text{t-value}}}{0.41} + \underset{\substack{(27.13) \\ \text{t-value}}}{0.499} \log M3$$

$$R^2 = 0.976 \qquad DW = 0.803$$

The responsiveness of change in price to the change in money supply [0.499] is higher than that of RNNP [0.237].

It may be noted that the relationship of Money Supply, Real Income and Prices for same period has little relevancy. In case of monetary variables it takes lesser time for them to adjust in the aggrigate analysis i.e. the effects can be felt in the same year. So monetary aggrigates can be compared with out any time lapse. As against this, it takes more time for the real sector to adjust to the change in monetary sector, hence the data of same year becomes non-comparable. Therefore, to enable the comparision between monetary adjustement and real sector adjustment, some time lapse is essential. Keeping this very fact in view, we have tried to analyse, the lagged effect of output and money supply on the current year prices. In order to study the impact of money supply variation on price level we have taken price level in the year `t´ as a function of previous year´s money supply "t-1" i.e.,

$$PL_t = f [M3_{t-1}] \ldots \ldots \ldots \ldots [5.VII]$$

Similarly, to study the effect of money supply variation on real production, we have

$$RI_t = f ( M3_{t-1} ) \ldots \ldots \ldots [5.VIII]$$

As well, a few more lagged partial adjustment estimates have been worked out. Past year´s price on current year´s production, past year´s price on current price, current year´s price to next year´s production. [ ].

From the regression analysis undertaken, we made following observations, based on the equation 5.VII and 5.VIII in the double log form with M3 in one year lag.

# Graph 5.4

## Money, Output and Prices



Legend:
□ RNP (Real Net National)
+ PI (Price Index)
◇ RMS (Real Money Stock)
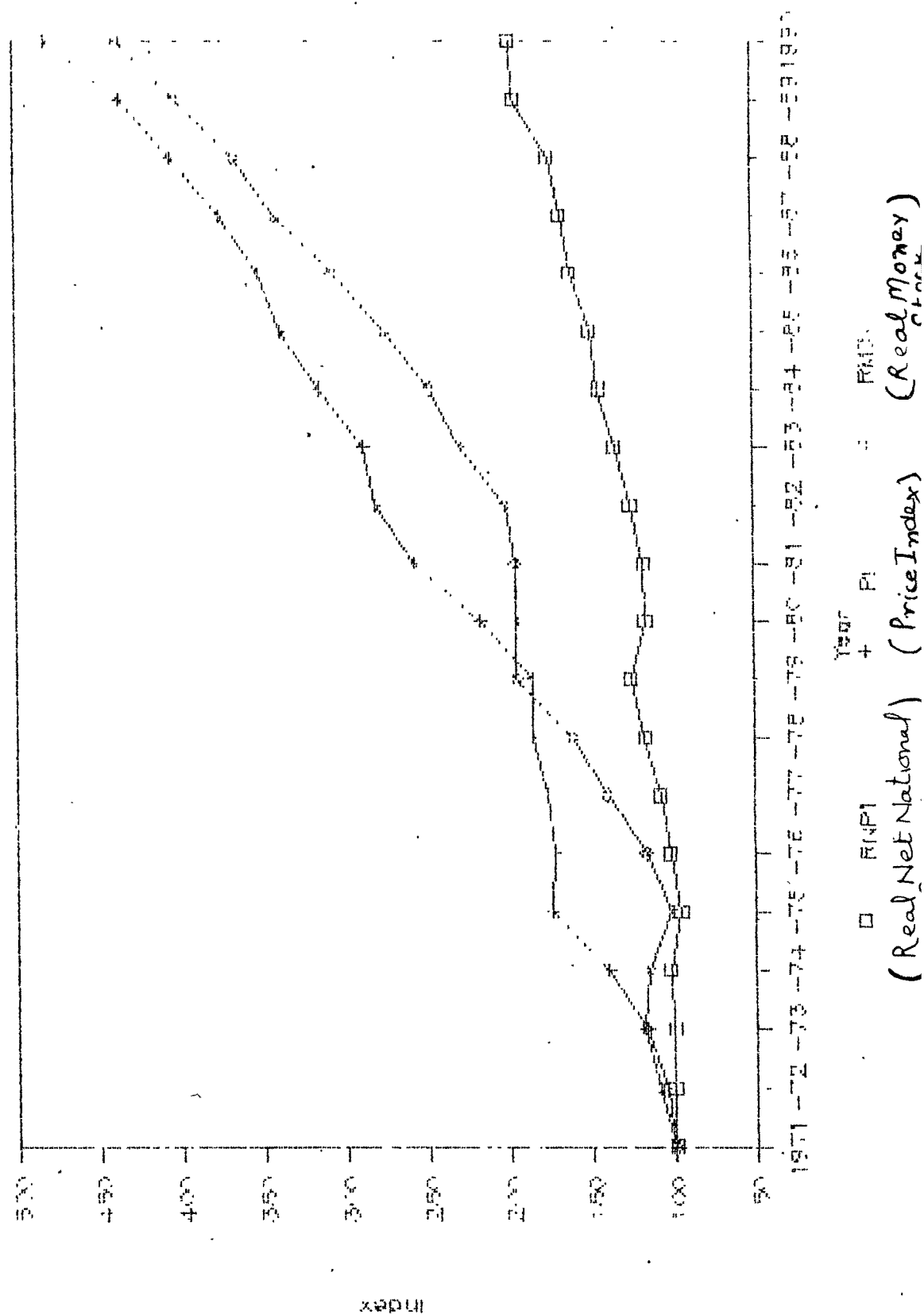
[A].

$$\log \text{RNNP} = 7.996 + 0.258 \log \text{M3}$$
$$(t = 17.06)$$

$$R^2 = .941 \qquad\qquad DW = .641$$


[B].

$$\log \text{PL} = .225 + .490 \log \text{M3}$$
$$(t = 30.145)$$

$$R^2 = .981 \qquad\qquad DW = .795$$


The above estimates show that the responsiveness of price to a given change in M3 in the previous year was higher than the responsiveness in the real output, i.e. 1% change in [M3] in the priod `t´ results into an increase in Real Net National Product in [t + 1] years by .258%, where as the Price rises by .49% [% $\Delta$ PI > % $\Delta$ RNNP]

Further, the relative changes in RNNP and PI with one year lag with [M3/PL] = RM3 [real money stock] reveals that responsivness of RNNP & PL are much more stronger than what it was in terms of nominal money stock [M3] [see graph] 5.4.

$$\text{Log } [\text{RNNP}_t] = f \{\log [\text{RM3}_{t-1}]\} \qquad \log [\text{PL}_t] = f \{\log [\text{RM3}_{t-1}]\}$$

$$\log \text{RNNP} = 8.046 + .511 \log \text{RM3}_{t-1} \qquad \log \text{PL} = .463 + .943 \log \text{RM3}_{t-1}$$
$$(t = 17.696) \qquad\qquad\qquad (t = 15.556)$$
$$R^2 = .946 \quad DW = 1.052 \qquad\qquad R^2 = .931 \quad DW = .596$$


The inducement of increase in Real Money stock over Real Net National product is more favourable, as 1% increase in RM3 in the previous year leads to 0.51% increase in Real Net

National Product in the current year. But, it is not sufficient enough, as percentage increase in RNNP in the current year is less than percentage increase in Real money stock in the past year [% $\Delta$ RNP$_t$ < % $\Delta$ RM3$_{t-1}$ ]. In fact, the lower respon- siveness of output to a given change in money stock even after one year lag leads to an imbalance in the real and monetary sectors adjustmeants, which finally results into price rise. The estimated responsiveness of price with a year's lag to the real money stock is not only positive but relatively very high [.943%].

The above analysis reveals that change in money stock in both nominal and real terms has very strong influence over National Production, Current and Real. The point worth to note here is that, the responsiveness of output to change in Money Supply is not as strong as it should be. Hence, continious eros- sion in the value of money due to high price rise is the experi- ence of the Indian economy in last two decades.

The lagged effect of Real Money Supply over RNNP was slightly better than the corresponding year effect which is evident from the above analysis. The RNNP responsiveness im- proved from .476% to .512% as we move from year to year, to lagged relationship. But, at the some time the experience in terms of price change has not changed much. The price respon- siveness to money supply was 0.951% on year to year basis, while lagged relationship showed a marginal fall to 0.942%.

Undoubtedly, the increase in money supply has a strong positive impact on national output and price level. It is observed that the price effect of increase in money supply is more stronger than the output effect, during the period of our study. Similar views were expressed by many other studies in this regard, which supports our contention.

**NOTE :**

O Rangrajan : Money Output and Prices - A Macro Econometric Model, Economic and Political Weekly, April 21, 1990.

01. Real Net National Product   =   $\dfrac{\text{Net National Product}}{\text{Price Index}}$
      [RNNP]

02. Index of Real Output   =   $\dfrac{\text{RNNP of current Year}}{\text{RNNP of 1970-71}} \times 100$

03. Index of Real Money Stock   =   $\dfrac{\text{Real Money Stock of Current Year}}{\text{Real Money Stock of 1970-71}} \times 100$