PRIVATE CORPORATE INVESTMENT IN INDIA
AN ANALYSIS OF ITS RELATIONSHIP WITH PUBLIC INVESTMENT

Dissertation submitted in partial fulfilment
of the requirement for the award of the degree of Master of Philosophy
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I hereby affirm that the research for this dissertation titled ***'Private Corporate Investment in India: An Analysis of its Relationship with Public Investment*** being submitted to the Jawaharlal Nehru University for the award of the degree of Master of Philosophy was carried out entirely by me at Centre for Development Studies, Thiruvananthapuram.

DEEPA SANKAR

Certified that this dissertation is a bonafide work of Deepa Sankar. This has not been considered for the award of any other degree by any other university.

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CHAPTER 1

INTRODUCTION

1.1 Significance of the Problem

In developing countries public investment has been a driving force behind the development strategy especially during the import substitution regime. This has been particularly true in the case of India. It was widely recognised that the public investment would play a crucial role not only in generating demand but also in providing infrastructural support for industrialisation. It was also generally believed that private investors would be reluctant to channel needed resources to key industrial projects because of huge investments, long gestation period and low rate of return. The absence of fully developed capital markets was viewed as an impediment to private investment. All these factors put together necessitated the rise in public investment, which is financed largely through the budgetary support and fiscal measures.

Financing of public investment through fiscal deficit and its impact on the interest rates and consequently, on the private investment has been an issue of concern. In the case of India, fiscal deficits started mounting from the mid eighties. This is evident from Table 1.1. Therefore, the question arises whether it is desirable to have a higher fiscal deficit to finance the public investment. And, if it is unavoidable, what effects would it have on the behaviour of private investment, especially private corporate investment. In particular, would public investment financed through fiscal deficits crowd out the private investment?

The last question namely the effect of public investment on private investment assumed significance from an analytical as well as policy view point

Table 1.1 Central Government Deficit as percent of GDP

Year	Fiscal Deficit
1975-76	4.1
1980-81	6.2
1981-82	5.4
1982-83	6.0
1983-84	6.3
1984-85	7.5
1985-86	8.3
1986-87	9.0
1987-88	8.1
1988-89	7.8
1989-90	7.8
1990-91	8.3
1991-92	5.9
1992-93	5.7
1993-94	7.4

Source: GOI (1995):Economic Survey 1994-95.

The problem continues to be significant even when the development strategy has moved more away from import substitution toward liberalisation. As is well known, India was compelled to go in for an IMF-World Bank style stabilisation program, which has now been popularly termed as 'The Economic Reforms of 1991'. Some of the main ingredients of the stabilisation - SAP in the context of fiscal policy and on the role of the public sector have been the following.

Reduction of the fiscal deficits.

Providing a greater role for the private sector, in particular, the private corporate sector, to invest, expand and diversify.

A withdrawal of the state, in particular, the public sector from direct manufacturing and other related activities; in short a diminision of the role of public investment.

The aforesaid measures are based on the view that public investment financed through fiscal deficit could result in 'crowding out' of the private investment.

1.2 Role of Public Investment in Indian Planning

In India, the policy makers were very keen on the utilisation of the potentialities of investment, especially of the public sector. Especially the post independence years witnessed a period in which we have been "pursuing a path in which the public sector was expected to be the engine of growth[1]".

Propounding the philosophy of development, the Second Five year Plan mentioned that "The adoption of the socialist pattern of development require that all industries of basic and strategic importance, or in the nature of public utility services, should be in the public sector. Other industries, which are essential and require investment on a scale which only the state, in the present circumstances, could provide, have also to be in the public sector. The state has also therefore to assume direct responsibility for the future development of industries over a wide area"[2].

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[1] B Rudder Dutt (1992).

[2] Government of India, Planning Commission, Second Five year Plan (1956), Page 9.

It further emphasized that " The Public sector has to expand rapidly. It has not only to initiate developments which the private sector is either unwilling or unable to undertake; it has to play the dominant role in shaping the entire pattern of investment in the economy, whether it makes the investment directly or whether these are made by the private sector. The private sector has to play its part within the framework of the comprehensive plan accepted by the community"[3]. Besides, "in a growing economy which gets increasingly diversified, there is scope for both public and private sectors to expand simultaneously, but it is inevitable, if development is to proceed at the pace envisaged and to contribute effectively to the attainment of the larger social ends in view, that the public sector must grow not only absolutely, but also relatively to the private sector"[4]. The forgoing highlights the importance assigned to the public sector by the planners during the early decades of planning.

In view of the leading role that the public sector enjoys in India, an understanding of the linkages between the investment in public sector and the rest of the economy - particularly the private corporate sector is important. The growth of public sector in India has been predominant in sectors with high forward linkages (eg: steel, machinery etc), which are not only capital intensive but also critical to development.

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[3] Ibid

[4] Ibid

1.3 Relationship Between Public and Private Investment: Conceptual Issues

In recent years, there have been seemingly opposite views on the effects that the public investment has on private investment. Some economists believe that public investment provides a significant stimulus to private investment and thereby serves as a powerful instrument of stabilisation and growth, while others are not so optimistic. The broad framework for the relationship between public investment and private investment can be explained in terms of the several channels through which public investment influences private investment. Sundararajan and Thakur point out four such relations between them.[5]

First and foremost, public investment competes with the private sector for scarce physical and financial resources and thereby, exerts a negative influence on private investment, at least in the short run. Second, to the extent that public investment complements private investment by creating infrastructure and raising the productivity of the private capital stock, private investment requirements per units of output are reduced. Third, increased public investment raises the demand for output of the private sector. It thereby influences output expectations and investment requirements of the private sector. Finally, public investment raises the aggregate output and savings, supplementing the economy's physical and financial resources and thus offsets at least a part of any crowding out effect on private investment. Thus, some economists are of the opinion that by undertaking lumpy and risky investment, the public sector complements private investment by way of creating necessary infrastructure and providing critical inputs while some others argue that public investment actually "crowds out" private investment.

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[5] Sundararajan V and Subhash Thakur (1980).

The debate on the relationship between public investment and private investment centres around the two aspects of (i) crowding in (i.e. complementarity) and (ii) crowding out.

1.3.1 The Crowding out Hypothesis

According to Friedman the public investment (which is financed by either market borrowing or money creation, or both) apart from the savings of the government, could lead to a reduction of real income of the economy because there is a "reduction in the physical volume of assets created due to lowered private productive investment" (because the resources for investment is taken by the public sector)[6]. The view, that the debt financing of public investment entails a reduction in private sector investment is known as the 'crowding out hypothesis'.

Three different arguments by which crowding out occur have been pointed out by Blinder and Solow[7]. According to the first view, the genesis of which can be traced back to the writings of the classical economists, in a full-employment economy the government can divert resources only by taking away resources available to the private sector. Therefore, any method of financing government investment, whether through increased taxation, or debt financing or money creation (borrowing from the Central bank) - would lead to crowding out effects[8].

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[6] Friedman M (1972).

[7] Blinder, Alan S and Solow, Robert M (1973).

[8] S Gopalakrishnan(1988).

The second way in which crowding out could occur is based on the concept of the "transactions crowding out". One of the basic tenets of Keynesian macro economic theory is that investment is inversely related to the rate of interest. Debt financed government spending increases in the first instance the level of income in the economy. Since the transactions demand for money is directly related to the level of income, this increase in income leads to an increase in the demand for money. Given the money supply, restoration of equilibrium in the money market calls for an increase in the rate of interest. The resultant increase in the rate of interest reduces the private sector investment activity in the economy[9].

The third way in which crowding out could occur is through the 'wealth effect' of government debt, both on private consumption as well as demand for money. When the 'wealth effect' of government bonds is included in the analysis, the transactions crowding out effect is merely the first round effect of debt financing on private investment. For, now the private sector perceives government bonds as private wealth, which can produce a 'net wealth effect' on private consumption. The resulting increase in private consumption would give an impetus for private investment activity in the economy. The perceived increase in private wealth on account of government bonds would also increase the demand for money in the private sector. Given the supply of money, this increase in the demand for money causes the interest rate to rise. This increase in interest rate further

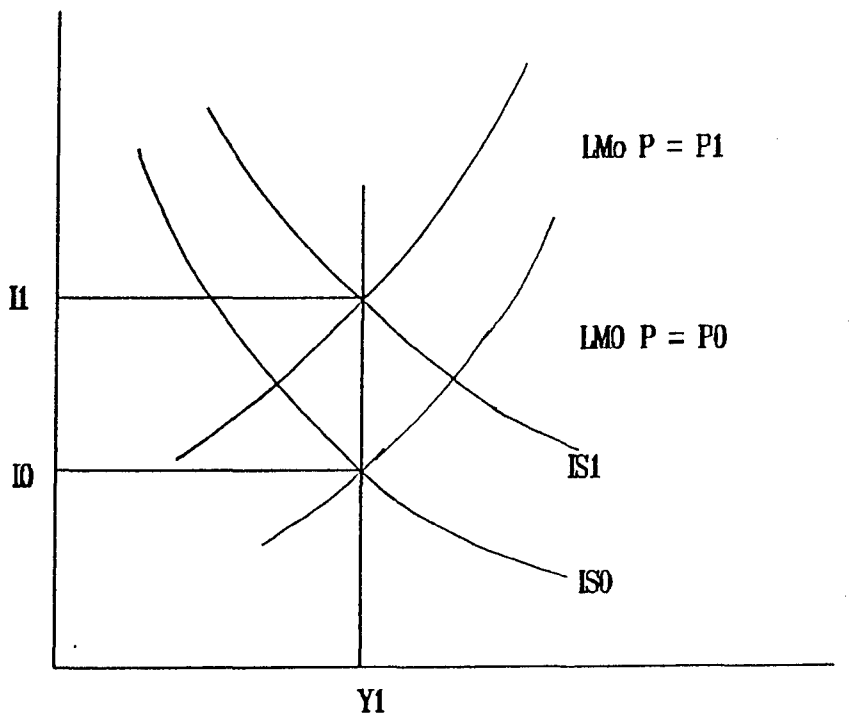
[9] Ibid

strengthens the initial rise in the interest rate associated with the transactions crowding out effect[10].

The neo-classical IS-LM model can be explained as follows:-

The IS schedule is moved up from IS_0 to IS_1 by increased government expenditure. This is financed by bond sales, so the nominal money supply remain unchanged at M_0 .

Figure 1.1



Source: Levacic and Rebbman(1976)

Excess aggregate demand results, the price level rises, reducing the real value of the money stock and shifting the LM function to left. In order to equate the now smaller stock of real balances with the demand for real balances, the interest rate must rise to i1. The

[10] Ibid

higher interest rates chokes off private sector investment. This effect is known as crowding out because resources are taken away from the private sector in order to meet the requirements of public sector expenditure. The rise in the interest rate is the mechanism by which this occurs.[11]

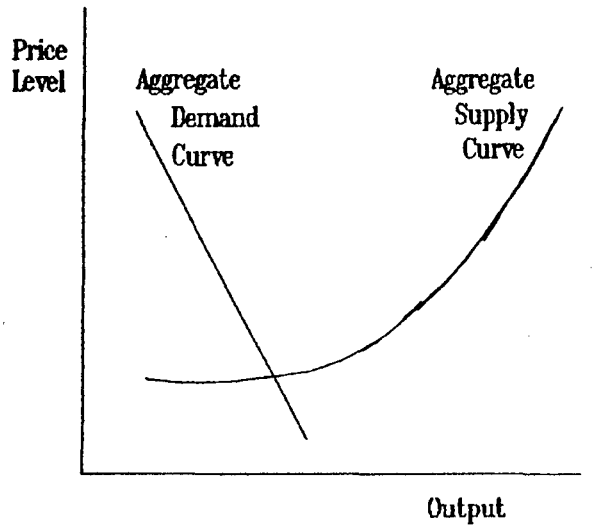
Thus traditionally, the crowding out debate centered around the proposition that if the government finances a budget deficit by issuing bonds, this would raise the rate of interest and thereby crowds out private investment.

In the other extreme case, Stiglitz says that in the case of the international capital market where the country can borrow as much as it would like at a fixed rate of interest[12]. Instead of crowding out domestic investment, government borrowing simply leads to a flow of funds from abroad. In reality, what happens is that, as the government tries to get more funds, some additional funds are attracted from abroad and some individuals save more than they otherwise would, and so there is some increase in the total funds available. At the same time, some investment is crowded out, so that the total stimulus provided to the economy by the increased government expenditure is not significantly high. The

[11] Levacic, Rosalind and Rebmann, Alexander(1976).

[12] Stiglitz, Joseph E (1993).

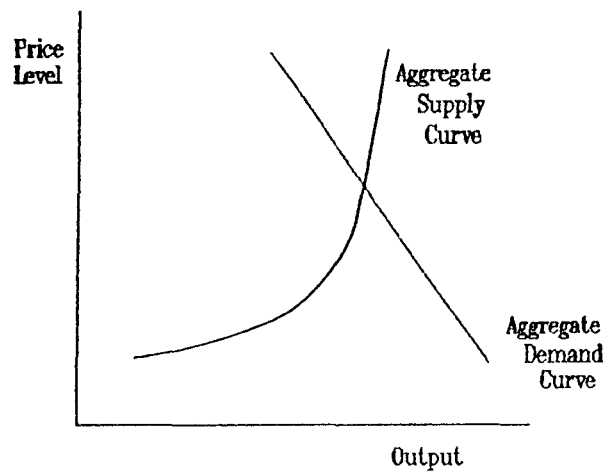
Figure 1.2(a)



Source: Stiglitz (1993)

Figure 1.2 (b)

[B]



Source: Stiglitz (1993)

magnitude of crowding out is also likely to depend on whether or not the economy has a lot of excess capacity.

In a situation where initially the economy is operating along the horizontal part of the aggregate supply curve, increases in the government expenditures are likely to increase aggregate demand and thus equilibrium output. Then there will be at most, limited crowding out. On the other hand, in a situation, where the economy is operating along the vertical part of the aggregate supply curve, the picture is different. Since total output cannot increase, any increase in government expenditures must come at the expense of some other component of aggregate demand. Hence the Government expenditures may, for instance, crowd out investment[13]. There is an important lesson that follows from Stiglitz. Namely, the fact that at times there must be crowding out should not mislead us into thinking that there will always be crowding out.

Howard Vane and *John L Thompson* put forward the five main instances in which, they think, crowding out may occur[14]

First, crowding out may arise as a direct result of the way in which fiscal expansion is financed. An increase in government expenditure financed by net open market sales of government debt will put upward pressure on interest rates. The rate of interest on new bond issues must increase to induce the public to lend the government more money. The

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[13] Ibid

[14] Vane, Howard R and Thompson, John L (1982).

rise in interest rates will in turn cause a reduction in the level of private investment expenditure undertaken in the economy, as firms cancel investment projects they had planned to finance by borrowing before interest rates increased. Another way of looking at this finance effect is to argue that private securities will be replaced by government securities in portfolios. In other words, increased sales of government bonds will lead to significant reduction in the quality of finance available to private firms, as those who lend funds to the government have less money to lend to others.

Second, crowding out may occur due to an expectation effect. If, for example, the private sectors' confidence in the economic future were adversely affected by a budget deficit, private investment would be reduced, as the business community lowered their estimates of the future returns from new investment projects.

Third, crowding out may arise as government expenditure will cause a rise in the price level in the long run if sufficient unemployed resources are not available to produce the extra goods demanded. The rate of interest will rise as the private sector sells bonds to restore the real value of their nominal money holdings and cause a reduction in private investment.

Fourth, crowding out may occur in an open economy operating a fixed exchange rate again due to a price effect. If, prices rise following fiscal expansion, exports will become less competitive with foreign produced goods, whereas imports will become more

competitive with home produced goods. Output and employment will fall as exports decrease and imports increase.

Finally, even in the case, where an increase in government expenditure is financed by increasing taxes (that is, balanced budget multiplier), some partial crowding out of private expenditure will occur. As income rises the transactions demand for money will increase and with a fixed money supply, this causes interest rate to rise. This in turn will cause some reduction in the investment in the economy. The value of balanced budget multiplier will in consequence be less than one (that is, partial crowding out will occur)[15]

1.3.2 The Crowding in (or Complementarity) Hypothesis

According to Howard vane and Thompson, if a government injection does succeed in sustaining a higher level of activity in the short term, there may be some long run crowding in. Government injections in the form of investment may increase the capacity and hence output of the economy, while a higher level of capacity utilization may generate more investment and increase the capacity of the economy[16]. This is more so because public investment is most often concentrated in the production of such goods and services that the private sector will not normally produce in optimal amounts. Moreover public goods are hard to ration and are subject to substantial start up costs (lumpy and indivisible investments). These public goods are nevertheless, of critical importance to the proper functioning of a market system because they tend to generate large and widespread spill

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[15] Ibid

[16] Ibid

over benefits[17]. For example, investments by the state in social and economic infrastructure tend to complement private capital formation because they facilitate the implementation and realization of private agents' investment plans through their elimination of transportation, communications and educational bottlenecks. Public investment also has an indirect effect on private capital formation because it not only augments overall aggregate demand for goods and services produced by the private sector, but also influences private investors' future profit and sales expectations[18]. Thus public investment is complementary to private investment if an initial increase in public investment leads to an increase in the total investment in the economy.

1.4 The Relationship Between Public and Private Investment: Empirical Studies

During and after the Great Depression, J M Keynes argued for government budget deficits as one of the remedial measures to fight economic downturns and to cure unemployment in industrialised countries. In contrast, it is conventional wisdom in most developing countries that larger budget deficits have coincided with wasteful government spending, large bureaucracies and other counter productive economic policies. Despite the ongoing debate on the effect of fiscal deficits on economic performance, it is surprising that there is a lack of thorough empirical investigation into the specific question of the deficit

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[17] The new classic explanation for market failure in a developing country and the need for state intervention in the provision of social overhead capital is found in Nurkse R (1953); Rosenstein Rodan P N (1943); and Scitovsky, Tibor (1954)

[18] Ramirez, Miguel D (1995).

Table 1.2: Empirical Studies

slno	Author	Model	Period	Country	Variables	Results
1	Blejer & Khan (1984)	Flexible Accelerator Model	1971-79	24 Developing countries	Private investment, output, real bank credit real public investment etc.	It is not the level, but the change in public investment that crowds out private investment. Infrastructure investment crowds in private investment.
2.	Miguel D Ramirez (1994)	A variation of the Flexible accelerator Model	1950-90	Mexico	Private investment, flow of real credit, public investment, exchange rate etc.	When the public capital stock is productive and complements the private capital stock, a ciders paribus increase in public investment would have productive and overall positive effect on factor productivity and output.
3.	Sunderarajan & Thakur (1980)	Neo-classical (Jorgenson) variation of the flexible accelerator model	1960-1978	India & Korea	Private investment, public investment, capital stock etc.	Crowding out dominates in India,Positive (complementary) relationship between public and private investment in Korea
4.	B K Pradhan, D K Ratha & Atul Sarma (1984)	General Equilibrium Model	1960-80	India	Private GCF,Taxation, money creation, market borrowing, markup prices etc.	Crowding out occurs whenever public investment is raised, but its extent varies with different modes of allocation and financing of public investment
5.	M S Mohanty (1995)	Ricardian Equivalence Model	1960-90	India	private investment and budget deficits	Crowding in is more than the crowding out

Slno	Author	Models	Year	Country	Variables	Results
6.	K. Krishnamurthy (1985)	Sectoral Model	1975-80	India		"Crowding-in" in some sectors; eg,in infrastructure, but not in all sectors. But still, overall complementary within sectors
7.	Mushtaq Ahmad (1994)	IS-LM Framework	1970-90	Pakistan	Fiscal deficits, interest rates etc.	Neither monetary nor fiscal policy has any influence on interest rates and so on investment also.
8.	Nemat Shafik (1992)	private investment's neo classical version	1970-88	Egypt	private investment, interest rates etc.	private investment depends on mark ups, internal financing, government policy, interest rates etc.
9.	Joshua Greene & Delano (1991) Villanueva	Neo-classical model	1975-87	23 developing countries	GDP growth,public GCF,interest rates, debt ratio etc.	positive relationship between private investment and GDP growth, per capita income, negatively to interest rates, and inflation .
10.	Karen Parker (1995)	Simple Flexible Accelerator Model	1974-1994	India	Public investment, Interest rate, Exchange rate, Industrial production growth etc.	Public and infrastructural investment crowds out the private investment in India.

growth connection. Most empirical works on government budget deficits and macro economic performance have been confined to developed countries, particularly the US.[19]

In the empirical literature the relationship between public and private investment is often posed as competitive or adversal.[20] The empirical studies reveal differing results depending on the variables used. (See Table 1.2) While some authors have focussed on the effects of fiscal deficits others have been concerned about the relationship between public investment on private investment. There have also been attempts to test the relationship between public and private investment within a the General equilibrium framework.

High fiscal deficits push up interest rates or reduce the availability of credit to the private sector, or both, thus crowding out private investment. Hence, reduction of the public deficit during macro economic adjustment should allow private investment to expand. This has been confirmed by the study conducted by Van Wijnbergen in 1982 in the study on the Republic of Korea.[21] However, the way fiscal deficit is corrected also matters. The mix of tax increases and spending reductions will affect aggregate private investment. Efforts to reduce the public deficit often involve cutting back on private investment. Some of these expenditures (especially on such components of infrastructure as roads, ports, and communication networks) may be complementary with private investment and may cause

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[19] Nelson, Michael A and Singh, Ram D (1994).

[20] Chhibber Ajay, Dailami Mansoor and Shafik Nemat (1992).

[21] Van Wijnbergen, Sweder (1982) pp 133-170.

private investment to fall. This underscores the need to protect public expenditure on infrastructure to encourage the recovery of investment and growth.[22]

Several empirical studies have attempted to shed light on this issue. A study by Blejer and Khan (1984) is one of the earliest attempts in understanding the impact of different types of public investment on private capital formation. Based on cross country data they found that Government investment in infrastructure is complementary with private investment whereas, other types of government investments are not[23]. A study on Turkey by Chhibber and van Wijnbergen finds strong evidence, to the effect that non-infrastructural public investment hurts private investment. But the evidence on the positive impact of public infrastructure investment on private investment was not strong.[24] Studies by Green and Villanueva in 1991 and also by Serven and Solimano in the same year, using multi-country panel data arrived at same conclusions.[25] Karen Parker (1995) who made a study on India, says that public infrastructure investment crowds out private investment, although she has not been able to empirically substantiate her argument.

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[22] Servan, Luis and Andres Solimano (1992) pp 95-114.

[23] Blejer, Mario, and Mohsin Khan (1984) pp 379-403.

[24] Chhibber, Ajay and van Wijnebergen (1992).

[25] Green, Joshua, and Deleno Villanueva (1991) pp 33-48; and Serven, Luis, and Andres Solimano (1991).

Mushtaq Ahmad (1994) also analysed the effects of government budget deficits on the interest rates in the case of Pakistan for the period (1970 to 1991)[26]. According to the author, Pakistan experienced a host of structural changes during this period, especially in the financial sector. In order to test the Crowding Out hypothesis, following the methods used by authors like Evans (1985), Brath et al (1985), Kolluri and Giannaros(1987), Monadjemi(1989) and Al Saji (1991), M Ahmed has utilised the IS-LM model. His study revealed that neither monetary policy nor fiscal policy has any influence on real interest rates during the period under study. He says that Government budget deficits do not exert significant influence on nominal or real interest rates which can in turn influence the investment pattern of the country.

Namat Shafik (1992), in his paper on the modelling of private investment in Egypt presents an empirical model of private investment that takes into account certain features of a developing economy such as the oligopolistic market structure, putty-clay technology, inelastic supply of non-traded capital goods and financial repression. The results for Egypt indicate that at the macroeconomic level, private investment depends on mark-ups, internal financing, demand and the cost of investment goods. However, the cost of investment goods is defined, not as the interest rate, but as the outcome of the interaction of supply and demand in the market for capital goods. The effects of government policy on private

[26] Mushtaq Ahmed (1994).

investment are mixed with some evidence of crowding out in credit markets and of crowding in as a result of government investment in infrastructure.[27] It supports the positive impact of public infrastructural investment on private investment.

In the study conducted by Joshua Greene and Delano Villanueva, the authors have tried to analyze the effects of several policy and other macroeconomic variables on the ratio of private investment to gross domestic product in developing countries during 1975-87. Econometric evidence indicates that the rate of private investment is positively related to real GDP growth, level of per capita GDP, and the rate of public sector investment, and negatively related to real interest rates, domestic inflation, the debt-ratio, and the ratio debt to GDP.[28]

The budget-growth link, rather than its impact on private investment has been theoretically analyzed by V K R V Rao. [29] He demonstrates that the inflationary impact of government budget deficits in developing countries depend on a set of prevailing conditions in the economy. Important among these are the government policies toward public investment. Recent empirical evidence for developed economies by D A Aschauer and Eisner suggests that public investment(eg. roads, utilities) contributes more to productivity than does private investment.[30]

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[27] Nemat Shafik (1992)

[28] Joshua Greene and Delano Villanueva (1991).

[29] Rao, V K R V (1953).

[30] D A Aschauer(1989 and 1990); and R Eisner(1988 and 1989).

Coming to the Indian studies, we may analyse the study by M S Mohanty in some detail[31]. His paper essentially tries to examine the implications of rising public deficit for saving activity in India under the framework of Ricardian Equivalence Theory (REI), which claims that under certain conditions, the effect of government expenditures on aggregate demand is insensitive to the fact whether such expenditures are financed by taxes or by debt. At the outset the author speaks about three major routes through which fiscal deficits could have implications for private saving. The first, route is that fiscal deficits through the Keynesian framework increase aggregate absorption in the economy and therefore, reduce the saving potential. The second route of impact of budget deficit stems from direct complementarity and substitution possibilities involved between public and private expenditures. Private sector's consumption and investment may exhibit complementarity relation with public consumption and investment. In this case, with rising public sector deficit, private financial balance will also deteriorate. The deficit could lead to a reduced national saving and increased reliance on foreign saving. The opposite would be true if private expenditures are substitutes for public expenditure. The third route of impact could arise, if deficit is due to the growing fiscal incentives meant for promoting saving activities in the economy. In this case deficit could be positively associated with private savings.

Mohanty study was set against the background of the growing concern for the rising public deficit in India and its possible adverse implications for saving activity. He considers that in order to test this, the Ricardian proposition must be invalidated in the

[31] M S Mohanty(1995).

Indian context. He cites the example of a recent work by Ghatak and Ghatak (1993) reporting substantial evidence in favour of RET in the Indian context. His objective being the collection of empirical evidence on the impact of budget deficit in India, the issue was approached from the consumption side: to see whether budget deficit led to a contraction in private consumption in India and to what extent. While the tests based on overall fiscal deficit reveal some evidence of Ricardian behaviour, it is inferred that such an outcome may reflect the 'direct crowding out' impact of government expenditure on private consumption.

According to Mohanty, not only does government dissavings increase private consumption through the route of disposable income but also tends to crowd in additional income, probably due to the complemetarity relation of government current account expenditure with private consumption. But he says that the coefficient on investment is negative and proves the earlier contention that the increased resort by the government to the capital market for financing its growing investment expenditures has a significant 'crowding out' impact on the private investment.

Another empirical study attempted in the framework of RET is by Kanahaiya Lal Gupta[32]. His attempt is to empirically analyse the economic effect of budget deficits. He investigates into the possible association between budget deficits with reserve money, inflation, degree of monetisation, 'the crowding out hypothesis' by using the data for

[32] Gupta K L (1992) Budget Deficit and Economic Activity in Asia, Routledge, London.

selected Asian countries, including India. His broad conclusion is that government investment does not crowd out private investment.

Another noteworthy study is by V Sunderrajan and S Thakur(1980), who have examined the relationship between public and private investment in a developing country by postulating a dynamic model of investment, savings and growth and by testing and simulating it for two countries- India and Korea where the public sector has played a significant role.

Their analysis was within a framework of a growth model which is an adaptation of the neo-classical theory of investment as developed by Jorgenson- a variant of the flexible accelerator model of investment) that is designed to highlight the role of public investment. The model is designed to highlight the role of public investment by explaining the behaviour of private investment, savings and growth and incorporating several channels through which public investment influences private investment.

Their findings show that in India, there is substantial crowding out in the initial period, but private investment is stimulated in all subsequent periods. These latter effects are weak in each period, so that the initial negative effect is not offset for considerable period. However, the crowding out is only partial, so that public investment does not raise total investment. The effect on aggregate output is also negative in India, reflecting the much larger incremental capital output ratio in the public sector than in the private sector. In sharp contrast, the effects of public investment on private investment are positive and

large both in the immediate and subsequent periods, in Korea, reflecting its strong positive effect on aggregate output and output expectations of the private sector.

Pradhan, Ratha and Sharma(1990) have tested the complementarity aspect between public and private investment in India under different modes of allocation and financing of public investment. The authors have used an 18 sector computable general equilibrium model (17 commodity sectors and one financial sector) where money plays a non-neutral role. The authors say that when public investment increases, the initial crowding out of private investment will lead to a lower demand for working capital (credit). That will shift the supply curve of final goods to the left and the value added from these sectors will decrease. On the other hand, value added in the public sector will increase as a result of increased public investment.

In their simulations, the authors considered a 10 percent increase in public investment financed through:

1. money creation,
2. increasing direct taxes on high income group,
3. by increasing the mark up uniformly on all administered prices, except industrial raw materials, and
4. by market borrowing.

The authors conclude that private investment has a tendency to decline whenever public investment increases and therefore there is a crowding out of private investment effect. However, the extent of crowding out varies with different modes of allocation and

financing of public investment. It is the highest when the mode of financing is market borrowing. Further they note that even though private investment decreases, total investment in the economy increases when public investment is stepped up. Since public investment is exogenously controlled, the increase in total investment is really due to rise in private investment. In that sense, there is complementarity between public and private investment. The complementarity effect also varies with modes of allocation and financing of public investment. The authors argue that public investment crowds out private investment, but in terms of its effect on total investment and growth and distribution of income, the economy is better off with increased public investment.

Another important work on India is by Krishnamurthy(1985). His aim was actually to examine the inflation inducing and growth generating forces, and their interaction in a developing country with predominant agriculture and abundant labour supply. In the process of making an econometric model for India, they have tried to analyse the role of government in promoting economic growth through its investment activities and the impact of its fiscal operation on supply of money are stressed. Krishnamurthy found that increased public investment results in crowding out of private investment, but leads to higher growth.

Krishnamurthy (1985) had taken allocation of public investment between sectors as an exogenous variables that can move the system. To capture the important aspects of the economy, he had developed sectoral models dealing with agriculture, industry, public sector infrastructure and tertiary sectors. The models were simulated to assess

complementarity and crowding out effects of public investment on private investment and output, assuming average conditions prevailing during the period 1975 to 1980. His estimates show that the crowding out effect dominates the complementarity effect in industry and tertiary sectors during the years of increase in public investment.

The foregoing review of the literature on the subject suggests that the empirical evidence on the nature of relationship between the public and private investment is not conclusive. It is also noted that difference in interpretations (and often contradicting findings) are partly due to the choice of different periods but more due to the difference in the specification of models. Interestingly, the varied interpretations have led to the emergence of varying notions about the relationship between public and private investment namely, "Crowding in", (Complementarity) and "Crowding out". Obviously, a fresh enquiry into the relationship between public and private investment is needed. The present study is such an attempt. It examines the relationship between public and private corporate investment in India for the time frame of 34 years from 1960-61 to 1993-94.

1.5 Objectives of the Study

The main objectives of this study are:

(i) to trace the trends and patterns in the public and private investment;

(ii) to analyse the financing aspects of public and private corporate investment; and

(iii) to test empirically verify the crowding in/crowding out hypothesis by examining the private corporate investment.

1.6 Organisation of the Study

The study is organised in four chapters. The first chapter, that is the present one has examined various theoretical aspects and reviewed the empirical studies. In the second chapter, the trend, composition and pattern of public and private investments are traced. The third chapter tests empirically the relationship between public and private corporate investment using econometric tools. The final chapter sums up the main findings of the study.

CHAPTER 2

PUBLIC AND PRIVATE INVESTMENT TRENDS AND PATTERNS

This chapter analyses trends and patterns in public and private investment. In section 2.1, trends in gross fixed capital formation (Public and Private) are examined. This is followed by Section 2.2, where we examine the composition of public and private investment by industry of origin. Since savings in the economy is an important source for financing investment, the trends in saving for the public and private sector are studied in section 2.3. In this section the pattern of financing of investment by the public and the private sectors is also examined. The final part of this chapter (section 2.4) traces the emerging relationship between public and private corporate investment.

Concepts and Data: The dominant and dynamic component of accumulation is *Gross Domestic Capital Formation* (GDCF) and can be defined as gross additions to fixed assets (and increases in stock of commodities) during a period of account. *Gross Fixed Capital Formation* (GFCF) comprises of fresh construction and acquisition of machinery and equipment. *Change in stocks* refers to variations in inventories during the accounting period of materials and supplies, work in progress and finished products and goods in the possession of producers.[1]

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[1] EPW Research Foundation (1995).

Data on GDCF is desegregated by type of institutions, for the public, private corporate sector and the household sector. The public sector in this context includes the government investment in infrastructure as well as non-infrastructure sectors. The private sector comprises of the private corporate sector and the household sector. The household sector includes households proper and unincorporated enterprises. While investment by the private sector is analyzed in order to provide a general background, the focus is on analyzing the trends and pattern of investment by public sector and the private corporate sector.

Two important sources of data on investment are: (i) Report on Currency and Finance published by the Reserve Bank of India and (ii) National Accounts Statistics compiled by the Central Statistical Organization (CSO). This study is based on data from the National Accounts Statistics, the procedure used by CSO for estimating capital formation is worth noting. The CSO estimates capital formation using the commodity flow method. The total Gross capital formation (GCF) is arrived at by adding the Fixed capital formation and the change in stocks. However there are serious limitations in the method of estimating investment especially for the unorganized sector of the economy.

2.1 Trends in Capital Formation

The overall trends in pattern of capital formation by ownership is delineated here to trace the underlying relationship between the public and private investment. As a prelude, we examine the rate of capital accumulation in the economy by ownership over time. This is important in the sense that the Indian planning itself was aimed at building the capital

stock with the rationale that the underdevelopment is the manifestation of scarce capital stock in a labour surplus economy. From the table 2.1, it can be inferred that gross capital formation as percentage of GDP rose from around 16 percent in 1961 to over 25.7 percent in 1991 after which it declined to around 20 percent in 1994. The rate of capital formation in the public sector appears to be, more or less, stagnant in most part of the study period except for the early eighties. This is not the case with the private sector, where the rate of capital formation has been on the rise with fluctuations since the early seventies. It is more pronounced after mid-seventies, revealing that the private sector dominates over the overall capital formation in the economy since the mid-seventies (see Table 2.1). The emerging relationship between the public and private sectors since the early seventies requires, therefore, a closer look at the trends in capital formation by sectors.

As apparent from the table 2.1, the annual growth rates of gross capital formation in the public sector as well as in the private sector is marked with 'cyclicality' in the sense that there is no consistent direction of its growth, as both the increase and decline come one after the other frequently. Though the annual growth rates have been fluctuating highly, there is a marked change in the average growth rates for the period before 1981 and after 1981. The average growth of the total investment (at constant 1980-81 prices) for the period from 1962 to 1981 was 4.56 percent has showed a marginal increase to 4.9 percent

Table 2.1 Gross Domestic Capital Formation and its Growth (1960/61 to 1993/94)

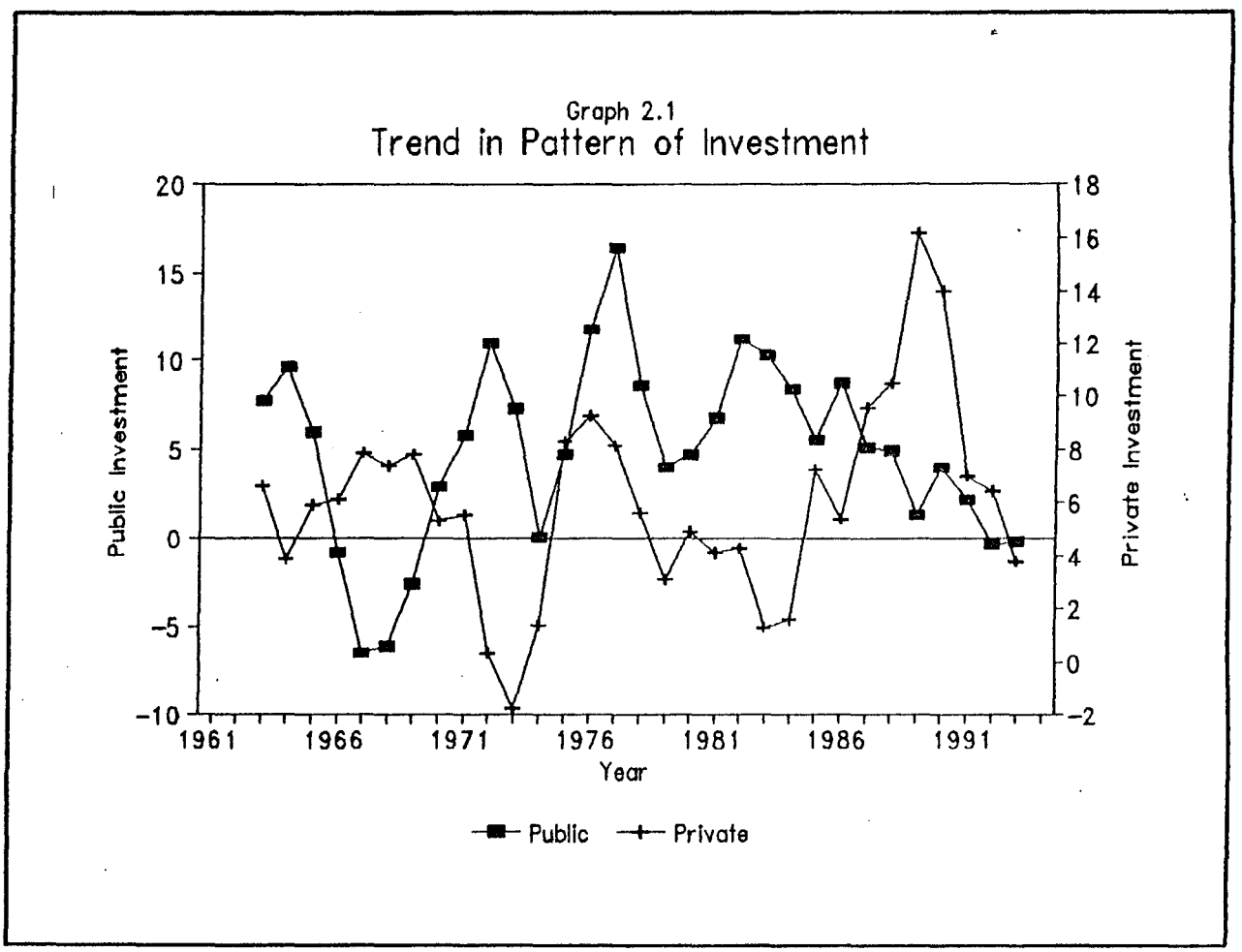
Year	Total	Public	Private	Annual Growth Rates*		
				Total	Public	Private
1961	15.9	7.0	8.9			
1962	15.6	6.7	8.9	-8.28	0.21	-13.60
1963	16.5	7.8	8.7	16.46	19.02	14.56
1964	16.6	7.9	8.7	5.21	12.95	-0.74
1965	16.4	7.9	8.6	9.46	5.39	13.02
1966	16.9	8.5	8.5	11.19	8.65	13.25
1967	18.0	7.2	10.8	5.11	-11.37	18.00
1968	16.5	6.7	9.8	-8.59	1.42	-14.46
1969	15.1	5.9	9.2	-5.74	-9.91	-2.83
1970	16.0	5.6	10.4	14.94	-0.08	24.64
1971	17.1	6.5	10.6	7.66	16.46	3.11
1972	18.5	7.1	11.4	5.13	9.54	2.55
1973	17.1	7.3	9.8	-6.41	18.34	-21.87
1974	18.3	7.7	10.6	27.07	-0.93	53.55
1975	19.8	7.6	12.2	-9.85	-2.43	-14.38
1976	20.8	9.6	11.2	3.19	26.04	-12.70
1977	20.9	10.1	10.8	9.82	11.75	7.88
1978	19.8	8.2	11.6	8.84	-15.26	33.90
1979	22.3	9.5	12.8	20.74	19.86	21.32
1980	22.9	10.3	12.5	-10.60	4.07	-20.14
1981	20.9	8.7	12.3	8.68	7.45	9.73
1982	23.8	10.4	13.4	5.03	13.59	-2.07
1983	22.5	11.1	11.4	-5.33	5.40	-15.65
1984	21.1	10.0	11.1	6.38	-0.18	14.27
1985	21.2	10.8	10.3	2.29	10.80	-6.65
1986	24.2	11.2	13.0	15.97	3.11	32.01
1987	23.2	11.7	11.5	3.89	6.82	1.03
1988	22.5	9.9	12.6	3.84	-13.14	21.33
1989	24.5	9.9	14.6	19.68	8.80	27.69
1990	24.2	10.0	14.3	2.07	6.97	-1.00
1991	25.7	9.7	15.9	13.76	4.60	19.99
1992	22.9	9.2	13.7	-12.36	-7.20	-15.42
1993	23.3	8.9	14.4	8.02	2.08	11.88
1994	21.3	8.9	12.4	-3.92	6. 4	-10.29

Sources: 1 CSO(1995): The National Accounts Statistics.

2. Ministry of Finance, Government of India (1995):The Economic Survey, 1994-95.

*. Estimated figures.

for the period 1981 to 1994. The average growth rate of the public investment per annum for the pre- 1981 period was 6.0 percent which declined to 4.0 percent for the period 1981 to 1994. In the case of private investment, the average growth rates has increased from 5.5 percent to 6.2 percent per annum for the two periods. Similar trends are observed with respect to gross domestic fixed capital formation. Hereafter, our analysis is based on the gross domestic fixed capital formation (see appendix 2a).



As wide fluctuation in the pattern of trends in capital formation by sectors conceal more than what it can reveal about the underlying relationship between them, we have used Raj's (1984) method of smoothening the annual growth rates to discern the trend in fixed capital formation by sectors and hence, their relationship over time. The graph 2.1 substantiates our earlier observation that there has been a shift in the pattern of investment from the public sector to the private sector since the mid-seventies. The private sector has, however, failed to respond to the liberalization efforts since 1991.

As far as the relationship between the public and private investment is concerned, it is interesting to note that there exists a 'counter-cyclical' relationship between the public and private investment during the study period but for the seventies in which they move together (see Graph 2.1). The pattern of co-movements holds true for the phase of liberalization since 1991 as well. Such a shift in the pattern of relationship between the public and private investment, and that too over time, would indicate that there must have been a strategic shift in the investment priorities of the respective sectors since the mid-seventies.

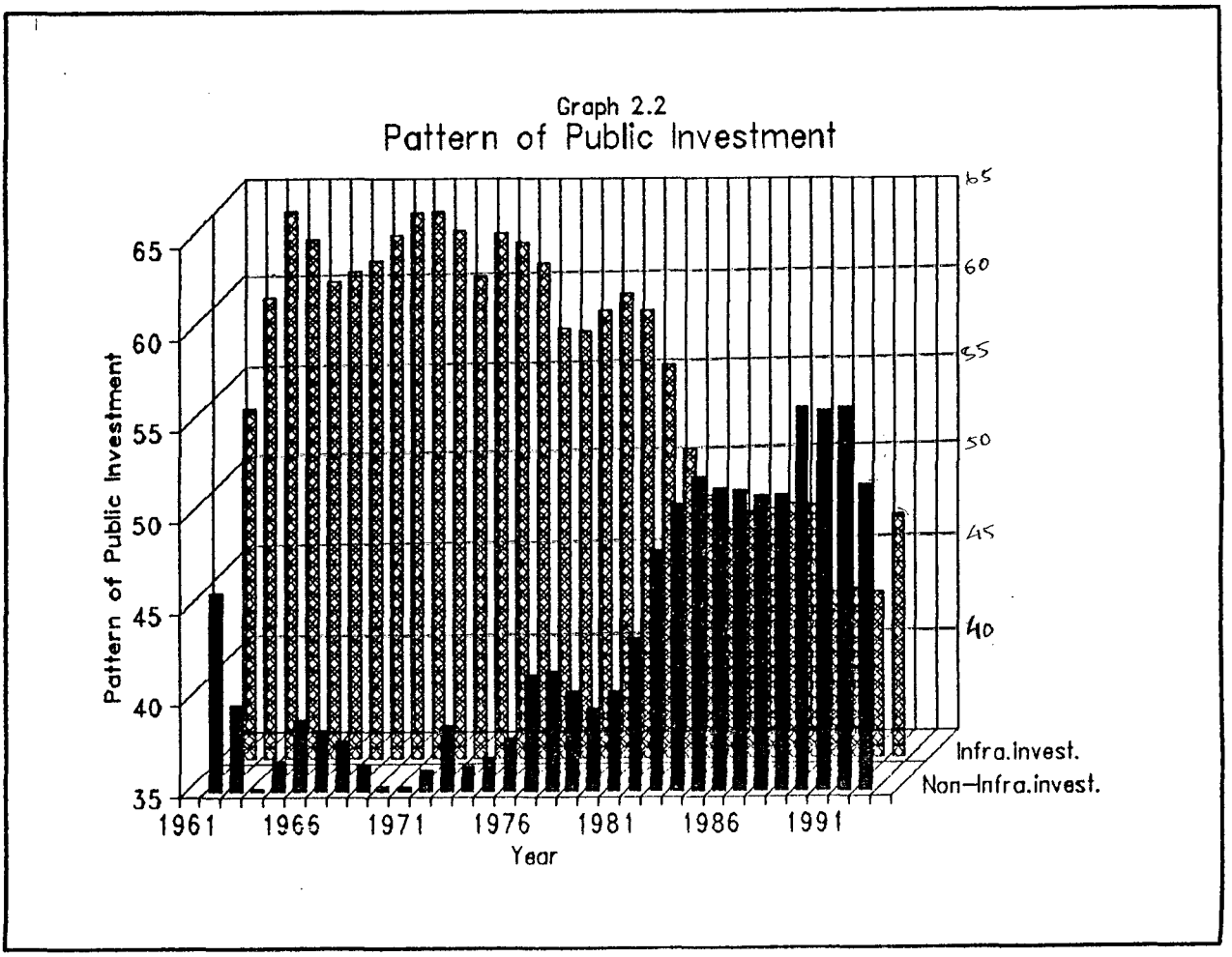
2.2 Pattern of Public and Private Investment

The pattern of public investment and private investment are examined to see whether there has been a decisive shift in the composition of the respective sectoral investment since the mid-seventies. More specifically, we try to find out to what extent the intra-sectoral changes in the public and private investment have influenced the relationship between the sectoral investment. The analysis of the pattern of compositional shift in public and

private investment is limited to the level of functional category in so far as the objective of the study validates the crowding-out hypothesis against the underlying relationship between the public and private investment.

2.2.1 Pattern of Public Investment

As argued earlier, the pattern of public investment by functional categories is taken up here for a closer examination. The functional classification that we have used to examine the compositional shift in the public investment, is the infrastructure investment versus the non-infrastructure investment. This classification is not without reasoning. It has its underpinning from the very conception of public sector in the Indian planning. It may be recalled here that the public sector was justified in the Indian context of providing infrastructural support for industrialization at subsidized cost. Similarly, the public sector was also allowed to enter into the fields of economic activity, where the private investment would not be forth coming due to the long gestation involved, lumpy investment and low rate of return. Thus, these two- pronged strategy of state intervention posits implicitly the two types of relationship between the public and private sectors and accordingly between the respective sectoral pattern of investment: (i) the complementary relationship between infrastructure investment and private investment and (ii) the competing relationship between non-infrastructure public investment and private investment.

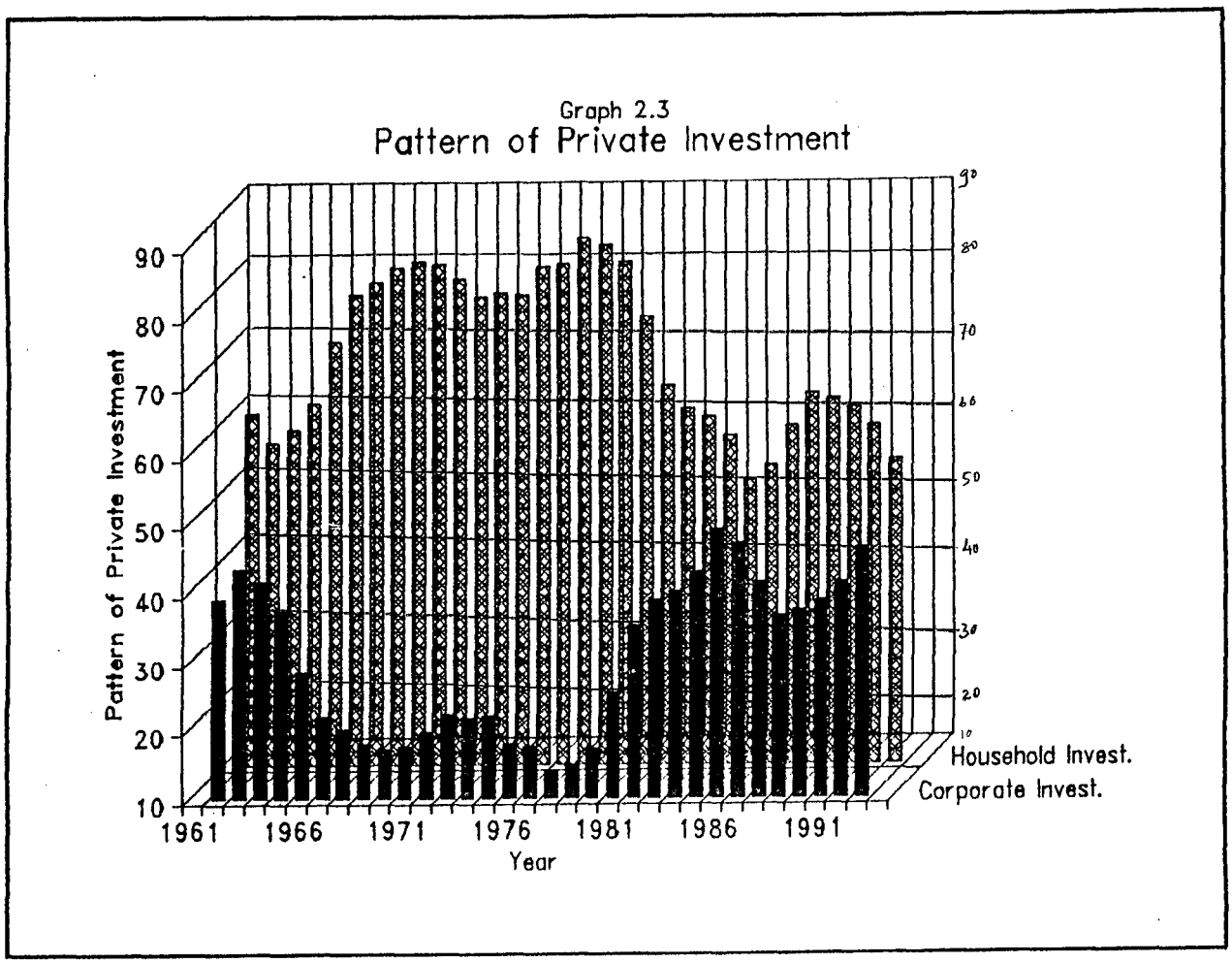


The trend analysis of the pattern of public investment by the aforesaid functional categories suggests that there has been a discernable shift in favour of non-infrastructure public investment since the mid-seventies from the infrastructural investment. But, it is more evident only after the early eighties (see Graph 2.2). It means that the move away from the infrastructural area by the public sector would have its profound effects on the nature of relationship between the public and private sectors only after the early eighties. The observed shift in the priority of the public investment indicates that the public sector has moved into the competing areas only after the early eighties. Till then, the public sector continued to operate in the areas of infrastructure and heavy investment projects

critical for the private investment as envisaged in the Planning. This corroborates our earlier observation that the observed counter-relationship between the public and private investment since the early eighties is due to the shift in public investment towards the areas of activity where it competes with the private sector. It may be, therefore, argued that at the activity level, public investment complements the private investment till the early eighties and competes with the private sector thereafter.

2.2.2 Pattern of Private Investment

Like the pattern of public investment, the pattern of private investment is also analyzed at the level of functional classification. The private investment is broadly divided into household investment and corporate investment. Household investment is normally derived as the residual of the private investment. A large chunk of the household investment lies at the agriculture sector. It does not, however, imply that household investment does not go into the industrial activities. It, indeed, includes the household and non-household industrial activities at smaller scale but are different from that of the public sector. What is important to note here is that the household investment affects inversely the investment potential of both the public and private sectors because much of the aggregate saving critical for investment in the non-household sector comes from the



household sector. This aspect of the household sector that is the financing of investment in the economy, is taken up in the next section.

Given the role of household sector in financing the overall investment in the economy, the behaviour of household investment becomes the most crucial limiting factor in the behaviour of corporate investment. For a given level of household saving, if the household investment declines, it would mean that the investible resources are potentially available to the rest of the economy. As seen from the graph 2.3, the increase in the investment by the corporate sector since the early eighties largely corresponds to a decline in household investment. This could possibly be on account of a change in the

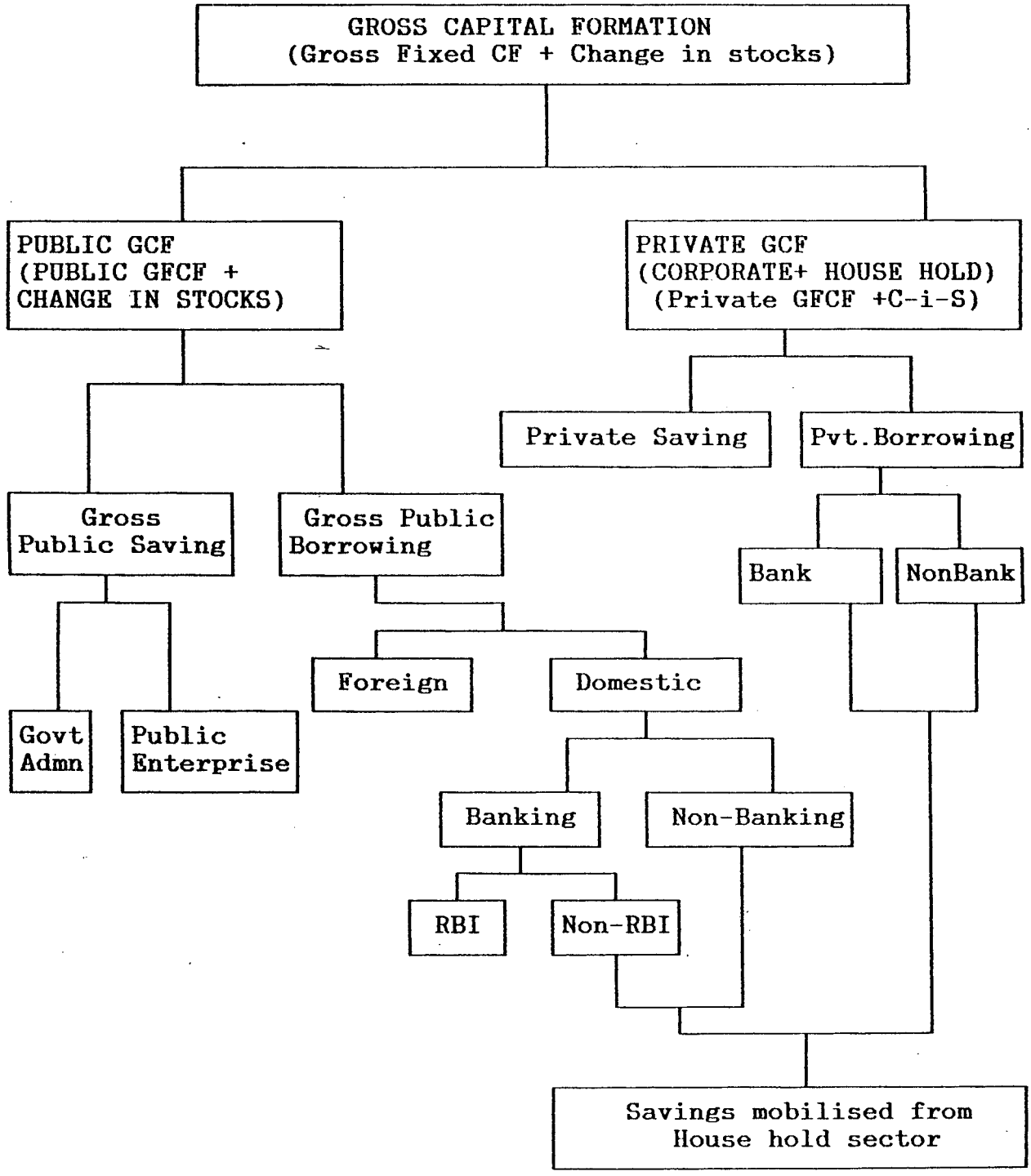
composition of asset holdings of the household sector. To recap, the analysis of intra-structural changes in the pattern of public and private investment has shown that from the eighties onwards, the public sector has largely moved into non-infrastructure related activities where it competes with the corporate sector.

2.3 Financing of Investment

The rate of savings in an economy determines the overall potential for investment. Apart from savings, external aid, deficits can also be a means of financing investment. Public investment could be financed through public sector savings, government taxes and fiscal deficits. Savings is generated by government administration as well as through the profits of public enterprises. Government also borrows from financial institutions, banks etc. Apart from domestic sources, public investment is financed by borrowing from abroad also.

In contrast to public investment, the private sector is limited to financing its investment from its own savings or by borrowing from banks and financial institutions. The private corporate sector can also raise resources from the capital markets. However, the extent to which the public and private (corporate) sector borrow in the domestic market, they compete with each other for the resources mobilised by the financial intermediaries. For this reason, while analyzing the relationship between public and private corporate investment it is necessary to take into account the pattern of financing for each of the sectors. This is explained in the flow chart.

Chart 2.1 Financing of Gross capital formation and its components.



2.3.1 Savings

The gross domestic savings in the Indian economy rose from 12.7 percent of GDP in 1960-61 to 15.7 percent in 1970-71, and further to 21.2 percent of GDP in 1980-81. After reaching a peak level of 23.7 percent in 1990-91 it then declined in the next two years to 20 percent in 1992-93 and 1993-94. The fall in savings rate in the 90s can be mainly attributed to the fall in the household savings rate which accounts for 60 to 80 percent of domestic saving. The household saving increased from around eight percent of GDP in the early 1960s to over 15 percent in the late 1970s. After reaching a peak of 20 percent of the GDP in 1990-91 it fell to 15.9 percent in 1993-94.

As compared to household sector savings, Private corporate savings has accounted for a relatively small proportion of the overall saving in the economy. It has been in the range of 1.5 percent of the GDP from the early 60s right up to the mid 80s. Interestingly, in contrast to the household sector saving rate which started declining after 1990-91, private corporate saving rate shows a small but discernible increase from the mid eighties to reach a level of 4 percent of the GDP in 1993-94. This counter-tendency has also got reflected in the relative shares of household vis-a-vis corporate sector investment (see Graph 2.3). Nevertheless, it needs to be noted that private corporate sector savings meets only a small proportion of its financing needs which is largely dependent on external sources.

Public savings in India, which was 2.6 percent of GDP in 1960-61 increased at a modest rate and moved up to 2.9 percent by 1970-71 and further to 3.4 percent by 1980-81. During the 80s, the rate of public savings has shown a secular decline which continued

into the nineties. By 1993-94 the rate of public savings had reached a low of 0.2 percent of the GDP. It would not be incorrect to infer that the fall in the rate of public savings has been one of the factors contributing to the inability of the public sector to finance its investments. The financing of public investment during the 80's, in particular investment in infrastructure had therefore to increasingly rely on fiscal deficits (including borrowing). It is evident from the above analysis that household savings have mainly contributed to sustaining the rate of investment in the economy although there has been a decline in the rate of saving since 1990.

2.3.2 Taxes

Increased direct taxation for financing public investment could, inter-alia, result in low capital formation in the private sector. This could be because the rich income group (which has the highest propensity to save) will tend to pay a part of taxes by diverting its savings. It may not always be possible to raise additional resources for public investment through taxation on account of a narrow tax base. More importantly, the government may not be willing to raise direct taxes for political reasons. This renders borrowing from the available sources both domestic as well as foreign an important source for financing the growing investment needs.

2.3.3 Borrowings

Given the paucity of internal savings, as also limits to mobilising additional resources through taxes, the public investment in India has tended to be increasingly financed through public borrowing (see appendix 2b). Although it is important to examine the

sources of its borrowing in detail in order to understand the impact of government borrowing on private investment, it is, beyond the scope of the present study. Nevertheless, an attempt is made to highlight the components which may have had direct bearing on the availability of funds to the private corporate sector. Table 2.2 shows the sources of financing of Public investment.

Table 2.2 Capital Formation by Central Government & Its Financing

(Percentage of GDP)

	1980-81	1990-91	1991-92	1992-93	1993-94
A. GCF out of Budgetary Resources of the Central Government.	6.6	6.5	5.7	5.4	6.0
B. Gross Savings of the Central Government	0.0	-2.0	-1.3	-1.2	-2.5
C.Gap (A-B)	6.6	8.5	7.0	6.6	8.5
Financed by					
A. Draft on others of Domestic Economy	5.4	7.8	5.9	5.7	7.8
(i) Domestic Capital Receipts	3.5	5.7	4.8	3.9	6.1
(ii)Budget Deficit	1.9	2.1	1.1	1.8	1.2
b. Draft on Foreign Savings	1.2	0.7	1.0	0.9	0.7

Source : Economic Survey 1994-95.

It may be seen from the table 2.2 that the budgetary support for the capital formation in the economy has been declining since early eighties accompanied by the decline in gross savings of the government. The consequent increase in the financing gap necessitated

an increase in the draft on the rest of the economy. In other words, it is an increase in the Government's borrowing.

The government undertakes expenditures on social and economic infrastructure which has been considered essential for the supporting the developmental process in the country. However, the financial return on these public investments has been far lower than the corresponding social rate of return on such investments. In order to ensure assured access to investible funds, the nationalised banks and the Life Insurance Corporation (LIC) have been statutorily required to invest in government securities. These institutions have accordingly emerged as a major source of public borrowing. The low rates of interest accruing on such securities also meant that unlike market economies, direct participation of the private sector in holding in the government securities has been negligible.

Apart from the resources mobilised by the government through the sale of securities, the public sector organisations (enterprises) also borrow directly from public financial institutions like the Industrial Finance Corporation of India, the State Financial Corporations, the Industrial Development Bank of India, Agricultural Refinance And Development Corporation of India, Industrial Credit and Investment Corporation of India etc.

As a matter of fact, most of the institutions mentioned above mobilise savings from the household sector and channelise them not only to finance public investment but also to the private corporate sector. In order to address the issue of 'crowding out' of the private

corporate sector by the public sector in the market for borrowed funds, it is critical to examine whether this increase in borrowing for financing public investment necessarily implied a reduction in the availability of loanable funds to the private corporate sector. The issue is taken up in the subsequent section.

2.3.3. Financing Private Investment

The primitive nature of capital markets in developing countries limits the financing of private investment to the use of retained profits, bank credit, and foreign borrowing [2]. An increase in the real credit to the private sector will in general encourage real private investment. Control of total bank credit is usually the principal instrument of monetary policy in developing countries. By varying the composition of credit between the public and private sectors the government can affect the speed and ability of private investors to achieve their desired levels of investment.

A view that has gained considerable currency is that the availability of credit is the main constraint on investment activity of the private sector.[3] According to McKinnon (1973), the rates of return on investment in developing countries typically tend to be quite high, whereas real interest rates on loanable funds are kept artificially low by governments for a variety of reasons. Since the total amount of financing is limited and the price mechanism is not allowed to operate smoothly, the private corporate sector in a developing country is restricted by the level of its retained profits (savings) and the

[2] Blejer and Khan (1984)

[3] McKinnon, Ronald I (1973):.

available bank financing. The effect exerted by the rate of interest on private investment (if any) is at best indirect within this rationing framework. It could only work through the channel of financial savings.

Coming to the source of financial savings, it is mainly the households sector that have net surplus funds and is thus the provider of investible resources to the rest of the economy. Investment by the private corporate sector as well as the public sector depends on the extent to which household savings are mobilised through the intermediation of financial institutions. Similarly, the extent to which the household savings are in the form of financial assets is an indicator of the ability of an economy to mobilise the savings for purposes of investment.

The share of financial assets in households savings has been increasing, particularly since the early eighties. Further, the composition of financial assets held by the households sectors clearly shows that the spread of institutions has also contributed to mobilising resources for investment by the deficit sectors of the economy. The diversification in the portfolio of financial assets of the households sector is also an indicator of the emergence of newer financial instruments (see Table 2.3).

Table 2.3 Composition of Financial Assets of the Household Sector (1961 to 1991).
(in per cent)

Assests	1961-62 65-66	1974-75	1990-91
	21.1		
Currency	31.8	11.4	10.7
Bank Deposits	28.3	47.2	30.8
LIC & PF		26.6	28.7
Capital Market Instruments	11.4 7.4	4.6	15.0
Others		10.2	14.8
Total	100	100	100

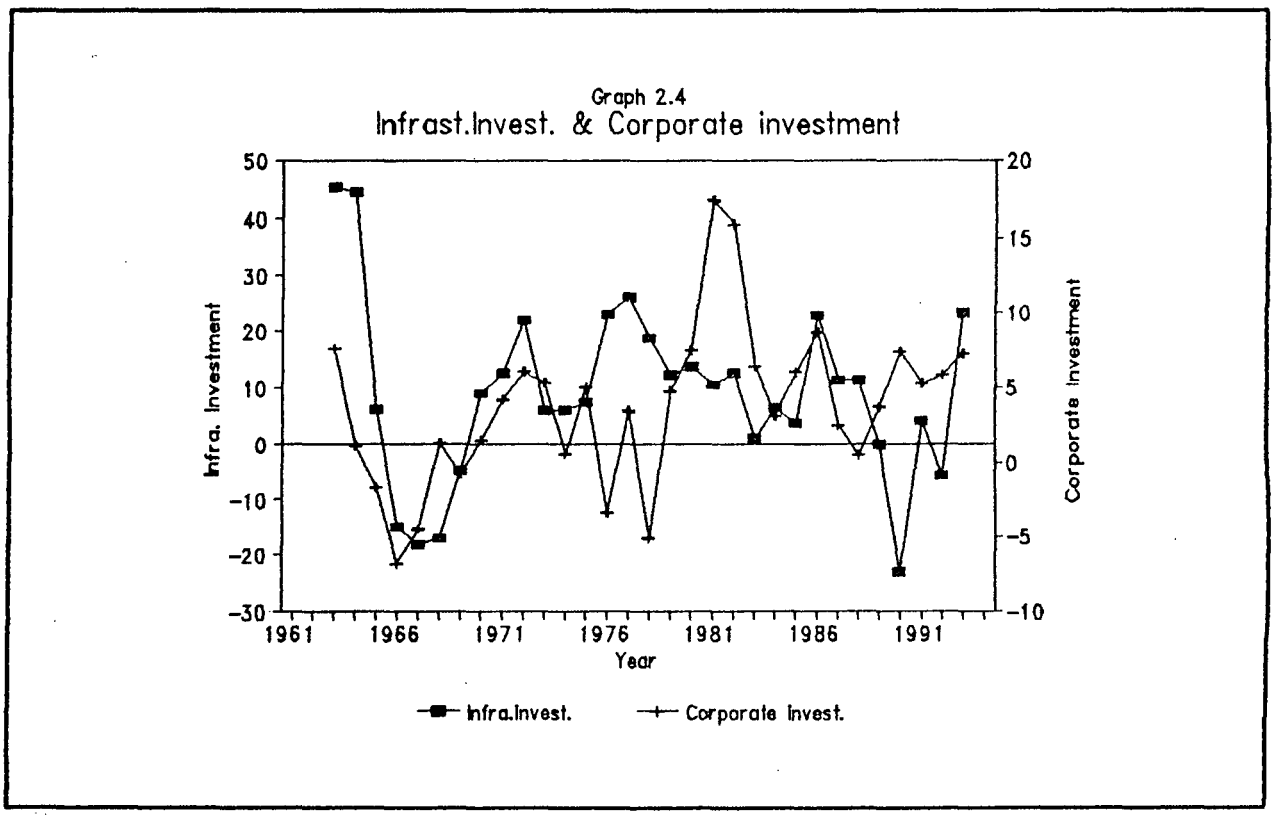
Note: Capital market instruments include the shares and Debentures, Corporate Deposits and the UTI securities.
Source: Report on Currency and Finance 1991-92.

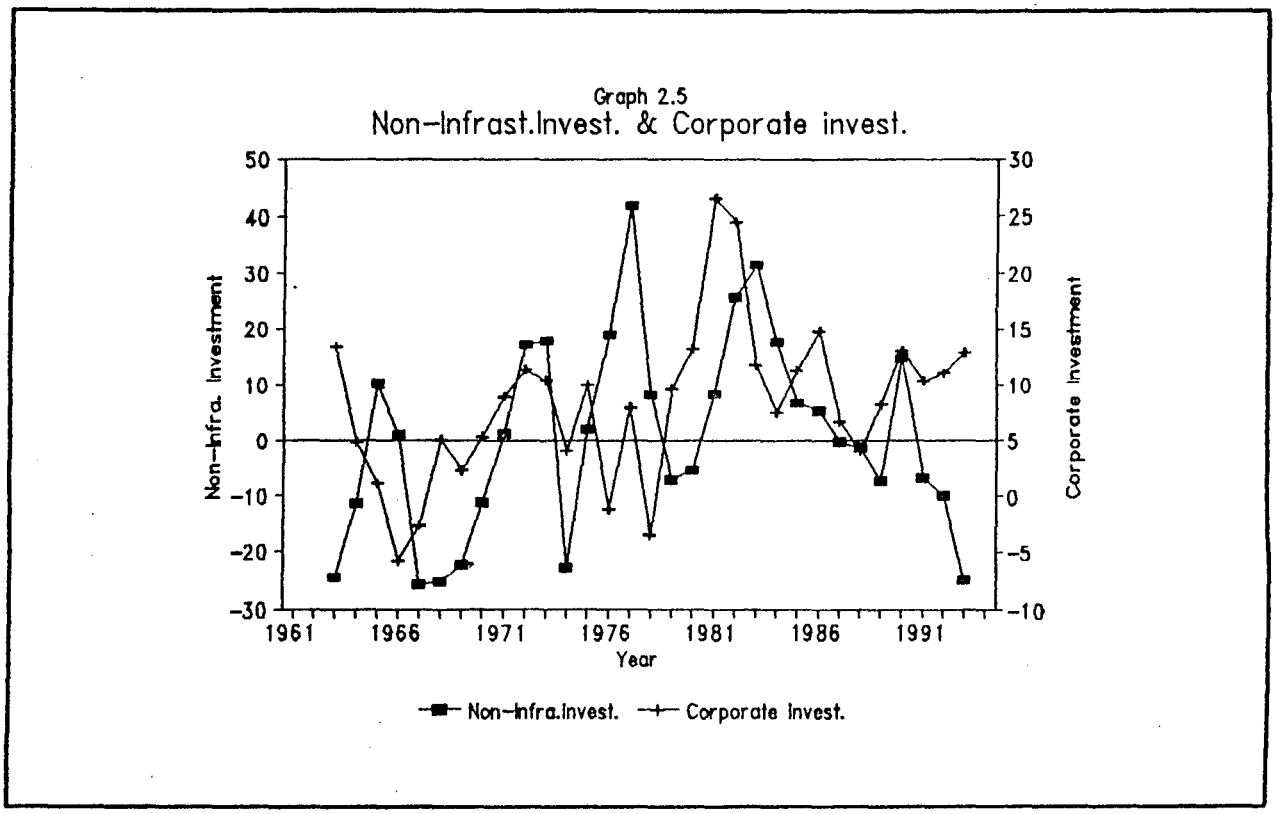
It is evident from the table 2.3 that the structure of house hold saving has undergone a strategic shift in favour of capital market instruments whereby the private sector has had direct access to the loanable funds of the household sector. The forgoing analysis also indicates that the private corporate sector at the aggregate level is unlikely to have been constrained in a significant way in terms of its access to loanable funds. To that extent, the question of 'crowding out' of the private corporate sector in the market for loanable funds on account of governments reliance on borrowing does not seem to be relevant in the Indian context.

2.4 Relation Between Public and Private Investment: Stylized Facts

Having observed that households' investible resources are increasingly mobilised through financial institutions and capital market instruments as seen through the proliferation of

financial assets, it becomes pertinent to explore the emerging nature of relationship between the public sector and private corporate sector. As argued in Section 2.2, there exists two types of relationship: the public sector, on the one hand, provides infrastructural support for the corporate sector and, on the other hand, participates into the areas where the corporate sector operates. The analysis of the pattern of public investment has also,





subsequently, pointed out that there has been a perceptible shift in the pattern of public investment from infrastructure activities to non-infrastructure activities since the early eighties. It would then appear that the notion of public investment per-se, either 'crowding out' or 'crowding in' of private investment is not a simple one, but needs to view in terms of the composition of public investment.

At the outset, the relationship between the public and corporate investment is discerned through the visual inspection of the relative trends in three year moving averages of the respective annual growth rates. It is found that the trends in infrastructure-oriented public investment and corporate investment more or less move together. One may even venture to term it as a 'pro-cyclical' relationship. Interestingly, investment in infrastructure moved long with private corporate investment even during the phase of liberalisation since 1991.

There is an implicit suggestion of a crowding in tendency of private corporate investment by public investment in infrastructure sector.

The analysis is extended to the relationship between non-infrastructure investment and corporate investment (see Graph 2.5). Here the relationship between non-infrastructure investment and corporate investment does not seem to follow any clear pattern. The non-infrastructure public investment had grown in relation to corporate investment during the early sixties whereas the reverse holds true in the early nineties. These divergent tendencies which happen to correspond to the period of import substitution regime and the recent period of liberalisation, make it difficult to draw any clear inference about the nature of relationship non-infrastructure-oriented public investment and private corporate investment.

2.5 Summary

In this chapter we examined the trend, composition and pattern public and private investment (in particular private corporate investment) with the objective of exploring the underlying relationship between the two. The observed trends, which throw some light on the debate on the question of 'crowding in' versus 'crowding out' of private investment by public investment. The empirical validation of the crowding out hypothesis requires a rigorous testing of a model in which the public investment is decomposed into its components (infrastructure and non infrastructure) and incorporating simultaneously financial variable and other determinants of private corporate investments. We now turn to such an empirical exercise.

CHAPTER 3

RELATIONSHIP BETWEEN PUBLIC AND PRIVATE INVESTMENT AN EMPIRICAL TESTING

In this chapter, an econometric analysis is carried out to test the relationship between public and private investment. While the specification of the model that is guided by the observed trends and patterns in public and private investment we would like to place it against the backdrop of the vast empirical literature that exists on the determinants of private corporate investment.

3.1 Review of Investment Models

Much of the literature on private corporate investment has focussed on its determinants in the context of an industrialised economy. An examination of empirical literature suggests that there is no unique investment function, which can be termed as the most appropriate for explaining private corporate investment. Ackley (1978) has remarked that "investment theory has received a great deal of attention in the last two decades. Nonetheless, it is fair to say that there is no clear consensus among economists as to a single "best" theory of investment. Empirical generalisations regarding investment behaviour are similarly inconclusive. This is reflected in the fact that no econometric investment function performs very well; in particular, none allows us to predict the path of investment with much confidence" (Ackley, Gardener (1978)).

The Neo-classical flexible accelerator model has been widely used for explaining investment behaviour for industrial economies. However, some of the key assumptions underlying this model, such as perfect capital markets, little or no government investment etc. are inapplicable as far as developing countries are concerned. Accordingly, empirical research has focussed on identifying other economic factors that might be expected to affect the level of private investment.

On account of the problems inherent in applying the standard neoclassical model particularly to developing countries, a number of hypotheses have been advanced to explain the variations in the private investment activity in such countries. One approach has been based on the hypothesis that private investment in developing countries is positively related to the accumulation of domestic real money balances. Underlying this hypothesis is the assumption that private investors in these countries must accumulate money balances before undertaking investment projects because of their limited access to credit and equity markets. Because real money balances are directly influenced by real deposit interest rates, there should be a positive relationship between private investment and real interest rates in these countries.[1]

Some studies have attempted to retain the neo-classical model but have modified it to address the analytical and data problems involved in its application to developing countries, in particular the lack of data and the resource constraints facing private

[1] Greene, Joshua and Delano Villanueva(1991).

investors (for example, Sunderarajan and Thakur (1980), Tun Wai and Won (1982), and Blejer and Khan (1984)). A broad consensus has, however, emerged in recent years that in contrast to developed countries, one of the principal constraints on investment in developing countries is the quantity, rather than cost, of financial resources. This view put forward by McKinnon (1973)[2] has gained considerable currency in the literature on financial development. The rates of return on investment in these countries typically tend to be quite high whereas real interest rates on loanable funds are kept low by governments for variety of reasons. Since the total amount of financing is limited and the price mechanism is not allowed to operate smoothly, it would seem legitimate to hypothesize that the private investor in a developing country is restricted by the level of available bank financing. [3].

We have already touched upon these aspects in the last section of the previous chapter and therefore, further elaboration on this point may not be necessary. However, in the specification of our model, the role of bank credit and interest rates is specifically taken into account with a view to test the McKinnon hypothesis.

In many developing countries, the capital markets are not well developed and are rudimentary in nature. This limits the financing of private corporate investment to the use of its savings (that is, retained profits), domestic borrowing which is mostly available in

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[2] McKinnon, Ronald I(1973).

[3] von Furstenberg, G M (1980), pp 637-78.

the form of bank credit, and foreign borrowing. Of these, the flow of bank credit to the private sector would perhaps tend to be quantitatively the most important. An increase in the real credit to the private sector will in general encourage real private investment, and rolling over bank loans can sufficiently lengthen the maturity of the debt. Control of total bank credit is usually the principal instrument of monetary policy in developing countries. By varying the composition of credit between the public and private sectors, the government can affect the speed and ability of private investors to achieve their desired level of investment. Monetary policy can thus have a direct and potent influence on the rate of private investment[4].

The above discussion suggests that even in a developing country context, it may be meaningful to take into account financial variables such as the level of credit and the rate of interest while explaining private corporate investment. The previous chapter brought to focus the importance of the composition of public investment and its likely impact on corporate investment. Therefore, the specification of the model that is to follow incorporates the aforesaid influences in trying to explain the relationship between public and private investment .

3.2. Specification of the Corporate Investment Model

Given the complex relationships between the public and private investment, the examination of "crowding in or crowding out" between the sectors would naturally entail an understanding of the determinants of the private corporate investment. For instance,

[4] Blejer Mario I and Khan, Mohsin S (1984).

the financial variables such as interest rate and bank credit have significant bearing on shaping, and rather sustaining, the relationship between the public and private corporate investment. It is in this context that the relationship between the public and private investment is examined within the corporate investment model.

The corporate investment model which is being used here to estimate the relationship between public and private corporate investment is a modified version of the commonly used accelerator model. The modification became necessary as it was difficult choose any one of the existing model (Sunderarajan and Thakur(1980) , Blejer and Khan (1984), Ramirez (1994) and Karen Parker (1995)) as such in view of the difference in objectives and scope of these studies. More over, the analysis of the composition of public and private investment in the preceding chapter also necessitates a modification of the standard investment model for incorporating the composition of public and private investment.

The investment model used in the study is specified as under:

$$CI = f\ (\ NIF, INF, BC, IR, CI(-1))$$

A list of variable names and their description is given in Table 3.1

Table 3.1 List of variables in the Corporate Investment Model

INF - Public Infrastructure Investment
NIF - Public Non-Infrastructure Investment
CI - Private Corporate Investment
BC - Bank Credit available for Corporate Sector
IR - Real Interest Rate[5]
NI - (NIF/INF)

The model (1) postulates that there is a complementarity between public infrastructure investment and private corporate investment while there is trade-off between public non-infrastructure investment and private corporate investment. In addition, the bank credit and real interest rate are included to test the McKinnon hypothesis.

The logarithmic transformation enables us to estimate empirically the model specified above as follows

$$\ln CI_t = \alpha + \beta_1 \ln INF_t + \beta_2 \ln NIF_t + \beta_3 \ln BC_t + \beta_4 IR_t + \beta_5 \ln CI_{t-1} + e_t \quad \text{---------- (1)}$$

[6] The real interest rates has been arrived at by deducting inflation rates (WPI) from the Minimum Lending rates (selective credit control) prescribed by the RBI for the commercial banks including the State Bank of India for which the data is available from the Report on Currency and Finance published by the RBI.

It is noted that real interest rate is retained as it is because of negative values for some years during the study period. Moreover, the model (1) is likely to suffer from the presence of multicollinearity between public infrastructure investment (INF_t) and public non-infrastructure investment (NIF_t) for the plausible reason that the public infrastructure investment is equally important for the public non-infrastructure investment in terms of infrastructural support and effective demand generation.

Keeping this in view, the log-linear model is reformulated into the following one so that the relationship between public and private investment does not suffer from the effects of multi-collinearity.

$$\ln CI_t = \alpha + \beta_1 \ln INF_t + \beta_2 \ln NI_t + \beta_3 \ln BC_t + \beta_4 IR_t + \beta_5 \ln CI_{t-1} + e_t \quad \text{-------- (2)}$$

where $\ln NI_t = \ln (NIF_t / INF_t)$

The public non-infrastructure investment (NIF_t) is replaced by the ratio of public non-infrastructure investment/public infrastructure investment (NI_t). Although we expect that there must be multi-collinearity between the aforesaid independent variables at *apriori* level, we begin with the estimation of model (1) and then move on to the modified model (2).

3.3 Estimated Model: Interpretation

The private corporate investment models as enunciated in the model (1) and model (2) are estimated using the ordinary least squares (OLS) method. The results are presented in Table 3.2. It is interesting to note that despite the high R-squared and non-auto correlation, the model (1) suffers from the problem of multicollinearity between public investment in infrastructure and public investment in non-infrastructure. We, therefore, rely on the estimates of the model (2) which is aimed at resolving the problem of multicollinearity. It may be seen from the table 3.2 that all the variables except the real interest rate in the model (2) have become significant without any change in the predictive power of the model. This is evident from the estimates of R-squared, standard error of regression and Durbin-Watson Statistic (D-W). Since the real interest rate continues to be insignificant, we have re-estimated the model (2) without the real interest rate variable and presented it in the third column of the table 3.2. It shows an improvement in the predictive power of the model (2) without affecting the parameters of the variables under consideration. The model (2) without the real interest rate is taken up for an interpretative analysis.

It reveals that there is complementarity between public investment and private corporate investment when the former is defined in terms of the investment in infrastructure. The relationship between public investment in non-infrastructure and private corporate investment is weak. In fact, the result do not permit us to comment on the nature of relationship between that part of the public investment and private corporate investment.

Table 3.2 Private Corporate Investment Model for India (1960-61 to 1993-94)

Indepenent Variables	Model 1	Model 2	Model 2 without IR
Constant	-0.101 (0.110)	-0.101 (0.110)	-0.109 (0.129)
ln NIF	0.349 * (1.805)		
ln NI		0.349 * (1.805)	0.341 * (1.879)
ln INF	-0.026 (0.109)	0.323 * (2.324)	0.324 * (2.380)
ln CI (t-1)	0.412 * (3.618)	0.412 * (3.618)	0.411 * (3.684)
ln BC	0.297 * (5.327)	0.297 * (5.327)	0.298 * (5.472)
IR	-0.001 (0.140)	-0.001 (0.140)	
R-squared	0.955	0.955	0.955
Ad. R-squared	0.947	0.947	0.948
S E of Reg.	0.194	0.194	0.190
D-W Statistic	1.77	1.77	1.79

Note: Dependent Variable - Private Corporate Investment (DCI)
Figures in parentheses are estimated t-ratios
* denotes significant at 5 per cent
** denotes significant at 10 per cent

The one-year lagged corporate investment is positive and significant , suggesting that there is an acceleration effect. In the case of financial variables, bank credit is significant with a positive sign whereas the real interest rate is insignificant. On the whole, it is evident that when public investment is decomposed activity-wise, the relationship between public investment in infrastructure and private corporate investment is complementary.

3.4 Conclusion

An eonometric analysis is carried out in this chapter to validate the relationship between public and private investment. For this purpose, the accelerator model for explaining variations in private corporate investment has been modified by incorporating an activity wise decomposition of public investment. The result suggest that there is complementarity between public investment in infrastructure and private corporate investment. In variance to the above, the relationship between public investment in non-infrastructure activity and private corporate investment is not very clear. On the whole the econometric testing does not give adequate empirical support to the 'crowding out' hypothesis

CHAPTER 4

SUMMING UP

The purpose of this study has been to unravel the complex relationship between public and private investments in Indian economy. The main hypothesis subjected to empirical scrutiny is whether the relationship between public and private investment is one of "crowding in" or that of crowding out. Employing the relevant data from National Accounts statistics and from the Reserve Bank of India, the study tested the relationship over the period 1960-61 to 1993-94. The issues addressed in the study assumes increasing importance for the future as more and more developing countries try to encourage private investment.

First, we tried to bring out the significance of the study in the present situation in India. With the fiscal reforms becoming the focus of many an economic debate, the question as to whether the government should go in for more investment as it did during the earlier periods of planning, and the question on the government investment's influence on the private investment have become important. It is not only in India, but in developing as well as developed countries that this question has been raised. An analysis of these aspects is done in the first part of the first chapter.

Next, we tried to bring out the various definitions and concepts of crowding out and crowding in. In a broad sense, "crowding out" in investment is defined as increased public

investment resulting in bringing down the rate of investment in the private sector. On the other hand, increase in Public investment also can increase private investment by providing infrastructure and by removing the bottlenecks on the path of private investment process. This is "crowding in" by the public investment by 'complementing' private investment. We have looked into the theoretical explanations and factors that determine whether the relationship between them were crowding in or crowding out.

A review of the literature available on this area on developing as well as developed countries provided an understanding of the experiences of various countries and the explanations for it. We reviewed some studies on the relationship between private investment and public investment and also some of its other determinants ranging from developed countries like U S and Canada to developing countries in Latin America. We came across some of the studies on India also. Some of the studies on India were of the opinion that public investment actually crowds out private investment. Some studies have taken sectoral analysis and argued that in sectors like agriculture, crowding in take place while in other sectors, it is mostly crowding out. Since our concern is only about the corporate investment, we have not taken the agriculture investment in public and private sector into our analysis.

Keeping these factors in mind, the objectives were designed. The objectives were to test the kind of relationship that exists between the public and private corporate investment and also to see what are the factors that influenced the behaviour of the private corporate

investment. Here, one thing to remember is that we have taken investment only in fixed assets, that is public and private fixed investment.

An overview of the trends and pattern of the public and private investment is done in the second chapter. Here, we have first analysed the various issues involved in the data used and the factors that determine private investment. The analysis of the aggregate trends was carried out for the period 1960-61 to 1993-94. The analysis showed that the public sector in India continued to be dominant in terms of its share in gross capital formation to the end of the eighties. However, the importance of the private corporate sector grew, during the early eighties. The revival of growth in investment from the mid-seventies (after a period of stagnation) was marked in the private corporate sector as compared to the public sector. The analysis of trends and pattern of sectoral investment in chapter 2 suggested that there has been a complementary relationship between public investment in infrastructure and private corporate investment.

The question of 'crowding out' of the private corporate sector in the market for loanable funds on account of governments reliance on borrowing was also examined in some detail. It was seen that for the economy as a whole, the household sector has surplus savings which when mobilised through the process of financial intermediation go to support investment activities of public as well as private sector. Our study showed that even though, the public sector came to increasingly rely on borrowed funds to finance its investment, yet this type of 'crowding out' of the private corporate sector in the market for loanable funds was not significant in the Indian context. This is mainly because the

structure of household savings has undergone a strategic shift in favour of capital market instruments whereby the private sector has had direct access to the loanable funds of the household sector. Our study therefore indicated that the private corporate sector at the aggregate level is unlikely to have been constrained in a significant way in terms of its access to loanable funds.

The analysis of the pattern of investment in the public sector and its impact on private sector investment suggested that it is not merely the aggregate volume of public investment, but its composition that matters in so far as its impact on private investment is concerned. Due to limitation of time and space a detailed analysis of the composition of public investment could not be carried out. However, we have gone into this issue (chapter 3) by incorporating the influence of public investment in infrastructure and non infrastructure related activities within a framework of an econometric model. This model which aims at explaining the responsiveness of private investment to public investment, also incorporates key financial variables like bank credit and the rate of interest. The estimated model shows that financial variables such as increase change in bank credit has positive influence on the rate of private corporate investment in the economy. At the same time, the rate of interest does not seem to play significant role in determining the private corporate investment.

The findings of this study when brought together help us in concluding that any debate on the relationship between the public and the private sector has to take into account the sectoral composition of public investment. Our study also shows that the changes in the

composition of public and private investment and the inter-linkages between the two, deserves further study and research not only at the aggregate level but also at disaggregate level. It also follows, that any move to reduce the role of the public sector and the extent of public intervention should take into account the inter-linkages and the compositional aspects of investment.

Appendix

Table 2.a: GFCF as Percentage of GDP 1961-1994.

Year	Total FCF	Public FCF	Corporate FCF	HouseholdFCF	Pvt GFCF	Pbc.Infra
1961	13.3	6.5 (48.93)	2 (20.99)	4.8 (35.9)	6.8	2.3
1962	14	6.4 (45.93)	2.9 (15.05)	4.6 (33.07)	7.5	2.2
1963	14.4	7.1 (49.25)	2.2 (20.57)	5.1 (35.7)	7.3	3.6
1964	14.8	7.4 (49.60)	3.1 (16.09)	4.4 (29.83)	7.5	4.0
1965	14.8	7.4 (49.85)	2.4 (9.63)	5 (34.04)	7.4	3.6
1966	15.8	7.8 (49.52)	1.5 (10.06)	6.5 (40.9)	8	3.7
1967	15.6	6.9 (44.49)	1.6 (10.58)	7.1 (45.4)	8.7	3.3
1968	14.7	5.8 (39.58)	1.6 (9.73)	7.3 (49.9)	8.9	2.8
1969	14.7	5.8 (39.24)	1.4 (7.73)	7.5 (51)	8.9	2.7
1970	14.6	5.4 (37.13)	1.1 (9.83)	8.1 (55.13)	9.2	2.6
1971	14.6	5.5 (37.97)	1.4 (11.04)	7.6 (52.2)	9	2.9
1972	15.3	6.1 (39.55)	1.7 (10.14)	7.6 (49.4)	9.3	2.9
1973	15.9	7.1 (44.51)	1.6 (11.72)	7.2 (45.35)	8.8	3.3
1974	14.6	6.5 (44.20)	1.7 (10.53)	6.4 (44.07)	8.1	2.9
1975	15	5.8 (38.82)	1.6 (7.27)	7.6 (50.6)	9.2	3.1
1976	16.9	7.1 (42.02)	2.2 (8.89)	7.6 (44.76)	9.8	3.4
1977	18	8.3 (46.05)	1.3 (6.03)	8.4 (46.7)	9.7	3.5
1978	17.9	8 (44.70)	1.6 (8.71)	8.3 (53.9)	9.9	3.4
1979	18.1	8 (44.37)	1.1 (13.48)	9 (49.6)	10.1	3.5
1980	18.6	8.7 (46.81)	1.6 (18.53)	8.3 (44.48)	9.9	3.7
1981	19.3	8.6 (44.51)	2.6 (20.67)	8.1 (42.03)	10.7	3.9
1982	19.7	9.1 (46.41)	3.6 (16.83)	6.9 (35.1)	10.5	3.9
1983	20.1	10.4 (51.96)	4.2 (17.98)	5.5 (27.36)	9.7	4.1
1984	19.3	9.9 (51.13)	3.2 (19.65)	6.2 (32.1)	9.4	3.6
1985	19.7	10.1 (51.34)	3.5 (14.16)	6 (30.69)	9.5	3.9
1986	20.7	10.5 (50.69)	3.8 (14.06)	6.4 (30.8)	10.2	4.0
1987	21.2	11.4 (53.59)	4.2 (14.8)	5.7 (26.76)	9.9	4.8
1988	21.7	10.4 (47.89)	3.1 (16.36)	8.2 (37.95)	11.3	4.4
1989	21.6	10.1 (46.53)	3 (25.11)	8.5 (39.4)	11.5	7.2
1990	22.5	9.6 (42.68)	3.3 (27.85)	9.6 (42.5)	12.9	7.5
1991	23.2	9.4 (40.46)	3.8 (34.35)	10 (43.17)	13.8	7.0
1992	22.2	9.5 (42.93)	5.6 (26.11)	7.1 (31.96)	12.7	7.4
1993	21.5	8.5 (39.47)	6 (28.82)	7 (32.68)	13	7.3
1994	20.9	8.4 (40.15)	7.2 (34.45)	5.3 (25.5)	12.5	6.5

Source: EPW Research Foundation (1995) Special Statistics - 13
National Statistics For India-2, Domestic saving and Capital formation, Nov.25.
* Figures in the brackets show the percentage share of each sectors in the aggregate GFCF.

Table 2.b Components of Public Investment
(as percentage of Public Investment)

Year	PBC per.GDP	GDCF Public saving	Public Borrowing Total	Foreign	Domestic
1960/61	7.1	36.62	63.38	26.76	36.62
1965/66	8.5	36.47	63.53	27.06	36.47
1970/71	6.5	44.60	55.40	15.40	40.00
1975/76	9.6	43.75	56.25	18.74	37.51
1980/81	8.7	39.08	61.92	14.80	47.12
1985/86	11.2	28.83	71.17	9.91	61.26
1989/90	10.0	15.89	84.11	10.28	73.83

Source: Little and Joshi

Table The share of components in Domestic Borrowing
(As % of total domestic borrowing)

Year	Total as% of GDP	Banking system	RBI	Commercial bank	Non-bank pbc	nonRBI borrowing
1961/62	2.3	52.17	39.13	13.04	47.83	60.87
1965/66	3.1	58.06	45.16	12.90	41.94	54.84
1969/70	1.8	5.56	-11.11	16.67	94.44	111.11
1974/75	2.8	39.29	17.86	21.43	60.71	82.14
1979/80	5.2	65.38	50.00	15.38	34.62	50.00
1984/85	6.6	53.03	39.39	13.63	46.97	60.60
1989/90	7.9	58.23	39.24	18.99	41.77	60.76

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