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FISCAL POLICY AND THE GROWTH OF FIRMS: A STUDY OF INDIAN ENGINEERING COMPANIES

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Abstract

In this paper, the effect of government fiscal policies on the growth of firms is analysed using a theoretical model which is basically an extension of the Marris model of growth of firms. The theoretical analysis brings out that an increase in excise duty on products produced by a firm and related products would reduce the equilibrium growth rate and profit rate of the firm. A faster growth in government expenditure would raise the growth rate and profit rate of the firm. An increase in the corporate tax rate would lower the growth rate, but raise the gross profit rate.

Based on the theoretical model, an econometric analysis has been carried using data for 157 Indian engineering companies. The results indicate an adverse effect of taxation on growth of firms.

Fiscal Policy and the Growth of Firms : A Study of Indian Engineering Companies

1. Introduction

In this paper, we analyse the effect of government fiscal policy on the growth of firms. Three components of fiscal policy are chosen for the analysis, namely, excise duty, corporate income tax and government expenditure. A simple theoretical model showing the link between government fiscal policies and the growth of firms is described in Section 2. Based on the theoretical model, an econometric model has been formulated and it has been estimated using data for Indian engineering companies. The results of the estimation of the econometric model are presented and discussed in Section 3. The final section summarizes and concludes.

2. Theoretical Model

The theoretical model used for the analysis is basically an extension of the Marris model of the growth of firms (managerial enterprises) (Marris, 1963, 1964; Hay and Morris 1979, Ch.9). A brief description of the Marris model follows.

The model is concerned with the long-term growth of firms. It has been formulated as a steady-state system in which sales, assets, employment, profits and other such characteristics of a firm are presumed to grow at the same constant exponential rate over time.[1] In the Marris model, the long-term growth rate and profit rate of a firm are simultaneously determined by factors influencing the growth of demand and the growth of supply. Since it is a model for long-term growth, it is assumed that in equilibrium the growth rates of demand and supply must be equal. Also, the Marris model implicitly assumes that the objective of the firm (managerial enterprise) is to maximise its long-term growth rate.

A diagrammatic presentation of the Marris growth model is made in Figure 1. The growth rate of the firm is measured along the horizontal axis, while the profit rate (ratio of profits to capital stock) is measured along the vertical axis. Curve BC shows the `growth of demand´ function. The shape of the curve indicates that beyond a stage an inverse relationship arises between profitability and growth - the firm can grow faster only at the cost of reduced profitability. This trade-off between growth and profitability can be attributed to the following factors:

A. Diversification into new products is the major engine of corporate growth. However, all diversification may not succeed and only the ones that succeed help the firm step up its rate of growth. Thus, the growth rate of demand for a firm´s produce depends on its rate of successful diversification. But there are significant costs attached to expanding by successful diversification. It requires the firm to (i) spend increasingly on advertising and other marketing activities, (ii) incur greater R & D expenditure and (iii) adopt a relatively lower price so as to attract more customers. All these tend to reduce the firm´s rate of return on capital. And, the higher the rate of successful diversification the firm tries to achieve, the greater is the reduction in profitability.

B. Very rarely will demand for a product produced by a firm grow as a result of a given number of consumers individually consuming an ever-increasing quantity of the product. Generally it will result from a progressively larger number of people becoming customers, each with a particular and roughly constant demand. Following Marris, a distinction may be made between two types of consumers - "pioneering" customers and "sheeplike" customers. The former category of customers will initially buy the product on price considerations and/or being attracted by advertising and other promotional activities. The latter category will start purchasing the commodity (i) on recommendation of others, (ii) being interested in the product after experiencing another customer's purchase, or (iii) emulating others within the socio-economic group. After the initial purchase, both "pioneering" and "sheeplike" customers may continue to purchase the commodity due to habit or experience of satisfaction obtained from the initial purchases.

The probability of a diversification being successful will depend on the number of 'pioneering' customers the firm obtains and the number of new customers they bring in. The growth rate of demand for the existing products of the firm will also depend on this factor. How many pioneering customers (for a product) a firm obtains and how many new customers the pioneers bring in will in turn depend, among other factors, on (i) the level and success of advertising and other marketing activities, and (ii) the price charged. Evidently, an increasing budget for advertising and other marketing activities, and a lower price (both of which tend to reduce the rate of return on capital), can raise the growth rate of demand for the firm's produce.

C. There are, at any time, limits to the expansion that existing managers can achieve (since if more attention is paid to expansion projects, production activities suffer), and also limits to the rate at which management can expand its numbers and thereby its managerial capacity.[2] These managerial constraints on growth result in increasing inefficiency in the use of resources as the growth rate is raised, leading to an increase in capital-output ratio and a fall in the profit rate. This is known as Penrose effect (Penrose, 1959; Uzawa, 1969).

The above discussion indicates why an inverse relationship should arise between growth and profitability. However, there are reasons to expect that a small increase in the growth rate from a situation of no growth will have a favourable effect on profitability. First, with zero growth and no diversification at all, it is likely that some very profitable opportunities are being missed. Hence, bringing the growth rate to a positive level will enable the firm to take advantage of these opportunities. Secondly, zero growth may well represent a very dull, stultifying and rigid business environment which depresses managerial efficiency. Thus, some growth, by providing room for flexibility, initiative, etc., will stimulate managerial efficiency and thereby lead to higher profits. It would appear therefore that at very low growth rates the relationship between growth and profitability would be direct, and it would become inverse only after a certain growth rate has been achieved.

From the supply side, on the other hand, a direct relationship arises between profitability and growth. This is so because the higher the profits of the firm, the greater is the amount of retained earnings and the amount of external finance the firm is able to generate, which leads to a higher rate of investment and thus to a higher rate of growth of supply. The `growth of supply´ function is shown in Figure 1 by curve AD. The curve starts at a point on the vertical axis because certain minimum profit would normally be necessary before any funds are made available for expansionary investment.

The intersection of the growth of demand function BC and the growth of supply function AD at point X marks the unique long-run growth and profit rates. This is clearly the highest growth rate that the firm can attain, given the constraints on the growth of demand and growth of supply.

Marris formulated his model in a steady-state framework to facilitate analysis. But, to study, theoretically and empirically, the influence of government fiscal policies on the growth performance of firms, in the context of economic development, it is more convenient and perhaps also more appropriate to give up the steady-state assumption, and utilise the structure of the Marris model for explaining the growth of the firm in the medium-term. It would be realised that the arguments given above to explain the shapes of the growth of demand and growth of supply functions apply as much (if not better) to the medium-term as they do to the long-term. Also, it would not be unreasonable to assume that the growth rate of demand must equal the growth rate of supply in the medium-term.

As discussed above, the inverse relationship between growth rate and profitability depicted by curve BC in Figure 1 is attributable in part to the Penrose effect. Since the Penrose effect is due to the inability of the firm to increase one of its inputs, namely management, it is obviously not a demand-side constraint on the growth of the firm. Thus, taking the Penrose effect as a major factor responsible for the downward slope of the growth of demand function involves some inconsistency. One way out of this difficulty is to call curve BC the market expansion curve, showing the relationship between the rate of market expansion and the cost of market expansion in terms of reduced profitability. This can be justified on the ground that the Penrose effect relates to the cost that the firm has to bear to expand its markets, as do the other two points (regarding diversification, advertisement and promotional activities, pricing etc.) made above.

Thus, in what follows, Figure 1 is treated as describing the determination of the medium-term growth rate and profit rate of the firm, curve BC is referred to as the market expansion curve, and the effect of changes in government fiscal policy are analysed using this framework.

Effects of Fiscal Policy Changes

Let us now consider the effect of an increase in the rates of excise duty on the products produced by the firm and related products into which the firm may diversify in future. This would cause an inward shift in the market expansion curve. The reason for this is easy to see. If the entire increase in excise duty is passed on to the consumers, the same profitability rate can be maintained, but the rate of market expansion will come down. If the entire increase in excise duty is absorbed by the firm, the rate of market expansion can be maintained, but the profit rate will come down. Figure 2 depicts how the equilibrium growth and profit rates are affected by the inward shift of the market expansion curve consequent upon an increase in the rates of excise duty. Curves BC and B´C´ are the market expansion curves before and after the increase in excise duty rates. The new equilibrium occurs at X´. At X´ both the growth rate and profit rate of the firm are lower than those at X. Thus, the effect of an increase in excise duty rates on products produced by a firm and related products is to lower the growth rate and the profit rate of the firm.

While an increase in excise duty rates would cause an inward shift of the market expansion curve, an increase in the growth rate of government expenditure (provided other things remain the same) would cause an outward shift of the market expansion curve. This is so because a more rapid growth of government expenditure would open up greater growth opportunities for the firm. In Figure 2, this is shown by curve B"C" in relation to curve BC. The new equilibrium occurs at X". Thus, other things remaining the same, an increase in the rate of growth of government expenditure should raise both the profit rate and the growth rate of the firm.

Changes in corporate income tax rate will affect the growth of supply function. An increase in the corporate tax rate would cause the growth of supply function to shift to the left (since for the same gross profit rate, the retained earnings of the firm and its ability to raise external finance should go down), and also make the growth of supply curve steeper. This is shown in Figure 3. AD and A´D´ are the growth of supply functions before and after an increase in corporate tax rate. The new equilibrium occurs at Y which is above and to the left of point X. Thus, the effect of an increase in corporate tax rate is to reduce the growth rate and raise the gross profit rate of the firm.

Figure 3 brings out another interesting point, that the effect of excise duty hike on the gross profit rate of the firm depends on the prevailing rate of corporate income tax. In the figure, B´C´ is the market expansion curve after the increase in excise duty rates. If the growth of supply function is represented by AD, the equilibrium shifts from X to X´. If the growth of supply function is represented by A´D´ which involves a higher corporate tax rate, the equilibrium shifts from Y to Y´. The reduction in the rate of gross profit is Xu in the first case and Yw in the second. It is seen that Yw is relatively larger. Thus, at higher corporate income tax rate, a hike in excise duty rates leads to greater reduction in the gross profit rate. Obviously, this need not always happen. Whether or not this happens depends on the nature of shift of the market expansion curve. If there is a parallel downward shift of the market expansion curve due to an increase in excise duty rates, which does not seem unlikely, the resultant reduction in gross profit rate will be larger at higher rates of corporate income tax.

It should be recognised here that the theoretical model presented above lacks in rigour. By making suitable assumptions, a more rigorous theoretical model can be constructed.

But it seems, the basic results of such a model regarding the effect of fiscal policy changes on the growth of firms will not be substantially different from the results obtained here. The merit of the above theoretical model lies in its simplicity and in its clear-cut results which can be subjected to empirical verification.

3. Econometric Model

Based on the theoretical model described in Section 2 above, an econometric analysis of the growth of firms has been carried out using data for Indian engineering companies. The results of this exercise are presented in this section. The purpose of the exercise is not so much to test the theoretical model empirically, as to supplement the discussion at theoretical level with some empirical estimates of market expansion and growth of supply functions. The specification of the econometric model and the measures of variables used in the analysis have some serious limitations, as one would realise from the discussion that follows; but the results of the exercise should be of much interest, especially because the Marris growth model has so far found very little empirical application.

Model Specification

Although the market expansion and growth of supply functions involve non-linear relationships among variables, the econometric model has been specified in terms of linear equations since it greatly simplifies the estimaton procedure. The estimated model may therefore be interpreted as a linear approximation to the true model around the equilibrium point.

The market expansion function has been speficied as:

$$GS = a_0 + a_1\ GP + a_2\ EX + a_3\ DM + u \quad (1)$$

where GS is the growth rate of sales, GP the gross profit rate, EX the rate of excise duty, DM the demand-side effect of growth of government expenditure, and u the random error term. The coefficients of GP and EX are expected to be negative while the coefficient of DM is expected to be positive (for reasons explained in Section 2).

The specification of the growth of supply function is more complicated and it has been done using three equations. First, the relationship between investment and growth of sales is specified as:

$$GS = b_0 + b_1\ \overline{K} + b_2\ \overline{(L/K)} + v \quad (2)$$

where $\overline{K}$ is the growth rate of capital stock, $\overline{(L/K)}$ is the rate of change in labour-capital ratio and v is the random error term. The latter variable $\overline{(L/K)}$ is included in the equation to take into account the fact that a part of the investment may be directed to substituting labour by capital and thus may not contribute to output growth. The coefficients of both $\overline{K}$ and $\overline{(L/K)}$ are expected to be positive.

Secondly, the relation between investment and profit rate is specified as:

$$\overline{K} = c_0 + c_1\ GP + c_2\ DP + c_3\ CT + c_4\ RS + c_5\ IR + w \quad (3)$$

where GP is the gross profit rate, DP is the ratio of depreciation (provision) to invested capital, CT is the ratio of corporate tax to invested capital, RS denotes reserves and surplus (as ratio to invested capital) existing at the beginning of the period, IR is the cost of borrowed funds (external finance for investment project), and w is the random error term. If profits are high or reserves are high, the firm should be able to invest more. Thus the coefficients of GP and RS should be positive. By the same logic, the coefficient of the depreciation variable should be positive and the coefficient of the corporate tax variable should be negative. A negative coefficient is expected also for IR since a higher cost of borrowed funds, other things remaining the same, should lead to a lower rate of investment.

Finally, the relationship between corporate tax and gross profit is represented by a regression equation.

$$CT = d_0 + d_1 \, GP + d_2 \, BR + d_3 \, \overline{K} + s \qquad (4)$$

In this equation, BR is the ratio of borrowings (outstanding) to invested capital and s is the random error term. The coefficient of GP should obviously be positive. The coefficient of BR is expected to be negative, since at a higher level of borrowings interest payments will be larger and consequently the tax base will be smaller. The variable $\overline{K}$ is included in the equation to take into account investment-related tax incentives. Its coefficient should be negative.

Data and Measurement of Variables

The econometric model described above has been estimated using data for 157 Indian engineering companies[3] (public limited) belonging to eleven engineering industries[4] for the period 1971 to 1985.

Since the econometric model is concerned with the determination of growth, investment and profit rates in the medium-term, the influence of short-term factors should be eliminated to the extent possible in the estimation of the model.

In order to do so, average values of the variables and average growth rates have been taken for the periods 1971-75, 1976-80 and 1981-85. Thus, there are three observations for each firm, giving a total of 471 observations. As data for three periods are pooled in the regression analysis to estimate the model, two dummy variables have been included in all the four equations to allow for inter-period shifts of the functions. These two dummy variables are denoted by D_1 and D_2. The former takes value unity for 1971-75 and zero otherwise; the latter takes value unity for 1976-80 and zero otherwise.

The company accounts data used for the regression analysis have not been corrected for price changes. Making such price corrections is not easy. In particular, it is difficult to find a suitable price deflator for the series on gross fixed assets, because the reported figure for any year includes assets bought at different points of time in the past. Also, the multi-product character of firms makes it difficult to find appropriate price indices for sales. Since the data are not corrected for price changes, its use in the regression analysis must have affected the results. This is a limitation of the econometric exercise. It may, however, be mentioned that inter-period differences in the rates of inflation are partly captured by the coefficients of dummy variables.

The way the variables of the econometric model have been measured is described below. As noted earlier, for all these variables (except RS) the average value or the average annual growth rate has been computed for the periods 1971-75, 1976-80 and 1981-85 for use in the regression analysis.

GS = growth rate of sales.

GP = gross profit rate; ratio of gross profits to invested capital (gross fixed assets plus inventories).

$\overline{K}$ = growth rate of invested capital.

$\overline{(L/K)}$ = rate of change in ratio of wages and salaries to invested capital; employment figures not being available, data on wages and salaries are used.

DP = ratio of depreciation provision to invested capital.

CT = ratio of corporate tax (provision) to invested capital.

RS = ratio of reserves and surplus to invested capital at the beginning of the periods, i.e., 1971, 1976 and 1981.

IR = interest rate paid on borrowed funds (ratio of interest payment to total borrowings).

BR = ratio of total borrowings to invested capital.

Company accounts data used for the measurement of variables listed above do not contain information on excise duty. Thus, a different source, namely, Financial Performance of Companies, ICICI Portfolio,[5] has been used for this purpose. From this data source effective excise duty rates in different years have been computed (and averages taken for the three periods) for the eleven industries[6] (to which the 157 engineering companies belong). The effective excise duty rate computed for an industry has been used for all firms belonging to that industry.

The measurement of the demand-side effect of growth of government expenditure has been done in two stages. In the first stage, the time-series on sales for different firms of an industry are aggregated, and then the following regression equation is etimated

$$\ln S = \alpha + \beta_1 \ln G_1 + \beta_2 \ln G_2 + \beta_3 \ln G_3 + \beta_4 t + \S$$

where S is aggregate sales (for a particular industry), § is the random error term, and G_1, G_2 and G_3 are three components of government expenditure - (i) compensation of employees, (ii) net purchase of commodities and services, and (iii) gross domestic fixed capital formation in machinery and equipment (in the public sector). The variable t denotes time. It has been included in the regression to eliminate the trend effect.

For estimating the above regression equation data on G_1, G_2 and G_3 are taken from National Accounts Statistics (CSO). The estimated parameters are the elasticities of sales of a particular industry with respect to the three components of government expenditure. If the estimate of β_1, β_2 or β_3 is found to be negative, the coefficient is assumed to be zero and regression run again.

In the second stage the variable DM is measured utilising the estimated elasticities and the average annual growth rates of G_1, G_2 and G_3. Let g_{11}, g_{21} and g_{31} be the growth rates of G_1, G_2 and G_3 in the first period (1971-75), and let $\hat{\beta}_{1i}$, $\hat{\beta}_{2i}$ and $\hat{\beta}_{3i}$ be the estimated elasticities for the i'th industry; then the demand-side effect of growth of public expenditure for i'th industry for the first period is computed as:

$$DM_{i1} = \hat{\beta}_{1i}\, g_{11} + \hat{\beta}_{2i}\, g_{21} + \hat{\beta}_{3i}\, g_{31}$$

The estimate of DM obtained for a particular industry is applied to all firms belonging to that industry.

Results

Table 1 reports estimates of the four equations obtained by applying the ordinary least-squares (OLS) technique. For eq.(3), two estimates are presented - one based on all 471 observations and the other based on only those observations in which profit-after-tax is positive. This has been done because the relationship between profit rate and investment rate may not be the same between firms earning profits and those incurring losses. Similarly, for eq.(4), two estimates are presented - one based on the entire sample and the other based on only those observations in which profit-before-tax is positive. This has been done because corporate tax (provision) will rise with profit rate only if profit-before-tax is positive.

It is seen from Table 1 that in all the four equations the coefficients of the variables have the expected signs. Also, all the estimated coefficients, except the coefficient of excise duty, are statistically significant (some at 5 per cent level, most at 1 per cent level).[7] However, the values of R^2 for eqs. (1) and (2) are low, which indicates that the estimated equations do not explain a large part of the variation in the growth rate of sales. It should be mentioned that the value of R^2 tends to be low in cross-section regressions, especially those in which variables enter in a ratio form.

Another point to which attention needs to be drawn relates to the estimation of eqs. (3) and (4). When these equations are estimated from the restricted samples, the estimated coefficients are found to be higher in absolute value (in some cases substantially higher) compared to the estimates based on the entire sample. There is also improvement in the value of R^2 and in the statistical significance of the estimated coefficients.

One major weakness of the parameter estimates presented in Table 1 is that these have been obtained by applying the OLS technique to a system of simultaneous equations and the results obtained, therefore, suffer from simultaneous equations bias. To overcome this deficiency of parameter estimates, the system of four equations has been estimated also by the two-stage least-squares (2SLS) technique. Estimates of parameters of simultaneous equations obtained by the 2SLS method are known to be consistent and asymptotically unbiased. Since a fairly large sample is used here, these properties of 2SLS are important. The results obtained by applying the 2SLS method are presented in Table 2.

Comparing the estimates of the parameters of eqs. (1) and (2) obtained by the 2SLS method (Table 2) with those obtained by the OLS method (Table 1), it is seen that the estimated coefficients have the expected signs whichever method is used; but in absolute value the estimated coefficient of GP is substantially higher when the 2SLS method is used. On the other hand, the estimates of eq. (3) obtained by the 2SLS method are not at all satisfactory. The coefficients of gross profit, interest rate and corporate tax variables do not have the correct sign, and the explanatory power of the equation appears to be much worse than the explanatory power of the equation estimated by the OLS method.[8]

Regarding eq.(4), it is found that the OLS and the 2SLS results do not differ much in regard to the coefficients of GP and BR. But, the coefficient of K is positive (contrary to what one would expect) in the 2SLS estimates, while it is significantly negative in the OLS esimates.

To make an overall assessment of the regression results, it is clear that the results of 2SLS are quite poor. The results of OLS are relatively better, but the estimates for some of the equations are not satisfactory in terms of their explanatory power. One possible reason why the econometric analysis has not yielded sufficiently good results is that there are deficiencies in the measurement of variables. Also, in the econometric model some important variables may have been omitted and/or there may be some other specification problems.

Nonetheless, the econometric analysis has been useful, since the results obtained do provide some empirical support to the hypothesis that there is a two-way relationship between growth rate and profit rate of a firm. Also, the results suggest that higher taxation, both direct and indirect, tends to depress the growth performance of firms.[9]

4. Conclusion

In this paper, we analysed the effect of government fiscal policy on the growth of firms. The analysis was carried out, first, using a theoretical model which is basically an extension of the Marris model of growth of firms. The theoretical analysis brought out that an increase in excise duty on products produced by a firm and other related products into which the firm may diversify in future would lead to a reduction in the equilibrium growth rate and profit rate of the firm. An increase in the growth rate of government expenditure would have the opposite effect, i.e., both growth rate and profit rate would be raised. An increase in the rate of corporate income tax would lower the growth rate, but would raise the gross (pre-tax) profit rate of the firm.

Based on the theoretical model, an econometric analysis of growth of firms was carried out using data for Indian engineering companies. The results of the analysis were not very satisfactory, but some empirical support was found for the hypothesis that there exists a two-way relationship between growth rate and profit rate of a firm. Also, the results were suggestive of an adverse effect of taxation on the growth performance of firms.

The analysis presented in the paper is exploratory in character. It is possible and desirable to introduce greater sophistication in the formulation of the theoretical and the econometric model. This is a task for the future.

TABLE 1

Firm Growth Model - Regression Results (OLS Method)

Equation	Dependent Variable	GP	EX	DM	K	(L/K	DP	CT	RS	IR	BR	D_1	D_2	Const.	n	R^2
		Explanatory Variables														
1.	GS	-0.576* (-2.06)	-0.0096 (-1.366)	1.08* (2.13)								0.089 (1.38)	0.026 (0.40)	0.195	471	0.037
2.	GS				0.743** (3.04)	3.23** (5.09)						0.026 (0.40)	-0.023 (-0.36)	0.075	471	0.066
3.	K	0.378** (2.93)					1.108** (2.78)	-0.417* (2.03)	0.074** (2.58)	-0.330** (-3.88)		-0.111** (-7.36)	-0.097** (-6.80)	0.175	471	0.206
3a.	K	0.888** (4.96)					0.986* (2.37)	-1.054** (-4.34)	0.127** (3.73)	-0.382** (-4.21)		-0.087** (-5.47)	-0.081** (-5.48)	0.117	385	0.227
4.	CT	0.515** (37.36)			-0.018* (-1.97)						-0.067** (-12.43)	0.005 (1.81)	0.001 (0.25)	0.003	471	0.812
4a.	CT	0.614** (48.84)			-0.021** (-2.71)						-0.101** (-18.32)	0.009** (3.56)	0.003 (1.21)	-0.005	390	0.903

t - values in parentheses; notation for variables explained in the text.

* statistically significant at 5% level.

** statistically significant at 1% level.

Table 2

Firm Growth Model - Regression Results (2SLS Method)

Equation	Dependent Variable	GP	EX	DM	$\overline{K}$	$\overline{(L/K)}$	DP	CT	RS	IR	BR	D_1	D_2	Const.	n	R^2
1.	GS	-1.425*	-0.0078	1.00								0.094	0.025	0.305	471	0.018
		(-2.51)	(-1.08)	(1.95)								(1.44)	(0.39)			
2.	GS				0.989	3.64*						0.029	-0.009	0.032	471	0.064
					(1.17)	(2.46)						(0.43)	(-0.12)			
3.	$\overline{K}$	-7.970*					0.764*	2.159	0.820*	2.192		0.051	-0.028	0.403	471	-15.711
		(-2.07)					(2.23)	(0.97)	(2.13)	(1.77)		(0.48)	(-0.39)			
3a.	$\overline{K}$	-8.071*					0.573*	2.000	0.831*	2.286		0.069	-0.020	0.412	385	-14.807
		(-2.00)					(2.16)	(0.76)	(2.12)	(1.77)		(0.65)	(00.26)			
4.	CT	0.520**			0.009						-0.066**	0.008*	0.004	-0.003	471	0.808
		(16.12)			(0.68)						(-10.43)	(2.55)	(1.09)			
4a.	CT	0.609**			0.023						-0.114**	0.013**	0.006**	-0.000	390	0.874
		(19.06)			(1.80)						(-16.42)	(4.42)	(2.65)			

t - values in parentheses; notation for variables explained in the text.
* statistically significant at 5% level.
** statistically significant at 1% level.

Figure 1

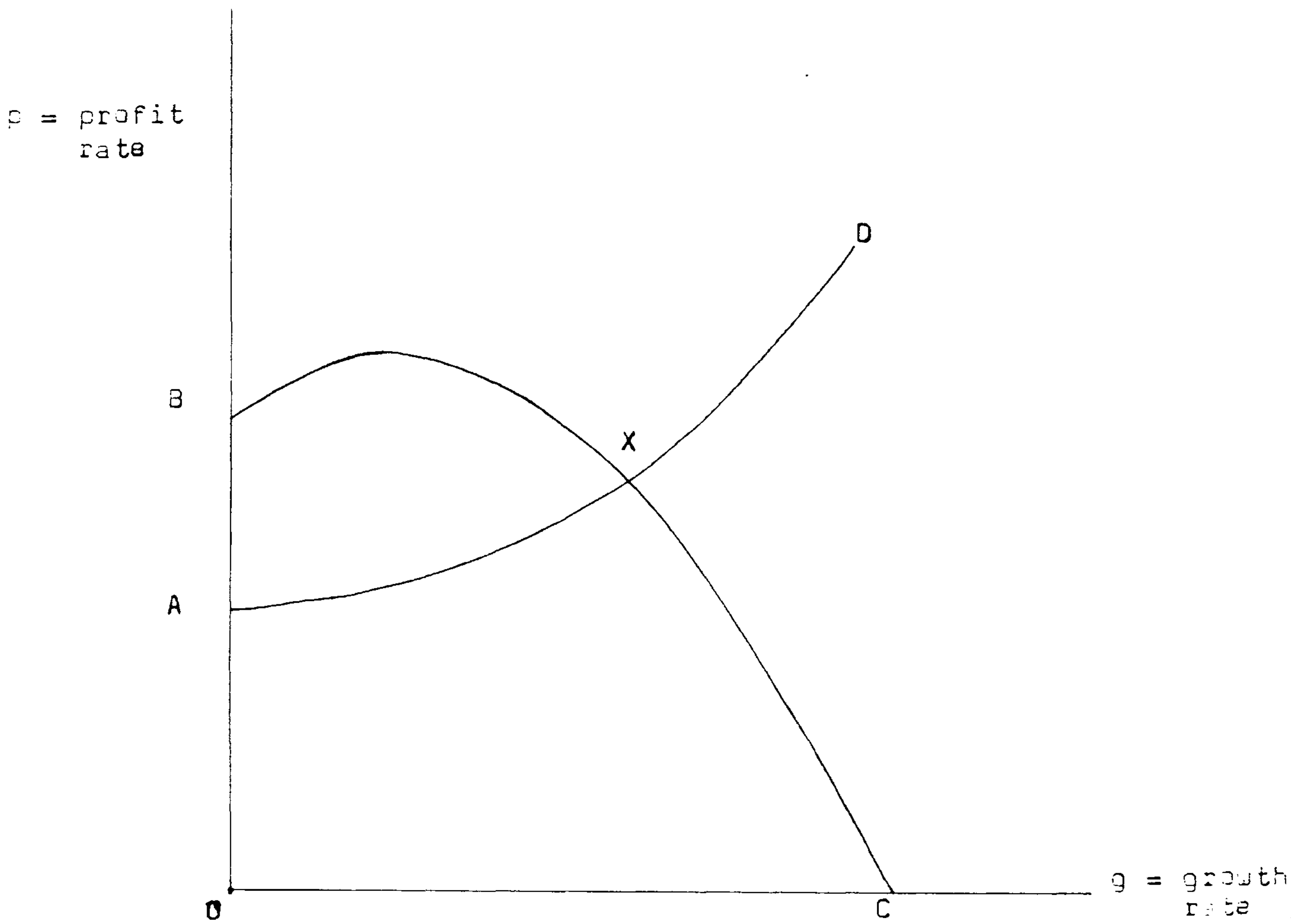


Figure 2

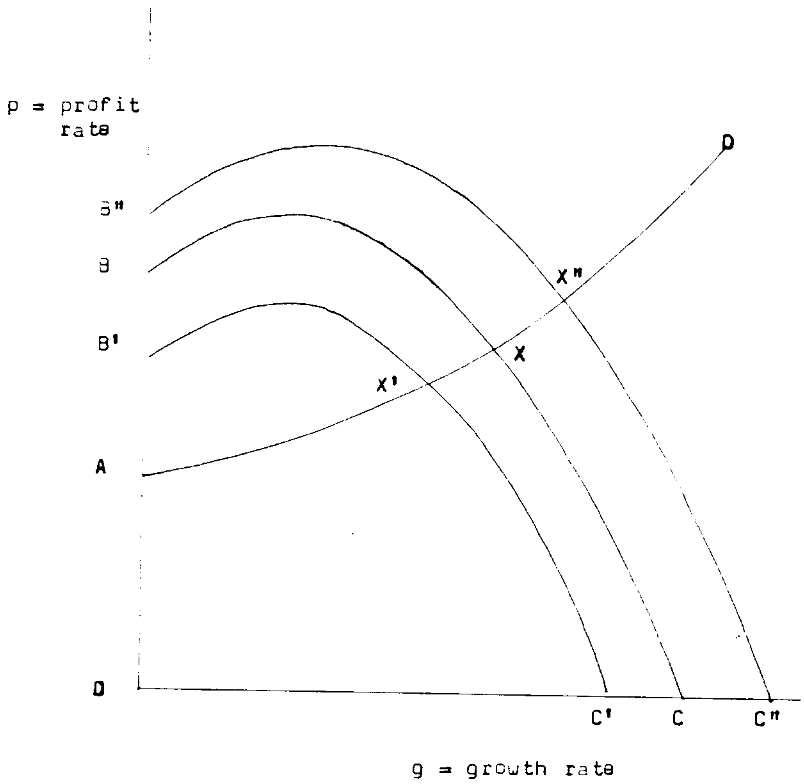
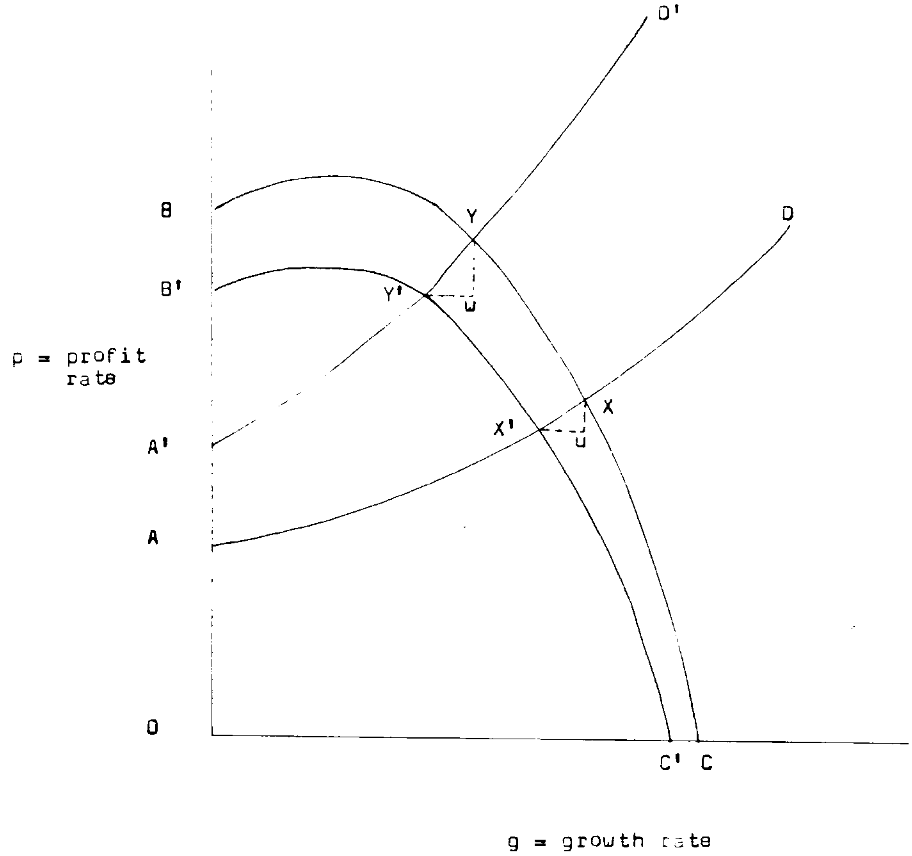


Figure 3



NOTES

1. This makes the definition of growth rate of the firm unambiguous.

2. This limit arises because management must work like a team with adequate coordination between the acts of different members. For the team to function effectively, it is necessary that the individuals have experience of working with others in the team and with the firm. This takes time. Evidently, the size of the organisation cannot be expanded very rapidly without adversely affecting the efficiency of the management.

3. These companies are included in the RBI sample on the basis of which RBI publications on the Finances of Medium and Large Public Limited Companies are brought out. The data have been made available to NIPFP by the RBI. For the present analysis, data for only those companies are used, for which the complete series from 1971 to 1985 is available.

4. These eleven industries are: (1) automobiles, (2) automobiles parts and components, (3) cables, (4) dry cells, (5) electric lamps, (6) other electrical machinery, (7) machine tools, (8) textile machinery, (9) steel tubes and pipes, (10) steel wire ropes, and (11) steel forgings.

5. Industrial Credit and Investment Corporation of India. This is a regular annual publication. The sample coverage is fairly large.

6. For two industries, information on excise duty was not available in the data source mentioned for some of the years. In those cases, the available series has been extrapolated using data on excise revenue collection and output of the relevant industry.

7. It should be pointed out further that in no case the numerical value of the coefficients appears implausible.

8. It is interesting to note that in Table 2 the value of R^2 for eq. (3) is negative. It should be pointed out in this context that the computer package used for the estimation of the system of simultaneous equations by the 2SLS method defines the coefficient of determination (R^2)is such a way that the range for R^2 is not (0, 1) but ($-\infty$, 1). Thus, the reported values of R^2 in Table 2 cannot be interpreted in the same way as the values of R^2 in Table 1, obtained by the

OLS method. For a discussion on this point, see Econometric Models, Techniques and Applicataions by M.D. Intrilligator, p. 392.

9. Some simulation exercises carried out utilising the estimates of the equations (disregarding their inadequacies) indicate that a 10 per cent increase in excise duty will reduce the annual growth rate of the "average" firm by about 1.8 per cent; and a 10 per cent increase in the corporate income tax rate will reduce the growth rate by 1.2 per cent. One cannot, however, rely much on these results, and for this reason the results of simulation have not been presented in the paper.

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