Using the social rate of discount in evaluating public investments in the Philippines

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What discount rate to use in evaluating public investments has been a subject of long and intense debate. There are varying views coming from both theory and practice. The common practice is to use a range of estimates and perform a sensitivity analysis. The range usually suggested for developing countries is 8–15 percent. The range commonly used in developed countries is lower (3–7%). In any case, behind the numbers and proposed methodologies are unresolved questions and, to some degree, unsettled debate on what should be the social rate of discount. This Policy Note puts forward some suggestions on the “appropriate” social rate of discount for use in benefit-cost analysis (BCA) of public investments in the Philippines.

Some theoretical issues

Granted that costs and benefits can be properly identified and quantified (which is an extremely difficult task to do), there remains a question of what “social discount rate” should be used in public investment projects (or in any public policy impact analysis).

The social rate of discount can be viewed from two general perspectives: the consumer (saver) or producer (investor).

Consumption rate of interest

From the perspective of consumption, the social discount rate is the “rate at which the society is willing to postpone current consumption for more consumption in the future” (Marglin 1963; Sen 1967; Diamond 1968). This is also referred to by Zhuang et al. (2007) as “social rate of time preference”. The question is how this should be measured.
One view is that the social rate of discount should be the revealed preference, that is, the market rate of interest. The argument is that the market rate of interest is the revealed preference of individuals (and collectively of society) and should “not be disregarded in the realm of time, where it is accepted, broadly speaking, in evaluating current commodity flows” (Arrow and Kurz 1970).

The other view is that the “revealed preference” is not “Pareto” optimum. This implies that the social rate of discount should be lower than the market rate of interest. Society as a whole might desire to save for the future, but individuals, left to themselves, would rather let others do the saving. This individual behavior leads to suboptimal savings on the whole and implies a lower “social” rate of discount than what the market reveals. In addition, others argue that “policymakers should be more patient” than private individuals because of the “asymmetry in the intertemporal control rights” (Caplin and Leahy 2004). When making decisions for the present, one cannot alter decisions made in the past. In the same way, when future generations make decisions, they cannot change the decisions made by the present generation. This implies a social rate of discount lower than what is “revealed” by the market rate of interest.

The implication of a (lower) social rate of discount offers a clear prescriptive guide to policymakers (that is, society having greater concern for the future than individuals), especially where intergenerational (and environmental) impacts are concerned. A high discount rate, in effect, disregards, or at least places very little value on, benefits accruing to the future (generation), which such projects aim to serve. However, practical problems and difficulties arise when applying the principle in evaluating most public investment projects. In choosing desirable projects to support (or undertake), a lower discount rate implies a lower hurdle rate. This means a higher number of projects would qualify and very likely more than what can be afforded given capital and budget constraints. There could also be a higher probability of choosing the wrong projects.

The social opportunity cost of capital as the social discount rate

From the point of view of production, efficiency is the primary consideration given scarce resources. We want to make sure that the project being considered is at least as good as the next best alternative. This means comparing the (internal) rate of return of the project being considered with the social opportunity cost of capital. This is the same as using the social opportunity cost of capital as the social discount rate in computing the present value of net social benefits and determining if benefits outweigh costs.

1 This is the gist of the argument in Marglin and Sen’s isolation paradox.
Basically, the social opportunity cost of capital would be the rate of return of the best alternative investment at the margin (the best investment for the last peso in terms of future returns). That (a) this is a marginal concept of best alternative use, that (b) there is risk and uncertainty, and that (c) there could be capital market imperfections and distortions (taxes, for example), among other considerations, will make it very difficult to estimate the opportunity cost of capital to be used in evaluating public investment projects. Any estimate would thus have some limitations about what number to use and should take these into account.

In the absence of market distortions such as taxes and where the capital market is perfect (and there is no isolation paradox and assurance problem), the market rate of interest should equal the consumption rate of interest, the social opportunity cost of capital and thus, the social rate of discount. However, in reality, there are distortions, market imperfections, risks, and uncertainties. These and other factors would tend to drive a wedge between the two rates and would yield a range estimates for either approach. Which market rate of interest? How about the international borrowing rate? What is the best alternative investment and for which sector? How large is the project?

Box 1. Ramsey formula for the social rate of discount

A methodology proposed by Ramsey (1928) to estimate the social discount rate is the sum of two elements: (1) a "pure" time preference and (2) the growth in per capita income multiplied by the elasticity of the marginal utility of consumption.*

\[ \delta = \rho + eg \]

where \( \delta \) is the social rate of discount
\( \rho \) is the rate of pure time preference,
\( \varepsilon \) is the elasticity of marginal utility of consumption, and
\( g \) is the rate of growth of per capita consumption

In the first term, the future is discounted purely because there is preference for the present. This could arise from individual’s “myopia” or perceived risk of death. Some disregard “myopia” as a factor due to ethical grounds. Risk of death could reflect individual risk and/or that for the whole generation. The second term is a reflection of risk and income inequality aversion. The future is discounted by the growth in per capita consumption multiplied by an estimate of this "aversion to income inequality". The estimate of this coefficient is usually close to 1.

For example, taking \( \rho \) to be equal to 0.5 percent, \( \varepsilon \) equal to 1.3 and \( g \) to be 4 percent yields a social rate of discount 5.7 percent.

* This results from maximizing the utility of consumption over time subject to production and investment constraint (and other additional assumptions such as diminishing marginal utility of consumption).
**Weighted average approach**
An attempt to reconcile these opposing views on the social rate of discount is the weighted average approach. A first round impact of a proposed government project that needs to be examined is how it affects savings and investment. How will the project be financed? For small projects, the effect is marginal, in which case the suggested rate of discount is the social opportunity cost of capital.

If a government project is large enough, how it is to be financed could have a considerable impact on consumptions or savings (and investment). For example, does the project cut into other (including private) investments, or would financing the project come from decreased consumption? More likely (depending on elasticities), it would be some combination of both. Or perhaps, the project’s financing would compete with foreign borrowing. As such, a suggested approach usually followed in most countries is a weighted average of the rates implied from these three factors (savings, production, and foreign borrowing). Together with a sensitivity analysis, the weighted average also addresses practical issues and problems of estimation.

**Estimating the social opportunity cost of capital**
The bottom line is that whatever the approach, the social opportunity cost of capital is a key variable and a solid estimate because it is essential in project evaluation.

The Philippines has been using a generally high social rate of discount, mainly based on the social opportunity cost of capital approach. Past estimates for the Philippines employed different methods appropriate for the circumstances and data availability at the time. One of the earliest estimates of the opportunity cost of capital for the Philippines was done under the Industrial Promotion Policies for the Philippines (IPPP) project in the 1970s (Bautista et al. 1979). The figure was around 15 percent. This estimate was based on pre-1979 data using different methodologies: (1) an aggregate production function; (2) returns to the manufacturing sector; (3) rates on commercial papers; (4) the LIBOR rate; and (5) the t-bill rates. The estimates clustered around 15 percent, which was close to the result using returns-to-manufacturing method. A sequel to the IPPP project was done in the mid-1990s. That time was an era of major reforms, including substantial liberalization in the foreign exchange market. For the project, the estimate for the opportunity cost of capital used is 12 percent based on the LIBOR rate (for the Philippines, this is adjusted by risk
premium). The economy has recovered from the 1983–84 economic crisis and the decline in the discount rate was expected.

The most recent estimate of the social discount rate we found is by Jenkins and Kuo (1998). They used the weighted average approach. The social rate of time preference is estimated by the real rate of return on savings in money market, which is approximately 2.6 percent. This is derived using the nominal rate of around 13 percent and inflation rate of around 8.25 percent during the period covered (1994–1996). The opportunity cost of capital estimated by the returns to domestic investment was estimated using an aggregate top-down approach yielding an average of around 9.75 percent (for the period 1976–1995). The real marginal cost of foreign borrowing rate was based on US prime lending interest rate and country rate premium (and an estimate of Philippine stock of foreign debt responsive to market interest rate) yielding an estimate of around 10.8 percent. Using estimated corresponding weights (around 8% for household savings, 50% for foreign funds, and 42% for domestic funds), they computed the social discount rate to be around 10 percent. The estimate is lower than previous estimates, but is still within expected range, based on rates used by other countries.

In an ADB survey of social discount rates used by selected countries across the world, Zhuang and colleagues in 2007 found significant variations in approaches and estimates. Even within countries, the application could differ. For example, in the United States, the Office of Management and Budget used mainly the social opportunity cost of capital while the Environmental Protection Agency, the Congressional Budget Office, and the General Accounting Office used the social rate of time preference approach. Over time, some countries have also switched, mainly in the case of developed countries, from using the social opportunity cost of capital to social rate of time preference (Box 2). The level of development and the context (agency or mandate) appear to have some bearing on which approach is used.

In the Philippines, the National Economic and Development Authority (NEDA), the government’s socioeconomic planning arm, prefers to stick to the higher estimate of the opportunity cost, probably because of the need to be more discriminating given budget constraints. Is there a need for an updated estimate, considering that the most recent estimate is much lower at 10 percent (and an apparent downward trend)? Are we losing out on some projects that should have been undertaken because of the higher hurdle rate?

**Alternative BCA methodologies**

It would help to look at the alternative methodologies used for BCA. There are a number of methodologies for BCA. These include the following, among others:
<table>
<thead>
<tr>
<th>Country/Agency</th>
<th>Discount Rate</th>
<th>Theoretical Basis</th>
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<tbody>
<tr>
<td>Australia</td>
<td>1991: 8%; current: SOC rate annually reviewed</td>
<td>SOC approach</td>
</tr>
<tr>
<td>Canada</td>
<td>10%</td>
<td>SOC approach</td>
</tr>
<tr>
<td>People's Republic of China</td>
<td>8% for short and medium term projects; lower than 8% rate for long-term projects</td>
<td>Weighted average approach</td>
</tr>
<tr>
<td>France</td>
<td>Real discount rate set since 1960; set at 8% in 1985 and 4% in 2005</td>
<td>1985: To keep a balance between public and private sector investment 2005: SRTP approach</td>
</tr>
<tr>
<td>Germany</td>
<td>1999: 4% 2004: 3%</td>
<td>Based on federal refinancing rate, which over the late 1990s was 6% nominal; average GDP deflator (2%) was subtracted giving 4% real</td>
</tr>
<tr>
<td>India</td>
<td>12%</td>
<td>SOC approach</td>
</tr>
<tr>
<td>Italy</td>
<td>5%</td>
<td>SRTP approach</td>
</tr>
<tr>
<td>New Zealand (Treasury)</td>
<td>10% as a standard rate whenever there is no other agreed sector discount rate</td>
<td>SOC approach</td>
</tr>
<tr>
<td>Norway</td>
<td>1978: 7% 1998: 3.5%</td>
<td>Government borrowing rate in real terms</td>
</tr>
<tr>
<td>Pakistan</td>
<td>12%</td>
<td>SOC approach</td>
</tr>
<tr>
<td>Philippines</td>
<td>15%</td>
<td>SOC approach</td>
</tr>
<tr>
<td>Spain</td>
<td>6% for transport; 4% for water</td>
<td>SRTP approach</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1967: 8% 1969: 10% 1978: 5% 1989: 6% 2003: 3.5% Different rates lower than 3.5% for long-term projects over 30 years</td>
<td>SOC approach until early 1980s; thereafter SRTP approach</td>
</tr>
<tr>
<td>US (Office of Management and Budget)</td>
<td>Before 1992: 10%; after 1992: 7%</td>
<td>Mainly SOC approach with the rate being derived from pretax return to private sector investment Other approaches (SPC, Treasury borrowing rates) are also mentioned</td>
</tr>
<tr>
<td>US (Congressional Budget Office and General Accounting Office)</td>
<td>Rate of marketable Treasury debt with maturity comparable to project span</td>
<td>SRTP approach</td>
</tr>
<tr>
<td>US (Environmental Protection Agency)</td>
<td>Intragenerational discounting: 2–3% subject to sensitivity analysis in the range of 2–3% and at 7%, as well as presentation of undiscounted cost and benefit streams</td>
<td>SRTP approach</td>
</tr>
<tr>
<td></td>
<td>Intergenerational discounting: presentation of undiscounted cost and benefit streams subject to sensitivity analysis in the range of 0.5–3% and at 7%</td>
<td></td>
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</tbody>
</table>

Source: Table 4 of Zhuang et al. (2007)
SOC – social opportunity cost of capital; SRTP – social rate of time preference
1. net present value (NPV)  
2. internal rate of return (IRR)  
3. domestic resource cost (DRC)  
4. benefit-cost ratio  

If one uses the same assumptions, they result in the same appraisal about a project’s desirability. However, they will not produce the same ranking of projects.  

This is best illustrated by assuming a single period.  

Let \( Y \) = quantity of output  
\( X \) = quantity of intermediate input  
\( P_y, P_x \) the corresponding prices (in border prices, assuming both output and inputs are tradables)  
\( K \) = capital  
\( L \) = labor  
\( R \) = rent (land and buildings)  
\( r \) = opportunity cost of capital  
\( w \) = economic price of labor  
\( SER \) = shadow exchange rate (social price of foreign exchange)  

Then,  
\[
\text{NPV} = SER(P_y - P_x) - rK - wL - R \\
\text{IRR} = \left[ SER(P_y - P_x) - wL - R \right]/K \\
\text{DRC}/\text{SER} = \left[ rK + wL + R \right]/[SER(P_y - P_x)] 
\]

The criterion for the project to be desirable would be:  
\[
\text{NPV} > 0, \text{ using NPV method} \\
\text{IRR} > r, \text{ using the IRR method} \\
\text{and} \quad \text{DRC}/\text{SER} > 1, \text{ using the DRC method.} 
\]

Note that all three will consistently (mathematically) yield the same result. In other words, all are equivalent with respect to making a judgement about a project’s social desirability. However, if one would rank projects/activities according to the highest NPV, or highest IRR or lowest DRC, the results could be different.  

Each has its own advantages over the others. A general guideline in choosing projects based on their rankings is to use the most binding constraint in considering the different projects. If a government agency is looking at the same output, for example, the provision of the same length of road from different proposals, the NPV is the method to use.  

In general, capital would be a binding constraint. A government agency would therefore have a limit on the number of projects it could undertake. In this case, the IRR ranking would be the logical method to use as this is what would maximize returns to capital.  

In using the IRR method, note that the social opportunity cost of capital is not used directly in the computation. It is only used as a threshold. What this implies is that if one is not confident with the discount rate being used (for example, too many borderline projects pass the evaluation), the analysis could be supplemented with a maximum total number of projects or investible funds.
However, if one is performing an ex-post evaluation of a project, using a very high discount rate could be significantly unfair, especially if the assessment/review has been very cautious and clear in identifying and valuing costs and benefits. In such cases, one should use a social rate of discount lower than 15 percent which is currently being used.

Thus, perhaps a new estimate for the social opportunity cost of capital is not necessary, unless there is reason to believe that its value might have increased since the last estimate. The opportunity cost of capital is likely to be stable until the country has really taken off and reached middle-income level.

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Finally, if one is evaluating a project with very long gestation period, intergenerational costs and benefits become important, and using a high estimate will unfairly discount the future values. In general, for long gestation projects, a lower discount rate is used by most countries.

References