

## THE PUBLIC DISCOUNT RATE

Prof. Dr. Yaşar M. GEYİKDAĞI\*  
Neclá V. GEYİKDAĞI\*\*

### ABSTRACT

Previous studies which aimed at finding a public discount rate based on the opportunity cost concept and using the before - tax rate of return in the private sector have not taken into account social costs and the risk premium difference between the public and private sectors. This paper strives to remedy this deficiency by incorporating into the process the benefits that the private sector derives from the government plus the risk premium difference between the public and private discount rates.

### I — INTRODUCTION

The discount rate to be used in the public (Government) sector is of vital importance in the attempt at maximizing efficiency in resource allocation between the private and public sectors. It can be used as a hurdle rate for accepting or rejecting public projects. Thus, if one lowers the public discount rate, then, more public projects will be accepted and vice versa. The purpose of this paper is to improve the process of calculating a practical and realistic average public discount rate based on the average rate of return in the entire private sector taking into account benefits that the private sector derives from the public sector and the lower average risk premium of public projects compared to that of the private sector. In other words, the rate we seek is the opportunity cost of capital of the private sector taking into account the social costs of the private sector and the risk premium difference between the two sectors. Before going any further, it would be appropriate to make a critical and brief review of the three main arguments which are relevant to the derivation of a discount rate for the public sector.

---

(\*) «State University of New York - Old Westbury»

(\*\*) Economist.

The first one emanates from the social time preference school which maintains that the social discount rate should reflect society's preference for present benefits over future benefits. The use of private discount rates to reflect the social time preference rate is considered inappropriate due to imperfections in capital markets and the possibility that individuals do not behave collectively in the same way as they do individually (1). In order not to jeopardize the welfare of future generations, the Government should assume its responsibility towards correcting «myopic rates» (2). Obviously, this is a problem of allocation over time. The derivation of such a rate would generate much debate due to the subjectivity and arbitrariness that would be involved in assigning values to parameters. Hence its practicality and general acceptability, let alone its accuracy, would greatly suffer.

The second argument comes from the opportunity cost school which emphasizes the problem of optimal resource allocation between the public and private sectors. It rejects the relevance of the social time preference rate to investment decisions (3). Since resources are limited, a public investment will involve the sacrifice of some other investment. The foregone project is usually thought of as being in the private sector of the economy. According to this argument, a better allocation of resources would be provided by leaving the resources in the private sector if the before - tax rate of return on the private investment exceeded the return on the government project. If the foregone investment could have earned a rate of  $r_p$ , the public investment should achieve at least  $r_p$  percent or more. Although it is practical, the proponents of this argument do not take into account the social costs and different risk of private enterprise, an important refinement which we shall bring into the picture.

The third argument is for a synthetic rate. Since our world is not perfectly competitive, the two rates calculated according to the two arguments explained above (social time preference and opportunity - cost arguments) would not be equal. Imperfections in the capital markets and other factors entail a lower social rate of time preference,  $r_s$ , than the opportunity cost rate,  $r_p$  (or the marginal internal rate of return in the private sector). Along this line of reasoning, a number of attempts have been made to combine the two approaches and consequently to develop a synthetic rate. Marglin has developed a model which allows for the fact that public investment may be partly at the cost of foregone consumption

by the present generation (4). Since this view is a synthesis of the first two arguments, the criticisms directed against them are valid here as well.

## II — THE SOCIAL COST OF THE PRIVATE SECTOR

Our reasoning is based on the thought that the private sector as a whole derives from the public sector considerable benefits which are not taken into account in the conventional income (profit or loss) statements of the private firms. In a way, these are subsidized costs which the firms would have had to incur were it not for the government's taking care of them. Hence, the before - tax average private sector rate of return is overestimated when one sees that benefits provided by the government or social costs are not taken into account.

If we work with aggregate figures, it should not prove too difficult to find a before - tax average conventional\* rate of return for all of the private sector. Similarly, aggregate figures are available for government expenditures, private sector expenditures and total investments.

Before proceeding any further, it would be helpful to show a simplified and stylized before - tax aggregate income statement for the private sector as a whole. In addition to the conventional revenues and costs which are simply the usual revenues and costs used in accounting, we also have shown the subsidized costs. Kapp (5) explains these costs in much greater detail.

Before tax aggregate income statement of the private sector

Revenues :

1. Conventional Revenues

Costs :

1. Conventional Costs
2. Subsidized Costs
  - a) Using the infrastructure investments of the Government.
  - b) Government cleaning pollution created by firms.
  - c) Using the educated manpower produced by Government schools.
  - d) Government defending the country and maintaining internal order and peace, etc.

---

(\*) Conventional (private) figures are simply those used in accounting. They do not take the above mentioned subsidized costs into account.

We could take the example of a detergent factory established on the bank of a river. This private firm dumps its wastes into the river and seriously pollutes it. If the Government does the cleaning, the costs of cleaning are not included in the firm's income statement. This example shows how private firms are subsidized by the Government. Obviously, if these costs are excluded, the profitability of the firm will look higher than it really is. Broadly speaking, we may say that the private firm bases its costs and hence rate of return on private rather than social costs.

Some would think that the example of pollution is an obvious and easy one and would question the validity of defense expenditures which they would categorize as a «pure public good», an expenditure that is incurred anyway. We believe that this is an oversimplification which considers one area in time and space.

If one looks at examples in history, one would easily observe that defense expenditures cannot be taken for granted. For instance, in pre - Islamic Arabia, merchants had to protect their caravans with their own small private armies and that certainly added to their costs. This case was not unique as it also existed in Central Asia, China and some parts of Europe. It exists today in certain Asian and African countries, though on a smaller scale. Many private establishments in developed countries face this situation by maintaining private security guards against hazards and criminals of various kinds. Thus, a decrease in the Government's spending on internal security would lead to a corresponding increase in private firms' spending on private security and this would certainly increase their private costs.

The main problem lies in the full enumeration and quantification of these subsidized costs. If we want to simplify the process of finding how much the subsidized costs are, we may allocate the total benefits resulting from Government spending among private sector, the households and the public sector according to the shares of these three in the gross national product. Thus, the total subsidized costs of the private sector or the total benefits that the private sector derives from the public sector would be

$$\text{Total Government Expenditures} \times \frac{\text{Total Private Sector Expenditures}}{\text{Gross National Product}}$$

If we define conventional profits to be

$$\pi_c = \text{Revenue} - \text{Cost}$$

We can define adjusted profits as

$$\pi_a = (\text{Revenue} - \text{Cost}) - \text{Subsidized Costs}$$

As a hypothetical example, we might assume that revenues are \$ 12 billion, costs are \$ 10 billion and subsidized costs are \$ 1 billion. Then, conventional profits are

$$\pi_c = 12 \text{ billion} - 10 \text{ billion} = 2 \text{ billion}$$

or expressed as a percentage return on costs

$$r_c = \frac{2 \text{ billion}}{10 \text{ billion}} \times 100 = 20 \%$$

whereas the adjusted profits are

$\pi_a = (12 \text{ billion} - 10 \text{ billion}) - 1 \text{ billion} = 1 \text{ billion}$  or expressed as a percentage return on costs

$$r_a = \frac{1 \text{ billion}}{11 \text{ billion}} \times 100 = 9.09 \%$$

One can thus see how a seemingly slight increase in costs can bring about a major decrease in the rate of return. Of course, though far better than not taking the subsidized costs into account, this method will still yield rough estimates.\* Hence, painstaking as it is, a large representative sample of private firms could be studied in order to determine, with grater precision, how much they benefit from Government expenditures. Such a study would require considerable manpower, time and, of course, funds.

### III — THE PUBLIC - PRIVATE RISK PREMIUM DIFFERENCE

One must bear in mind that the private discount rate includes a risk premium which is normally higher than that contained by the public discount rate. Therefore, the next step is to find the risk premium difference between the public and private discount rates. A clearcut way of finding it would be to take the difference between the average yield of long - term private and Government bonds of similar maturity. Of course, since one observes a va-

(\*) It should be borne in mind that the private sector gets high benefits from certain Government expenditures and little or nothing from others. We assume that the highs and lows will even out to give us the above estimate.

riety of private bonds with a variety of risk (AAA, AA, A, BBB, BB etc.), of similar maturity, one should take the weighted average yield ( $y_p$ ) of bonds of similar maturity of the entire private sector. Then, the risk premium difference between the average private bond yield ( $y_p$ ) and the average Government bond yield ( $y_g$ ) would be

$$\Delta y = y_p - y_g$$

Again by using hypothetical figures, we assume that  $y_p$  is 14 percent and  $y_g$  is 11 percent. Then, the risk premium difference would be

$$14 \% - 11 \% = 3 \%$$

Thus, the public rate of return which takes into account the subsidized costs of the private sector as well as the risk premium difference would be

$$r^* = r - \Delta y \text{ or } 9.09 \% - 3 \% = 6.09 \%$$

using our hypothetical figures.

At this stage, it should be emphasized that the yield on bonds cannot be taken as a rate of discount per se. Yet, the difference between the average bond yields of the private and public sectors can give us the risk premium difference.

#### IV — CONCLUSIONS

We have developed a new method of calculating the public discount rate cost concept and arguing that the public rate of discount should be equal to the private rate of discount which takes into account social costs as well as the risk premium difference between the two sectors. The incorporation of these two factors will certainly lead to an average public rate of discount which is lower than the average private rate of discount based solely on private costs and without taking the risk difference into account.

#### BIBLIOGRAPHY

- (1) Marglin, S.A., «The Social Rate of Discount and the Optimum Rate of Investment, *Quarterly Journal of Economics*, February 1963, pp. 98-99.
- (2) The argument against the use of myopic rates were first formulated by Pigou, A.C. (*The Economics of Welfare*, London, 1932, pp. 23-30) and have been developed by Dobb, M. (*An Essay on Economic Growth and Planning*, London, 2nd Ed., 1969, pp. 15-16) and (On Optimising the Rate of Saving', *Economic Journal*, Sen, A.K., September 1961, pp. 486-491).

- (3) Hirshleifer, J., de Haven, J., and Milliman, J., **Water Supply**, Chicago, 1969, p. 117, and Baumol, W.J. On the Social Rate of Discount, **American Economic Review**, December 1968, pp. 788 - 802, and Stockfisch, J.A., The Interest Rate Applicable to Government Investment Projects, in Hinrichs, H., and Taylor, G., eds., **Program Budgeting and Benefit - Cost Analysis**, Pacific Palisades, California, 1969, pp. 187 - 201.
- (4) Marglin, S.A., «The Opportunity Cost of Public Investment», **Quarterly Journal of Economics**, May 1963, pp. 274 - 89. For a detailed discussion see also Marglin, S.A., **Public Investment Criteria: Benefit - Cost Analysis for Planned Economic Growth**, M.I.T. Press, Cambridge, Mass., 1967.
- (5) Kapp, K.W., **Social Costs of Private Enterprise**, Asia Publishing House, 1963.

