The Rental Cost of Capital for the Manufacturing Sector—1959-1960 to 1970-1971

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Pakistan, like other under-developed countries, is faced with a situation where factor prices do not reflect their scarcity values, thereby leading to a waste of valuable resources in the form of highly capital intensive techniques and excess capacity in the manufacturing sector. Low costs of using capital in Pakistan have been attributed to a combination of factors *e.g.* low rates of interest, overvaluation of domestic currency, low tariffs on machinery imports, and fiscal incentives such as tax holidays and accelerated depreciation aimed at encouraging investment. In this paper a formula incorporating the effect of various such policy packages on the cost of capital has been used to estimate the market and "real" rental cost of capital over time (1959-1960 to 1970-1971) providing a measure of the degree of distortion introduced into the factor market *via* government policies.[1]

An attempt has also been made to examine differentials in capital cost between developed and less developed regions and by firm size. Under-developed areas in Pakistan have been the recipients of special fiscal concessions in the form of longer periods of tax holiday and lower rates of tariff on capital inputs. Small and medium sized firms on the other hand have been at a disadvantage *vis-a-vis* large firms which, due to their influence, have been the major beneficiaries of the licensing system, and have been able to borrow funds at very low interest rates.

In this paper after describing the methodology and data attempt is made to present an analysis of estimates of market cost of capital over time and evaluation of: relative importance of accelerated depreciation, tax holiday, and

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[1]To simplify exposition, we will refer to the rental cost of capital as simply the cost of capital. The cost of capital should not be confused with the financial cost of capital that we discuss below.

other policy variables in reducing cost of capital to the entrepreneur in general; and the degree of advantage in terms of lower costs of capital enjoyed by investors in backward areas *vis-a-vis* those in developed areas.

Then computation of "real" cost of capital over time, using values for interest and exchange rates which are more realistic approximations of their scarcity prices has been presented. Finally price of capital to small and medium size units under various assumptions pertaining to borrowing rates and price of machinery has been estimated.

METHODOLOGY AND DATA

Cost of capital is the opportunity cost to the owner of capital of renting out his assets on an annual basis.[2] The minimum rental value acceptable to the owner of capital will be at least equivalent to the amount he would get if he, himself, were to use the asset for production. Under the assumptions of no government intervention and competitive conditions this minimum rental value (denoted by P_k) is given by the following equation:

$$P_k = k(r+d) \qquad .. \qquad .. \qquad (1)$$

where

k = is the original price of capital

r = is the annual rate of interest (the financial cost of capital)

d = is the rate of economic depreciation

Government policies modify the cost of capital; artificially low interest rates, overvaluation of domestic currency, accelerated depreciation allowance and tax holiday tend to reduce the cost of capital where as corporate taxes and tariffs on imported machinery increase the minimum rental value of assets. Moreover the impact of fiscal factors such as accelerated depreciation allowances and tax holiday varies over the life-time of the asset. The cost reducing effect is more pronounced in the earlier years and decreases over time as the tax exemption period ends and depreciation allowances are used up. Hence a comparison of capital costs for assets operating at different points in their economic life would give results which would not be representative of the costs over each of their respective life spans.

To enable meaningful comparisons between assets with different life spans, the concept has been expanded to the "uniform rental value such that the present value of the stream of uniform rental rates, which are constant in every year of the investment's life, is equivalent to the present value of the variable stream of rental [4]. Owners of capital would therefore be indifferent between receiving the uniform rental rates and the variable stream of rental values resulting from the differential impact of tax and depreciation policies" [4].

Using the above concept and incorporating the important policy variables (interest rates, accelerated depreciation, tax holiday, exchange rate, corporate tax and tariffs) it can be shown that the uniform rental cost of capital is:

[2]This approach to measuring cost of capital was first developed by Jorgenson [8].

$$P_k^* = \frac{K^* \cdot f(1+t)\left[r + \frac{d-u'}{S_1^n}\left(\frac{n}{n+1}\ \frac{d't}{(1+i)^t}\right)\right]}{1 - u'\left(\frac{S^n_{h+1}}{S_1^n}\right)} \quad \ldots \quad (2)$$

P_k^* is the uniform rental value

K^* is the world price of capital goods

f is the official exchange rate

t is the nominal tariff on machinery imports

u' is the rate of corporate tax

d' is the rate of depreciation allowed for tax purposes

i is the discount rate

h is years of tax holiday

$$S_x^y = y \frac{1}{t-x\ (1+i)t}$$

It should be emphasized that this formula is valid only under two fairly restrictive assumptions. The first is that the financial cost of capital is not excludable from income for tax purposes. Second, it is assumed that the amount of financing required remains constant, whereas in reality the balance owned by the owner of the machine would normally decline as part of the principal was returned to the creditor with each annual installment. Nevertheless, our purpose is to show how policies affect the trends in rental values, and these two assumptions affect only the absolute level of the rental payment and not the trend over time.

To estimate actual average capital cost, based on the above formula, it is necessary to have detailed information at a micro level since the effect of fiscal/monetary policies varies from firm to firm depending on the size of firm, type of industry and other factors. Given the lack of requisite data, the formula will be used to show the general trend and not the actual change in the cost of only one component of capital, namely machinery.

ESTIMATES OF MARKET COST OF CAPITAL

The formula presented in the previous section provides a mean of quantifying the effect of fiscal incentives on the cost of capital, making it easier to evaluate and compare the relative attractiveness of various measures to the entrepreneur. All forms of fiscal and monetary incentives reduce cost of capital to some extent, the problem is to determine the degree of reduction caused by a particular policy variable. The purpose is to isolate the effect of different devices and to assess their combined impact on the cost of capital over time.

The analysis is first limited to concessions in the form of accelerated depreciation allowances and tax exemptions granted to industry during the period under study. The "no tax" incentive case is used as a standard of comparison. Then trends in the values for the price of machinery, the tariff rate, the financial cost of capital are discussed.

Accelerated Depreciation Allowances

Accelerated depreciation, by deferring tax payments, is in effect equivalent to an interest free loan and enhances the financial ability of the investor to expand his investment. During 1959-1960 to 1970-1971, the procedures for deducting depreciation allowances underwent two important changes.

During the period 1959-1960 to 1964-1965, a firm not eligible for tax holiday was entitled to four different types of allowances computed on written down value *i.e.* original cost of assets less depreciation allowances granted in preceding years. Initial allowance at the rate of 25 percent cost was admissible in the year of installation or in the first year of commercial production. Also a normal allowance ranging from 7 percent to 40 percent of written down value was given and an average rate of 10 percent was applicable to most industries. An additional depreciation allowance, at a rate equivalent to normal depreciation was granted in the first five years of an undertaking. Extra shift allowances ranging from 50 percent to 100 percent of normal depreciation depending on whether the plant is operating on double or triple shift basis were permitted. Tax holiday enterprises were not entitled to initial or additional allowances. At the end of the tax holiday period, normal and extra shift deductions were admissible on original cost.

During the period 1965-1966 to 1969-1970, additional allowance was discontinued to undertakings established after July 1965. In the case of tax holiday firms depreciation was computed on written down value instead of original cost, the written down value being original cost less normal depreciation over the holiday period.

During the period 1970-1971, a special allowance at the rate of 15 percent of written down value was accorded in the second year of an undertaking. Tax holiday firms could also avail of this allowance in the year immediately succeeding the end of exemption period.

The differential impact on cost of capital of depreciation allowances allowed in the above three periods is obviously reflected in the tax saving potential of each type. The present value of expected tax savings attributable to depreciation deductions over the life of a machine is derived by multiplying the present value of future depreciation allowances by the tax rate.

$$\sum_{t=1}^{n} \frac{d't}{(1+i)t} .u \qquad .. \qquad .. \qquad (3)$$

Where u is the tax rate, d' is depreciation allowed, i is the discount rate and n is the life of the asset. The higher the tax rate, the more accelerated the depreciation allowances, the greater the reduction in potential capital cost.

Table 1

Present Value of Depreciation Allowances as Percentage of Original Cost

	$\sum_{1}^{n} \frac{d't}{(1+i)t}$	$\sum_{1}^{n} \frac{d't}{(1+i)t} .u$	
		u=.5	u=.6
Normal Depreciation procedure[a]	47	23.5	28.2
Period 1959-1960 to 1964-1965	76	38	45
Period 1965-1966 to 1969-1970	67	33.5	40
Period 1970-1971	71	35.5	42.6

[a]Deductions at the rate of 10 percent of written down value.

Maximum benefit of accelerated depreciation was provided in the period 1959-1960 to 1964-1965 as reflected in the highest present value of depreciation allowance. Present value of tax savings being 38 percent and going upto 45 percent for a tax rate of 0.6. Substitution of system prevailing during this period for normal depreciation procedure increased the present tax value of deductions by 62 percent from 23.5 percent to 38 percent.

Table 2

*Computation of Capital Cost**

Years	P'_{ko}	P_{ko}
1959-1960	18.2	14.7
1960-1961	18.2	14.7
1961-1962	18.8	15.4
1962-1963	18.9	15.5
1963-1964	19.3	15.9
1964-1965	19.1	15.6
1965-1966	21.4	19.1
1966-1967	22.4	20.0
1967-1968	23.3	21.0
1969-1970	23.3	21.0
1970-1971	23.1	20.4

Sources: For values of the parameters one stated in detail in the "Appendix on Data Used."

*From equation 2 with u=.5, d=6.2%, n=16, t=1

d': official rate of depreciation

r: Average rate of interest on advances against machinery

k and t: are held constant to isolate the effect of the remaining variables on the cost of capital.

P'_{ko} Capital cost calculated on assumption of normal depreciation procedure.

P_{ko} Capital cost calculated on the basis of actual depreciation deductions allowed over time.

From Table 2 it may be seen that a shift from accelerated depreciation admissible in period I to normal depreciation procedure increases the cost of capital by 22 percent. For period II the difference between P_{ko} and P'_{ko} is reduced to 12 percent because depreciation allowances are less liberal. As mentioned earlier, the additional allowance was discontinued for undertakings installed after 1965. In 1970-1971 with the introduction of the special depreciation allowance, the difference between P'_{ko} and P_{ko} increased by 13 percent.

Tax Holiday

The tax holiday scheme introduced in 1959 granted complete exemption from income tax to new undertakings provided they used local raw materials and re-invested 60 percent of their profits. In 1960 these conditions were liberalized and existing firms could enjoy tax holiday privileges if development or expansion consisted of an identifiable new unit. Changes over time in duration of holiday for developed, semi-developed and under-developed regions are summarised as follows:

	Developed	*Semi-Developed*	*Under-Developed*
Period I (1961-1962—1964-1965)	4 years	6 years	8 years
Period II (1965-1966—1969-1970)	2 years	4 years	6 years
Period III (1970-1971)	0	3 years	6 years

Table 3

Cost of Capital for Varying Tax Holiday Periods

Years	P'_{ko}	P_{ko}	P_{k8}	P_{k6}	P_{k4}	P_{k3}	P_{k2}
1961-1962	18.8	15.4	12.9	13.5	14.3		
1962-1963	18.9	15.5	13.0	13.0	14.3		
1963-1964	19.3	15.9	13.2	13.7	14.6		
1964-1965	19.1	15.6	13.0	13.6	14.4		
1965-1966	21.4	19.1		16.2	17.2		18.4
1966-1967	22.4	20.0		16.8	17.8		19.2
1967-1968	22.7	20.3		17.0	18.0		19.4
1968-1969	23.3	21.0		17.4	18.5		19.9
1969-1970	23.3	21.0		17.4	18.5		20.0
1970-1971	23.1	20.4		17.1		18.8	

Note: The other parameter values of equation (2) are the same as in Table 2.

P'_{ko} Cost of capital with no tax holiday and normal depreciation procedure.

P_{ko} Cost of capital with no tax holiday and accelerated depreciation.

P_{k8}, $_{k6}$, $_{k4}$, $_{k3}$, $_{k2}$,: Cost of capital for firms eligible for 8, 6, 4, 3 and 2 years of tax holidays respectively.

Table 4 summarizes information on cost of capital differentials across regions. Comparison of capital cost for the no incentive case (P'_{ko}) with capital cost for eight year tax holiday firm in Period I gives the maximum cost differential of 46 percent. For Period II and III there is a decrease in the differential between P'_{ko} and P_{kud} mainly due to a shorter tax holiday period (from 8 to 6 years) for under-developed regions. Furthermore from July 1965 onwards depreciation deductions, in the case of tax holiday firms, were made on written down value and not on original cost.

Table 4

Relative Differences in Cost of Capital for Varying Tax Holiday Periods

	P'_{ko} P_{kud}	P_{ko} P_{kud}	P_{kd} P_{kud}	P_{ksd} P_{kd}	P_{kd} P_{ksd}
Period I	46%	19.6%	10.5%	4.5%	6%
Period II	33%	20%	14%	6%	8%
Period III	35%	19%	19%	10%	9%

P'_{ko} Cost of capital with no tax holiday and normal depreciation procedure

P_{ko} Cost of capital with no tax holiday and accelerated depreciation.

P_{kud}, P_{ksd}, P_{kd} Cost of capital for tax holiday firms located in under-developed, semi-developed and developed regions respectively.

The "no incentive" case is merely a hypothetical standard of comparison. Most firms not eligible for tax holiday still enjoy accelerated depreciation allowances. The differential between P_{ko} and P_{kud} is fairly low (19 percent).

Comparing firms within the tax holiday scheme, cost differentials although not very substantial initially increased over time. The difference in the rental cost of capital between developed and under-developed areas went up from 10 percent in period I to 19 percent in Period III. The difference in exemption periods applicable to developed and backward areas increased from four years to six years. Between semi-developed areas and under-developed regions, the capital cost differential was only 4 percent in Period I, if the investor chose the semi-developed location. By Period III the cost difference had gone up to 10 percent.

The tax holiday scheme provides the greatest benefits for undertakings expecting high profits in the initial years. Relatively lower profits in under-developed areas due to infrastructural obstacles considerably diminishes the incentive impact of tax exemptions.

The Rental Cost of Capital at Market Prices

The rental cost of capital more than doubled from 1959-1960 to 1970-1971 as can be seen in Table 5. Substantial increases took place after 1964-1965, rising over the Third Plan period by 102 percent, as compared to 14 percent over the second plan period.

Table 5

The Market Cost of Capital Equipment: 1959-1960—1970-1971

Years	r	K	t	P_{ko}
1959-1960	5.74	100	10%	16.2
1960-1961	5.72	101	12.5%	16.7
1961-1962	6.08	101	12.5%	17.5
1962-1963	6.13	102	12.5%	17.8
1963-1964	6.3	103	12.5%	18.4
1964-1965	6.21	105	12.5%	18.5
1965-1966	7.36	108	25%	25.8
1966-1967	7.84	109	25%	27.3
1967-1968	7.98	109	40%	31.0
1968-1969	8.29	112	40%	32.8
1969-1970	8.3	119	50%	37.4
1970-1971	8.22	126	50%	38.5

The slow rate of increase in Period I was due to a combination of factors —a negligible rise in interest rates from 5.74 percent in 1959-1960 to 6.21 percent in 1964-1965, the machinery price index showed an increase of only five points, and tariff rates remained unchanged at 12.5 percent.

In 1965-1966 capital costs shot up by 40 percent which was nearly triple the increase registered in the entire preceding period. The sudden rise in cost was a reflection of changes in policy objectives over the third plan period. Greater emphasis was placed on the development of the intermediate and capital goods industry. With a view to increasing protection to this sector tariff rates on machinery were doubled. In the preceding year, the bank rate had been raised from 4 percent to 5 percent in recognition of the need to rationalize the interest rate structure, average interest rate on advances went up by 18 percent from 6.2 percent to 7.3 percent. The policy of additional depreciation allowances was terminated.

Cost of capital rose at an annual average rate of 10 percent over the next four years, annual average increase in interest rates and machinery prices being 2 percent and 3 percent respectively. Larger than average increase in capital cost over 1967-1968 and 1969-1970 coincided with increase in tariff rates.

TRENDS IN "REAL" COST OF CAPITAL

Computations of the market cost of capital, *i.e.* the cost to the entrepreneur, were based on the actual costs to investors of borrowed funds and foreign exchange. These costs were the outcome of a system of exchange control and distortions in the operation of financial markets. The real rental value of capital excluding these market distortions can be calculated by imputing shadow prices to foreign exchange and interest and by eliminating the cost reducing effect of fiscal incentives. Shadow prices reflect the social opportunity cost of a factor taking into account all alternative uses. Estimates of shadow prices for Pakistan can be made as follow.

Capital

The going rate of profits in the manufacturing sector would set the price of borrowed funds high but would not be appropriate in face of distortions in input and output prices. Shahrukh Rafi [10] revaluing inputs and outputs at world prices, arrived at estimates of rates of return to capital ranging from 11.7 percent to 15.4 percent depending on assumptions made for the shadow wage rate. A.R. Khan [9] argues that potential opportunity cost of capital for the economy as a whole, in terms of foregone alternatives, is likely to be higher than that for any one sector, and feels that the social rate of return is not less than 15 percent. This is the value we have used in our computations of equilibrium cost of capital.

Foreign Exchange Rate

Capital equipment used in the large scale manufacturing sector was mostly imported during the 1960—1971 period. Due to distortions introduced by the exchange control system, the price paid for imported capital goods by a licence holding industrialist greatly understated the scarcity value of foreign exchange.

In the presence of quantitative controls, excess demand at low official price of foreign exchange is reflected in high markup over the cif value of imported goods in the domestic market. Using estimates of markup rates computed by Pal [16], by direct comparison of cif and domestic prices of a selected sample of imports, Islam [6] derives an average markup on all imports. The rate of markup in the nature of a scarcity premia is arrived at by deducting normal profits and distribution costs[3] from this average markup rate. Further assuming that the rate of markup (exclusive of normal profits) is equal to the ratio of the scarcity price to official price of foreign exchange, overvaluation of domestic currency is defined as:

$$\frac{\overset{*}{e} - \hat{e}}{\hat{e}} \cdot 100 = \frac{[-\hat{e}\,(\alpha-\beta-\gamma)-\hat{e}]}{\hat{e}}$$

where

$\overset{*}{e}$ Scarcity price of a unit of foreign exchange

$\hat{e}$ Official exchange rate

α ratio of market price of C and F value

β normal profit as a percentage of C and F value $\div$ 100

γ cost of distribution as percentage of C and F value

Since direct price observations were available for 1963-1964 only, Islam [6] worked out a formula to compute rate of overvaluation for the remaining years. Using his methodology, we have approximated the shadow price of foreign exchange for the period 1959-1960 to 1970-1971. Details regarding methodology and data used are given in Appendix Table 2.

A comparison of estimated shadow or "real", and market costs of capital, as seen in Table 6, indicates the high degree of distortion introduced in

[3]Normal profits and distribution cost are assumed to be 30 percent of cif value.

to market prices by way of government policies. For the years 1962-1963 to 1964-1965 market cost of capital was as low as one-fourth it's equilibrium price. In the case of eight year tax holiday firms the ratio of market to equilibrium price went to one-fifth reflecting a subsidy on capital use of 80 percent of the equilibrium price.

Table 6

Estimated Real Cost of Capital and Market Cost of Capital to Tax Holiday Firms

Years	at shadow prices	At market prices				
		Length of tax holding				
		10 year	8 years	6 years	4 years	2 years
1959-1960	59.1	16.2	13.7	14.3	15.1	
1960-1961	54.7	16.7	14.8	14.8	15.5	
1961-1962	59.4	17.5	14.67	15.3	16.2	
1962-1963	72.7	17.8	14.9	15.5	16.5	
1963-1964	72.6	18.4	14.6	15.9	16.9	
1964-1965	78.6	18.5	14.7	16.1	17.1	
1965-1966	69.4	25.8		21.0	23.2	24.9
1966-1967	79.2	27.3		22.0	24.3	26.2
1967-1968	90.1	31.0		25.89	27.5	29.7
1968-1969	106.5	32.8		27.2	29.0	31.3
1969-1970	110.5	37.4		21.0	33.0	35.6 (P_{k3})
1970-1971	152.7	38.5		32.4		

Source: Table 1 and 4.

The divergence between the rental costs at shadow and market prices narrowed appreciably in 1965; the estimated "real" cost of capital showed a decrease of 11 percent over the 1964 value while the market cost went up by 40 percent for reasons already described. The average subsidy for the remaining years of the third plan was reduced to 66 percent of the equilibrium price for the firm not entitled to exemption and to 75 percent in the case of eight years tax holiday firms. The trend towards a reduced differential between shadow market costs was reversed in 1970-1971 mainly due to a sharp rise in the shadow price of foreign exchange. Estimates of the shadow price of exchange for the last three years of period under review seem exaggerated and should be assessed keeping in mind the shortcomings of method used to estimate overvaluation of domestic currency mentioned earlier in this section.

COST OF CAPITAL FOR THE SMALL ENTREPRENEUR

The benefits of subsidized capital were not spread evenly among all investors, but went disproportionately to the large, well established industrialists. Facilities of low interest charges and cheap foreign exchange were enjoyed primarily by the large firms whose wealth and power was instrumental for their easy access to credit and licences. Sanction from an agency like PICIC meant not only release of foreign exchange for import requirements but also automatic financing at low interest rates.

On the other hand the small entrepreneur had difficulty obtaining funds from the commercial banks. He was considered a lending "risk" and when he did manage to obtain credit it was available at substantially less favourable terms.

The equipment needs of the small scale sector were largely met by local machinery. According to survey [12] 86 percent of the machinery used in this sector was produced domestically. When imported machinery was required by small scale firms, it was bought at higher mark-ups from commercial importers since it was nearly impossible for a small producer to obtain a licence. An attempt has been made in this section to evaluate the differential impact of incentive measures on the small industrialist *vis-a-vis* larger firms.

Cost of capital to the small entrepreneur has been estimated on the basis of the following assumptions regarding interest rates and price of domestic machinery.

(1) Capital cost computed for two sets of values for interest rates

r_1 = Maximum interest rates charged for advances against machinery. Data on interest rates were taken from the Banking Statistics of Pakistan 1971-1972

r_2 = Interest rate 2 percent higher than the average rate applicable to advances against machinery.

(2) Price of local machinery is assumed to be equal to the domestic price of imported goods. Average mark-ups on landed cost for machinery imported under licence are available for 1964-1965 Pal [16] and 1966-1967 of Alamgir [1]. The Price of domestic machinery is derived by the following formula:

$$k_d = K(1+t)\ (1+\gamma)$$

where

k_d price of domestic machinery

K C and F value of imported machinery

t tariff rate on machinery

γ Markup on landed cost

From Table 7 we see that even under the most favourable assumptions ($r=1_1$, u=0.45) the rental cost of capital to the small industrialist in 1964-1965 was twice as high as the price facing the big industrialist. Use of maximum interest rates (r_2) and average tax rate of 0.5, further increases the difference, costs to the small scale producer going up to three times what they were to the large scale producer.

From 1964-1965 to 1966-1967, the cost of capital to the small scale entrepreneur increased by 40 percent as compared to 47 percent for the large scale industrialist. The relatively slower rate of increase was mainly due to a fall in the markup on imported machinery following import liberalization.

Table 7

Estimates of Cost of Capital to the Small Entrepreneur (P_{ks})

		P_{ks} u = 0.5		P_{ko}	P_{ke}	P_{ks} u = .45	
		r_1	r_2			r_1	r_2
1964-1965	0.74	40.4	56.02	18.5	78.6	37.3	51.5
1966-1967	0.71	56	66.1	27.3	79.2	51.5	60.59

Looking at the difference between estimated real cost of capital and private cost to the small entrepreneur it is evident that capital use was subsidized to a much lesser degree in the small scale sector.

CONCLUSIONS

The market cost of capital showed an appreciable increase over the third plan period as the result of higher tariff rates, less liberal depreciation allowances and rising interest rates. A comparison with estimates for the real estimated cost of capital indicates that although the divergence between private and social cost was reduced slightly in the late sixties, use of capital was still being subsidized in 1970-1971 to the extent of two-thirds of its equilibrium price. A much lower level of subsidy to the small entrepreneur, amounting to 17 percent of the equilibrium price, reflected the inequities generated by the discriminatory policies of commercial banks and licensing authorities.

The use of tax holiday and concessionary tariffs had significantly reduced capital costs in under-developed areas. The cost of using capital to an undertaking not entitled to exemptions was on the average 25 percent higher than to firms receiving eight year and six year tax holidays. However, the potential for increasing the regional cost differential in favour of backward areas was not fully realized due to the availability of very liberal depreciation allowances to non-tax holiday areas. It should be pointed out here, that the impact of fiscal incentives on the cost of capital would be over-stated if tax practices are characterized by widespread evasion, since the effective tax rate from which exemption is granted is lower than the nominal tax rate.

This study has estimated the degree to which government policies have subsidized the use of capital. To what extent were government objectives met by the artificially low cost of capital? This question requires detailed investigation on various issues. It is necessary to evaluate the responsiveness of investment to capital costs in the context of the Pakistan industrial sector. How important are factors like risk, uncertainty, economic and political climate which are not considered in the formula? How effective were low capital prices as a means of channelling investment into the approved sectors? To what extent did favourable cost differentials for backward areas compensate for infrastructural obstacles? The answers to these questions require further research.

APPENDIX ON DATA USED

Data:

K: Since most capital goods are imported, the unit value index of exports of manufactured goods from developed countries is taken as a proxy for capital price index. From 1950-1960 to 1971 machinery averaged 40 percent of manufactured exports. Furthermore, changes in the unit value index of manufactured exports followed the same pattern as movements in the wholesale price index of machinery for the United States, as can be seen in Appendix Table 3.

Source: *Monthly Bulletin of Statistics* (United Nations)

t: Tariff rate on machinery.

Source: *Fiscal Policy in Pakistan* Vol. I and II, Ministry of Finance, Pakistan.

f: The official exchange rate remained unchanged over the period, hence f is assumed to be one for computations of market cost.

d,n: The average rate of economic depreciation in the manufacturing sector assumed to be 6.2 percent based on an estimated length of life of 16 years.

Source: *Schedule of Depreciation rates in West Pakistan*—1967-1968 (Planning Division, Govt. of Pakistan.)

r: Average rate of interest on advances against machinery.

Source: *Banking Statistics of Pakistan*—1971-1972, State Bank of Pakistan.

d′: Depreciation deductions for tax purpose applicable at a rate of 10 percent for most industries. Details about accelerated depreciation given in Section II.

Source: Abdur Rab. *Income Taxation in Pakistan.* Pakistan Institute of Development Economics, Islamabad. Research Report No 45, December 1965.

u: Nominal tax rate was 60 percent, however due to various rebates an effective tax rate of 50 percent is used for calculation of capital cost. Larry White [19] places the average tax rate on profits (exclusive of tax holiday and accelerated depreciation) at 47.9 percent.

Source: Abdur Rab. *Income Taxation in Pakistan.* Pakistan Institute of Development Economics, Islamabad. Research Report No. 45, December 1965.

Appendix Table 1

Calculations Market Cost of Capital Machinery

		$\sum_{h+1}^{n} \frac{d't}{(1+i)^t}$	u/s_1^n	$\sum_{h+1}^{n} \frac{d't}{(1+i)^t}$		$r+d-u/s_1^n \sum_{(h+1)}^{n} \frac{d't}{(1+i)^t}$				
				Years	r+d	TH_0	TH_2	TH_4	TH_6	TH_8
Period I (1959-1960 to 1964-1965)	No.TH	.7624	.0457	1959-1960	.1194	.0737		.0972	.1016	.1055
	TH_8	.2323	.0139	1960-1961	.1192	.0735		.097	.1014	.1053
	TH_6	.2963	.0178	1961-1962	.1228	.0771		.1006	.105	.1089
	TH_4	.3703	.0222	1962-1963	.1233	.0776		.1011	.1055	.1094
				1963-1964	.125	.0793		.1028	.1072	.1111
				1964-1965	.124	.0783		.1018	.1062	.1101
Period II (1965-1966 to 1969-1970)				1965-1966	.1356	.0954	.1133	.121	.1262	
	TH_0	.6708	.0402	1966-1967	.1404	.1002	.1181	.1258	.131	
				1967-1968	.1418	.1016	.1195	.1272	.1348	.1324
	TH_2	.3717	.0223	1968-1969	.1449	.1047	.1226	.1303	.1303	.1355
	TH_4	.2431	.0146	1969-1970	.145	.1048	.1227	.1304	.1356	
				1970-1971	.1442	.1018	TH_3		.1336	
	TH_6	.1574	.0094				.1242			
Period III (1970-1971)	TH_0	.7071	.0424							
	TH_6	.1769	.0106							
	TH_3	.3347	.02							

—Continued

Appendix Table 1—*Contd.*

$$\frac{1-u(s^n_{h+1})}{(S^n_1)} \qquad \frac{r+d-u}{s^n_1}\left(\sum_{h+1}^{n}\frac{d't}{(1+i)^t}\right)\Big/\,1-u(s^n_{h+1}/s^n_1)$$

		TH_0	TH_2	TH_4	TH_6	TH_8
Period I (1959-1960 to 1964-1965)	$TH_0=.5$	.1474		.1379	.1303	.1249
	$TH_2=.615$	.147		.1376	.13	.1246
		.1542		.1427	.1346	.1289
	$TH_3=.66$	.1552		.1434	.1353	.1295
		.1586		.1458	.1374	.1315
	$TH_4=.705$	.1566		.1444	.1362	.1303
Period II (1965-1966 to 1969-1970)	$TH_8=.78$	.1908	.1842	.1716	.1618	
		.2004	.192	.1784	.1679	
	$TH_8=.845$	.2032	.1943	.1804	.1697	
		.2094	.1993	.1848	.1737	
		.2096	.1995	.1850	.1738	
		.2036	TH_3		.1712	
			.1881			

—*Continued*

Appendix Table 1—*Contd.*

$$K(1+t)\left[(r+d-u/s_1^n \sum_{h+1}^{n} \frac{d't}{(1+i)^t}\right]/1-u(s_{h+1}^n/s_1^n)$$

	K	t %	K(1+t)	P_{ko}	P_{k2}	P_{k4}	P_{k6}	P_{k8}
1959-1960	100	10	110	16.21		15.17	14.33	13.74
1960-1961	101	12.5	113.62	16.7		15.63	14.77	14.16
1961-1962	101	12.5	113.62	17.52		16.21	15.29	14.65
1962-1963	102	12.5	114.75	17.8		16.46	15.53	14.86
1963-1964	103	12.5 (7.5% TH_8)	115.87	18.38		16.89	15.92	14.56
			110.72	18.5		17.06	16.09	14.71
1964-1965	105	12.5 (7.5%)	118.12	25.76	24.87	23.17	20.97	
1965-1966	108	25 20%(TH_6)	112.87	27.3	26.16	24.31	21.96	
1966-1967	109	25 20%	133	31.0	29.65	27.53	25.89	
1967-1968	109	40	129.6	32.83	31.25	28.98	27.24	
1968-1969	112	50	136.25	37.41	35.61	33.02	31.02	
1969-1970	119	50	130.8	38.48	P_{k8}		32.36	
1970-1971	126		152.6		35.55			
			156.8					
			178.5					
			189					

K: Unit value of index of exports of developed countries.
u=.5 u/s_1^n =. 06
s_1^n=7.82 n=16 years
d=6.72% i=0.1

Appendix Table 2

Index of Wholesale Price by Commodities Base 1963-1964

Weights	Commodity	1959-1960	1960-1961	1961-1962	1962-1963	1963-1964	1964-1965
.042	Tobacco	95.2	96.2	92.3	88.5	100	101.6
.013	Tyres and Tubes	101.0	100.9	99.0	97.3	100	104.9
.085	Sugar refined	82.4	82.4	85.2	91.1	100	104.8
.128	Mineral Oil	90.7	90.7	90.7	91.2	100	100
.032	Paper and Newsprint	85.8	85.8	96.8	97.8	100	102.5
.638	Metal	79.2	73.1	79.6	107.2	100	79.2
.063	Coal and Coke	102.6	92.2	92.2	92.2	100	109.4
	Index of domestic wholesale price imports: West Pakistan						
		83.64	79.18	83.71	101.73	100	88.07
	Unit value Index of Imports into West Pakistan						
		99.2	102.6	100.4	100.3	100	83.3
		.6	.48	.6	.94	.92	1.04

Continued

Appendix Table 2—*Contd.*

Weights	Commodity	1965-1966	1966-1967	1967-1968	1968-1969	1969-1970	1970-1971
.042	Tobacco	104.0	102.7	106.7	101.0	111.0	108.3
.013	Tyres and Tubes	107.3	112.7	120.9	122.0	123.1	123.4
.085	Sugar refined	95.5	87.6	104.1	97.7	97.7	89.4
.128	Mineral Oil	104.1	125.7	127.0	128.6	130.8	138.2
.032	Paper and Newsprint	106.3	107.2	105.6	112.1	116.1	124.8
.638	Metal	90.2	94.9	110.6	136.8	150.5	192.7
.063	Coal and Coke	122.1	126.6	141.7	165.5	183.5	182.1
		95.82	101.27	114.03	131.89	142.59	169.8
		105.3	98.6	97.7	97.5	107.7	98.9
		0.75	0.98	1.25	1.59	1.53	2.3

Appendix Table 3

Machinery Price Index

Year	(1)	(2)	(3)
1959-1960	100	100	100
1960-1961	101	—	100
1961-1962	101	—	98.9
1962-1963	102	—	99.2
1963-1964	103	—	99.9
1964-1965	105	102	103.6
1965-1966	108	—	105.8
1966-1967	109	108	107.7
1967-1968	109	112	108.4
1968-1969	112	115	111.3
1969-1970	119	121	112.4
1970-1971	126	126	112.4

Column (1) Index of Unit Value of Exports of Manufactured goods from Developed Countries.
Source: Monthly Bulletin of Statistics U.N. Publication.

Column (2) Wholesale Price Index of Machinery, United States.
Source: U.S. Statistical Abstract.

Column (3) Domestic Wholesale Price Index of Machinery—West Pakistan.
Source: 25 years of Pakistan.

Appendix Table 4

Real Estimated Cost of Capital—Machinery

			K	f	K.f	P_{KE}
r	.15	1959-1960	100	1.61	161	59.1
d	.062	1960-1961	101	1.48	149.5	54.7
r+d	.212	1961-1962	101	1.6	161.6	59.4
u	.5	1962-1963	102	1.94	197.8	72.7
u/S_1^n	.06	1963-1964	103	1.92	197.6	72.6
(a): $\sum_{t=1}^{n} \frac{d't}{(1+i)} t.$		1964-1965	105	2.04	214	78.6
	.4725	1965-1966	108	1.75	189	69.4
		1966-1967	109	1.98	215.8	79.2
		1967-1968	109	2.25	245.3	90.1
(b): $u/S_1^n . \sum_{1}^{n} \frac{d't}{(1+i)} t.$	.0284	1968-1969	112	2.59	290	106.5
(c): r+d−(b)	.1836	1969-1970	119	2.53	301	110.5
(d): $\frac{r+d-(b)}{1-u}$	.3672	1970-1971	126	3.3	415.8	152.7

f : Scarcity value of foreign exchange expressed as a multiple of the official rate.
K : Unit value of exports of manufactured goods from developed countries.
P_{KE} : Estimated cost of capital.

Appendix Table 5

Market Cost of Capital—Small Scale Sector

	β	Normal Markup	ϒ	K(1+t)	K(1+t)(1+ϒ)	r_1	r_2	d	(a)
1964-1965	62.2	12%	74%	118.12	205.5	8.21	12	6.2	.7624
1966-1967	58.8	12%	71%	136.25	233	9.84	12	—	.6708

: markup on land cost (conclusive of normal profits) : +normal markup

Calculation $r=r_1$, $u=.5$, $u/s_1^n = .06$

	r+d	(b)	(c)	(e)	P_{ks}
1964-1965	.1441	.0457	.0984	.1968	40.44
1966-1967	.1604	.0402	.1202	.2404	56
	$r=r_2$	$u=.5$,	$u/s_1^n = .06$		
1964-1965	.182	.0457	.1363	.2726	56.02
1966-1967	.182	.0402	.1418	.2836	66.09
	$r=r_1$,	$u=.45$	$u/s_1^n = .058$		
1964-1965	.1441	.0442	.099	.1816	37.32
1966-1967	.1604	.0389	.1215	.2209	51.47
	$r=r_2$	$u=.45$,	$u/s_1^n = .058$		
1964-1965	.182	.0442	.1378	.251	51.06
	.182	.0389	.1431	.26	60.59

(a) $\sum_{1}^{n} \frac{d't}{(1+i)^t}$

(b) $u/s_1^n \sum_{1}^{n} \frac{d't}{(1+i)^t}$

(c) r+d − (b)

(d) 1−u

(e) $\dfrac{r+d-u/s_1^n \sum_{1}^{n} \frac{d't}{(1+i)^t}}{1-u}$

Construction of Wholesale Domestic Price Index of Imported Commodities

Following commodities used to construct domestic wholesale price index.

(1) Tobacco
(2) Refined sugar
(3) Mineral oils (kerosene oil and motor spirit)
(4) Paper and newsprint
(5) Tyres and tubes
(6) Coal and Coke
(7) Metal

Indices of wholesale prices of these commodities for West Pakistan, were weighted by a five year (1960—1965) average of their value in total imports to arrive at the composite index. Value of imports were taken from Nurul Islam's Imports of Pakistan—Growth and Structure.

Index numbers of unit value of imports and wholesale price indices for selected commodities (both for West Pakistan) were taken from 25 years of Pakistan and were recomputed with 1963-1964 as base.

APPENDIX II

Indirect method of estimating overvaluation of domestic currency evolved by Islam is given below:

ρ_b = rate of overvaluation of domestic currency at the official exchange rate in period b

$$\rho_{b'} = \left[\frac{\overset{*}{e}b - \hat{e}b}{\hat{e}b}\right] = \left[\frac{e^*_b - e^c_b}{e^c_b}\right]$$

p_c = domestic wholesale price index of the major imported goods; with

p_b = 100

m_c = import price index; with $m_b = 100$

Subscript b = base period, July 1963-June 1964

Subscript c = current period, *i.e.*, each of the years under consideration except the base year.

By definition

$$(e^*_c/e^*_b).100 = p_c \text{ : or, } (e^*_c) = 100 = p_c\ e^*_b$$

and $$(e^c_c/e^c_b).100 = m_c; \text{ or } (e^c_c).100 = m_c\ e^c_b$$

$$e_c = \frac{(e_c^* - e_c^c)}{e_c^c}$$

$$= [(p_c\, e_b^*) - (m_c\, e_b^c)] / m_c\, e_b^c$$

$$= p_c/m_c)\, [(e_b^*) - (m_c / p_c)]$$

$$= (p_c/m_c)\, [\{ (e_b^*/e_b^c) - 1 \} - \{ (m_c/p_c) - 1 \}]$$

$$= (p_c/m_c)\quad (e_b - \lambda c)$$

where $\lambda c = [(m_c/p_c) - 1]$

Data requirements for calculating scarcity values by this formula are as follows:

(1) domestic wholesale price index of imported commodities with base 1963-1964.

(2) Import price index with base 1963-1964.

(3) eb : markup of scarcity price of foreign exchange on official price in the base year.

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