19. DERIVING THE DISCOUNT RATE FOR SEEDLING NURSERIES AND OTHER LIVELIHOOD PROJECTS

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A critical parameter in the financial appraisal of forestry investment projects is the discount rate or required rate of return by the investor – usually taken as the weighted average cost of capital – used to convert incremental net cash flows to their present values. For forestry projects by smallholder and indigenous communities, relatively high discount rates are invariably adopted in investment project assessment (IPA). Long payback period and uncertain or community tenure can make formal sources of lending inaccessible. An assessment of availability of finance and of previous investment studies for small-scale forestry-related projects in the Philippines suggests an appropriate discount rate of about 20% per annum in current price terms or about 15% for constant price analysis (net of inflation).

INTRODUCTION

Choice of the discount rate for project evaluation is often difficult. The appropriate rate can be influenced by a number of factors, e.g. whether a private or social rate is to be used, whether a short-term or a long-term rate is required, whether funding will be from borrowings or equity sources or both, whether a constant price or current price analysis is to be carried out, and whether allowance is needed for taxation impacts. Rates vary between countries and also within countries, sometimes changing sharply over short time periods, so the chosen rate represents a forecast mean rate over a project's life.

Livelihood projects – such as those associated with the SMI Tampakan mine project in Mindanao – have elements of both private and social investment. For the adoptors, as households or communities of indigenous or otherwise mine-affected people who benefit from the new enterprises, the projects are private investments to which they commit their labour and management skills and some capital inputs; even if grant funding is provided to meet project start-up costs they have to contribute working capital and asset replacement capital. Further supporting this private investment view is the intention that the communities take '*ownership*' of the projects, and that the new enterprises become financially sustainable, probably with continued training and extension support in the early years. Hence project adoption decisions will depend on judgment of private financial outcomes. On the other hand, for SMI which is providing funding support for the livelihood projects, regardless of whether this is viewed as part of the royalty payments or good company citizenship, the livelihood projects are essentially social investments. The projects in general '*would not have hap*pened' if it were not for the funding support, and indeed may not have been financially viable as private commercial investments.

A similar issue concerning choice of discount rate, and whether to conduct a private or socio-economic analysis was encountered by Venn (2004) when evaluating timber utilization options for the Wik Aboriginal community in Cape York Peninsula, Australia. Venn carried out a private financial analysis which was relevant to decision-making by the indigenous community and its gatekeepers, but less so in relation to the Australian Government funding from which would have been required to implement the timber utilization options.

Experience of the School of Economics at The University of Queensland on evaluation of Australian International Development Aid Bureau (AIDAB) and AusAID projects revealed a narrow performance band for which projects in developing countries could be supported. The projects were required to be financially non-viable, otherwise Australia would be accused of profiting from '*dumping*' equipment and technology in these countries, and Australia could be challenged by other countries participating in the development assistance program. At the same time, the projects had to be developmentally sound, so that they did justify support. These constraints could be viewed as requiring relatively low private benefits but relatively high social (or economic in a broad sense) benefits. These constraints were operationalised by ensuring that the financial internal rate of return (FIRR) of the projects was less than the cost of capital, but the economic internal rate of return (EIRR) taking into account social and environmental as well as financial benefits was greater than the cost of capital.

Not only does the discount rate concept change in a social (or socio-economic) analysis relative to a private investment analysis, but the cash flow items which are considered relevant and the way in which they are valued also differs. In the project evaluations for AIDAB, the EIRR was computed from a social cost-benefit analysis perspective. Transfer payments (taxes and subsidies) were regarded as irrelevant for social analysis, externalities or spillover costs and benefits which were not included in private financial analysis are brought into the calculations, and input and product costs were valued at their shadow prices (taken as import parity prices), i.e. prices adjusted for local distortions such as artificially constrained prices for food products.

DISCOUNT RATE CONSIDERATIONS FOR PRIVATE INVESTMENT PROJECT ANALYSIS (IPA)

The *required rate of return* of the investor appears to be the relevant discount rate concept for private investment decisions, and this is typically approximated by the *weighted average cost of capital* (WACC) (Dayanandra et al. 2002). In determining the weighted average cost of capital, allowance is usually made for the cost of borrowed funds and the opportunity cost of using own funds, in financing an investment. If income taxes are incurred, the borrowing rate and the opportunity cost of using own capital are both reduced by the tax impact of interest paid or earned. If a constant price analysis is conducted, the WACC is reduced by removing the inflation component.

In the case of livelihood projects for indigenous people affected by the Tampakan mine project, borrowing from formal lending institutions would be difficult if not impossible. These institutions cannot in general foreclose on bad debts because there are no individual property rights to land, foreclosure on disadvantaged social minorities would be seen as socially reprehensible, and there may be retaliatory measures from the indigenous communities. Borrowing is often from informal sources, including middlemen, friends, stores patronized, private lenders and landlords (Peque 2005), often at very high interest rates (of 20% or more) and for very short loan duration (sometimes until harvest of an annual crop). Interest rates from these informal sources are probably highly variable and estimation of a typical rate is difficult, and in any case a short-term rate is of limited relevance for evaluation of investments with a project life of 10 years or more. A further characteristic of livelihood projects is that the initial capital outlays for equipment and training are likely to be met from the community development fund set up for indigenous people by SMI.

Indigenous communities in southern Mindanao, and the rural poor in general, typically have little savings available to finance investment projects, and their main input is labour, to make use of low-cost building materials and other project inputs. When expenditures greater than normal are to be financed, this often happen through asset sales, such as cutting some timber or sale of small animals (pigs, chickens). Periods of insufficient household food (going hungry) appear to

be not uncommon. Apparently in southern Mindanao, making and selling charcoal is a frequent source of emergency funds. Given the general absence of savings, and the likelihood of grant funding for initial capital outlays of livelihood projects, the question arises as to whether own funds should even be taken into account when determining the cost of capital for financial analysis of these projects. A cost for own funds is however needed when equipment replacement takes place, because it cannot be assumed that grant funding will continue throughout the project life. Hopefully, communities can be encouraged to set up saving or sinking funds to allow for capital replacement or expansion expenditure, in the form of bank accounts or probably more likely as other investment projects with high financial liquidity. An example observed in Leyte is raising pigs with the proceeds of sales from community seedling nurseries. If savings are generated within a project, and are held as a cash reserve, then an interest earning on own funds can be considered to exist, and a rate could be calculated. However, if savings are invested in other projects, then the rate of earning on these projects could be considered as a return to multiple resources (including labour and land) and not just capital, so determining an own-funds earning rate may not be possible.

There is clearly a lack of evidence of utilization of capital markets in the indigenous communities to be affected by the Tampakan mine. These communities are generally regarded as welfare cases, rather than profitable customers of formal credit providers. In this situation, determining an appropriate discount rate for financial evaluation of livelihood projects is by nature subjective, and determining the sensitivity of project financial performance over a number of rates will be necessary. Adopting a '*current*' or '*best guess*' rate above that which would be used for investments for farmers on A&D land would seem appropriate, given the acute shortage of funds and high investment uncertainty in tribal communities. While the discount rate would normally be reduced to allow for income tax saved on borrowed funds and incurred on earnings from own funds, it can be assumed that indigenous minority groups will in general pay no income tax, so no adjustment for tax will be needed. In the case of investments by community groups (e.g. tribal groups or community organizations, COs), these would also be exempt from income tax payments because they would be regarded as non-profit organizations.

A *constant price analysis* has been adopted for the financial analyses, which assumes that the rate of increase in price over time will be the same for all cash flow components. This assumption is justified on the grounds that there is insufficient information to predict differential rates of change in the prices to be earned from providing goods and services and the costs of variable inputs in the livelihood projects. A consequence of using a constant price analysis is that the rate of inflation must be netted out of the estimated cost of capital. Inflation rates have been highly volatile in the Philippines in recent years, with low rates prevailing during the recent years due to the global financial crisis (GFC).

Replacement of capital items during the project life raises concerns not only about the cost of own funds but also whether the indigenous people will have put funds aside for replacement expenditure. In general, it is assumed that durable assets are installed in funded livelihood projects, such that replacement investments during the project life are minimized. This includes, for example, nursery construction using steel mesh raised beds, rather than bamboo slatting which may have to be replaced every 2–3 years, and purchase of new or near-new machinery.

DISCOUNT RATE CONSIDERATIONS FROM AN ECONOMIC OR COST-BENEFIT PERSPECTIVE

The discount rate for social (or socio-economic) analysis can be considered as the cost of capital or alternatively as the social rate of time preference (Department of Finance 1991). The cost of capital is generally lower for projects supported by government, because the

large pool of projects conducted implies a lower risk level relative to single projects by private investors.

Under both discount rate concepts, a starting point is the interest rate on government bonds. This can in general be regarded as a risk-free rate, although national governments do sometimes default on their international debts. The current interest rate on government bonds is relatively low in the Philippines, having been reduced during the global financial crisis, as has been the case in many countries. According to ADB AsianBondsOnline (2010), as of 27 May 2010 the 2-year government bond rate was 4.95%, the 5-year rate 6.36% and the 10-year rate 7.875%.

Interest rates charged by government lending institutions are somewhat higher than the bond rate. For example, Land Bank of the Philippines (2010) quoted interest rates on commercial loans as of 31 May 2010 as in Table 1. These are relatively high by developed country standards, at this time when the global financial crisis has led to reduced interest rates. Notably, the rates reported here would be for loans for which mortgages can be applied.

Table 1. An example of recent loan rates for the rural sector in the Philippines

COMMERCIAL RATES	RATES FOR: 1/1/2010 - 6/30/2010
For SMEs under Sulong Program	
Term	**Interest Rate**
Short Term Loan up to 1 Year	9.0000
Term Loan of up to 3 years (fixed for the 3-year period of the loan)	12.0000
Term Loan of up to 5 years (fixed for the 5-year period of the loan)	14.0000

Source: Land Bank of the Philippines, https://www.landbank.com/rates.asp#interests, accessed 15 July 2010.

Inflation rates have been highly variable in the Philippines in recent years. Recent inflation rates are illustrated in Table 2. These rates, which are in general much lower than rates in the previous decade, range from about 3% to 9% per year. The influence of the global financial crisis is apparent in the rates for 2009–10. According to Yap and Yap (2010), '*Philippine inflation held at 4.4 percent in April, the fastest pace since December, as oil and food costs rose amid the global economic recovery. Consumer prices may have climbed as much as 5.1 percent in May, Bangko Sentral ng Pilipinas Governor Amando Tetangco estimated yesterday'*. These are apparently annualized rates.

Table 2. Recent inflation rates in the Philippines

Year-on-Year Inflation Rates in the Philippines, All Items January 2005 - June 2010						
Month	**Year**					
	2005	**2006**	**2007**	**2008**	**2009**	**2010**
January	8.4	6.7	3.9	4.9	7.1	4.3
February	8.5	7.6	2.6	5.4	7.3	4.2
March	8.5	7.6	2.2	6.4	6.4	4.4
April	8.5	7.1	2.3	8.3	4.8	4.4
May	8.5	6.9	2.4	9.5	3.3	4.3
June	7.6	6.7	2.3	11.4	1.5	3.9
July	7.1	6.4	2.6	12.3	0.2	
August	7.2	6.3	2.4	12.4	0.1	
September	7.0	5.7	2.7	11.8	0.6r	
October	7.0	5.4	2.7	11.2	1.6	
November	7.1	4.6	3.2	9.9	2.8	
December	6.7	4.3	3.9	8.0	4.3r	
Average	7.6	6.2	2.8	9.3	3.2	

Source: Philippines National Statistics Office, http://www.census.gov.ph/data/sectordata/datacpi.html, accessed 15 July 2010.

DISCOUNT RATES ADOPTED IN PAST STUDIES OF FORESTRY-RELATED PROJECTS IN THE PHILIPPINES

A review of appraisals of forestry-related projects in the Philippines reveals a wide range of discount rates adopted. According to Venn et al. (2000, pp. 100–101),

'During the 1970s and 1980s in the Philippines, discount rates of up to 24% were employed for evaluating forestry investments (Appleton 1980). Rates in use today are lower, although still high by Western standards. DENR (1998a) used rates of between 12% and 18%, and Uriarte and Pinol (1996) used 18%. Niskanen (1998a) used an estimate of the social rate of time preference in his study of Filipino and Thai forestry investments, which he assumed could be approximated by the rate of return required by international financing institutions such as the Asian Development Bank (currently around 10–12%). Real discount rates of between 12% and 18% are used in this study. Discount rates of between 15% and 18% are likely to approximate market rates of interest in the Philippines'.

In an agroforestry study in northern Mindanao, Bertomeu (2006) stated that '*Annual discount rates of 15% and 20% in real terms are assumed, based on the cost of borrowing capital in the area*'. Similarly, Rañola et al. (2007) adopted a discount rate of 10% for evaluation of agroforestry systems in northern Mindanao; while not stated, this is probably a rate net of inflation, for use in a constant price analysis and equivalent to about 15% in nominal terms.

DISCOUNT RATE ADOPTED FOR THE LIVELIHOOD PROJECTS

For the analyses of livelihood projects, the social rate of time preference view of discount rates appears relevant to SMI in the company's role of providing funding support, while the weighted average cost of capital appears relevant to the individuals and groups in

indigenous communities adopting the projects. The view is taken here that the private financial analysis model is the more relevant.

For the analysis of livelihood projects supported by SMI, the borrowing and lending rates are both assumed to be 15% in real (constant price) terms, equivalent to about 20% in nominal (current price) terms, with an inflation rate of about 5%. While an additive model of real rates of interest and inflation rates would imply simple subtraction, the multiplicative model normally favoured slightly changes the difference between these two rates, as discussed below.) The discount rate is taken as constant throughout the project life, for projects implemented by both individual households and groups of households. In sensitivity analysis, real discount rates are varied between zero and 30%, in steps of 10%.

The discount rate adopted is consistent with that of Venn et al. (2000) and Bertomeu (2006). While it is somewhat lower than the rate quoted for loans of five-year term by the Land Bank of the Philippines, it is unlikely that indigenous communities would have access to bank finance. It is likely that relatively high rates would apply to indigenous communities because of their time preference for funds, given the high poverty levels as reported by Emtage (In press) and the high rates charged by informal lending sources.

REMOVING INFLATION FROM THE DISCOUNT RATE FOR CONSTANT PRICE ANALYSIS

The way in which inflation is treated in investment project appraisal depends on whether a current price (nominal price) or constant price analysis is to be carried out. Suppose:

1. n is the nominal rate of interest which includes inflation (e.g. the interest rate on bank loan finance or in general the weighted average cost of capital for financing and investment project);
2. p is the annual inflation rate (e.g. as represented by the annual rate of change in a country's consumer or wholesale price index); and
3. r is the annual real interest rate, all expressed as decimal values.

The relationship between these rates may be treated as the *additive* model, **1 + n = 1 + r + p**. Here n = r+p is the real interest rate, hence **r = n-p**. Alternatively, the relationship may be treated as a *multiplicative* model **(1 + n) = (1 + r) (1 + p)**, from which 1 + r = (1 + n)/(1 + p), or **r = (1 + n)/(1 + p) – 1**. The additive model is generally regarded as the more realistic.

As an example, suppose the n = 20% and p = 5% or, in decimal terms, n = 0.2 and p = 0.05. Under the additive model r = 0.2 – 0.05 or 0.15 or 15%. Under the multiplicative model, r = (1 + 0.2)/(1+ 0.05) – 1= 1.1429 – 1 = 0.1429 or 14.29%. The inflation rate is given a greater weighting under the multiplicative model than under the additive model, resulting in a slightly lower estimated real rate.

CONCLUDING COMMENTS

The choice of an appropriate discount rate always presents a problem for investment project appraisal. Further, there is often confusion about what concept is being estimated as a discount rate. For private investments, such as investment in seedling nurseries by smallholders, communities or other non-government investors, the required rate of return is typically based on the weighted average cost of capital. In this case, the main point of confusion is whether a constant or current price analysis is being conducted and hence whether the inflation rate should be removed in the calculation of weighted average cost of capital. Another point of confusion is whether allowance should be made for the impact of income or revenue taxation. It is critical that researchers carrying out financial investment

appraisal make clear the assumptions and steps with respect to discount rate, if their financial estimates are to be meaningful to others.

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