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Investment Allowance and Growth of Investment in India

General

THE machinery and equipment component of the total gross domestic capital formation in India in constant prices (1970-71 prices) has gone up from Rs 1,237 crore in 1960-61 to Rs 6,942 crore in 1984-85, registering a growth of 6.5 per cent per annum (Table 2.1). The private sector component, whose share is over 60 per cent, has registered a growth rate of 5.8 per cent per annum while the public sector component has grown at the rate of 7.8 per cent per annum during the same period. The private sector figures include capital formation by households as well, and separate figures for the corporate sector as such are not available. To what extent the investment incentives, particularly development rebate and investment allowance, are responsible for the growth remains unknown.

An attempt is made here to quantify the effect of the above tax incentives on the growth of private corporate investment, by examining the extent of the inducement effect on the investment decision making process of the corporate sector. This is done in an integrated model of corporate behaviour covering its three major aspects, namely, investment, financing and dividend decisions. The model is estimated using sample data published by the Reserve Bank of India. The impact of the incentives is quantified with the help of the estimated model.

The Framework

What we mean by the inducement effect of investment in-

TABLE 2.1

Gross Domestic Capital Formation in Machinery and Equipment by Public and Private Sectors (1960-61 to 1982-83) (at 1970-71 prices)

(Rs crore)

Year	*Public sector*	*Private sector*	*Total*
1960-61	572.51	664.65	1237.16
1961-62	522.83	879.23	1402.06
1962-63	567.38	1015.60	1582.98
1963-64	567.93	1304.35	1872.28
1964-65	754 91	1372.21	2127.13
1965-66	837.30	1380.48	2217.77
1966-67	850.99	1345.75	2196.74
1967-68	855.70	1354.59	2210.29
1968-69	902.22	1364 44	2266.67
1969-70	748.65	1657.64	2406.28
1970-71	887.00	1459.00	2346.00
1971-72	887.94	1780.63	2668.57
1972-73	1123.10	1867.08	2990.19
1973-74	1155.66	2185.00	3340.67
1974-75	1132.35	2177.11	3309.46
1975-76	1619.93	1850.52	3470.45
1976-77	1984.13	2015.29	3999.41
1977-78	2027.81	2185.98	4213.79
1978-79	1812.94	2841.76	4654.70
1979-80	1852.71	2942.10	4794.81
1980-81	2014.62	3089.39	5104.01
1981-82	2252.36	3114.67	5367.03
1982-83	3004.32	2532.21	5536.52
1983-84	3624.11	3007.21	6631.32
1984-85	3873.73	3608.72	6942.45

Source: Government of India, *National Accounts Statistics*, Central Statistical Organisation.

centive is the amount of new investment (fixed) that could take place at the 'margin' which is specifically attributable to the particular incentive provision.

Basically there are three reasons as to why companies go in for investment in machinery and equipment: First, when output demand is expected to increase, additional capacity needs to be created. Second, old worn-out equipment needs to be replaced. And third, plants need to be modernised to catch up with changing technology, Given these reasons, the decision to invest in additional equipment by a company crucially depends on expected cost imputable to the additional investment, which is also known as the 'cost of capital' in the literature pertaining to corporate investment behaviour. More specifically, the 'cost of capital' is interpreted as the minimum rate of return per annum required by the equity holders to make it worthwhile to invest in the additional equipment rather than in other available investment opportunities.

In the present study, the quantification of the inducement effect of the tax incentives under study is attempted in two steps: First, the importance of the cost of capital in the investment decision is measured by fitting an investment function in which gross investment is described as a function of expected sales turnover and expected cost of capital. The exact form of the investment function is discussed in the Technical Note. Second, an attempt is made to measure the reduction in the cost of capital due to the tax incentives and simulate the investment model to quantify the effect of such reduction on the investment.

a. The investment model

The model, in brief, consists of two equations which are as follows (for derivation, see the Technical Note):

$$K_t/K_{t-1}=A^{a_s}.\ (p/c)_t^{*a_s}.\ Q^{*a_k}{}_t.\ K^{-a}{}_{t-1} \qquad (2.1)$$

and

$$I_t/K_{t-1}=K_t/K_{t-1}-(1-d) \qquad (2.2)$$

where K denotes the capital stock, $(p/c)^*$ denotes the expectations regarding the ratio of output price to cost of capital, I denotes the gross investment, Q^* denotes the expected sales

turnover and d denotes the ratio of 'economic' depreciation. The parameters A, g, and s respectively, can be interpreted as the distribution pattern of value-added between capital and labour, lag in adjustment of actual capital stock growth to 'desired' capital stock growth, and the elasticity of substitution between capital and labour.

b. Effect on the cost of capital

Corporate taxation affects investment decision *via* the cost of capital. A levy of corporation tax pushes up the required rate of return. And any relief from the corporation tax, therefore, has an opposite effect. The extent of the reduction, however, depends upon the nature and type of the tax relief. The cost of capital including the extent of tax relief can be solved by using the project viability condition, namely, that for an investment project to be viable, the present value of the sum of the annual capital rentals should be at least equal to the value of the machinery intended to be purchased.

Using this condition, a general expression for the 'cost of capital', c, has been derived in the case of Indian companies as follows:

$$c=q(r+d)\left[\frac{1-B}{(1-u)(1-Av)}-\frac{zu}{1-u}+\frac{Bi}{r+p}\right] \qquad (2.3)$$

where $$z=d'/(d'+r+p)$$

where r=discount rate (minimum net rate of return expected by shareholders), d='real or economic' depreciation rate, d'= rate of tax depreciation allowance, B=the gearing ratio, A= the dividend pay-out ratio, u=corporation tax rate (including surcharge), v=personal income tax rate on dividends, z=sum of the present value of the tax deductions' association with unit capital spending, i=rate of interest on debt capital, p=rate of inflation, and q=price of new machinery. (For a brief derivation, see the Technical Note).

The cost of capital is made up of three main components: (*i*) The minimum return required in the face of the 'Classical' income tax system with double taxation of dividends; less (*ii*) the tax saving per unit of the minimum return due to tax dep-

reciation in the face of inflation, plus (*iii*) the extra required return to pay for the real interest payments on debt capital.

The cost of capital expression, apart from containing the main policy parameters of the corporate behaviour such as, dividend pay-out ratio, gearing ratio, and discount rate, also contains the relevant facets of the income tax system in this country. Thereby it shows what would be the likely change in c if the rate of investment allowance is changed.

The rental cost formula is helpful in quantifying the inducement effect of investment incentives. In particular, the sum of the present values of tax deductions associated with one unit of capital (as denoted by z in the rental cost) varies with different incentive schemes: for example, under the development rebate/investment allowance scheme along with the existing tax depreciation allowance, the unit deduction z_1,

$$z_1=(d'/(d'+r+p)+k, \tag{2.4}$$

where k denotes the rate of investment allowance. Under the scheme of 'initial depreciation' (which existed during the two intervening years after the discontinuation of development rebate) the unit deduction is given by z_2, where

$$z_2=k+\frac{(1-k)\,d}{d+r+p} \tag{2.5}$$

where k denotes the rate of initial depreciation.

A similar expression can also be derived for the new 'funding' scheme, introduced in 1987-88 as follows: Under the scheme, a new portion (say, k) of taxable income is allowed as tax deduction, provided it is used for purchasing machinery either in the current year or in the subsequent years (by depositing the amount with the specified financial institutions). The funding scheme, in a way, allows a company to get the entire cost deducted from tax if *by some means* the machine is acquired in advance and payment is made later. The company can retain k portion of its taxable income every year until the cost of the machinery is covered. Further, the cost of deferring the payment could be assumed to be negligible, as machinery acquisition is not a once for all activity, but a continuing process.

Therefore, it is possible to get the entire equity cost of the new machinery as tax deduction (in course of time), in addition to the depreciation allowance. Thus, given the debt-equity policy, the unit tax deduction z_3 under the funding scheme is,

$$z_3 = \frac{d'}{d' + r + p} + (1 - B). \qquad (2.6)$$

Given the reduction in the cost of capital—due to the tax incentive—, to what extent companies go for new investment depends upon the sensitivity of investment to changes in the cost of capital, which is estimated by the above investment model.

In order to have an idea of the full impact of tax incentives on corporate behaviour one also needs to know how the dividend pay-out ratio, A, and the capital structure parameter, B, are affected by the incentives as there is an in-built bias in the investment allowance provision in favour of profit retention and internal financing. The impact mechanism will be discussed in detail in Chapter 3. While simulating the investment model, effects of a change in c on the debt-equity, as well as dividend pay-out are taken into account.

Data and Estimation

The investment model is fitted to aggregate time-series data pertaining to three samples (manufacturing) of medium and large public limited companies (1960-1982), private limited companies (1965-1982), and government companies separately, the data source for financial variables being the Reserve Bank of India's publication, *Financial Statistics of Joint Stock Companies* as well as their *Bulletins*. Apart from the fact that continuous time-series data are available in a fair amount of detail, the sample coverage is fairly high. The sample covers as much as 80 per cent of the total paid-up capital in the case of non-government non-financial public limited companies, 30 per cent in the case of private limited companies and 35 per cent in the case of non-financial government sector companies.

The financial variables are interpreted as follows: The variable K_t is taken to be the stock of fixed assets (machinery and plant) in real terms. For this, first the net investment series are

defined by the wholesale price index relevant to machinery and plant, and then the series are cumulated to obtain the capital stock in constant prices. The variable Q_t is proxied by real income from sales (net of excise duties). The gross cash flow variable Y_t is interpreted as profits before tax and depreciation and other provisions. The discount rate r is proxied as three-year moving average of profits after tax per rupee of net-worth. Interest rate i is taken as interest payments on outstanding debt. Debt-equity ratio is represented as a ratio of long-term debt over equity capital. Corporation income tax rate is proxied by tax provision over gross cash flow, while the individual income tax rate relevant to dividend income is computed from the *All India Income Tax Statistics*. The tax depreciation rate, d', rate of investment allowance k, as well as the proportion of investment allowance required to be retained, are taken to be the same as the statutory rates. Finally, inflation rate is interpreted as change in the wholesale price index.

The estimation procedure briefly is as follows: First, the dividend equation was fitted, which yielded estimates for the parameters I and s_1. Using these estimates, the long-run dividend pay-out ratio series A^* are generated. Next, the debt-equity equation was fitted using the estimated series for A^*, which was used to generate B^* series. Then, with the help of the estimated series of A^* and B^* and other tax, interest and price elements, the value of c is computed. Finally, the investment function (equation 5) is estimated using the c_t series and the sales variable as a proxy for Q_t.

Regression Results

The regression results of the investment function for the three samples are presented in Table 2.2. (The regression estimates of the debt-equity equation and dividend equation will be discussed in Chapter 4.) The regression of the investment functions are significant in all the three cases. The coefficient of (p/c) is significant in the case of medium and large public limited companies as well as medium and large private limited companies while it turns out to be insignificant in the case of government sector companies. The coefficient of Q/K_{t-1} denotes the lag parameter, whose estimate is significant in all the three cases. The estimate of the elasticity of substitution works out

TABLE 2.2

Regression Results of the Investment Function

Dependent variable = *log* (K_t/K_{t-1}) / *Sample*	*Const.*	*Coefficient of log* (p/c)	*Coefficient of log* (Q/K_{t-1})	R^2	*F*	*DW*
1. Med & large public ltd cos.	0.1981**	0.0295	0.1525	0.83	62.48	1.5
2. Med & large pvt. ltd cos.	0.2143*	0.0411*	0.2628**	0.83	55.22	1.4
3. Government companies	1.8723**	0.0073	0.0336*	0.57	15.84	1.6

Notes: *, ** denotes that the coefficients are significant at 10 per cent and 5 per cent levels, respectively.

to be 0.19 in the case of public limited companies, 0.17 in the case of private limited companies, and 0.22 in the case of government companies. In brief, the estimated equation shows that both the cost factors as well as expected demand for output are important in determining the corporate investment.

Quantification of the Impact of the Tax Incentives

The estimated equation is simulated for the effect of investment allowance (or development rebate) by substituting the actual cost variable with an alternative computed without the tax incentive, e.g., the rate of investment allowance, k. The effect of k being zero is not only felt through z variable but also through the gearing ratio function. In other words, if k is zero, to that extent the overall effective corporation tax rate would be higher, leading to some amount of substitution of equity financing with debt financing, thus raising B. On the other, the unit tax benefit as indicated by z, would also be lowered. The

combined effect would alter the estimate for the rental cost of capital. The hypothetical variable c', thus computed, is substituted for the actual c in the equation, and the change in the investment series *via* change in K_t/K_{t-1} is computed and presented in Table 2.3. The government sector is left out while

TABLE 2.3

Estimated Increase in the Fixed Investment (Machinery and Plant) Attributable to the Investment Allowance/Development Rebate in the Private Corporate Sector (1960-61 to 1982-83)

(Rs crore)

Year	*Public limited companies*	*Private limited companies*	*Total private corporate sector*
1960-61	1.39	0.39	1.78
1961-62	2.37	0.91	3 28
1962-63	3.96	0.92	4.88
1963-64	3.49	1.11	4.60
1964-65	4.86	1.15	6.01
1965-66	4.05	0.90	4.95
1966-67	3.91	1.74	5.65
1967-68	6.34	2.56	8.90
1968-69	4.57	2.24	6.81
1969-70	6.16	2.23	8.39
1970-71	4.38	1.16	5.54
1971-72	3.12	1.60	4.82
1972-73	5.41	1.39	6.80
1973-74	6.79	1.71	8.50
1974-75	22.73	2.86	25.59
1975-76	12.74	2.07	14.81
1976-77	9.47	2.07	11.54
1977-78	11.35	3.03	14.38
1978-79	23.51	3.27	26.78
1979-80	42.31	4.14	46.45
1980-81	36.83	4.24	41.87
1981-82	39.17	2.63	51.80
1982-83	58.64	12.44	71.08

simulating the investment function as the rental cost variable in that case is not found to be significant.

The table shows that the difference between the actual investment and the hypothetical investment is not negligible. It shows that up to 1972-73, the effect was less than Rs 9 crore and the effect has been more pronounced from 1973-74 onwards, i.e., ever since the revival of investment allowance (notwithstanding the two-year initial depreciation allowance). The jump in the inducement effect between the years 1973-74 and 1974-75 from Rs 8.50 crore to Rs 25.59 crore might also be due to factors such as increased awareness of the tax benefits.

a. Projections

For estimating the likely inducement effect for the next five years from 1987-88 to 1991-92, the model is simulated with alternative tax incentive schemes. The cost of capital that will be faced by the corporate sector under the different schemes is computed as well as the change in the investment, taking into account the likely change in the debt-equity policy, is worked out. These are given in Table 2.4.

TABLE 2.4
Cost of Capital under Investment Allowance and Funding Schemes (Average Estimates for 1986-87 to 1991-92)

Tax situation	*Rental cost of capital as a proportion of equipment price*
Without tax incentives	0.3041
With investment allowance	0.2402
With 'funding' scheme	0.1378

Table 2.4 shows that without any tax incentives the expected rental cost of capital would be approximately 30 per cent of the machinery price, on an average. The rental cost with the investment allowance is 24 per cent while with the funding scheme it is expected to be 13.8 per cent, which is substantially lower compared to the investment allowance. This is obvious, because while only a fraction of the investment expenditure is deductible under the investment allowance scheme, under the new scheme, tax deduction up to the entire equity-financed por-

tion could be obtained in course of time, with proper planning. In this way the funding scheme is much more powerful in the long-run compared to the investment scheme.

To what extent would these changes in the rental cost affect the investment plans over the next five years? Table 2.5 presents the projected growth of the capital stock (plant and machinery) from 1986-87 to 1991-92 based on the Reserve Bank of India sample of medium and large public limited companies. The projections are made with the help of the estimated investment function described above. They show that the likely growth of fixed capital (machinery) is 350 per cent with the funding scheme, while it is 286 per cent with the investment allowance scheme, whereas without these schemes the likely growth would be only 214 per cent.

TABLE 2.5

Capital Stock Growth Projection under Investment Allowance and the Funding Schemes (1986-87 to 1991-92)

(*Index*)

Year	*Without tax incentives*	*With investment allowance*	*With funding scheme*
1986-87	100	100	100
1987-88	117.08	127.36	129.57
1988-89	137.60	159.24	164.38
1989-90	160.01	196.07	204.81
1990-91	185.20	238.18	251.29
1991-92	213.51	286.03	348.59