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TRENDS IN PROFITABILITY AND COST OF CAPITAL IN THE INDIAN PRIVATE CORPORATE SECTOR — 1960-61 TO 1977-78

P. K. Pani, Kripa Shanker and R. Satyanarayana*

Introduction

This paper attempts to analyse the trends in profitability and cost of capital for the Indian private corporate sector for the period of eighteen years, ended 1977-78. It is divided into three sections. In the first section, conceptual aspects such as the scope and significance of different measures of profitability and cost of capital, etc., are discussed. An analysis of trends in the various measures is attempted in the second section — separately for all-industries/industry groups and selected industries. The third section presents a summary of the findings. In addition to the brief discussions at appropriate places of the article, details of the concepts, methods of computations, limitations etc., are given in the Appendices.

SECTION — I

Rate of Return on Capital

Conventionally the return on capital stock is worked out as the ratio of profits to the book value of capital as reported by the companies in their annual accounts. This ratio, however, does not depict the true picture of profitability because the numerator and the denominator represent the values at prices prevailing at different points of time. Thus profits (numerator) being a result of current purchase and sale operations of a firm during a given accounting period, are evaluated at current prices while the book value of physical capital stock (denominator), which is the total value of assets acquired at different points of time in the past incorporates in its valuation historical prices paid at the time of their acquisition.** Additionally the profit figures, worked out net of depreciation on physical capital, during the accounting year, may not measure the real return when the

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** Some companies revalue their assets periodically, but since majority of the companies report physical assets at historic cost, there could be some difficulty in interpreting the aggregate value of physical assets at book value or historical cost. In this article these terms are synonymously used.

depreciation allowed on the fixed capital stock does not reflect their current market or replacement value. The result is an overstatement of real profits and consequently an overestimation of the rate of return on physical capital.

Inflation and Conventional Accounting Practices

These aspects raise the question of the relevance of conventional accounting practices, especially in a changing economic environment characterised by high rates of inflation. A continuation of conventional accounting practices, particularly in times of inflation could lead to (i) dividend policies which could result in the payments out of capital because of a misjudgement of earnings, lower retained earnings and less availability of funds for further investment; (ii) incorrect decisions as to costs and prices, biased pay negotiations; and (iii) delayed and sub optimal investment decisions both towards replacements and additions to capital stock which could lower capital productivity. While these aspects focus on the necessity of a gradual change over to modified accounting practices, taking into due consideration of the effects of inflation, the following paragraphs try to work out the rate of return based on the current set of data but suitably adjusted for the effects of rising prices.

Taxation, Inflation and Investment Growth

The return on capital, even when the latter is adjusted to take into account the prospective replacement cost, is only an approximate indicator of the real profitability. Taxation of profits and investment allowances, subsidies and other incentives towards investment, alter the return on capital from the entrepreneur's angle. While corporate taxes reduce profit, incentives towards investment would increase the cash flow to companies. New investment is made profitable as companies can draw on the relatively cheap source of internal funds released by investment allowances and other tax benefits. These resources shown in the books of companies as 'deferred tax liability' could reduce the total cost of capital funds which the companies would have otherwise acquired from the capital markets at higher interest rates. Similarly, post-tax earnings would be higher with liberal tax allowances.

As a stimulant of investment, ensuring of a higher real return on capital presents one aspect while reducing the cost of capital funds financing the physical assets formation, another. The expectations about the rate of interest on the saving of the contributors of capital funds change with inflation. This alters the market price of securities and the cost at which finance can be obtained by investors. The stock holders (savers) can raise the price of equity/preference/debenture

capital in times of inflation to make the yields correspond to the anticipated nominal earnings. On the other hand, the cost of long-term capital to companies in the form of fixed value obligations, (loans of the term lending institutions, bank advances, etc.) would decline and lessen the burden of servicing of them by companies unless these borrowings are accompanied by a rise in the interest rate to compensate for the price increase (e.g. floating rates of interest). The form of financing the companies resort to (equity or borrowed funds) has a bearing on the overall cost of acquisition of funds. With a given level of earnings (pre or post-tax), the incentive to further investment would depend on the difference between the expected post-tax real return and the post-tax cost of capital. If the savers and investors hold identical expectations on earnings, this difference could be measured by the ratio of replacement cost of capital adjusted for tax benefits to the financial valuation of the stock of funds financing the capital. In the long run the ratio of financial valuation to replacement cost, would not differ from unity. Investors (borrowers) and savers (equity holders and other financiers) may however have, in the short run, different expectations of the future earnings of companies. Variations in the ratio (over or below unity) in the short run could also arise due to shift in Government policy (prices or tax incentives), technological progress etc. Thus individual industries may show different levels of this ratio while for the corporate sector as a whole equilibrium conditions may more or less prevail. The trend in the ratio can be a guide for policy action when Government wants to provide for investment incentives in specific areas. It may be noted that the differences between the rate of return and the cost of capital could be important determinants of investment levels.

Performance Indicators

With a view to quantify some of the indicators discussed above, profitability ratios (two pre and two post-tax), post-tax measures of costs of capital (one forward looking and one backward looking) and a valuation ratio are worked out in this article.

Pre-tax Profitability Ratios

The first ratio, which is an indicator of the pre-tax profitability at historical (reported) cost, has as numerator, the trading profits net of depreciation as reported by the companies; the trading profits are taken equivalent to the gross profits of the RBI Studies on Company Finances. The denominator of the ratio is the reported value of the physical capital stock. It may be pointed out that the physical capital, for the purpose of this study is taken as comprising both

the fixed and inventory capital. The second ratio of real pre-tax profitability is worked out as the ratio of trading profits net of depreciation at replacement cost to the replacement value of physical capital stock.

The impact of taxation on profitability is, as mentioned earlier, of considerable importance for the savers (providers of capital funds) as well as for the investors (employers of these funds). When uniform taxation is not present, post-tax return on the physical capital employed is an important indicator of the line of activity where capital funds owned and borrowed could be used more profitably. The savers (financiers) conventionally depend on the measure relating the earnings (viz. dividends plus retained earnings as reflective capital gains), to the equity to know the line of activity where they can profitably place their savings. The rate of return representing the net yield to suppliers of finance is worked out by taking the ratio of earnings to the base comprising not only the equity but also the loan capital and current liabilities net of trade receivables and liquid assets such as cash and bank balances. The two measures of return — one from the angle of investors (employers of capital) and another of savers (financiers of capital) provide figures of the profitability (or return) and of cost of capital for the firm.

Post-tax profitability ratios

For an appropriate measure of post-tax profitability rate, besides adjusting the earnings for taxation, it is necessary that the employed capital stock (of fixed assets at replacement value plus inventories) is also adjusted suitably for tax benefits enjoyed by the companies or would be available to them as a result of their past and future investment activity. Tax incentives reduce the entrepreneurs' share of risk capital employed. In the Indian context, the taxation incentives mostly result in an increase of cash flows. An enumeration of various classes of tax benefits offered to companies is given in the Appendix II. Some companies might enjoy the tax concessions by making certain specified categories of investment, without reporting corresponding amounts in the annual accounts. The tax written down value of fixed assets for the purpose of this article is taken as equivalent to the written down value of net fixed assets as recorded in the books of accounts minus tax benefits estimated from books of accounts. In view of the earlier remark, this measure may overstate the actual value which incorporates all tax benefits utilized by the corporate sector.

As stated earlier, two post-tax rates of return, viz., 'backward looking' and 'forward looking' are computed. In the case of back-

ward looking rate of return, the actual value of allowances that were in force at the time of the installation of capital were taken into account for adjusting the value of total capital employed from the taxation angle. As all the past allowances were taken at the same value without any revaluation, for computing tax adjusted total capital employed such an adjustment is deemed to be "backward looking". Whenever a company realises more than the written down value of the fixed assets after sale, the company is supposed to pay taxes on the excess realised, and such a tax liability is viewed as the Government's own equity stake in the fixed capital. Extending this approach, in the backward looking adjustment of total capital employed, the contingent tax liability on the excess of the replacement value over the book value of net fixed capital, was computed at the normal rate of corporate taxation and the same was deducted from the replacement value of net fixed capital.* When new investment and the prospective returns are to be considered, what matter most are not the past allowances but the current investment allowances and as such the 'backward looking' rate of return would not be of much help. Accordingly another method of computing post-tax return viz., 'forward looking', was considered wherein the value of total capital employed was adjusted in a different manner. In this case the actual value of past allowances was not considered, instead their present value was computed using the yield rate on long term Government securities as the discount rate. Firstly, the proportion of the present value of all the past allowances in the total replacement value of the gross fixed capital was computed and using this proportion the present value of the allowances relating to the replacement value of net fixed capital was obtained. The tax adjusted value of total capital employed was then taken as net of the present value of allowances computed as explained above. Thus the tax adjusted total capital employed in the case of 'forward looking' return represents the existing fixed capital, as if

* The need for such adjustments when investment allowances are present can be illustrated as follows: Suppose investment during a year can be fully written off against profits during the year.

P = Profits, I = investment, r = tax rate; with no new investment, tax dues are rP ; with investment, I , tax dues are $r(P-I)$; rl is the additional cash flow for companies towards incurring of an investment expenditure I ; tax adjusted capital value to the company is $I(1-r)$. On immediate resale, company will realise value of capital as I , its own stake being $I(1-r)$, Government's contribution being rl as the latter has foregone tax to that extent. This argument can be extended to the whole of capital stock.

it was acquired during that year so that its value was in line with the present value of current investment allowances.**

Thus the post-tax rates of return are worked out in such a way as to allow for the effects of both inflation and taxation not only on profits but also on the valuation of physical capital employed (vide Appendix for the details of concepts and the methods of computations).

The value of physical capital stock is taken as the average of its values as at the beginning and the closing of the accounting year so as to properly relate the same with earnings which relate to the during the year activities. Earnings are defined as comprising gross trading profits plus rent receipts less capital consumption but gross of interest (paid). Since the rate of return relates to physical capital, non-trading incomes are excluded.

Conceptually, the earnings should be adjusted for income from abroad but in view of the non-availability of required data, no such adjustments are carried out. The estimation of replacement value of the physical capital stock is beset with several problems. The estimates of current replacement cost of fixed capital are derived by making use of replacement cost ratio.¹ Inventories are taken at the book value as it is expected that there may not be considerable difference between the book and market values since inventories are held relatively for smaller periods; even if one desires to carry out these adjustments, adequate data are not available.

Post-tax real cost of capital

For a proper understanding of the factors influencing the investment activities of companies, it is useful to correlate the trends in the profitability and in the cost of capital. A brief mention of how cost of capital funds is measured is made earlier. Cost of capital is defined variously by different theorists. In simpler terms, cost of capital may be viewed as the price to be paid for finances utilised in connection with the physical investment. Generally long-term interest rates are considered as a proxy for the cost of capital. A limitation which should be kept in mind, when taking long-term interest rate as an indicator of the cost of capital, is that the in-

** For details of computations, see the Appendix. For the rationale underlying the 'backward' and 'forward' looking tax adjusted rates of return, see the article 'Trends in profitability' by J. S. Flemming, et al, in Bank of England "Quarterly Bulletin", Vol. I, No. 16, March 1976, Pages 40—41.

¹. Kripa Shanker, 'Capital-Output Ratios in the Indian Corporate Sector, 1961-62 to 1977-78', Reserve Bank of India Occasional Papers, Vol. 2, No. 1, June 1981.

creases in nominal interest rate could be contemporaneous with the increases in prices. If the expected rate of return exceeds the cost of capital over the complete life of a project, then it would be worthwhile to go in for new fixed investment. In a situation of unanticipated inflation, the equity holders tend to gain more than the debt holders. Another point to be noted is that the equity, built-up through retained earnings, may form a major source of finance for fixed capital investment. It is, therefore, appropriate that cost of this equity is also reckoned with while arriving at a measure of the cost of capital. Such a measure, not only takes into account both the components of company finance, but also eliminates the effects of inflation, which makes the debt finance seem to be costlier than the equity finance. Thus the overall cost of capital represents the rate at which company's future earnings are discounted by the capital market. In view of the unobservable nature of expected future earnings, an assumption is made that the expected real earnings per unit of investment in the years ahead, are the same as the present earnings. In the article, only the forward looking post-tax measure of cost of capital is discussed though the back-ward looking measure is also presented. The former is worked out as the ratio of earnings (adjusted taking into account both the taxation and the present value of all the past allowances per unit of investment) to the financial valuation of companies. The components of financial valuation of the companies are (i) market value of share capital and debentures (ii) other borrowings (iii) net trade credit (trade dues less receivables).

Valuation ratio and growth rate of fixed investment

A measure of relative profitability, viz., valuation ratio (Tobin's 'q'), which is the ratio of real rate of return to the cost of capital, is worked out. In simple terms, the estimated valuation ratio is the ratio of financial valuation of companies to the replacement cost of physical capital. It was James Tobin² who emphasized the role of valuation ratio as a possible determinant of investment. This ratio is generally viewed as a measure of divergence between the demand for capital goods and the supply of capital funds. Thus when the demand price exceeds the supply price i.e. when the valuation ratio exceeds the value unity, then entrepreneurs would opt for more investment in fixed assets which would generate to them net profits out of their use. In fact, what the entrepreneur would be interested, is the return on new investment and the relevant cost of capital which is related to the marginal flow of funds. Nonetheless, the average valuation ratio worked out on the lines mentioned above can still be considered

². Tobin, James; "A general equilibrium approach to monetary theory", Journal of Money, Credit and Banking, Vol. 1, Feb. 1969.

as a reasonably good indicator as to the existence or otherwise of proper climate for investment.^{3,4} One can reasonably suppose that the incentive to invest will be stronger if the valuation ratio remains relatively high, and the investment will be less attractive if valuation ratio tends to assume low values. The dividing line which determines whether to invest or not, may not however be strictly related to the valuation ratio assuming the value unity. As this ratio cannot be measured accurately, any apparent deviation from unit value has to be carefully interpreted.

Methodology followed in working out various rates of return and costs of capital in this study is broadly same as given in the two articles on this subject, viz.,

- (i) Trends in Company Profitability; and
- (ii) The cost of Capital, Finance and Investment, appearing in the Bank of England Quarterly Bulletin.⁵ Some modifications are, however, incorporated keeping in view the problems peculiar to the Indian context, such as the tax structure, investment allowances, availability of data, etc.

SECTION — II

Separate measures of profitability and cost of capital are presented for three main industry-groups, viz., (1) Manufacturing, (2) Agriculture and allied activities and (3) Other activities (covering mostly service activities), in addition, to the eight individual industries, (a) Cotton textiles, (b) Jute textiles, (c) Sugar, (d) Electrical machinery, apparatus and appliances, (e) Medicines and pharmaceutical preparations, (f) Basic industrial chemicals, (g) Cement and (h) Trading.

All industries

The pre-tax rate of return (at historical prices) of the corporate sector which was at 13.9 per cent in 1960-61 rose to 16.4 per cent in 1977-78, showing a mild up-trend during the period, noticeable mostly subsequent to 1968-69 (Statement I). In contrast to this,

³. Fumio Hayashi: "Tobin's Marginal q and Average q : A Neoclassical Interpretation" *Econometrica*, Volume 50, No. 1—January 1982.

⁴. Nelson: "Tobin's ' q ' and Investment in U.S. Economy". *Brookings Papers on Economic Activity*, September 1981.

⁵.a) Flemming, J. S.; Price, L.D.D., and Ingram, D.H.A., "Trends in Company Profitability", Bank of England Quarterly Bulletin, Volume 16, No. 1, March, 1976, and

b) Flemming, J.S., Price, L.D.D., Byers (Mrs.), S. A., "The Cost of Capital, Finance and Investment", Bank of England Quarterly Bulletin, Volume 16, No. 2, June 1976.

c) Williams N.P., "Influences on the profitability of twenty-two industrial sectors"—Bank of England—Discussion paper No. 15, March 1981.

the real pre-tax rate of return (which takes into account the replacement value of the net fixed capital stock and of the depreciation provision of stock so valued) fluctuated at around 8.4 per cent between 1960-61 to 1965-66 but declined subsequently to the level of 5.2 per cent at the end of the study period. While the difference between these two rates of returns was fairly constant upto 1970-71, there was increasing divergence between the two in the subsequent period, which highlights the inflationary effects in the later years of the study. The decline in the real post-tax forward looking rate of return, which came down from 4.2 per cent in 1960-61 to 2.2 per cent at the end of the study period, was much steeper as compared to the decline in pre-tax real return. Post-tax return formed between 36 to 50 per cent of the pre-tax return over different years. The post-tax cost of capital was generally higher by one percentage point, than the post-tax real return. The former declined from a level of 4.5 per cent in 1960-61 to 3.3 per cent in 1977-78.

The valuation ratio which was at 0.93 in 1960-61 gradually declined to 0.66 in 1977-78. It was lower than unity throughout the period of the study. The growth rate of investment which was 5.3 per cent in 1960-61, rose to 8.3 per cent in 1966-67 showing an up trend. After a decline to 3.6 per cent in 1968-69, it hovered around 4 per cent during the remaining period. As between the movements of the valuation ratio and of the investment rate there does not seem to be a close association over the study period. Factors other than the valuation ratio appeared to have influenced the investment growth.

Analysing the trends over the Plan Periods, we find that except for the Annual Plan Period (1966-67 to 1968-69) and 1974-75 to 1977-78, the pre-tax return (at historic prices) remained around 14 per cent (Table 1). It came down in the Annual Plan Period, partly as a result of the recessionary conditions in the industrial sector in those years. The return was at peak levels in the years 1974-75 to 1977-78.

If adjustments for price changes in the capital stock are made, the rate of return (pre-tax after revaluation) becomes almost half of the measure at historic prices. The corporate sector could get an average return of around 7 per cent in real terms.

Performance of various industry groups

The manufacturing group comprises three main groups, namely, (i) processing and manufacture — food stuffs, textiles, tobacco, leather and products thereof (ii) processing and manufacture-metals, chemicals and products thereof and (iii) processing and manufacture not else-

Table 1: Average rate of return, cost of capital, rate of investment and valuation ratio — All-Industries
(Per cent per annum)

Period	Rate of return				Cost of capital		Rate of investment	Valuation ratio
	Pre-tax		Post-tax		Post-tax			
	Hist-oric cost	After reval-uation	For-ward look-ing	Back-ward look-ing	For-ward look-ing	Back-ward look-ing		
	1	2	3	4	5	6		
1961-62 to 1965-66	14.46	8.47	3.52	3.17	4.48	3.91	6.21	0.82
1966-67 to 1968-69	12.17	6.03	2.27	1.97	3.14	2.60	5.76	0.72
1969-70 to 1973-74	14.64	6.54	2.94	2.07	3.73	2.51	4.32	0.79
1974-75 to 1977-78	16.56	5.75	2.36	1.26	3.50	1.72	4.64	0.67
1960-61 to 1977-78	14.56	6.92	2.93	2.26	3.83	2.81	5.21	0.76

where classified, as adopted for the Studies on Company Finances, published by the Reserve Bank of India. It is the biggest group in the corporate sector, with the net sales and total net assets of the selected companies of this group accounting for almost 85 per cent of the total of respective items of all the selected companies. The trends observed in the rate of return, the cost of capital, etc., of the manufacturing group bore considerable similarity to those observed for 'all industries'; the performance of manufacturing group was a shade better than for all-industries (Table 2).

'Agriculture and allied activities', comprise companies whose predominant activities are agro-based such as tea, coffee and rubber plantations, etc., 'Other activities' cover companies which are mainly engaged in service oriented activities such as construction, electricity generation and supply, shipping, trading and hotels, restaurants and eating houses, etc.

In both the cases, the rate of return at historic cost was considerably stable upto 1973-74; in the subsequent period contrary trends were observed for these groups. The rate for 'agriculture and allied activities', was around 14 per cent during the first three periods, but shot up to 32 per cent in the last phase (1974-75 to 1977-78).

Table 2: Average rate of return, cost of capital, rate of investment and valuation ratio — various industry groups @
(Per cent per annum)

Period	Rate of return				Cost of capital		Rate of investment	Valuation ratio
	Pre-tax		Post-tax		Post-tax			
	Historic cost	After revaluation	Forward looking	Backward looking	Forward looking	Backward looking		
1	2	3	4	5	6	7	8	
MANUFACTURING								
1961-62 to 1965-66	14.60	8.60	3.62	3.20	4.29	3.75	6.41	0.85
1966-67 to 1968-69	12.22	6.04	2.32	1.94	3.09	2.50	6.15	0.75
1969-70 to 1973-74	15.05	6.77	3.11	2.16	3.74	2.49	4.29	0.84
1974-75 to 1977-78	16.82	5.95	2.68	1.34	3.79	1.80	4.22	0.71
1960-61 to 1977-78	14.81	7.09	3.10	2.31	3.83	2.75	5.23	0.81
AGRICULTURE AND ALLIED ACTIVITIES								
1961-62 to 1965-66	13.96	8.53	3.16	3.43	6.86	7.30	3.51	0.46
1966-67 to 1968-69	12.10	6.63	2.02	2.24	4.57	4.75	3.51	0.43
1969-70 to 1973-74	13.66	6.69	2.51	2.56	4.46	4.26	2.87	0.56
1974-75 to 1977-78	31.62	16.49	6.82	7.20	13.72	13.07	5.50	0.50
1960-61 to 1977-78	17.66	9.62	3.73	3.93	7.39	7.33	3.78	0.50
OTHER ACTIVITIES								
1961-62 to 1965-66	14.10	7.56	3.00	3.05	4.75	4.59	4.84	0.63
1966-67 to 1968-69	11.17	5.92	2.08	2.28	3.42	3.55	6.77	0.61
1969-70 to 1973-74	11.38	4.84	1.53	1.52	2.54	2.36	5.38	0.60
1974-75 to 1977-78	8.56	3.44	0.34	0.18	0.48	0.20	7.46	0.51
1960-61 to 1977-78	12.21	5.49	1.79	1.80	2.88	2.74	5.95	0.59

@ Refer to Statement I for the year-wise data.

In the case of 'other activities' while the rate was around 11 per cent during 1966-67 to 1973-74 as compared to 14 per cent in the Third Plan, it declined to 8.6 per cent in the last phase of the study period. Another feature is, that the gap between historic cost and real rate of return was much wider in various periods for 'other activities' group than for the group 'agriculture and allied activities'. The post-tax real return in the case of 'other activities' group declined from 3.0 per cent in the Third Plan period to 1.5 per cent in Fourth Plan period, and further down to 0.3 per cent during the last four years (1974-75 to 1977-78). The average post-tax forward looking rate of return declined from 3.2 per cent in the Third Plan to 2.0—2.5 per cent during 1966-67 to 1973-74 for 'agriculture and allied activities'. The rate rose to the level of 6.8 per cent during the last phase of the study period. The average post-tax forward looking cost of capital was distinctly higher than the post-tax real return for both 'agriculture and allied activities', and 'other activities'. Consequently, the valuation ratio during different periods was much lower being in the range 0.43 to 0.63 for these industry groups. While the rate of investment for 'other activities' group, rose from 4.8 per cent to 7.5 per cent over different periods of the study, the valuation ratio declined from 0.63 to 0.51 during the same period. As compared to this, the rate of investment in the case of 'agriculture and allied activities' remained stable between the period 1960-61 to 1968-69 at 3.5 per cent, declined to 2.9 per cent during 1969-70 to 1973-74 before moving up to 5.5 per cent in the last phase. A slight increasing trend in the valuation ratio from 0.46 to 0.50 over various periods is noticed.

Relative performance of broad categories of industries

The eight industries considered for the study were grouped into four broad categories on the basis of their characteristic features. The categories are (i) "traditional industries", comprising cotton textiles, jute textiles, sugar and cement, (ii) "capital intensive industries" comprising cement and basic industrial chemicals, (iii) "technology oriented industries" comprising basic industrial chemicals, electrical machinery, apparatus and appliances, and (iv) "other industries" comprising medicines and pharmaceutical preparations and trading. It may be noted that while 'cement' is included in both the first and second categories, 'basic industrial chemicals' is included in both the second and third categories. This has been done to take care of the ambiguity of classification which is done in somewhat arbitrary manner as these two industries can be considered to fit in either of the respective categories. For the purpose of working out the average values of different ratios for a category, a weighted average of the ratios

of industries included in that category was taken; the total gross fixed investment of the concerned industries constituted the weights.

The average pre-tax rate of return (at historic prices) was well above 14 per cent for each industry category other than the "traditional" industries for which it was less than 12 per cent (Table 3).

The category 'other industries' recorded the highest pre-tax (historic cost) rates of return. This was followed by 'technology oriented' industries and 'capital intensive' industries in that order. Pre-tax real returns, though maintaining the relative inter-categories differences, came down steadily; the decline was more pronounced in the 'traditional' industries and least in the category of "other" industries. There was also a general decline in the post-tax forward looking real rate of return for 'traditional' industries from 2.4 per cent in the Third Plan to 1.1 per cent during the last period and for 'other industries' from 8.4 per cent to 7.2 per cent during the same period. In the case of the "technology oriented" industries, the rate declined from 3.6 per cent in the Third Plan period to 1.8 per cent in the period 1966-67 to 1968-69; thereafter it rose to 4.2 per cent in the last phase. In the case of 'capital intensive' industries, this rate marginally improved from 2.6 per cent in the Third Plan period to 2.9 per cent during the last phase though it declined during the intervening periods. The post-tax real return (forward looking) for the entire period of the study was comparatively low for "capital intensive" industries and "traditional" industries at 2.2 per cent. "Other" industries category recorded the highest rate of 8.1 per cent, while for 'technology' oriented' industries it was 3.3 per cent.

The post-tax cost of capital (forward looking) was marginally higher than the post-tax real rate of return (forward looking) for all the industry categories discussed here. There was a declining trend in the growth rate of fixed investment for all the four industry categories over the different periods. While the growth rate of investment was distinctly higher in the Third Plan period and the Annual Plan period for all the categories of industries, the average growth rate hovered around 5 per cent in the Fourth Plan period and declined further 3 to 4 per cent during the period 1974-75 to 1977-78. The average growth rate of investment over the entire period of study for the "capital intensive", the "technology oriented" and "other" industry categories was 6.9, 7.9 and 8.1 per cent respectively, it was lower than 5 per cent for "traditional" industries. The valuation ratio was generally less than one in various periods considered and also for all the four industry categories. Within each of the industry

Table 3: Average Rate of Return, Cost of Capital, Rate of Investment and Valuation Ratio According to Broad Industry Categories

(Per cent)

Period	Rate of return				Cost of capital		Rate of investment	Valuation ratio
	Pre-tax		Post-tax		Post-tax			
	Hist-oric cost	After reval-uation	For-ward look-ing	Back-ward look-ing	For-ward look-ing	Back-ward look-ing		
	1	2	3	4	5	6	7	8
TRADITIONAL INDUSTRIES								
1961-62 to 1965-66	11.65	6.29	2.44	1.84	2.91	2.18	6.20	0.81
1966-67 to 1968-69	8.78	3.66	1.46	1.08	1.98	1.44	4.80	0.73
1969-70 to 1973-74	11.59	4.92	2.61	1.71	3.30	2.12	3.47	0.78
1974-75 to 1977-78	9.34	2.01	1.07	-0.14	1.49	-0.28	3.45	0.69
1960-61 to 1977-78	10.74	4.64	2.16	1.33	2.66	1.57	4.49	0.77
CAPITAL INTENSIVE INDUSTRIES								
1961-62 to 1965-66	14.58	7.72	2.60	2.27	2.97	2.30	7.70	0.92
1966-67 to 1968-69	14.04	6.33	1.49	1.46	2.06	1.81	8.48	0.76
1969-70 to 1973-74	15.48	5.51	1.44	0.58	1.70	0.54	5.11	0.81
1974-75 to 1977-78	22.01	6.61	2.85	0.09	3.56	-0.14	3.27	0.75
1960-61 to 1977-78	16.16	6.55	2.09	1.21	2.43	1.13	6.91	0.85
TECHNOLOGY ORIENTED INDUSTRIES								
1961-62 to 1965-66	17.64	10.70	3.57	4.15	3.49	3.80	12.86	1.04
1966-67 to 1968-69	14.08	6.81	1.82	2.14	2.49	2.61	8.65	0.76
1969-70 to 1973-74	18.00	7.74	2.84	2.20	3.07	2.16	5.54	0.93
1974-75 to 1977-78	24.25	8.72	4.17	1.76	5.34	2.06	3.71	0.78
1960-61 to 1977-78	18.51	8.76	3.26	2.77	3.61	2.74	7.89	0.92

Table 3 (Concl.)

Period	Rate of return				Cost of capital		Rate of investment	Valuation ratio
	Pre-tax		Post-tax		Post-tax			
	Hist-oric cost	After revaluation	Forward looking	Backward looking	Forward looking	Backward looking		
	1	2	3	4	5	6		
OTHER INDUSTRIES								
1961-62 to 1965-66	24.38	18.58	8.44	9.09	9.68	9.91	10.89	0.91
1966-67 to 1968-69	25.61	18.12	8.16	8.63	9.56	10.00	15.98	0.86
1969-70 to 1973-74	28.97	19.23	8.79	8.63	9.54	9.64	5.06	1.00
1974-75 to 1977-78	26.23	15.44	7.17	7.00	9.17	8.73	4.61	0.78
1960-61 to 1977-78	25.91	17.68	8.06	8.29	9.26	9.36	8.11	0.91

categories, no strong relationship between changes in the rate of investment and changes in the valuation ratio over time could be observed. However, the cross section of industry categories shows the higher are the post-tax real return and valuation ratio, the higher is the rate of growth of investment. The performance of the "technology oriented" and "other" industry categories was thus better than the "capital intensive" and the "traditional" industry categories. Despite a low post-tax real return, the "capital intensive" industries could still register a comparatively higher rate of investment. In contrast, the "traditional" industries were characterised by low rate of investment accompanying meagre profitability coupled with low valuation ratio. Of the eight individual industries considered for the study, the performance of the three industries namely "medicines and pharmaceutical preparations", "electrical machinery, apparatus and appliances" and "trading" was superior to other industries as evident from the average values of different measures considered for the study (Table 4).

Incentives and growth of investment

For the purpose of the study, the quantum of incentives was taken as tax benefits arising out of the allocations to the development rebate reserve. The allocation to this reserve was worked out from the balance sheet as the difference of the cumulative develop-

Table 4 — Average rate of return, cost of capital, rate of investment and valuation ratio for the period 1960-61 to 1977-78

(Per cent per annum)									
Industry groups/ industries @	Rate of return				Cost of capital		Rate of invest- ment	Valuation Ratio	Incentives as per- centage of investment
	Pre-tax		Post-tax		Post-tax				
	Historic Cost	After re- valuation	Forward Looking	Backward Looking	Forward Looking	Backward Looking			
	1	2	3	4	5	6			
All Industries	14.56	6.92	2.93	2.26	3.83	2.81	5.21	0.76	5.12
Manufacturing	14.81	7.09	3.10	2.31	3.83	2.75	5.23	0.81	5.11
Agriculture and allied activities	17.66	9.62	3.73	3.93	7.39	7.33	3.78	0.50	2.82
Other activities	12.21	5.49	1.79	1.80	2.88	2.74	5.95	0.59	4.71
Sugar	11.66	6.48	3.51	2.95	4.96	4.09	4.11	0.72	3.92
Cotton textiles	11.07	4.68	2.16	1.40	2.52	1.58	4.76	0.81	4.83
Jute textiles	7.01	2.51	1.05	0.24	1.26	0.12	3.75	0.71	3.20
Electrical machinery, apparatus and appliances	20.44	12.62	6.03	6.02	6.53	6.13	7.98	0.96	4.99
Basic industrial chemicals	17.77	7.27	2.20	1.52	2.49	1.44	7.86	0.91	8.15
Medicines & pharmaceutical preparations	29.07	18.18	8.05	8.39	7.87	7.59	6.45	1.05	3.08
Cement	11.64	4.52	1.78	0.35	2.28	0.27	4.24	0.68	5.81
Trading	22.04	17.06	8.08	8.16	10.96	11.53	10.14	0.74	2.16

@ Refer to Statement II for the year-wise data, except for Col. 9

ment rebate/investment allowance reserves at the end and beginning of the accounting year. Such a method of computation has, no doubt, limitations, as a measure of the total amount of such allowances utilized by the companies or allocation made/or permitted to be made by the companies. The value of incentives was expressed as a percentage of the gross investment made during the year, so as to enable us analyse the inter-industry differences in the levels of incentives over different periods. For the corporate sector as a whole, average ratio of incentives to gross fixed investment was at 5.9 per cent during the Third Plan period (Table 5). It remained around the same level in the subsequent periods but came down rather sharply to 2.5 per cent during the last phase (1974-75 to 1977-78). While the ratio of investment incentives to gross investment for the "manufacturing" group differed only marginally from that observed for "all industries", the ratio was the lowest in the case of 'agriculture and allied activities' (1.6 to 2.6 per cent) for different periods except for the Annual Plan period when it was at 5.3 per cent. In the case of "other activities" the ratio was higher than that for 'agriculture and allied activities'. Both these groups also recorded sharp declines in the ratio in the terminal year of the period studied. There seemed to be broad similarity in the trends of the ratio of incentives to gross fixed investment and the valuation ratio over the four periods in the case of all industry groups other than 'agriculture and allied activities'.

As amongst different industry categories considered, the ratio of incentives to gross fixed investment was generally at a higher level for the 'capital intensive' and 'technology oriented' industries as compared to the 'traditional' industries. Over the period studied, there was a general uptrend in this ratio for the 'capital intensive' industries (6.5 per cent to 9.5 per cent) and 'technology oriented' industries (5.2 per cent to 9.2 per cent). In contrast, the ratio declined for both 'traditional' industries (from 5.6 per cent to 2.8 per cent) and 'other industries' (from 3.8 per cent to 1.2 per cent). The trends in the valuation ratio seemed to be broadly related with that of the ratio of the incentives to gross fixed investment during the year for different categories of industries analysed. However, the rate of investment showed a declining trend for the, "capital intensive" and "technology oriented" industries.

Table 5 — Investment incentives, rate of investment and valuation ratio

(Per cent per annum)

Period	All industries			Manufacturing			Agricultural and allied activities			Other activities		
	Incentives as percentage of investment	Rate of investment	Valuation ratio	Incentives as percentage of investment	Rate of investment	Valuation ratio	Incentives as percentage of investment	Rate of investment	Valuation ratio	Incentives as percentage of investment	Rate of investment	Valuation ratio
	1	2	3	4	5	6	7	8	9	10	11	12
1961-62 to 1965-66	5.87	6.21	0.82	5.82	6.41	0.85	2.63	3.51	0.46	6.34	4.84	0.63
1966-67 to 1968-69	5.87	5.76	0.72	4.95	6.15	0.75	5.26	3.51	0.43	5.93	6.77	0.61
1969-70 to 1973-74	5.72	4.32	0.79	5.94	4.29	0.84	2.38	2.87	0.56	4.63	5.38	0.60
1974-75 to 1977-78	2.52	4.64	0.67	2.73	4.22	0.71	1.60	5.50	0.50	2.52	7.46	0.51
1960-61 to 1977-78	5.12	5.21	0.76	5.11	5.23	0.81	2.82	3.78	0.50	4.71	5.95	0.59
Period	Traditional industries			Capital intensive industries			Technology oriented industries			Other industries		
	Incentives as percentage of investment	Rate of investment	Valuation ratio	Incentives as percentage of investment	Rate of investment	Valuation ratio	Incentives as percentage of investment	Rate of investment	Valuation ratio	Incentives as percentage of investment	Rate of investment	Valuation ratio
	1	2	3	4	5	6	7	8	9	10	11	12
1961-62 to 1965-66	5.62	6.20	0.81	6.46	7.70	0.92	5.19	12.86	1.04	3.76	10.89	0.91
1966-67 to 1968-69	3.65	4.80	0.73	3.33	8.48	0.76	4.56	8.65	0.76	2.40	15.98	0.86
1969-70 to 1973-74	5.12	3.47	0.78	10.96	5.11	0.81	9.80	5.54	0.93	2.80	5.06	1.00
1974-75 to 1977-78	2.82	3.45	0.69	9.48	3.27	0.75	9.15	3.71	0.78	1.15	4.61	0.78
1960-61 to 1977-78	4.65	4.49	0.77	7.54	6.91	0.85	7.27	7.89	0.92	2.67	8.11	0.91

SECTION III

Summary and conclusions

The return on capital in corporate investment studies is conventionally assessed measuring capital at historical costs, as companies present only such data in their annual accounts. In times of inflation, the use of such capital data would overstate the return. An entrepreneur, who would be more interested in retaining the productivity of the physical capital, would like to calculate the return on the replacement value of such capital. Similarly, the calculations of a post-tax return, while taking profits net of tax in the numerator, should in the denominator adjust the value of capital stock for accumulated allowances provided by the Government for promoting investment. The latter comprises the income foregone by Government when the Government exempts certain expenditures for tax purposes or gives grants/subsidies, etc. The return on capital for an entrepreneur is thus to be calculated on that part of funds (owned or borrowed), he utilises towards capital formation and not on the part of funds that accrue to him as additional cash flows in the context of Government allowing him rebates to promote higher investment. The rebates/grants/allowances which form part of the total capital utilised for productive operations, can be considered as Government's share of the total capital, as with higher rebates/allowances, entrepreneurs' share of risk capital will be lower. On the other hand, profits that are generated by employment of the capital, accrue to him without any additional deductions of tax, which are not applicable to other entrepreneurs.

The article examines the rates of return on capital for the private corporate sector after making necessary adjustments for inflation, tax rebate/investment allowances, etc. The demand for funds is related to the return on physical capital employed; the financing of this capital or volume of the funds offered by savers and the financial institutions is influenced by the rate of interest offered by companies by way of dividends on securities, interest on short and long term loans, etc. This aspect of funds reflects the cost at which entrepreneurs secure funds for purchasing capital assets. The cost is the average rate at which the capital market evaluates various types of the financial capital (equity, debentures, etc.) of the companies taking into consideration both the monetary return and the uncertainty and risk associated with that return. Problems like valuing the retained earnings of companies give rise to difficulties in assessing the overall cost of capital to companies. The study, however, presents a measure of this cost based on security prices, interest

rates on loans etc. The measure is, however, somewhat imprecise (more so at the level of individual industries).

Before discussing the results, it is useful to point out certain caveats for a proper perspective and interpretation of the results of the study. These generally emanate due to inadequacy and/or non-availability of the required data as also due to the procedures of estimation of various rates of return, etc., in the calculations. Investment incentives during a year are worked as the difference between the accumulated development rebate reserves between two years though rebates utilized during the year or transferred to general reserves account do not figure in the outstanding development rebate reserves. The book value of the inventories is taken as the current market value in the absence of adequate price data. Similarly "earnings" of companies are taken without making adjustments for incomes from abroad, etc. Inadequacy in the methods of estimation arise in valuing the fixed assets with the use of the replacement cost ratio. Due to non-availability of the price data for various types of fixed assets, especially plant and machinery used in different industries, the use of a single replacement cost ratio may not be quite appropriate for making adjustments at the individual industry level. Further, use of a single corporate tax rate, use of yield rates on long-term Government securities as discount rate for computing the present value of the past allowances, etc., may not be highly satisfactory. In spite of such limitations, it is hoped that the resultant estimates do provide a relatively good idea of the magnitudes of costs and returns on investment in the private corporate sector, though they may not give precise magnitudes of these.

(1) The pre-tax rate of return on capital measured at historical prices, of the private corporate sector remained practically stable during the study period 1960-61 to 1977-78. However, there was a steady decline in the real rate of return on capital—both pre and post-tax. The pre-tax rate of real return which was 8.4 per cent in 1960-61, decreased by 40 per cent to 5.2 per cent in 1977-78. Compared to this the post-tax return declined nearly by half from 4.2 per cent in 1960-61 to 2.2 per cent in 1977-78 indicating an increasing incidence of tax on profits. Post-tax rates of return in some "traditional" industries (e.g. cotton and jute textiles) and "capital intensive" (e.g. cement) industries were quite low in the recent period. For "technology oriented" industries, the decline in the post-tax rate of return was not only arrested by 1968-69, but the rate also improved in the subsequent period.

(2) Concomitant with the decline in the real rate of return, there was a decline in the cost of capital — post-tax. Here again there

were variations among different categories of industries.

(3) It may probably be argued that the decline and/or relative stagnancy in the growth rate of investment in the corporate sector during the period was partly due to the larger decline in the post-tax real rate of return in comparison with the fall in post-tax cost of capital. The ratio of the former to the latter decreased by a third, from 0.93 in 1960-61 to 0.66 in 1977-78. However, the role of the above valuation ratio known as Tobin's "q", as a determinant of the rate of growth of investment cannot be described as very important in the Indian context. Rapid technological change embodied in the newly invested capital and obsolescence of the output from old capital makes new capital more attractive than old and lowers the relative price of old capital, decreasing thereby the market value of old capital. For a given income stream, the financial value of capital in industries using old capital is low and the cost of capital appears high. Traditional industries of the Indian corporate sector belong to such a category. The valuation ratio in these industries was lower than unity and declined progressively over the period. Since a huge segment of the Indian corporate sector still comprise such industries, the cost of capital was high and valuation ratio declined for the corporate sector as a whole.

(4) Such an explanation seems to be substantiated by the figures of valuation ratio (Tobin's q) obtained for the whole period for individual industries. In the old industries like cotton and jute textiles, cement and sugar, the ratio of the post-tax real rate of return to the cost of capital varied between 0.68—0.81; in the relatively modern industry of basic industrial chemicals it was 0.91 while in recently established new industries like 'electrical machinery etc.' 'medicines and pharmaceuticals' the ratio stood at 0.96 and 1.05 respectively.

(5) Incentives by way of additional cash flow to companies through tax rebates etc., on depreciation, development rebate reserves, etc., formed more than a third of the total investment made during 1960-61 to 1977-78. There is no appreciable difference in the ratios when the value of investment allowances (accumulated cash flows) are related to the value of investment at book value or when both incentives and investment are revalued to the present values through the use of discount rates and prices of investment goods. The ratio of investment allowances to gross investment increased from 0.33 in the period 1961-62 to 1965-66 to 0.38 in the period 1969-70 to 1973-74 (Statement III). There was a marginal decline in the ratio in the latter period. The comparable figures for U.K.

industry ranged between 0.35 to 0.56 at various time points. For reasons mentioned earlier, the rate of growth in investment for the corporate sector as a whole was not commensurate with the rise in the ratio of investment allowances to investment. It could perhaps be said that the rise in ratio of investment allowances could have partly stemmed the decline in the post-tax real rate of return.

(6) For the period as a whole, the level of incentives by way of tax concessions on development rebate/investment allowances, etc. enjoyed in relation to fixed investment (Table 5) by the "manufacturing" group was higher (5.1 per cent) than that in the case of "agriculture and allied activities" and "other activities" groups (2.8 per cent and 4.7 per cent respectively). Investment incentives in particular were considerably large in the case of 'technology oriented' (7.3 per cent) and 'capital intensive' (7.5 per cent) industries. Again across the industrial groups the growth rate of investment seems to be significantly related to the rate of investment allowances offered in relation to the level of investment and/or the post-tax real rate of return†. In industries where either or both are high, the rate of growth of investment was high. Investment allowances per se do seem to have a positive impact on the growth rate of Indian corporate sector.

† The relationship between rate of growth of investment (Y), and incentives per unit of investment (X_1) and post-tax forward looking rate of return (X_2) estimated over nine observations i.e. for eight individual industries mentioned in the analysis and 'All industries' is as follows:

$$Y = 0.7825 + 0.4969 X_1 + 0.7644 X_2^*$$

$$t\text{-statistic: } (0.3896) \quad (1.2964) \quad (2.8608)$$

Elasticity (0.3762) (0.4955)
at the mean

Mean $\bar{Y} = 6.05$; Standard error of estimate = 1.65; $R^{2**} = 0.5784$ (F value: 4.1138)
Multiple coefficient of determination

Mean $\bar{X}_1 = 4.59$; Mean $\bar{X}_2 = 3.92$

* Significant at 5% level

**Significant at 10% level

Statement—I: Rate of Return, Cost of Capital, Rate of Investment and Valuation Ratio of the Private Corporate Sector by Industry Groups — 1960-61 to 1977-78
(Per cent)

Year	Pre-tax rate of return		Post-tax rate of return		Post-tax cost of capital		Rate of invest- ment	Valua- tion ratio
	Hist- oric cost	After reva- luation	For- ward look- ing	Back- ward look- ing	For- ward look- ing	Back- ward look- ing		
	1	2	3	4	5	6	7	8
ALL INDUSTRIES								
1960-61	13.91	8.41	4.17	3.49	4.48	3.80	5.29	0.93
1961-62	13.83	8.37	3.95	3.56	4.45	4.00	6.46	0.89
1962-63	14.13	8.46	3.28	3.01	4.09	3.67	6.31	0.80
1963-64	14.93	8.84	3.47	3.25	4.30	3.93	6.78	0.81
1964-65	14.96	8.54	3.43	3.11	4.62	4.09	5.85	0.92
1965-66	14.44	8.16	3.46	2.94	4.94	4.24	5.67	0.70
1966-67	13.54	7.11	2.56	2.23	3.47	2.90	8.29	0.74
1967-68	11.51	5.57	2.03	1.77	2.94	2.46	5.42	0.69
1968-69	11.46	5.41	2.22	1.90	3.02	2.49	3.57	0.74
1969-70	13.34	6.41	2.76	2.23	3.32	2.60	4.24	0.83
1970-71	14.85	6.85	2.98	2.31	3.44	2.60	3.92	0.86
1971-72	14.54	6.43	3.08	2.24	3.98	2.76	3.99	0.77
1972-73	14.39	6.09	2.67	1.55	3.62	2.01	4.72	0.74
1973-74	16.08	6.93	3.20	2.01	4.31	2.58	4.75	0.74
1974-75	19.06	7.68	3.21	1.99	4.60	2.63	6.01	0.69
1975-76	14.97	5.13	2.03	1.11	2.97	1.50	4.78	0.69
1976-77	15.85	5.04	2.02	1.00	3.13	1.41	3.66	0.65
1977-78	16.36	5.15	2.19	0.95	3.33	1.34	4.12	0.66
AGRICULTURE & ALLIED ACTIVITIES								
1960-61	16.69	11.18	5.39	5.31	7.90	7.71	3.53	0.68
1961-62	12.85	7.99	3.36	3.47	6.18	6.27	4.67	0.54
1962-63	14.26	8.85	3.06	3.37	6.37	6.83	4.20	0.48
1963-64	13.58	8.36	2.92	3.29	6.33	7.09	2.23	0.46
1964-65	14.79	8.99	3.35	3.71	8.08	8.58	3.34	0.42
1965-66	14.33	8.44	3.09	3.30	7.35	7.74	3.15	0.42
1966-67	14.85	8.64	2.92	3.11	6.24	6.40	3.40	0.47
1967-68	13.20	7.38	2.36	2.67	5.57	5.65	4.62	0.42
1968-69	8.25	3.87	0.77	0.93	1.89	2.20	2.52	0.41
1969-70	12.57	6.69	2.12	2.33	3.68	3.82	2.30	0.58
1970-71	15.14	8.21	2.97	3.12	4.60	4.52	3.15	0.64
1971-72	13.65	7.19	2.69	2.71	5.09	4.83	2.56	0.53
1972-73	12.61	6.42	2.18	2.15	4.42	4.10	3.38	0.49
1973-74	14.35	7.01	2.60	2.51	4.52	4.03	2.98	0.57
1974-75	26.64	14.19	6.03	6.41	11.28	10.78	2.97	0.53
1975-76	20.23	10.03	3.91	4.07	8.35	7.77	3.56	0.47
1976-77	35.42	18.43	7.67	8.18	15.12	14.67	8.05	0.51
1977-78	44.18	23.30	9.65	10.12	20.13	19.10	7.44	0.48

**Statement—I (Concl'd.) — Rate of Return, Cost of Capital, Rate of Investment
and Valuation Ratio of the Private Corporate Sector by Industry Groups —
1960-61 to 1977-78 (Per cent)**

Year	Pre-tax rate of return		Post-tax rate of return		Post-tax cost of capital		Rate of invest- ment	Valua- tion ratio
	Hist- oric cost	After reva- luat- ion	For- ward look- ing	Back- ward look- ing	For- ward look- ing	Back- ward look- ing		
	1	2	3	4	5	6	7	8
MANUFACTURING								
1960-61	14.38	8.77	4.51	3.65	4.37	3.61	5.33	1.03
1961-62	14.23	8.70	4.18	3.69	4.33	3.81	6.97	0.97
1962-63	14.30	8.63	3.38	3.03	3.93	3.45	6.78	0.86
1963-64	15.09	8.93	3.52	3.22	4.05	3.61	7.15	0.87
1964-65	15.01	8.62	3.51	3.11	4.42	3.82	6.09	0.79
1965-66	14.38	8.14	3.51	2.97	4.72	4.03	5.76	0.74
1966-67	13.81	7.30	2.71	2.26	3.56	2.87	8.29	0.76
1967-68	11.39	5.45	2.05	1.72	2.87	2.32	5.53	0.71
1968-69	11.47	5.38	2.20	1.84	2.85	2.31	4.68	0.77
1969-70	13.54	6.49	2.80	2.23	3.13	2.43	4.39	0.90
1970-71	15.09	6.98	3.06	2.33	3.31	2.48	4.01	0.92
1971-72	14.98	6.70	3.31	2.39	4.06	2.82	3.98	0.81
1972-73	14.95	6.40	2.90	1.66	3.69	2.03	4.60	0.79
1973-74	16.67	7.28	3.49	2.18	4.49	2.67	4.36	0.78
1974-75	19.12	7.76	3.38	2.03	4.77	2.66	5.50	0.71
1975-76	15.03	5.19	2.27	1.14	3.17	1.47	3.87	0.72
1976-77	16.23	5.32	2.38	1.08	3.43	1.43	3.59	0.70
1977-78	16.90	5.54	2.69	1.12	3.80	1.49	3.94	0.71
OTHER ACTIVITIES								
1960-61	9.59	5.30	1.96	1.95	3.14	3.06	5.87	0.62
1961-62	11.38	6.48	2.66	2.84	4.01	4.08	4.08	0.66
1962-63	12.73	7.45	2.83	2.93	4.38	4.38	3.84	0.65
1963-64	14.51	5.60	1.62	1.75	2.60	2.63	5.37	0.62
1964-65	15.91	9.22	3.81	3.89	6.81	6.63	4.63	0.56
1965-66	15.98	9.05	4.08	3.82	5.97	5.25	6.26	0.68
1966-67	11.97	6.66	2.34	2.40	3.76	3.61	11.76	0.62
1967-68	10.88	5.62	1.88	2.06	3.10	3.22	6.05	0.61
1968-69	10.68	5.48	2.02	2.39	3.41	3.82	2.49	0.59
1969-70	10.82	5.34	2.01	2.08	3.25	3.25	3.96	0.62
1970-71	12.26	5.67	2.05	2.23	2.29	3.42	3.82	0.62
1971-72	11.13	4.48	1.37	1.38	2.28	2.09	4.80	0.60
1972-73	10.69	4.09	0.98	0.87	1.69	1.35	6.15	0.58
1973-74	11.99	4.60	1.24	1.04	2.20	1.68	8.16	0.56
1974-75	16.71	6.24	1.68	1.26	2.83	1.84	10.63	0.59
1975-76	13.16	4.12	0.73	0.51	1.39	0.84	10.82	0.52
1976-77	10.75	2.28	— 0.17	— 0.08	— 0.37	— 0.14	3.43	0.46
1977-78	8.71	1.11	— 0.89	— 0.98	— 1.92	— 1.76	4.97	0.47

Statement—II: Rate of Return, Cost of Capital, Rate of Investment and Valuation Ratio of the Private Corporate Sector by Selected Industries—1960-61 to 1977-78 (Per cent)

Year	Pre-tax rate of return		Post-tax rate of return		Post-tax cost of capital		Rate of invest- ment	Valua- tion ratio
	Hist- oric cost	After reva- luat- ion	For- ward look- ing	Back- ward look- ing	For- ward look- ing	Back- ward look- ing		
	1	2	3	4	5	6	7	8
SUGAR								
1960-61	11.58	8.21	3.91	3.86	4.17	4.20	4.50	0.94
1961-62	8.83	6.07	3.05	2.86	3.76	3.55	5.13	0.81
1962-63	8.24	5.36	2.37	2.26	3.65	3.47	4.12	0.65
1963-64	12.26	7.95	3.90	3.51	6.38	5.70	2.54	0.61
1964-65	14.03	8.69	4.30	3.64	6.13	5.21	4.31	0.70
1965-66	13.08	8.32	4.38	3.60	5.64	4.72	4.68	0.78
1966-67	10.46	6.28	3.31	2.72	4.37	3.61	4.50	0.76
1967-68	7.36	3.53	1.95	1.39	3.37	2.43	5.00	0.58
1968-69	17.80	11.07	6.10	5.47	7.98	7.22	3.27	0.76
1969-70	11.66	6.66	3.49	2.89	4.43	3.70	4.99	0.79
1970-71	6.52	3.12	2.21	1.51	2.21	1.49	3.54	1.00
1971-72	10.48	5.74	3.92	3.28	5.06	4.11	2.83	0.77
1972-73	18.54	11.08	6.12	5.34	9.23	7.82	3.08	0.66
1973-74	14.39	7.59	3.99	3.16	5.79	4.49	4.47	0.69
1974-75	13.28	5.88	2.77	2.09	4.83	3.39	5.52	0.57
1975-76	8.65	2.69	1.74	1.11	2.75	1.65	3.25	0.63
1976-77	13.02	5.34	3.18	2.65	5.75	4.44	3.35	0.55
1977-78	9.61	3.19	2.43	1.72	3.76	2.49	4.89	0.65
JUTE TEXTILES								
1960-61	9.80	5.64	3.22	2.14	4.87	3.39	3.04	0.66
1961-62	3.99	1.00	0.15	0.60	0.25	1.05	3.53	0.60
1962-63	22.24	15.24	7.30	6.42	7.42	6.72	7.49	0.98
1963-64	14.78	8.75	3.23	2.46	3.97	3.22	8.71	0.81
1964-65	7.00	2.29	0.18	0.52	0.29	0.90	5.94	0.61
1965-66	8.82	3.74	1.16	0.41	1.78	0.67	5.65	0.65
1966-67	2.61	0.83	1.24	1.48	1.92	2.51	3.71	0.65
1967-68	1.56	1.39	1.39	1.75	2.30	3.09	3.09	0.61
1968-69	5.31	1.25	1.00	0.45	1.34	0.66	4.00	0.74
1969-70	4.23	0.57	0.70	0.12	0.90	0.17	3.09	0.79
1970-71	7.86	2.66	1.74	0.80	2.29	1.14	1.27	0.76
1971-72	14.08	6.41	3.65	2.09	4.46	2.66	2.18	0.82
1972-73	6.24	1.52	1.09	0.06	1.67	0.10	3.23	0.65
1973-74	1.06	1.69	1.31	2.12	1.81	3.03	2.66	0.73
1974-75	13.04	5.30	3.11	1.87	4.70	2.83	5.00	0.66
1975-76	5.88	0.80	1.36	0.35	2.13	0.55	1.94	0.64
1976-77	-1.82	-3.97	-3.77	-4.62	-5.69	-7.04	1.61	0.66
1977-78	0.21	-2.07	-0.92	-1.68	-1.19	-2.23	1.52	0.77

Statement — II (Contd.) : Rate of Return, Cost of Capital, Rate of Investment and Valuation Ratio of the Private Corporate Sector by Selected Industries — 1960-61 to 1977-78

(Per cent)

Year	Pre-tax rate of return		Post-tax rate of return		Post-tax cost of capital		Rate of invest- ment	Valua- tion ratio
	Hist- oric cost	After reva- luat- ion	For- ward look- ing	Back- ward look- ing	For- ward look- ing	Back- ward look- ing		
	1	2	3	4	5	6	7	8
COTTON TEXTILES								
1960-61	15.48	9.70	5.15	4.12	4.35	3.66	5.55	1.18
1961-62	16.91	10.87	5.57	4.98	5.54	5.08	6.81	1.01
1962-63	10.34	5.59	1.40	1.32	1.70	1.63	7.37	0.82
1963-64	11.08	5.43	1.28	0.95	1.45	1.10	7.11	0.88
1964-65	11.44	5.47	1.61	1.04	1.97	1.30	6.39	0.82
1965-66	7.66	2.84	0.47	0.01	0.63	0.02	5.99	0.73
1966-67	9.67	4.28	1.52	1.28	2.05	1.76	6.56	0.74
1967-68	8.05	3.02	1.14	0.90	1.53	1.22	4.30	0.75
1968-69	6.41	1.88	0.90	0.65	1.16	0.86	2.42	0.77
1969-70	10.38	4.29	2.24	1.69	2.51	1.94	2.85	0.89
1970-71	10.61	4.22	2.26	1.58	2.72	1.91	3.50	0.83
1971-72	8.48	2.70	1.85	1.05	2.61	1.49	3.21	0.71
1972-73	13.04	5.42	3.00	1.81	3.58	2.17	4.63	0.84
1973-74	21.06	10.79	5.84	4.40	7.34	5.52	4.28	0.80
1974-75	15.06	5.13	2.47	1.13	3.82	1.71	5.37	0.65
1975-76	5.21	-0.70	-0.70	-1.87	-1.05	-2.74	3.48	0.66
1976-77	6.90	-0.11	0.22	-1.13	0.31	-1.49	2.96	0.73
1977-78	12.27	3.36	2.70	1.19	3.08	1.33	2.90	0.88
ELECTRICAL MACHINERY, APPARATUS, APPLIANCES, ETC.								
1960-61	22.22	16.77	8.12	8.40	5.84	5.98	15.21	1.39
1961-62	18.91	13.51	6.58	6.60	5.10	4.78	10.26	1.29
1962-63	22.39	16.54	7.30	2.84	6.30	6.32	9.50	1.16
1963-64	25.75	18.64	8.51	8.99	8.16	8.17	12.19	1.04
1964-65	25.46	18.31	8.39	8.68	9.62	9.57	13.40	0.87
1965-66	23.78	16.87	7.77	7.92	9.75	9.67	17.05	0.80
1966-67	18.34	11.60	4.76	4.74	6.35	5.73	13.50	0.75
1967-68	14.77	8.72	3.68	4.05	5.48	5.51	7.68	0.67
1968-69	11.72	6.25	2.71	3.07	3.90	4.06	4.60	0.70
1969-70	15.35	8.78	4.07	4.32	3.55	3.52	4.11	1.15
1970-71	19.74	11.43	5.30	5.24	3.29	3.11	5.56	1.61
1971-72	22.18	13.31	6.99	6.94	7.13	6.65	4.57	0.98
1972-73	19.96	11.56	5.92	5.65	6.87	6.15	4.94	0.86
1973-74	19.68	10.92	5.63	5.27	7.40	6.54	4.41	0.76
1974-75	23.08	12.31	6.07	5.76	7.85	6.92	5.32	0.77
1975-76	20.40	10.25	5.30	4.94	7.02	6.07	4.23	0.76
1976-77	20.62	10.70	5.57	4.89	6.81	5.67	3.99	0.82
1977-78	22.09	10.62	5.83	5.10	7.16	5.88	3.14	0.81

Statement — II (Contd.) : Rate of Return, Cost of Capital, Rate of Investment and Valuation Ratio of the Private Corporate Sector by Selected Industries — 1960-61 to 1977-78

(Per cent)

Year	Pre-tax rate of return		Post-tax rate of return		Post-tax cost of capital		Rate of invest- ment	Valua- tion ratio
	Hist- oric cost	After reva- luat- ion	For- ward look- ing	Back- ward look- ing	For- ward look- ing	Back- ward look- ing		
	1	2	3	4	5	6	7	8
BASIC INDUSTRIAL CHEMICALS								
1960-61	14.01	8.11	3.72	3.49	3.19	2.91	6.78	1.17
1961-62	17.60	10.60	3.78	4.49	2.64	2.81	20.55	1.43
1962-63	14.82	8.43	1.74	2.42	1.61	2.00	17.58	1.08
1963-64	13.72	7.15	1.17	1.71	1.22	1.62	13.33	0.96
1964-65	14.90	7.71	1.58	2.26	1.67	2.21	7.80	0.95
1965-66	16.11	7.81	1.58	2.37	1.98	2.78	5.77	0.80
1966-67	17.93	8.73	2.18	2.81	2.77	3.15	8.03	0.79
1967-68	12.12	5.18	0.88	1.15	1.17	1.31	7.95	0.75
1968-69	10.95	3.63	-0.28	-0.09	-0.33	-0.15	10.07	0.84
1969-70	15.13	6.36	1.39	1.45	1.50	1.42	8.86	0.93
1970-71	16.98	6.65	1.56	1.59	1.73	1.73	4.33	0.91
1971-72	17.68	6.27	1.82	0.97	2.33	1.09	5.95	0.78
1972-73	18.57	6.47	1.92	0.52	2.26	0.54	5.36	0.85
1973-74	18.89	6.15	2.13	0.04	2.45	0.04	4.85	0.87
1974-75	26.60	8.97	3.90	1.42	4.99	1.57	3.59	0.78
1975-76	25.61	8.31	3.55	0.60	4.32	0.64	3.48	0.82
1976-77	23.43	6.86	3.03	-0.16	4.00	-0.18	3.03	0.76
1977-78	24.80	7.53	4.04	0.33	5.42	0.40	4.08	0.75
MEDICINES AND PHARMACEUTICAL PREPARATIONS								
1960-61	15.17	10.11	4.03	4.37	3.44	3.75	10.57	1.17
1961-62	22.39	15.77	7.60	8.28	5.78	5.77	12.14	1.31
1962-63	20.81	14.15	5.57	6.56	5.71	6.05	13.78	0.98
1963-64	24.61	17.05	7.72	8.61	8.84	8.97	10.56	0.87
1964-65	26.44	17.59	7.57	8.39	7.27	7.47	7.63	1.04
1965-66	28.55	19.16	8.90	9.64	9.78	9.92	6.19	0.91
1966-67	35.86	24.86	10.97	12.16	10.89	11.07	6.86	1.01
1967-68	29.44	19.83	8.80	9.54	9.12	9.08	7.12	0.96
1968-69	32.11	21.18	9.62	10.46	8.52	8.50	7.42	1.13
1969-70	39.68	26.05	11.80	12.56	7.09	6.97	5.58	1.66
1970-71	34.53	21.67	9.57	9.60	6.51	6.25	6.98	1.47
1971-72	31.28	18.99	8.38	8.31	7.42	7.00	6.61	1.13
1972-73	30.97	18.35	7.78	7.54	7.52	6.99	4.65	1.03
1973-74	29.68	17.23	7.51	7.11	8.11	7.31	5.64	0.93
1974-75	27.10	14.55	6.20	6.07	8.12	7.29	4.81	0.76
1975-76	27.86	14.98	6.51	6.31	8.03	7.19	3.18	0.81
1976-77	32.96	17.64	8.05	7.77	9.19	8.22	3.67	0.88
1977-78	33.77	18.07	8.37	7.73	10.26	8.90	3.35	0.82

Statement — II (Concl'd.): Rate of Return, Cost of Capital, Rate of Investment and Valuation Ratio of the Private Corporate Sector by Selected Industries — 1960-61 to 1977-78

(Per cent)

Year	Pre-tax rate of return		Post-tax rate of return		Post-tax cost of capital		Rate of invest- ment	Valua- tion ratio
	Hist- oric cost	After reva- luation	For- ward look- ing	Back- ward look- ing	For- ward look- ing	Back- ward look- ing		
	1	2	3	4	5	6	7	8
CEMENT								
1960-61	9.85	4.57	4.80	0.91	5.98	1.17	2.41	0.80
1961-62	11.01	5.04	4.78	1.12	5.84	1.39	3.26	0.82
1962-63	14.62	7.87	4.04	2.24	5.44	3.05	5.81	0.74
1963-64	13.30	6.99	2.83	1.68	3.81	2.31	6.95	0.74
1964-65	13.03	6.49	2.51	1.37	3.37	1.89	5.51	0.74
1965-66	14.79	7.67	3.43	2.14	4.78	3.05	4.61	0.72
1966-67	19.12	10.32	4.32	3.27	6.06	4.59	7.51	0.71
1967-68	15.54	7.71	2.82	1.90	4.18	2.82	7.73	0.67
1968-69	9.81	3.99	0.90	0.25	1.34	0.36	8.96	0.68
1969-70	11.07	4.20	0.91	0.22	1.35	0.33	5.54	0.67
1970-71	13.56	5.27	1.61	0.83	2.41	1.23	3.95	0.67
1971-72	12.65	4.58	1.61	0.80	2.51	1.22	2.13	0.64
1972-73	8.24	1.83	0.10	-0.90	0.15	-1.33	1.85	0.66
1973-74	3.68	-0.85	-1.65	-2.77	-2.89	-4.78	1.25	0.57
1974-75	4.19	-1.28	-2.28	-3.62	-5.15	-7.68	3.10	0.44
1975-76	11.93	3.03	0.73	-0.47	0.83	-0.51	1.66	0.88
1976-77	8.88	0.85	-0.27	-1.79	-0.46	-2.78	2.07	0.59
1977-78	14.25	3.12	0.89	-0.93	1.52	-1.48	1.99	0.59
TRADING								
1960-61	21.36	18.27	8.61	8.96	9.73	10.08	11.09	0.88
1961-62	23.80	20.52	9.99	10.45	9.70	9.98	10.62	1.03
1962-63	23.24	19.54	8.49	8.95	9.78	10.09	13.05	0.87
1963-64	24.75	20.47	9.12	9.79	11.65	12.09	11.34	0.78
1964-65	23.87	19.43	8.91	9.36	12.08	12.40	11.45	0.74
1965-66	25.55	20.35	9.58	10.12	14.01	14.39	11.35	0.68
1966-67	20.19	14.69	6.57	6.92	8.76	9.06	55.43	0.75
1967-68	20.29	15.64	7.10	7.01	10.12	11.18	9.18	0.70
1968-69	18.83	14.22	6.61	6.65	9.91	10.92	5.91	0.67
1969-70	17.20	12.44	5.81	5.98	8.91	10.04	3.75	0.65
1970-71	22.03	16.15	7.83	7.89	11.53	12.45	4.20	0.68
1971-72	25.50	19.95	10.02	9.20	15.52	16.33	3.46	0.65
1972-73	25.23	19.81	9.52	8.79	13.78	14.44	3.40	0.69
1973-74	24.86	19.09	9.19	8.61	13.63	14.26	4.68	0.67
1974-75	26.15	19.45	8.80	8.55	10.81	11.17	11.81	0.81
1975-76	18.73	13.03	6.55	6.67	9.50	9.94	7.15	0.69
1976-77	18.37	12.68	6.62	6.77	9.28	9.71	2.16	0.71
1977-78	16.72	11.39	6.06	6.17	8.70	9.07	2.45	0.70

**Statement — III: Estimates of Allowances per Unit of Fixed Capital Investment for the Indian Private Corporate Sector,
1960-61 to 1977-78**

Period	Ratio of cumulated investment allowances for all years to re-valued capital stock(a)	Ratio of cumulated investment allowances from 1960-61 to revalued cumulated investment from 1960-61 (a')	Ratio of cumulated investment allowances for all years to capital stock at historical prices (A)	Ratio of cumulated investment allowances since 1960-61 to cumulated investment since 1960-61 (A')
	Past investment allowances revalued to present values using running yields on Government stocks each year	Investment and investment allowances are at their book values		
	(1)	(2)	(3)	(4)
1961-62 to 1965-66	0.2328	0.3260	0.2359	0.3178
1966-67 to 1968-69	0.2684	0.3355	0.2678	0.3248
1969-70 to 1973-74	0.3120	0.3824	0.3133	0.3673
1974-75 to 1977-78	0.3111	0.3579	0.3273	0.3602
1960-61 to 1977-78	0.2763	0.3520	0.2814	0.3442

PROFITABILITY AND COST OF CAPITAL

N.B.: Investment allowances comprise tax benefits accruing as a result of deduction from gross profits, depreciation, development rebate/investment allowances, etc. capital stock (investment) refers to fixed capital only.

APPENDIX-I

SOURCES OF DATA, CONCEPTS AND METHODOLOGY
OF ESTIMATION

1. Source of data

The basic data used for this article were drawn from the annual studies on "Finances of medium and large public limited companies", published in various issues of the Reserve Bank of India Bulletin. The number of selected companies included in the Reserve Bank of India analysis is (i) 1333 for the period 1960-61 to 1965-66 (ii) 1501 for the period 1965-66 to 1970-71, (iii) 1650 for the period 1970-71 to 1975-76 and (iv) 1720 companies for the period 1975-76 to 1977-78.

2. Replacement cost ratio (RCR)

The replacement cost ratio was used for converting the book value of the capital stock and accumulated depreciation to the current replacement cost. The derivation of this ratio is broadly as follows: starting from the year 1950, an investment goods price index is calculated separately for three categories of investment (i) construction (2) machinery (3) furniture, fixture and other assets, based on wholesale prices of construction materials and wage rate in the case of item (1), prices of selected machinery in respect of item (2) and selected items of the third category for item (3), published by the Central Statistical Organisation, Ministry of Planning, Government of India. Let P_{ct} , P_{mt} , P_{ot} denote the price indices for three components of total investment and I_{ct} , I_{mt} , I_{ot} the investment expenditures in the three categories during the year t at current prices; the replacement value of capital stock starting with base year 1960 is calculated as:

$$K_{jrt} = K_{jr1960} \times \frac{P_{jt}}{P_{j1960}} + P_{jt} \sum_{i=1}^{t-1} I_{ji}/P_{ji} + I_{jt}; j = c, m, o.$$

where K_{jr1960} is the replacement value of capital stock of category j in the year 1960.

Replacement value of total capital stock at time t

$$= K_{crt} + K_{mrt} + K_{ort} = K_{rt}$$

Book value of total capital stock generally corresponds to the cumulative investment since 1960, except when revaluation of physical assets takes place. This is roughly equivalent to

$$\sum_{i=1}^t I_{ci} + \sum_{i=1}^t I_{mi} + \sum_{i=1}^t I_{oi} + K_{1960} = K_{bt}$$

Where K_{1960} is the book value of capital stock at the end of 1960.
Replacement cost ratio for the year $t =$

$$\frac{K_{nt}}{K_{bt}} = \frac{\text{Replacement value of capital stock}}{\text{Capital stock at book value}}$$

For further details of the working of the ratio, reference may be made to the study 'Capital-Output Ratios in the Indian Corporate Sector 1960-61 to 1977-78', published in the June 1981 issue of the Reserve Bank Of India Occasional Papers.

3. Tax written down value of fixed assets (TWDVF)

The written down value of fixed assets shown in the accounts is net of depreciation, both valued at the book value. However, through investment in fixed assets in certain areas companies become eligible to claim tax concessions which add to cash flows and reduce the value of company's own contribution towards fixed investment. In the absence of full details on all types of tax concessions availed by companies, the tax written down value of fixed assets was taken as the written down value of fixed assets at book value less accumulated tax benefit on account of only development rebate/investment allowance reserves. It was also presumed that tax written down value of fixed assets at the beginning of the study year i.e. 1960-61 would be same as the average book value of the net fixed assets during that year. Thus for the year 1960-61, (TWDVF) is the average value of net fixed assets at the book value in 1960-61 minus the accumulated tax benefit on account of cumulative development rebate reserve. For a subsequent year t , $TWDVF_t = TWDVF_{t-1} + \text{Net fixed investment in year } t$ (i.e. the difference between gross fixed investment and depreciation during the year as per the balance sheet) — (during the year tax benefit mentioned above). In case a company does not make profits in a particular year (e.g. new companies under construction stage) it may not be in a position to avail the tax concessions that may arise out of allocation to development rebate/investment allowance reserves in that year. These tax benefits could however accrue in later years, when the company shows taxable profits. This could imply that tax written down value (TWDVF) would be overestimated in the former years and underestimated in the later years. The total tax written down value of fixed assets for all the non-financial, non-Government, public limited companies in the population was worked out by blowing up the data of selected companies with factors based on the paid-up capital coverage of the selected companies of the company finance studies.

4. Tax adjusted rate of discount 'R'

The average running yield on Government of India securities net of tax was taken as the tax adjusted rate of discount. Data on yields were taken from different issues of the Reserve Bank of India Bulletin.

5. Total allowances in a year t

Total allowances were taken as the tax benefit on account of development rebate/investment allowance reserves plus depreciation during the year based on the balance sheet. Actual allocations by companies to the development rebate/investment allowance reserves during the year are, however, not available. The difference between the cumulative reserves at the closing and the beginning of the year was taken as the allocation to these reserves during the year. When the difference was negative, the allocation to the reserves during the year was taken as nil. Present value of total allowances at the beginning of the study year i.e. 1960-61, was taken as the same as the total investment allowances in that year. The present value of total allowances in a year t i.e. $TA_t = (\text{Present value of total allowances at the end of the year } t-1) \times (1+R_t) + \text{total}$

allowances during the year t. Thus, $TA_t = \sum_{j=1}^{t-1} TA_j(1+R_1).....(1+R_j) + IA_t$

$IA_t = \text{Investment allowances in the year } t$

6. Replacement value of investment in a year t

Replacement value of investment during the initial year i.e. 1960-61 was taken as the gross fixed investment during that year. Total replacement value of investment in a year t was worked out as equal to $(\text{Replacement value of investment upto } t-1) \times \frac{RCR_t}{RCR_{t-1}} +$

Gross fixed investment during the year t, where RCR_t is the replacement cost ratio for the year t.

7. Computation of "a'" i.e. present value of investment allowances in a year t per unit of replacement value of investment in a year t

Value of "a'" was worked as

$$a' = \frac{\text{Present value of total investment allowances in a year } t}{\text{Total replacement value of investment in a year } t}$$

$$\text{i.e.} = \frac{\text{Item 5}}{\text{Item 6}}$$

8. Present value of all cumulative allowances in a year t

For the initial year 1960-61, the value of all cumulative allowances was taken as the value of accumulated tax benefit on cumulative depreciation allowances relating to replacement value of fixed assets as at the end of 1960-61 and cumulative value of development rebate reserve/investment allowances in 1960-61. Present value of cumulated allowances in a year t is equivalent to the value of Item (5), plus the present value of cumulated allowances in the year 1960-61 i.e. $CTA_t = \text{Item (5)} + CTA_{1960-61}(1+R_1) \dots (1+R_t)$ where CTA_t is the cumulated total investment allowances in the year t in the form of depreciation allowance, etc. In other words, the present value of all cumulative allowances in a year t was thus worked out as equal to (present value of all cumulative allowances upto $(t-1) \times (1+R_t)$ + total allowances during the year t.

9. Replacement value of stock of fixed assets in the year t

Replacement value of stock of fixed assets in 1960-61 (i.e. beginning of the study period) was worked as equal to the capital stock at historical cost in 1960-61 $\times$ RCR 1960-61. Replacement value of stock of fixed assets in a year t after 1960-61 was worked out as equal to (Replacement value of stock of fixed assets in t-1) $\times$ RCR_t + fixed investment in the year t.

RCR_{t-1}

10. Computation of 'a' i.e. present value of cumulative allowances in a year t per unit of replacement value of stock of fixed assets in a year t

$$\begin{aligned} & \text{Present value of all cumulative allowances} \\ & \text{in the year t} \\ = & \frac{\text{Replacement value of stock of fixed assets}}{\text{in the year t}} \end{aligned}$$

$$= \frac{\text{Item 8}}{\text{Item 9}}$$

11. Tax adjusted value of capital stock

For arriving at the tax adjusted value of capital stock, required for estimating the forward looking rate of return, the total of all allowances, were worked out as a proportion of the gross fixed capital stock at replacement value. This proportion was worked out as equivalent to the present value of allowances per unit of invest-

ment. The tax-adjusted value of capital stock was derived as the *net fixed capital stock* at replacement value net of the tax allowances so computed. Thus, to put symbolically,

$$CF = (1-a) FR + W$$

where CF = Tax adjusted value of capital stock

FR = Replacement value of net capital stock, (Average of beginning and end of year stock of *net* fixed capital valued to current price using replacement cost ratio during the year)

W = Average of beginning & end of year stock of inventories as shown in the accounts.

12. Financial valuation of companies

Financial valuation of companies was computed as

$$= \text{Market value of (ordinary shares + preference shares + debentures) + Other borrowings + Trade dues and other current liabilities — Loans and advances and other debtor balances — liquid assets.}$$

where :

(a) Market value of ordinary shares in a year t

$$= \frac{\text{Total dividend paid on ordinary shares during the year t}}{\text{Rate of yield on ordinary shares per-cent per annum}} \times 100$$

(b) Market value of preference shares in a year t

$$= \frac{\text{Total dividend paid on preference shares during the year t}}{\text{Rate of yield on preference shares per-cent per annum}} \times 100$$

(c) Market value of debentures

$$= \frac{\text{Total interest paid on debentures}}{\text{Rate of yield on debentures per-cent per annum}} \times 100$$

- (d) **Liquid assets:** This is the sum of cash and bank balances and investment in shares and securities, etc.

13. Pre-tax rates of return

i) Rate of return at historic cost

$$\frac{G}{FH+W} = \frac{\text{Gross profits during the year}}{\text{Net fixed capital stock at historic cost} + \text{inventories}}$$

ii) Real rate of return

$$\frac{Y}{FR+W} = \frac{\text{Real earnings, net of depreciation at replacement cost}}{\text{Net fixed assets at replacement cost} + \text{inventories}}$$

G = Gross profits during the year, viz., trading profits after deducting depreciation at historic cost

Y = Gross profits + Capital consumption at historic cost — Capital consumption at replacement cost (CCR)

CCR = Capital consumption at replacement cost is worked as
= Capital consumption (P&L A/c) at historic cost
X RCR

FH = Net fixed capital at historic cost.

FR = Net fixed capital at replacement cost is worked out as = Net fixed capital at historic cost x RCR

W = Value of inventories

Both fixed capital and inventories in a year were taken as the average of the respective values at the beginning and end of that year.

14. Post-tax rates of return

The measures of post tax profitability were worked out assuming that interest and dividends were subject to basic personal income tax rates. This assumption was necessitated by the complex nature of taxation structure, comprising a plethora of taxes depending on the recipients' income levels, etc.

i) Forward looking rate of return

$$\frac{(1-b)Y + (b-t) \text{INT} - (b-a') \text{CCR} - t' \text{DIV}}{(1-a)FR + W}$$

Where b = Corporation tax rate

t = Tax rate on interest as applicable to persons

t' = Tax rate on dividend as applicable to persons

INT = Interest paid

DIV = Dividend paid

ii) Backward looking rate of return

$$= \frac{(1-b)Y + (b-t) \text{INT} + b \left(\frac{N}{G} (SD - AFY) \right) - b \text{CCR} - t' \text{DIV}}{(1-b) \text{FR} + W + b \text{TWDVF}}$$

Where: SD = Capital consumption during the year (P&L A/c)

AFY = All the first year allowances i.e., development rebate reserves during the year + depreciation on gross fixed investment during the year

$\frac{N}{G}$ = Ratio of net fixed investment to gross fixed investment during the year

N = Gross fixed investment during the year (G) minus during the year depreciation provision.

When this figure i.e. value of N was negative it was taken as zero

TWDVF = Tax written down value of fixed assets

15. Post-tax costs of capital

i) Forward looking cost of capital

$$= \frac{(1-b)Y + (b-t) \text{INT} - (b-a') \text{CCR} - t' \text{DIV}}{\text{Financial valuation of companies}}$$

ii) Backward looking cost of capital

$$= \frac{(1-b)Y + (b-t) \text{INT} + b \left(\frac{N}{G} (SD - AFY) \right) - b \text{CCR} - t' \text{DIV}}{\text{Financial valuation of companies}}$$

16. Valuation Ratio: It was worked out as

$$= \frac{\text{Financial valuation of companies}}{\text{Tax adjusted replacement value of physical capital stock (forward looking)}}$$

$$= \frac{\text{Post-tax real rate of return (forward looking)}}{\text{Post-tax cost of capital (forward looking)}}$$

17. Rate of investment in year t

It was worked out as the ratio of gross fixed investment during the year t to the replacement value of the stock of gross fixed assets in the year t-1.

18. Tax rate

A single tax rate relating to domestic companies in which public are substantially interested, relevant for each of the years of the study period was used for this study. To illustrate, for the study year 1977-78, the tax rate including surcharge, relating to domestic companies in which public are substantially interested and whose total income exceeds Rs. 1,00,000, was taken as 57.75 per cent.

APPENDIX-II**SOME DATA PROBLEMS IN THE COMPILATION OF THE SERIES
ON THE RATE OF RETURN AND THE COST OF CAPITAL****1. Investment Incentives and rate of return**

In working out tax benefits enjoyed by the companies in the context of investment incentives, only such tax concessions that are allowed on the depreciation, the development rebate reserve/investment allowance reserve are considered. Incentives towards investment either in the new projects or towards expansion of capacities in the companies already operating, come from various directions. Some of these as given in the original version of Income-tax Act 1961 as modified upto 1981 are mentioned below.

1. Section 32 : Depreciation

Section 32 (ii-a) allows additional depreciation allowance in the case of new plant and machinery installed after 31st March 1980 but before 1st April 1985, a further sum equal to one half of the admissible depreciation excluding extra shift allowances etc. in respect of the previous year in which such machinery or plant is first put to use.

2. Section 35(i) (iv) : Expenditure on research

Companies are entitled for full deduction from the income, the expenses including capital expenditure in connection with scientific research related to the business carried on by them.

3. Section 35B : Export market development allowance

Companies are allowed a deduction of sum equal to one and half times of the amount of certain specified expenditures such as advertisement, publicity outside India incurred in connection with the development of export markets.

4. Section 35-D : Amortization of certain preliminary expenses

Companies are entitled for amortization, spread over a period of 10 years, equal to one tenth of certain preliminary expenses such as preparation of feasibility reports, project reports, etc. incurred by them in connection with the new industrial ventures, such that the aggregate to be considered is taken 2.5 per cent of total capital employed in the business of the company, etc.

5. Section 80 HH : Deduction in respect of profits and gains from newly established undertakings or hotel business in backward areas

Units whose new projects are located in the notified backward areas (listed in the 8th Schedule of Income-tax Act) whose busi-

ness activity commenced after 31st December 1970 are eligible for deduction of 20 per cent of the profits and gains in respect of each of the ten assessment years relevant to the previous year in which the industrial undertaking begins to manufacture or produce articles or do the business of a hotel.

6. Section 80I: Deduction in respect of profits and gains for industrial undertakings after a certain date etc.

Companies are allowed in computing total income a deduction from such profits and gains of an amount equal to 25 per cent thereof, subject to the provisions of the section for initial assessment year and all the seven assessment years immediately following the initial assessment year.

7. Section 80J: Deduction in respect of profits and gains from newly established undertakings or ships or hotel business in certain cases :

Under this section, subject to the provisions assessee companies will be allowed a deduction from their profits and gains (reduced by deduction, if any, admissible under Section 80 HH or 80 HHA) at the rate of 7.5 per cent of the capital employed computed in a manner specified in sub-section (1A) in the year beginning from the previous year in which the company commences production and each of the four succeeding assessment years with a right to set off deficiency, if any, over the next assessment year as reckoned from the end of the initial assessment year.

8. Section 80(O) : Deduction in respect of royalties etc. from certain foreign enterprises

Companies are entitled to deduction from their income by way of royalty, commission, fees, received in consideration of the use of patent, invention, technical design etc., from the Government of foreign state or foreign enterprise the whole of such income shall be allowed as deduction subject to the provisions of this section.

Companies undertaking new industrial projects have also the benefit of other incentives such as cash subsidy, interest free development loan, excise duty rebate, concessional rate of power and water tariff, etc.

The analysis of company accounts published by the Department of Statistical Analysis and Computer Services of RBI does not give detailed data in respect of each of the above tax incentives utilised by the sample of companies. Tax benefits per unit of investment which are worked out on the basis of the depreciation provision, changes in development rebate/investment allowances appearing in

the balance sheet of companies, would have underestimated the tax concessions actually enjoyed, by the companies. It is, however, difficult to know the extent of underestimation in the absence of data on the number or proportion of companies availing different tax concessions and the average amount of tax deduction per company so obtained in each industrial category. It is estimated that, for some selected companies, tax saving could be of the order of a maximum two thirds of the profits. However it is implicitly assumed that the utilisation of tax concessions (other than development rebate reserve etc.) considered in the above analysis, form a minor portion of the aggregate investment made in the corporate sector as a whole. Ignoring other tax concessions would overestimate tax written down value of capital stock and therefore underestimate the post-tax real rate of return.

II. Share market evaluation and the cost of capital

The financial valuation of equity capital of all companies in the exercise would have been underestimated due to various factors, some of which are discussed here.

(1) The yield rate used for working out market valuation of equity/preference/debenture capital is taken from the data on yields published in the RBI Bulletins. These yield rates could have overestimated the average yield on equity capital for the entire corporate sector. This is due to the reason that the RBI sample of companies for which such yield rates are calculated are generally profit making companies and whose shares are quoted on atleast one of the three important stock exchanges at Bombay, Madras and Calcutta. For the corporate sector, as a whole, there are quite a number of companies which would not have made profits or skipped payment of dividends. In fact, in the 1720 medium and large public limited companies covered by the RBI study on company finances for year 1977-78, as many as 803 companies did not pay dividends.

(2) With a view to have some idea of likely bias in the estimate of cost of capital, yields on equity capital of 432 companies whose shares are quoted on Bombay, Madras, Calcutta and Ahmedabad stock exchanges were examined. The weighted average yield on shares of these companies was worked out on the basis of prices quoted as on 18th to 30th December 1981, gives a figure of 5.62 per cent per annum. The weights used in the calculations are based on the volume of owned funds. Of the 432 companies as many as 73 companies skipped dividend during the previous year. The expected yield of these companies is taken as nil in the above calculations. If, however, these 73 companies were excluded, the

weighted average yield works out to 5.95 per cent per annum. This indicates that the average yield for the corporate sector as a whole is likely to be less than the average yield rate used for the calculation of market value of the equity capital in this study, particularly when number of companies skipping the dividend is more. It would, therefore, be appropriate, that yield rate for the entire corporate sector is worked out in such a way as to give due weight to the companies with nil yield. In other words, a correction factor has to be applied to the published yield data; this factor could be a function of the share of total income of dividend paying companies to the total income (or profits etc.) of all the companies. Basing on RBI sample of companies an adjustment to the yield on equity capital of the corporate sector as a whole was worked and the revised estimates of cost of capital at "All industry" level, stood at 2.8% for 1977-78 compared to 3.3% as given in this study for the same year.

The average cost of capital is a function of the proportion of both the equity capital (whose valuation need modification based on the revised yield rates) and of other borrowings (and the interest rate at which these are received). The average cost varies as the proportion of equity capital in the total financial value of all capital changes. The relationship between the actual and estimated cost of capital taking into account the above mentioned changes in the estimation of market value of equity capital, and the share of equity capital in the total valuation is given below :

$$C_{1i} = \frac{E_i}{D_i + Y_i}$$

$$C_{2i} = \frac{E_i}{(1 - \alpha_i) D_i + Y_i}$$

where

E_i = Real earnings of companies

C_{1i} = Estimated cost of capital as worked out in the study

C_{2i} = Modified cost of capital

α_i = Correction factor for the estimation of financial value of equity capital

D_i = Financial valuation of equity capital as worked out in the study

Y_i = Financial valuation of items other than equity capital

i = Subscript for the year

$$\frac{C_{1i}}{C_{2i}} = \frac{(1 + \alpha_i) D_i + Y_i}{D_i + Y_i}$$

$$C_{1i} = C_{2i} \times \left[\frac{(1 + \alpha_i) D_i + Y_i}{(D_i + Y_i)} \right]$$

$$= C_{2i} \times \left[\frac{\alpha_i D_i}{D_i + Y_i} + 1 \right]$$

$$= C_{2i} \times \left[\frac{\alpha_i}{1 + P_i} + 1 \right]$$

$$= C_{2i} + \frac{C_{2i} \alpha_i}{1 + P_i}$$

where $P_i = Y_i/D_i$

The overestimation of cost of capital varies directly with the extent of under-estimation of the market value of equity capital (α_i) and with the proportion of market value of equity capital in the total financial valuation of companies. The yield rates, published by RBI particularly prior to 1970-71 are based on the dividend paying companies, as such overestimation in the cost of capital for this period could have been higher.

The following table gives modified estimates of cost of capital based on a value of α_i ranging between 0.32 to 0.45.

(Per cent)

Year	Cost of capital		Year	Cost of capital	
	As estimated in the study	Modified		As estimated in the study	Modified
1960-61	4.48	3.63	1970-71	3.44	2.89
1961-62	4.45	3.59	1971-72	3.98	3.40
1962-63	4.09	3.33	1972-73	3.62	3.17
1963-64	4.30	3.51	1973-74	4.31	3.71
1964-65	4.62	3.82	1974-75	4.60	3.92
1965-66	4.94	4.17	1975-76	2.97	2.46
1966-67	3.47	2.98	1976-77	3.13	2.65
1967-68	2.94	2.57	1977-78	3.33	2.83
1968-69	3.02	2.59			
1969-70	3.32	2.79			

3. Further for the purpose of assessing the cost of capital it is assumed that the current tax adjusted earnings of the companies (ei) are a good proxy for the expected future earnings as perceived by the shareholders of the companies. This assumption may not be quite realistic. The expectation of the shareholders may vary depending on whether investment of a company is being placed in a new project or towards the expansion of old line of activity. Earnings of established companies may not therefore portray a correct view of the return on the former, stock market valuations being highly sensitive to current developments would have resulted in an overestimation of the future earnings for the corporate sector which comprises both newly registered firms and established companies. Consequently, the cost of capital might have been overestimated. In sum, the absolute magnitude of the cost of capital calculated in this note should not be taken at its face value. It may not be appropriate to deduce therefrom that on the average the cost of capital for the corporate sector is higher than the rate of return on physical assets, as the former could have been overestimated and the latter underestimated. The compiled series may only indicate the broad trend along which the two rates moved.

SIZE AND PROFITABILITY WITH REFERENCE TO SMALL SCALE INDUSTRIAL UNITS IN THE ASSISTED SECTOR

K. G. K. Subba Rao*

The Survey of Small Scale Industrial Units† conducted by the Reserve Bank of India in 1977-78 revealed several interesting features of these units in the assisted sector, i.e. units which are financed by the commercial banks. Some aspects on the working of these units have been examined in various studies‡. In this article, an attempt is made to study the profitability vis-a-vis size of the units, size measured by investment in plant and machinery§. According to the survey results, 29 per cent of the small scale industrial units in the assisted sector were organised as self-employed units, i.e. working without hired labour. In the case of such units, the proprietor will have a dual identity, both as an investor as also a worker in the unit. The profits attributable to the entrepreneur and consequently the return on capital employed, will get unduly inflated, if proper imputation of the labour expenses is not made. As such, it is necessary to make a rough assessment of the labour component embedded in the profits, and

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† For the purpose of the survey, a Small Scale Industrial Unit was defined as one with original investment of not more than Rs. 10 lakhs in plant and machinery; for ancillary units, the limit was Rs. 15 lakhs. A sample of 12356 units was investigated for the purpose of enquiry. The estimates of important economic magnitudes are presented in the Statistical Reports (Vols. 1 and 2) brought out by Reserve Bank.

‡ V. M. Sundar Raj "Financing of Small Scale Industries — A profile," Reserve Bank of India *Bulletin*, April 1980.

Ravi Varma — "Employment and Production in Small-Scale Industries — some findings of the Reserve Bank Survey" Reserve Bank of India *Occasional Papers*, December 1980.

K. G. K. Subba Rao — "Credit Allocation and Demand for Credit with reference to Small Scale Industrial Units in the Assisted Sector" in "Forecasting in Banking Industry", National Institute of Bank Management, December 1981.

§ The estimates pertaining to the detailed items of Assets and Liabilities, Income and Expenditure, sources and uses of funds and a number of financial ratios relevant for assessing the profitability and efficiency of the small scale industrial units are presented for different categories of units in Vol. 2 of the Statistical Report. The size classifications adopted were (1) value of net assets and (2) Investment in plant and machinery. For the present study, the latter measure is taken to represent size of the unit.

bifurcate the payments to labour and capital for assessment of the profitability of the units. Section I of the paper gives a general background of the contribution of the small scale industrial units to output, employment and value added in different sizes of small scale industrial units. Some of the important structural ratios highlighting capital efficiency are also discussed therein. In Section II of the paper, the profitability of small scale industrial units is discussed with reference to size of the units, after making suitable adjustments for the imputed value of emoluments in the profits of the units. The return on owned funds (adjusted) is also compared with the rate of interest on borrowed funds (institutional and non-institutional) in each of the size classes. A summary of observations is given in Section III.

SECTION I

Contribution of small scale industrial units to output, employment and value added.

The distribution of small scale industrial units in the assisted sector revealed that 89 per cent of the units had investment in plant and machinery less than Rs. 1 lakh, about 9 per cent of the units in the range of Rs. 1-5 lakhs, and hardly 2 per cent of the units had investment in plant and machinery above Rs. 5 lakhs. It may be observed from Table 1 that units with investment in plant and machinery of less than Rs. 1 lakh had 31 per cent of the total value of fixed assets of all the assisted units, and their share was as much

Table 1: Shares of Small Scale Industrial Units of different sizes in fixed assets, output, employment and value added.

Size of units in terms of investment in Plant and Machinery (Rs.)	Percentage distribution of units	percentage share in			
		Total value of fixed assets	Total value of output	Total number of paid employees.	Value added (gross)
Upto 1,000	34.75	1.65	7.87	19.26	10.12
1,000 — 10,000	21.15	3.28	6.22	11.26	7.89
10,000 — 20,000	11.70	4.03	5.71	7.34	7.07
20,000 — 50,000	13.71	10.31	12.32	12.22	12.97
50,000 — 1 lakh	7.69	11.79	12.84	11.47	13.01
1 lakh — 2 lakhs	5.03	14.88	17.31	11.49	14.34
2 lakhs — 5 lakhs	3.87	23.40	18.31	12.56	16.76
5 lakhs — 10 lakhs	1.79	22.52	15.07	11.65	13.67
Above 10 lakhs	0.27	8.14	5.15	2.75	4.17
Total	100.00	100.00	100.00	100.00	100.00

as 44 per cent in total production, 61 per cent in total employment and 51 per cent in total value added by the assisted units. The units in the size group Rs. 1-5 lakhs accounted for 36 per cent of the total production, 24 per cent of the total employment and 31 per cent of the total value added by the assisted units. Units with investment in plant and machinery above Rs. 5 lakhs constituted about 2 per cent of the total number of assisted units; their share was 20 per cent in total production, 14 per cent in total employment and 18 per cent in total value added.

Some of the structural ratios indicating efficiency of capital etc. are set out in Table 2. The value added-capital ratio (capital defined as gross fixed assets/total net assets) showed a gradual decline with the increase in the size of the units. Thus the ratio was the highest at around 4 in the case of units with investment in plant and machinery upto Rs. 1,000, 1-2 in case of units with investment in the range of Rs. 1,000-20,000 and gradually tapered down with the increase in the size of the units. The ratio was less than 0.5 for units with investment in plant and machinery of more than Rs. 5 lakhs. The labour-capital ratio also showed a consistent decline with the increase in the size of the units, the ratio being the highest in respect of units in the investment slab upto Rs. 1000. Taking Rs. 1 lakh of investment in fixed assets as the norm for comparison of capital-labour ratio, the average employment of paid labour for the assisted sector was 14. The employment per unit of investment was considerably higher in respect of units with investment upto Rs. 1 lakh. In the higher investment slabs, the ratio was much lower than the average level of employment for the sector as a whole. In a capital source economy with abundance of labour, these ratios are of significance (Table 2).

The income generation (net value added) per unit of gross output (sales taken as a proxy to output) was around 0.17 for units in different size classes with investment upto Rs. 20,000, .14- .15 for units in the investment range of Rs. 20,000 — Rs. 1 lakh and was around 0.12 for units in sizes with investment above Rs. 1 lakh. These data reveal that the income generation per unit of investment was relatively higher for units in the lower investment slabs. On the average, about 56 per cent of the income generated in the assisted sector went to paid labour as emoluments and the balance mostly to capital. The share of factor payments to labour in value added (net) exceeded 60 per cent in respect of units with investment upto Rs. 1000. At the other end of the scale, the percentage share was considerably higher in slabs with investment exceeding Rs. 5 lakhs — about two-thirds of the income generated has gone for distribution as emoluments. In most other size classes, the share of wage bill was in the range of

50-55 per cent. The share of the entrepreneur in total income generated (as indicated by the ratio of profits after tax to value added) was relatively more in the case of units with investment upto Rs. 1 lakh, the share being 30-40 per cent in the different size classes within the investment range of Rs. 1000-50,000. The share was less than 20 per cent in respect of units with investment exceeding Rs. 1 lakh; the units in the size class Rs. 5 lakhs — 10 lakhs incurred losses (Table 2).

Table 2 : Some important Structural ratios for Small Scale industrial units in the Assisted Sector classified by size of investment in plant and machinery.

Size of units in terms of investment in plant and machinery (Rs.)	Value added (gross) to fixed assets (gross)	Value added (net) to total net assets	Employ- ment for Rs. 1 lakh investment in fixed assets (gross)	Value added (net) to sales	Salaries and wages to value added (net)	Profits after tax to value added (net)
Upto 1,000	3.96	0.57	167	0.1691	0.6254	0.2585
1,000 — 10,000	1.59	0.37	49	0.1718	0.5150	0.3601
10,000 — 20,000	1.17	0.33	26	0.1687	0.4862	0.3859
20,000 — 50,000	0.87	0.28	17	0.1435	0.5064	0.3108
50,000 — 1 lakh	0.77	0.27	14	0.1449	0.5103	0.2751
1 lakh — 2 lakhs	0.69	0.20	11	0.1166	0.5501	0.1947
2 lakhs — 5 lakhs	0.54	0.21	8	0.1269	0.5589	0.1491
5 lakhs — 10 lakhs	0.47	0.20	7	0.1223	0.6562	*
Above 10 lakhs	0.42	0.17	5	0.1180	0.6641	0.1457
All units	0.72	0.25	14	0.1369	0.5605	0.2169

*Numerator negative

Considering the share of various components of expenditure in value of production in different size classes, it is observed that manufacturing expenses formed about 75-80 per cent, wage bill constituted 6-9 per cent in most of the size classes, except in the lower strata of units with investment less than Rs. 1000, where it was about 11 per cent. The share of interest was less than 3 per cent for units in the size classes upto Rs. 2 lakhs, and slightly more for higher investment slabs. The share of profits in value of production was relatively higher (3-5 percent) in case of units with investment upto Rs. 1 lakh, while it was less than 1 percent in case of units in investment range Rs. 1 lakh — 5 lakhs. The units with investment above Rs. 5 lakhs incurred losses (operating profits being negative) (Statement 1).

SECTION II

Profitability of Small Scale Industrial Units vis-a-vis size

A characteristic feature of the small scale industrial units (particularly the units in the lower investment slabs) is that some of them come under the 'self-employed' category i.e. without hiring any workers. This is more so in the case of traditional industries with a low capital base, which do not involve much of manufacturing activity. According to the survey*, 29 per cent of the units in the assisted sector came under the above category, the entrepreneur in such cases assuming a dual role of being both an investor and also a worker. Apart from the proprietors/partners working for the unit under this category, other unpaid family members may be working for the unit. The proportion of such unpaid labour is likely to be more in the case of units with low capital investment. As such, it is probable that some of the units categorised as self-employed units in the survey had some unpaid family labour employed in the business.

The profits attributable to the entrepreneur in the case of self-employed units will have to be suitably adjusted for a proper assessment of the return on capital employed, after imputing the share of labour component attributable to the self-employed category in the total expenses. In the context of any discussion of profitability with reference to size (indicated by investment in plant and machinery) this aspect assumes importance. For this purpose, information on self-employed persons and imputed emoluments in respect of units in each size class is required. The survey data provided distributions of assisted units for each industrial group (at two digit and three digit levels of National Industrial Classification) by number of persons employed which included the "zero" category covering self-employed units. However, no data are available in respect of unpaid employees working for the unit in "zero" category. Further distribution of units by two way classification of size of employment and size of the units is also not available.

The proportion of self-employed persons in total employment for each size class is worked out using information available from other sources. In the Report on Census of Small Scale Industrial Units

* The survey data revealed that more than 60 per cent of the units in respect of each of the industrial groups viz. 1) Beverage tobacco and tobacco products 2) weaving and finishing of cotton textiles in handlooms 3) wooden and cane boxes etc. and 4) footwear are self employed units.

published by the Development Commissioner* information on total employment (including self-employed persons) and number of self-employed persons in respect of 31 important industrial groups at the four digit level of National Industrial Classification is available. Further data on number of units and investment in plant and machinery for each of these industrial groups are also available separately. *A priori*, it can be expected that the proportion of self-employed persons would tend to be higher in respect of units with low investment. Thus an inverse functional relationship between proportion of self-employed persons (Y) vis-a-vis average level of investment (X) can be assumed. Based on the cross section data for these industrial groups, several functional relationships (linear, semi-log and double-log functions) are estimated and the equations presented in Appendix I. In all cases, the coefficient of X turned out to be negative and significant. The following equation is selected in view of the reasonably satisfactory fit, compared to other equations.

$$Y = 41.3847 - 7.5080 \log X$$

t Statistic	5.53
Elasticity	- 0.44

$$\bar{R} \text{ adj} = 0.71, \text{ SEE} = 7.92, \text{ Mean} = 16.93$$

As expected, the coefficient of X is negative and significant. The measure of elasticity indicated that for every 10 per cent increase in investment in plant and machinery, the proportion of self-employment to total employment will decline by about 4.4 per cent. Based on the above equation the proportion of self-employed persons in total employment in each size class is estimated by using the average investment in plant and machinery in each of the size classes and estimates are presented (inset table).

The estimates indicated a reduction in the proportion of self-employed to total employment, as the size of the units increased. It may be observed from the data that the proportion of self-employment to total employment was the highest at 51 in the lowest strata of units with investment upto Rs. 1000 and declined steeply as the size of the units increased. The survey tabulations presented estimates of paid employees in each of the size classes; the number of self-employed persons in each of the size classes is estimated by applying the proportions of self-employed category to paid employees in each size class to the total number of paid em-

* Report on Census of Small Scale Industrial Units, Government of India, Development Commissioner, Small Scale Industries, 1977. The scope of the Census was restricted to units registered with State Directorates of Industries. This, however, excluded units which come under the purview of different statutory boards or special agencies.

Size of units in terms of investment in plant and machinery (Rs.)	Proportion of self-employed persons to total number employed (estimated)	Average number of self employed persons per unit (estimated)
Upto 1,000	51	7
1,000 — 10,000	29	3
10,000 — 20,000	21	2
20,000 — 50,000	15	2
50,000 — 1 lakh	9	2
1 lakh — 2 lakhs	4	1
2 lakhs — 5 lakhs	*	*
5 lakhs — 10 lakhs	*	*
Above 10 lakhs	*	*

Note: The industrial groups considered for the purpose of estimating the equation are somewhat heterogenous, with average level of investment in each industrial group ranging from Rs. 2000 to Rs. 1 lakh and the proportion of self-employment to total employment varying from 3 to 53 per cent. It would be appropriate to use the cross section data of industrial groups for each size class and estimate the regression equations separately. In the absence of data in such detail, the above procedure is adopted and the consequential limitations may be borne in mind while interpreting the results presented.

* In these cases, the proportion was negative, and hence not presented. By and large, it may be assumed that it will be zero i.e. all employees are hired.

ployees. The average number of self employed persons in each size class is also worked out separately based on the estimated number of self-employed units in each size class. The average was the highest at 7 in the case of units in the lowest investment slab i.e. units with investment in plant and machinery upto Rs. 1000.

The profits of units in respect of each size class are reworked, after netting out the imputed emoluments of the self-employed persons based on the average emoluments per employee in each of the size classes worked out separately from survey data. The profitability rates reworked on this basis, as also the unadjusted rates are presented in Table 3. The cost of borrowed funds (interest as percentage of outstanding loans) is also presented for relative comparison with returns on investment.

It may be observed that the profitability rates were toned down considerably, when allowance is made for the imputed value of emoluments attributable to self-employed persons. The profit margin for all assisted units together was 5.3 per cent, the return on total net assets (capital) was 9.6 per cent and return on owned funds (net worth) 13.9 per cent. In the lowest strata of units with investment upto Rs. 1000, the net position seems to be that these are units with

Table 3: Profitability and cost of borrowed funds for assisted units classified according to investment in Plant Machinery.

Size of units in terms of investment in plant and machinery (Rs.)	Gross profits as percentage of sales		Gross profits as percentage of total net assets		Profits after tax as percentage of net worth*		Interest as percentage of outstanding loans†
	U	A	U	A	U	A	
upto 1000	6.12	+	20.64	+	47.31	+	16.89
1,000 — 10,000	8.55	4.93	18.30	10.54	33.91	14.10	14.64
10,000 — 20,000	8.97	6.85	17.70	13.51	34.74	23.43	14.91
20,000 — 50,000	6.98	5.73	13.71	11.25	23.91	17.21	15.29
50,000 — 1 lakh	6.99	6.26	12.89	11.57	24.66	20.25	13.70
1 lakh — 2 lakhs	5.49	5.23	9.29	8.84	18.07	16.01	13.46
2 lakhs — 5 lakhs	5.83	5.83	9.87	9.87	14.85	14.85	14.50
5 lakhs — 10 lakhs	4.85	4.85	7.74	7.74	+	+	14.79
Above 10 lakhs	5.67	5.67	8.17	8.17	17.53	17.53	14.79
All Units	6.27	5.26	11.43	9.59	21.05	13.92	14.47

U Unadjusted.

A: Adjusted.

* Most of the small scale industrial units, which are organised as proprietary/partnership concerns do not maintain accounts. In such cases, 'capital and reserves' were derived as residual, after enumeration of all physical/financial assets and netting out the identified liabilities. Even in respect of those units which maintain accounts, it is not the practice to show capital and reserves as distinct entries in the balance sheet; capital shown in these accounts incorporates all changes on account of additions to/withdrawals from capital and also profit/loss during the year. In such cases, capital itself is reckoned as synonymous to networth (capital + reserves).

† Borrowings cover both institutional and non-institutional loans. If only institutional loans are considered, the rate of interest would be much lower. Information on interest separately on institutional and non-institutional loans is not available in the Survey reports. However, the Basic Statistical Returns on Banking Statistics contain data on loans owed by Small Scale Industries to commercial banks, at various rates of interest. The weighted average rate of interest (weights being the outstanding amounts owed by these units) works out to be 12.9 per cent. Based on this, the interest on loans owed by small scale industrial units to institutional agencies is segregated and the rate of interest on non-institutional loans worked out, which was 16.9 per cent. Similar calculations for units in different sizes could not be worked out for lack of adequate data.

+ Numerator negative.

losses and really not viable if the imputed emoluments of self-employed category were taken into consideration as a cost element. (As indicated earlier the self-employed persons were estimated to be more than 50 per cent in this category). Considering all other size classes, the profit margin varied in the range of 5-6 per cent. The

return on capital employed varied in the range of 8-12 per cent; the rates in the strata of units in the investment slabs in different ranges upto Rs. 1 lakh (excluding the lowest size class) were relatively higher. Profits after tax as percentage of net worth (return on owned funds) exceeded 20 per cent in the two size classes viz. 1) Rs. 10,000—20,000 and 2) Rs. 50,000—Rs. 1 lakh. In most other size-classes the profitability rates were in the range of 15-20 per cent, except in case of units in investment range of Rs. 5 lakhs—10 lakhs which incurred losses. The results thus indicated that even after considering the imputed value of emoluments of self-employed persons, the profitability rates in respect of units in some of the slabs with investment upto Rs. 1 lakh (excluding the lowest strata) were somewhat higher, when compared to the rates in respect of units with investment above Rs. 1 lakh.

A comparison of the profitability rates of the small scale industrial sector vis-a-vis the medium and large public limited companies in the private corporate sector revealed certain interesting features. The results indicated that though the overall profit margin of small scale industrial units was somewhat less than that of the medium and large companies in the private corporate sector, the profitability rates (either on total net assets or on owned funds) of the small units are dimensionally of the same magnitude as those of medium and large public limited companies in the private corporate sector.

Table 4: Profitability ratios of Medium and Large Public Limited Companies according to size of paid-up capital 1978-79.

Size of paid-up capital	Percentage distribution of companies	Gross profits as percentage of sales	Gross profits as percentage of total net assets	Profits after tax as percentage of net worth.
Rs. 5 lakhs — 10 lakhs	9.59	7.1	8.5	2.6
Rs. 10 lakhs — 25 lakhs	25.98	6.3	10.3	8.5
Rs. 25 lakhs — 50 lakhs	20.23	7.6	12.0	13.4
Rs. 50 lakhs — 1 crore	18.08	7.6	10.2	8.0
Rs. 1 crore — 2 crores	10.69	9.0	11.0	11.1
Rs. 2 crores — 5 crores	9.12	10.1	12.2	11.3
Rs. 5 crores and above	6.27	10.9	12.3	12.2
Total	100.00	9.5	11.7	11.5

Source: Finances of Medium and Large Public Limited Companies, 1978-79 — Reserve Bank of India Bulletin, November 1981.

The cost of borrowed funds of small scale industrial units may be viewed against the background of the return on owned capital invested. It may be observed that the rate of interest on borrowed funds (both institutional and non-institutional) is in the range of 14-17 per cent*. The return on owned funds far exceeded the interest cost of funds in two size classes viz. 1) Rs. 10,000 — Rs. 20,000 and 2) Rs. 50,000 to Rs. 1 lakh, while in most of the other size classes, the spread between these two rates was marginal. The units in the investment range of Rs. 5-10 lakhs, incurred losses. Considering all units together, the return on owned funds was somewhat less than the interest cost of funds, which indicated that borrowed funds are a necessary complement to owned capital for running the enterprise.

SECTION III

Summary of observations

In the study, the profitability ratios of small scale industrial units in the assisted sector are reworked, after imputing emoluments of self-employed persons and making consequential adjustments in profits. The self employed persons were found to be predominant in the lowest strata of units with investment upto Rs. 1000. These units seem to be really not viable, if the cost of labour is evaluated with imputed emoluments based on average payments to hired workers.

The profit margin for all assisted units after adjustments was 5.3 per cent, while the return on total capital was 9.6 per cent and that on owned funds was 13.9 per cent. Even after netting the imputed value of emoluments of self-employed persons, the profitability ratios (either on total capital or owned funds) were generally higher in respect of units in the investment slabs upto Rs. 1 lakh (excluding those in the lowest strata), compared to the units in higher investment slabs. The return on owned funds far exceeded the interest cost of funds in some of the lower investment slabs, though the spread between the two rates was marginal in most other size classes. Considering all the assisted units, the return on owned funds lagged behind the interest cost of funds, which indicated that borrowed funds are a necessary complement to owned capital for running the enterprise. The overall profitability rates of small scale industrial units in the assisted sector were broadly of the same magnitude as

* As against these rates, the average cost of borrowings (rate of interest on outstanding loans) in respect of Medium and Large Companies was 13.4 per cent in 1977-78 (vide article on Finance of Medium and Large Public Limited Companies, Reserve Bank of India Bulletin, November 1981).

those of medium and large public limited companies in the private corporate sector.

Statement 1: Expenditure components and profits as percentage of value of production for small scale industrial units classified by size of plant and machinery

Size of units in terms of investment in plant & machinery (Rs.)	Manufacturing expenses	Salaries, wages, etc.	Depreciation	Interest	Other expenses	Profits†
Upto 1,000	79.4	10.5	0.2	1.2	4.6	4.1
1,000 — 10,000	78.2	8.8	0.6	2.0	5.2	5.2
10,000 — 20,000	78.0	8.1	0.8	2.1	5.8	5.2
20,000 — 50,000	80.0	7.2	1.1	2.3	5.9	3.5
50,000 — 1 lakh	78.8	7.3	1.2	2.6	7.1	3.0
1 lakh — 2 lakhs	81.0	6.2	1.2	2.8	8.0	0.8
2 lakhs — 5 lakhs	79.2	7.1	1.9	3.5	7.5	0.8
5 lakhs — 10 lakhs	78.2	8.0	2.0	4.2	8.9	*
Above 10 lakhs	74.4	7.6	2.5	3.7	12.6	*
All units	79.1	7.6	1.3	2.9	7.3	1.8

† Operating profits less other income.

* Numerator negative

APPENDIX 1

Equation Serial No.		$\bar{R}$ adj	SEE	Mean
1.	$Y = 24.6205 - 0.1928 X$	0.53	9.45	16.93
t Stat	9.02	3.60		
Elasticity	— 0.45			
2.	$\log Y = 2.9578 - 0.0103 X$	0.31	0.90	2.55
t Stat	11.32	2.00		
Elasticity	— 0.41			
3.	$Y = 41.3847 - 7.5080 \log X$	0.71	7.92	16.93
t Stat	8.91	5.53		
Elasticity	— 0.44			
4.	$\log Y = 3.8405 - 0.3967 \log X$	0.41	0.86	2.55
t Stat	7.59	2.69		
Elasticity	— 0.51			

Y: Proportion of self-employed persons to total number employed.

X: Average investment in plant and machinery (in Rs. thousands).

APPENDIX 2

The important concepts and definitions of different items used for survey tabulations and also for the present study are detailed below :

1. **Value added by manufacture (net) :** It is obtained by deducting from the 'value of production' the 'total value of inputs' i.e., (i) raw materials consumed (ii) stores and spares consumed (iii) power and fuel (iv) other manufacturing expenses (v) repairs and maintenance (vi) other expenses and (vii) depreciation provision during the year. Value of production comprises net sales and change in stocks of finished goods and work-in-progress.
2. **Value added by manufacture (gross) :** This item is arrived at by adding 'depreciation provision' to 'value added by manufacture (net)'.
3. **Gross profits :** This represents the profits before payment of interest and tax provision but after charging depreciation.
4. **Operating profits :** Gross profits less interest payments.
5. **Profits after tax :** This is the difference between profits before tax and tax provision.
6. **Net worth :** This item comprises capital and reserves.
7. **Total net assets :** This is the total value of assets net of accumulated depreciation.

GOVERNMENT DEFICIT, MONEY SUPPLY AND INFLATION IN INDIA

Y. S. R. Sarma*

Studies on inflation in developing countries generally followed the Quantity Theory explanation. A quantitative assessment of the role of money supply in hyper inflation in developed countries was made by Philip Cagan (1956, 3). According to the Quantity Theory, inflation is caused by expansion in money supply. Money Supply is assumed to be exogenous with no feed back from inflation to money supply. Recent investigations on the inflationary process in developing countries reveal that inflation and fiscal deficit with the concomittant increase in the money supply are not independent. In many developing countries the government's fiscal deficit is largely financed through resources to credit from the Central Bank. Government expenditure adjusts at a faster rate to inflation due to government's desire to maintain real expenditures at a planned level. On the other hand, revenue collections lag behind. Thus inflation results in widening the gap between government's expenditure and revenue, enlarging the fiscal deficit which is financed by the banking system particularly the Central Bank, leading to further increases in money supply and prices. This self-generating process of inflation was first suggested by Olivera (1967, 7). A model of the inflationary process was empirically tested by Dutton (1971, 5) and Aghevli (1977, 1). The self-generating process of inflation was again empirically shown to exist for selected developing countries by Aghevli and Khan (1978, 2).

An attempt is made in the present paper to formulate a model that describes the inter relationships between inflation, money supply and government deficit, for India following the framework Aghevli-Khan model. The period of study is 1961-62 to 1979-80. The study is organised into four sections. A model of the inflationary process is described in Section I. Section II deals with the empirical results, obtained from estimating the structural equations of the model. The third section describes the results of a simulation experiment to test

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the performance of the model in describing the inflation process. A brief summary of the findings is given in the last section.

I. A model of money supply and inflation

The basic hypothesis of the inflationary process is set up in terms of the quantity theory of money. Price level is related to the stock of money. The basic hypothesis is extended by relating the money supply to government deficit. Government deficit itself is endogenously determined by relating government expenditures and government revenue to price changes. The rate of change in the whole-sale price index (P) is used for measuring inflation. The broad definition of money supply i.e. M = currency plus demand deposits plus time deposits is used in the present study. For the purpose of measuring the budget deficit only the central government budget is considered. The postulated model of the inflationary process has four equations explaining the price level, government expenditure, government revenue and supply of money. One definitional equation is used to explain the stock of money from the endogenously determined increase in money supply. Each of these equations are discussed below. All the behavioural equations are specified in logarithmic form.

1. Determination of the price level

Demand for real money balances is formulated as a function of the real income and the opportunity cost of holding money balances. The recent experience in India shows that substitution between money and goods/physical assets is more important than between money and other financial assets. In view of this, the interest rate or rate of return on alternative financial assets is ignored. The expected rate of inflation has been considered as the opportunity cost of holding 'real' money balances. Desired 'real' money balances are related to real income (YR) and the expected rate of inflation, the rate of inflation in the previous year being considered as a proxy for it.

$$\log (M/P)^* = \alpha_0 + \alpha_1 \log YR - \alpha_2 \log P_{-1}/P_{-2} \quad \alpha_1, \alpha_2 > 0 \quad (1)$$

The actual stock of real money balances is assumed to adjust partially to the difference between the desired real money balances and the actual stock in the previous period.

$$\log (M/P) - \log (M/P)_{-1} = \lambda [\log (M/P)^* - \log (M/P)_{-1}] \quad (2)$$

where λ ($0 < \lambda < 1$) is the speed of adjustment.

Substituting (1) in (2) we get

$$\log (M/P) - \log (M/P)_{-1} = \lambda [\alpha_0 + \alpha_1 \log YR - \alpha_2 \log \frac{P_{-1}}{P_{-2}} - \log (M/P)_{-1}] \quad (3)$$

Rearranging the terms, the following equation of the demand for money is obtained.

$$\log (M/P) = \lambda \alpha_0 + \lambda \alpha_1 \log YR - \lambda \alpha_2 \log \frac{P-1}{P-2} + (1-\lambda) \log (M/P)_{-1} \quad \text{--- (4)}$$

The above equation can be written as an equation determining the price level, given the stock of nominal money

$$\log P = -\lambda \alpha_0 - \lambda \alpha_1 \log YR + \lambda \alpha_2 \log \frac{P-1}{P-2} - (1-\lambda) \log (M/P)_{-1} + \log M \quad \lambda \alpha_1 > 0, \lambda \alpha_2 > 0 \quad \text{--- (5)}$$

This equation shows that, other things remaining the same, an increase in money supply will lead to a rise in the price level and an increase in national income would lower the price level. Expectations of higher rate of inflation will have a positive effect on the price level.

2. Government Expenditure and Revenue

Desired real expenditures of the government $(G/P)^*$ are assumed to be related to the level of real income. Real income is, however, considered exogenous although it is influenced by government expenditure and other factors. In addition, government expenditures may be dictated by many considerations other than the current level of real income, as the object is to increase the real income according to planned targets. The real income elasticity of government expenditure is expected to be unity in the long run

$$\log (G/P)^* = \beta_0 + \beta_1 \log YR \quad \text{--- (6)}$$

It is postulated that the difference between the real expenditure and the expenditure in the previous period is partially adjusted to the difference between desired real expenditure and actual real expenditure of the previous year.

$$\log (G/P) - \log (G/P)_{-1} = \mu [(\log (G/P)^* - \log (G/P)_{-1})] \quad 0 < \mu < 1 \quad \text{--- (7)}$$

The underlying assumption in the relation is that government attempts to keep its real expenditures at the planned level in the face of an increase in the price level. It is possible that in the wake of unabating inflation government would cut down both its nominal and real expenditures. There is some evidence that in the Indian context, Government do react to inflation and reduce their spending. This aspect is not fully explored here.

Substituting (5) in (6) we get the equation for explaining government expenditure

$$\log (G/P) - \log (G/P)_{-1} = \mu [\beta_0 + \beta_1 \log YR - \log (G/P)_{-1}] \quad \log (G/P) = \mu \beta_0 + \mu \beta_1 \log YR + (1-\mu) \log (G/P)_{-1} \quad \mu \beta_1 > 0; 0 < \mu < 1 \quad \text{--- (8)}$$

The average time lag in the adjustment of real government expenditure is given by $\frac{1 - \mu}{\mu}$

Expected nominal revenues (R) of the Government are related to nominal income. Actual revenues adjust proportionately to the difference between the expected revenue and the actual revenue in the previous period.

$$\log R^* = \gamma_0 + \gamma_1 (\log YR \times P), \gamma_1 > 0 \quad \text{--- (9)}$$

$$\log R - \log R_{-1} = w (\log R^* - \log R_{-1}), 0 < w < 1 \quad \text{--- (10)}$$

Substituting (9) in (10) we get

$$\log R - \log R_{-1} = [\gamma_0 + \gamma_1 \log (YR \times P) - \log R_{-1}] \quad \text{--- (11)}$$

$$\text{or } \log R = w\gamma_0 + w\gamma_1 \log (YR \times P) + (1-w) \log R_{-1} \quad \text{--- (12)}$$

It is expected that, in the long run, government revenue grows at the same rate as the nominal income. The same may hold good for government expenditure. In the short run, however, the adjustment coefficient of government revenue (w) is likely to be less than the adjustment coefficient (μ) of government expenditure. The nominal deficit will be a function of the increase in the price level. The reason for government expenditure to adjust faster than revenue, is, as stated before, the government's inability to restrain expenditure during periods of inflation, or stating in another way its difficulty to reduce their planned expenditure in real terms. On the other hand in developing countries including India, nominal revenues lag substantially behind price increases. This is due to the low nominal income elasticities of tax system and long lags in the collection of taxes.

3. Supply of Money

Supply of money is related to the high powered money (or reserve money) through the multiplier. Changes in high powered money can occur through Central Bank's claims on the Government, Central Bank's claims on commercial and co-operative banks and changes in foreign exchange assets. Alternatively, changes in money supply are related to change in bank credit to government, bank credit to commercial sector and net foreign exchange assets of the banking sector. Change in the Reserve Bank's credit to government is a function of the fiscal deficit of the government. Assuming an exogenously determined money multiplier, changes in the stock of money are apart from other factors determined by government expenditure (G) and revenue (R) and government's draft on foreign saving and domestic borrow-

ings (E). Bank credit to government is determined by government expenditure (G) and revenue (R). Bank Credit to Commercial Sector (BC) and foreign exchange assets of the banking sector (FE) are assumed to be exogenous.

$$\log \Delta M = d_0 + d_1 \log (G-R) + d_2 \log \Delta BCC + d_3 \log \Delta FE \quad (13)$$

$$M = M_{-1} + \Delta M \quad (14)$$

The model is briefly described as follows :

- 1 $\log (P/M) = f [\log YR, \log (P-1/P-2), \log (M/P)-1]$
2. $\log (G/P) = f [\log YR, \log (G/P)-1]$
3. $\log R = f [\log (YR \times P), \log R-1]$
4. $\log \Delta M = f [\log (G-R), \log \Delta BCC, \log \Delta FE]$
5. $M = M_{-1} + \Delta M$

Where P = Domestic Price level (Index number of wholesale prices)

G = Nominal government Expenditure (only Central Govt.)

R = Nominal Government Revenue (only Central Government)

M = Stock of Money

ΔM = Change in the stock of money.

YR = Real Income (National income at constant prices).

ΔBCC = Change in the Bank Credit to Commercial Sector.

ΔFE = Change in the Foreign Exchange Assets of the Banking Sector.

The endogenous variables in the model are P, G, R, ΔM and M. The variables YR, BCC and FE are exogenous to the system. The model, is expected to work as follows. An initial budget deficit results in an increase in the reserve money and therefore money supply, other things remaining the same the increase in money supply will push up the price level. The increase in price level in turn increases Government revenue and expenditures differentially, raising the government deficit in the process. The cycle repeats until equilibrium levels of money supply and prices are reached. The structural equations of the model are estimated by the method of ordinary

least squares (OLS). The time period considered for this purpose is 1961-62 to 1979-80. The empirical results are analysed below.

II. Empirical Results

The estimated equations have yielded meaningful results for the explanation of the price level, government expenditure and revenue. The money supply equation has not yielded plausible results when foreign exchange assets of the banking sector is included as an explanatory variable. Foreign exchange assets have been comparatively small upto 1974-75 but increased significantly since 1975-76. In view of this a 'Dummy' variable taking the value 1 upto 1974-75 and 10 for latter years was introduced in the regression equation to capture the impact of foreign exchange assets, on money supply.

The estimated equations are presented below :

1. $\log (P/M) = 2.7419 + 0.6050 \log (P_{-1}/P_{-2}) - 0.8167 \log YR - 0.5507 \log (M/P)_{-1}$
 $(4.09) \quad (2.66) \quad (4.26) \quad (4.05)$
 $\bar{R}^2 = 0.96 \quad D.W. = 2.25 \quad SEE = 0.025$
2. $\log (G/P) = -1.7307 + 0.6173 \log YR + 0.4198 \log (G/P)_{-1}$
 $(2.29) \quad (2.82) \quad (2.65)$
 $\bar{R}^2 = 0.86 \quad D.W. = 1.90 \quad SEE = 0.039$
3. $\log R = -1.1614 + 0.3826 \log (YR \times P) + 0.6346 \log R_{-1}$
 $(2.00) \quad (2.38) \quad (4.60)$
 $\bar{R}^2 = 0.99 \quad D.W. = 1.50 \quad SEE = 0.030$
4. $\log \Delta M = -1.1148 + 0.0655 \log DMY + 0.3965 \log \Delta BCC$
 $(1.56) \quad (0.87) \quad (2.44)$
 $+ 0.8775 \log (G-R)$
 (2.68)
 $\bar{R}^2 = 0.96 \quad D.W. = 1.96 \quad SEE = 0.090$

Note: Figures in the brackets are the t-values of the regression coefficients.
 DMY is a Dummy variable taking the values 1 from 1961-62 to 1974-75 and 10 from 1975-76 onwards.

$\bar{R}^2$ — Coefficient of determination (adjusted for degrees of freedom)
 D.W. — Durbin-Watson Statistic
 SEE — Standard Error of Estimate

From the price equation it is observed that increase in real income would lower the price level. Inflationary expectations have, positive impact on the current price level as expected. The higher the stock of real money balances held in the previous year the lower will be the increase in the current year price level which is in accord-

ance with the postulated adjustment mechanism. All the estimated coefficients are found to be statistically significant. The long run income elasticity of the demand for money balances is estimated to be 1.81. Government expenditure and revenues rise with increase in national income. The income coefficient in both the expenditure and revenue equations is statistically significant. The speed of adjustment of real government expenditure to the desired level is 0.58 which is higher than the speed of adjustment of revenue (0.37). The short-run income elasticity of government expenditure is found to be 0.62 while that of revenues is 0.38. This implies that collection of revenues lag behind expenditure given the same level of income. The long run income elasticities of expenditure and revenues are 0.91 and 1.00 respectively, indicating that in the long run both government expenditures and revenues move proportionately with inflation. The estimates of the average time lags indicate that real money balances take 1-1/4 years adjust to the difference between the demand for money and the actual money stock of the end of the previous year. Government revenues take greater time lag (1-2/3 years), to adjust to the desired level. Due to this money supply will increase faster aiding the inflationary process. Money supply is satisfactorily explained by government deficit defined as the difference between government expenditure and revenue. The dummy variable which has been introduced into the money supply equation to catch the impact of foreign exchange assets from 1975-76 has the expected positive sign. The regression coefficient is however, not found to be statistically significant. Bank credit to commercial sector has the expected positive influence on money supply. Government deficit has larger impact on money supply than bank credit to commercial sector.

All the individual equations have a high degree of explanatory power. The residuals are free from autocorrelation. The standard errors of the estimated equations are low. The structural equations of the model seem to be adequate as the graphs of the actual and estimated values of price level, government expenditure, government revenue and money supply are found to be quite close during the sample period.

III. Simulation of the model

While the individual equations for the endogenous variables appear to be good, it is necessary to test the collective performance or the goodness of fit of the model as a whole. The technique of simulation has been used to track the behaviour of the endogenous variables over the sample period. This section presents the results of both static and dynamic simulation of the model to assess how closely

the model of inflation tracks the movement of the four endogenous variables viz. price level, government expenditure, government revenue and money supply. In the dynamic simulation, the values of the lagged endogenous variables are obtained by the simulation process itself. The dynamic simulation experiment is a more rigorous test of the goodness of fit of the model than the static simulation in which the values of the lagged endogenous variables are actuals.

The inflation model used for the simulation experiment has five equations viz. the price equation, government expenditure and revenue equations, an equation of the change in money supply and an identity. Static simulation results show that the model captures the movement of the four endogenous variables fairly well. Dynamic simulation results are somewhat unsatisfactory. The root mean square errors of prediction (RMSE) of the endogenous variables are given below.

RMSE of Prediction (%)

	OLS	Static Simulation	Dynamic Simulation
Price level (P)	5.2	5.4	15.2
Govt. Expenditure (G)	8.4	9.1	13.1
Govt. Revenue (R)	6.4	6.4	9.9
Money Supply (M)	0.0	3.2	6.1

The static simulation prediction errors of endogenous variables vary from 3% to 10%. Dynamic simulation errors are somewhat large however. The actual and the simulated paths of the price level and money supply which are of main interest are given on pages 65 and 66.

IV. Summary

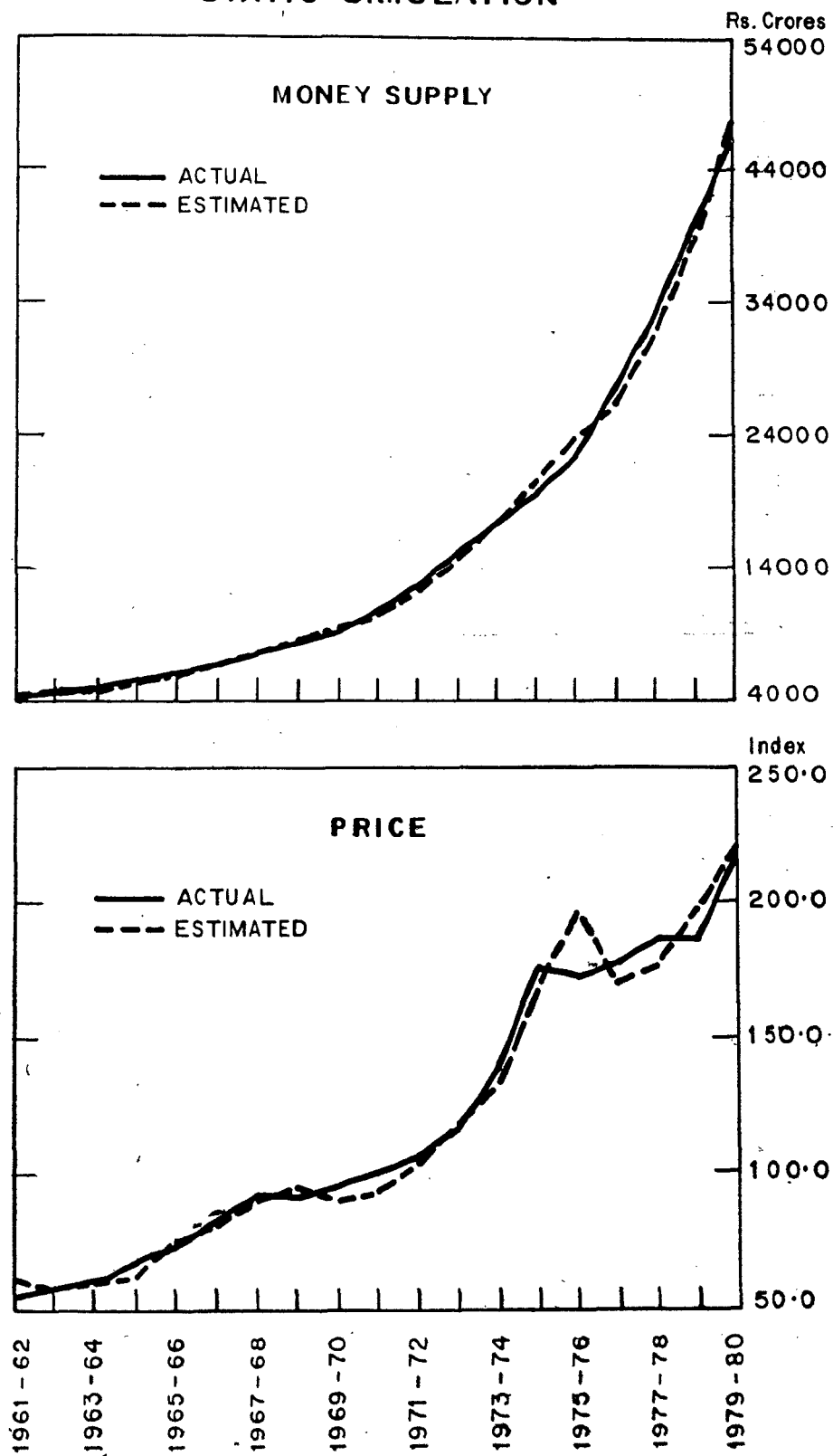
The purpose of this study is to determine the relationship between inflation, money supply and government deficit. Recent studies on inflationary process in the developing countries show that inflation widens the gap between government expenditure and revenue. The increased fiscal deficit which is largely financed by the Central Bank, increases money supply. The monetary expansion leads to a further increase in price level and the process is self-generating. This, hypothesis was sought to be empirically tested in the present paper. The experience in India is similar to other developing countries with large budgetary deficits of the Central Government being mainly financed

by the Reserve Bank. The widening budgetary gap is mainly due to government's desire to keep the real expenditure at the planned level and lags in revenue collections. A simple dynamic model of the inflationary process is formulated in which government expenditure, revenue, money supply and price level are endogenously determined being basically related to real national product which is exogenous. The results accord well with the hypothesis postulated above. Government expenditure adjust at a faster rate than government revenue to inflation leading to higher budgetary deficit and a consequent increase in money supply and price level. Simulation of the model shows that the model tracks the movement of money supply and price level adequately. The implication of the results is that fiscal authorities must aim at minimising if not eliminating the budgetary deficits by improving revenue collections, reducing the lags and curtailing nominal expenditure in tune with rising price levels. This would be helpful in containing the self generating process in the price inflation and in turn can reduce the burden on monetary authorities.

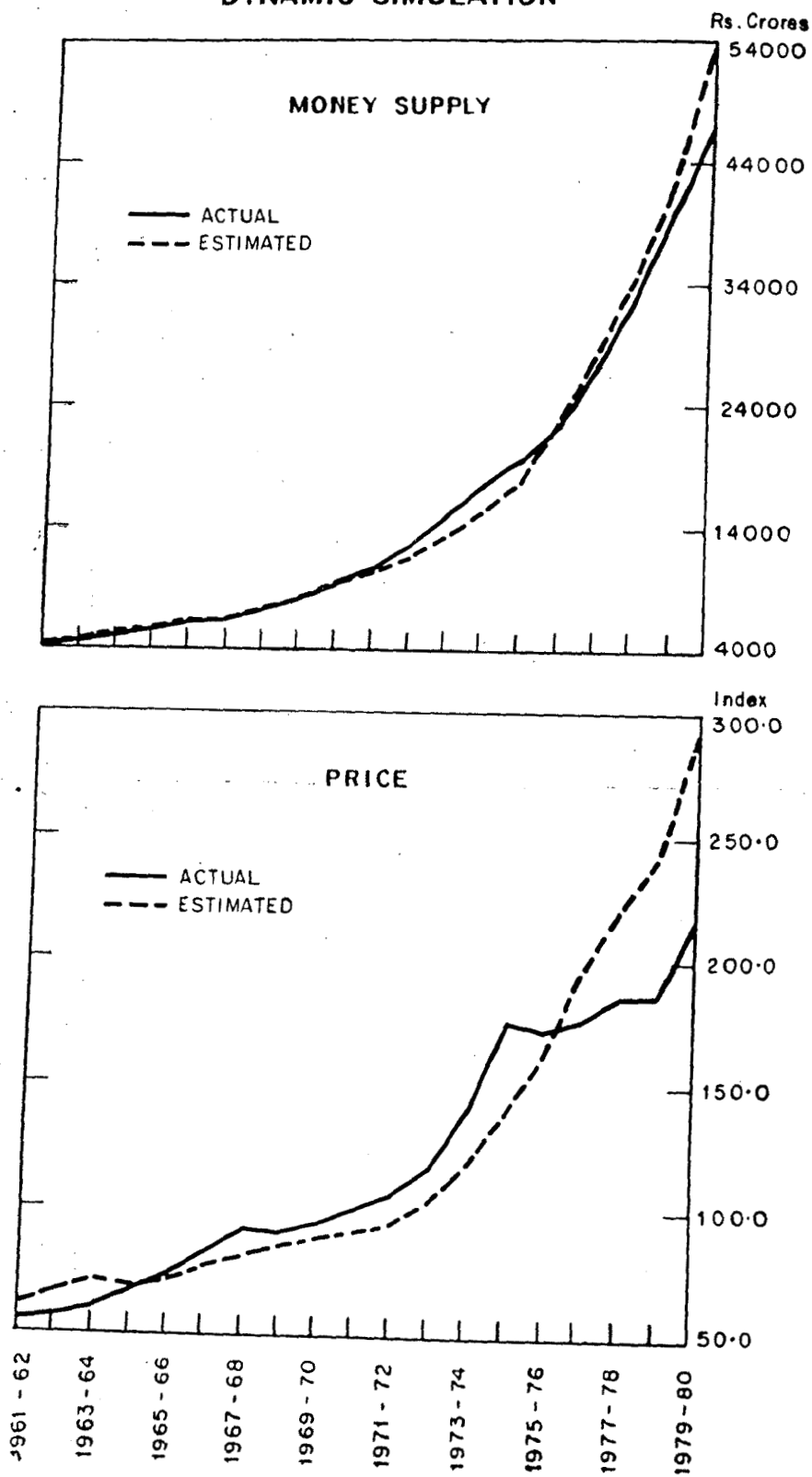
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STATIC SIMULATION



DYNAMIC SIMULATION



Money Supply, Government Expenditure & Revenue and Price Level

Year	Index No. of Whole- sale prices (1970-71 = 100)	Money Supply (Rs. crores)	Central Government Expendi- ture (Rs. crores)	Central Government Revenue (Rs. crores)	Reserve Money (Rs. crores)	Net Foreign Exchange Assets of the RBI (Rs. crores)	Bank Credit to commercial Sector (Rs. crores)	National Income at constant prices (1970-71 prices) (Rs. crores)	Capital Receipts of Central Government (Rs. crores)
	P	M	G	R	H	FE	BCC	YR	CR
1961-62	55.2	4243	2083	1037	2343	119	1643	24799	957
1962-63	57.3	4553	2768	1428	2533	91	1860	24276	1204
1963-64	60.9	5037	3419	1846	2776	122	2120	26681	1381
1964-65	67.5	5499	3883	2081	2957	94	2371	28694	1645
1965-66	72.7	6134	4164	2345	3229	59	2655	27243	1646
1966-67	82.8	6817	5304	2473	3461	124	3142	27487	2473
1967-68	92.4	7460	5075	2554	3660	151	3563	29738	2251
1968-69	91.3	8306	5023	2760	4068	302	4072	30597	2078
1969-70	94.8	9336	5621	3067	4389	574	5407	32543	2508
1970-71	100.0	10958	6151	3342	4814	538	6455	34235	2524
1971-72	105.6	12690	7578	4028	5380	608	7368	34715	3031
1972-73	116.2	15033	8422	4578	6015	563	8729	34191	2974
1973-74	139.7	17571	9047	5073	7260	672	10701	35967	3646
1974-75	174.9	19457	10575	6558	7387	391	12671	36411	3296
1975-76	173.0	22286	13139	8075	7732	1078	15392	40011	4698
1976-77	176.6	27279	14477	8739	9544	2542	18503	40534	5607
1977-78	185.8	32905	16313	9792	10941	4532	21221	44090	5588
1978-79	185.8	39890	19684	11240	13716	5506	25347	46636	6938
1979-80	216.8	46769	20031	11177	16461	5494	30756	44328	6153

M = Currency + Demand Deposits + Time Deposits

G = Expenditure on Revenue Account + Capital Disbursements

R = Receipts on Revenue Account

Source: 1. RBI Bulletin — various issues. 2. Report on Currency and Finance — various issues.

3. National Accounts Statistics C.S.O. — various issues.

IMPACT OF THE RISE IN THE PRICES OF PETROLEUM PRODUCTS ON THE GENERAL PRICE LEVEL — 1970-71 TO 1980-81

D. V. S. Sastry

Introduction

Though it is recognised that the steep rise in the import prices of crude oil and petroleum products affects the level of commodity prices considerably, its contribution to the general rate of inflation tends to be under estimated. The impact of rising crude prices on the general price level is measured through the weight it carries in index of whole-sale prices. Thus, petroleum and natural gas accounts for 0.6 per cent of total weight in the index, and petroleum products for 4.9 per cent. A ten points rise in the prices of the former is equivalent to an advance of 0.06 point in the general index while a similar 10 points rise in the latter is equivalent to an increase of 0.5 point. The following table gives the weighted contribution of the prices of these two commodities since 1970-71.

Table 1: Index numbers of wholesale prices of commodities:
Base (1970-71 = 100)

Commodity/Year	Weight	1970-1971	1980-1981	Changes over base year level	Weighted contribution	Percentage weighted contribution
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1) All Commodities	1000.00	100.0	256.8	156.8	156.8	100.0
2) Petroleum and Natural gas	6.02	100.0	2041.8	1941.8	11.7	7.5
3) Mineral Oils	49.12	100.0	413.6	313.6	15.4	9.8

During the same ten year period, manufactured products contributed for 49.9 per cent of the rise in the all commodities, primary articles other than petroleum for 29.0 per cent, fuels and power other than petroleum products for 3.9 per cent. The above figures have to

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be read in the context that the prices of mineral oils (comprising kerosene, petrol, diesel, aviation spirit, lubricating oil and furnace oil) are administered prices. The nature of pricing of crude petroleum produced domestically is not known. The comparatively small percentage contribution of the prices of crude petroleum and its products can be shown in a slightly different way. The all commodities index rose at an average rate of 9.9 per cent per annum over the last decade.* The average rate of corresponding increase in the crude oil prices is 35.2 per cent, while that of mineral oils is 15.3 per cent. In the ten per cent inflation rate, the two groups of commodities accounted for 0.2 and 0.7 per cent respectively. This means that about one tenth of per annum inflation rate can be accounted by these two products together.

The above is an estimate of the direct impact of crude petroleum and its products prices on all commodities prices. The calculation ignores the behaviour of enterprises which use these fuel inputs in their production process in pricing their output. Enterprises may try to cover the increased costs either wholly or partially. If further as some of the manufactured products form intermediate inputs, there could be a further feedback of the latter type of price rise to prices of commodities in the subsequent stage of manufacture. A measurement of the total impact of the increase in the prices of crude oil requires a model of price formation in the economy. One such formulation can be done by the use of input-output table. The following is such an exercise.

Method

The Central Statistical Organization published a commodity vs. industry transactions matrix for 1973-74† along with the national account statistics for 1978-79. The intermediate transactions matrix which is of 60 x 60 dimension gives the distribution of output of various commodities used as inputs in industries, the outputs absorbed as final consumption (public and private sectors), as capital formation (including inventory accumulation) and as exports. Imports of commodities are treated as negative demands and are subtracted from final use to obtain total output. Non-competing imports can be considered on par with primary inputs of labour and capital. In such a case it would be possible to use these tables to study the impact of a given exogenous rise in the prices of imported commodities on the output prices in respect of each industry.

* This is measured on end points basis i.e. the increase between the base year 1970-71 level of 100 and of the average level of 256.8 in 1980-81.

† The technical note of the Sixth Five Year Plan presents an I-O table for the year 1979-80.

The usual input-output (I.O.) table presents inter-industry transactions so as to yield the inputs of various industries including the quantum of primary factors that are needed to produce the output of a particular industry. Expressed at a given year prices, the column total of an I.O. table will yield.

Value of output of an industry in a year at factor cost (market prices)	=	Value of intermediary inputs + value of non-competing imports used in the output + value of primary factors used in the production process (plus indirect taxes)
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If there are n industries in the economy and x_{ij} is the quantity of input of industry j required to produce x_i the total output of industry i , and p_j is the price per unit of output of the j th industry, we can express the value of output of various industries in terms of costs of intermediary inputs, imports and primary factors as

$$1) \quad p_i x_i = p_1 x_{i1} + p_2 x_{i2} + \dots + p_n x_{in} + w_i L_i + m_i M_i \quad (i=1, 2, \dots, n)$$

The unit costs of output in the i th industry are

$$2) \quad p_i = p_1 a_{i1} + p_2 a_{i2} + \dots + p_n a_{in} + w_i l_i + m_i v_i \quad \text{with } a_{ij} = x_{ij}/x_i \\ (i = 1, 2, \dots, n)$$

where $x_1, x_2 \dots x_n$ are the total outputs of n industries; a_{ij} is the input requirement of j th industry for producing one unit in industry i ; w_j the cost per unit of primary factor, L_i quantity of primary factor used, l_i is amount of primary factor per one unit of output of the i th industry, m_i cost per unit of imports, M_i quantity of imports used in the output of industry i , and v_i is amount of imports required for producing one unit in the i th industry. If p 's were to be the market prices, indirect taxes would be an additional input in measuring the total value of output. It would be seen from the above that if there is a rise in import price(s) (m_i) of particular good(s), the direct impact of this would be on the prices of output of the industry that uses these imports, provided the rise in the import price is not absorbed by intermediate economic agents in the process of (distributing) supplying the necessary imports to the producing sectors. To the extent the import costs are either subsidised or are not passed on to the industry using these inputs, the cost price of output of the industry would on this account be correspondingly less. The implicit assumption in the above set of price relations is that each of the industries uses a mark up (over costs) criterion in pricing its output. With a rise in the prices of output in an industry, costs to other industries which use this output as input,

increases. This will have a feedback for the cost structure of the original industry and so on. Thus the direct and indirect impact of a rise in import prices of particular commodity can, under the full cost, pricing assumption be expressed in the mathematical notation as

$$p = (I - A^1)^{-1} (wl, mv)$$

where p is the column vector of prices of output of industries; wl is the column vector of unit costs of primary factors multiplied by input requirement of primary factors per unit of output of various industries, mv vector of import prices of goods (or combination of goods) used in the production process multiplied by the quantum of imports needed for unit of output of various industries; A^1 is the 'transpose' of input-output coefficients matrix.

The assumption that producers prices would be a constant mark up over costs may not be that realistic in the context of Indian economy. In a private market economy the extent to which additional costs could be absorbed by producers or passed on to purchasers will depend on price elasticities of demand and supply in the short and long run. In the pricing of products of public sector, a set of principles other than profit maximization may prevail in their pricing. Administered pricing may be more related to 'social rates of return'. In either case, the assumption of stable vector of wl indicating the return to primary factors may not prevail. Producer/purchase prices may remain unaltered or altered less; the impact of exogenous rise in import prices being absorbed wholly or partially by the elements in wl depending on the type of policy measures taken by public and private enterprises.

Another basic assumption of the I.O. type price formation relations is that the input-output coefficients a_{ij} are constant. This is made on the basis of a stable commodity or industrial technology and of non-substitutability of inputs in the production process. Such a situation could be obtained at a high level of disaggregation of production process. The published data do not permit the derivation of such coefficients. In spite of these limitations a broad idea of the impact of rising prices of crude petroleum and petroleum products can be had through the use of inter-industry transaction matrix. The use of this matrix gives a sort of upper bound to which sectoral prices could have risen, had the exogenous price shocks through variations in import prices, excise rates, wage rate, higher return on capital through larger profits, are passed on fully by manufacturing enterprises to their purchasing customers. For purpose of our calculation, the available 60 x 60 commodity vs. industry transactions matrix is condensed to six broad groups of industries viz., (1) Products

of primary sector excluding production of crude petroleum and natural gas (2) Petroleum and natural gas (3) Products of secondary sector excluding petroleum products (4) Petroleum products (5) Railway and other transport services (6) Other services sector including miscellaneous activity.

Results

Statement 1 gives the inter-industry transaction matrix of the order 6×6 based on the above classification while Statement 2 gives the percentage share of different inputs to sectoral output. Crude petroleum enters as input only in the production of petroleum products. The input cost of petroleum products in the total value of gross output of the primary sector forms 0.4 per cent, of the secondary sector 0.5 per cent and of the transport sector 4.3 per cent. In its own production and production of crude petroleum the corresponding percentages are 0.59 and 0.19. Its share is negligible in the remaining sector. The weightage of the primary and secondary sectors in the wholesale price index is of the order of 41.7, 49.9 per cent respectively. The transport sector does not figure in the index of prices of commodities. But the national income deflator which includes the price component of services output is affected by changes in the prices of services sector due to rise in crude oil and petroleum product prices. To measure the impact of price rise of oil and oil products, it is assumed that the import prices of these products in I.O. table rise by the same per cent as the prices registered in wholesale prices index of commodities compiled by the office of the Economic Adviser to the Government of India. The corresponding index numbers are given in Statement 3.

Statement 4 gives the direct and indirect effects of a rise in the prices of either factor inputs, imports or taxes which are exogenously determined on the prices of six sectors based on the two assumptions that (1) Input-Output coefficients are stable; (2) the rise in the costs of inputs are fully passed on to output prices. The second row in the statement states that a rise in import prices of crude petroleum while raising its own price marginally, will have the largest impact on the prices of petroleum products. Prices in the transport sector experience the second largest impact followed by the output prices in the secondary sector. A rise in the prices of petroleum products will have the largest impact on the prices of transport sector, followed by the prices of secondary sector. Compared to 1970-71, wholesale prices of crude petroleum have risen by 13.84 times by 1979-80 while that of petroleum products have gone

up by 3.08 times.* Assuming the same increases would have been registered in the import prices of these products, the impact on sectoral prices would be as given in Statement 6. These are repeated below for the 1979-80 and 1980-81.

Table 2: Hypothetical Index Numbers of Sectoral Prices@

Sector/Year	1970-71	1979-80	1980-81
1) Primary Sector	100.0	104.4	106.7
2) Crude Petroleum and Natural Gas	100.0	1349.7	1989.9
3) Secondary Sector	100.0	105.5	108.3
4) Petroleum Products	100.0	668.2	958.1
5) Railway and Other Transport Services	100.0	129.8	145.0
6) Miscellaneous	100.0	101.7	102.6
All Sectors	100.0	111.9	118.0

@For an assessment of an impact of changes in the prices of crude petroleum and products on the prices of final demand categories like private final consumption expenditure, public final consumption expenditure, gross fixed capital formation, changes in stocks and exports under similar hypothesis please see Statement 12. The average inflation for the period 1972-73 to 1980-81 in the above categories were 9.16, 6.21, 10.32, 10.48 and 10.59 per cent respectively of which the average inflation attributable to crude petroleum and petroleum products under this hypothesis were respectively 0.98, 0.89, 0.90, 1.29 and 1.26 per cent.

Statement 2 however shows that the value of crude petroleum forms 64 per cent of total cost and its prices have risen nearly 20 times during 1970-71 to 1980-81, but petroleum products prices have not risen more than 4.2 times, though they should have gone up by atleast twelve times as predicted by the above model. Also the landed cost of imported crude oil and petroleum products rose from Rs. 107 per tonne in 1970-71 to Rs. 2,391 in 1980-81 i.e. 22.3 times while domestic wholesale prices rose less than the rise in the import prices. Domestic output of crude was about 37 per cent of total consumption of crude petroleum in the country. But Government which is the main importer of crude may not be pricing its output as per import prices. The lower rise in domestic prices of crude can also partly be explained as other input costs from 3% of total cost of crude production and these costs have not gone up in the same proportion as crude prices. Similarly, prices of petroleum products are substantially subsidized by the Government. It is, therefore, appropriate to treat prices of petroleum products as exoge-

* The corresponding figures for 1980-81 are a price rise of 20.42 times in crude petroleum and 4.14 times in petroleum products.

nously given and work out the implication of their rise for sectoral prices. Statement 5 gives the impact multipliers in such a case. It is worked out on the assumption that prices of other sectoral inputs do not have any impact on prices of petroleum products but a rise in petroleum products price will influence the sectoral prices directly to the extent they contribute as input costs to the total cost. The direct and indirect impact on the remaining sectoral prices would be as follows for 1979-80 and 1980-81.

Table 3: Hypothetical Index Numbers of Sectoral Prices @

Sector/Year	1970-71	1979-80	1980-81
1) Primary Sector	100.0	100.9	101.4
2) Crude Petroleum and Natural Gas	100.0	1350.1	1990.5
3) Secondary Sector	100.0	101.1	101.7
4) Railway and Other Transport Services	100.0	106.2	109.3
5) Miscellaneous	100.0	100.5	100.8
All Sectors (including petroleum products)	100.0	104.5	106.8

@For an assessment of an impact of changes in the prices of crude petroleum and petroleum products on the prices of final demand categories like private final consumption expenditure, public final consumption expenditure, gross fixed capital formation, changes in stocks and exports under similar hypothesis, please see Statement 13. The average inflation for the period 1972-73 to 1980-81 in the above categories were 9.16, 6.21, 10.32, 10.48 and 10.59 per cent respectively of which the average inflation attributable to crude petroleum and petroleum products under this hypothesis were respectively 0.29, 0.34, 0.19, 0.45 and 0.33 per cent.

Table 4: Hypothetical Index Numbers of Sectoral Prices

Sector/Year	Weight	1980-81		
		(i) @	(ii)	(iii)
1. Primary Sector	40.6	105.4	106.7	101.4
2. Crude Petroleum and Natural Gas	0.3	1989.2	1989.8	1990.5
3. Secondary Sector	23.4	106.6	108.3	101.7
4. Petroleum Products	0.6	784.8	958.1	413.6
5. Railway and Other Transport Services	4.5	135.9	145.0	109.3
6. Miscellaneous	30.6	102.0	102.6	100.8
All Sectors	100.0	115.2	118.0	106.8

@ For an assessment of an impact of changes in the prices of crude petroleum and petroleum products on the prices of final demand categories like private final consumption expenditure, public final consumption expenditure, gross fixed capital formation, changes in stocks and exports under similar hypothesis, please see Statement 14. The average inflation for the period 1972-73 to 1980-81 in the above categories were 9.16, 6.21, 10.32, 10.48 and 10.59 per cent respectively, of which the average inflation attributable to crude petroleum and petroleum products under this hypothesis were respectively 0.80, 0.75, 0.73, 1.08 and 1.04 per cent.

The above table shows that, had the Government also priced supplies of (imported and domestic) crude petroleum at the international prices and passed on the costs to consumers of petroleum products, the rise in petroleum product prices would have been much higher. Correspondingly other sectoral prices would have risen much more than hitherto. The following Table shows the extent of price increases in 1979-80 with (i) no change in import price of petroleum products but the price of crude oil supply is raised to the tune of import prices and passed on as cost to purchasers of petroleum products (ii) in addition to (i), import prices of petroleum products are increased to the tune of administered domestic prices of petroleum products, (iii) crude oil price rises do not affect prices of petroleum products which are officially set as hitherto — industrial costs being subsidised to that extent.*

Table 5: Hypothetical Index Numbers Of Sectoral Prices

Sector/Year	Weight@	1970-71	1979-80		
			(i)	(ii)	(iii)
1) Primary Sector	40.6	100.0	103.5	104.4	100.9
2) Crude Petroleum and Natural Gas	0.3	100.0	1349.2	1349.7	1350.1
3) Secondary Sector	23.4	100.0	104.4	105.5	101.1
4) Petroleum Products	0.6	100.0	552.8	668.2	308.8
5) Railway and Other Transport Services	4.5	100.0	123.7	129.8	106.2
6) Miscellaneous	30.6	100.0	101.4	101.7	100.5
Total	100.0	100.0	110.0	111.9	104.5
All sectors (ignoring price changes in sectors 1,3,5 and 6)		(100.0)	(105.2)	(105.9)	(103.8)

@Proportional to value added in total national product in 1979-80. Figures in brackets assume no change in sectoral prices other than in the prices of crude petroleum and petroleum products.

Between 1970-71 to 1979-80 the national income price deflator rose at the rate of 8.21 per cent per annum reaching a level of 203.5 in 1979-80 compared to the base level of 100 in 1970-71. Under the respective assumptions, oil prices would have contributed to the inflation rate by 0.85 percentage point, 1.26 percentage point and 0.49 percentage point per annum. Since the last assumption is more realistic and corresponds to the situation prevailing, it can be said that the rise in the prices of petroleum products has contributed to 6.0 per cent to the inflation rate in the economy as measured by N.I.D.

* The corresponding data for 1980-81 are given on page 74.

Table 6 : Hypothetical Index Numbers of Commodity Prices

Sector/Period	1970-71			1979-80			March 1980			July 1981		
	(i)			(ii)			(i)			(i)		
	1	2	(iii)	3	4	(iii)	5	6	7	8	9	10
1. Primary (42.212)	100.0	103.5	104.4	104.4	100.9	100.9	104.8	105.8	101.1	105.7	107.5	101.8
2. Crude Petroleum and Natural Gas (0.602)	100.0	1349.2	1349.7	1349.7	1350.1	1350.1	1781.4	1781.7	1782.5	2106.5	2107.0	2108.9
3. Secondary (52.274)	100.0	104.4	105.5	105.5	101.1	101.1	105.9	107.1	101.4	107.1	109.2	102.3
4. Petroleum products (4.912)	100.0	552.8	668.2	668.2	308.8	308.8	709.5	839.2	335.0	827.3	1054.8	512.2
Total	100.0	132.5	141.0	141.0	118.7	118.7	143.7	152.6	122.9	152.2	167.0	134.3
Total (ignor- ing indirect effects of 1 and 3)	(100.0)	(129.8)	(136.4)	(136.4)	(117.8)	(117.8)	(140.1)	(146.4)	(121.7)	(150.5)	(159.0)	(132.3)
All Commodi- ties Wholesale Price Index	(100.0)	..	..	..	(217.6)	(217.6)	..	..	(233.2)	..	..	(283.7)

Note : Figures in brackets given below the sectors are weights allocated to the sectoral prices.

Had it not been for the administered pricing system adopted by the Government, the large rise in the oil prices would have resulted in furthering the inflation rate in the prices of commodity and services sectors by additional three fourths point per cent. In effect, Government absorbed the difference 0.77 (1.26 — 0.49) percentage point of inflation rate (i.e. 9.4 per cent of current inflation rate) that would have been experienced by the economy. Without taking indirect effect of the rise in oil prices on other sectoral prices, the aggregate impact on aggregate national income deflator would have been underestimated to the tune of 1 to 5 per cent depending on the various assumptions made. Administered pricing of petroleum products benefited the transport sector most. Without this subsidization, their prices would have been 35.7 per cent higher in 1980-81. Similarly primary and secondary sectoral prices would be higher by 5.3 per cent and 6.6 per cent respectively. Miscellaneous activities represent essential services other than transport. The prices in this sector would only be nominally larger in the absence of subsidized petroleum prices. To calculate the direct and indirect impact of oil price rise on commodity prices separately, we confine our calculations to groups (1) to (4) above i.e. ignore services sectors (5) and (6). The combined index for this purpose is calculated using the weights adopted for the index of wholesale prices of commodities. The table below gives the net impact, annual variations being given in statements (6) and (7).

Table 7: Average Rate of Annual Inflation in Per Cent in Commodity Prices*

	Total	Attributable oil price rise	(2)/(1) X 100
	(1)	(2)	(3)
Since 1970-71 upto 1980-81	9.9	1.7	17
Between March 1980 to July 1981	15.8	6.9	44
Between March 1980 to October 1981	13.2	5.8	44+

* See Appendix

+The wholesale price index in October 1981 is 283.6

The impact of oil prices on commodity prices is similar to that in the case of national income deflator. The average rate of annual inflation in commodity prices from the year 1970-71 to July 1981 is about 10.6 per cent. Compared to this rate, the inflation rate attributable to oil price increase is 2.7 percentage point i.e. nearly 27 per cent.

Without administered pricing the rise in commodity prices would have been higher, for example, the increase due to oil prices escalation would be 4.8 per cent per annum during the period 1970-71 to 1980-81 and 7.0 per cent during March 1980 to July 1981. Here

again the input-output structure and product processing indicates that indirect effects are comparatively smaller in the overall price rise. Depending on the assumption made, the additional price rise due to indirect effects would be as stated earlier of the order of 1.5 to 5 per cent. i.e. the additional contribution to the inflation rate is relatively low.

The impact of oil price rise on the economy is not wholly reassured by the extent of price inflation that it brings about either in sectoral prices or overall. Price inflation initiated in whatever way may in a private market economy bring about distortions in the relative prices. The structure of the supply and demand elasticities may induce a secondary price rise in some sectors. Low supply elasticities may result in excess demand either for domestic consumption or from the export sector. These analytical aspects of imported inflation do not form part of the current discussion.

Summary

It is observed that the high escalation in the imported prices of crude oil and petroleum products would have resulted in an average annual rate of inflation of 4.8 per cent per annum in commodity prices over the period 1970-71 to 1980-81, had the rise in these prices been passed on as input costs to the industries using petroleum products. The system of administered pricing of petroleum products delinking their prices from imported prices of crude, has resulted in a much lower level of inflation that is attributable to oil price hikes. It is estimated that about a sixth of inflation rate of 9.9 per cent in the all commodities index during the period could possibly be ascribed to the rise in the prices of crude oil and petroleum products.

Between March 1980 to July 1981, with the rise in the administered prices of petroleum products, the contribution of oil price to the inflation rate could amount to 44 per cent while the commodity prices rose at an average rate of 15.8 per cent per annum, the average rise due to linkage effects, in a combined index of sectoral prices (including oil and oil products) would be of the order of 6.9 per cent.

A salient feature of production structure in the Indian economy is that the direct and indirect effects of the increase in oil prices are not comparatively much higher than the direct effect. The indirect effect arises when product prices are fully marked up to compensate for higher cost of fuel inputs, and the rise in product prices because of the higher manufacturing costs when the former are used as inputs in the production of the latter.

With the assumption that each sector using petroleum product inputs would fully mark-up their product prices to cover up the costs,* the prices in the primary sector would have gone up by 7.5 per cent, in the secondary sector by 9.2 per cent and in the transport sector by 50.0 per cent between 1970-71 and July 1981; but with the administered pricing system, the net rises on this account in the three sectors are 1.8 per cent, 2.3 per cent and 15.3 per cent respectively. The largest beneficiary of administered prices is, as to be expected, the transport sector.

The impact of a rise in oil prices on the national economy is only partly measured by the extent of its contribution to the price inflation. With a distortion in relative prices, and low supply elasticities of production, the economic system may not respond adequately by generating additional output required for the export sector to fill in the trade gap. Imported inflation may be transmitted as higher export prices, reducing whatever competitiveness an economy possesses in the international market. Government's measures towards controlling the cost induced inflation by reducing aggregate demand may result in recession/deflation and unemployment. The absence of proper realignment of relative prices and movement of factors of production, in the short run, may reduce labour productivity, potential/actual output and induce a second round of price inflation, more so when the economy is operating at full capacity level, in atleast some sectors. The note does not analyse these aspects.**

For this purpose a macro model of the economy which explains the import and export relations and their linkage with the aggregate demand and production structure is required. Such a model should emphasize the adjustment problems faced by the country as a result of rising energy prices and less buoyant international economy.

* This could be sometimes an unrealistic assumption as the extent to which sellers can shift the rise in costs due to exogenous shocks could depend on the elasticities of demand and supply of the commodity with respect to price. The impact measured in the above case would be an upper limit.

**An analysis of the adjustment problems and an econometric model to measure these is provided by W. D. Nordhaus "Oil and Economic performance of industrial countries" Brookings Papers Vol. 2 — 1980.

STATEMENT 1: INTER-INDUSTRY TRANSACTIONS, 1973-74

(Figures in crores of rupees)

Sector/Item	Primary (P)	Crude Petroleum and Natural Gas (C)	Secondary (S)	Petroleum Products (PP)	Railway and Other Transport Services (R)	Miscella- neous (OTH)	Total Intermediate Use (1 to 6)	Total Final Use (except imports) (8)	Total Output (7+8) (9)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Primary (P)	5885	—	5800	1	164	902	12752	23672	36423
(2) Crude Petroleum and Natural Gas (C)	—	—	—	516	—	—	516	1	517
(3) Secondary (S)	1573	5	9423	52	826	1580	13460	20063	33522
(4) Petroleum Products (PP)	149	1	165	5	192	12	523	280	803
(5) Railway and Other Transport Services (R)	156	—	861	3	336	556	1913	2541	4454
(6) Miscellaneous (OTH)	482	2	3246	15	274	934	4953	13122	18075
(7) Total Input (1 to 6)	8245	8	19496	590	1792	3984	34117	59678	93795
(8) Imports	734	417	1568	144	87	—	2950	—	—
(9) Indirect Tax	249	2	2127	17	386	227	3007	2162	5168
(10) Value Added	27170	89	10351	57	2189	13864	53721	—	—
(11) Gross Output (7 to 10)	36398	517	33542	808	4454	18075	93795	61840	—

Note :- '—' denotes nil or negligible.

The column and row totals do not tally exactly because of small discrepancies in the Original Table and because of rounding off the figures in crores.

STATEMENT 2: SHARE OF INPUT OF DIFFERENT SECTORS/FACTOR IN THE GROSS OUTPUT OF SECTORS
INTER-INDUSTRY TRANSACTIONS, 1973-74

Sector/Item	Primary	Crude Petroleum and Natural Gas	Secondary Petroleum Products	Railway and Other Transport Services	Miscellaneous	Total Intermediate Use	Total Final Use (except imports)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Primary	16.17	—	17.29	0.07	3.67	4.99	13.60
(2) Crude Petroleum and Natural Gas	—	—	—	63.82	—	—	0.55
(3) Secondary	4.32	1.00	28.09	6.38	18.55	8.74	14.35
(4) Petroleum Products	0.41	0.19	0.49	0.59	4.30	0.06	0.56
(5) Railway and Other Transport Services	0.43	0.05	2.57	0.32	7.55	3.08	2.04
(6) Miscellaneous	1.33	0.38	9.68	1.83	6.16	5.17	5.28
(7) Total Input (1 to 6)	22.65	1.62	58.12	73.01	40.24	22.04	36.37
(8) Imports	2.02	80.74	4.67	17.78	1.95	—	3.15
(9) Indirect Tax	0.68	0.35	6.34	2.10	8.66	1.25	3.21
(10) Value Added	74.65	17.29	30.86	7.11	49.15	76.70	57.28
(11) Gross Output (7 to 10)	100.00	100.00	100.00	100.00	100.00	100.00	100.00

— denotes nil or negligible.

The above Statement is derived from original figures (figure in lakhs).

STATEMENT 3: WHOLESALE PRICE INDEX OF COMMODITIES

(Base : 1970-71 = 100)

Year	All Commodities		Crude Petroleum and Natural Gas		Mineral Oils	
	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year
	(1)	(2)	(3)	(4)	(5)	(6)
1971-72	105.6	5.60	130.2	30.20	108.2	8.20
1972-73	116.2	10.04	142.0	9.06	111.6	3.14
1973-74	139.7	20.22	317.1	123.31	141.7	26.97
1974-75	174.9	25.20	686.5	116.49	240.2	69.51
1975-76	173.0	—1.09	700.3	2.01	257.2	7.08
1976-77	176.6	2.08	740.3	5.71	267.5	4.00
1977-78	185.8	5.21	787.6	6.39	268.0	0.19
1978-79	185.8	—	802.9	1.94	269.9	0.71
1979-80	217.6	17.12	1384.0	72.38	308.8	14.41
1980-81	256.9	18.06	2041.8	47.53	413.6	33.94
Average		10.24		41.50		16.82

STATEMENT 4: IMPACT MULTIPLIERS OF CHANGES IN PRICES OF IMPORTS ON SECTORAL PRICES

Sector/Item	Primary	Crude Petroleum and Natural Gas	Secondary	Petroleum Products	Railway and Other Transport Services	Miscellaneous
	(1)	(2)	(3)	(4)	(5)	(6)
(1) Primary	1.2110	0.0036	0.3085	0.0251	0.1175	0.0960
(2) Crude Petroleum and Natural Gas	0.0037	1.0013	0.0067	0.6434	0.0315	0.0014
(3) Secondary	0.0787	0.0153	1.4410	0.1061	0.3070	0.1469
(4) Petroleum Products	0.0058	0.0021	0.0103	1.0081	0.0493	0.0022
(5) Railway and Other Transport Services	0.0087	0.0012	0.0467	0.0080	1.0944	0.0403
(6) Miscellaneous	0.0257	0.0057	0.1547	0.0337	0.1052	1.0735

STATEMENT 5: IMPACT MULTIPLIERS OF CHANGES IN PRICES OF IMPORTS ON SECTORAL PRICES

(Excluding Petroleum Products)

Sector/Item	Primary	Crude, Petroleum and Natural Gas	Secondary	Railway and Other Transport Services	Miscellaneous
	(1)	(2)	(3)	(4)	(5)
(1) Primary	1.2109	0.0035	0.3081	0.1144	0.0958
(2) Crude Petroleum and Natural Gas	—	1.0000	—	—	—
(3) Secondary	0.0780	0.0151	1.4396	0.2931	0.1463
(4) Railway and Other Transport Services	0.0087	0.0012	0.0466	1.0938	0.0403
(5) Miscellaneous	0.0255	0.0057	0.1543	0.1026	1.0734

'—' Nil or Negligible.

STATEMENT 6: HYPOTHETICAL SECTORAL PRICES ON THE ASSUMPTION THAT IMPORT PRICES OF CRUDE OIL AND PETROLEUM PRODUCTS INCREASED AS THE WHOLESALE PRICES DURING THE PERIOD.†

Year	Primary		Crude Petroleum and Natural Gas		Secondary		Petroleum Products		Railway and other Transport Services		Miscellaneous		Total	
	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1970-71	100.00		100.00		100.00		100.00		100.00		100.00		100.00	
1972-73	100.17	0.17	140.89	40.89	100.20	0.20	121.22	21.22	101.11	1.11	100.06	0.06	100.43	0.43
1973-74	100.78	0.61	311.31	120.96	100.06	0.75	199.60	64.66	105.22	4.06	100.30	0.23	102.07	1.63
1974-75	102.22	1.43	670.91	115.51	102.74	1.76	384.30	92.53	114.90	9.20	100.85	0.55	105.85	3.70
1975-76	102.33	0.11	684.37	2.01	102.88	0.13	398.56	3.71	115.65	0.65	100.89	0.04	106.12	0.25
1976-77	102.49	0.15	723.30	5.69	103.07	0.19	418.36	4.97	116.68	0.90	100.95	0.06	106.52	0.38
1977-78	102.62	0.13	769.32	6.36	103.23	0.16	435.32	4.05	117.57	0.76	101.00	0.05	106.79	0.25
1978-79	102.67	0.05	784.21	1.94	103.29	0.06	441.76	1.48	117.91	0.29	101.02	0.02	107.03	0.23
1979-80	104.44	1.72	1349.66	72.10	105.48	2.12	668.19	51.25	129.78	10.06	101.69	0.67	111.93	4.57
1980-81	106.71	2.17	1989.87	47.43	108.28	2.65	938.08	43.38	144.97	11.70	102.55	0.85	118.02	5.44
March 80	105.78		1781.70		107.14		839.25		138.74		101.87		115.54	
July 81	107.46	1.59*	2107.01	18.26*	109.21	1.93*	1054.84	25.69*	150.04	8.14*	102.84	0.95*	119.85	3.73*

† Based on Statement 4.

* Change of July 1981 over March 1980.

STATEMENT 7: HYPOTHETICAL SECTORAL PRICES ON THE ASSUMPTION THAT IMPORT PRICES OF CRUDE OIL RISE AS INDICATED IN THE WHOLESALE PRICES AND AS ARE PASSED ON TO OTHER SECTORAL PRICES BUT PRICES OF PETROLEUM PRODUCTS ARE THE ADMINISTERED PRICES WITHOUT BEING AFFECTED BY PRICES OF CRUDE OIL OR OTHER SECTORAL PRICES.†

Year	Primary		Crude Petroleum and Natural Gas		Secondary		Railway and other Transport Services		Miscellaneous		Petroleum Products		Total	
	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous Year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1970-71	100.00		100.00		100.00		100.00		100.00		100.00		100.00	
1972-73	100.05	0.05	141.35	41.35	100.06	0.06	100.35	0.35	100.03	0.03	111.60	11.60	100.19	0.19
1973-74	100.18	0.13	311.38	120.28	100.22	0.16	101.24	0.89	100.11	0.08	141.70	26.97	100.83	0.63
1974-75	100.61	0.42	671.09	115.52	100.75	0.53	104.16	2.89	100.36	0.25	240.20	69.51	102.49	1.65
1975-76	100.68	0.07	684.56	2.01	100.84	0.09	104.66	0.48	100.40	0.04	257.20	7.08	102.68	0.18
1976-77	100.72	0.04	723.51	5.69	100.90	0.05	104.97	0.29	100.43	0.03	267.50	4.00	102.86	0.17
1977-78	100.73	—	769.53	6.36	100.90	—	104.98	0.01	100.43	—	268.00	0.19	102.96	0.10
1978-79	100.73	0.01	784.44	1.94	100.91	0.01	105.04	0.05	100.44	—	269.90	0.71	103.00	0.05
1979-80	100.90	0.17	1350.07	72.11	101.12	0.21	106.19	1.10	100.54	0.10	308.80	14.41	104.53	1.49
1980-81	101.35	0.45	1990.49	47.44	101.68	0.56	109.30	2.93	100.81	0.27	413.60	33.94	106.84	2.20
March 80	101.06		1782.45		101.37		106.97		100.74		335.00		105.76	
July 81	101.81	0.75*	2108.94	18.32*	102.32	0.94*	115.33	7.81*	101.20	0.46*	512.20	52.90*	108.24	2.35*

† Based on Statement '5'.

— Denotes nil or negligible.

* Change of July 81 over March 80.

**STATEMENT 8: HYPOTHETICAL INDEX NUMBERS OF PRICES OF
COMMODITIES AND SERVICES**

Year	A		B	
	Index	Percentage increase over previous year	Index	Percentage increase over previous year
	(1)	(2)	(3)	(4)
1970-71	100.00		100.00	
1972-73	100.43	0.43	100.19	0.19
1973-74	102.07	1.63	100.83	0.63
1974-75	105.85	3.70	102.49	1.65
1975-76	106.12	0.25	102.68	0.18
1976-77	106.52	0.38	102.86	0.17
1977-78	106.79	0.25	102.96	0.10
1978-79	107.03	0.23	103.00	0.05
1979-80	111.93	4.57	104.53	1.49
1980-81	118.02	5.44	106.84	2.20
March 80	115.54		105.76	
July 81	119.85	3.73*	108.24	2.35*

STATEMENT 9: HYPOTHETICAL INDEX NUMBERS OF PRICES OF COMMODITIES

Year	A		B	
	Index	Percentage increase over previous year	Index	Percentage increase over previous year
	(1)	(2)	(3)	(4)
1970-71	100.00		100.00	
1972-73	101.46	1.46	100.56	0.56
1973-74	106.91	5.38	102.25	1.68
1974-75	119.61	11.87	107.03	4.68
1975-76	120.53	0.78	107.67	0.60
1976-77	121.90	1.13	108.17	0.47
1977-78	123.11	1.00	108.36	0.18
1978-79	123.56	0.37	108.49	0.11
1979-80	139.59	12.97	111.97	3.21
1980-81	159.80	14.48	118.03	5.41
March 1980	151.71		114.55	
July 1981	166.18	9.54*	121.98	6.49*

*Change of July 1981 over March 1980.

Note: 'A' = Based on the assumption that Import prices of Crude Oil and Petroleum Products rise as indicated in the wholesale prices and these are passed on to other sectoral prices.

'B' = Based on the assumption that import prices of crude oil rise as indicated in the wholesale prices and are passed on to other sectoral prices but prices of petroleum products are the administered prices without being affected by prices of crude oil or other sectoral prices.

STATEMENT 10: HYPOTHETICAL SECTORAL PRICES ON THE ASSUMPTION THAT IMPORT PRICES OF CRUDE OIL RISE AS INDICATED IN THE WHOLESALE PRICES

Year	Primary		Crude Petroleum and Natural gas		Secondary		Petroleum Products		Railway and other Transport Services		Miscellaneous		Total	
	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year	Index	Percentage increase over previous year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1970-71	100.00		100.00		100.00		100.00		100.00		100.00		100.00	
1972-73	100.12	0.12	140.86	0.86	100.14	0.14	114.81	14.81	100.78	0.78	100.04	0.04	100.32	0.32
1973-74	100.60	0.48	311.22	120.95	100.74	0.60	176.56	53.78	104.01	3.21	100.23	0.19	101.69	1.36
1974-75	101.62	1.01	670.63	115.48	102.00	1.26	306.83	73.78	110.84	6.56	100.62	0.39	104.58	2.84
1975-76	101.66	0.04	684.05	2.00	102.05	0.05	311.70	1.59	111.10	0.23	100.63	0.01	104.69	0.11
1976-77	101.77	0.10	722.97	5.69	102.19	0.13	325.81	4.53	111.84	0.67	100.67	0.04	105.00	0.30
1977-78	101.90	0.12	768.99	6.37	102.35	0.16	342.49	5.12	112.71	0.78	100.72	0.05	105.37	0.35
1978-79	101.94	0.04	783.87	1.94	102.40	0.05	347.88	1.57	112.99	0.25	100.74	0.02	105.49	0.12
1979-80	103.54	1.57	1349.25	72.13	104.39	1.94	552.81	58.99	123.74	9.51	101.35	0.61	110.03	4.30
1980-81	105.36	1.75	1989.24	47.43	106.64	2.15	784.79	41.96	135.89	9.83	102.04	0.68	115.17	4.67
March 80	104.77		1781.42		105.91		709.46		131.95		101.82		113.50	
July 81	105.69	0.88*	2106.48	18.25*	107.05	1.08*	827.28	16.61*	138.12	4.68*	102.17	0.34*	116.82	2.93*

* Change of July 1981 over March 1980.

STATEMENT 11: HYPOTHETICAL INDEX NUMBERS OF PRICES OF COMMODITIES ON THE ASSUMPTION THAT IMPORT PRICES OF CRUDE OIL RISE AS INDICATED IN THE WHOLESALE PRICES.

Year	Index	Percentage increase over previous year
1970-71	100.00	
1972-73	101.06	1.06
1973-74	105.49	4.39
1974-75	114.84	8.86
1975-76	115.19	0.31
1976-77	116.20	0.88
1977-78	117.40	1.03
1978-79	117.79	0.33
1979-80	132.49	12.48
1980-81	149.14	12.56
March 1980	143.73	
July 1981	152.19	5.89*

* Change of July 1981 over March 1980.

STATEMENT 12: CHANGES IN THE PRICES (HYPOTHETICAL) OF FINAL DEMAND CATEGORIES ON THE ASSUMPTION THAT IMPORT PRICES OF CRUDE OIL AND PETROLEUM PRODUCTS INCREASED AS THE WHOLESALE PRICES DURING THE PERIOD.

Year	Private final consumption expenditure		Public final consumption expenditure		Gross fixed capital formation		Change in Stocks		Exports	
	Total rise	Attributable to petroleum prices	Total rise	Attributable to petroleum prices	Total rise	Attributable to petroleum prices	Total rise	Attributable to petroleum prices	Total rise	Attributable to petroleum prices
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1972-73	11.76	0.29*	4.50	0.35*	8.01	0.20*	4.27	0.50*	11.11	0.36*
1973-74	18.99	1.01	7.40	1.17	11.92	0.76	26.33	1.65	21.67	1.27
1974-75	20.19	2.09	20.23	2.09	24.65	1.79	23.71	2.98	25.34	2.69
1975-76	-5.37	0.14	6.56	0.12	10.52	0.13	-1.16	0.18	7.65	0.18
1976-77	3.13	0.20	2.95	0.17	2.10	0.19	3.84	0.25	6.60	0.26
1977-78	5.40	0.17	2.07	0.14	2.71	0.16	1.61	0.21	12.38	0.22
1978-79	3.16	0.06	2.80	0.05	8.38	0.06	3.64	0.08	-0.85	0.08
1979-80	13.36	2.20	3.16	1.84	15.68	2.14	18.76	2.70	0.85	2.88
1980-81	11.88	2.63	N.A.	2.05	8.91	2.67	13.28	3.08	N.A.	3.43
Average	9.16	0.98	6.21	0.89	10.32	0.90	10.48	1.29	10.59	1.26

*Increase over 1970-71

PETROLEUM PRICES AND GENERAL PRICE LEVEL

STATEMENT 13: CHANGES IN THE PRICES (HYPOTHETICAL) OF FINAL DEMAND CATEGORIES ON THE ASSUMPTION THAT IMPORT PRICES OF CRUDE OIL RISE AS INDICATED IN THE WHOLESALE PRICES AND ARE PASSED ON TO OTHER SECTORAL PRICES BUT PRICES OF PETROLEUM PRODUCTS ARE THE ADMINISTERED PRICES WITHOUT BEING AFFECTED BY PRICES OF CRUDE OIL OR OTHER SECTORAL PRICES.

8

Year	Private final consumption expenditure		Public final consumption expenditure		Gross fixed capital formation		Change in Stocks		Exports	
	Total rise	Attributable to petroleum prices	Total rise	Attributable to petroleum prices	Total rise	Attributable to petroleum prices	Total rise	Attributable to petroleum prices	Total rise	Attributable to petroleum prices
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1972-73	11.76	0.11*	4.50	0.17*	8.01	0.06*	4.27	0.23*	11.11	0.13*
1973-74	18.99	0.28	7.40	0.42	11.92	0.16	26.33	0.56	21.67	0.33
1974-75	20.19	1.06	20.23	1.15	24.65	0.54	23.71	1.51	25.34	1.01
1975-76	-5.37	0.12	6.56	0.14	10.52	0.09	-1.16	0.18	7.65	0.15
1976-77	3.13	0.07	2.95	0.09	2.10	0.05	3.84	0.10	6.60	0.09
1977-78	5.40	—	2.07	—	2.71	—	1.61	—	12.38	—
1978-79	3.16	0.01	2.80	0.01	8.38	0.01	3.64	0.02	-0.85	0.02
1979-80	13.36	0.27	3.16	0.31	15.68	0.22	18.76	0.42	0.85	0.34
1980-81	11.88	0.70	N.A.	0.78	8.91	0.57	13.28	1.01	N.A.	0.89
Average	9.16	0.29	6.21	0.34	10.32	0.19	10.48	0.45	10.59	0.33

*Increase over 1970-71.

— denotes nil or negligible.

STATEMENT 14: CHANGES IN THE PRICES (HYPOTHETICAL) OF FINAL DEMAND CATEGORIES ON THE ASSUMPTION THAT IMPORT PRICES OF CRUDE OIL RISE AS INDICATED IN THE WHOLESALE PRICES.

Year	Private final consumption expenditure		Public final consumption expenditure		Gross fixed capital formation		Change in Stocks		Exports	
	Total rise	Attributable to petroleum prices	Total rise	Attributable to petroleum prices	Total rise	Attributable to petroleum prices	Total rise	Attributable to petroleum prices	Total rise	Attributable to petroleum prices
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1972-73	11.76	0.20*	4.50	0.25*	8.01	0.14*	4.27	0.35*	11.11	0.25*
1973-74	18.99	0.81	7.40	0.96	11.92	0.61	26.33	1.35	21.67	1.02
1974-75	20.19	1.52	20.23	1.58	24.65	1.28	23.71	2.25	25.34	1.95
1975-76	-5.37	0.05	6.56	0.04	10.52	0.05	-1.16	0.07	7.65	0.07
1976-77	3.13	0.14	2.95	0.13	2.10	0.13	3.84	0.18	6.60	0.19
1977-78	5.40	0.17	2.07	0.15	2.71	0.16	1.61	0.22	12.38	0.22
1978-79	3.16	0.05	2.80	0.05	8.38	0.05	3.64	0.07	-0.85	0.07
1979-80	13.36	2.08	3.16	1.82	15.68	1.97	18.76	2.65	0.85	2.72
1980-81	11.88	2.17	N.A.	1.74	8.91	2.17	13.28	2.59	N.A.	2.84
Average	9.16	0.80	6.21	0.75	10.32	0.73	10.48	1.08	10.59	1.04

* Increase over 1970-71

APPENDIX

The rate of change in aggregate of sectoral prices between July 1981 and March 1980 can be calculated in two ways as given by the following formula.

$$I. \text{ Aggregate index for March 1980 } - P_{M,1980} = \sum_i W_i \frac{P_{M80,i}}{P_{1970,i}}$$

$$\text{Aggregate index for July 1981 } - P_{Jy,1981} = \sum_i W_i \frac{P_{Jy81,i}}{P_{1970,i}}$$

Relative change of aggregate price index between July 1981 and March 1980 $\frac{P_{Jy,1981}}{P_{M,1980}} = P_{JM}$ say,

Where W_i are sectoral weights, $P_{M80,i}/P_{1970,i}$ are sectoral indices for March 1980 with 1970 prices as base and $P_{Jy81,i}/P_{1970,i}$ are sectoral prices for July 1981 with 1970 as base.

II. Similarly :

Relative change of aggregate price index between July 1981 and March 1980 with the same notation as above. $\sum_i W_i^1 \frac{P_{Jy81,i}}{P_{M80,i}} = P_{JM}^1$ say,

P_{JM} and P_{JM}^1 differ based on the dispersion of rises in sectoral prices. P_{JM} can be expressed as

$$P_{JM} = \sum_i W_i^1 \frac{P_{Jy81,i}}{P_{M80,i}} \quad \text{where} \quad W_i^1 = \frac{W_i P_{M80,i}/P_{1970,i}}{\sum_i W_i P_{M80,i}/P_{1970,i}}$$

The difference between P_{JM} and P_{JM}^1 would therefore depend on the deviation of W from W^1 . The following table gives values of P_{JM}^1 for all commodities wholesale price index and based on type (III) in table on page 76.

Table 8: Relative change of July 1981 over March 1980

Sector	Wt.	All Commodities	Contribution due to price rise in oil and products
(1)	(2)	(3)	(4)
1. Primary Sector	42.212	124.8	100.7
2. Crude Petroleum and Natural Gas	0.602	118.3	118.3
3. Secondary Sector	52.274	117.0	100.9
4. Petroleum Products	4.912	152.9	152.9
TOTAL	100.000	122.1	103.5

It would appear from the above that the contribution of the rise in oil prices is about a sixth in the aggregate inflation rate between March 1980 and July 1981 and this is different from what is stated on page 77. As stated earlier the difference in the rates of growth is to be traced to different pattern of weights implied in the two sets of calculation. While the calculations in the above table use fixed (1970) pattern of weight, the implied weights in the earlier calculations are as follows.

Table 9: Implied weights for calculating change in aggregate sectoral index, between July 1981 and March 1980*

Sector	All Commodities Index	Index calculating the contribution of oil price rise
(1) Primary	35.929	34.734
(2) Crude Petroleum and Natural Gas	4.719	8.733
(3) Secondary	52.296	43.140
(4) Petroleum Products	7.056	13.392
All	100.000	99.999

* These refer to values of

$$W_i^1 = \frac{W_i \frac{P_{M80,i}}{P_{1970,i}}}{\sum_i W_i \frac{P_{M80,i}}{P_{1970,i}}}$$

where P's are given in column 7 of Table on page 68

It would be seen by taking March 1980 as comparison base and 1970 as weight base, the rise in the sectoral prices due to oil price increase is not given due weightage in the calculation of overall price index calculated earlier as the previous weight structure does not take into account the change that has been brought about by the rise in the value of transactions in crude petroleum and its products in the overall transactions in the economy. This does not act as a limitation to the calculations done in the regular note which shows that nearly 40% of rate in price inflation during March 1980 to July 1981 could have been accounted by rise in oil prices.

BOOK REVIEW

"Accounting for Price Level Changes", — N. Mishra — Sultan Chand & Sons, New Delhi—Rs. 50—285 pages.

The present business accounting system based on historical cost is adopted by business enterprises because of its underlying simplicity and apparent certainty derived from original book-keeping records. Although it serves the purpose in a relatively constant environment, it fails to reflect the true picture during periods of rapid increase in prices. The annual accounts prepared on historical cost basis fail to assess the real value of the assets, provide inadequate depreciation to replace the assets consumed during the year, evaluate the stocks at purchase price which is inadequate for later replenishment and altogether ignore the effects of holding monetary assets/owing monetary liabilities, during periods of inflation. There has been an increasing awareness of these limitations in recent years and attempts have been made to evaluate costs and revenues as required for different purposes through price-level restatements, replacement cost accounting etc., and concepts like net replacement cost, net realisable value, economic value etc. have been developed. The UK and USA were among the first to appoint official committees for developing standard accounting procedures that would reflect the effects of price changes in business accounts. In UK, the Sandilands Committee recommended what is referred to as the method of Current Cost Accounting (CCA) whereas the Financial Accounting Standards Board of USA proposed the method of General (Current) Purchasing Power Accounting (GPPA). The proposals of these Committees were subsequently modified before making it mandatory on the part of certain categories of corporate management to include in their reports a statement of financial position of the company based on Current Cost Accounting. In USA, a supplementary statement based on both the methods of General Purchasing Power Accounting (GPPA) and Current Cost Accounting (CCA) is required to be furnished along with the conventional accounts.

The book under review provides an introduction to inflation accounting in general and examines the implications of the practical application of the GPPA method of accounting in particular. It sets out the basic controversial issues such as historical cost accounting vs. accounting for price changes, adjusting all the items of annual accounts for price changes vs. confining price adjustments to selected items and use of a single general price index for making price adjustment for all items vs. the use of item-specific price indices. The

relative merits of the Sandilands CCA method (UK) and the GPPA method (identified with the USA) are discussed at some length. CCA is concerned mainly with the valuation of fixed assets and stocks on the basis of 'value to the business', which is defined as the amount the company would lose if it were deprived of these assets. The value to the business of an asset is its written down current replacement cost (NRC) except in situations where NRC is greater than both net realisable value and economic value. The GPPA method is designed to convert historical cost accounts representing the sum total of the money units of different periods (having different purchasing powers) "into uniform money units, that is, money units of general purchasing power". In this method, monetary items do not need adjustment for price changes as such items are stated in current money units. The author advocates rather too strongly the use of the GPPA method in preference to CCA approach. After providing a fairly good account of the rationale and approaches to inflation accounting mentioned above, the book devotes itself to a detailed application of the GPPA method to the accounts of two chemical companies — Hindustan Insecticides Ltd. and Indian Organic Chemicals Ltd. and two engineering companies — Hindustan Steel Ltd. and Tata Iron and Steel Company Ltd. Data from the annual accounts of the companies covering a period of 15 years from 1960-61 to 1974-75 are supplemented by information collected through questionnaires.

The book is organised into seven chapters. The introductory chapter spells out the scope and objectives of the study. The problems emanating from the present historical cost accounting system during times of inflation and the consequential need for alternative accounting methods are discussed in Chapter 2. Chapter 3 gives a neat review of different methods of accounting for price changes and associated controversies. This chapter dealing as it does with a critical study of Sandilands CCA approach and Financial Accounting Standard 33 of USA constitutes the core of the book and can be read with profit by anyone interested in understanding what inflationary accounting is all about. The actual application of the GPPA method to the accounts of four companies mentioned above is attempted in Chapter 4. Some of the assumptions made by the author in this chapter cannot, however, be accepted at their face value. For instance, it is assumed that fixed assets at the end of the first year of the study have been purchased at the average price of that year. One could as well argue that it would have been more appropriate to work out the average price based on the prices prevailing in the earlier years. Similarly, inventory valuation based on the Last In First Out (LIFO) method would perhaps yield an estimate closer to the current year's value rather than by the First In First Out (FIFO)

method adopted by the author. Chapters 5 and 6 present the analysis based on the revalued items of profit and loss account and the balance sheet. The concluding chapter summarises the results of the study and outlines some suggestions and recommendations for those interested in the subject of Price-level Accounting.

The more important findings of the study are as follows: Sales are overstated under historical cost accounting. Many profit years turn into loss years under the GPPA method. The real tax rate works out to be much higher than the nominal tax rate. Although the dividends distributed worked out to be higher than the net income available, the share-holders' dividend income in real terms showed a declining trend over the years. The depreciation provided on fixed assets was found to be very much inadequate. The real rate of return on capital invested turned out to be significantly lower than that worked out under historical cost accounts.

The value of the book would have been enhanced had the author made an attempt to construct the accounts based on the method of CCA currently in vogue (in fact the CCA method as proposed by the Sandilands Committee has since undergone certain modifications which take into account the various criticisms levelled against the original proposal) and compared the results with those obtained under the GPPA method. There can be no doubt, however, that the book is a useful addition to the literature on inflation accounting.

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