CHAPTER - 4

CAUSALITY BETWEEN MONEY FINANCE AND & ECONOMIC GROWTH IN INDIA

This chapter will attempt theoretically and empirically causality between money stock and money income as well as financial development and economic growth in India. A fairly common approach in the field under investigation is to assume that financial development causes economic growth and thus regress real economic activity on some measure of financial development, see for example, Fischer[101], Fry[102], Jao[103], Leff and Sato[104], and Wallich[105], among others. However, this procedure is arbitrary in view of the fact that there is no consensus in the literature about the direction of causality. Does the causation go from financial development to growth or vice-versa ? Or is there a two-way causation ? For an appropriate specification of the simultaneous equation model, identification of this direction of causality is important. Instead of basing judgement on purely qualitative arguments, we examine this question by using the tests of causality developed by (Granger, 1969[106],1973[107]) and their subsequent modification by Sims[108].

Section I attempts to assess statistically causality between monetary assets (M_1 and M_3) and money income in India. Section II attempts to establish direction causation between financial growth (proxied by financial issues, credit to agriculture and credit to industrial) and gross domestic product (aggregate agricultural as well as industrial).

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[101] Fisher, B. (1981) : 'Interest Rate Ceilings, Inflation and Economic Growth in Developing Countries', Economics.

[102] Fry, M.J. (Sept., 1982) : 'Models of Financially Repressed Developing Economies', World Development.

[103] Jao, Y.C. (April, 1976) : 'Financial Deepening and Economic Growth : A Cross-Section Analysis', The Malayan Economic Review.

[104] Leff, N.H. and K. Sato (Dec., 1975) : 'A Simultaneous-Equations Model of Savings in Developing Countries', Journal of Political Economy.

[105] Wallich, H.C. (May, 1969) : 'Money and Growth : A Cross-Country-Section Analysis', Journal of Money, Credit and Banking.

[106] Granger, C.W.J. (July, 1969) : 'Investigating Causal Relations by Economic Models and Cross-Section Methods', Econometrica, pp. 424-38.

[107] Granger, C.W.J. (July, 1973) : 'Causality, Model Building and Control : Some Comments', presented at the IFAC/IFORS International Conference on Dynamic Modelling and Control.

[108] Sims, C. (Sept., 1972) : 'Money, Income and Causality', American Economic Review, B2, pp.542-52.

4.1 Empirical Tests of Causality between Money Stock both (M_1 & M_3) and Money Income, in India.

Tests for causality :

Economic theory is ambiguous as to whether money causes income or vice-versa, or whether there is a two-way causation. Empirical tests have been designed to render help in such situations. The most popular ones are those given by Granger(1969)[109] and Sims[110].

The Granger tests involves fitting the following two equations :

$$Y_t = \alpha + \sum_{i=1}^{K_1} b_i Y_{t-i} + \sum_{i=1}^{K_2} c_i M_{t-i} \quad ...(1)$$

$$M_t = ß + \sum_{i=1}^{K_2} d_i Y_{t-i} + \sum_{i=1}^{K1} r_i Y_{t-i} \quad ...(1)$$

where α, $ß_i$, c_i, d_i, b_i, r_i are parameters to be estimated and Y and M are the variables between which the direction of causality is under testing. According to the test, unidirectional causation from M to Y is implied if the coefficient r_i's as a group in equation 2 are insignificant while the coefficients c_i's as a group in equation 1 are significant. The conclusion would be reversed.

(i.e. Y causes M) if the findings on significance are the opposite. The two way causation (feedback) is implied if both these coefficients' groups are significant and no causation is established if neither of these two coefficients as a group is significant. The significance of a group of coefficient could be tested through the F-test (Gujarati 1978)[111]. For example, to test the significance of the coefficient of y variables (i.e. b's) as a group in equation 1, compute the F-statistic as follows :

$$F \begin{matrix} k_1 \\ n - k_1 - k_2 - 1 \end{matrix} = \frac{(Q_2 - Q_1)/k_1}{Q_3/n - k_1 - k_2 - 1} \quad .....(3)$$

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[109] Granger, C.W.J. (July, 1969) : op. cit.,

[110] Sims, C. (Sept., 1972) : op. cit.,

[111] Damodar N. Gujarati (1978) : Basic Econometrics McGraw-Hill International edition, New York.

where Q_1 = explained sum of squares by the variant of 1 equation which includes all Y variables but none of the M variables as regressors.

Q_2 = explained sum of squares by equation 1

Q_3 = residual sum of squares of equation 1

K_1 = number of M variables in equation 1

K_2 = number of Y variables in equation 2

n = number of observations used in estimating equation 1

Equations (1) & (2) were estimated not on the levels of the variables but on their first differences. This was because the tests require that the values of the variables should exhibit the properties of stationarity, i.e. their means and variances should be invariant over time.

4.2 Causality between Money stock (M_1 and M_3) and Money income in India

Money stock is a policy variable which affects bothe the price level and real income; In flex-price models, real income is assumed to be fixed (Classical case); and in fix price models, real income is variable (Keynesian case). It is difficult to separate influence of money on real income and price level and therefore, influence of money stock on money income has to be statistically assessed. The causation tests were applied to examine the causality direction between Money stock (both M_1 and M_3) and Money income proxied by GNP at current prices in India. We first report the estimated equations :

(Estimated equations in the context of Granger test)

(I)

$M1_t = f$ (3 past $M1_t$, Y_t and 3 past Y_t)

$M1_t = f(M1_{t-1}, M1_{t-2}, M1_{t-3}, Y_t, Y_{t-1}, Y_{t-2}, Y_{t-3})$

$M1_t = f(18.69+0.156M1_{t-1}+338M1_{t-2}-0.494M1_{t-3}+205Y_t+0.338Y_{t-1}+0.576Y_{t-2}+0.881Y_{t-3})$

(0.135) (1.56) (2.88) (-0.40) (0.99) (1.20) (2.22) (3.17)

$R = 0.925$

$R^2 = 0.856$

$R = 0.80$

D.W. = 1.76

(II)

$M1_t = f(3 \text{ past } M1_t)$

$M1_t = f(M1_{t-1}, M1_{t-2}, M1_{t-3})$

$M1_t = f(291.17+299M1_{t-1}+601M1_{t-2}+0.555M1_{t-3})$

(1.70) (2.31) (5.18) (0.465)

$R = 0.818$

$R^2 = 0.669$

$R = 0.629$

D.W. = 1.22

(III)

$Y_t = f$ ($M1_t$, 3 past $M1_t$ and 3 past Y_t)

$Y_t = f$ ($M1_t, M1_{t-1}, M1_{t-2}, M1_{t-3}, Y_t, Y_{t-1}, Y_{t-2}, Y_{t-3}$)

$Y_t = f$ $(965+2.19M1_t-0.733M1_{t-1}+306M1_{t-2}-1.56M1_{t-3}-.506Y_{t-1}+0.355Y_{t-2}+0.285Y_{t-3})$

(0.68) (0.99) (0.68) (2.4) (-1.28) (-1.82) (1.23) (0.83)

$R = 0.87$

$R^2 = 0.76$

$R = 0.69$

D.W. = 1.78

(IV)

$Y_t = f$ (3 past Y_t)

$Y_t = f$ ($Y_{t-1}, Y_{t-2}, Y_{t-3}$)

$Y_t = f$ $(2022.54+.539,Y_{t-1}+5.26\ Y_{t-2}-2.72\ Y_{t-3})$

(1.18) (0.455) (5.56) (-2.50)

$R = 0.763$

$R^2 = 0.582$

$R = 0.532$

D.W. = 1.60

(V)

$M3_t = f$ (3 past $M3_t$, Y_t and 3 past Y_t)

$M3_t = f (M3_{t-1}, M3_{t-2}, M3_{t-3}, Y_{t-1}, Y_{t-2}, Y_{t-3})$

$M3_t = f (-65.87+0.738M3_{t-1}+0.483M3_{t-2}-0.369M3_{t-3}+0.423Y_t-0.468Y_{t-1}+0.678Y_{t-2}+0.737Y_{t-3})$

(-0.397) . (3.48) (1.34) (-1.20) (1.75) (-0.151) (1.87) (1.97)

$R = 0.985$

$R^2 = 0.972$

$R = 0.962$

D.W. = 2.14

(VI)

$M3_t = f$ (3 past $M3_t$)

$M3_t = f (M3_{t-1}, M3_{t-2}, M3_{t-3})$

$M3_t = f (157.95+0.472M3_{t-1}+0.998M3_{t-2}-0.350M3_{t-3})$

(0.908) (2.26) (3.19) (-1.07)

$R = 0.973$

$R^2 = 0.947$

$R = 0.941$

D.W. = 1.76

(VII)

$Y_t = f$ ($M3_t$, 3 past $M3_t$ and 3 past Y_t)

$Y_t = f (M3_t, M3_{t-1}, M3_{t-2}, M3_{t-3}, Y_t, Y_{t-1}, Y_{t-2}, Y_{t-3})$

$Y_t = f (1880+3.01M1_t3-5.12M3_{t-1}+7.14M3_{t-2}-3-3.78M3_{t-3}-0.547Y_{t-1}-0.562Y_{t-2}+0247Y_{t-3})$

(0.135) (1.56) (2.88) (-0.40) (0.996) (1.20) (2.22) (3.17)

$R = 0.925$

$R^2 = 0.856$

$R = 0.808$

D.W. = 1.76

(VIII)

$Y_t = f$ (3 past Y_t)

$Y_t = f\ (Y_{t-1}, Y_{t-2}, Y_{t-3})$

$Y_t = f\ (2022.54+0.539\ Y_{t-1}+5.26\ Y_{t-2}-2.72\ Y_{t-3})$

(1.18) (0.455) (5.56) (-2.50)

$R = 0.763$

$R^2 = 0.582$

$R = 0.532$

D.W. = 1.60

Estimated Equations in the context of Sims test :

(I)

$M1_t = f\ (Y_t$,3 past Y_t and 3 future $Y_t)$

$M1_t = f\ (Y_t, Y_{t-1}, Y_{t-2}, Y_{t-3}, Y_{t+1}, Y_{t+2}, Y_{t+3})$

$M1_t = f\ (49.68+0.586Y_t+0.531Y_{t-1}+0.51Y_{t-2}+0.749Y_{t-3}+0.138Y_{t+1}+0.233Y_{t+2}-0.899Y_{t+3})$

(0.326) (3.29) (2.00) (1.63) (2.28) (1.04) (1.777) (-0.653)

$R = 0.906$

$R^2 = 0.821$

$R = 0.761$

D.W. = 0.97

(II)

$M1_t = f\ (Y_t$,3 past $Y_t)$

$M1_t = f\ (Y_t, Y_{t-1}, Y_{t-2}, Y_{t-3})$

$M1_t = f\ (48.50+0.589Y_t+0.685Y_{t-1}+0.715Y_{t-2}+0.873Y_{t-3})$

(0.307) (3.57) (2.81) (2.17) (2.83)

$R = 0.882$

$R^2 = 0.778$

$R = 0.741$

D.W. = 1.37

(III)

$Y_t = f(M1_t$, 3 past $M1_t$ and 3 past $M1_t)$

$Y_t = f(M1_t, M1_{t-1}, M1_{t-2}, M1_{t-3}, M1_{t+1}, M1_{t+2}, M1_{t+3})$

$Y_t = f(-311.42-0.745M1_{t-1}.0.189M1_{t-1}+5.33M1_{t-2}-3.71M1_{t-3}+3.33M1_{t+1}$ to $.484M1_{t+2}+0.538M1_{t+3})$

(-0278) (-0.443) (-1.34) (4.63) (-4.61) (3.69) (0.748) (0.790)

$R = 0.918$

$R^2 = 0.843$

$R = 0.791$

D.W. = 2.44

(IV)

$Y_t = f(M1_t$, 3 past $M1_t)$

$Y_t = f(M1_t, M1_{t-1}, M1_{t-2}, M1_{t-3})$

$Y_t = f(574.39+4.38M1_t-0.773M1_{t-1}+2.62M1_{t-2}-2.96M1_{t-3})$

(0.389) (2.88) (-0.662) (2.02) (-3.02)

$R = 0.823$

$R^2 = 0.678$

$R = 0.625$

D.W. = 2.12

TABLE : 4.1

Regression Results for causality Test between Money and Money income in India.

Granger Test

Equation No.	Sample Period	Depedent Variable	Independent variables	ESS (Explained Sum of Squares)	Rss (Residual Sum of Squares)
1	1951-52 to 1991-92	$M1_t$	3 past values of $M1_t$, Gnp_t and 3 past Gnp_t	29000300 (7)	7069736 (29)
2	1951-52 to 1991-92	$M1_t$	3 past values of $M1_t$	22684000 (3)	11192000 (33)
3	1951-52 to 1991-92	GNP_t	M1t, 3 past $M1_t$,	1721570000 (7)	752490700 (29)
4	1951-52 to 1991-92	GNP_t	3 Past GNP_t	1093370000 (3)	1146860000 (33)
5	1951-52 to 1991-92	$M3_t$	3 Past M3t, GNP_t, 3 Past GNPt	239438000 (7)	6573940 (29)
6	1951-52 to 1991-92	$M3_t$	3 Past $M3_t$	178960000 (3)	67346800 (33)
7	1951-52 to 1991-92	GNP_t	3 Past GNPt, $M3_t$, 3 Past M3t	1752360000 (7)	707804000 (29)
8	1951-52 to 1991-92	GNP_t	3 Past GNP_t	1093370000 (3)	1146860000 (33)

The Figures in brackets in column 5 and 6 indicate respective degrees of freedom.

TABLE - 4.2

F. Statistic for Causality Test

Granger Test

Money stock and GNP (1951-52 to 1991-92)

Equation No.	F. Values (Calculated)	Degrees of freedom		Result
		Numerator	Denominator	
1 & 2	8.63	3	29	GNP Causes M_1
3 & 4	8.07	3	29	M_1 Causes GNP
5 & 6	8.89	3	29	GNP Cuases M_3
7 & 8	9.00	3	29	M_3 Causes GNP

Source : Table 4.1

* F value of 8.63 was obtained as follows :

$$F = \frac{29000300-22684000/3}{7069736/29} = \frac{2105433.3}{243784} = 8.63$$

As clearly brought out - by Tables 4.1, and 4.2 the causality between money stock and money income has turned out to be bi-directional using either the Granger test (Table 4.2; equations 1 & 2). In all the reported empirical results, F values have been found to be significant, at 1% level and thus strongly indicate that money stock and money income are endogenous to each other.

Interesting enough, the effects of money income on money stock and that of money stock on money income seem to extend upto one or two years. This observed lag structure seem to be consistent with the theoretical implications of the asset approach to the balance of payments since the money supply affects nominal GNP and/or national income in the short run (in one or two years in evidence) while GNP or NI effects the money supply in the long run (in two years in evidence) under the fixed exchange rate regime.

This bi-directional causality between money stock and money income seem to be partly due to the policy of deficit financing in India. Owing to the deficit financing, changes in money supply have increasingly become dependent upon the budget deficits. In view of the substantial magnitude of deficit financing and functional dependence of money stock on budgetary policy implies that money stock is endogenised. Furthermore, a fixed exchange rate system in which one country serves as the reserve currency country has important asymmetrical properties. Indeed, only the reserve currency country can control its money supply. From this, several implications concerning direction of causality follow. Control of money supply results in the ability to influence price level and thus nominal income in the reserve currency country. These changes in price and nominal income in the reserve currency country will simultaneously affect condition in world market. Individuals in other countries reacting to these changes, adjust their portfolios. This adjustment process prompts simultaneous changes in prices, nominal income and the money stock in non-reserve currency countries. It is also interesting to note that in so far as the authorities primarily aim to regulate structure of interest rates, movements in money stock can be expected to respond to movements in nominal income. Besides, GNP or nominal income can be a cause of the money supply in a reverse direction if monetary policy is conducted so as to stabilize the rate of change in GNP, reducing the rate of change in the money supply when GNP grows too fast and increasing it when GNP slows down. All this is to emphasize that the observed empirical evidence for causality is justified and is consistent with prevalent features of Indian economy. The major implication is that form and direction of causal relationship do depend on the institutional context and that Granger's results do not have general validity.

4.3 Implications for Monetary Policy

The objective of this chapter has been to examine the substantive question whether there is statistical evidence that money is "Exogenous" in some sense in the money income relationship for the Indian Economy. The evidence from this exercise strongly suggests that the money supply changes do not seem to be independent of nominal income changes and hence denies the existence of unidirectional causality from money stock to money income. Existence of feedback clearly suggests that money and income are simultaneously determined. This also implies that neither money nor money income can be treated as strictly exogenous in their distributed lag regressions and failure to do so would lead to spurious statistical relationships and would render the estimated coefficients an ambiguous interpretation.

More importantly, the study contends that the studies of the simple statistical relationship between movements in money stock and in money incomes can by themselves provide very little information about the strength of monetary policy. The statistical relationship could be quite close, but this might reflect to a very large extent the accommodation of movements in the money supply to autonomous changes in money incomes (given the authorities policy aims and operational techniques). If the authorities make an abrupt change in their operations, the established relationship or regularities might cease to apply. In such situation, attempts to measure the effects of monetary policy by correlating changes in the money stock with changes in money incomes probably greatly overestimate the strength of monetary policy. The overestimation occurs owing to the existence of a two-way relationship between money stock and money income.

Our results of a bi-directional causality between money stock and money incomes could be rationalized by three major reasons : it is probable that in an attempt to peg the interest rates on financial assets, the Reserve Bank has allowed the money supply to vary in order to offset changes in the demand for money as income varied. In this context, the money supply ceases to be exogenous and correlation between M and Y represents a possible direction of causation from Y to M. Secondly the Indian Economy being an open economy, the money supply can easily be altered by substantial changes in the flow funds from abroad (short run monetary movements). To the extent that greater capital inflows are attracted during times of high income and demand for money, which raise the rate of interest, a correlation between changes in M and changes in income will be observed which is not indicative of monetary changes causing the level of income. Thirdly, due to the policy of large scale deficit financing, changes in money supply have increasingly been dependent upon the budget deficit. In view of the substantial magnitude of deficit financing it would be very difficult to discriminate between the effects of the changes in nominal stock of money and the changes in autonomous expenditure. The functional dependence of money stock on budgetary policy necessitates a model in which nominal stock of money is also endogenised. However, more important is the fact that the actions of the authorities in financial markets which will directly affect the money supply, will usually be strongly influenced by current and expected future developments in the economy and any attempts to disentangle this two way interaction by considering the lead/lag relationship reinforce the view that the monetary policy has some causal impact on money income, but do not allow this to be clearly isolated and quantified.

We reiterate our conclusion on an alternative interpretation that with the existence of bi-directional causality, money stock as well as money income contain an efficient assessment of each other in as much as that movements of money (or money income) provide advance information to the movements, of money income (money stock). In this sense predictable movements of money stock cause movements in money income or other way round.

4.4 Finance and Economic Growth

In order to discuss the controversy in the literature as to the direction of causality between financial development and Economic growth, we use some of concepts introduced by Patrick[112]. He distinguishes between supply leading and demand following financial development. We may term as "demand-following" the phenomenon in which the creation of modern financial institutions, their financial assets and liabilities, and related financial services is in response to the demand for these services by investors and savers in the real economy. In this case, the evolutionary development of the financial system is a continuing consequence of the pervasive, sweeping process of economic development. The emerging financial system is shaped both by changes in objective opportunities-the economic environment, the institutional framework-and by changes in subjective responses-individual motivations, attitudes, tastes, preferences.

The nature of the demand for financial services depends upon the growth of real output and upon the commercialization and monetization of agriculture and other traditional subsistence sectors. The more rapid the growth rate of real national income, the greater will be the demand by enterprises for external funds (the saving of others) and therefore financial intermediation, since under most circumstances firms will be less able to finance expansion from internally generated depreciation allowances and retained profits. (The proportion of external funds in the total source of enterprise funds will rise.) For the same reason, with a given aggregate growth rate, the greater the variance in the growth rates among different sectors of industries, the greater will be the need for financial intermediation to transfer saving to fast-growing industries from slow-growing industries and from individuals. The financial system can thus support and sustain the leading sectors in the process of growth.

[112] Patrick, H.T. (Jan., 1966) : 'Financial Development and Economic Growth in Underdeveloped Countries', Economic Development and Cultural Change.

The demand-following supply response of the growing financial system is presumed to come about more or less automatically. It is assumed that the supply of entrepreneurship in the financial sector is highly elastic relative to the growing opportunities for profit from provision of financial services, so that the number and diversity of types of financial institutions expands sufficiently; and a favorable legal, institutional, and economic environment exists. The government's attitudes, economic goals, and economic policies, as well as the size and rate of increase of the government debt, are of course important influences in any economy on the nature of the economic environment. As a consequence of real economic growth, financial markets develop, widen, and become more perfect, thus increasing the opportunities for acquiring liquidity and for reducing risk, which in turn feeds back as a stimulant to real growth. (Lewis Arthur, 1955)[113].

In the Supply-leading case, "The creation of financial institutions and the supply of their financial assets, liabilities, and related financial services is in advance of demand for them, especially the demand of entrepreneurs in the modern, growth-inducing sectors"[114]. Supply-leading phenomenon thus represents a situation in which financial development causes economic growth-just the reverse of the demand-following phenomenon.

"Supply-leading" has two functions: to transfer resources from traditional (non-growth) sectors to modern sectors[115], and to promote and stimulate an entrepreneurial response in these modern sectors. Financial intermediation which transfers resources from traditional sectors, whether by collecting wealth and saving from those sectors in exchange for its deposits and other financial liabilities, or by credit creation and forced saving, is akin to the Schumpeterian concept of innovation financing.

New access to such supply-leading funds may in itself have substantial, favorable expectational and psychological effects on entrepreneurs. It opens new horizons as to possible alternatives, enabling the entrepreneur to "think big". This may be the most significant effect of

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[113] W. Arthur Lewis (1955) : The Theory of Economic Growth. (London : George Allen and Unwin) pp.267-86

[114] Patrick, H.T. (Jan., 1966) : Op. cit. pp. 175.

[115] The difference between traditional and modern sectors is that the former are dominated by elements (attitudes, forms of economic organization, production technology) inherited from the pre-modern economy, whereas modern sectors are dominated by internationally modern technology, rationality (maximization behaviour and attitudes) and modern institutions and other forms of economic organization. See, for example, K. Ohkawa and H. Rosovsky, "A century of Japanese Economic Growth", in W.W. Lockwood, ed., *The State and Economic Enterprise in Modern Japan* (Princeton : Princeton University Press, forthcoming).

all, particularly in countries where entrepreneurship is a major constraint on development. Moreover, as has been emphasized by Rondo Comeron(1963)[116], the top management of financial institutions may also serve as entrepreneurs in industrial enterprises. They assist in the establishment of firms in new industries or in the merger of firms (the advantages of economies of scale may be more than offset by the establishment of restrictive cartels or monopolies, however), not only by underwriting a substantial portion of the capital, but more importantly by assuming the entrepreneurial initiative.

By its very nature, a supply-leading financial system initially may not be able to operate profitably by lending to the nascent modern sectors. There are, however, several ways in which new financial institutions can be made viable. First, they may be government institutions, using government capital and perhaps receiving direct government subsidies. This is exemplified not only by Russian experience in the latter half of the nineteenth century, but by many underdeveloped countries today. Second, private financial institutions may receive direct or indirect government subsidies, usually the latter. Indirect subsidies can be provided in numerous ways. Commercial banks may have the right to issue banknotes under favorable collateral conditions; this technique was more important in the eighteenth and nineteenth centuries (national banking in Japan in the 1870's; and the same in the United States) than it is likely to be in present underdeveloped countries, where this right is reserved for the central bank or treasury. Nonetheless, modern equivalents exist. They include allowing private financial institution to create deposit money with low (theoretically, even negative) reserve requirements and central bank rediscount of commercial bank loans at interest rates effectively below those on the loans. Third, new, modern financial institutions may initially lend a large proportion of their funds to traditional (agricultural and commercial) sectors profitably, gradually shifting their loan portfolio to modern industries as these begin to emerge. This more closely resembles the demand-following phenomenon; whether such a financial institution is supply-leading depends mainly on its attitude in searching out and encouraging new ventures of a modern nature.

It cannot be said that supply-leading finance is a necessary condition or precondition for inaugurating self-sustained economic development. Rather, it presents an opportunity to induce real growth by financial means. It thus is likely to play a more significant role at the beginning of

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[116] Rondo Cameron, (Fall 1963) : "The Bank as Entrepreneur", *Explorations in Entrepreneurial History*, Series 2, I, No. 1, pp. 50-55.

the growth process than later. Gerschenkron (1962)[117] implies that the more backward the economy relative to others in the same time period (and the greater the forced-draft nature of the economic development effort), the greater the emphasis which is placed on what we here term supply-leading finance. At the same time, it should be recognized that the supply-leading approach to development of a country's financial system also has its dangers, and they should not be underestimated. The use of resources, especially enterpreneurial talents and managerial skills, and the costs of explicit or implicit subsidies in supply-leading development must produce sufficient benefits in the form of stimulating real economic development for this approach to be justified.

In actual practice, there is likely to be an interaction of supply-leading and demand following phenomena. Nevertheless, the following sequence may be postulated. Before sustained modern industrial growth gets underway, supply-leading may be able to induce real innovation-type investment. As the process of real growth occurs, the supply-leading impetus gradually becomes less important, and the demand-following financial response becomes dominant. This sequential process is also likely to occur within and among specific industries or sectors. One industry may initially be encouraged financially on a supply-leading basis and as it develops have its financing shift to demand-following, while another industry remains in the supply-leading phase. This would be related to the timing of the sequential development of industries, particularly in cases where the timing is determined more by governmental policy than by private demand forces.

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[117] Alexander Gerschenkron, (1962) : *Economic Backwardness in Historical Perspective-A Book of Essays* (Canbridge : Harvard University Press) p. 363, See also Ch.4.

Estimated Equations For Causality Tests Between

Financial development and Economic Growth

1. $GDP_t = f(GDP_{t-1}, GDP_{t-2}, GDP_{t-3}, FI_t, FI_{t-1}, FI_{t-2}, FI_{t-3})$

$GDP_t = 4517-0.51GDP_{t-1}-0.22GDP_{t-2}-0.013GDP_{t-3}+0.39FI_t+0.93FI_{t-1}+0.41FI_{t-2}-0.18FI_{t-3}$

(-2.56) (-1.04) (-.07) (2.63) (5.05) (1.68) (-.81)

$R^2 = 0.75$

$R^2 = 0.46$

Standard Error = 3202

2. $GDP_t = f(GDP_{t-1}, GDP_{t-2}, GDP_{t-3})$

$GDP_t = 2098.6 + 0.05GDP_{t-1} + 0.24GDP_{t-2} + 0.27GDP_{t-3}$

(0.31) (1.42) (1.48)

$R^2 = 0.16$

$R^2 = 0.08$

Standard Error = 4212

3. $FI_t = f(FI_{t-1}, FI_{t-2}, FI_{t-3}, GDP_t, GDP_{t-1}, GDP_{t-2}, GDP_{t-3})$

$FI_t = -2665-0.72FI_{t-1}+0.01FI_{t-2}+0.49FI_{t-3}+0.48GDP_t+0.54GDP_{t-1}+0.21GDP_{t-2}+0.04GDP_{t-3}$

(-2.95) (0.04) (2.09) (2.63) (2.40) (0.87) (0.23)

$R^2 = 0.59$

$R^2 = 0.49$

Standard Error = 3557

4. $FI_t = f(FI_{t-1}, FI_{t-2}, FI_{t-3})$

$FI_t = 767-0.19FI_{t-1}+0.53FI_{t-2}+0.64FI_{t-3}$

(-1.13) (3.29) (3.44)

$R^2 = 0.45$

$R^2 = 0.40$

Standard Error = 3862

5. $GDP_t = f(GDP_{t-1}, GDP_{t-2}, GDP_{t-3}, FI_t, FI_{t-1}, FI_{t-2}, FI_{t-3})$

$GDP_t = 1354-0.61GDP_{t-1}-0.39GDP_{t-2}- 0.5GDP_{t-3}+0.18FI_t+0.35FI_{t-1}-0.03FI_{t-2}-0.2FI_{t-3}$

(-3.33) (-1.92) (-0.25) (1.63) (3.29) (-0.26) (-1.47)

$R^2 = 0.44$

$R^2 = 0.31$

Standard Error = 2292

6. $GDPAgri = f(GDPAgri_{t-1}, GDPAgri_{t-2}, GDPAgri_{t-3})$

$GDPAgri = 1763-0.45GDPAgri_{t-1}-0.32GDPAgri_{t-2}-0.013GDPAgri_{t-3}$

(-2.57) (-1.78) (-0.077)

$R^2 = 0.20$

$R^2 = 0.13$

Standard Error = 2576

7. $FI_t = f(FI_{t-1}, FI_{t-2}, FI_{t-3}, GDPAgri_t, GDPAgri_{t-1}, GDPAgri_{t-2}, GDPAgri_{t-3})$

$FI_t = 872-0.29FI_{t-1}+0.63FI_{t-2}+0.81FI_{t-3}+0.46GDPA_t+0.05GDPA_{t-1}-0.36GDPA_{t-2}-0.46GDPA_{t-3}$

(-1.54) (3.55) (4.24) (1.63) (0.14) (-1.04) (-1.60)

$R^2 = 0.56$

$R^2 = 0.45$

Standard Error = 3684

8. $GDPA_t = f(GDPA_{t-1}, GDPA_{t-2}, GDPA_{t-3}, WAgri_t, WAgri_{t-1}, WAgri_{t-2}, WAgri_{t-3})$

$GDPA_t = 1169-0.71GDPA_{t-1}-0.33GDPA_{t-2}+0.03GDPA_{t-3}+2.88WA_t+1.87WA_{t-1}-1.76WA_{t-2}-2.0WA_{t-3}$

(-3.78) (-1.66) (0.20) (2.85) (2.04) (-1.28) (-0.95)

$R^2 = 0.47$

$R^2 = 0.34$

Standard Error = 2228

9. WCrA. =f(WCrAt-1, WCrA.t-2, WCrA.t-3, WA.GDP, WA.GDPt-1, WA.GDPt-2, WA.GDPt-3)

$$WCrA = -13.61-0.21WCrA._{t-1}+0.14WCrA._{t-2}+1.11WCrA._{t-3}+0.07WA.GDP+0.09WA.GDP_{t-1}$$

(-1.39) (0.61) (4.04) (2.85) (2.73)

$$+0.014WA.GDP_{t-2}-0.03WA.GDP_{t-3}$$

(0.42) (-0.97)

$R^2 = 0.89$

$R^2 = 0.87$

Standard Error = 211

10. WCrA. = f($WCreditAgri_{t-1}$, $WCreditAgri_{t-2}$, $WCreditAgri_{t-3}$)

$$WCrA. = 96.72+0.06WCrA._{t-1}-0.03WCrA._{t-2}+1.09WCrA._{t-1}$$

(0.42) (-0.03) (4.11)

$R^2 = 0.71$

$R^2 = 0.69$

Standard Error = 417

11. GDPAt = f($GDPA_{t-1}$, $GDPA_{t-2}$, $GDPA_{t-3}$, $AgriCr_t$, $AgriCr_{t-1}$,$AgriCr_{t-2}$, $AgriCr_{t-3}$)

$$GDPA_t = 1487-0.65GDPA_{t-1}-0.22GDPA_{t-2}+0.23GDPA_{t-3}-0.33AgriCr_t-2.55AgriCr_{t-1}$$

(-3.43) (-0.97) (1.07) (-0.36) (-2.16)

$$-2.02AgriCr_{t-2}+6.82AgriCr_{t-3}$$

(-1.97) (2.60)

$R^2 = 0.42$

$R^2 = 0.28$

Standard Error = 2331

(Total Credit to Agri ⟶ TCtA)

12. TCtA = f(3 Past TCtA, Agri GDP, 3 Past Agri GDP)

$TCtA = 38.12-0.11TCtA_{t-1}+0.11TCtA_{t-2}+1.61TCtA_{t-3}-0.01AgriGDP+0.07AgriGDP_{t-1}$

(-0.43) (0.53) (3.18) (-0.36) (1.66)

$+0.07AgriGDP_{t-2}+0.06AgriGDP_{t-3}$

(1.65) (1.42)

$R^2 = 0.99$

$R^2 = 0.99$

Standard Error = 473

13. CreditAgrit = f($CreditAgri_{t-1}$, $CreditAgri_{t-2}$, $CreditAgri_{t-3}$)

$CreditAgrit = 167+0.02CreditAgri_{t-1}+0.11CreditAgri_{t-2}+1.46CreditAgri_{t-3}$

(0.12) (0.64) (4.44)

$R^2 = 0.99$

$R^2 = 0.99$

Standard Error = 492

14. GDPIndt = f($GDPInd_{t-1}$, $GDPInd_{t-2}$, $GDPInd_{t-3}$, $CrInd_t$, $CrInd_{t-1}$, $CrInd_{t-2}$, $CrInd_{t-3}$)

$GDPIndt = 1337-0.42GDPInd_{t-1}-0.11GDPInd_{t-2}-0.11GDPInd_{t-3}+2.85CrInd_t$

(9.60)

$-0.76CrInd_{t-1}-2.10CrInd_{t-2}-0.18CrInd_{t-3}$

(-1.12) (-3.51) (-0.25)

$R^2 = 0.82$

$R^2 = 0.77$

Standard Error = 1275

15. $GDPInd_t$ = f($GDPInd_{t-1}$, $GDPInd_{t-2}$, $GDPInd_{t-3}$,)

$GDPInd_t = 1947-0.28GDPInd_{t-1}-0.12GDPInd_{t-2}-0.19GDPInd_{t-3}$

(-1.62) (-0.68) (-0.98)

$R^2 = 0.09$

$R^2 = 0.01$

Standard Error = 2697

16. Credit to Ind = f(3 Past CrInd Ind GDP, 3 Past Ind GDP)

$$\text{Credit to Ind} = -220+0.45\text{CrInd}_{t-1}+0.74\text{CrInd}_{t-2}-0.07\text{CrInd}_{t-3}+0.26\text{IndGDP}$$

(2.34) (4.41) (-0.36) (9.6)

$$+0.06\text{IndGDP}_{t-1}-0.02\text{IndGDP}_{t-2}-0.02\text{IndGDP}_{t-3}$$

(1.01) (-0.38) (-0.28)

$R^2 = 0.97$

$R^2 = 0.96$

Standard Error = 389.3

17. CreInd = f(CreInd_{t-1}, CreInd_{t-2}, CreInd_{t-3})

$$\text{CreInd} = 149+0.57\text{CreInd}_{t-1}+0.64\text{CreInd}_{t-2}-0.15\text{CreInd}_{t-3}$$

(3.28) (3.51) (-0.76)

$R^2 = 0.85$

$R^2 = 0.83$

Standard Error = 819

18. $\text{GDP}_t = (\text{TI}+\text{TI}_{t-1}+\text{TI}_{t-2}+\text{TI}_{t-3}+\text{GDP}_{t-1}+\text{GDP}_{t-2}+\text{GDP}_{t-3})$

$$\text{GDP}_t = 2843+0.044\text{TI}+0.13\text{TI}_{t-1}-0.065\text{TI}_{t-2}+0.087\text{TI}_{t-3}$$

(1.85) (0.59) (1.6) (-0.79) (0.65)

$$+0.004\text{GDP}_{t-1}-0.053\text{GDP}_{t-2}+0.24\text{GDP}_{t-3}$$

(0.018) (-.20) (1.04)

$R^2 = 0.29$

$R^2 = 0.12$

19. $\text{TI} = (\text{TI}_{t-1}+\text{TI}_{t-2}+\text{TI}_{t-3})$

$$\text{TI} = 1575-0.004\text{TI}_{t-1}+0.58\text{TI}_{t-2}+0.73\text{TI}_{t-3}$$

(0.70)(-0.03) (3.73) (2.22)

$R^2 = 0.36$

$R^2 = 0.31$

20. $TI = (TI_{t-1}+TI_{t-2}+TI_{t-3}+GDP+GDP_{t-1}+GDP_{t-2}+GDP_{t-3})$

$TI = -8291.60-0.35TI_{t-1}+0.18TI_{t-2}+0.19TI_{t-3}+0.26GDP$

(-2.24) (-1.8) (0.94) (0.59) (0.59)

$+1.56GDP_{t-1}+1.32GDP_{t-2}+0.27GDP_{t-3}$

(3.3) (2.27) (0.47)

$R^2 = 0.58$

$R^2 = 0.48$

21. $GDP^A = (TI+TI_{t-1}+TI_{t-2}+TI_{t-3}+GDPA_{t-1}+GDPA_{t-2}+GDPA_{t-3})$

$GDP^A = 1704+0.039TI_t+0.051TI_{t-1}-0.04TI_{t-2}+0.05TI_{t-3}$

(2.7) (0.93) (1.26) (-79) (0.58)

$-0.56GDPA_{t-1}-0.53GDPA_{t-2}-0.06GDPA_{t-3}$

(-2.7) (-2.4) (-0.29)

$R^2 = 0.30$

$R^2 = 0.14$

22. $TI = (TI_{t-1}+TI_{t-2}+TI_{t-3}+GDPA_t+GDPA_{t-1}+GDPA_{t-2}+GDPA_{t-3})$

$TI = -1982-0.095TI_{t-1}+0.57TI_{t-2}+0.62TI_{t-3}$

(-0.67)(-0.53) (3.4) (1.9)

$+0.73GDPA_t+2.17GDPA_{t-1}-1.42GDPA_{t-2}-0.066GDPA_{t-3}$

(0.93) (2.45) (1.39) (-0.073)

$R^2 = 0.50$

$R^2 = 0.38$

23. $GDPInd_t = (TI_t+TI_{t-1}+TI_{t-2}+TI_{t-3}+GDPInd_{t-1}+GDPInd_{t-2}+GDPInd_{t-3})$

$GDPInd_t = 999.1-0.16TI_t-0.002TI_{t-1}+0.14TI_{t-2}+0.11TI_{t-3}$

(1.32)(-2.60) (-0.03) (2.2) (1.4)

$+0.22GDPInd_{t-1}+0.21GDPInd_{t-2}-0.17GDPInd_{t-3}$

(0.78) (0.67) (-0.43)

$R^2 = 0.38$

$R^2 = 0.16$

24. $TI = (TI_t+TI_{t-1}+TI_{t-2}+TI_{t-3}+GDPInd_t+GDPInd_{t-1}+GDPInd_{t-2}+GDPInd_{t-3})$

$TI = -4039-0.05TI_{t-1}+0.37TI_{t-2}+0.33TI_{t-3}-1.2GDPInd_t$

(2.1)(-0.30) (2.1) (1.6) (-2.6)

$+2.9GDPInd_{t-1}+2.0GDPInd_{t-2}+2.25GDPInd_{t-3}$

(5.8) (2.6) (2.26)

From Table 4.3 and Table 4.4 using the criteria by C.W. Granger. It is clear that there appears to be two way causality between financial growth and economic development. It can be said that the variation in aggregate economic activities are caused by development of financial markets, instruments and institution, the statistical evidence flourished here also indicates reverse causation from real economic growth to financial growth. Even when we take agricultural GDP and Industrial GDP, the Indicators of financial development like financial issues, Credit to agricultural as well as credit to Industrial sector seem to cause variation in real economic activities. In table two all the f-values are found to be statistically significant and there, they Indicate the Existence of feed back mechanism. Therefore, for the Indian economy It can safely be said that monetary growth as well as financial growth cause significant variations in over all economic growth as well as sectorial economic growth. They also in term are affected by developments in real economic activities following patrick at least for the Indian economy both the demand-following and supply-leading approaches have statistical validity and there is the existence of two way causality. The financial development in India, on the basis of corroborative evidence furnished, is both supply leading phenomenon as well as demand following phenomenon. Even when variations in real aggregate GDP, Agricultural GDP and industrial GDP are regressed against total financial issues, Statistical evidence clearly indicate that all F - statistics computed are statistically significant at 1% & 5% level of significance. It testifies to the causal role played by financial growth; Aggregate GDP and sectorial GDP variables have also been found to be causal variables in affecting financial growth statistically significantly. There is a feedback from real to financial sector and reverse causation from financial to real sector.

Table 4.3

Regression Results for Causality Tests betweenFinancial variables and GDP (Aggregate, Agriculture & Industry)

Granger Test

Equation No.	Dependent Variable	Independent Variables	ESS (Explaind Sum of Squares)	RSS (Residual Sum of Squares)
(I)	GDP	3 Past GDP FIt, 3 Past Fit	397282815(7)	297416100(29)
(II)	GDP	3 Past GDP	109088533(3)	585610383(33)
(III)	Fit	3 Past FIt GDP, 3 Past GDP	530104105(7)	367104688(29)
(IV)	Fit	3 Past Fit	404799535(3)	492409259(33)
(V)	Agri. GDP	3 Past Agri. GDP, FIt, 3 Past Fit	122691393(7)	152366559(29)
(VI)	Agri. GDP	3 Past Agri. GDP,	55916490(3)	219141462(33)
(VII)	FIt	3 Past FIt Agri. GDP, 3 Past Agri. GDP,	503560122(7)	393648672(29)
(IV)	FIt	3 Past FIt	404799535(3)	492409259(33)
(VIII)	Agri. GDP	3 Past Agri. GDP, WAgri. Credit, 3 Past WAgri. Credit	130991775(7)	144066177(29)
(VI)	Agri. GDP	3 Past Agri. GDP,	55916490(3)	219141462(33)
(IX)	Agri. Credit	3 Past Agri. Credit, Agri. GDP, 3 Past Agri. GDP,	16626431(7)	3802977(29)
(X)	Agri. Credit	3 Past Agri. Credit	14671704(3)	5757703(33)
(XI)	Agri. GDP	3 Past Agri. GDP, Total Credit to Agri. its 3 Past values	117404532(7)	157653420(29)
(XII)	Agri. GDP	3 Past Agri. GDP, current & 3 Past Total issues	83873862(7)	191184090(29)
(XIII)	Agri. GDP	3 Past Agri. GDP,	55916490(3)	219141462(33)
(XIV)	Total Issues	3 Past Total issues, current & 3 past Agri. GDP	3634626672(7)	3576988277(29)
(XV)	Total Issues	3 Past Total Issues	2658220781(3)	4553394167(33)
(XVI)	Industry GDP	3 Past Industry GDP, current & 3 Past Total issues	87228016(7)	176495912(29)
(XVII)	Industry GDP	3 Past Industry GDP	23607356(3)	240116572(33)
(XVIII)	Total Issues	3 Past Total issues, current & 3 past Industry GDP	5933689219(7)	1277925729(29)
(XXIX)	Total Issues	3 Past Total issues	2658220781(3)	4553394167(33)

GDP values at 1980-81 prices; Fi_t represents issues of financial sectors (Secondary issues). Ti indicates Total issues (Primary + Secondary)

Table 4.4

Regression Results for Causality Tests between Financial variables and GDP(Aggregate, Agriculture & Industry)

Granger Test

Equation No.	Dependent Variable	Independent Variable	ESS (Explained Sum of Squares)	RSS (Residual Sum of Squares)
(XXX)	Total Credit to Agri.	3 Past Total Credit to Agri, Agri. GDP. 3 Past Agri. GDP,	1061266702(7)	6490761(29)
(XXXI)	Total Credit to Agri.	3 Past Total Credit to Agri.	1059754590(3)	8002873(33)
(XXXII)	Industry GDP	3 Past Industry GDP, Credit to Industry, 3 Past Credit to Industry	216529530(7)	47194398(29)
(XXXIII)	Industry GDP	3 Past Industry GDP	23607356(3)	240116572(33)
(XXXIV)	Credit to Industry	3 Past Credit to Industry, Industry GDP, 3 Past Industry GDP	145094950(7)	4395280(29)
(XXXV)	Credit to Industry	3 Past Credit to Industry	127347195(3)	22146036(33)
(XXXVI)	Total Issues	3 Past Total issues, current & 3 past Agri. GDP	4233121218(7)	2978493730(29)
(XXXVII)	Total Issues	3 Past Total Issues	2658220781(3)	4553394167(33)
(XXXVIII)	GDP	3 Past-GDP Current & 3 Past Total Issues	201744043(7)	492954873(29)
(XXXIX)	GDP	3 Past GDP	109088533(3)	585610383(33)

All the variables have been used in their first differences; Financial variables considered are FIt(issues of Financial sector), TI (Total issues = issues of financial & non-financial sectors). Total Bankcredit, change in Agri. credit and change in credit to industry.

Table 4.5

F - Statistics for Causality Test Time Period 1951 - 1990

Granger Test

Equation No.	F. Values	Degrees of freedom		Result
		Numerator	Demoninator	
I & II	9.63	3	29	Financial issues causes variations in GDP
III & IV	9.23	3	29	GDP causes variations in Financial issues
V & VI	4.23	3	29	Financial issues causes variations in Agricultural GDP
VII & IV	2.42	3	29	Variations in Agricultural GDP causes variations in Financial issues
VIII & VI	5.03	3	29	Changes in Agri. Credit causes variations in Agricultural GDP
IX & X	4.96	3	29	Agricultural GDP causes variation in incremental Agricultural credit
XI & VI	3.77	3	29	Total Agricultural credit causes variation in Agri. GDP
XII & XIII	2.25	3	29	Agricultural GDP change causes variations in total credit lent to Agri.
XIV & XV	39.50	3	29	Credit to Industry causes variation in Industry GDP
XVIII & XIX	5.11	3	29	GDP causes variation in total issues
XX & XXI	1.82	3	29	Total issue do not cause variation in GDP
XXII & XXIII	14.13	3	29	Total issue causes variation in Agricultural GDP
XXIV & XXV	2.63	3	29	Agricultural GDP causes variation in total issues
XXVI & XXVII	3.48	3	29	Total issue causes variation in Industrial GDP
XXVIII & XXIX	24.77	3	29	Industrial GDP causes variation in total issues

Table value of F is 2.28 at 10% and 2.92 at 5% level of Significance.

APPENDIX IV VARIABLES IN FIRST DIFFERENCES USED FOR CAUSALITY ANALYSIS

	V51	V52	V53	V54	V61	V62	V63	V64	V71	V72	V73	V74	V81	V82	V83	V84
1955–56	812	612	468	83	1.1	1.9	−0.5	0	14.1	58 2	27.4	25.3	22.6	20.5	21	21.1
1956–57	759	812	612	468	0.5	1.1	1.9	−0.5	79.9	14.1	58.2	27.4	23.7	22.6	20.5	21
1957–58	75	759	812	612	−2.6	0.5	1.1	1.9	14.4	79.9	14.1	58.2	24.2	23.7	22.6	20.5
1958–59	637	75	759	812	−4.1	−2.6	0.5	1.1	20.4	14.4	79.9	14.1	21.6	24.2	23.7	22.6
1959–60	741	637	75	759	−9.1	−4.1	−2.6	0.5	144.3	20.4	14.4	79.9	25.7	21.6	24.2	23.7
1960–61	1162	741	637	75	1.8	−9 1	−4.1	−2:6	97.1	144.3	20.4	14.4	16.6	25.7	21.6	24.2
1961–62	941	1162	741	637	−2.7	1.8	−9.1	−4.1	133.8	97.1	144.3	20 4	18.4	16.6	25.7	21.6
1962–63	947	941	1162	741	0.8	−2.7	1.8	−9.1	127.44	133.8	97.1	144 3	15.7	18.4	16.6	25.7
1963–64	1428	947	941	1162	4.3	0.8	−2.7	1.8	183.16	127.44	133.8	97.1	14.9	15.7	18.4	16.6
1964–65	1095	1428	947	941	18.81	4.3	0.8	−2.7	235.05	183.16	127.44	133.8	18.69	14.9	15.7	18.4
1965–66	521	1095	1428	947	8.4	18 81	4.3	0.8	418.24	235.05	183.16	127.44	37.5	18.69	14.9	15.7
1966–67	482	521	1095	1428	29.4	8.4	18.81	4.3	222.111	418.24	235.05	183.16	−15.9	37.5	18.69	14.9
1967–68	488	482	521	1095	24.6	29.4	8.4	18.81	88.5	222.111	418.24	235.05	−75.3	−15.9	37.5	18.69
1968–69	964	488	482	521	88.51	24 6	29.4	8.4	466.2	88.5	222.111	418.24	99.9	−75.3	−15.9	37.5
1969–70	1661	964	488	482	153.29	88 51	24.6	29.4	343.5	466.2	88.5	222.111	188.41	99.9	−75.3	−15.9
1970–71	305	1661	964	488	36.73	153.29	88.51	24.6	43	343.5	466.2	88.5	341.77	188 41	99.9	−75.3
1971–72	615	305	1661	964	122.98	36.73	153.29	88.51	557	43	343.5	466.2	378.52	341.77	188.41	99.9
1972–73	823	615	305	1661	71	122.98	36.73	153.29	284	557	43	343.5	501.5	378.52	341.77	188.41
1973–74	438	823	615	305	27	71	122.98	36.73	702	284	557	43	572	501.5	378.52	341.77
1974–75	458	438	823	615	187	27	71	122.98	537	702	284	557	598.8	572	501.5	378.52
1975–76	1310	458	438	823	307	187	27	71	147	537	702	284	785	598 8	572	501.5
1976–77	2205	1310	458	438	289	307	187	27	133	147	537	702	1092	785	598.8	572
1977–78	1828	2205	1310	458	1144	289	307	187	837	133	147	537	1381	1092	785	598.8
1978–79	2566	1828	2205	1310	185	1144	289	307	964	837	133	147	2525	1381	1092	785
1979–80	−978	2566	1828	2205	257	185	1144	289	1096	964	837	133	2710	2525	1381	1092
1980–81	1070	−978	2566	1828	617	257	185	1144	1691	1096	964	837	2967	2710	2525	1381
1981–82	2518	1070	−978	2566	1031	617	257	185	1195	1691	1096	964	3584	2967	2710	2525
1982–83	1625	2518	1070	−978	654	1031	617	257	2079	1195	1691	1096	4615	3584	2967	2710
1983–84	3134	1625	2518	1070	1282	654	1031	617	1533	2079	1195	1691	5269	4615	3584	2967
1984–85	−2338	3134	1625	2518	1444	1282	654	1031	1681	1533	2079	1195	6551	5269	4615	3584
1985–86	1895	−2338	3134	1625	1396	1444	1282	654	1949	1681	1533	2079	7995	6551	5269	4615
1986–87	3027	1895	−2338	3134	1461	1396	1444	1282	3246	1949	1681	1533	9391	7995	6551	5269
1987–88	3003	3027	1895	−2338	1187	1461	1396	1444	4061	3246	1949	1681	10852	9391	7995	6551
1988–89	13989	3003	3027	1895	2117	1187	1461	1396	7921	4061	3246	1949	12029	10852	9391	7995
1989–90	−6383	13989	3003	3027	2793	2117	1187	1461	5127	7921	4061	3246	16939	12029	10852	9391
1990–91	0	−6383	13989	3003	256	2793	2117	1187	6773	5127	7921	4061	17195	16939	12029	10852
1991–92	0	0	−6383	13989	2376	256	2793	2117	6009	6773	5127	7921	19571	17195	16939	12029

Sources :
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V11 = Change in GDP and V12,V13,V14 are its lag Values
V21 = Change in Financial Issues and V22,V23,V24 are its lag Values
V31 = Change in Total Bank Credit and V32,V33,V34 are its lag Values
V41 = Change in GDP of Agriculture Sector and V42,V43,V44 are its lag Values
V51 = Change in GDP of Industrial Sector and V52,V53,V54 are its lag Values
V61 = Change in Credit to Agriculture Sector and V62,V63,V64 are its lag Values
V71 = Change in Credit to Industrial Sector and V72,V73,V74 are its lag Values
V81 = Total Credit to Agriculture and V82,V83,V84 are its lag Values
V91 = Change in Total Issues and V92,V93,V94 are its lag Values

	V11	V12	V13	V14	V21	V22	V23	V24	V31	V32	V33	V34	V41	V42	V43	V44	V91	V92	V93	V94
1955–56	1278	2032	2446	1245	170	154	98	75.1	149	79	15	−67	−238	787	1914	760	630.4	371	83.8	84.8
1956–57	2913	1278	2032	2446	−72	170	154	98	139	149	79	15	1485	−238	787	1914	1124	630.4	371	83.8
1957–58	−654	2913	1278	2032	88	−72	170	154	62	139	149	79	−1294	1485	−238	787	907	1124	630.4	371
1958–59	4055	−654	2913	1278	50	88	−72	170	51	62	139	149	2772	−1294	1485	−238	1180	907	1124	630.4
1959–60	1258	4055	−654	2913	152	50	88	−72	114	51	62	139	−305	2772	−1294	1485	1330	1180	907	1124
1960–61	4159	1258	4055	−654	−388	152	50	88	193	114	51	62	2019	−305	2772	−1294	1703	1330	1180	907
1961–62	1952	4159	1258	4055	314	−388	152	50	88	193	114	51	27	2019	−305	2772	1473	1703	1330	1180
1962–63	1353	1952	4159	1258	31	314	−388	152	178	88	193	114	−637	27	2019	−305	1748	1473	1703	1330
1963–64	3353	1353	1952	4159	185	31	314	−388	228	178	88	193	734	−637	27	2019	2047	1748	1473	1703
1964–65	5277	3353	1353	1952	76	185	31	314	218	228	178	88	2963	734	−637	27	2539	2047	1748	1473
1965–66	−2736	5277	3353	1353	228	76	185	31	254	218	228	178	−3874	2963	734	−637	2557	2539	2047	1748
1966–67	734	−2736	5277	3353	45	228	76	185	406	254	218	228	−444	−3874	2963	734	3497	2557	2539	2047
1967–68	5929	734	−2736	5277	39	45	228	76	339	406	254	218	4575	−444	−3874	2963	3707	3497	2557	2539
1968–69	2056	5929	734	−2736	177	39	45	228	363	339	406	254	−56	4575	−444	−3874	3745	3707	3497	2557
1969–70	5268	2056	5929	734	52	177	39	45	575	363	339	406	2268	−56	4575	−444	3674	3745	3707	3497
1970–71	4317	5268	2056	5929	638	52	177	39	713	575	363	339	2663	2268	−56	4575	3781	3674	3745	3707
1971–72	913	4317	5268	2056	401	638	52	177	579	713	575	363	−755	2663	2268	−56	5580	3781	3674	3745
1972–73	−291	913	4317	5268	428	401	638	52	852	579	713	575	−1980	−755	2663	2268	5899	5580	3781	3674
1973–74	4144	−291	913	4317	1510	428	401	638	1284	852	579	713	2699	−1980	−755	2663	6581	5899	5580	3781
1974–75	1105	4144	−291	913	−1005	1510	428	401	1363	1284	852	579	−612	2699	−1980	−755	8365	6581	5899	5580
1975–76	8671	1105	4144	−291	2731	−1005	1510	428	2115	1363	1284	852	5100	−612	2699	−1980	10512	8365	6581	5899
1976–77	1312	8671	1105	4144	862	2731	−1005	1510	2296	2115	1363	1284	−2581	5100	−612	2699	15729	10512	8365	6581
1977–78	7939	1312	8671	1105	3869	862	2731	−1005	1766	2296	2115	1363	4224	−2581	5100	−612	17343	15729	10512	8365
1978–79	6285	7939	1312	8671	−3342	3869	862	2731	2856	1766	2296	2115	1066	4224	−2581	5100	25237	17343	15729	10512
1979–80	−6268	6285	7939	1312	3951	−3342	3869	862	3743	2856	1766	2296	−6052	1066	4224	−2581	19679	25237	17343	15729
1980–81	8191	−6268	6285	7939	3027	3951	−3342	3869	3833	3743	2856	1766	5326	−6052	1066	4224	30505	19679	25237	17343
1981–82	7462	8191	−6268	6285	−212	3027	3951	−3342	4310	3833	3743	2856	2757	5326	−6052	1066	34921	30505	19679	25237
1982–83	4026	7462	8191	−6268	10313	−212	3027	3951	5812	4310	3833	3743	−603	2757	5326	−6052	40236	34921	30505	19679
1983–84	10950	4026	7462	8191	−4960	10313	−212	3027	5801	5812	4310	3833	5277	−603	2757	5326	59439	40236	34921	30505
1984–85	5604	10950	4026	7462	8623	−4960	10313	−212	7659	5801	5812	4310	17	5277	−603	2757	48617	59439	40236	34921
1985–86	6131	5604	10950	4026	1696	8623	−4960	10313	7104	7659	5801	5812	155	17	5277	−603	68675	48617	59439	40236
1986–87	6111	6131	5604	10950	4277	1696	8623	−4960	7241	7104	7659	5801	−917	155	17	5277	72564	68675	48617	59439
1987–88	7330	6111	6131	5604	5248	4277	1696	8623	7228	7241	7104	7659	214	−917	155	17	72087	72564	68675	48617
1988–89	17684	7330	6111	6131	16880	5248	4277	1696	19182	7228	7241	7104	8240	214	−917	155	90405	72087	72564	68675
1989–90	9694	17684	7330	6111	10919	16880	5248	4277	15735	19182	7228	7241	1515	8240	214	−917	1E+05	90405	72087	72564
1990–91	12372	9694	17684	7330	615	10919	16880	5248	13849	15735	19182	7228	0	1515	8240	214	2E+05	1E+05	90405	72087
1991–92	2525	12372	9694	17684	19496	615	10919	16880	6291	13849	15735	19182	0	0	1515	8240	2E+05	2E+05	1E+05	90405
																	2E+05	2E+05	2E+05	1E+05

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