The Effect of Tax Holiday on Investment Decisions: Some Comments

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In the Winter 1974 issue of the *Pakistan Development Review*, Messrs: Azhar and Sharif have published an article entitled "The Effects of Tax Holiday on Investment Decisions: An Empirical Analysis." It was an interesting article in a very useful area of research. Apart from other subsidies, tax holidays are granted to encourage investment generally, but in certain areas particularly. Thus a study on tax holiday is important from the policy point of view as it helps decide whether to reintroduce the tax holiday policy which was abolished in 1972. Unfortunately, there are some conceptual and methodological problems in the study so that the results presented by Azhar and Sharif are rather suspect. However, before taking up these problems, let it be pointed out that the conclusions drawn by Azhar and Sharif regarding ineffectiveness of the tax holiday policy in encouraging private investment is not quite correct. Their study showed that 20 percent of firms would not have invested if they had not been granted tax holidays. A policy which encourages investment by 20 percent cannot be called ineffective. Before drawing any such conclusions, one is advised to look at the relative effectivenesses of different investment-promoting policies.

Regarding the methodological problems in the study by Azhar and Sharif, it is significant that the authors assumed that the life of a project was equal to the tax holiday period. Such an assumption implies that the minimum profits required to establish a firm in a particular area rises as the tax holiday period decreases, and in particular as the tax exemption period $\rightarrow 0$, the minimum profits required to start an industry $\rightarrow \infty$ However, on the other hand, one would expect that the minimum profits required to establish an industry in an underdeveloped area would be higher than those in a developed area.

The profitability conditions under which tax holiday would encourage investment when the life of a project is greater than the tax exemption period can be derived as described in the following paragraph.

Let a firm have a constant profit per unit of capital (P) over time. The firm is exempted from tax for the first (a) years and pays a tax that is (i) percent of the profits in the period of (a) to (b) years. Then the present value of a Rupee invested in the year (o) will be

$$V_a = -1 + P\int_o^a e^{-rt}\,dt + P(1-i)\int_a^b e^{-rt}\,dt \quad \ldots \quad (1)$$

$$= -1 + \frac{P}{r}\left[1 - e^{-ra}\right] - \frac{P}{r}(1-i)\left[e^{-ra} - e^{-rb}\right] \quad \ldots \quad (2)$$

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If no tax exemption is given, then the present value of a Rupee invested at time t = o, would be

$$V_b = -1 + P(1-i)\int_o^b e^{-rt}\,dt \quad \ldots\ldots\ldots\ldots\ldots \quad (3)$$

$$V_b = -1 + \frac{P(1-i)}{r}\left[1 - e^{-rb}\right] \quad \ldots\ldots\ldots\ldots\ldots \quad (4)$$

The following inequality will have to be satisfied if the tax holiday has to be effective in encouraging investment:

$$V_b < 0 < V_a$$

After rearrangement, (5) implies

$$P\left[\frac{1 - ie^{-ra}}{1 - e^{-rb}} - (1-i)\frac{e^{-rb}}{1 - e^{-rb}}\right] > \frac{r}{1 - e^{-rb}} > P(1-i) \ldots (6)$$

As may be, observed from (6), the only additional information required is that of (b), *i.e.* the life of the project, which is easily available from [1]. When b = a, this equation stands for the inequality reported by Azhar and Sharif, *i.e.*

$$P(1-i) < \frac{r}{1 - e^{-rb}} < P \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (7)$$

We have used the same values for other parameters, *i.e.* i = 0.50 and r = 0.10. On the basis of these parameters, the present value with tax exemption, as a percentage of profits, is derived and is reported in Table 1.

Table 1

Present Value with Tax Exemption as a Percentage of Profits

Tax Holiday Period	*Percentage of Profits**
2 Years	61.1
4 Years	70.2
6 Years	77.6
8 Years	83.7

*These percentages have been calculated on the basis of b = 17, i = 0.50, and r = 0.10.

The critical minimum profits, i.e. $\frac{r}{1 - e^{-rb}}$ works out to be 12.24 percent.

Since Azhar and Sharif have not given specific data sources in their study beyond saying that they derived their data from the Balance Sheets, it has not been possible for the present writer to use the same data. Moreover, the profit percentages reported by them for some firms were as high as 258 percent a figure which makes one look away at the quality of data utilised by Azhar and Sharif. However, we have made use of the Balance Sheets compiled by the State Bank of Pakistan to ascertain the results arrived at by Azhar and Sharif. Of the total sample of 40 firms used by Azhar and Sharif in their study, the Balance Sheets compiled by the State Bank of Pakistan listed only 17 for which it also gave data. Data for those 17 firms were gathered, and the results based on an analysis of those data are reported in Table 2.

It may be observed that five firms (*i.e.* Nos. 4, 6, 13, 14 and 17) out of the 17 firms would clearly have not invested if the tax holiday had not been granted to them.

Since these five firms represent as much as 30 percent of the 17 firms, one cannot really conclude that the tax holiday policy had been ineffective. Moreover, the projects having slightly higher returns than the critical minimum profits might not have been undertaken without tax holiday, due to the risks involved in the investment. The minimum profits required will be higher than the critical minimum quantity for hedging against risk. Table 1 shows that profits without tax exemption cluster around the critical minimum quantity, and this investment would not have taken place without the tax holiday.

Table 2

S. No.	$P\left[\frac{1 - ie^{-ra}}{1 - e^{-rb}} - (1 - i)\frac{e^{-rb}}{1 - e^{-rb}}\right]$	$P(1 - i)$	No. of years of tax holidays
1	18.5	15.1	2
2	10.9	7.8	4
3	18.3	15.0	2
4	18.9	12.1	6
5	18.5	13.2	4
6	12.24	8.7	4
7	20.4	14.5	4
8	7.7	5.5	4
9	26.8	16.0	8
10	7.7	5.5	4
11	25.6	16.5	6
12	30.2	21.5	4
13	12.24	8.7	4
14	18.94	13.5	4
15	17.85	11.5	6
16	20.4	14.5	4
17	16.85	12.0	4

Source: [2].

Note: The Critical Minimum Profit is 12.24 percent and is constant for all the firms.

The same methodology may be adopted with a slight modification for studying the effect of location. For the present value without tax exemption to be less than critical minimum was a necessary condition for the encouragement of investment through tax holiday. However, in a study of location of industries, this is no longer a necessary condition. On the other hand, the necessary condition would be that the profits without tax exemption in a backward region be lower than in a developed region. However, for such an analysis a larger sample will have to be studied.

In view of the methodological problems involved in the study as well as in view of the incorrect conclusions drawn by Azhar and Sharif, one should reconsider their results before making any use of them.

Appendix

Names of the 17 *Firms Taken from* [2] *and Studied in These Comments*

1. Fazal Textiles Mills Ltd.; Karachi.
2. Mohammed Farooq Textile Mills Ltd.; Karachi.
3. Kohinoor Rayon Mills Ltd.; Lahore.
4. Mir Textile Mills Ltd.; Karachi.
5. Afsar Textile Mills Ltd.; Muridke.
6. The Burewala Textile Mills Ltd.; Multan.
7. Noon Textile Mills Ltd.; Bhalwal.
8. Shafiq Textile Mills Ltd.; Karachi.
9. Sind Fine Textile Mills Ltd.; Sheikhupura.
10. Amin Fabrics Ltd.; Kotri.
11. Ravi Rayon, Kala Shah Kaku.
12. Souvenir Tobacco Ltd.; Karachi.
13. Hyesons Sugar Mills Ltd.; Khairpur.
14. Shahtaj Sugar Mills Ltd.; Mandi Bahauddin.
15. Indus Dyeing Mfg. Co. Ltd.; Hyderabad.
16. Pakistan Fisheries Ltd.; Karachi.
17. Beco Industries Ltd.; Lahore.

References

1. Pakistan. Planning Commission. "Estimates of Depreciation for West Pakistan: A Study of Working Group set up by Planning Commission." Islamabad. n.d. (Mimeographed)

2. State Bank of Pakistan. *Balance Sheet Analysis of Joint Stock Companies Listed on the Karachi Stock Exchange*, 1966—1971. Karachi. 1972. (Also used here were earlier editions relating to 1963—68, 1964—69 and 1965—1970 periods.)