The Appropriate Measure of the Social Discount Rate and Its Role in the Analysis of Policies with Long-Run Consequences

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ABSTRACT

The appropriate measure of the social discount rate is the social opportunity cost of borrowed funds (a weighted average of the rates of return on displaced investment, postponed consumption, and incremental foreign funding), which ensures that a proposed policy produces a potential Pareto improvement. The approach yields a discount rate in the order of 7 percent per annum for the United States using national income accounts data, with no evidence of any secular decline in the rate over the past half century. Using a lower discount rate equal to the social rate of time preference requires either (1) abandoning a basic tenet of benefit-cost analysis that worthy projects must improve allocative efficiency, or (2) assuming that the government must balance the budget each period (no debt financing at the margin), debt reduction is not an option, and the marginal tax instrument is a nondistortionary tax that impacts only consumption. Neither option seems reasonable.

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The social discount rate is the interest rate that government agencies should use when evaluating alternative proposed policies, programs, or regulatory changes that require a stream of expenditures and produce a stream of expected benefits over several years into the future. The appropriate social discount rate is equal to the social opportunity cost (SOC) of borrowed funds. This is the rate of return the economy as a whole forgoes when a given dollar of funds is withdrawn from the capital market to fund a project. It is a weighted average of the marginal rate(s) of productivity of capital in the private sector, the marginal rate(s) of time preference of consumers, and, in an open economy, the marginal cost of incremental funding from abroad. The weights reflect the proportions of funds that are drawn from each source when the government enters the capital market to finance a project.

An alternative view is that the social discount rate should equal the social rate of time preference (STP), which is the rate at which individuals (or society) trade current for future consumption. While there are conditions under which these two views can be reconciled, these conditions are quite stringent. In general, the STP view leads to a lower discount rate than the SOC view; it results in more projects being judged worthy at any moment in time, and it is especially favorable to projects with large up-front costs and benefits expected only or primarily in the distant future.

In the next section, I outline the basic assumptions of the analysis and compare and contrast the two major discount rate procedures, making a strong case for the superiority of the SOC approach. In the section after that, I describe the conceptual foundations for the SOC rate. I then explain how an empirical estimate of the SOC rate is obtained, suggest a numerical value that is appropriate under current conditions, and identify key factors that might justify a revision of the rate in the future. Next I discuss how to deal with projects with large up-front costs and benefits accruing to generations yet unborn. In the penultimate section I note some qualifications and extensions to my case, and I conclude by summarizing the main results.

ALTERNATIVE APPROACHES TO THE SOCIAL DISCOUNT RATE

Assume that all benefits and costs are measured in constant purchasing power dollars, so the interest rate or discount rate is a real rate. Also assume that the benefits measure the willingness to pay of the recipients. This assumption poses challenges for projects or programs with long-run impacts, because the recipients may not be present to reveal their true willingness to pay. Inferences must therefore be drawn from the preferences of the current generation. It is also worth noting that the relevant expenditures need not be confined to the outlays by government. This is particularly relevant when evaluating proposed regulatory changes that impose compliance costs on private firms or households.

Assume that the government is striving to pursue the public interest and is functioning in a predominantly market-based economy. Its major source of revenue is taxation, where most taxes are distortionary, and its expenditures are disciplined by an intertemporal budget constraint that says that, while the budget need not balance in each fiscal period (so debt financing is permissible), it must balance in the long run, meaning that it is not feasible for government debt to grow faster than the economy.

Projects can be financed either by raising taxes or by borrowing. The SOC view of the discount rate emphasizes that even if a particular tax is being proposed to fund a project, the marginal source of funds for any project is the capital market as long as there is outstanding government debt. By contrast, proponents of the STP view maintain that the particular source of funding should be taken into account in assessing a project's worthiness. In general they argue that, because government spending in any fiscal year is financed primarily by tax revenue collected in that year, the focus should be on the effect of the tax increase required to fund the project.

The response by SOC proponents is that the proportion of project funding that can be attributed to taxes versus borrowing is irrelevant whenever budget imbalances each year manifest themselves as net withdrawals from, or injections into, the capital market. It is the *marginal* source of funds, not the *average* source of funds, that represents the SOC of each and every dollar of funds. Even if a particular tax is being proposed to fund a particular project, the tax revenue collected could be used to pay down the outstanding debt rather than to fund the project.[1] The SOC approach therefore separates project evaluation from tax reform, thereby ensuring that all projects are being evaluated on a level playing field.

1. Even if the marginal *source* of funds were a tax increase (e.g., because of a binding balanced-budget constraint), the marginal cost of *using* the funds would be the SOC rate, not the cost of raising the tax.

There is a further advantage of the SOC approach to the discount rate. The SOC rate is the rate of return on the borrowed funds that is just sufficient to compensate for the weighted average cost of (1) postponing consumption for a period, (2) replacing the investment displaced so the capital stock can be restored to its preproject level at the beginning of the next period, and (3) in an open economy, paying for incremental funding from abroad. Everyone is thereby left no better or worse off. No social welfare function needs to be specified, and therefore no welfare judgments need to be made.

Proponents of the STP discount rate maintain that because of capital market imperfections, the wide range of interest rates observed in the market, and myopia on the part of the public, the appropriate discount rate should be a normative rate set by policymakers and not necessarily reflective of the actual rates of return that consumers and savers face. Apart from the difficulty of arriving at a consensus about what is the appropriate social welfare function (and the implied STP rate), there is the fundamental question as to why the basic methodology that underpins benefit-cost analysis—that benefits and costs should be measured by the willingness to pay and the willingness to accept compensation to forgo, respectively—should be abandoned when evaluating benefits and costs over time.[2]

Even if the STP rate does reflect individuals' marginal rates of time preference, in order to implement the procedure it is necessary to convert all benefits and costs into their "consumption equivalents" by applying a shadow price, greater than one, to account for the private investment that is displaced or induced by the project. This is because what is being discounted is constant purchasing power dollars' worth of consumption at various dates, not constant purchasing power dollars of income that can be spent on either consumption or investment, as in the SOC approach. In reality, most proponents of the STP approach ignore the shadow pricing of investment entirely in the belief that either (a) little or no investment gets displaced when projects are financed by income or consumption taxes (rather than by borrowing), or (b) a dollar's worth of project benefits has the same consumption equivalent as a dollar's worth of project costs, so shadow pricing investment is unnecessary. However, it is not sufficient to show that a project has a positive net present value (NPV) when benefits and costs are discounted at

2. The benefit-cost analysis methodology requires that just as *current* benefits and costs are derived from actual behavior, *deferred* benefits and costs ought to be converted to present values by discounting at a rate that reflects actual behavior, not a rate determined by the political process or by moral sentiments.

the STP discount rate. We need to be sure that there aren't other uses of the funds that would make everyone even better off.

The original proponents of the STP approach recognized that it is essential to account for the private investment displaced or induced by a project, but they assumed a simple Keynesian saving rule represented by a constant marginal propensity to save. As well, they assumed a constant, time-independent shadow price for investment displaced. In effect, they assumed that the private sector behaves myopically with respect to the project (by failing to anticipate the future benefits and costs, even though this information is known by the government agency that is responsible for the project). The procedure they recommended leads to an underestimate of the investment that is displaced in financing any project whenever the private sector exhibits foresight about its future costs and benefits.[3]

While it would seem uncontroversial that any project that increases the present value of consumption discounted at an STP rate equal to individuals' marginal rates of time preference should be undertaken, it is still necessary to ensure that there are not other uses of the funds that would enable everyone to be even better off.[4] This is precisely what the SOC discount rate procedure achieves by ensuring that undertaking the project is preferable to using scarce tax dollars to redeem the outstanding government debt.[5]

CONCEPTUAL FOUNDATIONS FOR SOC DISCOUNT RATE

In a well-functioning but distorted capital market, there is a wedge between the rates of return that govern individuals' consumption-saving decisions and the rates of return on incremental investments in the various sectors of the economy. The predominant source of discrepancy is the tax system, but differences in the riskiness and liquidity of investments and imperfect information are additional contributing factors. If we just focus on a capital income tax distortion arising from the combined effects of the personal and corporate income tax and ignore all the other factors, four different rates of interest can be distinguished: the production rate of interest, or marginal rate of return on investment ρ; the

3. If future costs and benefits are anticipated, a worthy project will not induce any reduction in planned consumption during the financing phase. Most of the funding will displace investment as individuals reduce planned saving in order to maintain preproject consumption. This is true whether the project is tax financed or debt financed, which is what Ricardian equivalence implies.
4. A fundamental tenet of benefit-cost analysis is that when choosing between two mutually exclusive projects, the preferred project has the highest NPV.
5. David F. Burgess, "Removing Some Dissonance from the Social Discount Rate Debate" (EPRI Working Paper No. 2008-2, Economic Policy Research Institute, London, ON, June 2008).

consumption rate of interest r, which is the production rate of interest net of corporate and personal taxes, $r = \rho\,(1 - \tau c)(1 - \tau p)$, where τc and τp represent the corporate and personal tax rates, respectively; the government's borrowing rate b, which is the production rate of interest net of the corporate tax, or the consumption rate of interest grossed up by the personal tax, $b = \rho\,(1 - \tau c) = r\,/\,(1 - \tau p)$; and the economic opportunity cost of borrowed funds, $\omega = \alpha \times \rho + (1 - \alpha)\,r$, which is a weighted average of the production and consumption rates, where α represents the proportion of funds that displace investment.[6]

In a closed economy, the supply of funds comes from savers, and the demand for funds comes from investors and government. If the government wishes to increase its borrowing to fund a project, the increased demand for funds puts upward pressure on interest rates, thereby inducing some additional postponement of consumption and crowding out some private investment that would otherwise have occurred. Thus, even though the government can borrow at rate b, the social opportunity cost of borrowing is actually $\omega > b$. Not only must the government pay net interest to bondholders at rate r per dollar of borrowing, but also the private investment that is displaced per dollar of borrowing results in a loss of corporate income tax revenue equal to $\alpha \times \tau c \times \rho$ dollars and loss of personal income tax revenue equal to $\alpha \times \tau p\,(1 - \tau c)\,\rho$ dollars. The social opportunity cost of a dollar of borrowing is therefore $\omega = r + \alpha\,[\tau c + \tau p\,(1 - \tau c)]\,\rho$, which simplifies to $\omega = \alpha \times \rho + (1 - \alpha)\,r$, a weighted average of the production and consumption rates of interest.

In an open economy, an additional source of funds is the international capital market. When the government enters the capital market to borrow additional funds, the increased demand for funds also attracts funding from abroad. Thus, beyond displacing domestic investment and consumption, there is displacement of net exports, or equivalently an increase in the current account deficit. If f represents the marginal cost of incremental funding from abroad, the social opportunity cost of borrowed funds becomes $\omega = \alpha 1\rho + \alpha 2r + (1 - \alpha 1 - \alpha 2)\,f$, where the αi's represent the proportions of incremental funding drawn from investment and consumption respectively.

6. For simplicity I am assuming that all firms are incorporated, all investment is by corporations, there are no property taxes, and interest on government bonds is subject to the personal income tax. I am also ignoring a subset of consumers who consume more than their income (borrow on credit) rather than the majority who consume less than their income (save for the future).

The SOC rate ω will typically lie below the marginal rate of productivity of capital ρ.[7] Some have maintained that the appropriate discount rate should actually be the marginal rate of productivity of capital ρ, because the government always has the option of using the borrowed funds to invest directly in the private sector. But this reflects a misunderstanding of how a well-functioning but distorted capital market works. The SOC rate measures the rate of return that society earns on an incremental dollar of funds injected into the capital market as well as the social opportunity cost of drawing a dollar of funds from the market. Thus, while the government could invest in a particular private-sector project that yields a rate of return ρ, it will as a consequence displace some private investment and saving (and lose the associated tax revenue) with the result that the overall social yield on the government's investment is not ρ but ω.

Finally, it should be noted that in a growing economy, some proportion of newly issued government bonds will be purchased by the Federal Reserve (and therefore monetized) each year in the pursuit of price stability. Thus, some government borrowing does not crowd out investment, consumption, or net exports. But this does not affect the estimate of the SOC rate, which measures the *marginal* cost of raising an additional dollar of funds, not the *average* cost of raising the funds.

EMPIRICAL ESTIMATION OF THE SOC RATE

What is the appropriate numerical value of the SOC rate? It would be wrong to understate the empirical challenges that are involved in arriving at a reliable estimate. The rate of return on displaced investment must be inferred from estimates of the rate of return to reproducible capital in place. National accounts data are the preferred source for estimating the real rate of return to capital because they cover all sectors of the economy, therefore reflecting a well-diversified portfolio, and capital is valued at replacement cost rather than at market prices. Rate-of-return estimates obtained in this way exhibit much less volatility year over year compared to estimates based upon financial market data. The rate of return on postponed consumption should reflect not only the after-tax rate of return on saving (net of the cost of financial intermediation) but also the real rate of return on consumer borrowing.[8] The cost of incremental funding from abroad will

7. This is true unless the rate of return to capital is a constant independent of the amount of capital invested.

8. I am unaware of any serious empirical examination of this issue. Clearly some consumers respond to higher interest rates by reducing borrowing on credit. The cost of their forgone consumption is

typically be understated by the rate of return earned by foreign investors (net of taxes paid to the host government) whenever the supply of foreign funding is upward sloping, as it will be, owing to country risk and other factors. Then there is the challenge of inferring the *marginal* contributions of funding from each source when only the *average* contributions are available. For example, domestic saving may finance more than 90 percent of domestic capital formation (with foreign saving accounting for less than 10 percent), but this does not mean that domestic savers will contribute 9 times as much incremental funding as the amount drawn from abroad.

Any useful estimate of the SOC rate is intended to apply for long periods of time and not to be subject to cyclical swings. With all these caveats in mind, I believe that the appropriate value for the SOC rate is around 7 percent.[9] This figure is derived from estimated rates of return on investment, saving, and foreign funding of 8 percent, 4.5 percent, and 6 percent respectively, and estimated weights on each of these sources of 0.6, 0.15, and 0.25 respectively.[10]

I see no justification for assuming a declining SOC rate in the future unless a convincing case can be made that the marginal rate of productivity of capital is in secular decline, perhaps because of a declining economic growth rate or because of capital deepening caused by the gradual elimination of the capital income tax.[11]

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the real rate of return paid to creditors. Including this category of consumer-borrower along with the typical consumer-lender would raise the estimate of the cost of postponed consumption and the implied SOC rate. However, the increase would be quite modest given the small proportion of incremental funding drawn from postponed consumption compared to displaced investment and incremental foreign funding.

9. The careful analysis of Arnold Harberger and Glenn Jenkins suggests my 7 percent figure is likely to be an understatement. On the other hand, using the CEA (2017) estimate for the average annual real return to capital of 7.2 percent over the 1960–2012 period, the implied SOC rate would be lower than 7 percent. See Arnold C. Harberger and Glenn P. Jenkins, "Musings on the Social Discount Rate," *Journal of Benefit-Cost Analysis* 6, no. 1 (2015): 6–32; Council of Economic Advisers, *Discounting for Public Policy: Theory and Recent Evidence on the Merits of Updating the Discount Rate*, January 2017.

10. David F. Burgess and Richard O. Zerbe, "Appropriate Discounting for Benefit-Cost Analysis," *Journal of Benefit-Cost Analysis* 2, no. 2 (2011): 1–20.

11. The real yield on long-term Treasury bonds has been well below its historical average over the past decade, which might suggest that the rate of return on postponed consumption has fallen, thereby justifying a *lower* SOC rate. However, the real return on postponed consumption is best derived from estimates of the real return to capital after deducting corporate, personal, and property tax, and other fees. Since there is no evidence that the real return to capital has declined, and since the capital income tax rate has actually fallen, the implied real return on postponed consumption has risen, thereby implying, if anything, a *higher* SOC rate.

EVALUATING PROJECTS WITH BENEFITS IN THE DISTANT FUTURE

It has frequently been noted that an SOC discount rate of 7 percent makes benefits and costs that are expected in 50 years or more almost insignificant in present value terms. An STP discount rate of 2 percent would increase the present value of an expected benefit in 50 years by more than a factor of 10. Thus a project that requires an expenditure of $50 million today and yields benefits worth $1 billion in 50 years has an NPV of −$16 million when evaluated at a 7 percent SOC rate, but it has a positive NPV, $320 million, when evaluated at a 2 percent STP rate. (If the project were financed by a consumption tax on the current old generation it might avoid any displacement of investment.) But the project should be rejected because its failure to pass the SOC test means that those living 50 years from now would be even better off if the $50 million sacrificed by the current old generation were used instead to pay down the outstanding government debt. Debt reduction would deliver benefits worth $1.47 billion instead of the $1 billion delivered by the project.

How, then, should benefit-cost analysis evaluate projects with large up-front costs and expected, but uncertain, benefits only in the very distant future? Measuring benefits that accrue to future generations is particularly problematic. Thus, trying to assess what future generations would be willing to pay, for example, for an environment with less carbon in the atmosphere seems almost nonsensical. Each living generation takes the state of nature more or less as given and establishes the appropriate infrastructure to best deal with its challenges. Perhaps it would be better to regard currently living generations as the primary beneficiaries of such investments. The benefits represent the moral satisfaction derived from addressing an issue that current scientific evidence suggests poses a significant risk to the well-being of generations yet unborn. The advantage of this perspective is that it takes the focus off the discount rate, and in particular removes the pressure to use an STP discount rate that is set low enough to judge the investment as worthy. Now the focus is on what currently living generations are willing to pay for the moral satisfaction they receive. While a precise answer is hard to obtain, one thing is certain: the richer currently living generations are, the more they will be willing to pay. Pursuing projects only if they pass muster at the SOC rate promotes economic efficiency and higher real income, thereby increasing the willingness to pay for actions that contribute to the well-being of generations yet unborn.

EXTENSIONS AND QUALIFICATIONS

There are two additional points worth making; the first is a qualification, and the second is an extension. First, the SOC criterion takes as its benchmark a project

whose benefits are just like cash. This is a reasonable assumption for projects with commercial benefits that are traded in markets, for infrastructure improvements that facilitate ordinary economic activity, and for social welfare programs that deliver services that enable individuals to reduce other private spending. But what about projects with benefits that are nonpecuniary, such as investments that reduce health or environmental risk? If nonpecuniary benefits are made available to individuals free of charge, they may increase felicity at some point in time (i.e., increase welfare at that time) but otherwise leave no behavioral trace. For example, if additional dollars spent on homeland security this year make individuals feel safer this year, does this induce them to spread the monetary value of this benefit over time? When the SOC criterion is applied to the evaluation of benefits that, unlike cash, leave no behavioral trace, it will be necessary to take into account "indirect revenue effects" in addition to the project's direct benefits and costs. The indirect revenue effect represents the change in capital income tax revenue that would result if the government were to increase lump sum taxes by an amount equal to the private sector's willingness to pay for the project's benefits.[12]

Alternatively, it would be appropriate to discount benefits at the STP rate (reflecting individuals' after-tax rates of return on saving) but discount the costs at the SOC rate, after multiplying costs by a parameter (always greater than one) that represents the marginal cost of transferring a dollar of funds to the government's budget using the marginal tax instrument.[13] Benefits are discounted at the STP rate because they are nonpecuniary and fully consumed when provided. Costs are discounted at the SOC rate because project expenditures impact the government's budget and a dollar of government revenue can always be invested in the capital market to yield the SOC rate. Costs are multiplied by a "marginal cost of funds" parameter because, even if the marginal tax instrument is a lump sum tax, the cost to present value consumption of raising a dollar of funds is more than a dollar because of the adverse effect on capital income tax revenue.[14]

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12. The SOC criterion measures the impact of the project on the government's budget when the private sector is held at preproject utility. For a project with nonpecuniary benefits, no revenue will flow to the government from the provision of the benefits, so taxes must be raised to redeem the debt that was issued. If taxes were raised by an amount equal to the private sector's willingness to pay for the project's benefits, the private sector would be kept at preproject utility, but the government budget would record an impact on capital income tax revenue. This is the indirect revenue effect of the project.
13. Liqun Liu proves this result for the case when the SOC rate equals the pretax rate of return. See Liqun Liu, "A Marginal Cost of Funds Approach to Multi-Period Public Project Evaluation: Implications for the Social Discount Rate," *Journal of Public Economics* 87 (2003): 1707–18.
14. A more complete discussion of this procedure is found in David F. Burgess, "Reconciling Alternative Views about the Appropriate Social Discount Rate," *Journal of Public Economics* 97

The second point pertains to the appropriate discount rate to use for cost-effectiveness analysis or "choice of technique" analysis. Proponents of the STP criterion since Martin Feldstein have argued that the appropriate way to compare two alternative projects that yield the same stream of benefits is to discount the alternative cost streams at the STP rate, with no need to apply a shadow price to the investment displaced by these two options.[15] Office of Management and Budget *Circular A-94* and subsequent revisions authorize the use of a 3 percent discount rate (purported to represent the government's long-term borrowing rate) for cost-effectiveness analysis or for within-government expenditures, while also recommending a 7 percent discount rate for conventional benefit-cost analysis.[16] But the appropriate discount rate for cost-effectiveness analysis or for expenditures within government is still the SOC rate. Dollars spent on the more capital-intensive option will save future dollars that would have to be spent on the less capital-intensive option. Unless the extra dollars spent on the capital-intensive option yield a return in terms of future cost saving equal to or greater than the SOC rate, the more capital-intensive option should be rejected. The SOC rate is also the correct rate to use when evaluating proposed regulatory changes whose primary impact is to impose costs on and yield benefits to households. The funds that households use to adhere to the regulation come at the expense of other private consumption or saving, and these funds have a social opportunity cost equal to the SOC rate even if the private opportunity cost of the funds to the household differs from this rate.

CONCLUSION

The social discount rate is, or should be, a key parameter in policy analysis. However, despite more than 50 years of debate within the economics profession, there is still no consensus about its appropriate value. Part of the problem reflects disagreement about what benefit-cost analysis is supposed to achieve. Should it identify projects that increase "social welfare," however defined, or should it identify projects that yield a potential Pareto improvement (thereby ensuring that the gainers can compensate the losers even if they are not obliged to do so)? Those who view benefit-cost analysis as an instrument for identifying

(2013): 9–17. Notice that it is not the same as the STP procedure because costs are discounted at the SOC rate, not the STP rate.

15. Martin Feldstein, "Choice of Technique in the Public Sector: A Simplification," *Economic Journal* 80, no. 320 (1970): 985–90.

16. Office of Management and Budget, *Revised Circular No. A-94*, 1992.

a social welfare improvement interpret the social discount rate as a reflection of the views of policymakers with respect to the present versus the future. Those who view benefit-cost analysis as an instrument for identifying potential Pareto improvements look for the social discount rate in the workings of the real economy. Thus, there is a fundamental issue not yet resolved; is the social discount rate a positive concept or is it a normative concept?

This essay makes the case for the social discount rate as a positive concept whose value should be derived from the performance of the real economy. Specifically, the appropriate social discount rate should equal the social opportunity cost of borrowed funds, which is the rate of return the economy forgoes when the government, or the individual, enters the capital market to fund the project. The social discount rate obtained in this way will be a weighted average of the marginal rate of productivity of capital, the marginal rate of time preference, and the marginal cost of external funding. An important implication is that what should be discounted is not constant purchasing power dollars of consumption but constant purchasing power dollars of income that can be spent on either consumption or investment. Despite major empirical challenges in arriving at an appropriate numerical value—or range of values—for the SOC rate, the pursuit of this key parameter is essential if benefit-cost analysis is to perform a constructive role in policy analysis, which is to identify projects that make the best use of the scarce tax dollars available.

What I am recommending is a single discount rate applicable to the evaluation of all projects, programs or regulatory interventions at any point of time, a rate that is stable over time and revised only if there is clear evidence of changes in its key underlying determinants, which is first and foremost the marginal rate of productivity of capital.

The alternative of using a discount rate equal to the social rate of time preference requires that all benefits and costs be converted into units of consumption, but this conversion is typically ignored in standard applications. Moreover, the method that is recommended for making this conversion is ad hoc and predicated on myopic behavior. It will underestimate project costs whenever the public exhibits foresight about these costs. More fundamentally, the STP discount rate procedure assumes a social welfare function that allows a project to pass muster even though it fails to ensure that a Pareto improvement is possible, and even though there are alternative uses of the funds that would make everyone even better off.

Using a social discount rate that represents the social opportunity cost of borrowed funds does not rule out the possibility that there may be additional

factors to take into account in appraising a project beyond its direct benefits and costs. It has been noted that when a project's benefits are nonpecuniary and, unlike cash benefits, fully consumed when they are provided, there are "indirect revenue effects" to include. An alternative evaluation procedure for such cases would be to discount the benefits at the STP rate but to discount the costs at the SOC rate after multiplying them by a factor representing the marginal cost of raising a dollar of government revenue using the marginal tax instrument. This is not an exception to the validity of the SOC discount rate but rather an alternative way of incorporating indirect revenue effects that are present when benefits deviate from the "just like cash" benchmark that is implicit in the SOC approach.

ABOUT THE AUTHOR

David F. Burgess is a professor emeritus at the University of Western Ontario. He has specialized and published widely in international trade and finance, examining the economic effects of protectionism, trade liberalization initiatives (the Canada-US FTA and NAFTA), fiscal deficits, and capital market restrictions. Burgess spent the academic year 1979–80 on secondment to the Canadian federal government in Ottawa investigating the appropriate social discount rate for evaluating various energy policy initiatives. This led to subsequent commissioned work on the appropriate discount rate for evaluating natural gas pipeline extensions in British Columbia, alternative electricity options for Ontario Hydro, and the full cost accounting of alternative transportation modes for Transport Canada. Burgess retired from the university in June 2008.

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