The Public-Sector Discount Rate for Canada: Some Further Observations

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Abstract

The increased interest by economists in the theoretical and empirical foundations of criteria to be used in making public-sector investment decisions in an encouraging development. Presently, as the federal government and several provinces are experiencing serious budgetary deficits while simultaneously facing demands to undertake a wide variety of major investment expenditures in areas such as energy supply and transportation, the determination of the empirical magnitude of the opportunity cost of the resources the public sector utilizes is an important topic in public policy research. The papers by Harry Campbell (1981) and David Burgess (1981) contribute to this discussion as does a previous comment by M. T. Sumner (1980); however, only a modest effort has been made to date to further the basic empirical research that is required to provide decision makers with improved estimates of this parameter.

Keywords: Public-Sector, Discount Rate, Canada

I INTRODUCTION

The increased interest by economists in the theoretical and empirical foundations of criteria to be used in making public-sector investment decisions is an encouraging development. Presently, as the federal government and several provinces are experiencing serious budgetary deficits while simultaneously facing demands to undertake a wide variety of major investment expenditures in areas such as energy supply and transportation, the determination of the empirical magnitude of the opportunity cost of the resources the public sector utilizes is an important topic in public policy research. The papers by Harry Campbell (1981) and David Burgess (1981) contribute to this discussion as does a previous comment by M.T. Sumner (1980); however, only a modest effort has been made to date to further the basic empirical research that is required to provide decision makers with improved estimates of this parameter.

II THE SOCIAL OPPORTUNITY COST OF CAPITAL VERSUS THE SHADOW PRICE OF CAPITAL AND THE CONSUMPTION RATE OF INTEREST

In Campbell's discussion, he provides a lucid description of the derivation of a benefit cost rule that utilizes the concepts of a shadow-price of foregone investment and a discount rate reflecting the consumption rate of interest initially derived by Marglin (1963a,b). There is general agreement that this approach can be reconciled with the procedure of evaluating projects using a single discount rate based on a capital market determined social opportunity cost of public funds. I also agree with Campbell that the procedure one uses is largely a matter of the analyst's taste.

Although what is convenient is largely determined by what one is accustomed to doing, the almost total lack of practitioners in countries or international organizations who regularly employ the Marglin technique might cause one to question its strength in this regard. At the same time, Campbell's formulation of the Marglin net present value criterion in terms of a benefit cost ratio incorporates all the defects inherent in this latter investment criterion. The benefit cost ratio is not independent of the way operating costs are accounted for in calculating the flows of benefits and costs generated by a project, i.e., operating costs can

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either be deducted from current benefits or added to investment costs, nor does it necessarily provide the correct ranking of mutually exclusive projects if they involve different sizes of investment expenditures. (Roemer and Stern, 1975:34)

There is, however, a fundamental difference in the underlying assumptions employed in the shadow price of investment formulation recommended by Marglin (1963b) and Campbell (1981) and the social opportunity cost approach with respect to the reinvestment of depreciation. The former assumes that the entire gross of depreciation income stream arising from a project is available for consumption or reinvestment while the social opportunity cost approach assumes that depreciation is reinvested and it is only the project’s income stream net of depreciation that is allocated on a discretionary basis between investment and consumption purposes. (Sjaastad and Wisecarver, 1977:523) Which of these two assumptions better reflects the real world is an empirical question.

When studying private sector behavior, we normally measure the income out of which people make their consumption and savings decisions as being net of depreciation. In the public sector, consumers of its goods and services are unlikely to be aware of what part of the benefits received from a project represents net output and what is depreciation. However, if the government either explicitly or implicitly has made a commitment to provide the good or service beyond the life of the project, then reinvestment of public sector funds approximately equal to the depreciation of the project’s capital, is required.

Because the value of the marginal propensity to reinvest (Campbell’s $b_1$) out of the gross output flows to the project will change with the length of life of the project (if all depreciation is reinvested), different shadow-prices will need to be estimated for every project with a different length of life. On the other hand, a discount rate equal to the social opportunity cost of funds need not be altered (when the project’s life is changed) because the marginal rate of reinvestment used in the estimation of the discount rate is applied only to output net of depreciation.

In a recent paper (Warr and Wright, 1981) the authors also compare the use of a single social opportunity cost of funds (the market rate of discount in their terminology) to discount projects as compared to the procedure suggested by Marglin (1963b) in a model where the consumption rate of interest is less than the opportunity cost of foregone investment because of the public good nature in saving for the benefit of consumption by future generations. From their analysis, they conclude:

It is shown that the appropriate rate of discount for use in benefit-cost analyses in this model is the market rate of discount, regardless of whether the Marglin-Sen assumptions on individual preferences and distributional mechanisms, implying the existence of an isolation paradox, are imposed on the model. The alternative approach advocated by Marglin [1963b] ... imposes far more formidable data requirements and could at best produce results that are equivalent to the calculation of the net present value using the market rate of discount; but—we argue that in general no such equivalence is possible.’ (Warr and Wright, 1981: 130)

A further practical problem arises when Campbell’s procedure is used to evaluate private sector projects in which the government has an interest. This type of project has become an increasingly common client for social cost-benefit analysis in Canada. Such an evaluation usually begins with a financial appraisal that is denominated in units of income, i.e., Canadian dollars, to determine the attractiveness of this project from the private point of view. If we were to follow Campbell’s recommendations, we would then convert all these financial data, along with any economic externalities, into consumption streams by means of shadow-prices.
If the financial cash flow is denominated in dollars, while the economic analysis is denominated in consumption units, a year-to-year comparison of these two net benefit profiles has no transparent meaning. Yet in practical decision making, the comparison of the net financial cash flow through time with the dollar value of the net economic benefit received by the economy through time is important information in the determination of the magnitude and timing of subsidies or financing that the government may decide to provide. Even though both approaches can be designed to give the identical net economic present value for a given project, the magnitude of the net present value is usually not the only variable of concern to decision makers.

In order to answer questions involving the distribution of costs and benefits through time, the annual economic benefits and costs must be denominated in the same units as the financial analysis. To obtain the economic net present value of the project at this point, the net economic benefit profile can be discounted directly by a single discount rate reflecting the social opportunity cost of capital. Alternatively, using the Margin-Campbell approach, we would first estimate the appropriate shadow-price of investment for this project. Second, these shadow-prices would be used to convert the dollar denominated economic benefit and costs flows into flows denominated in units of consumption. Thirdly, these streams would be discounted by the consumption rate of interest to obtain the net present value of the project. Even if the two approaches are theoretically equivalent, there appears little to be gained from the additional effort the latter approach entails.

III EMPIRICAL ESTIMATION OF THE SOCIAL OPPORTUNITY COST OF PUBLIC FUNDS

The paper by Burgess (1981) represents a very careful examination of the values of the variables that were estimated, borrowed, and assumed when I constructed a measure of the social opportunity cost of public funds in Canada. (Jenkins, 1973, 1977) Although I disagree with some of the adjustments he reports, he has performed a service to analysts of public sector investment in Canada by his detailed review of the key variables influencing this parameter and identification of the present gaps in our knowledge concerning the values of items needed to estimate accurately this key parameter for public sector investment appraisal.

In his paper, Burgess claims to have identified five sources of upward bias in my estimates of the social opportunity cost of public funds in Canada. They are: (a) too low a response of saving to changes in rate of return and too high an estimate of the social cost of foregone consumption; (b) too low a response of foreign capital inflows to increased government borrowing and too high an estimate of the cost of foreign funds; (c) some tax revenues that were included as benefits generated by the factors of production should have been included as a cost of production; (d) the effect of the foreign exchange distortion should not be included in the opportunity cost of public sector funds; (e) the labor externalities attributed to investment in the private sector were overestimate.

When one reads the conclusions of Burgess’s paper and finds out that after making these 'adjustments' he arrives at an estimate of the social opportunity cost of public funds of 7.0 to 7.5 per cent rather than my previous estimate of 10 per cent, one might be tempted to think that this range is close enough for practical purposes and should not cause any undue concern. However, if we think of this parameter as the price the economy pays for the use of capital employed in public sector investment projects and consider that there is a 33 to 43 per cent range in the estimates of this fundamental price, then obtaining a reliable estimate of this parameter takes on an added degree of urgency. In practical terms, the difference
between a 7 per cent and a 10 per cent discount rate probably means that if the latter is the correct economic cost of funds, the economy would be better off postponing large capital intensive energy projects for perhaps five years longer than would be economically optimal if the economic cost of funds were 7 per cent. Seen in this light, it comes as no surprise that the builders and supporters of such projects from the US Corps of Engineers to state planners in the Peoples Republic of China have all gone on record favoring the use of a low discount rate in investment planning. At the same time, it is of sufficient importance to warrant the necessary effort to determine the value of this parameter for Canada within a small range of uncertainty.

The Response of Domestic Saving and Its Social Cost.
In this case, Burgess proposes to substitute my use of an estimate made by Wright (1969) of the elasticity of savings with respect to the interest rate of 0.2 covering the postwar experience in the US up to 1958 for a more recent estimate of 0.4 made by Boskin (1978) from US data covering the period 1929 to 1969 (the war years 1941–1946 being omitted). By applying the larger estimate of the elasticity of savings to a broader definition of savings than I used, the estimated share of public sector borrowing sourced from increased private domestic savings was increased from 5 to 15 per cent. Because the social cost of foregone consumption is the lowest cost of funds, this adjustment tends to decrease the estimate of the social discount rate by 0.7 percentage points.

There is certainly nothing special about the estimate of the parameter developed by Wright (1969) except that it was the only estimate of this parameter available for any country closely resembling Canada at the time I carried out my initial calculations. However, given what we know today about the great difference in savings behavior between the US and Canada during the middle to late 1970s and the degree by which Boskin’s estimates have been called into question by Hawrey and Hymans (1978) (they could not even get the right sign on the rate of return variable when estimating over the 1947 to 1969 period), it is surprising that Burgess did not make any effort to estimate this parameter for Canada. Recently, some preliminary work has been carried out by McCourt (1981) and Jenkins and Mescher (1981) to estimate the response of savings in Canada to changes in the rate of return. McCourt has concentrated his efforts in estimating savings and consumption functions where savings were measured as net savings (i.e., positive savings less changes in consumer credit). On the other hand, Jenkins and Mescher have dealt with the estimation of the response of consumer borrowing (negative savings) to changes in interest rates and government borrowing.

Estimating both savings and consumption functions using quarterly data from 1963 to 1979 and using a variety of measures of the rate of return on savings, McCourt (1981:37–45) has been unable to estimate even one equation where the rate of return had a coefficient significantly different from zero. However, most of the coefficients on the rate of return variables had the correct sign. Jenkins and Mescher (1981) have found that borrowers of consumer loans do respond significantly to changes in the cost of borrowing induced by changes in the rate of government borrowing. Hence, it is likely that it is the response of borrowers of consumer loans that is yielding the correct signs on the insignificant coefficients in the McCourt equations. The results of Jenkins and Mescher (1981:42) indicate that, holding real income constant, the elasticity of the quantity of credit demand with respect to the expected real interest rate is -0.34. A simulation of the impact of a change in the growth of government debt on interest rates and the impact of interest rates on the demand for consumer credit was carried out. This yielded the result that 7.5 per cent of a given increase in government borrowing was sourced from a reduction in the demand for consumer credit.
From the empirical evidence generated to date it would seem that the best estimate of the elasticity of supply of savings with respect to its rate of return is zero if we consider gross positive savings, before the impact on consumer loans is factored into the total response of net savings.

Jenkins and Mescher (1981:48) have also estimated the consumer credit borrowers’ willingness to pay for credit and the social opportunity cost of credit to financial corporations. Net of inflation they are 12.0 per cent and 4.19 per cent, respectively. The former is a measure of the rate of time preference of those individuals who borrow, while the difference between the two variables measures the real costs incurred by financial corporations when extending consumer loans. It is the rate of 4.19 per cent that is the relevant variable for estimating the social cost of public funds obtained from this source.

Substituting these Canadian estimates for the US ones used by Burgess, we find that instead of making a reduction in the previous estimate of the social discount rate equal to 0.70 percentage points, as proposed by Burgess, the reduction is approximately 0.18 percentage points.

**Contribution of Foreign Funding and its Social Opportunity Cost**

The estimate of the incremental long-term impact on inflow of foreign savings into Canada from an increase in government borrowing is one of the most important but least researched questions in Canadian public policy. Burgess refers to estimates of the elasticity of supply of foreign long-term portfolio capital flows into Canada reported by Leipziger (1974:69) ranging from 7.0 to 10.0. As approximately 25 per cent of private domestic investment in Canada is financed by foreign savings, these elasticities imply that incremental foreign funding will contribute somewhere between 1.75 and 2.5 times as much displaced private investment to the sourcing of funds borrowed by governments. However, for these estimates to be completely correct for the calculation of the social discount rate, we would have to assume that the demand for imports was simultaneously increased by the same amount as the capital inflow in order to avoid adjustments in domestic economic activity arising from changes in the exchange rate.

During the period 1975 to 1980 the Bank of Canada tried to maintain a monetary target policy with the result that the incentive to borrow or lend abroad was not quickly extinguished by changes in monetary policy. As a consequence, in 1975–76 when long-term interest rates were lower abroad than in Canada, there was a significant increase in foreign borrowing led by the provincial governments and their enterprises. This caused the exchange rate to be maintained at a higher level than was consistent with Canada’s international competitiveness in production. As a result, Canada’s merchandise account in its balance of payments deteriorated. Hence the ultimate sourcing of investment funds for the public sector in this period may have been biased more towards the domestic traded goods industries than would be indicated by the interest elasticities of domestic demand for investment funds relative to the elasticity of supply of foreign savings to Canada.

If the capital markets are allowed to function, there is little doubt that my previous procedure of using the average proportion of investments financed abroad as an estimate of the marginal fraction of Canadian borrowing financed from foreign sources is a conservative lower bound estimate of the actual share sourced from foreign savings. However, before one assumes that a major share of Canadian public sector funds are derived from foreign sources and come relatively inexpensively to Canada, there is a need to have a better understanding of the nature of the adjustment of the Canadian economy to foreign portfolio investment. Also, the marginal economic costs of these funds including appropriate risk premium need to
be estimated. To my knowledge, that empirical work has not been completed for Canada.

In addition, recent implicit (FIRA) and explicit (Canadianization of the oil industry) policies of the Canadian government to limit foreign investment in Canada would cause one to question if it is correct for the government to assess the social cost of its borrowing by assuming that the share it will source from foreign investors is two or three times present national average.

Are Taxes Distortive or Corrective?
Burgess argues that part of the property tax is levied in lieu of charges for local public service that enter as inputs in the private production process and that some inputs such as electricity are provided at subsidized prices, thus overstating the rate of return from private sector investment. If these are the facts of the situation, I have no disagreement with this conclusion. However, before one lowers the social discount rate because the rate of return on private capital is overstated, two questions should be asked. First, do the total public expenditures on the provision of these local public services and electricity generation decrease (or grow more slowly) when the government borrows and undertakes investment projects? Second, in the appraisal of public sector projects, will a deduction be made against the benefits generated by these investments for the local public services they consume or for the subsidy component of the electricity they consume? If the answers to both of these questions are no, then reducing the economic return from private sector investment for these quasi user charges for local public goods and electricity subsidies will bias the selection of projects towards ones located in the public sector. If there are local costs incremental to the expansions of either the private or public sector firm, then they should be either treated as a cost in both cases or excluded from both. The same arguments that Burgess makes to assert that the returns on private investments are overstated also apply with equal or greater force to public sector projects.

To date I have not seen a single project appraisal done for the public sector in Canada that included as a cost of the project the incremental costs for local public services required to service the project. In addition, the costs of the project appraisal, design, and implementation usually carried out by the regular civil service is seldom, if ever, charged out as a cost to the public investment project.

Given the difficulty of assessing the incremental local public service costs for most public sector projects and given the rather ad hoc adjustment of one half of the rate of property tax Burgess has made to the rate of return on private sector investment to account for this variable, it would seem a more neutral assumption to assume the public and private investments use local public inputs in approximately the same rate per dollar of investment. Hence, the downward adjustment made by Burgess in the private rates of return to account for this factor could be set aside.

I am much more inclined to accept Burgess’s adjustment for the component of energy subsidization. Due to the massive distortions now present in the energy sectors in Canada, I feel more confident that project analysts will be inclined to try to estimate this cost also for public sector investment. However, to date this has not been common practice for the case of electricity use.

Should Foreign Exchange Distortions be Accounted for in the Social Discount Rate?
The reason why trade distortions should be included in the calculation of the opportunity cost of foregone private sector investment is not the reason that I think Burgess has stated in his paper. Whether or not the private rates of return from investments would be higher or
lower than they are now if there were no trade distortions is irrelevant when measuring the social discount rate with these distortions in place. The foreign exchange distortion of 4 per cent of the value of private sector capital displaced by the government borrowing was estimated simply by calculating the change in tax revenues on imports plus export taxes lost less the export subsidies saved because of this transfer of capital from the private to the public sector. This holds regardless of whether or not Canada is a price taker in the export and import good markets. The actual calculations I made were done by simulating a three sector (importable, exportable, and non-traded good) model of the Canadian economy for the impact of a transfer of capital from the private or public sectors. If the government borrowing induces an adjustment in the sectors so as to end up creating a net reduction in tax revenues from trade, then this is an additional cost of the funds. If it reduces export subsidies more than import and export tax losses, then the sign of the adjustment changes and there is a reduction of the opportunity cost of the borrowed funds.

While I agree with Burgess that an equal rate of tax on imports and exports will make the market rate of foreign exchange approximately equal to the shadow price of foreign exchange, it will not eliminate the cost associated with the interaction of the trade distortions with a general reduction in the size of the private importable and exportable goods sectors. In fact, an increase of either tariffs or export taxes will tend to increase the size of the value of taxes displaced and hence the opportunity cost of private investments because the welfare cost of reducing trade further is increased.

With the completion of the recent Multilateral Trade Negotiations and increased energy taxes, there is a need to recalculate the magnitude of this distortion. However, the reasoning provided by Burgess provides no basis for eliminating this part of the opportunity cost of displaced private investment.

*Shadow vs. Market Wage Rates and the Opportunity Costs of Postponed Private Investment*

I find the reluctance of Burgess to attribute any loss in labor externalities to the contractor of private sector investment activities as being somewhat curious given the widespread enthusiasm of government departments and many economists to justify public sector investment activities on the basis of their perceived employment benefits. There does not seem any obvious reason why labor benefits are only associated with public sector activities. Burgess argues that it is unrealistic to assume that in any of the labor markets of Canada the real wage paid to labor is above the market clearing wage. However, this assumption has been made and generally accepted as reality by those estimating the social opportunity cost of labor for Canada in the slow growth regions. (Boadway and Flatters, 1981:60)

While I agree with Burgess that labor benefits of public sector projects are usually exaggerated, the 5 per cent of the wage bill I previously attributed as being the difference between the wage bill and social opportunity cost is certainly well below the minimum level of labor externality usually claimed as a benefit of public sector projects. In addition, the argument made that employment may increase if income and leisure are complements is difficult to realize when the number of hours of work, when employed, is generally not determined by the employee. In this case, a fall in labor income due to a decrease in demand for labor is accompanied by an increase in unemployment. Hence, it is very difficult to have leisure and income complementary goods to the point where total employment rises as labor income falls.

Even if we were to accept Burgess's methodology for measuring labor market externalities and assume that wages are flexible with only tax and subsidy distortions present, it is difficult to understand how he could have missed the unemployment insurance system in Canada. In Burgess's calculations, only the loss of the marginal income tax rate of 15 per cent is included
as a cost of diverting investment from the private sector. First, it is probably the case that 15 per cent represents too low a marginal income tax rate, even for those in Canada who experience unemployment. Second, approximately 70 per cent of the unemployed time of individuals in Canada is covered by unemployment insurance. (Jenkins and Kuo, 1978) As the unemployment insurance benefits are equal to 60 per cent of earnings (up to the national average) the increase in unemployment insurance payments net of tax that occurs with a reduction in employment is equal to 36 per cent of the wage rate. Hence, the estimated labor externalities that should be attributed to private sector investment when both taxes and unemployment insurance are included in Burgess's methodology to add 1.70 percentage points to the rate of return on private capital. This compares with the .50 percentage points he has added and the 1.32 percentage points I previously included in the estimated return from private capital.

IV CONCLUSIONS

While both the Campbell and Burgess papers have made a contribution to the discussion of the measurement of investment criteria in Canada, most of the detailed empirical research is still left to be done. Burgess has pointed out, correctly, the importance of the foreign supply of savings for financing investment in Canada as a determinant of the opportunity cost of public sector funds. However, the measurement of the net long-run increase in foreign investment in Canada as a response to government borrowing and the risk inclusive cost of these funds are still essentially unresearched questions. More work also needs to be done on the estimation of the response of domestic savings to government borrowing. Finally, the integration of the effects of inflation and the changes in business taxes during the 1970s needs to be carried out to estimate the rates of return from private investment in Canada for recent years.

Although Burgess has attempted to decrease the estimates of the economic rates of return from private investment in Canada through a substitution of a number of assumptions concerning property taxes, labor externalities and the effect of tax and subsidy distortions on traded goods, the empirical basis for the particular assumptions he uses appears, in general, to be either weak or non-existent. Given the role of the social discount rate as a guide in project selection and timing to help prevent the wasteful allocation of Canada's resources, it would seem prudent that a lowering of this hurdle below that recommended by the Treasury Board (1976) be based on the results of further empirical research not alternative assumptions.

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