PUBLIC ENTERPRISES IN INDIA

An Enquiry into

Some Aspects of Physical and Financial Performance

Dissertation submitted in partial fulfilment of the requirements for
the award of the degree of Master of Philosophy in Applied Economics of
the Jawaharlal Nehru University, New Delhi

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I hereby affirm that the research for this dissertation titled "Public Enterprises in India: An Enquiry into Some Aspects of Physical and Financial Performance" being submitted to the Jawaharlal Nehru University for the award of the Degree of Master of Philosophy was carried out entirely by me at the Centre for Development Studies, Trivandrum.

Trivandrum
9-12-1988

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Certified that this dissertation is the bonafide work of Smt. Radhika Srinivasan and has not been considered for the award of any other degree by any other University. The dissertation may be forwarded for evaluation.

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Contents

Chapter 1

Public Sector: The Macroeconomic Context

This study makes an attempt to assess the performance of public enterprises by placing them in a macroeconomic context. Two reasons have motivated this approach: (a) despite the range and diversity of public sector activity and its critical role in a 'dirigistic' development strategy, there is a lack of recognition - at a theoretical level - of public sector as a separate sectoral entity (like agriculture and industry), having a distinct set of inter-relationships with the rest of the economy. This theoretical inadequacy has resulted in: (b) a large body of empirical literature which tries to explain the performance of public enterprises solely in terms of enterprise specific micro factors, to the virtual neglect of the macroeconomic environment within which they operate. Consequently, a macro picture of public sector performance does not emerge from such studies.

While this study does not directly explore the larger theoretical issues, as a first step towards it, we have made an attempt to link the public sector performance with the rationale of its existence and the macroeconomic environment within which it operates so as to appreciate the constraints, hampering their 'efficient' functioning. / It is our basic premise that an explanation for public sector performance has to be sought not only within the firms, but beyond, in its relationships with the rest of the economy. More specifically, the micro-level evaluation of public enterprises has been dealt with, by examining physical and financial parameters and understanding the

emerging patterns in the light of their macroeconomic environment.

I

The standard macroeconomic models which are basically aggregative are not appropriate for analysing developing countries, given the structural heterogenity within such economies. From the point of view of organisation of production, differences in supply response, price formation and the rapidity of adjustment to prices, contemporary development economics holds that the most appropriate sectoral division is between agriculture and non-agriculture.[1] With the agricultural sector quantitatively more important and the non-agricultural sector more dynamic, the path for sustained accumulation and industrialisation is sought to be postulated in terms of an interaction between the two sectors. While this argument that a higher rate of growth of agriculture would exert a determining influence on the rate of growth of industrial production, is a long standing one dating back to classical economists, viz., James Steuart, Adam Smith and Ricardo, its rejuvenation in development literature owes a great deal to Lewis.[2]

Following Lewis a large body of literature[3] has emerged highlighting the channels through which agricultural performance influences industrial growth - investment requirements and the macro adjustments between the two sectors that permit savings to come forth; non-agricultural demand for employment and food confronting agricultural supply response; shifts in income distribution that ensue along with rural- urban migration. The emphases on the type of linkage that is operative, obviously vary. For example, 'Keynesian type'

formulations focus on the savings-investment link whereas models with classical predilictions emphasise the interactions that go to determine the functional distribution of income. While these inter-linkages have emerged with different contours historically, they grow through changing technology, with agriculture using more and a greater variety of industrial inputs, and the emergence, on the other hand, of a variety of agro based industrial activities. With increasing commercialisation, new products appear and production becomes diversified both in inputs as well as outputs. The stylised view of growth following from the symbiotic relation was one of steady expansion of industry, at least till "the turning point"[4] is reached.

Notwithstanding the importance of these relationships, experience on the whole, however, seems to suggest that possibly more is needed today for rapid industrialisation than maintaining a satisfactory performance in agriculture. The agriculture-industry relation, which evolves with the pace of capitalist development reflecting changes in the historical conditions, seems to have weakened. This is partly due to the increase in agricultural production being confined to food grains, the proportionately larger increase in the import demand of agriculture for petroleum based inputs as also due to the changes in industrial structure. The unbalanced nature of the product mix originating in agriculture plays a very major role in limiting the impact on industrial expansion. Similarly the effect of a rise in the amount of imported purchased inputs used by the agricultural sector spills over into the balance of payments creating a proportionately larger increase in import demand for petroleum and petroleum based products. If this

process suggests a ' a delinking ' of industrial growth from its moorings in the agricultural sector, there can be serious implications on the sources, pattern and sustainability of macro-economic growth.

These analytical issues have been pointed out in the Indian situation during the staganation debate of the mid-sixties.[5] One of the main explanations for the stagnation of Indian industry has been in terms of agricultural performance. Various facets of agrarian conditions have been highlighted as they affected the supply - availability[6] and terms on which supplied[7] - of one of the main constituent of wage goods. That apart, recognising the importance of agriculture in the formation of home market, it has been argued that the industrial strategy was undertaken without substantial land redistribution and this made it inevitably transitory[8]. Treating agriculture as a sector where 'flex - price fix - output' system operates, a slow rate of agricultural growth translates itself into a rise in the prices-absolute and also relative to industry. This apart from squeezing the profit margin in industry, also narrows the 'population base' of demand for industrial products. This in turn favours a product mix such as to correspond to the tastes of those in whose hands purchasing power is concentrated-industrial production then is propelled to a great extent by a fast rate of increase in demand for consumer durables, which are highly capital intensive and import intensive.[9]

Further, since surplus producing agriculturists are taxed comparatively lightly, a shift in income distribution in their favour would adversely affect public revenues and hence public investment. While public investment is not mechanically linked

to public revenue and deficit financing is always possible, it is to a large extent constrained by the availability of consumer goods, especially foodgrains. However, it is not agriculture based movements alone but the movement accompanied on the one hand by subsidies and tax cuts on the corporate sector to maintain its profitability, and on the other hand, by public purchase of unsold stocks of landlords, which together make any expansion of public investment potentially more inflationary and hence an increase in public investment less workable, in so far as the government for political reasons, feels compelled to curb inflationary outbreaks.[10]

A way out of this impasse of slow industrial growth imposed by poor performance of agriculture is to alter the strategy of industrialisation, from agriculture based import subsituting strategy to export- oriented industrialisation[11]. The export-led growth as a possibility has been advocated by neo-classical economists who saw great benefits from trade and exchange liberalisation. However, (facts point out that) the laissez-faire interpretation of 'export miracles' work only after a period of import-substituting industrialisation supported by substantial capital inflows. Export-orientation entails directed policies such as cheap credit and explicit subsidies (which have an impact on resources available for public investment), overall price incentives like devaluation and supportive public investment. The implication of severe competition in sectors where export expansion is envisaged, the heavy protection in the rich country markets and the foreign exchange constraint during 'the process of transition from a closed to an open one' may act as deterrents to export. They may

further require a conducive international environment, which is precarious as is evident in the eighties.

Thus if neither import-substitution nor exports can play the role of a prime stimulus to sustained industrial growth, a lot of importance began to be attached to the role that public investment can play. The key question then is, can India secure resources for stepping up the rate of public investment? If a satisfactory rate of growth of real public investment is essential as a growth promoting force, major decisions aimed at mobilising resources from sectors which have benefited from the development process is necessary. Mere stimulation of monetary demand through deficit financing or even taxation is difficult because any further increase in indirect taxation would only reduce the level of mass consumption which is low enough already and India's tax policy given the political constraints hardly makes any attempt at raising resources through direct taxation of prosperous farmers or the unorganized industrial sector. It is within this scenario that emphasis is to be placed on the large scale stepping up of surplus from public enterprises[12]. This is a function of the level of efficiency in the operation and maintenance of the public sector.

Thus, an analysis of public sector performance within a dirigistic development strategy requires an adequate appreciation of its close relationship with the regime of planning and macro economic policies. The impact of the public sector in the economy can be better appreciated through its role in determining investment (rate and structure), resource mobilisation and containment of inflation and demand generation.

Public Investment and its Structure:

Rapid growth of investment in the public sector and the share of the public sector in the national income and capital formation is inherent in any process of planned economic development. In underdeveloped economies, investment may be the crucial factor in the "vicious circle", generating income, a capacity to save and the incentive for further investment. The role of public investment as an instrument of stabilisation and growth policy is seen in its stimulation of private investment.

(1) Public investment creates infrastructure and raises the productivity of private capital stock.

(2) Public investment raises the demand for output of the private sector thereby influencing output expectation and investment requirements of the private sector.

(3) Public investment raises aggregate output and savings and hence supplements the economy's physical and financial resources.

Evidently, there are two sets of linkages. On the demand side, the influence operates through the demand public investment creates for basic and capital goods industries and through generation of employment and income. On the supply side, public investment encourages private investment by providing critical inputs and infrastructural facilities. However, it is not merely the rate of investment but its structure/composition which determines the precise role and influence of public investment. For e.g. a large proportion of public investment in industrial categories like agriculture and electricity, gas and water tend to strengthen its relationship with private investment, whereas a

shift in favour of finance, community and personal services may tend to weaken the relationship. Similarly an increasing proportion of public investment in departmental enterprises (railways, irrigation or electricity schemes) will by easing out infrastructural bottlenecks act in a complementary manner to promote private investment. On the other hand Government investments within non-departmental commercial enterprises may tend to compete and even 'crowd-out' private investment under conditions of scarce resources - both physical and financial. Since opportunities for the Government to implement policies and programmes in the public sector in pursuit of their priorities and objectives of development, are determined in great part by their capacity to raise revenue, the role of the public sector in this function of resource mobilisation is vital, as we shall see in the succeeding paragraphs.

Resource Mobilisation:

In monetized developing economies where finance becomes the vehicle for transforming development, the mobilisation of financial resources for accelerated growth is an important objective of fiscal policy. Various measures are adopted by Governments for fuller mobilisation of the whole range of domestic financial resources and for ensuring the most effective use of available resources. Particular attention is paid to streamline and strengthen tax administration with the objective of raising both government and private savings, given tight net capital flows from abroad.

In this context, the role of public enterprises in resource mobilisation receives close attention. However, partly because of poor financial performance, the public enterprises in

many developing countries have played a much less important role as an instrument of domestic resource mobilisation than was expected. Financial surplus in public enterprises can be generated by either increasing revenues while holding costs at the same level or by decreasing costs while holding revenues constant, or by some combination of both options. The former implies adjusting the pricing policy, (of both inputs and output) the latter a more effective\ efficient performance. This brings us immediately to the question of comparison of the potential for mobilising resources through a change in pricing policy vis-a-vis the likely inflationary impact in downstream industries due to the price rise. It may be imperative to exploit public profits by cutting subsidies or refusing to multiply low productivity jobs, given the difficulty of pursuing a strategy of rapid accumulation via agriculture, exports or taxes.

An important aspect governing the performance of public enterprises is the determination of the price of their products. Many public enterprises in the core and the infrastructure sectors are exclusive or dominant producers and their prices are essentially administered prices. The performance of such enterprises is also dependent on the level of administered prices and the way these are determined. A policy of elastic supply at low subsidised prices in the face of poor financial working results has meant a strain on the government budget for sustaining these industries at the existing level. With the growth of revenue from taxation and market borrowings attaining near saturation, the planners today are faced with the option of turning to the public sector enterprises for additional resources.[13] For the VII Plan, 32.2 per cent of the total

outlays is expected to come from the contribution of the public sector as against 16.8% in the VI Plan. In this context, we could examine the macro consequences of raising revenues by upward revision of administered prices.

Inflation:

Evidently there are impacts on the economy by stepping up administered prices for the purpose of revenue mobilisation via inflation. Many studies[1 4] have pointed out the cost push aspect of an increase in administered prices. The argument is as follows: (1) To the extent that administered prices constitute a weight in the Wholesale Price Index (WPI), the latter will go up when the former goes up. (2) The cost of production of the user industries will increase leading to an upward revision of their output prices, which will result in higher WPI. The extent of inflation will however depend on the demand conditions. If demand is inelastic, the producers will be able to pass on the cost increase to the consumers. Otherwise they will have to absorb part of their cost increase by cutting their margins. Thus except for the extreme case of infinitely elastic demand, there will be inflation consequent upon a hike in administered prices. To stretch the argument a little further, since the prices will have gone up, the demand for the corresponding goods will go down, and if the supply of goods, in the long run adjusts accordingly to equate with demand, there will be a secular decline in real income. Therefore, an increase in administered prices may result, in the long run, in higher prices with a lower income.

However, there are larger complexities involved in the issue and there cannot be an apriori theoretical judgement on

the effect of a rise in administered prices. (i) If there exists some scope for factor substitution, in the downstream industries (at least among the non-basic inputs), to that extent, cost-increase will not be proportional, even if one input becomes costlier. (2) If the additional revenue generated due to the administered price hike will be used to reduce the government deficit, the money supply in the economy may go down and therefore there will be deflationary pressures on the prices. (3) The way the additional revenue is spent will have wide-ranging implications on prices and income. If for example, the government decides to 'invest' the additional revenue in capital goods, the output and income in the economy may indeed go up.

Having sketched broadly, the environment in which the public sector operates and the different roles it assumes in the economic environment, it is easier for us to appreciate how considerations, exogenous or policy determined, influence the operation of the public enterprise unit at the micro level. When adhoc and uncoordinated policies operate, they often get translated into unsynchronised pricing and investment decisions at the firm level. The overall efficiency of any production enterprise depends first of all on the mutual compatibility and timely co-ordination and implementation of decisions on (i) investment with reference to size, product-mix , technology and location of plants and (ii) pricing. For eg. (a) Short-term considerations serving immediate socio-economic or political purpose may govern investment decisions, such as the need to avail of the 'aid' provided bilaterally or multilaterally leading to a choice of less than appropriate technology. (b) Socio-political considerations may affect investment with respect to

size and location (for generation of employment/regional distribution)at the cost of future economic viability of the project,and (c) Considerations of need for subsidisation or contrarily, resource mobilisation may influence pricing decisions. Such a set of reasons may work to create at the micro-level a disjuncture or delinking between pricing and investment behaviour reflecting in apparent inefficiencies.

Thus the apparent inefficiencies of a public enterprise may in fact reflect the macro-economic and the sector-specific policies which impinge on them with respect to the efficiency of specific investment decisions in terms of size, technology, location and product mix. How do we then explain the differential performance of different public enterprises given that they operate in the same macro environment? The reason is that while some of these factors are under the control of the enterprise, several are not and while some are common to all, others are sector-specific or in some cases enterprise specific. The impact of macro economic linkages in operational terms is determined by certain micro variables at the enterprise level. When the macro economic policies of stepping up investment/resource mobilization or prevent inflation interact with micro level variables such as capacity utilisation, rate of profit, output mix or the customer composition, it provides scope for differential performance among the enterprises. Two separate points emerge here - (i) the impact of macro economic policies depends on micro performance variables; (ii) micro performance depends not only on firm-level but also sector-specific or economy wide policies.

Let us take the cases where the enterprise specificities of output mix, customer composition, the supply/demand constraint

operate to allow macro sector policies to differentially impact on them. Assume the existence of two enterprises, one producing capital goods and the other intermediate goods, both characterised by low capacity utilisation. A policy to raise investment in the former pushes up capacity utilisation and generates a corresponding amount of surplus, given that the wages are a part of fixed costs in public enterprises. However, a similar policy of pushing up investment may not ultimately be pursued in an intermediate-goods-enterprise, for an increase in capacity utilisation may be concomitant with a substantial increase in wage income since it generates demand for commodities else where in the economy. This could cause a rise in demand for food etc. nudging up the inflationary spiral. This example clearly illustrates that the macro policy, (of raising investment) and the micro specificity (of output mix) are interactive - while the former alters the micro performance parameters (capacity utilisation), the micro characteristic by itself determines the macro linkages (inflation, demand generation etc. in this case) that are operative. To express the interaction through another micro-level variable viz. customer composition: If capacity utilisation of firms with Government as the main customer is low i.e. excess capacity exists, we can expect that an increase in public investment will generate a corresponding increase in the surpluses of these enterprises, which can be regarded as vertically integrated. Given the commodity composition it is also difficult to visualise any threat of inflation since sectoral investment finances itself and there is no spill over of demand to other sectors. On the contrary, a policy to step up investment in those public

enterprises dependent externally for "surplus realisation", neither automatically takes care of resource generation nor contains the threat of inflation. The anti- inflationary impact will be effective if output of those public enterprises increases as a result of investment, where supply bottlenecks prevail and minimal where demand constraint is operative.

The performance of public enterprise should also be assessed in relation to the phases of overall 'economic activity', especially recession (when demand is declining) and upswing (when demand is rising)[15]. To the extent that the phases of business cycles will determine the leverage by which price changes can be effected, the performance of public enterprises will be influenced given that they operate under a regime of administered prices. For example, if we assume prices are set to cover wage-cost, material cost, depreciation per unit of output and an average profit rate per unit, then mark up over variable cost (hence price) has to go up in a recession (when depreciation and other fixed cost hidden in wage and material cost to capital output ratio increases). And in a phase of recession, there is "scope" to do so (in the absence of any inflationary threat), given the level of overall economic activity. Further, given that the public enterprises are capital intensive, their fixed cost (per unit) is increasing faster in phases when demand and capacity utilisation is declining and will therefore suffer losses unless mark-up price is raised. The opposite will be true in phases of increasing demand. Fixed cost per unit of output declines rapidly when capacity utilisation is rising and for increasing the price, the environment is not quite so ideal.

An unambiguous definition of objective of production is a

fundamental prerequisite for co-ordinated decision on investment output and prices. In the private sector, the objective of profit maximisation has given a definite direction to such decisions without involving serious incompatibility. In the public sector, on the other hand, achievement of socio-economic objectives like generation of dynamic externalities of growth, redistribution of income and wealth, creation of employment opportunities, promotion of balanced regional development, assistance to small scale and ancillary industries sector and economic self-reliance have been considered to be the major guiding considerations for decision making along with the realisation of some target rate of return on capital investment for generating internal resources for its future development. Not all these objectives have been quantifiable in terms of money flow, and in fact many of them have been either mutually inconsistent or conflict with profit maximisation. These conflicts have not been translated into operational form by specifying the acceptable trade offs between profit and the achievement of other objectives at the margin. As a consequence profit objective has often been relegated to the background. This is in part also fostered by these firms having a 'soft budget constraint' which is not simply a financial matter.[16] For, as Kornai has shown, the soft budget constraint has interrelated consequences on the price responsiveness, demand generation and efficiency of the firm.

An appreciation of these factors establishes our point of departure from comparative work on performance evaluation of public enterprises. As one of the succeeding chapters will show, evaluation has, unfortunately, often taken a fragmented view of

performance, seeking to emphasise only some specific aspect of functioning of the enterprises. Chapter 2 deals with the possibilities for accumulation in public sector. Sections 2 and 3 provide the empirical evidence for the same. In Chapter 3, there is comparative assessment of the various criteria hitherto employed for performance evaluation of public sector enterprises. Section 1 of Chapter 4 provides the rationale for choice of the set of criteria that we have employed for evaluating the sample firms ,with the distinct theoretical relationships between them being discussed in Section 2. Chapter 5 indicates the data sources and spells out the methodology involved in computing each of the criteria. Chapter 6 reports the analysis based on the classification scheme of grouping the sample firms, by the levels of performance attained, as indicated by the suggested criteria of evaluation. Chapter 7 presents the summary and the policy implications of the findings.

Notes

1. As mentioned above, public sector has not been treated separately which is a significant drawback, especially in the Indian case in view of the importance acquired by it during the plan period.

2. See Lewis,W.A. (1954).

3. See Ranis,G. and Fei,J. (1961).

4. See Minami, R.(1986).

5. For a review of literature, see, Nayyar,D.(1978).

6. See Raj, K.N. (1984) and Vaidyanathan,A.(1972).

7. See Mitra, A. (1977) and Chakravarthy,S.(1979).

8. See Patnaik, P. (1979)

9. ibid.

10. ibid.

11. The logic of this position has been carefully stated by Bhagwati,J. and Desai,P. in their OECD volume India: Planning for Industrialisation (Oxford 1970).

12. For a formal analysis, see chapter 2, section I.

13. It was under such a "constellation of forces" that the VII Plan envisaged raising the tax to GDP ratio and more pertinently projected the stepping up of resources from public enterprises.

14. See Jha, S. & Mundle, S.(1987) and Gupta, S.P and Sreenivasan, T.G.(1984).

15. See Means, G.C. (1967).

16. The 'Soft budget constraint' syndrome is usually associated with the paternalistic role of the State towards its economic organizations, that is towards State-owned firms. The 'softening' of the budget constraint appears when the strict relationship between expenditure and earnings has been relaxed, because excess expenditure over earnings will be paid by some other institution, typically by the State. For further details, See, Kornai.J (1986).

Chapter 2

Investment and Savings: An Analysis of Non-Departmental Enterprises

I

In the previous chapter an attempt was made to understand, in the abstract, why under certain conditions (which approximate the Indian situation) public expenditure has a crucial bearing on the process of capital accumulation in the economy. In this Chapter we shall first outline, formally, the possibilities of accumulation within the public sector which will provide a framework for analysing the empirical evidence detailed in Sections II and III.

Recognising that the capital formation potential in the public sector depends on the scope and branch composition of the public sector, let us treat it as comprising of public enterprises and general Government. Since the purpose is to focus sharply on 'self financed' expansion of the public sector, which is the standard norm against which its macro performance is assessed and inferences regarding efficiency drawn, we treat it as closed, such that all physical transactions between public sector and the rest of the economy (including capital transfers on public account) are assumed away. The process of accumulation in the public sector is considered jointly with the way fiscal receipts are utilised. We shall assume that those receipts exceed the current administrative expenditures and that taxes are currently collected and spent. In these circumstances, the whole

profit, of public enterprises is designated for accumulation.

$I_p = I_n + a(T + Y + P)$, where

I_p = Investment in the public sector

I_n = Profits of non-departmental enterprises

T = Tax revenue

Y = Non-tax reveue

P = Operating surplus of (departmental enterprises)

a = Coefficient of accumulation of government sector

We could take into account the possibility of financing public investments through loans. However, in a dynamic analysis, coefficient 'a' will decrease as a consequence of burdening the current expenditure in the State budget with the servicing of debt.

Saving in the Public Sector

$S = (T + Y + P) - (C + Z)$

$(T + Y + P)$ = General governments revenue

$(C + Z)$ = Public Expenditure on consumption of goods (C) and subsidies (Z)

Therefore ,

Capital Formation in Public Sector is

$$I_p = I_n + a(S + C + Z) \qquad (1)$$

Therefore,

$$a = \frac{I_p - I_n}{S + C + Z}$$

In the absence of foreign 'aid', intersector borrowing and lending and forced saving out of deficit financing, the value of $I_p - I_n$ must be equal to S ,

$$\text{Therefore, } a = \frac{S}{S + C + Z} \qquad (2)$$

The above identity is a simple means of formalising the pattern of capital formation in the public sector and can be easily extended to analyse the possible influence of the public sector on increasing the investment in the economy. Consider equation 2. In the assumed circumstances any increase in the size of the current expenditure (C + Z) directly reduces a, the coefficient of accumulation in the government sector. Even if it is assumed that there will be non-negative response from the private sector, it need not be along desired lines.

In addition to reducing current expenditure, Equation 2 suggests two other major methods (apart from borrowing and deficit financing)

(1) raising tax revenues
(2) increasing the operating surpluses of public enterprises.

Even a peripheral acquaintance with the Indian economy would inform us that it has not been possible to reduce current expenditure which has increased at around 13% between 1950-51 and 1977-78[1]. Constraints on deficit fiancning, as we explained in Chapter 1 stem from the necessity to keep inflationary pressures in check, while the ability of increasing tax revenue is constrained by political considerations, the only viable solution to the requirements of a dirigistic development strategy through a policy of state accumulation, is to increase the operating surpluses of public enterprises. For even if public expenditure policy was satisfactorily planned, a poor revenue raising through management of public enterprises could wreck the state accumulation policy and consequently retard the visualised growth process. In the absence of adequate surplus generation by the public enterprises, a self financed expansion of public sector is

not possible. This scenario closely approximates the Indian situation, especially after mid-sixties when public investment declined due to a resource crisis. However, with compulsive pressures on the need for increasing capital formation in order to sustain the overall accumulation, the public sector financed a substantial part of its investment by borrowing inter-sectorally. This is empirically validated in Section 2.

II

Investment in the public sector has been growing steadily and now constitutes more than half of the total planned investment in the economy over different plan periods (See Table 2.1).

Table 2.1: Growth of Investment in the Public and Private Sectors over Different Plan Periods (in Rs. Crores)

	Private Sector	Public Sector	Total
1951-1956	1,800	1,560	3,360
1956-61	3,100	3,731	6,831
1961-66	4,100	6,300	10,400
1969-74	8,980	13,655	22,635
1974-79	27,048	36,703	63,751
1980-85	74,710	84,000	158,710

Source: Department of Economic Affairs, Ministry of Finance Government of India.

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The distribution of capital formation between the two sectors (table 2.2) shows that for the entire period the percentage share in capital formation is 43:57; the average for the period 1969-74 was 40:60, which improved to 45:55, in the 1974-79 period and 49:51 in the 1980-85 period.

From Table 2.3, it is evident that during the period 1969-74 the average shares of the public and private sectors in gross savings was 17:83 which improved to 21:79 in 1974-79. There was however a perceptible fall in the share of the public sector in the share of the public sector in the 1980-85 period to 18:82.

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Table 2.2: Gross Domestic Capital Formation: 1950-51 to 1984-85
(Rs.Crores)

	Public sector	Private sector	Total	% of share in total capital formation	
				Public sector	Private sector
1950-51	260	694	954	27	73
1951-52	304	884	1,188	26	74
1952-53	257	515	772	33	67
1953-54	293	616	909	32	68
1954-55	436	634	1,070	41	59
1955-56	498	971	1,469	34	66
Average:1951-56	358	724	1,082	33	67
1956-57	666	1,293	1,959	34	66
1957-58	833	1,010	1,843	45	55
1958-59	815	970	1,785	46	54
1959-60	900	1,096	1,996	45	55
1960-61	1,141	1,402	2,543	45	55
Average:1956-61	871	1,154	2,025	43	57
1961-62	1,147	1,291	2,438	47	53
1962-63	1,445	1,471	2,916	50	50
1963-64	1,681	1,585	3,266	51	49
1964-65	1,948	1,787	3,735	52	48
1965-66	2,216	2,174	4,390	50	50
Average:1961-66	1,687	1,662	3,349	50	50
1966-67	2,135	3,302	5,437	39	61
1967-68	2,332	3,003	5,335	44	56
1968-69	2,168	2,946	5,114	42	58
Average:1966-69	2,212	3,084	5,296	42	58
1969-70	2,259	4,026	6,285	36	64
1970-71	2,773	4,404	7,177	39	61
1971-72	3,165	4,821	7,986	40	60
1972-73	3,607	4,523	8,130	44	56
1973-74	4,814	7,010	11,824	41	59
Average:1969-74	3,324	4,957	8,281	40	60
1974-75	5,664	7,715	13,379	42	58
1975-76	7,677	7,134	14,811	52	48
1976-77	8,513	8,208	16,721	51	49
1977-78	7,450	11,315	18,765	40	60
1978-79	9,649	14,625	24,274	40	60
Average:1974-79	7,791	9,799	17,590	45	55
1979-80	11,816	13,467	25,283	47	53
1980-81	13,926	17,259	31,185	45	55
1981-82	17,528	18,957	36,485	48	52
1982-83	20,047	19,764	39,811	50	50
1983-84	21,773	23,575	45,348	48	52
1984-85*	26,772	23,009	49,781	54	46
Average:1980-85	20,009	20,513	40,522	49	51

* Quick Estimate

Source: Centre for Monitoring Indian Economy, "Public Sector in the Indian Economy, November 1986

Table 2.3: Gross Domestic Saving: 1950-51 to 1984-85

(Rs.Crores)

	Public sector	Private sector	Total	% share in total saving	
				Public	Private
1950-51	168	807	975	17	83
1951-52	252	753	1,005	25	75
1952-53	145	661	806	18	82
1953-54	127	795	922	14	86
1954-55	151	903	1,054	14	86
1955-56	172	1,258	1,430	12	88
Avg:1951-56	169	874	1,043	17	83
1956-57	231	1,368	1,599	14	86
1957-58	245	1,125	1,370	18	82
1958-59	227	1,182	1,409	16	84
1959-60	236	1,529	1,765	13	87
1960-61	425	1,638	2,063	21	79
Avg:1956-61	273	1,368	1,641	16	84
1961-62	494	1,599	2,093	24	76
1962-63	566	1,910	2,476	23	77
1963-64	709	2,117	2,826	25	75
1964-65	817	2,318	3,135	26	74
1965-66	809	2,982	3,791	21	79
Avg:1961-66	679	2,185	2,864	24	76
1966-67	668	3,846	4,514	15	85
1967-68	667	3,830	4,497	15	85
1968-69	858	3,839	4,697	18	82
Avg:1966-69	731	3,838	4,569	16	84
1969-70	1,033	5,011	6,044	17	83
1970-71	1,253	5,530	6,783	18	82
1971-72	1,278	6,230	7,508	17	83
1972-73	1,333	6,500	7,833	17	83
1973-74	1,807	9,625	11,432	16	84
Avg:1969-74	1,341	6,579	7,920	17	83
1974-75	2,676	10,050	12,726	21	79
1975-76	3,339	11,589	14,928	22	78
1976-77	4,185	13,845	18,030	23	77
1977-78	4,168	16,062	20,230	21	79
1978-79	4,780	19,366	24,146	20	80
Avg:1974-79	3,830	14,182	18,012	21	79
1979-80	4,967	19,736	24,703	20	80
1980-81	4,590	24,494	29,084	16	84
1981-82	7,230	26,637	33,867	21	79
1982-83	7,869	29,369	37,238	21	78
1983-84	7,217	35,607	42,824	17	83
1984-85*	6,788	40,418	47,206	14	86
Avg:1984-85	6,739	31,305	38,044	18	82

* Quick Estimate

Source: CMIE, Public Sector in the Indian Economy, November 1986.

While the share of public sector in investment has markedly increased, (from 40% in 1969/74 to 45% in 1974/79 to 48% in the 80's), there is no corresponding rise in its savings - while its share in savings did improve from 17% in 1969-74 to 21% in 1974-79, it declined again to 18% in the eighties.

This mismatch between Investment and Savings within the public sector suggests that it has been making a draft on the savings generated elsewhere in the economy (Table 2.4)

Table 2.4: Resource Deficit of Public Sector

(Rs.Crores)

	Gross capital formation	Gross Savings	Deficit	
			Rs. Crores	Col.3 as % of
	1	2	3	4
1950-51	260	168	92	35
1951-56	1, 788	847	941	53
1956-61	4,355	1,364	2,991	69
1961-66	8,437	3,395	5,042	60
1966-69	6,635	2,193	4,442	67
1969-74	16,618	6,704	9,914	60
1974-79	38,953	19,148	19,805	51
1979-80	11,816	4,967	6,849	58
1980-85	1,00,046	33,694	66,352	66*

* Provisional Estimates

Source: Central Statistical Organisation, National Accounts Statistics: 1970-71 - 1983-84 January 1986 and earlier issues.

As Table 2.4 indicates the resource deficit (Gross Savings as a % of GCF) in the public sector has been increasing from 35% 1950-51 to 60% in 1969-74 to 66% in 1980-85. This in itself should not be seen as an indicator of inefficiency in the public

sector. For, the rise in resource deficit, from 53% in 1951-56 to 69% in 1956-61 can be explained by the nature of investment activity - heavy investment with long gestaton lags - carried out in the II Plan period. The occurence of the droughts and the imposition of the plan holiday, is explanatory for the lack of improvement in the deficit in the sub-periods, 1966-69. Thereafter, the significant fall in the deficit in the period 1969-79, the phase of industrial deceleration, may be explained more by the decline in public investment rather than an improvement in the savings position .

Notwithstanding such explanations which can account for the movements in the public sector resource deficit over time, the the Investment-Savings gap has been used to call into question the efficiency in performance of the public sector.

Caution is however required in interpreting the role of the Public Sector based on the aggregated data. The need for a disaggregation is that it is unrealistic to speak of the public sector as a whole given its heterogenity. The basic diversity in the composition of the activities of the public sector makes it imperative to look beyond an overall/aggregated picture of performance.

The major variables affecting the Investment-Savings gap apart from the growth of the variables themselves is (1) the composition of investment across the different categories within the public sector (viz. the 'Administrative Departments, the Departmental Enterprises' and the Non-Departmental Enterprises). and (2) the asset structure of capital formation i.e. the components of construction and Machinery and Equipment.

These variables have different roles to play in bridging

the Investment Savings gap. A shift in public investment may occur, for example, in favour of the sectors which stimulate private investment (for e.g. in infrastructure), but may not lead to increased savings in the concerned sector. Conversely, an increase in investment in commercial activities as in the non-departmental enterprises can be expected to generate financial savings in the sector, by virtue of the nature of productive activity.

The structure of capital formation in terms of its asset composition is warranted for obtaining an idea of the effect of investment on generating financial savings. The National Accounts Statistics identifies three important forms viz. Construction, Machinery and Equipment and Inventories. For instance, if the machinery and equipment intensity of investment is high, there are two reasons why we could expect it to reflect in improved saving position. (1) An increase in the demand for machinery equipment will activate demand for public sector output in non-department non financial manufacturing sector which acting with existing low capacity utilisation levels, can lead to increase in operating surpluses and therefore, savings in the public sector. (2) The second reason relates to how depreciation figures, a non-cash expenditure, is charged to the profit and loss account, and therefore constitutes an important source of internally generated funds. As is obvious since the rate of depreciation will vary according to the age structure of the asset and machinery equipment has a lesser age span than the construction component[2], a larger proportion of investment in machinery equipment will imply a larger depreciation amount and therefore, a larger operational financial surplus. The

significance of depreciation as an element in resource mobilisation gains another dimension when it is recognised that it figures more prominently in the case of non-departmental enterprises than the departmental enterprises, due to their differing nature of activity.

Table 2.5: Gross Capital Formation in the Public Sector
(Rs.Crores)

	Departmental enterprises	Non-departmental non-financial enterprises	Total for non-financial enterprises
1960-61	338(52)	305(48)	643
1961-62	451	270	721
1962-63	592	308	900
1963-64	691	359	1,050
1964-65	762(64)	433(36)	1,195
1965-66	765	898	1,663
1966-67	751	1,005	1,756
1967-68	714	1,030	1,744
1968-69	746	1,046	1,792
1969-70	728(42)	985(58)	1,713
1970-71	843(38)	1,330(62)	2,173
1971-72	994(41)	1,403(59)	2,397
1972-73	1,138(45)	1,412(55)	2,550
1973-74	1,268(37)	2,175(63)	3,443
1974-75	1,501(33)	3,048(67)	4,549
1975-76	1,733(27)	4,686(73)	6,419
1976-77	2,019(28)	5,139(72)	7,158
1977-78	2,238(36)	3,980(64)	6,218
1978-79	2,628(34)	5,132(66)	7,760
1979-80	3,062(33)	6,103(67)	9,165
1980-81	3,642(34)	7,076(66)	10,718
1981-82	4,242(31)	9,628(69)	13,870
1982-83	4,748(30)	11,134(70)	15,882
1983-84	5,322(32)	11,377(68)	16,699
Rate of growth	12.73%	17.04%	15.21%

Note: Figures in brackets are % share of authority in capital formation.

Source: CMIE, Public Sector in the Indian Economy, November 1986.

The time-series (See Table 2.5) suggests that the importance of departmental enterprises as shown by their share in

Gross Capital Formation has diminished considerably over the years. The weight of the departmental enterprises in public sector Gross Capital Formation has diminished from 52% in 196Ø-61 to 38% in 197Ø-71, to 34% and 31% in 198Ø-81 and 1983-84 respectively. This decline in the share of departmental enterprises has not been caused by a slow-down in its rate of growth (Average annual increase was 12.7%) but by a relatively higher growth rate of capital formation in non-departmental enterprises (Average annual increase of 17.Ø%). Consequent upon the high rates of growth, the share of non-departmental enterprises in Gross Capital Formation has increased from 48% in 196Ø-61 to 57% in 1969-7Ø, to 73% in 1975-76, to 68% in 1983-84.

This suggests that with the larger and increasing share of non-departmental enterprises in investment, the productive capacity of the public sector has been increasing. With the public sector going into more and more directly productive activities, it is legitimate to expect this to reflect in improved performance/efficiency of the public sector as a whole.

Regarding the pattern of asset structure as Table 2.6 would indicate the construction component has had the larger share in Gross Fixed formation for the Departmental Enterprises. In the non-departmental Enterprises, there was a declining share in the construction component of investment since 197Ø-71; Machinery and Equipment is the larger component in the total fixed capital formation.

Having established that (1) it is the NDEs (non-departmental enterprises) which have a larger and increasing share in investment than the DEs (departmental enterprises) and (2) the asset structure implies that machinery and equipment is the major

component in investment in the NDEs, as against the construction

Table 2.6: Capital Formation by type of assets and by type of authority[3] (Rs.crores) (1970-71 prices)

Year	Non-Departmental Enterprises			Departmental Enterprises		
	GDFCF	Construction	Machinery and Equipment	GDFCF	Construction	Machinery and Equipment
1960-61	620	117	396	575	502	169
1961-62	567	207	323	694	509	187
1962-63	625	267	326	829	595	232
1963-64	777	431	353	953	705	251
1964-65	849	426	466	1020	731	279
1965-66	1027	501	507	1136	700	310
1966-67	968	459	528	883	587	302
1967-68	869	391	561	828	559	218
1968-69	927	349	594	876	574	254
1969-70	1004	473	479	776	567	210
1970-71	977	596	421	804	583	221
1971-72	971	580	435	837	604	230
1972-73	1250	613	601	907	796	273
1973-74	1195	555	608	1005	776	266
1974-75	1140	466	652	928	657	271
1975-76	1639	657	994	989	671	317
1976-77	2122	849	1254	1195	895	321
1977-78	2315	1083	1197	1130	959	329
1978-79	2603	820	1202	1317	1009	307
1979-80	2035	962	1111	1319	945	347

Source: Drabu, H (1986): Structure of Public Investment and Industrial Deceleration in India

component in the departmental enterprises, it is imperative to examine how these specific features have contributed to the generation of savings and the consequent implication for bridging the Investment-Savings gap.

The net profits after tax less dividends on capital, represent the net savings, i.e. the net retained profits. The entire non-financial commercial public sector had a total net savings of Rs.295 crores in 1983-84 as against a net capital formation of Rs.12,716 crores in this segment, in the same year. (Refer Table 2.7)

Table 2.7: Net Savings in the Entire Commercial Public Sector
(Rs.crores)

Total for all	Departmental enterprises	Non-=departmental non-financial enterprises	Total for non-financial enterprises
1	2	3	4
196Ø-61	96	-1Ø	86
1961-62	127	-2Ø	1Ø7
1962-63	139	-19	12Ø
1963-64	176	-1	175
1964-65	131	-15	116
1965-66	146	-19	127
1966-67	141	-38	1Ø3
1967-68	1Ø5	-61	44
1968-69	149	-57	92
1969-7Ø	175	-33	142
197Ø-71	158	-12	146
1971-72	212	-74	138
1972-73	163	-68	95
1973-74	24	-84	-6Ø
1974-75	77	83	16Ø
1975-76	177	-1Ø5	72
1976-77	454	98	552
1977-78	572	-234	338
1978-79	5Ø7	-24Ø	267
1979-8Ø	454	-337	117
198Ø-81	318	-723	-4Ø5
1981-82	269	-181	88
1982-83	396	168	564
1983-84	369	-74	295

Net Savings: The difference between the current receipts and the current disbursements, i.e. broadly net profits after tax less dividends

Source: CMIE, "Public Sector in the Indian Economy", November 1986.

However, as mentioned earlier depreciation, a non-cash expenditure, charged to profit and loss account, is an important source of internally generated funds to the non-financial enterprises. Thus, the gross savings (net savings plus depreciation and other write offs) of these enterprises increased from Rs.188 cr. in 196Ø-61 to Rs.4228 cr. in 1983-84, implying on

average annual increase of 14.5% over this period.

Table 2.8: Gross Savings in the Commercial Public Sector

(Rs. Crores)

Year	Departmental enterprises	Non-department non-financial enterprises	Total for non-financial enterprises
196Ø-61	16Ø(85)	28(15)	188
1961-62	187	35	222
1962-63	211	47	258
1963-64	249(74)	72(26)	321
1964-65	212	79	291
1965-66	229(73)	1Ø6(27)	335
1966-67	229	133	362
1967-68	2Ø3(63)	147(37)	35Ø
1968-69	241	185	426
1969-7Ø	274(57)	25Ø(43)	524
197Ø-71	281	3Ø7	588
1971-72	334(48)	311(52)	645
1972-73	311(47)	353(53)	664
1973-74	189(29)	464(71)	653
1974-75	228(27)	621(73)	849
1975-76	355(4Ø)	546(6Ø)	9Ø1
1976-77	64Ø(41)	894(59)	1,534
1977-78	762(51)	723(49)	1,485
1978-79	728(47)	828(53)	1,556
1979-8Ø	726(44)	935(56)	1,661
198Ø-81	683(44)	854(56)	1,537
1981-82	866(33)	1,771(67)	2,637
1982-83	1,129(3Ø)	2,725(7Ø)	3,854
1983-84	1,23Ø(3Ø)	2,998(7Ø)	4,228
Average annual increase (%)	9.3	22.5	14.5

Figures in brackets indicate %share of authority in Gross Savings

Source: CMIE, Public Sector in the Indian Economy, November 1986.

From table 2.8, it is evident that DEs had a larger share in the Gross Savings than the NDEs until the end of the 6Ø's, whereafter the share of the NDEs began to improve. Over the period 196Ø-61 to 1983-84, average annual increase in saving of the DEs was 9.3% whereas that of NDEs was 22.5%, a part of which is accounted for by the low base of savings in NDE.

To recapitulate, (1) From 196Ø-61 to 1983-84 NDEs has a larger and increasing share in investment than the DEs, (2) the asset structure implies that machinery and equipment is the major component in investment in the NDEs and (3) Since the mid-sixties average annual increase as well as share in gross savings was higher for the NDEs than the DEs.

Table 2.9 :Investment Savings Gap

(Rs. Crores)

Year	Total I-S gap (NDE+DE)	I-S gap NDE	I-S gap DE	% of NDE gap to total gap	% of DE gap to total gap
196Ø-61	455	277	178	6Ø.9	39.1
1961-62	499	235	264	47.Ø	53.Ø
1962-63	642	261	381	4Ø.7	59.3
1963-64	729	287	442	39.4	6Ø.6
1964-65	9Ø4	354	55Ø	39.2	6Ø.8
1965-66	1328	792	536	59.6	4Ø.4
1966-67	1394	872	522	62.6	37.4
1967-68	1394	883	511	63.3	36.7
1968-69	1366	861	5Ø5	63.Ø	37.Ø
1969-7Ø	1189	735	454	61.8	38.2
197Ø-71	1585	1Ø23	562	64.5	35.5
1971-72	1752	1Ø92	66Ø	62.3	37.7
1972-73	1886	1Ø59	827	56.2	43.8
1973-74	279Ø	1711	1Ø79	61.3	38.7
1974-75	37ØØ	2427	1273	65.6	34.4
1975-76	5518	414Ø	1378	75.Ø	25.Ø
1976-77	5624	4245	1379	75.5	24.5
1977-78	4733	3257	1476	68.8	31.2
1978-79	62Ø4	43Ø4	19ØØ	69.4	3Ø.6
1979-8Ø	75Ø4	5168	2336	68.9	31.1
198Ø-81	9181	6222	2959	67.8	32.2
1981-82	11233	7857	3376	7Ø.Ø	3Ø.Ø
1982-83	12Ø28	84Ø9	3619	7Ø.Ø	3Ø.Ø
1983-84	12411	8379	4Ø92	67.2	32.8

Source: Derived from CMIE, Public Sector in the Indian Economy,1986.

The higher relative rates of growth in Savings and Investment in NDEs,(22.5% savings, 17.Ø4% investment) would suggest that NDEs should contribute to a reduction in the resource crunch. On the other hand, a comparison of the rates of growth of Saving with Investment in DEs (9.3% of savings, 12.73%

of investment) would suggest that they have contributed to

Table 2.10: Share of NDEs in the growth of the Total Investment - Savings Gap

	Growth in total I-S gap	Growth in NDE I-S gap	Growth in DE I-S gap	% of NDE gap to total gap	% of NDE gap to total gap	Growth in gap of NDE	Share of NDE to growth Total gap
1961-62	9.67	-15.16	48.31	47.0	53.0	9.21	-95
1962-63	28.66	11.06	44.32	40.7	59.3	5.19	18.1
1963-64	13.55	9.96	16.00	39.4	60.6	4.05	29.8
1964-65	24.0	23.34	24.43	39.2	60.2	9.19	38.3
1965-66	46.9	123.73	-2.54	59.6	40.4	48.58	103.58
1966-67	4.96	10.10	-2.11	62.6	37.4	6.02	121.37
1967-68	0	1.26	-2.11	63.3	36.7	.78	-
1968-69	-2.01	-2.49	-1.17	63.0	37.0	-1.58	78.6
1969-70	-12.96	-14.63	-9.99	61.8	38.2	-9.21	71.1
1970-71	33.31	39.18	-23.79	64.5	35.5	23.89	71.7
1971-72	10.54	6.74	17.44	62.3	37.7	4.31	40.9
1972-73	7.65	-3.02	25.30	56.2	43.8	1.88	24.5
1973-74	47.93	61.57	30.47	61.3	38.7	34.6	72.2
1974-75	32.62	41.84	17.98	65.6	34.4	25.6	28.5
1975-76	49.14	70.58	-8.25	75.0	25.0	46.3	94.2
1976-77	1.92	2.54	0	75.5	24.5	1.90	98.9
1977-78	-15.84	-23.27	7.03	68.8	31.2	17.45	110.2
1978-79	31.08	32.15	28.77	69.4	30.6	22.12	71.2
1979-80	20.95	20.07	22.95	68.9	31.1	13.92	66.4
1980-81	22.35	20.39	26.69	67.8	32.2	14.05	62.9
1981-82	22.35	26.28	14.09	70.0	30.0	17.80	79.6
1982-83	7.10	7.03	7.2	70.0	30.0	4.92	69.3
1983-84	3.68	-3.57	13.06	67.2	32.8	-0.25	-67.9

Source: Derived from CMIE, Public Sector in the Indian Economy, November 1986.

increasing the resource gap in the public sector. However, such an inference cannot be drawn, for relative rates of growth of saving and investment, operate from different bases, are distorted and are therefore not comparable. Table 2.9 reveals that the share of NDEs in the resource gap is larger. This however may be due to the high levels of absolute investments as well as savings. Inorder to take care of this problem and assess the contribution of NDEs and DEs to the resource gap and its growth, we have decomposed overall resource gap into a weighted

sum of the individual gaps. The share of the sector's gap to the total gap is the weight. Table 2.1Ø shows that while the share of NDEs in the total growth in the resource gap was higher, it has registered a secular decline after 1976-77. Between 1964-65 and 1976-77, the contribution of NDEs to the growth in the Investment-Savings (I-S) gap has increased from 39% to 75%. The explanation for this pattern in the I-S gap of NDE and its relation to the total gap can be sought by placing it in the context of the industrial deceleration that the economy experienced between 1961-66 and 1976-77. It may be noted that the brunt of the recession was borne by the NDEs. With the phase of recovery starting in 1976-77, the NDE showed marked improvement by way of a reduced share in the total gap. Therefore, even though the NDE share in the gap is higher, this may not necessarily reflect inefficiency for reasons already discussed.

Our next point of enquiry was the Investment Savings behaviour of the non-departmental non-financial (NDNF) manufacturing industry as they constitute the major industrial activity, within the public sector. For the entire period, 196Ø-61 to 1979-8Ø, Gross Savings registered a compound growth rate of 17.96% as against a 12.14% growth rate in Investment, in NDNF Manufacturing Sector. Conversely, in the NDNF Services sector, Savings registered a slower growth rate than Investment (16.9%, 19.43% respectively). Given the nature of activity in Manufacturing and Services Sector, savings per unit of investment is likely to be higher in the former than in the latter. With a higher rate of growth of investment in the Services sector than in the Manufacturing Sector (19.43% and 12.14% respectively) this

has an implication for increasing the savings-Investment gap. Thus the contribution of the Services sector to the Investment-Savings gap would be increasing, even though the share of Manufacturing in the gap would show as being significant despite its declining share (Refer Table 2.11).

Table 2.11: Share of NDNF in total Investment Savings Gap in the NDES

(Rs.Crores)

Year (1)	I-S gap in NDNF (2)	Total I-S gap in NDEs (3)	% share (Col.4 = Col.2/ Col.3) (4)
1960-61	24537	27700	88.58
1964-65	26406	35400	75.00
1965-66	36323	79200	46.00
1969-70	30340	73500	41.00
1970-71	26862	102300	26.00
1974-75	109863	242700	45.00
1975-76	116569	414000	28.00
1979-80	221744	576800	43.00

Source: Transactions of the Public Sector, Central Statistical Organisation, 1983.

The higher rate of savings in the Manufacturing Sector as against the Service Sector is also corroborated by the "Gross Profits" data from the Public Enterprises Survey. (Refer Table 2.12) Profits has increased at a rate of 25% in Manufacturing in the period 1975-76 to 1984-85, while it has only been 7.8% for the Services sector.

We investigated further regarding the pattern of Investment distribution within Manufacturing to assess whether the high-investment areas were the high-profits ones also (Refer Table 2.13). (Profitability measured as a ratio of Gross Profits to Total Capital Employed) . Steel, Chemicals, Pharmaceuticals and Fertilisers have the largest share in Investment, but the largest profit earners are Petroleum and Light to Medium

Table 2.12: Profits in Manufacturing and Services Sectors in Public Sector non-departmental Enterprises (Rs.Crores)

Year	Gross Profits	
	Manufacturing	Services
1975-76	43Ø	668
1976-77	58Ø	1Ø53
1977-78	421	558
1978-79	636	558
1979-8Ø	631	597
198Ø-81	8Ø9	612
1981-82	1873	781
1982-83	2613	855
1983-84	2597	968
1984-85	3319	1317
Growth rate for the period (1975-76 to 1984-85)	25%	7.8%

Source: Public Enterprises Survey, 1984-85

Table 2.13: Average Investment and Profitability (1974/75 to 1984-85)

Product Group	Investment (%)		Profitability (%)	
(a) Steel	28.6	(1)	3.81	(6)
(b) Coal	15.12	(3)	Ø.94	(8)
(c) Minerals & Metals	1Ø.55	(5)	3.97	(5)
(d) Petroleum	1Ø.95	(4)	13.81	(2)
(e) Heavy Eng.	6.79	(6)	8.96	(3)
(f) Light & Medium Eng.	2.5Ø	(8)	14.93	(1)
(g) Transport Equipment	4.57	(7)	8.37	(4)
(h) Chemicals, Pharmaceuticals and Fertilisers	21.18	(2)	2.87	(7)

Bracketed figures denote ranks.

Source: Public Enterprise Survey, Various Issues.

Engineering. Regarding the pace at which investment and profits have been growing, petroleum ranked first in both the growth rates of investment and profit (during 1974-75 to 1984-85).

Transport Equipment and Coal were the second and third fastest growers in Investment while the Fertilisers group and Coal sector were the next important groups in the pace of earning profits.(Refer Table 2.14).

Table 2.14: Compound Rates of growth of Investment and Profits in Product groups (1974/75 to 1984/85)

Product group	Rate of growth in Investment (%)	Rate of growth in Profit (%)
1. Steel	8.51	2.9
2. Coal	17.35	3Ø.6
3. Minerals and Metals	13.7Ø	-11.3
4. Petroleum	27.Ø	31.6Ø
5. Heavy Engineering	3.85	4.65
6. Medium and Height Engineering	13.46	14.38
7. Transport Equipment	25.13	16.3Ø
8. Fertilisers & Chemicals	14.Ø	3Ø.76

Source: Public Enterprises Survey, various issues.

To summarise the results:

1. While the share of public sector in investment has markedly increased (from 4Ø% in 1969/74 to 48% in the eighties), there is no corresponding rise in its savings (from 17% in 1969/74 to only 18% in the eighties).

2. This suggests a resource deficit, a draft the sector makes elsewhere in the economy.

3. A disaggregated view indicates that the share of NDEs in Capital Formation has been increasing,and its asset structure indicates a larger share in machinery and equipment. There is a contrasting picture in DEs, with its share in capital formation declining and a larger share of investment going into construction.

4. Not only was the share of NDEs in Gross Savings larger than that of DEs after the sixties, it had a higher growth rate in savings.

5. The high contribution of NDEs to the total resource gap should not in itself be seen as a pointer towards inherent inefficiency, for the reasons for the same can be located, elsewhere when its activity is seen in the overall macroeconomic context.

III

This profile of the pronounced Investment-Savings gap in the non-departmental manufacturing enterprises within the public sector, has often been construed of as a pointer towards their operational inefficiency. In this context it would be worthwhile examining a cross-section of studies analyzing public sector performance some of which reflect the aforesaid opinion, even if there is wide divergence in the criteria employed for evaluation.[4]

Among the many factors which were pointed out as contributing to the pervasive industrial stagnation (1) the slow down in public investment with its particular impact on infrastructure investment and (2) poor management of infrastructure sectors, figures prominently in Ahluwalia's[5] (1985) work on the industrial growth in India. She emphasised the supply side impact of the slow-down in public investment. The brunt of the downward adjustment was pointed out to be borne by the infrastructure sectors, leading to certain basic supply bottlenecks in the economy. This under-investment was associated

with the evidence of growing inefficiency in the infrastructure sectors. Estimates of total factor productivity growth (TFPG) for the manufacturing sector and its twenty industry groups, covering the period 1959-60 to 1979-80 were presented, suggesting that the efficiency in factor use in manufacturing declined over the twenty year period. The important industries experiencing declining factor productivity were petroleum products, basic metals, metal products, electrical and non-electrical machinery, chemical and chemical products (significantly, the public sector had the larger share in producing the aforesaid industrial products). Similar estimates for TFPG for the use-based categories suggested that efficiency in factor use in the intermediate goods and basic goods recorded the largest decline. The significance of this decline was seen in the light of the 'magnification effect' of the declining efficiency of intermediate goods/basic goods industry on other industrial sectors through the inter-industry input-output linkages. Additional support for the phenomenon of declining overall productivity was provided by the evidence of an increase in capital output ratios in manufacturing over time. This analysis tried to establish that the industrial stagnation in the Indian economy was associated with very poor performance in terms of productivity growth in these industrial categories where the public sector is operative in particular. However, notwithstanding that growth in total factor productivity is only a residual, it is necessary to note that in the use-based classification scheme Ahluwalia's estimation indicates that capital goods industries (most of which are constituted in the public sector), registered a positive growth in TFP.

In the same context Desai (1982-83)[8] claims that stagnation was accompanied by a rise in incremental capital-output ratios especially in industries with public sector enterprises. According to him, the strongest single factor that raised capital-output ratios is not lack of demand (acting via underutilisation of capacity), or diversified product-mix, but technological incapacity where equipment is run inefficiently. He reviews evidence in the major industries of Steel, Power, Fertilisers, Coal, Sugar, etc. and points out that equipment industries that started production in the sixties absorbed imported technology imperfectly and produced second-rate equipment. Thereby they foisted high capital costs and low capacity utilisation on industries that had to buy their equipment. Similarly, non-engineering industries showed technological incompetence in dealing with the problem of adaptation to local material and equipment. He has attributed the survival of these firms to protection from competition which has been built into the framework of economic regulation in our country.

Desai, however, seems to base his argument without recognising the fact that public sector investment in most of these capital goods and infrastructural industries is of the nature of stimulus to private investment and therefore the "Cross effect of these investments in these industries are exceptionally high. That is, the output resulting from these industries does not get recorded within the sector itself as it gets distributed across other industries particularly within the private sector. To the extent that these cross effects of investment are high, which in certain cases are even greater than direct effects, the

increment-capital-output ratios of these industries are overestimated and present a distorted picture of the public sector.

Ghosh (1984)[7] has also examined some efficiency parameters of the steel, cement, and sugar industries in order to focus attention on the problem of efficiency in Indian manufacturing industry. This micro approach was used to highlight the reason for the low productivity observed in a few key industries and in bringing out the absence of any direct link between investment and efficiency. He observes that there are serious scale diseconomeis in large scale production insofar as 'management' is concerned; and that the existing low productivity stems from inefficient management rather than from technological reasons. Five major factors which affect overall productivity were identified as (a) technology (b) maintenance of equipment (c) work methods (d) inventory management and (e) labour participation. These, he observes are all clearly in the domain of managerial inefficiency. Thus, it is not the technology inflow or policy controls or the problem of scale diseconomies, but a more "deep seated" problem of managerial failure which is causal to the overall decline in factor productivity in the manufacturing industry in India.

The basic problem with this kind of a contention is that such strong assertions on the role of managerial inefficiency remain as inferences; moreover the simultaneous existence of managerial inefficiency and decline in factor productivity does not prove a causal relationship.

Dholakia (1980)[8] has made a pioneering effort to quantitatively analyse the output growth in Indian public

enterprises. The study has sought to evaluate the performance of Indian public enterprises by estimating the rate at which the economic efficiency of these have changed and comparing it with its counterpart in the private enterprise for the period 196Ø-61 to 1975-76.

In the context of the growth of the national economy, the index of total factor productivity has been regarded as the most appropriate criterion for evaluating the performance of the public enterprises in relation to that of private enterprises. The study has the following observations to make: (a) The flow of total factor input in Indian public enterprises increased by about 159.5% over the period 196Ø-61 to 1975-76. (b) The overall economic efficiency of Indian public enterprises has increased by 26.7% during the period. In terms of growth of TFP, the non-departmental enterprises have performed better than the departmental enterprises, the relative increase in the efficiency of the former being 32.5% while that of the latter being 14.4% over the 15 year period. (c) Growth of TFP has been faster in public enterprises in the tertiary sector than the commodity producing sector. (d) The growth of TFP has made a contribution of 1.61 percentage points to the observed growth rate of net output. (e) The decline in the growth of total factor input has been entirely due to the sharp deceleration in the growth of capital input. (f) The break-up of the growth rate of TFP into its major components reveals that significant technical progress at an average rate of about 1.Ø8 percent per annum, has occured in Indian public enterprises. The TFP in all private enterprises taken together has increased only by 9.6% during the period. (h) The broad conclusion is that the performance of Indian public

enterprises during the period 1960-61 to 1975-76 can be regarded as quite satisfactory especially in relation to that of the corresponding private enterprises, if we evaluate the relative performance of these enterprises by the criterion of total factor productivity.

Notwithstanding that Dholakia's work is a major contribution contending the severe criticism of the public enterprises based exclusively on grounds of low profitability, his study represents a partial view in so far as it is not verified whether the conclusion based on factor productivity finds adequate support when supplemented by other criteria of performance as well.

We could now move on to examine a sample of typical exercises on evaluation based solely on financial criteria. The work by Singh[0] on the financial performance of government companies deals with the long term and short term financing of the Central Government Companies and their financial performance involving the examination of the size and composition of net-worth and long-term debt, leverage position, the role of bank credit and trade credit, the liquidity position of these companies etc. The profitability is analyzed with reference to their gross profits, operating profits and net profits, their changes over time and inter-industrial variations. The 4 years of study are: 1960-61, 1965-66, 1970-71 and 1975-76. The findings are the following. A comparison of gross profit positions of the Mining and Quarrying, Chemicals, other Processing and Manufacturing and Engineering industries (four) industries reveals that (1) Level of profit was highest in Mining and Quarrying and lowest in other processing & Manufacturing (2)

Gross Profit showed a declining trend in the case of all industries except engineering. (3) Gross Profit as a percentage both to value of production and total capital employed was higher and more stable in the case of large public companies in the private sector. (4) Cost of goods sold of companies in the private sector was lower and more stable than in respect of central government companies. (5) Wages, salaries, bonus etc. constituted a much higher percentage of cost of goods sold in the case of large public companies in the private sector. Whether it was because they were more capital intensive is not answered. From the view point of gross profits as a percentage to total capital employed, the performance of central government companies was far from satisfactory. The long-term financing of central government companies reveals that the financial structure was characterised by a heavy reliance on long-term funds, a declining share in the total resources of net worth, a sharply rising share of long-term debt and a marked rise in the debt equity ratio during 196Ø-7Ø. Short term funds constituted a relatively small percentage of the total resources of the companies.

This is a typical example of the effort taken in evaluation of public sector enterprises, based purely on the popular profitability critera. The study does not however throw light on whether the poor profitability is a result of failure on turnover front or whether low production in physical term is born out of inadequate capacity utilisation or is due to low mark-up to cover escalation in cost including increase in raw material costs.

Yet another example is the Economic and Scientific Research Foundation study[10] which proceeds from the central

assumption that the primary economic aim of an industrial unit or enterprise is to maximise output at minimum cost within a given economic environment. Government undertakings have been classified industry-wise and their performance is compared with corresponding industrial groups in the private sector. The comparison is based on the basis of "return on capital employed" and secondly on "net output per unit of capital employed". The study indicates that, in the case of public sector undertakings, the marginal return on capital for all industrial groups works out at 6% as against 19% in respect of corresponding private sector enterprises. If the steel industry is included, the return obtained is about 3%, less than a sixth of the normal return in the private sector. The alternative index of income generated per unit of capital employed shows that it has been declining since 1958-59 whereas it has been steadily rising in the private sector industry. The "income differential" between the private and public sectors is Ø.27. On this basis, the yearly notional loss in industrial output at the end of the II and III Plans is worked out at Rs.2Ø6 crores and Rs.382 crores respectively.

The problem with similar studies of public sector performance evaluation is that these arguments seem to proceed ignoring the multi-dimensional objectives of the enterprises and a general comparison with the private sector is undertaken without adequate appreciation of the special macro-environment under which they operate. No effort is taken to compare performance as indicated by criteria other than profitability, the appropriateness of which to public sector enterprises, is in question.

Notes

1. See Reddy, K.N, Sarma, J.V.M, Sinha.N, (1984).

2. In the Indian context, for example, it has been estimated that the average age of machinery and equipment extends from five years to forty years and that of construction for forty years to hundred years. See Gothoskar, S.P (198Ø).

3. Construction and machinery equipment do not add up to GDFCF (Gross Domestic Fixed Capital Formation) because (i) net sale of physical assets has not been included and (2) deflation for components has been carried out separately.

4. Most of the work on evaluation has centred on what ought to be the appropriate criteria in assesing public sector performance, rather than a systematic examination of their working based on the suggested criteria. And this has often been the result of the inability to quantify the "social cost" or "benefit". We shall take up a review of the "evaluators" in the next chapter.

5. See Ahluwalia, I.J (1985).

6. See Desai, V.Ashok (1984).

7. See Ghosh, Arun (1984).

8. See Dholakia, H.Bakul (198Ø).

9. See Singh, V.S.(1986).

1Ø. See Dubashi. J and Lahiri.A (1967).

Chapter 3

Criteria for Evaluation of Public Enterprises : A Critical Review

A review of the empirical literature reveals that there has been a veritable explosion in the methods suggested for evaluation. It suggests that the assessment of Public Enterprises, with reference to efficiency questions, has been carried out by (a) using different evaluation criteria, and (b) generalising about public sector performance on the basis of facts relating to one or a few public enterprises. The diversity in methods suggested for evaluation of Public Enterprises (which is by no means peculiar to India) reflects a lack of consensus on the status of Public Enterprises vis-a-vis the economy as also the multiplicity of their objectives all of which are not amenable to appropriate quantification.

Financial profitability as a primary yardstick for evaluation seems to be popular, despite widely accepted conceptual problems with this approach. For instance, Sen (1983) argues that while "public enterprises are not meant to maximise profits, and the very rationale of state ownership militates against the single minded pursuit of private profits....(However) in the absence of any well formulated alternative criterion, the public tends to judge the success or failure of public enterprises by profits and this has led to much cynicism about the abilities of public enterprises. This might be at least partly unjustified, but it is fairly inescapable in the absence

of a different system of performance evaluation".[1]

One can find several concepts of profits that have been employed. Conceptually, profit simply means "revenue" minus "expenses". Different measures of profit are possible but the most common definition of profit,: Private Profit = Net Sales- Cost of Sales - Administration, Selling and Distribution Expenses - Financial expenses - Other operating expenses + Other Incomes subsidies - non-operating expenses - Provisions for taxes. The qualifier "private" to the term profit considers "benefits" and "costs" from the viewpoint of the owners of an enterprise.

Private profitability, rather than the absolute level of profits has also been used as a criterion. Private profitability is defined as the ratio of 'private' profits to total assets. The reason for the popularity of this criterion could be that data for analysing anything other than the simple aggregate concepts are not readily available or it may be due to the fact that the concept of commercial profitability is firmly embodied in conventional accounting practices.

Notwithstanding that private profit is considered the bottom line, there are problems with private profitability as a criterion for public enterprise performance evaluation. (1) The basic problem with the criterion is its inappropriateness to public sector efficiency evaluation, given the rationale of public sector existence. (2) It fails to reflect 'social benefits' and 'social costs' of the enterprise operations; and (3) It fails to recognize several important constraints.

If private profit decreases due to an increase in a particular cost component, it does not imply ipso facto that social welfare will also decrease. Examples of such costs are

(1) direct taxes (2) interest payments (3) transfers (donations) and (4) depreciation. Ignoring distributional consequences, a transfer of income via direct taxes neither increases or decreases the total welfare of the society. It simply redistributes the welfare. Similarly, some items that are categorised as benefits are really not so from society's point of view. Examples of such benefits are, (1) Interest and dividends received and capital gains and losses on the sale of financial instruments; and (2) Transfers received. When private profit is the criterion not only may costs and benefits be misclassified from the social perspective, some may be ignored. Maintenance costs are a good example. They enter private profit as a cost, but the benefits which accrue in future years are not taken into account.

Thus we can see that the problem with profitability as a criterion for evaluation is at two levels. (1) "Profits can be measured differently for different purposes and the kind of measurement that is provided by conventional income statements" is not what is required for public sector evaluation[8]. For example, Public profits, instead of private profits could be used more appropriately in analysing public sector performance. In public profits, direct taxes, interest payments and transfers are not treated as costs as in conventional accounting; neither is depreciation deducted since it bears no real correspondence to the actual rate of physical deterioration. Similarly it excludes non-operating income such as interests and dividends, as they do not reflect the contribution to the national welfare. (2) Profits are not an adequate touchstone given the status of the public sector in relation to the rest of the economy. This is

especially true when they function under the regime of administered prices or have other objectives such as employment generation or reducing regional disparities.

The recognition of the inadequacy of private profitability to analyse public sector performance and the lack of consensus on a single measure for evaluation has provided fertile ground for proliferation of models and methodologies. At the broadest level of generalisation, these alternative approaches can be classified into two categories.

(1) Partial Indicators (2) Multiple Indicators.

(i) Partial Indicators:

These indicators are characterised by their emphasis on one aspect of enterprise performance to the exclusion of all others. One example of this class of indicators is the Productivity of individual Factors -- An example would be labour productivity (Q/L) or capital productivity (Q/K) where Q refers to the quantum of output, L the number of labourers and K the total capital employed. It says nothing about the productivity of other factors of production, the overall cost or the desirability of capital labour ratio. Another example would be cost-effectiveness which emphasises the attainment of a goal at the minimum possible cost; the quantity or quality of the goal never being questioned. Yet another example would be Partial Business Ratios. For example (inventory/output) ratio emphasises the importance of optimum level of inventories to the exclusion of all other objectives. The problem with such indicators is that they do not include all costs and benefits associated with the enterprise operation. Thus a policy prescription based on partial indicators may improve some aspect of enterprise

performance but not necessarily the overall performance. The inappropriateness of this partial indicator becomes even more evident when we consider that the priority of objectives will differ across firms, and even within a firm, will differ over a period of time.

(2) Multiple Indicators

These consist of a weighted average of a number of separate criteria and try to cover all aspects of operation of an enterprise. While multiple indicators do not suffer from lack of coverage it is common that they suffer from the problem of uneven coverage as also from arbitrary weighting. A few examples of this category are (1) The Korean Development Bank Indicator and (2) The Total Performance Measurement System.

Park4 (1986) describes the performance evaluation system for Government Invested Enterprises (GIE) in Korea. Basically, the Korean system uses two kinds of performance indicators, quantitative indicators which account for 70% of the final "score" of the GIE and qualitative indicators which account for 30%. There are a dozen quantitative indicators with public/private profitability or productivity as the most important single indicator (10-25% weight), and 3-4 qualitative indicators, such as long term corporate debt management plan and quality improvement of services to customers. Thus it cannot be said that the concept of a single primary indicator is applicable in Korea (which is strikingly different from Pakistan's scoring system, where public profitability and private profitability enter for 50% and 20% of the final score, respectively).

The problem with the KDB system is that it requires appropriate enterprise-specific comprehensive and non-duplicative

critiera. Jones[5] argues that the system has two serious technical flaws. One is that the criterion values are set in a way which violates the principle of fairness to the enterprise, in the sense that changes in demand affect public profitability. To the extent that, Public Profitability, the criterion with the largest weight, is affected by changes in demand and it is a factor exogeneous to the control of the firm and no allowance is given for that, the criterion is not comprehensive. In addition there is the problem of "duplication" in the current set of indicators - the duplication results in assigning implicit and uncalculated weights to some indicators, which consequently may have greater weights than explicitly specified. The question of indicators boils down to the relative weight - explicit or implicit - of various indicators. Consider a hypothetical set of indicators wherein the weights assigned are as follows:

1.	Net Profit/Liability and Equity	15%
2.	Gross Profit/Net Sales	5%
3.	Net Sales/Liability and Equity	5%
4.	Production record/Production goal	10%
5.	Sales record/Sales goal	5%
6.	Production record/Production Capacity	5%
7.	Production record/Number of employees	5%
8.	Manufacturing cost/Quantity of manufactured goods	15%
9.	Total liabilities/Quantity of Manufactured goods	15%
10.	Others	10%

Suppose a public enterprise increases its output by Rs.100/- and intermediate inputs consumed go up by Rs.100/- as well, the net effect of this change is nil. The effect of these changes on the criteria, however, could be the following- increase in criteria 3 to 7; decrease in 2; no effect on 1 and 9, and unpredictability for criteria 8 and 10. On balance, it would appear that the positive effects dominate. Thus, the risk

associated with using duplicative indicators is that it results in assigning weights to some indicators which are greater than explicitly specified.

The Total Performance Measurement System (TPMS) suggested by Dholakia and Khurana[6] (1976) claims to be a uniform system of measuring and reporting the economic and non-economic performance of an enterprise in a well defined, widely understood format. The TPMS aims at satisfying the following broad requirements.

- The financial performance should be separated from social performance.
- The system should be uniformally applicable to all enterprises to facilitate comparison of enterprises in different industries, different geographical locations and units with different input intensities.
- Since the system would be applied to public enterprises, reporting categories corresponding to national goals would be incorporated.

Thus the TPMS is a weighted index of the following three tiers of indicators - (1) In the first tier, financial performance indicators, such as return on economic assets and other financial ratios from balance sheet statements and profit and loss accounts are included. All items pertaining to social investments and expenditure are to be excluded, to facilitate the computation of the net financial return on economic assets. (2) In the second tier, those items of social benefits and costs which can be monetized in unambiguous terms are reported. These items are normalised to an appropriate base (per employee, % of sales etc.) and relevant norms (not mere averages, but goals reflecting desirable standards) by industry, by location and size are to be specified.(3) In the third tier, those items of social benefits and costs which cannot be monetized but are amenable to measure in natural (physical) units are specified, for instance, employee safety record and air quality in plant.

This approach is much more broad based than the KDB approach in so far as it defines performance in a more comprehensive manner. However, it too suffers from the problem of asymetric counting of benefits and costs i.e. in combining various partial indicators, the enterprise may get credited for increased ouput more times than it gets debited for increased inputs.

Dholakia (1983)[7] has suggested that the following are the three broad objectives to be pursued by public enterprises

- Public enterprises should make a significant contribution to financing plan outlays for the attainment of further economic development by generating commercial surplus;
- Public enterprises should accelerate the growth rate of the economy and improve the economic efficiency of resource utilisation
- Public enterprises should effectively contribute to the fulfillment of long term socio-economic objectives

The broad criteria of performance evaluation that would correspond to each of the above mentioned objectives are

(i) The criterion of financial viability
(ii) The criterion of factor productivity
(iii) The criterion of socio-economic benefits.

It is actually the total profit making potential and not the reported net profit which measures the contribution made by the enterprise in the financing of plan outlays, for the surplus generating potential of the enterprise should include, besides the net profit, contributions in the form of excise duties and other taxes actually paid and the net subsidy involved in the prices of the inputs purchased by a given enterprise and also in the prices of the output supplied by it. Dholakia contends that in the context of the growth of the national economy, the index of Total Factor Proudctivity is the most appropriate criterion for evaluation, for it indicates the overall efficiency of

resource utilisation by economic units over a specified time period. Regarding the criterion of socio-economic benefits, Dholakia points out that it would be necessary to develop a set of specific performance indicators and some research effort is required to integrate them with the other major criteria of financial viability and factor productivity.

The common problem with the above indicators is that they assign weights, which are arbitrary, to the criteria. This raises the issue of whether it is desirable to integrate the indicators or is it more appropriate to have a set of indicators which will reflect the different aspects of the running of the firm.

An attempt to aggregate the various indicators takes us into the realm of composite indicators.[8] These try to capture all aspects of enterprise performance in one single indicator. Under this approach the criterion of Public Profitability figures significantly. This concept was first made popular by Jones[9] and it was first put into practice in 1981. While laying down the performance criteria for public enterprises, it was considered necessary to take stock of all the multiple objectives in order to individually quantify them and then, after assigning some agreed weights, aggregate them. The peculiar characteristics of every individual enterprise have to be kept under consideration while selecting the performance criteria as well as in assigning relative weights. The most important criterion recommended by the Performance Evaluation System was that of Public Profitability.

$$\text{Public Profitability} = \frac{\text{Public Profit}}{\text{Operating Fixed Assets}}$$

It was recognised that in an environment of controlled prices and security of employment, pre-tax profits is a more realistic measure - however, profits on its own can be misleading if it does not take into account the assets employed in earning it. The numerator, public profit has been defined as the commercial after-tax profit plus all direct taxes plus interest payment plus depreciation minus financial incomes minus subsidies minus opportunity cost of working capital. The level of profit remains the main criterion, but the level of importance assigned to this criterion must vary from enterprise to enterprise.

However, the serious drawback in this criterion is that it does not appreciate the motivation of public sector existence. It is not Public profitability alone which is an objective of public sector enterprises as they are likely to be motivated by other considerations of employment generation, reduction of regional backwardness as well.

Realising the critical role assigned to the public sector in the mobilisation of resources for the Seventh Plan, the Government of India in 1984 set up a high-level committee to review and suggest policies for improving the performance of public enterprises under Arjun Sengupta. The Committee suggests that "there are certain objectives which are common and these should form the basis for general performance criteria". These general criteria may fall into four groups: (1) Financial performance (2) Productivity and cost reduction (3) Technical dynamism and (4) Effectiveness of project implementation". According to the Committee, the criteria for financial performance are the most important in that, public enterprises are expected to play an important role in the mobilisation of

resources and they can do as only if they are financially viable. It recommends three basic criteria:

(a) Gross margin on assets (for all enterprises) where
Gross margin = Sales minus operating costs;
Assets = Gross fixed assets plus inventories.
(b) Net profit on net worth (for core sector and profit making enterprises) where
Net Profit = Gross margin minus depreciation minus interest
Net Worth = Equity plus reserves
(c) Gross margin on Sales (for service enterprises) defined as: Gross margin divided by sales.

The standards against which financial performance have to be evaluated will have to vary for the enterprises -- Enterprises in the core sector are generally subject to price control and their financial performance is affected by this fact. However some normative rate of return is often implicit in price fixation procedures and can provide a standard for comparison. The rate of net profit, after allowing for distortions induced by lags in price adjustment, should be at least a stipulated percent fixed for each enterprise at the beginning of the year. The gross margin should be improving over time. For enterprises in the non-core sector, which generally operate in a competitive environment with a substantial private sector presence, (some of them like cement/drugs are subject to price control), the criteria for comparison should be the industry average; for service enterprises it may be necessary to focus attention on the direction of change in the gross margin on sales, in the loss making units, the gross margin should be positive so that they are at least covering operating costs.

The Committee suggests a simple monitoring of productivity and costs by examining the direction of change in indicators like capacity utilisation, raw materials costs per unit of output, value added per rupee of wages etc. The third group of

project implementation (i.e.) investment efficiency (iii) contribution to growth in productivity and international competitiveness and (iv) contribution to the social objectives. (See annexure for the EAC performance indicators and the operational details).

The Committee opined that since many of the public sector enterprises are under administered price regime it is necessary to supplement the financial indicators with key asset utilisation index as capacity utilisation. According to the Report, one overall indicator for measuring dynamic efficiency is the growth of total factor productivity, which takes into account the contribution of all input in the total growth of output. Recommending for the evaluation of investment efficiency, the Report has also suggested the need for some kind of social audit to evaluate their contribution to different objectives as (i) development of ancillaries (ii) indigenisation, (iii) export, (iv) energy conservation (v) environmental impact (vi) promoting employment of SC &ST categories (vii) development of domestic technology through research or development.

From the review it is evident that there is no a priori ground for any indicator to qualify as the most important criterion. The choice of an appropriate criterion would obviously depend on the approach that is adopted. The controversy regarding the alternative criteria mainly stems from the fact that the performance can be viewed from several angles.

To recapitulate our main arguments against the use of partial and multiple indicators which have been the two major types of evaluators suggested - They either suffer from uneven coverage by laying stress on one aspect of efficiency or in an

performance indicators suggested relate to technology development. The Report mentioned that since a simple quantitative indictor is difficult to define, a rough indication can be provided by the number of product or process innovations introduced or patents introduced during the year. The fourth set of performance indicators relates to project implementation. In the case of core sector enterprises performance could be assessed in terms of (a) percentage utilisation of plan funds, (b) average slippage in ongoing projects and (a) percentage cost revision for the approved investment programme relative to the previous year.

Our serious problem with the Report is that neither is any rationale given for the choice of these particular criteria, nor is any indication given to the course of action to be undertaken when the criteria are mutually exclusive. For example, "technical dynamism" involves costs in the present and may result in lower financial profits in the current year. The indicators suggested are also mutually conflicting - an a priori case can be made for a conflict between capacity utilisation and raw material cost (at constant prices) as percent of output, since if possible diseconomies of scale exist, the addition of a variable factor to a fixed factor, beyond a point, only leads to successively smaller outputs. No concrete steps are proposed to combine the qualitative and quantitative aspects for the assessment of "technical dynamism" or "project implementation", to come to a composite evaluation.

The Economic Advisory Council (EAC) (1986), in drawing up "The Performance Evaluation System for Public Sector Enterprises" identifies that the basic aim of the public sector units is to achieve (i) efficiency in the use of resources (ii) efficiency in

attempt at integrating the indicators they specify weights which may be arbitrary and need not reflect the totality of the firm's contribution or actual role in the economy. This throws up the significant issue that an indicator per se cannot reflect efficiency unless its interpretation is qualified by the macro economic policies/environment the firm is operating under. Thus it is necessary to set the context of underlying relationships in the operation of a firm and deviations of an indicator from either a norm or from the pointers of another criterion will then become explainable. The following aspects of the public sector operations have to be taken note of.

- The public sector units work in heterogeneous fields and these operate in different types of market structures and therefore the performance evaluation indicators cannot be uniform across all enterprises.
- Performance evaluation indicators will have to take into account static as well as dynamic elements. The current performance of the key public sector organizations has a very important bearing on the long term aspects of the national economy. Therefore, the temporal perspective is of considerable importance.
- Performance at the micro level i.e. the enterprise level is conditioned by macro-economic policies and environment on which an individual unit has no control.
- Choice of performance indicators should be decided keeping in view the position of public sector in the structure of production.

Annexure: EAC PERFORMANCE INDICATORS

I	FINANCIAL	
	a. Gross Margin on total capital employed	Quarterly
	b. Total Working Capital employed	"
	c. Total "net" interest payments due to working capital	"
	d. Variance between the actual and the budgeted per unit cost	"
II	PRODUCTION	
	a. Capacity Utilisation	"
	b. Total Value of production	"
	c. Total outgo due to faults on contractual performance obligations	"
III	INVESTMENT EFFICIENCY	
	a. Average slippage in ongoing projects	"
	b. Cumulative progress in the utilisation of plan funds	"
	c. Deviation between actual capital costs and the budgetted costs of the completed projects	Annual
IV	PRODUCTIVITY	
	a. Growth in total factor productivity	"
	b. Trends in international competitiveness	"
V.	SOCIAL AUDIT	

Notes

1. See Sen, A.K. (1983) p.1Ø-13.
2. See Anthony, Robert. N, (197Ø)
3. See Dean, J (1951).
4. See Park, Young. C (1986).
5. See Jones, Leroy. P. (1984).
6. See Dholakia. B & Khurana. R (1976).
7. See Dholakia. B (1983).
8. See Jones, Leroy. P (1979).
9. See Nawab, Syed Ali (1985).

Chapter 4

Criteria for Evaluation: A Formulation

I

Rationale for choice of criteria:

It follows from the discussion in the previous chapter that the rationale for choice of criteria has to be located within the specificities of public sector production as also its interrelationships with the rest of the economy. This would not only provide a broad-based set of criteria, but also help to understand the external constraints on the functioning of the enterprises.

The specificity of the public sector lies in its being a manufacturer of capital goods, especially those farthest removed from consumption goods and it is essential that their technical efficiency should be taken into account while evaluating the performance. For, any technical inefficiency in this sector will transmit itself across the board making the economy high cost structured. Further, the relationship of the sector with the rest of the economy operates primarily through its role in resource mobilisation, containment of inflation and demand generation as discussed in Chapter 1. To take into account these aspects of performance, we have used the following indicators:

(1)Financial indicator ---GROSS MARGIN ON CAPITAL EMPLOYED.

(2)Production indicator ---CAPACITY UTILISATION.

(3)Productivity indicator---TOTAL FACTOR PRODUCTIVITY.

A disaggregation into elements such as financial efficiency and productive efficiency should capture the firm's financial viability and at the same time help to temper the

financial judgement with an assessment of productivity levels especially with reference to the conditioning influence of external factors. Thus , it is intended that with the simultaneous use of financial and physical indicators , there would be no "smoke-screen" available to the enterprise to camouflauge their poor performance.In other words , our search was to find whether the losses are traceable to poor physical performance and gains to good physical performance, or whether in the transformation of physical efficiency in value terms, as indicated by the financial indicator, there were distortions in the picture brought through the price mechanism.

In the light of the earlier criticism it would appear that profitability need not be an indicator of efficiency in public sector enterprises. However a case for evaluating the financial profitability of the public enterprise exists for the following reasons:(1) the initial decision of the public authorities to create public enterprises and to give them certain forms of activity implicitly assumes that they have an enterprise dimension. In fact, the Industrial Policy Resolution (1956) explicitly states that "the public sector enterprises should provide the commercial surpluses which would help to finance further economic development" . The stipulation that the organisation would have a system of commercial accounts , would provide a balance sheet and would publish annual statements of profit and loss implies that profit and loss is to be accounted for. (2) More generally, if resource mobilisation is a matter of some importance then the profitability , contributing as it does to the generation of resources, might be viewed as a matter of prime purpose. In making investment decisions , profitability

studies examine inter alia , locational, technical, marketing, and financial matters. In actual practice public enterprises approve an investment decision only on assessing the probable returns.

The profitability for evaluating the performance can be viewed from several angles. In our approach we have made use of the 'gross margin on capital employed' ratio. The Gross Margin refers to the excess of income over expenditure, before providing for depreciation, deferred revenue expenditure, interest on loans , taxes, appropriation reserves. Alternatively, Gross Margin is simply Gross Profit + Depreciation + Deferred Revenue expenditure,where the Gross profit itself represents the excess of income over expenditure as appearing in the annual accounts of the enterprise, before providing for interest on loans, taxes and appropriation to reserves. By definition , Capital Employed means Gross Block minus depreciation plus Working Capital.Gross Block refers to the original cost of procuring the fixed assets as appearing in the annual accounts of the enterprise, plus\ minus sales and transfers.

The ratio of Gross Margin on Capital Employed seems the key financial ratio for a public enterprise for the following set of reasons:

In the case of public enterprises there is only one share-holder -the Government. This being so, since the taxes also go to the Government, and where the banking system is nationalised, interest payments also go to it , the division between dividends, retained earnings, taxes and interest payments become a little artificial.

The case for not providing for depreciation is that it

has no real correspondence with the actual rate of physical deterioration, in the absence of data on the age-structure of capital assets and the rate of discarding.

The significance of using Capital Employed in the denominator to normalise profits, instead of net-worth as the denominator emanates from the pattern in which capital is mobilised in the public enterprise. The financing patterns of public enterprises are not the same as the private enterprise pattern where the sources of capital are different and where consequently the gains go to different capital contributors. Since almost the entire capital comes in the shape of loans from the State or the nationalised banking system, the distinction sought to be made between debt and equity is artificial or even arbitrary. With the entire capital coming from one source, treating part of capital as entitled to dividends and part entitled to interest seems unnecessary. Effectually, therefore, the key indicator would not be net profits post-tax to net worth but gross margin pre-tax, pre-depreciation to total Capital Employed. This ratio would more efficiently capture the productivity of the total capital.

However, there are certain limitations to financial profitability as a criterion of performance.

The traditional belief about the nexus between financial profitability and efficiency is based on a text book view of competitive markets. The sources of demand and supply are freely at play in the market place-- competitive forces involve a survival of the fittest and the elimination of the unfit. In these conditions of "perfect" markets , prices reveal the scarcity value of various goods. Hence it is concluded that if

an enterprise can remain profitable in such a competitive market economy , it can do so only if it is efficient in the case of minimising unit cost.

-The manipulative possibilities of the commercial accounting systems is such that the profit situation can be engineered by playing around with the formulae.

-The examination of profitablity can be a very delusive operation if viewed only for a limited period of time. The dynamics of profitability situations imply that the evaluation of profitability ought to be done on an inter- temporal basis.

There are certain artificially contrived imperfections in the system which arise out of state policy. A government may require an enterprise, for reasons of social considerations or maybe of political expediency, deliberately to underprice its products and services. There could also be situations where governments treat certain public enterprises essentially as revenue earners and stipulate high profit margins. In either case , the profits or losses of the enterprise are not the result of management capability but of conscious state intervention. Evidently in such situations , the use of profitability as an index of efficiency is very questionable.

Having seen the limited character of the cash(financial) ratio , we cannot generalise on performance on its basis alone and it has to be accompanied by other indicators as well. We therefore require a set of yardsticks. These may be found within the physical characteristics of the productive process. We can describe them as physical indicators. These criteria have little to do with the balance sheets or profit & loss accounts and are neutral to the end purposes of the activity whether they be

commercial or social.What is being assesed is the effectiveness with which resources are utilised.

One key asset utilisation index that we have employed is the Capacity Utilisation index. The under utilisation of capacity leads to locking up of resouces, repercussion in linked industries , high cost of production, and obsolescence of plant and equipment even before full benefits can be derived from capital invested. The very complex nature of capacity leads to multiple definitions. Two descripitions of capacity are used in the literature, depending on whether the author in question is trying to define it in "economic" or "engineering" terms.

The concept of capacity output as interpreted in purely economic terms can be indeterminate. "The economist's definition identifies capacity output with the output rate prevailing when the short-run average -cost per unit is at a minimum. This is therefore concerned with that output from a given set of productive facilities that coincides with the maximum profit for the enterprise." Thus the economic definition need not describe anything resembling full engineering capacity output. Infact it would have to satisfy two conditions in order to do so. First, the volume of output produced when unit costs are at a minimum would have to be close to the firm's engineering capacity. Explicitly or implicitly, the economist's definition typically includes the notion of some reserve of productive abilities--firms can and do produce more than the optimum output in the short- run. Finally many firms are large enough to influence developments in the market for their products. Consequently, although they might like to maximise short-run profits they also have to take into account the longer term effect of their

actions. They may settle for a short-run rate of return compatible with the existing situation and strategies for the future. In these conditions, even if all the data concerning demand , costs and prices were available it would be difficult to predict short-run volume of output because this would depend on subjective, longer- term goals of managers rather than a neat objective criterion such as :short-run marginal costs must equal short-run marginal revenue in order to produce maximum short- run profits. Thus, neither of these conditions required for the economist's definition correspond to full engineering capacity output in the short-run. Cosequently the commensense practice, adopted in industry, of regarding engineering data as the most reasonable descripition of full "capacity output" is adopted here.

The engineering concept of Capacity Utilisation is physical, denoting the maximum physical output that can be produced per unit of time with a given fixed stock of capital facilities. This capacity rate of output is the maximum that can be produced on a persistent repititive basis without actual break- down or the incurring of some explicitly or implicitly assumed 'exceptionally high' marginal cost of production. This definition does not, however, provide a standard that can always be used without ambiguity. One is still left, for example,with the problem of accounting for changes in product specifications; and as the concept inevitably employs some kind of 'normal organisation of production' assumption this also has to be defined. Nevertheless, this particular definition of capacity describes reasonably clearly the maximum physical output obtainable from a given capital input under normal conditions of

production.

However, there are certain limitations in the use of Capacity Utilisation as a measure of efficiency. If the product is of a standardised variety , such as basic steel , cement or fertiliser, it is clear that higher capacity utilisation will be cost-effective. This does not neccesarily apply to the more complex case of industries where a given set of inputs can give rise to alternative possibilities of product mix (eg:engineering industries). Since the outputs themeselves can be varied and can have different market values , it is not so much the total physical production in terms of numbers or tonnage which counts as the the total marketable value of the package of products. When the productive capacity is created with a flexibility for producing a variety of items, the selection of a product-mix is a factor of the productive capability of the enterprise and also a factor of the marketability of the products. If higher utilisation of capacity is achieved without reference to the practical possibilities of marketing the products,it will be an exercise in futility. The use of Capacity Utilisation in strictly tonnage terms might prove to be counter productive. Capacity is also affected by the ageing process. When the normal productive efficiency of machines is over , their capabilities run down- It is therefore wrong to assume that installed capacity remains constant. After a period of time , there is need to reassesss the capability of the equipment and to "derate" it. It is the derated capacity which can then form a more realistic basis for the evaluation of Capacity Utilisation.

The second physical efficiency indicator that we have employed is Total Factor Productivity, an overall indicator for

measuring dynamic efficiency. This contention follows from the fact that the index of total factor productivity (TFP) is the most comprehensive indicator of the trends in the overall efficiency of resource utilisation by the economic units over a specified time period. In its measurement it takes into account the contribution of all inputs in the total growth of output. A measure of TFP acquires significance in our study because there exists constraints to resource expansion and growth cannot be achieved and sustained over a long period of time without substantial improvement in TFP.

A precise decomposition of the growth of output into the contribution of change in inputs and that of TFP is based on the economic theory of the production function.The literature on the subject has grown widely reflecting the advances in the theory of production function, index numbers and aggregation. Basically , the index of TFP , also referred to as the index of output per unit of total factor input , is derived as the ratio of the index of net output(i.e. the aggregate value added at constant prics)to the index of total factor input. The numerator indicates the actual growth of net output , while the denominator indicates the extent of growth that would have occurred had the overall productivity of the efficiency of all factors of production taken together remained constant.

The growth of TFP is measured as the difference between the rate of growth of value added and the rate of growth of total factor inputs where the rate of growth of input is a weighted combination of growth rates of individual factor inputs, the weights being the shares of the respective factors of production

in value added. Various TFP indices suggested differ from one another with regard to the weighting scheme involved. In most empirical studies, either the Kendrick index[1], the Solow index[2] or the Divisia index[3] has been used.

Kendrick Index--If there is one homogenous output denoted by Y and two factors of production , capital denoted by K and labour by L , w & r denote the factor rewards of labour and capital in the base year of study , the Kendrick Index for year t may be written as :

$$A = \frac{Y_t}{w_0 L_t + r_0 K_t}$$

Under the assumptions of constant returns to scale , perfect competition and payment to factors according to their marginal products, the total earnings of labour and capital in the base year exactly equal output of that year so that A may be equal to unity by definition. The Kendrick Index may be interpreted as the ratio of actual output to the output which would have resulted from increased inputs in the absence of techonological change. While the Kendrick Index is easy to calculate and understand , it suffers from an important defect that it is based on a linear production function and therefore fails to allow for the possible diminishing marginal productivity of factors.

Solow Index --It is based on the Cobb-Douglas production function and under the assumptions of constant returns to scale , autonomous Hicks-neutral techonological progress and payment to factors according to marginal product , the following equation is obtained:

$$\frac{\dot{A}}{A} = \frac{\dot{Y}}{Y} - \left\{(1-\beta)\frac{\dot{L}}{L} + \beta\frac{\dot{K}}{K}\right\}$$

where Y denotes output, L labour, K capital and β the income share of capital. Being based on the Cobb- Douglas production function , the Solow Index assumes the elasticity of substitution to be unity. Although this appears to be quite restrictive, it has been shown that unitary/ non-unitary elasticity of substition is unlikely to make significant difference to the estimates of TFP.[4]

Divisia Index - Translog Index -- The properties of the Divisia Index ,which makes its application desirable , have been disussed by Christensen & Jorgensen(197Ø) , Jorgensen & Girliches (1972) and others. It has been pointed out that the rates of growth of the Divisia Indexes of prices and quantities add up to the rate of growth of the value (factor reversal test) and that such indexes are symmetric in different directions of time (time reversal test). For applications to data at discrete points of time , an approximation to the continuous divisia index is required. The Translog Index is a discrete version of the continuous Divisia Index. The Translog Index of techonological change is based on a translog production function, characterised by constant returns to scale. It allows for variable elasticity of substition and does not require the assumption of Hicks-neutrality.

We have used the Quasi-Divisia index of measuring TFPG,

$$\frac{\dot{A}}{A} = \frac{\dot{V}}{V} - \frac{\dot{F}}{F}$$

where $\frac{\dot{V}}{V}$ is the rate of growth of value added and (2)

$$\frac{\dot{F}}{F} = \sum \left\{ \frac{P_i X_i}{C} \right\} \frac{\dot{X}_i}{X_i}$$

Here the total input growth rate is weighted by its share in the total cost. This definition would require a constant returns to scale assumption(for it is reasonable to assume that growth of

inputs is simultaneously accompanied by or causes a growth in cost of production). Therfore the quasi- Divisia index where the share of inputs is expressed as a ratio to value added(a figure net of input growth), is used to measure input growth , as indicated below:

$$\frac{\dot{F}}{F} = \sum \left\{ \frac{P_i X_i}{PQ} \right\} \cdot \frac{\dot{X}_i}{X_i}$$

This will obviate the need for a constant returns to scale assumption.

As will be indicated subsequently in the section on the relationships between the indicators, we have supplemented the absolute level of TFP, with the TFPG measure, to indicate performance.

We can thus gather that the index of TFP is a useful device to measure, in precise quantitative terms, the extent of increase or decrease in the overall efficiency of factor inputs used in any production process. The measurement of TFP growth is essentially dynamic in its approach and regards the excess of the actual growth of output over the observed growth of total factor inputs as an index of changing efficiency with which the enterprise utilises the scarce productive resources, during the course of its expansion.

In the next section we will examine the nature of the relationship that exists between the three indicators which will also serve as a further elucidation of the rationale for employing the three criteria simultaneously.

II

Relationships between the Indicators

The criteria of efficiency that we have employed are

basically different from each other. It is necessary to recognize the interplay between the indicators and their mutual conditioning influence. The first theoretical question that we need to answer is why we should expect compatibility between the indices and as a second step to answer, under what circumstances the conclusions emerging from one may be different from the one emerging from the other

In our effort to establish the relationship between the indicators, let us first take the indicators of Capacity Utilisation (CU) and Total Factor Productivity. By our definition, Capacity Utilisation is a ratio of actual production to Installed Capacity and TFP, a ratio of output to total inputs. A completely direct relationship between TFP and CU cannot be expected since the former considers variations in output only due to changes in the efficiency of factor inputs (the supply side), whereas the latter encompasses variations attributable to changes in both the supply and demand factors. Nevertheless, it seems reasonable to claim that, over a period of time we could expect a large degree of association between the two, unless diseconomies of scale are widespread.

A high level of capacity utilization should normally coincide with a high level of factor productivity, provided there are no diseconomies of scale. Definitionally, since any increase in capacity utilisation would entail higher production in output, it immediately implies higher factor productivity through higher ouput per total inputs.

The traditional theory of the firm assumes that economies of scale exist only upto a certain size of plant, which is known as the optimum plant size, because with this plant size all

possible economies of scale are fully exploited. If the plan increases optimum size there are diseconomies of scale, arising from managerial and other inefficiencies. It is argued that management becomes highly complex, managers are overworked and the decision making process becomes less efficient. Thus if we were to make the assumption that the public enterprises in question are operating at such a stage that, were they to increase their capacity utilisation i.e. they have not grown beyond the "optimum" size, they will reap scale economies, a performance picture of high levels of CU and TFP are perfectly possible. To extend the same line of argument, a situation of a high level of CU together with a low level of factor productivity becomes explainable by the existence of diseconomies of scale. It is possible to extort more output at the margin only by adding successively more units of input per unit of output.

TFP as a pure physical efficiency indicator becomes slightly inefficient if the output/input price indices used to deflate the value added/input time-series have been affected by the (initial) base-year price distortions -i.e. the input/output prices have been administered high or low against some normative consideration.[6] If input prices are not high commensurate with what is (or would have been) the "market" level or output prices are higher than what the market forces would dicate it to be, there is a favourable price distortion, reflecting in high TFP. The reverse case of the input price being higher or the output price being kept artificially lower than the corresponding norm results in an unfavourable price distortion, reflecting in low TFP. Whether or not a particular TFP measure actually reflects physical performance could be checked out by comparing TFP level

with Total Factor Productivity Growth (TFPG). If level of TFP matches with the growth in TFP over time (TFPG), then there is more credence to TFP's claim as being higher or low - i.e., the high/low level of TFP is more due to the physical effect than the influence of base-year price distortions. Against this, we can explain the situation of low CU and High TFP as being caused by favourable initial year price distortions.

Let us now consider the relationship between Capacity Utilisation and the financial ratio, Gross Margin on Capital Employed. By definition, Gross Margin is excess of income, originating from production, over expenditure - Profitability, therefore becomes a function of ouput. But this output is itself a function of Capacity Utilisation. Thus, given the price, an increase in Capacity Utilisation, should increase the Gross Margin ratio provided (a) the per unit difference between cost and price was positive to start with and (b) cost is not rising. A performance picture of high Capacity Utilisation and high Profitability are compatible normally, provided the firm is reaping economies of scale. However, Capacity Utilisation and profitability indicators will run counter to each other, if there is intervention in the running of the firm. Thus, a situation of high Capacity Utilisation made possible by economies of scale and a low Gross Margin ratio due to price controls becomes a possible situation under intervention. Equally possible is a reverse situation of Low Capacity Utilisation and High Gross Margin ratio, for reasons of diseconomies of production and price support, respectively. We refer to this price intervention, taking the form of either control or support, as 'price effect'.

We now come to the last set of indicators - profitability

and productivity. Profitability and productivity appraisal are complementary; they are not mutually exclusive, and hence are to be applied parallel.

By our definition TFP = $\frac{\text{Output}}{\text{Input}}$

Profitability = $\frac{\text{Gross Margin}}{\text{Capital Employed}}$

A higher level of productivity implies a higher level of output for given factors inputs. Given Capital Employed, a higher output level should in turn imply a larger margin of profits, ceteris paribus.

The complementarity/compatability between the indices can be traced to the means by which both can be increased in a firm:

- Greater volume of output usually results in economies of scale, better capacity utilisation, savings in inputs and costs per unit of output, i.e. it contributes to the growth of productivity and profitability.
- Savings in the use of the volume of the production factors get reflected both in the productivity and profitability measurement.
- Modification in the pattern of production/product mix increases both productivity and profitability.

However, if there is government intervention by way of price support, the financial indicator will run counter to the TFP indicator.It seems reasonable to expect that profitability can be increased by selling at higher and buying at lower prices, but we could assume productivity to remain neutral to such changes, atleast in the short run.

We could present the above arguments in a classifactory scheme as follows:

TFP

CU	High	Low
High		Either scale diseconomies or initial year price distortion
Low	Either Capital has low weight in TFP measure or favourable initial price distortions	

(GM/CE)

TFP	High	Low
High		Unfavourable price effects
Low	Favourable Price effects	

GM/CE

CU	High	Low
High		Unfavourable price effects
Low	Favourable Price Effects	

GM/CE

	High		Low	
	CU High	CU Low	CU High	CU Low
TFP High		Favourable Price distortions+ Favourable price effects	Unfavourable price effects	Favourable initial year price distortion but not subsequent favourable
TFP Low	Favourable Price effects + Scale diseconomies	Favourable price effects	Scale diseconomies	

We shall take this up further after the discussion on the data sources and methodology in the next chapter.

Notes

1. See Kendrick, J.W, (1961).
2. See Solow R,M, (1957).
3. Divisia; Economic Rationalle. Discussion of this index in the context of total factor productivity is available in Solow (1957), Jorgenson and Griliches (1967, 1972), Richter (1966) etc.
4. See Nelson R.R. (1965).
5. I am grateful to Sebastian Morris for drawing my attention to this.

Chapter 5

Data Base and Methodology

In this chapter, our discussion is concerned with the sources of data and the methodology followed in the study. It is divided into 2 parts, part (1) deals with the data source and (2) deals with the sampling procedure and discusses the measurement of the variables.

The Bureau of Public Enterprises(BPE), set up in 1965, has over the years, emerged as the most important agency of the Government of India in providing performance monitoring services of the public sector enterprises in India. BPE presents its annual PUBLIC ENTERPRISES SURVEY "as an overall review of the physical, financial and socio-economic performance" of the central government enterprises and this has been our major data source. The Annual Report consists of three volumes. The first gives an overview, sectorally consolidated (financial) information and an elaborate part containing a statistical narrative on investment, internal resources, inventories, pricing policy, capacity utilisation, ancillaries, international operations, personnel policy, cost control and internal audit, socio-economic and welfare measures, and regional development. Volume 2 gives detailed information, enterprise-wise, and Volume 3 presents the annual financial statements of each enterprise along with a page of standardised ratios.

We have also made use of the CAG(Comptroller and Auditor General), COPU (Committee of Public Undertakings) Reports as well.

The study is based on Central-Government manufacturing public sector enterprises producing basic raw-materials and capital-goods, such as Steel, Coal, Minerals and Metals, Chemicals, Pharmaceuticals and Fertilisers, Heavy Engineering, Medium and Light Engineering and Transportation Equipment. Initially, it was intended to study a representative sample of 30 firms with a minimum of 3 from each industry group, where the share in the value of production of each industry would determine the number of firms that will be studied in each group. However, this procedure had to be abandoned since the industry group which had a higher share in value of production, did not necessarily have a large number of individual enterprises. Alternatively, it was decided to arrange the firms in ascending order of their value of production, divide them into three equal groups and pick up one-third number of firms from each group on a random basis. This ensured that firms of all sizes of value of production would be picked up and there would be lesser bias in terms of the size of the firm, profit generated etc. It was also kept in mind that firms established before 1976 alone would be chosen since the period of our study is 1975-76 to 1985-86. The choice of the terminal year was simply on grounds of data availability. The petroleum group was excluded from the sample since it was considered to be a special case with several unique factors operating to influence their performance. (See Annexure 1 for details on sample firms).

Having stated the sources of data and the details on the sampling procedure, let us examine the variables which are to be measured -

(1) $\frac{\text{Gross Margin}}{\text{Capital Employed}}$. To repeat the definition already mentioned elsewhere, Gross Margin is simply Gross Profit + Depreciation + Deferred Revenue expenditure where Gross Profit itself represents the excess of income over expenditure as appearing in the annual accounts of the enterprise before providing for interest on loans, taxes and appropriation to reserves. Capital Employed means Gross Block minus depreciation plus working capital.

(2) The second variable is the percentage of Capacity utilisation which is defined as $\frac{\text{Actual production}}{\text{Installed capacity}}$.

(3) The third variable is total factor productivity defined as the ratio of output to a weighted combination of inputs.

Let us first take the case of the financial measure, $\frac{\text{Gross Margin}}{\text{Capital Employed}}$. The PES yields all the variables in current money terms. In order to make the measure of the rate of return compatible with a measure of real capital, which deviates in principle, from a measure of return on assets in current money terms, the financial variables have all been deflated with appropriate price deflatiors. The Gross Margin components of Gross Profit, Deferred Revenue Expenditure and Depreciation have all been deflated by the implicit price indices, generated from the current and constant series of Gross Domestic Product in Public Sector Manufacturing Industries.

The PES is again the source for details on Capital Employed, the denominator in the financial ratio. However, the problem with the Gross Block Series in the PES is that it refers

to additions in investment, (to the initial capital) made in different years, at prices in the years in which the additions are made. This kind of a problem is normally overcome by transforming the book-value of capital to Replacement Cost, expressed in constant prices for some bench mark year.[1] In the earlier studies, the gross investment series have been generated by the "Perpetual Inventory Accumulation Method". The annual change in fixed capital stock, built up year by year has been added to the gross fixed capital stock (at replacement cost) for some bench-mark year. The gross fixed capital stock at replacement cost has been either a simple rule of thumb doubling of the book-value[2] or arrived at applying the gross-net ratios[3] for a bench mark year, for disaggregated industry groups of manufacturing, using detailed balance sheet information. Such a gross investment series has been deflated by the wholesale Price Index of Machinery and Equipment or a combination of Domestic and Imported Prices of Machinery Equipment and Construction.

It has been possible from the data in PES to generate a series of gross investment, without resorting to approximating the replacement cost. The first consolidated annual report of the BPE on the financial performance of public sector undertakings, for the year 1960-61, came out in 1962. We have a fair mix of old and young firms; we have considered the year of take-over of the old firms as the year of establishment. It has been possible for us to generate a time profile of the capital stock with a very fair degree of accuracy for most of the firms; for a few, we have assumed that the capital stock estimates of 1960-61 are what the firm first acquired after its inception.

Having acquired the time profile of the Capital stock, it

was necessary to deflate the series using an appropriate price index for capital stock. In the light of the fact that a break-up of the Gross Block into land, machinery and equipment and construction components is not possible, we have used the implicit deflator from the current and constant series of Gross Domestic Capital Formation in Public Sector Manufacturing Industry. By deflating the estimates of Gross Block at current prices with the help of the above mentioned price indices, we have obtained the corresponding Gross Block estimates at constant 1970-71 prices. To this series of constant Gross Block figures, annual depreciation and working capital (both deflated by the Gross Domestic Product in Public Sector Manufacturing implicit indices), have been subtracted and added respectively to arrive at the Capital Employed figures expressed in constant terms).

The next variable in consideration is percentage of Capacity Utilisation. The information available in the PES is generally based on capacity ratings culled out from detailed project reports, licensed capacity statements or targets of production set by the individual enterprises. The measure of capacity utilisation is Total Production expressed as a proportion to Installed Capacity. Though not entirely satisfactory, the method points out to the trends in capacity utilisation as well as the operational efficiency. Since 1974-75, the BPE had initiated a detailed study of "Capacity Utilisation" aspects with the consultancy support of the National Productivity Council.

The third indicator of performance is Total factor productivity. We have employed the Quasi Divisia Index for measuring TFPG

$$\frac{\dot{V}}{V} - \frac{\dot{F}}{F} = \text{TFPG}$$

where (1) $\frac{\dot{V}}{V}$ is the total output growth rate and

(2) $\frac{\dot{F}}{F}$ is the total input growth rate

Further

The input growth rate

$$\frac{\dot{F}}{F} = \sum \left\{\frac{P_i X_i}{PQ}\right\} \frac{\dot{X}_i}{X_i}$$

where

$\sum \frac{P_i X_i}{PQ}$ is the share of input X in the value of ouput

$\frac{\dot{X}_i}{X_i}$ is the growth rate of input X

The ratio, total factor productivity,

$\text{TFP} = \frac{V}{F}$ where V = Value Added

$F = X_1^{W_1} \cdot X_2^{W_2}$

X_1 = Labour Series

W_1 = Share of labour in Value added

X_2 = Capital Stock series

W_2 = Share of capital in Value Added

$$\log F = W_1 \log X_1 + W_2 \log X_2$$

$$\frac{\delta \log F}{\delta t} = \frac{\delta \log F}{\delta F} \cdot \frac{\delta F}{\delta t} \equiv \frac{\dot{F}}{F} = W_1 \cdot \frac{\dot{X}_1}{X_1} + W_2 \frac{\dot{X}_2}{X_2}$$

$$\log \text{TFP} = \log V - \log F$$

After arriving at a series of TFP values for each year, we proceeded to arrive at TFPG value for the firm, for the 10 year period in the following manner.

TFPG = Gr. rate (V) - Gr.rate (F)

(Growth rate of F = $\frac{\dot{F}}{F} = W_1 \frac{\dot{L}}{L} + W_2 \frac{\dot{K}}{K}$

The growth rate of the Capital Stock Series (K Series)

$\ln(K) = a + r_1 t$, weighted by W_2, the average of the share of capital in value added for the period.

Similarly, the growth rate of the labour series (2 series)

$\ln(L) = a + r_1 t$, weighted by W_1, the average of the share of labour in value added for the period.

We shall now deal with how the variables of Capital Stock, employment, value added, share of wage and profits in value added were arrived at, for the measurement of total factor prdouctivity. It is generally agreed that there is no entirely satisfactory or universally accepted way of measuring Capital Stock. Not only are there serious theoretical problems, but even the actual practice shows wide divergence4.

First of all there was the question of gross vs net Capital stock. Ideally, if it were possible to derive a true measure of true economic depreciation, it would be desirable to use the estimate of net capital stock for economic analysis. Infact, the existing estimates of depreciation are either tax-based accounting concepts or based on certain rules of thumb. Either some (Roychaudary 1977) have used depreciation at book-value which is known to grossly overestimate the capital consumption, or others have circumvented the problem by assuming economic depreciation to be a fixed proportion of the preceding years capital stock. In our study, like Dadi and Hashim, Goldar and Alhuwalia, we have used the estimates of gross capital stock.

The problem with using Capital Stock figures gross of

depreciation is that in the case of old firms, it will overestimate its Capital Stock and therefore wil have a downward bias in the measurement of productivity. The Capital series have also not been corrected for discarding of assets with the result that the growth of capital could be overestimated and the growth of productivity underestimated. However, the constant price estimates of capital-stock will tend to underestimate the series for old firms, which were established before 1950-51. This is so because, the index of prices used to deflate the capital-stock at 1960-61 prices does not correspond to the age structure of assets. Given this, our estimates would appear to be accurate.

As mentioned earlier elsewhere, there were problems with the Gross Block figures in the PES. (Gross Block is defined as the "original" cost of procuring and erecting the fixed assets as appearing in the annual accounts of the enterprise at the end of the accounting year and takes into account additions thereto and deductions therefrom by way of sales and transfers). The problem is that the Gross Block refers to additions in investment, to the initial capital, made in different years, at prices in the years in which the additions are made.

As said earlier, we have generated the gross investment series using the gross fixed capital stock in the year of establishment of the firm, to which has been added the annual change in fixed capital stock and correcting them for yearly price changes. It would have been ideal to deflate this time profile of capital stock, by the WPI of Machinery and Equipment or a combination of Domestic and Imported Prices of Machinery and Equipment and Construction, but since the break-up of the Gross Block figures into its components is unavailable, we have used

the implicit deflator from the Current and Constant series of Gross Domestic Capital Formation in Public Sector Manufacturing Industry, to deflate the Capital Stock.(See Annexure 2 for Capital Employed Series).

This is as far as one input, Capital Stock is concerned. Even though it was possible to arrive at a refined series of Capital stock, the PES did not provide us with details on the number of labourers or a break-up of "Emoluments" into wages, salaries, other benefits etc. We have therefore used "Number of Employees" as a proxy for labour. Since the total input growth rate is the summation of the growth rates of labour and capital stock, weighted by their shares in Value Added, Labour Share was computed as

$$\frac{\text{Total Employee Emoluments}}{\text{Value Added}}$$, and Capital Share = 1-Labour Share,

as the share of labour and capital were assumed to exhaust the Value Added.

The Value Added for each enterprise was deflated by the wholesale Price Index of the main product of the firm. Single deflation method for correcting Value Added series for price changes may underestimate the growth in output, if the price indices of industrial raw materials and fuel and power were growing far less than the price index for manufactured articles. (See Annexure 3 for Value Added Series)

After arriving at the time-series values of Capacity Utilisation, Profitability and Total Factor Productivity for each firm, as a first check of the relationship between the indicators, Spearman's Rank Correlation Co-efficient was computed (The results are given below)

Table 5.1: Rank Correlation between (a) Capacity Utilisation and Gross Margin/CapitalEmployed (b) Total Factor Productivitiy and Margin/Capital Employed and (c) Capacity Utilisation and Total Factor Productivity for all firms

	Rank Correlation between Capacity Utilisation and Gross Margin/ Capital Employed	Rank Correlation between Total Factor Productivity and Gross Margin/ Capital Employed	Rank Correlation between Capacity Utilisation and Total Factor Productivity
1977-78	.42Ø9	.7552**	Ø.472
1978-79	.22Ø5	.6848**	Ø.165
1979-8Ø	.2595	.6232**	Ø.218
198Ø-81	.1856	.6369*	Ø.Ø79
1981-82	.1679	.4988**	Ø.Ø72
1982-83	.1638	.6971**	Ø.Ø48
1983-84	.2971	.6431**	Ø.161
1984-85	.4379	.6766**	Ø.224

* Significant at .Ø1 level
** Significant at .ØØ1 level

While for each of the years, there is significant correlation between TFP and profitability, no such strong relation between capacity utilisation and profitability is indicated. Rank Correlation co-efficient between capacity utilisation and TFP either does not indicate a strong relationship between the two. Simultaneously, an additional check of Rank Correlation between the average values over the years of capacity utilisation, gross margin/capital employed and total factor productivity of all the firms was computed and the result did not indicate significant relationships between the indicators. (Rank Correlation measure between. Average Total Factor Productivity and Average Gross Margin/Capital Employed is Ø.628 and Rank Correlation Co-efficient between Average Capacity Utilisation and Average gross margin/capital employed is Ø.3586, both of which are not

significant at 5% level of significance). However, this could well be vitiating the individual year variations as is indicated by the high correlation between total factor productivity and gross margin/capital employed in the year by year check.

Even though on the basis of the Rank Correlation coefficient, there is no indication of significant relationship between indicators other than between total factor productivity and gross margin/capital employed, over time, we tried to observe whether a relationship exists, (between indicators), with a more coarse classification, in firms which are generally at the upper or lower end of the spectrum, although within each category they may be well ranked.

A firm's summary measure of Capacity Utilisation (CU) Gross Margin [(GM)/ CE] Total factor productivity (TFP) for the ten year period is the simple average of the indicator across the years. (See notes for details on arriving at Capacity utilisation and profitability averages).[5,6]

Whether the indicator is high or low for the firm is decided depending on the position of its average measure vis-a-vis the Median, (the cut-off point), in the frequency distribution of the average measures (of that indicator) for all firms.[7] The Median values of the average profitability ratio is 3.25%; capacity utilisation is 66.45%; TFP is Ø.173 and depending on whether a firm has an average ratio above or below the Median value, the ratio is classified as being high or low for the firm. Refer Table 5.2 for the firms' average of the three ratios.

Table 5.2: Average Capacity Utilisation, Profitability and Total Factor Productivity

Firm[8]	Capacity utilisation	Gross Margin[9]/ Capital Employed	Total Factor Productivity
IISCO	59.41	Ø.94	Ø.Ø81
WCF	1ØØ.9Ø	5.48	Ø.1Ø2
BHALM	54.Ø	1.75	Ø.Ø69
IREL	65.1	8.61	Ø.Ø34
NMDC	49.Ø9	3.25	Ø.172
JESSOP & Co.	61.81	1.31	Ø.548
TUNGABHADRA	96.28	7.76	Ø.317
TRIVENI	96.8Ø	3.28	Ø.173
HEC	26.Ø8	1.76	Ø.Ø94
MINING	33.7Ø	1.77	Ø.Ø75
BIECO	63.1Ø	Ø.52	Ø.Ø97
NATIONAL	82.7Ø	Ø.37	Ø.Ø29
HINDUSTAN	94.6Ø	7.98	Ø.217
INSTRU	35.14	11.59	Ø.453
BEL	82.55	12.5Ø	Ø.429
BHARAT	35.25	5.43	Ø.268
CIWTC	35.58	LOSS	Ø.Ø74
MAZAGON	98.4Ø	9.43	Ø.257
GARDEN	63.8Ø	2.Ø5	Ø.1Ø3
SCOOTERS	3Ø.92	2.64	Ø.116
ANTIBIOTICS	88.1Ø	2.91	Ø.177
IDPL	73.5Ø	2.87	Ø.173
FACT	58.99	3.71	Ø.275
MFL	85.29	7.75	Ø.376
CCI	75.18	5.9	Ø.183
IPCL	72.17	6.Ø	Ø.236

Source: Estimated from various issues of "Public Enterprises Survey", Vol.III.

Based on the distribution of the average ratios of the three indicators, a classificatory scheme was arrived at. As a check to find whether these simple averages are truly representative, the co-efficient of variation of the average, for each firm, over time, was computed. The following results indicate that for the average capacity utilisation and average total factor productivity, the coefficient of variation is relatively low (Refer Table 5.3).

Table 5.3: Co-efficient of Variation of the Average Ratios for Capacity Utilisation, Total Factor Productivity, Gross Margin/Capital Employed: all firms

	Total factor productivity	Capacity utilisation	Gross Margin/ capital employed
IISCO	Ø.453	.1Ø	1.53
WCF	Ø.223	.Ø3	Ø.3Ø
BHALM	Ø.256	.22	1.Ø1
IREL	Ø.281	.21	.68
NMDC	Ø.496	.16	.37
JESSOP	Ø.168	.3Ø	1.54
THUNGA	Ø.346	.29	.32
TRIVENI	Ø.426	.21	1.Ø5
HEC	Ø.13Ø	.32	2.ØØ
MINING	Ø.357	.27	2.ØØ
BIECO	Ø.577	.1Ø	2.Ø2
NATIONAL	Ø.893	.23	3.ØØ
HINDUSTAN	Ø.155	.Ø8	Ø.38
INSTRU	Ø.177	.49	Ø.21
BEL	Ø.694	.17	Ø.28
BHARAT	Ø.274	.31	Ø.51
CIWTC	Ø.72Ø	.26	Ø
MAZAGON	Ø.246	.37	Ø.23
GARDEN	Ø.397	.23	1.3Ø
SCOOTERS	Ø.317	.32	1.29
ANTIBIOTICS	Ø.3Ø7	.25	1.18
IDPL	Ø.185	.19	1.Ø6
FACT	Ø.257	.17	Ø.57
MFL	Ø.266	.12	Ø.43
CCI	Ø.29Ø	.11	Ø.53
IPCL	Ø.258	.2Ø	Ø.66

Source: Same as Table 5.2

There are 22 firms with co-efficient of variation for total factor productivity less than .5; only for four firms, the co-efficient lies between .5 and .91. In the case of capacity utilisation, all 26 firms have co-efficient of variation less than .5. However, for profitability, the coefficient of variation tends to be higher, but still there are 9 firms whose coefficient is below Ø.5. Further, the firms with relatively higher co-efficient of variation in profitability are the ones which do not have incompatible relations between their performance indicators.

This indicates that it is justifiable to use the average of the ratios and they are fairly representative of the firm's performance over time.

Based on the averages, we have arrived at a classifactory scheme to categorize firms as being 'high' or 'low' performers. (See Chart 5.1) There are 8 firms in Cell 1 and another 8 in Cell 8 where all three indicators are all either 'high' or all 'low'. Thus, out of 26 firms, more than 60% of the sample firms are 'normal' with all their indicators of performance showing synchronised behaviour. The other six cells have firms with different combinations of high or low ratios, as shown below in Chart 5.1. We checked to see how many of these anomalous firms have their financial/physical indices near the median cut-off point. For TFP, Antibiotics, IDPL and NMDC are very near the median cut-off. For GM/CE, NMDC is again near the cut-off. Given the quality of the data, it is quite possible that there may have been some misclassification in these case. If this were true, Antibiotics and IDPL might move to cell (7) and NMDC to Cell (1).

Chart 5.1: Classification of firms according to High/Low Average Ratios.

Chart 5.1

GM/CE

	High		Low	
	CU (High)	CU (Low)	CU (High)	CU (Low)
TFP High	Thunga, Hindustan BEL, Mazagon, Triveni, CCI MFL, IPCL Frequency: 8, Cell(1)	INSTRU, BHARAT FACT 3 (2)	ANTIBIOTICS, IDPL 2 (3)	JESSOP 1 (4)
TFP Low	WCF 1 (5)	IREL, NMDC 2 (6)	NATIONAL 1 (7)	IISCO, HEC, Mining, Bieco, CIWTC, Garden, Scooters, Bhalm 8 (8)

Thus,

Cell 1	CU_H	TFP_H	GM/CE_H	Cell 4	CU_L	TFP_H	GM/CE_L
Cell 8	CU_L	TFP_H	GM/CE_L	Cell 5	CU_H	TFP_L	GM/CE_H
Cell 2	CU_L	TFP_H	GM/CE_H	Cell 6	CU_L	TFP_L	GM/CE_H
Cell 3	CU_H	TFP_H	GM/CE_L	Cell 7	CU_H	TFP_L	GM/CE_H

In the next chapter, we shall examine the factors that may lie behind the anomalous combinations of high or low ratios.

Notes:

1. Roychoudhry, U.D(1977),

2. Ibid.

3. Dadi M.M, Hashim B.R. (1973)

4. Goldar, B.N (1981)

5. Limitations of Capacity Utilisation details as given in the "Public Enterprises Survey".

   a. There is no uniformity in reporting the product names across the year. Is not clear whether it is due to changes in product mix from year to year or it is simply a question of availability of data.

   b. In the group analysis of capacity utilisation, the BPE report looks at performance in terms of different products in different years for the same firm. Strictly speaking, comparison of those percentages from year to year is not acceptable.

   c. For most of the firms, what was therefore followed by us, was summing up for every year, the production figures of each product as reported assuming that product not reported, was not produced in the year.

   d. However, there were certain cases, where even the above summing up of all products was impossible, since the products were measured in different units. In such cases, it was decided to add up the figures of the more important/ main products in the mix. This was considered to be better than reporting on a single product of the firm.

   e. There were also units where only Value of Production (VOP)details were available consistently for all the years. Despite the problem that VOP figures are not merely indicative of change in physical capacity utilization rates, but also incorporate price movements if any, they were used in the place of actual physical utilization rates where the former was unavailable.

6. In assessing the average profitability ratio, the loss-making years were considered as zero profit years and the positive figures were spread out over the ten years. To the extent the negative profit years were considered as zero profit years, this ratio suffers from an upward bias.

7. These values are therefore high and low not in some absolute sense but only vis a vis the sample median far the particular indicator. To the extent that the sample is representative

of public sector manufacturing the results may be generalizable. However no comparisons can be made with the private sector or for any other population of firms.

8. IISCO - Indian Iron and Steel Company Ltd.; WCF - Western Coalfields Ltd.; BHALM - Bharat Aluminium; IREL - Indian Rare Earths Ltd.; NMDC - National Mineral Development Corporation; Jessop & Co.- Jessop & Co. Ltd.; Thungabhadra - Thungabhadra Steel Products Ltd.; Triveni- Triveni Structurals Ltd.; HEC - Heavy Engineering Corporation; Mining - Mining & Allied Machinery Corporation; BIECO - Bieco Lawrie Ltd.; Hindustan - Hindustan Teleprinters; Instru - Instrumentation Ltd., BEL - Bharat Electronics Ltd.; Bharat - Bharat Pumps & Compressors Ltd.CIWTC - Central India Water Transport Corporation; Mazagon - Mazagon Dock Ltd.; Garden - Garden Reach Shipbuilders & Engineers Ltd., Scooters - Scooters India Ltd., Antibiotics - Hindustan Antibiotics Ltd.; IDPL -Indian Drug & Pharmaceuticals Ltd., MFL - Madras Fertilisers Ltd.; CCI - Cement Corporation of India; IPCL - Indian Petro-Chemicals Ltd.

9. In assessing the profitability ratio, as mentioned elsewhere, there may be an upward bias to the extent that loss-making years were considered as zero-profit years. However, we cross- checked for whether the so-called "high profit firms" have consistent high profits. They all enter the GM/CE slot only if they have shown high profits for atleast 8 in 10 yers. We also checked the contradicting firms of CU L & GM/CEH - are they really high or is it due to the non-consideration of negative profits? They appear as GM/CEH firms by virtue of registering profits in atleast 7 out of the 10 years.

Annexure 1

Name of firm	Year of estb.	Year of take over	Main Products	Main Customer
1. Indian Iron and Steel Company Ltd.(IISCO)	1918	1972	Steel Ingots/Saleable Steel	Private
2. Western Coal fields Ltd.(WCF)	1975		Coal	
3. Bharat Aluminium Ltd. (Bhalm)	1965		Aluminium	Private
4. National Mineral Development Corporation 1958 (NMDC)			Iron Ore, diamonds	Government
5. Indian Rare Earths Ltd. (IREL)	1950		Rare Earth Minerals	Government
6. Jessop & Co.Ltd.(Jessop)	1788	1973	Cranes and Structurals, Road Rollers, Wagons.	Private
7. Thungabhadra Steel Products Ltd.(Thunga)	1952	1967	Spillway and emergency gates,Transmission towers	Private
8. Triveni Structurals Ltd. (Triveni)	1965		Equipments for process industries, communication towers, nuclear power plant components	Government
9. Heavy Engineering Corporation Ltd.(HEC)	1958		Heavy Machine tools	Government
10. Mining and Allied Machinery Corporation Ltd. (Mining)	1965		Coal and Ore Mining machines, bulk handling equipments for ports, Steel, Fertilizer and Cement Plants and Ore mines, Coal handling equipments for thermal power plants	NA
11. Bieco Lawrie Ltd.(Bieco)	1919	1979	Electric Motors, Switch gearing Carbon brushes	Private
12. Hindustan Teleprinters Ltd.(Hindustan)	1960		Teleprinters, Printing, independent automatic	

				tape transmitters, teleprinter concentrators, power cubicles, electric typerwriters, telegraph, data signal generators.	Government
13.	Instrumentation Ltd. (Instru)	1964		Electronic and Electromagnetic, instruments, mechanical hydraulic and pneumatic instruments.	Government
14.	Bharat Electronic Ltd. (BEL)	1954		Communication Equipment	NA
15.	Bharat Pumps and Compressors Ltd. (Bharat)	1970		Reciprocating compressors and Centrifugal reciprocating pumps, high pressure solid drawn gas cylinders and hollow tubular bodies	NA
16.	Central India Water Transport Corporation (CIWTC)	1967		General Engineering	Private
17.	Mazagon Dock Ltd. (Mazagon)	1934	1960	Small vessels, passenger ships, dredgers, tankers, Government floating docks, assault boats	Government
18.	Garden Reach Ship builders and Engineers Ltd.(Garden)	1884	1960	Marine diesel Engines, deck machinery	Government
19.	Scooters India Ltd. (Scooters)	1972		Two/three wheelers and Vehicles	Private
20.	Hindustan Antibiotics Ltd.(Antibiotics)	1954		Antibiotics (like pencillin, streptomycin etc.)	Private
21.	Indian Drugs and Pharmaceuticals Ltd. (IDPL)	1961		Drugs, Pharmaceuticlas and surgical instruments	Private
22.	Fertilizers and Chemicals (Travancore) Ltd.(FACT)	1943	1963	Chemical fertilizers	Private
23.	Madras Fertilizers Ltd. (MFL)	1966		Chemical fertilizers	Private

24. Cement Corporation of India Ltd.	1965	Cement	Private
25. Indian Petrochemical Corporation Ltd.	1969	Petrochemicals	Private

Annexure 2: Time Series of Gross Block

(Rs. crores) at constant prices

	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
IISCO	8848.69	10188.14	12587.37	13038.85	13356.82	14151.42	14542.35	16894.42	16259.84	16487.37
HCF	0.00	9866.53	12228.07	15885.29	18806.95	20365.69	23442.72	28274.88	33438.10	38059.42
BHALM	5494.75	6170.43	7834.29	8190.15	8921.03	13926.24	14708.10	14898.10	15154.89	15510.17
NMDC	5386.20	9076.24	11409.94	12648.12	12883.60	12920.80	13062.70	13209.31	13399.57	13604.75
IREL	626.33	645.40	672.6	699.83	790.61	863.94	898.14	1538.42	1721.76	1865.70
JESCO	1804.29	1971.13	2203.69	2290.67	2306.20	2363.90	2372.90	2435.04	2463.66	2481.32
THUNGA	139.28	196.48	203.44	233.32	237.00	243.41	265.37	271.45	281.20	292.09
TRIVENI	595.58	596.79	602.60	617.81	639.93	651.15	681.03	687.11	713.22	730.22
HEC	21737.24	22006.56	22089.49	22162.84	22219.06	22257.93	22298.97	22464.44	22588.35	22628.09
MINING	3382.96	3460.42	3520.73	3560.93	3576.59	3598.22	3623.98	3642.58	3672.46	3693.65
BIECO	111.12	111.69	118.84	121.16	125.31	137.73	153.57	159.65	168.46	174.06
HINDUSTAN	367.94	382.84	408.35	434.43	447.79	488.26	522.82	549.16	589.10	648.56
INSTRU	767.85	898.34	964.45	994.87	1044.18	1083.04	1127.32	1169.53	1217.02	1268.58
BEL	4493.61	4793.32	4969.04	5143.98	5410.00	5620.37	5997.26	6355.22	6801.47	7347.20
BHARAT	291.23	533.74	638.55	992.43	1061.55	1091.20	1110.64	1127.86	1203.02	1248.64
CIHTC	495.10	540.99	627.42	572.56	626.02	642.45	648.21	684.68	1052.09	1225.18
MAZAGON	1573.84	1720.42	1936.16	2151.30	2264.66	2380.46	3536.33	4270.49	5164.57	6223.94
GARDEN	1387.86	1846.14	2009.68	2131.37	2219.85	2253.51	2293.10	2324.17	2358.76	2434.70
SCOOTERS	524.88	664.33	834.28	909.24	1023.99	1070.06	1119.82	1175.54	1213.28	1233.89
ANTIBIOTICS	1201.72	1249.40	1292.89	1385.25	1429.03	1540.41	1617.00	2195.90	2270.43	2326.36
IDPL	5821.99	6011.47	6217.93	6577.60	7531.52	8254.79	8734.99	8925.19	9144.38	9328.34
FACT	7960.85	8050.24	8088.51	8303.07	10284.18	10542.59	10814.73	10942.04	11239.93	11486.55
HFL	6038.73	6587.50	6617.08	6643.70	6694.39	6713.26	6755.86	6787.61	6957.43	7003.15
IPCL	2777.23	3069.84	9030.98	18321.58	18612.82	18798.70	19073.64	19790.58	21251.05	22805.95
CCI	1486.34	1669.86	2492.22	3031.72	3199.00	4100.59	6238.10	7452.81	7918.53	8150.68

Annexure 3: Time Series of Value Added

(Rs. crores) at constant prices

	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
IISCO	2108.45	2430.71	1612.65	0.00	1181.43	3382.89	3211.43	3089.76	3304.31	2238.02
HCF	0.00	4766.19	5284.71	4961.83	4894.82	4797.76	8869.10	7943.64	9003.32	9999.84
BHALM	305.85	556.14	645.41	556.88	464.79	609.97	443.42	339.58	440.26	1228.10
NMDC	1188.88	1493.80	1101.20	1248.28	1201.64	1575.27	1889.45	2182.74	3325.46	3171.20
IREL	127.84	162.44	134.17	138.58	95.91	72.86	83.26	111.43	162.37	495.41
JESCO	1140.25	1229.55	980.33	706.66	769.20	726.83	633.46	913.12	783.38	902.31
THUNGA	104.48	126.97	133.66	203.07	185.08	158.36	117.99	111.92	138.55	121.10
TRIVENI	100.93	211.34	246.00	248.47	211.22	160.43	174.00	118.21	109.80	342.47
HEC	2906.47	3009.95	1861.27	2297.43	2009.46	1731.43	2526.77	1671.13	1981.48	2209.43
MINING	842.96	958.23	0.00	516.13	591.77	300.83	358.77	436.03	691.22	658.81
BIECO	159.88	134.85	76.46	77.50	90.59	112.55	139.30	141.55	118.53	495.11
HINDUSTAN	197.46	259.37	254.05	236.19	196.31	222.86	230.92	215.37	240.82	253.21
INSTRU	247.93	382.01	470.73	584.54	577.20	825.09	722.90	882.23	1012.82	984.07
BEL	2086.73	2458.74	2504.25	2576.86	2187.19	1787.50	3679.18	4310.00	4733.72	5124.41
BHARAT	95.27	102.46	161.46	288.14	296.60	227.55	259.64	492.15	524.15	440.22
CIWTC	311.12	514.40	359.20	366.50	235.76	309.94	141.00	169.49	154.70	256.92
MAZAGON	1177.86	1346.85	1159.91	1284.94	1156.55	1442.95	1689.17	2020.15	3115.33	2886.03
GARDEN	878.91	1042.92	1071.84	718.87	682.72	724.73	662.39	654.19	734.46	828.06
SCOOTERS	50.55	230.22	200.23	248.66	200.96	330.79	273.15	360.54	277.49	225.59
ANTIBIOTIC	182.81	378.64	372.71	362.23	310.69	233.45	446.24	603.27	555.49	594.60
IDPL	1677.34	1796.12	1811.45	1365.91	1380.18	1503.89	1733.16	2355.89	2008.46	1641.11
FACT	913.37	1068.09	1178.89	1990.29	3511.96	2622.17	2399.12	2455.89	3008.22	4263.62
MFL	824.41	1339.41	1937.92	3584.47	2032.29	1635.12	1660.81	2000.00	1661.79	3137.52
IPCL	1344.72	1446.55	1136.00	2071.56	3255.12	4330.47	5125.53	5489.69	5099.26	3964.92
CCI	235.20	237.33	302.60	344.86	486.05	757.94	1165.25	2105.86	1453.89	1535.26

Chapter 6

Public Enterprise Performance: A Firm Level Analysis

In this chapter we are concerned with the analysis of performance in the firm with the simultaneous use of the alternative indicators. The purpose is not so much to explain the total behaviour of the firm as of highlighting the various aspects of performance. Our basic aim is (a) to avoid arriving at a fragmented view of performance by isolating the examination to a partial indicator and (b) to avoid giving subjective emphasis which is involved in the choice of a composite indicator. Essentially, the task is to compare performance as indicated by the three criteria and inspect whether all three point in the same direction. As explained in Chapter 4, theoretically, there are reasons why we expect the three criteria to move together. We shall attempt to examine how serious is the problem of non-congruence between physical and financial indicators, and among physical indicators themselves. We shall also try to ascertain the factors behind the divergence in indicators, and particularly the extent to which price controls or support are important.

Towards this end, a classificatory scheme has been adopted (as shown in Chapter 5 and reproduced below)in which there are eight different possible combinations of the three indicators. In Section 1 of the Chapter we examine those anomalous cases of firms where the physical and financial indicators do not match. It is postulated that this mismatch may be due to the favourable/unfavourable price regime that the firms are operating

under. In Section2, firms wherein, in addition to the physical-financial anomaly there is non-congeuence between the physical indicators themselves, are examined. It shall be examined whether there are factors other than price which are operative to cause this.

To recapitulate, a distribution of the (average) ratios of CU, TFP & GM/CE yields the following classification of the firms. While cell 1 contains the category where firms have all three indicators showing 'high', cell 8 has firms having all indicators low. The other 6 cells have firms with different combinations of high or low ratios, as reproduced shown below in Chart 5.1

Chart 5.1

GM/CE

	High		Low	
	CU(High)	CU Low	CU(High)	Cu(Low)
TFP High	Thunga, Hindustan BEL, Mazagon, Triveni, CCI MFL, IPCL Frequency:8 Cell(1)	INSTRU, BHARAT FACT 3 (2)	ANMBIOTICS, IDPL 2 (3)	JESSOP 1 (4)
TFP Low	WCF 1 (5)	IREL, NMDC 2 (6)	NATIONAL 1 (7)	IISCO,H&C, Mining, Bieco,CIWTC, Garden, Scooters, Bhalm 8 (8)

Thus, Cell 1 CU_H TFP_H GM/CE_H Cell 4 CU_L TFP_H GM/CE_L
Cell 8 CU_L TFP_H GM/CE_L Cell 5 CU_H TFP_L GM/CE_H
Cell 2 CU_L TFP_H GM/CE_H Cell 6 CU_L TFP_L GM/CE_H
Cell 3 CU_H TFP_H GM/CE_L Cell 7 CU_H TFP_L GM/CE_H

We can observe the following from the above classificatory scheme.

(1) There are 16 firms which are not 'anomalous':

- In 8 firms, total factor prodcutivity, capacity utilisation and gross margin/capital employed are all high (Cell 1)
- In 8 firms, all indicators are low (Cell 8), i.e. in nearly two-third of the firms, both physical and financial indicators tell the same story.

(2) There are 2 firms in which both physical indicators (total factor productivity and capacity utilisation indicators) are high but financial indicator (gross margin/capital employed) is low (Cell 3). Both are in pharmaceuticals group. Unfavourable price factors wherein the output is under direct price control with no corresponding price support for inputs, appear to be working. This would adversely affect the GM/CE ratio so as to cause this anomaly between physical and financial parameters;the physical indicator being unaffected by such price interaction.

(3) There are 2 firms where both physical indicators (total factor productivity and capacity utilisation) are low but the financial indicator (gross margin/capital employed) is high,Cell (6). Both are in Minerals and Metals group. Favourable price factors (for example, in the form of a price support for inputs) appear to cause the anomaly in this case.

In the light of the suggested explanation that favourable/ unfavourable price factors may be causing the 'anomalous' behaviour of the firms, we looked into the history of the firms to observe the following:

1. Of the 1Ø anamalous firms, let us first take the case of Hindustan Antibiotics Ltd. and Indian Drugs & Pharmaceuticals Ltd.(IDPL) which exhibit CUH and TFPH but GM/CEL. We postulated that unfavourable price factors may be working against the firms to cause low profitability, despite good physical efficiency.

A historical review of the price controls on the Drug Industry reveals that statutory controls on the prices of drugs were in existence as early as in 1962, with the Drugs (Display of Prices) Order and the Drugs (Control of Prices) Order of 1963, requiring the manufacturers to publish price lists and freezing the sale prices of drugs.

The Drugs (Prices and Control) Order, 197Ø (DPCO-197Ø) was promulgated, the principle objective of which was to effect a measure of rationalisation in the prices of drugs. The order was designed

- to reduce the prices of essential drugs which were found to be high.
- to promote diversification of entrepreneurship in the future development of the industry.
- to curb excessive profits.

The DPCO divided the Bulk drugs into 'essential' and 'other' bulk drugs. The Government announced the sale prices of 17 essential bulk drugs and froze the sale prices of the other bulk drugs. A Drug Prices Review Cell found that "prices of about 44.9% of the formulation were reduced, 36.15% were kept at the

earlier level and increases were granted only in respect of 11.45% of finished formulations".[1]

With the rise in the prices of petroleum products from the later part of 1973 (which form a significant proportion of raw materials consumed by pharmaceutical units), Government of India introduced some flexibility to compensate the cost escalation in raw/packing materials.

- A basis for calculating the escalatory effect due to the rise in prices of raw materials over the prices used in the cost data of 197Ø, was introduced
- An additional mark-up on the escalatory effect to provide for the increased cost of commission, transport and miscellaneous selling and distribution expenses as under: (a) 5Ø percent on escalatory effect wherever the existing mark-up is 75% or less (b) 28% on escalatory effect wherever existing mark-up is between 75% and 1ØØ%. (c) a maximum of 25% wherever the existing mark-up is between 1ØØ to 15Ø%, was provided.

Government announced in 1979 the Drugs (Prices control) Order ,replacing the order of 197Ø. The order empowered the Government to fix the maximum sale price of selected bulk drugs, after a scrutiny of manufacturing costs. The DPCO, 1979, prescribed a formula for calculating the retail prices of formulation which has two components viz. (a) Ex-factory cost and (b) Mark-up. The ex-factory cost is a sum of raw material cost, conversion changes, packing material costs and packing charges, for which norms were prescribed. The second component of mark up is calculated as a percentage of ex-factory cost intended to meet the expenses incurred by a manufacturer on sales promotion,

distribution, outward freight at the trade margin to be given to distributive functionaries. The balance is the mark up. The order had prescribed that the 'mark up' shall not exceed (a) 40% in the case of category I formulation (b) 55% in the case of Category II formulations and (c) Upto 100% in the case of category III formulations.

The Industry view on the DPCO (1979) (as given below) was that the price controls cover 80% of drug formulations produced in the industry which number over 20,000. This goes beyond the Hathi Committee recommendations which suggested that controls should be limited to 117 essential drug formulations.

- division of formulations into 3 categories for the purpose of determining the mark up is unrealistic and not based on any scientific criteria. There is an in built inequity in the system as the manufacturing capacity for producing these essential drugs is not uniformly distributed over all the units.

- revision of prices of formulation and bulk drugs is infrequent. Government approvals are usually granted after a considerable lapse of time. This cuts into even the minimum profitability allowed in granting price revisions.

While granting price approvals, the authorities do not take into account the actual manufacturing costs of the applicant units. Instead the prices are based on certain norms which favour some and penalise others.

- Present policies do not contain provision for automatic revision of selling prices (both upward and downward) to accommodate variations in manufacturing costs.

The pattern of production in the private sector consisting predominantly of multinational subsidiaries or their equity

partners in India indicates that their primary objective is trade, based in the economically preferable area of formulations from bulk drugs largely imported. It was such a context that necessitated the establishment of public sector enterprises of IDPL whose production started in 1968, and Hindustan Antibiotics Ltd. in 1955. The COPU in their 22nd Report said: "The setting up of the drug manufacturing units and surgical instruments factory in the public sector was intended to serve the triple objectives, namely to bring down the prices by large scale production of high quality life saving drugs, to provide facilities for medical relief to the people on a mass scale in consonance with the declared objectives of the Government in this regard and finally not only to achieve self-sufficiency but also to produce an exportable surplus and earn foreign exchange. The relative figures for bulk production and formulations indicate that public sector units produce large tonnage of drugs of relatively lower value while the private sector/MNC units operate in low tonnage high rupee value drugs.

Table 6.1: Bulk Drug Production

(Rs.crores)

	1976-77	1983-84
Public Sector	43	61
Indian organised Private Sector	25	155
Small-scale Sector	10	74
National Sector (Total)	78	290
Multi-national Campaign (FERA and Ex-FERA)	63	65

Source: Ekbal, B (1988) (ed):" A Decade after Hathi Committee."

Table 6.2: Ratio of Bulk-drugs to Formulations

Sectors	Ratio as on 1974-75	Ratio as on 1980-81	Ratio as on 1982-83
1. Foreign Sector	1:6	1:12.53	1:12
2. Indian Sector	1:8	1: 2.6	1: 3.44
3. Public Sector	1:0.8	1: 1.26	1: 1.12

Source: Ministry of Petroleum; Various Reports

It was in this context that the Hathi Committee pointed out that the profitability record of a firm in this industry depended more on the product composition of the units than on the scale of production etc.

The COPU (29th Report[3] and the annual numbers of PES) state that IDPL was making moderate profits from 1974-75 to 1978-79, but thereafter started suffering losses which continued to mount. The losses increased from Rs.13.23 crore in 1979-80 to Rs.32.13 cr in 1985-86. The cumulative loss as on 31-3-1986 stood at Rs.200 core as against the paid up capital of Rs.95.91 core. The Committee Report identifies the major factor for the losses as the product mix of IDPL. "The company's products predominantly comprised of life saving essential drugs and formulations made under Category I & II for which there was a freeze in prices from 1976 to 1980 but the cost inputs continued to go up steeply eroding the profitability of the company due to low mark-up". The company is also reported to have found it difficult to face the challenge from the mushroom growth of small scale units producing cheap drugs from intermediates causing a cost efficiency problem for IDPL. All this has resulted in acute cash shortage which

virtually reduced the companies credibility for prompt payment. As a result the company could not get the essential raw material in time which adversely affected its production and sale".

The various Annual Reports of Hindustan Antibiotics Ltd. pointed out that "after the enforcement of the Drug (Price Control) Order 197Ø and especially after the unprecedented rise in prices of inputs after the oil price hike of 1973, profitability of the company started declining and working results affected adversely due to delays in revision of selling prices of our products". The Annual Reports indicate that the "unrealistic picture of the financial result in contrast to the impressive production performance in physical terms" is due to the fact that "the increase in the fair selling price of bulk drugs and formulations allowed by Government on recommendation by BICP, are constantly outpaced by ever increasing cost of raw materials, fuel, power and wages over the years.

From the above discussion, the point that emerges is that the two public sector units have done very poorly in terms of their financial performance due to two reasons (1) Public sector activity has been concentrated in the production of bulk drugs of relatively lower value (2) Prices allowed by the Government have not kept pace with the rise in cost of production causing the mismatch between high level of physical production and financial performance. It is evident that price controls exercise a determining influence on poor financial performance.

We can now examine the two firms where both total factor productivity and capacity utilisation are low but gross margin/capital employed is high. The suggested explanatory factor in these firms in the 'Minerals and Metals' group was that

favourable price factors appear to be working to improve their financial position despite their poor physical performance.

Let us first take the case of Indian Rare Earths Limited which showed a high level of profitability of 8.6%, over the period. IREL was incorporated in 1950 for (a) treating monazite sand occuring on the beaches of Kerala and Tamil Nadu (b) to produce rare earths products (c) to recover thorium and uranium Rare Earths Chemicals, Thorium Compounds, Trisodium Phosphate besides beach sand minerals, viz. garnet, ileminite, monazite, rutile, sillimenite and zircon. The customer composition of the firm reveals that the firm earns substantial foreign exchange by its diversified export marketing base in West Germany, Taiwan, Iran etc. One can glean from the Annual Reports of the Company that "the profitability of the company increased despite a fall in sales turnover largely as a result of better per unit realisation in the overseas market".[3] Capacity Utilisation registered a low level because (a) of the keen competition in marketing ilemenite (b) producers of Titanium dioxide pigment were switching over to the use of slag to overcome pollution. But higher profits were possible due to increased exports of rutile and ileminite to Iran, Egypt. Profits grew despite increases in cost of production since efforts at diversifying the product range paid off and even demand for the companies major products like Ileminite and R.E. Chloride firmed up in the overseas market. Thus, we may infer that, for IREL, prices in the world market were high due to high demand for a rare material.

The PES (Vol.1 1973-74) states that IREL & NMDC belong to the Category IV of" Enterprises Selling Abroad" who have developed substantial export business on the basis of international export

prices. The position of these producing companies depends entirely on the international acceptance of the quality of their goods and their ability to meet international standards".

National Mineral Development Corporation (NMDC) was registered in 1958 was responsible for iron ore production in the Donnimalai and Balaidilla projects. It showed a profit rate of 3.26% for the period. The iron ore exports of NMDC, to Iraq and the steel mills of Japan, are canalised through MMTC,(Minerals and Metals Trading Corporation), which receives the F.O.B. price from foreign buyers. Due to recession in the steel indutry, MMTC, found it difficult to secure sale contracts for either lumps or fines in the later 197Ø period. Till 198Ø, the sale price for iron ore exported was paid by MMTC on the basis of prices provisionally fixed from time to time. However, from 1-4-198Ø, it was agreed with MMTC that NMDC would receive the residue available (from F.O.B. price) after meeting all external payments towards freight, port charges, export duty etc. In 198Ø, the Government decided that MMTC should pay NMDC a price based on 'Standard Costs', such costs to be related to certain norms of efficiency and it was hoped that the company would get better sale prices and break even. By 1981-82, there were improvements in the operating position of the company with higher despatch of iron ore and higher F.O.B., price received from Japanese Steel mills coupled with favourable exchange rate of dollar value. Higher residue was also received from MMTC thanks to certain concessions granted by the Government on account of reduction in port charges of Vizag plant, reduction in export duty of iron ore, reduction in inflated mileage in the Bailadilla Sector all of which contributed to offset the adverse increases in labour welfare cost, railway

freight etc. Till 1981, since FOB prices had not in general responded adequately to the increased domestic costs, the BICP conducted a cost-price study to allow a fair price to NMDC and recommended for price increases. In 1982-83, even though lump ore production was again curtailed due to lower off-take by the Japanese Steel mills and the prolonged severe recession, foreign exchange earnings on export of iron ore improved because of increases in FOB price and higher rupee realization per dollar sales turnover. However, by 1983-84, FOB price was cut by the Japanese by 12.9% in respect of lump and 12.5% in respect of fines and the entire price cut was passed down to NMDC. This increased the operational problems; however, due to the steep appreciation of exchange value of US dollar vis-a-vis the rupee the price reduction was offset.

The conclusion emerging from the above qualitative discussion is that in the case of one firm, financial performance has registered high levels due to high demand for a rare material in the export market and the consequent improved price position and in the case of the second firm, foreign exchange earnings have improved due to increase in the FOB price on its exports and higher rupee realization per dollar sales turnover. This detailed investigation seems to confirm the claim that favourable price factors appear to be working to improve its financial position despite its poor physical efficiency.

II

Having examined the contention that it appears to be favourable/unfavourable price factors which cause mismatch between physical and financial indicators for the previous 4 firms, in this section, we shall examine those cases where in addition to

the physical/financial divergence, there is incompatibility between the physical indicators themselves. To recapitulate the argument in Chapter 4, Section 2, we postulated that disassociation between the physical indicators themselves are caused by diseconomies of scale whereas price intervention by the Government, causes further disassociation between physical and financial indicators.

So far we have considered Cells (3) and (6) where there is the disjuncture between physical and financial indicators. Let us now proceed to cells (2), (4) (5) and (7).. Cases where the physical indicators themselves (CU & TFP) run counter to each other:

(2) CU_L; TPF_H ; GM/CE_H (4) CU_L; TFP_H; GN/CE_L

(5) CU_H; TFP_L ; GM/CE_H (7) CU_H; TFP_L GM/CE_L

We have dropped the firms (National Instruments) in Cell 7, for on closer inspection it was observed that the Value Added time series figures were lower than the Wage Bill series thereby indicating serious problems with the data of this firm. Further, the calculated TFP cannot be relied upon.

In the 5 firms in Cells (2), (4), and (5), total factor productivity and capacity utilisation run counter to each other (Cell 7 is empty). In four of them, total factor productivity is high but capacity utilisation is low.(Cells 2 & 4). In the other the reverse is true (Cell 5). Four are high profitability firms (Cells 2 & 5) and one has low profitability.(Cell 4). Also four firms have high TFP and low CU.

One would normally expect physical indicators to be similarly ranked. We could put forward two alternative

explanations that may account for their running counter to each other. One, TFP indices may be unusually high or low due to distortions in base year prices. To repeat a point, already mentioned elsewhere, if base year price distortions in respect of input or output prices exist, this will exert an upward/downward influence on the TFP indices, as the case may be.[4] If this were true for the above firms it might shift cell (2) firms to cell (6) and cell (7) firms to cell (3) Firms in cell (4) and (5) would shift to cells (8) and (1) respectively with no incompatibility between physical and financial indices and thereby ceasing to be anomalous.

Two, diseconomies of scale may set in much earlier than the norm for these particular firms, i.e. low CU may correspond to high TFP and high CU to low TFP. In this case one might explain the performance of firms in cells (2) and (7). However under this explanation the performance of firms in cells (4) and (5) would require additionally that price factors work so that financial performance does not reflect physical performance.

It is not possible to test easily between these alternatives without detailed cost and price data which are not available to us. Furthermore a combination of factors may be at work for any particular firm. The exercise undertaken below is therefore exploratory and the results extremely tentative and should be interpreted as such.

To check the validity of the TFP indices as measures of physical performance, we first simply compared TFP to TFPG figures for the above firms; the presumption being that since TFPG is price independent, TFP should correspond to TFPG if TFP is a valid physical measure. Of course this has to be interpreted cautiously

for the same reason that we have not used TFPG as our main indicator, i.e. TFPG may be high or low simply because the base TFP is low or high.

Next we recalculated TFP for these firms after changing the base year, i.e. if there are significant changes in TFP as a

Table 6.3: Average ratios of the anomalous firms

	CU %	(GM/CE) %	TFP	TFPG %	TFP with altered base year	Difference in TFP with change in base year
Instrumentation Ltd .	35.14	11.59	0.453	5.2	0.439	0.014
Bharat Pumps and Compressors	35.25	5.43	0.268	6.5	0.227	0.041
Fertilisers and Chemicals Travancore Ltd.	58.99	3.71	0.275	3.2	0.30	-0.025
Hindustan Antibiotics Ltd.	88	2.91	0.177	10.2	-	
Indian Drugs and Pharmaceuticals Ltd.	73	2.87	0.173	1.3		
Western Coalfields	100	5.48	0.102	3.6	.362	0.260
Indian Rare Earths Ltd.	65.10	8.61	0.034	-16.6	-	
National Mineral Development Corporation	49.09	3.25	0.172	17.1	-	
Jessop and Co.Ltd.	61.81	1.31	0.548	-5.0	.886	0.338

Cut-offs(Median)	CU	GM/CE	TFP	TFPG
	66.45%	3.25%	0.173	3.8%

Source: Derived from various PES volumes

result of doing this, it becomes a much less reliable measure of physical performance. The results are given in Tables 6.3 and 6.4.

For Instrumentation Ltd., Bharat and FACT(Cell 2), TFP changes very little as a result of the change in the base year (0.014, 0.041 and -0.025 respectively).

Table 6.4: Position of firms in Cells(2),(4) and (5) with altered TFP

Cells	Name of firm	TFP	TFPG	Changed TFP
(2)	Instrumentation Ltd.	H	H	H
	Bharat Pumps & Compressors	H	H	H
	FACT	H	L	H
(4)	Jessop & Co.Ltd.	H	L	H
(5)	WCF (Western Coal fields)	L	L	H

Source: Derived from Table 6.3

Further for Instrumentation Ltd.and Bharat both TFP and TFPG are high. With considerable caution one might therefore suggest that TFP as measured is a reasonable indicator of real productivity for these two firms. Thus for these two firms the second reason for CU & TFP running counter to each other may hold, viz., a sharply falling cost curve with diseconomies of scale setting in at a relatively low level of capacity utilization. Unfortunately we do not have the data to directly test this.

For FACT on the other hand the results of the above exercise are more ambiguous TFP is high while TFPG is just below the median. A closer look at FACT revealed a possible explanation for the divergence of TFP from a low level of capacity utilisation. Recalling our discussion in Chapter 5, the constant price estimates of capital stock will tend to underestimate the series for old firms established before 1950-51, since the index of prices used to deflate Capital Stock is at 1960-61 prices which does not correspond to the age-structure of assets. This would mean that the capital stock of initial years get deflated for a higher rate of increase in prices. Accordingly, the Capital Stock

series of FACT may well have been underestimated with a consequent upward bias on the productivity estimates. This nevertheless leaves a low level of CU associated with and a high level of GM/CE to be explained. The shortage of vital inputs like Sulphuric acid and repeated power interruptions were cited in the firm's Annual Reports as being serious limitations in obtaining fuller capacity utilization. However the pricing policy in the fertiliser industry is one where 'Retention pricing' is in operation, where each unit in the industry is guaranteed a price equal to its costs plus a specified return: the low cost units receiving a lower price and high cost units a higher price. With a low level of capacity utilisation, it is expected that the cost would be high thereby affecting the profitability ratio As pointed out in the discussion paper on 'Administered Price Policy' by the Ministry of Finance, over the years retention pricing may have tended to become a 'cost-plus' pricing system, allowing units to be financially viable even in the face of high costs. This could explain the high levels of GM/CE but with FACT operating at 58% (average) capacity utilisations, an explanation for the high profitability ratio has to be located else where. It is possible that the underestimation of the capital stock (due to the above mentioned reason) could be inflating the ratio.

For Jessop and WCF, TFP changes quite significantly with a change in base. Also TFPG is very low for Jessop in contrast with high TFP. For WCF, TFPG is around the median, which also contrasts with its low TFP, though the contrast between TFP and TFPG is not so sharp as for Jessop. Both tests indicate that for these two firms TFP may be a doubtful measure of real productivity. In the case of Jessop, the reliability of TFP

estimates may additionally be questionable due to the aforesaid problem of the underestimation of capital stock with its consequent influence on TFP is an upward direction. Jessop, established in 1733, will have it capital stock underestimated, since the index of prices used to deflate Capital Stock at 1960-61 prices does not correspond to the age-structure of the assets. Looking only at CU and GM/CE, both firms cease to be anomalous- WCF shifts to cell (1) and Jessop to cell (8).

The fact that base year price distortions have a bearing on TFP can be ascertained by an examination of the pricing pattern in the coal industry. In the case of Western Coalfields Ltd., where TFP alone is low with high Capacity utilisation and gross margin/capital employed, a recalculation of TFP with 1980-81 as the base year yielded a high measure (=.362) confirming the explanation that the deviation in the 'total factor productivity level as against CU_H and $GMCE_H$ may be due to unfavourable base year price distortions. In this context one can point out that in the seventies (our initial base year choice was 1970-71), coal pricing was under the control of Government of India. Even though the 1974 committee contemplated the fixation of price to allow for 10% return on capital employed, Government of India finally approved a prices which did not cater for a profit element.[5] Since its incorporation, the Company has been incurring losses upto 1978-79 and the accumulated loss upto the end of 1978-79 was Rs.95.11 crore. It was only from 1979-80, that the company started making profits which are reflected in the high average profitability ratio. The CAG Report on the company states that the profit from 1979-80 was attributed by the Department of Coal to increase in production, productivity and measures taken to

control the cost. It is however, seen that from 1979-80 onwards the increase in selling price more than offset the increase in cost of production except in 1984-85 as in Table 6.5.

The change in the base-year (from 1970-71 to 1980-81) from a year of price control to a year of price relaxation, is reflected in improved TFP position, bringing compatibility between the indicators.

Table 6.5: Increase in Cost and Price of Coal

(Rs. per tonne)

	Increase in Cost	Increase in Selling Price
1979-80	10.94	29.09
1980-81	8.51	14.04
1981-82	21.04	27.91
1982-83	24.52	13.73
1983-84	-0.03	4.79
1984-85	3.70	26.85

Source: Comptroller and Auditor General Report, Western Coalfields (1985)

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We could now present a summary of results.

(1) For a large number of firms (16 out of 26), no anomalies exist between physical and financial indicators. - 8 show all-low-position in the indicators; the other 8 show all high position in the indicators.

(2) Of the 9 anomalous firms we have two categories:

(A) where both physical indices are similar but financial indicator runs counter

(B) where physical indices themselves run counter to each other.

(3) Category (A) includes firms in cells (3) and (6). More detailed investigation as discussed earlier

indicates price factors may have been operative in each of these cases.

(4) Category (B) includes firms in cells (2), (4), (5) and (7). For two firms (Instrumentation and Bharat) TFP appears to be a reasonable index; scale effects may account for relatively low CU; TFP, TFPG and GM/CE are all high. Also the change in base year does not alter TFP very much.

For FACT our results are inconclusive. For Jessop and WCF, total factor productivity is not a reliable physical indicator. TFPG runs counter to TFP, and a change in base year does alter TFP considerably. Both firms in this case cease to be anomalous if one considers only capacity utilisation and profitability which are similarly ranked.

The general conclusions emerging are as follows:

(1) The controversy between physical and financial indices is not as severe as it appears apriori. In a significant majority of cases there are no anomalies in our sample.

(2) The anomalous cases are of 3 types:

- firms where both the physical indicators are similarly ranked, price controls or support do appear to account for the divergence of the financial indicator; there are 4 such firms;
- some of the firms where the physical indicators themselves diverge, scale factors appear to play a role; there are 2 such firms;
- the other firms where the physical indicators

diverge, TFP does not appear to be reliable; the 2 firms in this case then cease to be anomalous. The tests were inconclusive in the case of one firm.

However these conclusions are to be seen in the light of the following caveats. The absolute importance of price distortions versus other factors has not been tested here since these are only rankings within the sample. Second, price and scale factors may be at work in the non- anomalous cases as well. We have no means of testing for their importance without detailed cost and price information. Third, the above analysis does not purport to measure the importance of price controls/supports in any absolute sense and especially not vis a vis the private sector, since it is based on rankings within the public sector itself.

The conclusion that in a majority of cases there does seem congruence between levels in the physical and financial indicators is not to argue that examining firm-efficiency in terms of one indicator alone will suffice. It serves rather to suggest that the physical and financial indicators are in general interactive, mutually reinforcing each other's potency in improving/deteriorating the operational efficiency of the firm@. Treating administered prices as a sort of "mark-up", this relation between physical and financial performance can be brought out more sharply. Whereas 'mark-up' is constrained by/ dependent upon the price raising power of the firm which varies inversely with the amount of effective competition, administered prices are constrained by certain macro considerations of restraining inflationary pressures, generating resource

mobilisation etc., to which the government is sensitive. There are two opposing forces acting on administered prices - The motive of resource mobilisation tending to pull it up and the need to curtail inflationary pressures tending to push it down. In the mechanics of raising the mark-up, the firm improves its profitability and undertakes capacity expansion (reflecting physical efficiency) with the enlarged investment finances. The reverse becomes true with reduced mark-ups. The same process of the interaction between the financial and physical parameters (i.e. between mark-up and capacity expansion) can be visualised with the altering of the levels in administered prices, the constraints acting on it, alone being different.

While the majority of firms in the sample are not anomalous, there are a not insignificant number where price controls/supports do cause a divergence between physical and financial performance. We have no means for testing the absolute or the relative importance of one factor versus the other (financial vs. physical) but some observations can be made based on a few firms, which figure in the non-anomalous slots. The administered price for aluminium metal, defined as the retention price provides for a post-tax return on the net-worth of each enterprises, ranging from 7% at 55% utilisation of installed capacity to 12% at 90% capacity utilisation. Bharat Aluminium Ltd. has not been anywhere near approaching the profitability level implied in the formula for fixing retention prices. The poor financial performance of the aluminium company, seen in the context of its technical performance (particularly in terms of its material consumption, which seem to have a satisfactory record), suggests that the poor performance of the firm primarily

stems from (1) inadequate retention price which fails to take into account the increasing input costs and (2) the consequent inadequacy of working capital lending to falling capacity utilisation levels.[7]

The poor financial performance of many of the public sector projects is in certain cases, traceable largely to poor investment decisions, reflecting in improper technology or irrational product mix. This is shown in the case of IISCO where the plant has been systematically allowed to wear out without proper maintenance and timely replacement of equipment and where work methods are physically inefficient.[8] While poor availability and condition of coke, overaged batteries and intermittent operations of blast furnaces to suit availability of coke overaged plant and equipment and inferior quality of raw materials which inflate power consumption have resulted in lower production, the situation has not been salvaged by its financial position either, which being a function of the State policy, is not under the control of the firm or industry. It was only in 1982-83 that the regime of administered prices for pig iron and all categories of steel was abolished which may help in the generation of internal resources to be used for modernisation and diversification of expansion.

The full import of unearthing the root of the problem in inefficiency is obvious for policy considerations. At a point in time a firm may reflect inefficiency in both physical/financial parameters, but it is necessary to enquire into the source of the malady, since it may be the poor physical performance which (with a lag) transmits itself into poor results or vice versa. Therefore, the policy directions aimed at correcting the

"inefficient" situation have to be different in the two cases. An across the board increase in administered prices will only serve as a short term ameiliorative if the basic problem is technical inefficiency; conversely, a technologically upgraded plant has no incentive for further improvement if it is stifled under a regime of price control.

Notes

1. Narayanan, P.L (1984)

2. Committee of Public Undertakings: 5th Lok Sabha, 76th Report, 8th Lok Sabha, 29th Report.

3. Annual Report, Indian Rare Earths Limited, 1976-77.

4. If input prices in the base year are not high commensurate with what is (or would have been) the "market" forces dictate it to be, there is favourable base-year price distortion, reflecting in high total factor productivity. Conversely, an unfavourable base year price distortion of keeping the input price higher or the output price lower than the norm, causes low total factor productivity.

5. Comptroller and Auditor General Report on Western Coalfields Ltd., 1986.

6. For details See Chapter 4, Section II.

7. "Aluminium Industry in India" Problems and Prospects - Vol.1 National Council of Applied Economies Research.

8. "Public Enterprises Survey" Vol.II Year (198Ø-81) .

Chapter 7

Summary and Implications of the Study

It has been the basic premise of the study that the performance of public sector enterprises cannot be viewed in isolation as has been done hitherto, but that its evaluation needs to be carried out in the context of the macro-economic environment within which it operates. In the course of planning, the public sector has played varied roles in the economy ranging from determining the rate and structure of investment, mobilising resources, containing inflation and generating demand, which have to a large extent been determined by the prevalent macro economic conditions. This goes on to suggest that the many policies which determine public enterprise performance - pricing/investment/ output-mix/location etc. are in relation to and are conditioned by macro economic objectives.

Accordingly, an evaluation of public sector performance has been done at two levels, the macro (Chapters 1 and 2) and the micro (Chapters 3-6) levels. While this might suggest a compartmentalisation of the two levels of inquiry such that they are independent, it should be obvious that they are not. The two are interactive such that the macro role enforces certain constraints on the operation of the firms (Chapter 1), while the impact of the macro economic linkages in operational terms is itself determined by certain micro variables at the enterprise level. An attempt at directly integrating the two has not been made due to paucity of data on input-output linkages, cost structure, prices of output etc. Consequently, the macro factors have been used more towards locating the explanations for

observed patterns in micro level indicators of performance, leaving scope to explain aberrations as being policy induced. Chapter 2 continues the macro focus and we have examined the resource deficit as indicated by the Investment-Savings gap in the sector as a whole and the non-departmental enterprises in particular, and the consequent draft the sector makes on the savings generated elsewhere in the economy. The data suggest a higher share of non-departmental enterprises in the resource gap of the public sector but this may not necessarily reflect inefficiency as the larger gap may well be due to the high levels of absolute investment and savings as also the differential structure of investment between departmental and non-departmental enterprises. Further, the observed pattern of investment-savings gap of non-departmental enterprises was explainable in relation to the macroeconomic activity especially the phase of industrial deceleration.

The review of literature revealed that public sector performance evaluation has eluded a consensus and as yet there is no ready sample of indicators of efficiency at the firm level (Chapter 3). Chapters 1 and 2 provide the macro backdrop which help us to identify micro level indicators for evaluating firm level performance.The use of the physical and financial criteria (Chapter 6) can be rationalised partly in terms of the macro economic linkages that the public sector firms have because of their position in the structure of production. In technical terms the critical role of public sector in the economy stems from its being a manufacturer of capital goods. Any technical inefficiency especially in firms producing capital goods will transmit itself across the board making the economy a high cost

structured one. To capture this,.we have used the criterion of total factor productivity. The other physical efficiency criterion, capacity utilisation is related to the phase of economic activity especially with regard to the state of demand. The financial indicator (Gross Margin/Capital Employed) also serves a macro economic purpose in so far as it points towards the potential for resource mobilisation of individual firms as also the entire public sector.

In a more restrictive sense, the choice of physical/financial criteria was sought to be explained in terms of the contention that while social objectives may affect the financial performance of the firms adversely, the physical efficiency criteria should be relatively free of such distortions. It is therefore implied that there will be a distinct disjuncture between the two measures of performance.

In Chapter 4, this issue was taken up theoretically and an attempt was made to establish the conditions under which one would expect compatibility between the indicators. Empirically, in Chapter 5, we estimated the Rank Correlation Co-efficient between physical and financial indicators - while there seemed to be significant correlation between productivity and profitability, such a strong relation betweeen capacity utilisation and profitability was not indicated. However, a broad classification of high and low performance based on the median of the particular indicator in the sample, yielded the observation that a relationship exists between indicators in firms which are generally at the upper and lower end of the spectrum.

As a further step, we tried to question the factors that may lie behind the discrepancies between the indicators, within the same firm (Chapter 6). Out of a sample of 26 firms, 10 exhibited anomalous behaviour with the physical and financial indicators pointing in disparate directions. The investigation revealed that price intervention via administered prices may have been operative to cause incompatibility between physical and financial indicators-price controls or support appear to account for the divergence of the financial indicator from the physical indicator. For some of the firms where the physical indicators themselves diverge, scale factors appear to play a role since over a period of time, a large degree of association between the physical indicators is to be expected. However, in the absence of data on prices and cost structure, these conclusions are to be cautiously interpreted. For, this has not enabled us to (a) test for the absolute importance of price distortions versus other factors; (b) measure the importance of price controls/supports in any absolute sense and especially not vis-a-vis the private sector and (c) assess the possible role of price and scale factors in the non-anomalous cases as well.

The conclusion that there is congruence between levels in the physical and financial indicators suggests that the physical and financial indicators are in general interactive, mutually reinforcing each other's potency in improving/deteriorating the operational efficiency of the firm (Chapter 6). It is therefore imperative to enquire into the source of the poor performance of the firm, more so for policy prescription, since it may be the poor physical performance which (with a lag) transmits itself into poor financial results or vice versa. For in these two

cases, policies aimed at correcting the "inefficient" situation will have to be different. Even though an across the board technological upgradation or improved administered prices may be desirable from the vantage point of the micro enterprise, it may not be feasible either due to resource constraint or the consequences of a triggering of the inflationary spiral. Therefore, a policy of selective intervention based on firm and sector specificities vis-a-vis the macro economic constraints and policies, is necessary for improving firm level efficiency.

However,on the basis of issues raised in chapter 1 and the results obtained in chapter 6, certain general policy implications may be drawn. Given our discussions of the micro-macro linkages it is possible to visualise a situation where by altering some macro policies it should be possible to improve the performances of public enterprises. Consider, for instance, a change in the structure of investment. An increase in the machinery and equipment intensity of public investment even with no change in the level of investment will ensure increased capacity utilisation in non-departmental enterprises, especially in the capital-goods sector, which are operating at less than capacity.This will also generate a corresponding rise in the operating surplus since wages are a part of fixed costs. In addition to improving the resource mobilisation, the inflationary pressures are also kept at a minimum, since there will be no sectoral spill-overs.

An alternative scenario could be thought of in relation to the location of investment. An increase in investment in those enterprises which are operating in a demand constrained sector, will neither relieve the inflationary pressures extant in the

economy nor contribute positively to the mobilisation of resources. On the other hand, increased investment in sectors with supply rigidities will not only ease inflationary pressures but also generate resources. Given an understanding of the Indian economy, this could be considered as a case for greater public sector activity in agriculture.

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