Division of Economics, EGC
School of Humanities and Social Sciences
Nanyang Technological University
14 Nanyang Drive
Singapore 637332

Cost-Benefit Analysis in Developing Countries: What's Different?

Euston QUAH

18 December 2012

EGC Report No: 2012/05

HSS-04-88
Tel: +65 67905689
Email: D-EGC@ntu.edu.sg
http://egc.hss.ntu.edu.sg

COST-BENEFIT ANALYSIS IN DEVELOPING COUNTRIES: WHAT'S DIFFERENT?

Euston Quah*

18 December 2012

JEL-code: D61,Q5, H43, E6,H

Keywords:

Cost- benefit analysis, public project evaluation, policy economics, valuation methods, reviewed preference, related preference.

Abstract

There are both similarities and differences between conducting cost-benefit analysis in developed and developing countries . While the fundamental principles and theory underlying cost-benefit analysis maybe the same , the methodologies and the estimation techniques that are most appropriate in each context may substantially differ . The incompleteness and deficiencies of the labour , goods, and financial markets in developing economies may render revealed preference approaches to valuation unsuitable and inferior to stated preference models . But yet , even stated preference models are difficult to operationalize in developing countries where the literacy rates may not be too encouraging to allow for complete understanding of such valuation methods . It is largely because of the latter's complexity that the paper here suggests the newer method of adapting to the damage schedules approach to yield meaningful and more straightforward valuation of non-market goods and services . Understanding the differences in applying cost-benefit analysis to developed and developing countries will go a long way to helping policy makers make informed decisions .

Introduction

The Inadequacy of National Income Accounts and Why Cost-Benefit Analysis is Preferable

History has it that Nobel laureate and economist Simon Kuznets put forth the concept of Gross Domestic Product ("GDP") in response to a need for good data in public policy planning in the 1930s. Over the course of time, the importance of GDP and other national income indicators to policy formulation has only grown. Today, if only one macro indicator is available in any given country, chances are, the indicator is the country's GDP. This demonstrates the extent to which national income has become the most important macroeconomic indicator.

However, as Kuznets himself and other critics of GDP have repeatedly pointed out, national income statistics are not ideal measures of welfare.[1] Of the many criticisms, two of the more

* Economic Growth Centre and Division of Economics, Nanyang Technological University, Singapore.

[1] *See* SIMON KUZNETS, NATIONAL INCOME, 1929-1932, S. DOC. NO. 124, at 7 (1934).

prominent are the lack of consideration of equity and the fact that these statistics only measure economic activity and do not account for non-economic costs of growth.[2]

The good news is that equity considerations are increasingly being accounted for by augmenting national accounts with measures of inequity (e.g. Gini coefficient). Unfortunately, no indicator of measuring the non-economic cost of growth has met similar success as GDP in gaining wide acceptance and, as a result, national income statistics continue to present only one side of the picture. The need for such data is clear—optimal policy formulation requires information on the trade-offs between choices.

The costs of economic growth are often non-market in nature, such as environmental harm and or loss to psychological well-being. The list of non-market items is long and to properly account for the full costs of growth, all such items should be quantified, and the changes in the levels of each meticulously recorded. Additionally, to utilize the data to analyze trade-offs, it is necessary to assign monetary values to them. While this form of accounting may seem difficult to carry out, some semblance of it already exists in the form of what is popularly termed "green accounting."

Green accounting notwithstanding, a complete description that records changes in the level of all non-market goods that constitute the cost of growth is more of a grand vision than an achievable goal; the costs involved in such an endeavour is too high for most developing countries. Pragmatically, what these countries can do is to account for these costs at the micro level by conducting cost-benefit analyses when considering public projects.

Why Cost-Benefit Analysis is More Important to Developing Countries

Economic theory indicates that efficiency requires cost-benefit analysis. For developing countries there are three broad reasons why the need for cost-benefit analysis is especially pressing. First, to catch up to developed economies, developing economies need to grow even faster. The shorter the time-frame for convergence, the faster developing countries need to grow. Based on the average growth rate over the last decade, it would take the least developed countries[3] approximately 190 years to catch up to the countries in the Organization for Economic Cooperation and Development. The time required shrinks to around 130 years if growth in the least developed countries grew by just one percentage point faster.[4] Second, most of the world's natural resources are concentrated in developing countries. According to a United Nations report, the world's tropical forests are primarily located in developing nations.[5] For instance, the Amazon, the largest unbroken rainforest in the world, is largely located in Brazil and Peru. As a result, there is considerable international pressure on developing economies to take on greater responsibility for sustainable development. This was plainly illustrated during the Copenhagen Summit negotiations when developed nations made it clear that they wanted developing nations to bear future responsibility in taking on the largest emission reductions. Third, governments of developing countries face significantly greater budgetary constraints than their developed world

[2] *See* Simon Kuznets, *How to Judge Quality*, THE NEW REPUBLIC, Oct. 20, 1962.

[3] As defined by the United Nations Statistics division. The list of all 49 countries may be obtained from http://unstats.un.org/unsd/methods/m49/m49regin.htm#least.

[4] The data involved in the calculation were obtained from the World Bank World Development Indicators Database.

[5] *See* U.N. SYSTEM-WIDE EARTHWATCH, U.N. ENV'T PROGRAMME, *Forest Lost* (2007), *available at* http://earthwatch.unep.ch/emergingissues/forests/forestloss.php.

counterparts. Taken together, the heightened urgency for development, the great international pressure for environmental conservation, and the relative lack of resources at governments' disposal, mean that developing countries have to be extremely prudent about their choices of projects. In more popular terms, developing countries need more "bang for their buck." Since developing nations face the greatest need for optimal decision-making, cost-benefit analysis becomes an important tool to allow them to estimate the net benefits of proposed projects.

A Brief Review of Cost-Benefit Analysis Principles

Given the clear differences in the circumstances faced by developed and developing economies, should cost-benefit analysis in developing countries differ? Answering this question requires a review of some fundamental principles of cost-benefit analysis (Mishan and Quah, 2007). First, cost-benefit analysis must account for all benefits and costs of direct and indirect effects, including externalities. In addition, valuations must be as accurate as possible, reflecting the true social costs and benefits. This requires measuring use and non-use values, distortions in prices due to taxes or subsidies, and opportunity costs. Future benefits and costs must be discounted to allow a fair comparison in current dollars and uncertainty must be accounted for through sensitivity analysis. Finally, double-counting must be avoided and transfer payments should be ignored.

Clearly, the differing circumstances under which developed and developing economies operate have no bearing on the fundamental principles underlying cost-benefit analysis. However, in applying the principles, certain valuation techniques commonly used in developed countries are not appropriate for developing countries. To shed light on this, this chapter examines how labor, goods, and financial markets differ between developing and developed economies and how these differences may result in erroneous cost-benefit analysis if certain valuation techniques are used. The chapter then discusses the relative advantages and disadvantages of employing various valuation techniques in conducting cost-benefit analysis in developing countries. Finally, the chapter looks at whether the limitations of cost-benefit analysis are more severe for developing nations.

I. Differences Between Developing and Developed Nations and Implications for Cost-Benefit Analysis

A. Labor Markets

There are three differences between developing and developed economies pertaining to labor markets that could significantly influence the results of cost-benefit analysis. The first is the higher presence of disguised unemployment in developing economies; the second is the higher level of household production; and the third is the incompleteness of labor markets in developing nations.

Unlike in developed nations, the majority of the workforce in developing nations is employed in agriculture. In India, for example, 52 percent of the labor force is employed in the agricultural sector.[6] This in itself will not necessarily distort a cost-benefit analysis. However, a significant portion of these agricultural workers are actually employed in name only and paid a token wage despite their making zero marginal contribution to the production process. This practice is not

[6] *See* CENTRAL INTELLIGENCE AGENCY, *The World Factbook: India* (2010), https://www.cia.gov/library/publications/the-world-factbook/geos/in.html.

uncommon in developing nations, where farm owners routinely hire family members and pay them a token wage even when there are clearly no additional gains to be made from their employment apart from familial goodwill.

This phenomenon has serious implications for cost-benefit analysis, which requires that items be valued at their opportunity cost. The opportunity cost to reallocate a disguised unemployed laborer to a new position is zero. However, conventional cost-benefit analysis values the cost of labor using the wage rate. If a government project resulted in a laborer moving from disguised unemployment to a new, productive position paying the same wage, that new wage would count as a cost for a project. But, in reality there is no opportunity cost associated with that laborer's prior position—the prior employer loses no productivity when the worker leaves, and just saves the wage.

The challenges posed by this errant balancing are illustrated in the following scenario. Imagine a communal farm that currently produces twenty units of output every year, valued at $9000. The farm is co-owned by the whole village (population 30) and all villagers work on the farm in return for the value of the average output of $300 per year. Because there are more than enough farmhands, ten of the workers do not contribute at all to the total farm output. That is, even if they stopped working, the farm output would remain at twenty units a year; therefore, the marginal output of the last ten farmhands working in the village is zero.

Now imagine that the government proposed to start a project in this particular village that would generate $1000 in benefits. To carry out this project, the government will have to hire ten local workers, at a cost of $3000 (which is how much they would have made "working" at the farm for the year). A typical practice in cost-benefit analysis is to enter the prior wages of this person who switches jobs as a cost item, because it is assumed that their prior wage represents their productivity at their past job. Since the project reallocates their labor, the opportunity cost is the work they otherwise would have been doing.

Using this calculus, the project yields net costs, because the wages of $3000 are greater than the benefits of $1000. However, in truth, the opportunity cost for the ten farmhands giving up their previous employment should be zero since their marginal productivity was zero. When they quit working at the farm, it continued to generate twenty units of output, valued at $9000. The average output would increase to $450, because ten of the workers would no longer be drawing their income from the farm. The workers, in their new position, would generate $1000 worth of value. So the total productivity for the village is $10,000. Indeed, the government could pay for the project by taxing the twenty villages that remain as farmhands, and everyone could be made better off.

There is a caveat. Although the employment of the disguised unemployed is said to carry zero opportunity cost based on productivity, this does not account for the value of the foregone leisure or household production, including childcare and household work and maintenance. Such items may be significant if leisure is highly valued by individuals or if a large portion of the disguised unemployed are indeed actually employed in valuable household production.

This leads us to our next point, that there are higher levels of household production in developing nations than in developed nations. Household production is defined as the production of goods and services by the members of a household for their own consumption, using their own capital

and their own unpaid labor.[7] This value is difficult to measure. Valuation methods generally fall into two categories: the opportunity cost method, where the value of household production is valued at the foregone wage rate, and the replacement cost method, where the value is the cost of employing people to do it (Quah, 1993).

In developed economies, household production can be priced since labor markets are generally efficient, reflect opportunity costs, and demand for hired help exist. The same cannot be said for developing economies where labor markets are largely incomplete and households undertake most household production, as the name suggests. The households do not pay themselves for their household production and, therefore, such production cannot be easily priced. The same problem can be seen in the production that occurs in the underground economy.

The problem is two-fold. First, there is the technical issue that market-based measurement techniques are inadequate because markets for hired help either do not exist or are significantly incomplete in developing countries. Second, the higher levels of production undertaken by households mean that cost-benefit analysis, which does not incorporate this production, is biased and inaccurate. While developed nations may sometimes face similar problems in conducting cost-benefit analysis, the scale of the impact is much smaller. Accordingly, the accuracy of the cost-benefit analysis is much higher due to the existence and relative efficiency of the market for hired help and the much lower levels of household production.

The third difference between labor markets in developing and developed economies is the relative incompleteness, and hence, inefficiency, of the former when compared to the latter. This arises for a variety of reasons, including the extent of information failure and the ability of employers in developing countries to exercise monopsonistic (single buyer) power in the labor market.

The implication of the above differences is that wages in developing countries rarely reflect an individual's valuation of job attributes. In an efficient labor market, undesirable job attributes are compensated with wage premiums, which may then be used to place a value on the job attributes. The wage premiums represent the willingness to accept of individuals for the disutility arising from the undesirable job attribute. The implication for cost-benefit analysis is that intangible job characteristics, such as status and location, cannot be valued using hedonic pricing. A specific implication is the potential error in calculating the value of statistical life ("VSL"), which is conventionally calculated by studying the wage premiums associated with the increased level of risk of losing one's life on the job, and then extrapolating to estimate the theoretical amount required to compensate someone for the loss of life (Mishan and Quah, 2007). Using wage premiums that do not accurately reflect the compensation required for the differing levels of risk results in an erroneous VSL. This has severe implications for all other cost-benefit analyses that will be used to evaluate projects that impact health and safety, since the values of many costs and benefits are derived from the VSL.

B. Goods Markets

Another major difference between developing and developed economies is that the goods markets in developing economies are likely to be less efficient than those of developed economies due to information asymmetry. The disparity is even more apparent with the advent

[7] For a more detailed definition, see Duncan S. Ironmonger, *Household Production*, 20 INTERNATIONAL ENCYCLOPAEDIA OF THE SOCIAL & BEHAVIORAL SCIENCES (N.J. Smelser and P.B. Baltes eds., 2001).

of the Internet that has, by-and-large, been more accessible to, and more effectively utilized by, the developed world. This point is best illustrated by the growth of online shopping, which has driven down prices in the developed world, but has not had the same impact in the developing world.

Additionally, unlike in developed economies, the goods markets of developing countries are more likely to be distorted due to taxation, subsidies, or other forms of governmental intervention (Dinwiddy and Teal, 1996).

The inefficiencies and distortions of the goods markets mean that in developing countries, prices may not reflect the true values of goods. Therefore, using prices to value input items, as is usually done in developed countries, would likely result in an inaccurate cost-benefit analysis in a developing country.

An indirect issue that arises from the inefficiencies and distortions of the goods markets is the valuation of intangibles and externalities. Typically, in developed economies where the goods markets are considered efficient, intangibles and externalities are valued in relation to consumption through a revealed-preference approach. For example, in estimating the value of national parks and related recreation in the United States, the travel cost approach is commonly used. This approach obtains a demand curve by examining the price of recreation in a national park, which is the cost visitors are willing to pay to travel to visit the park (Fix and Loomis, 1997; Beal, 1995). However, the credibility of such revealed preferences breaks down when a goods market does not produce prices that reflect the true value of a good. In the example of the national park, if fuel was distributed through a rationing system, then the private cost of travelling would be very hard to determine and the demand curve obtained would be inaccurate. Rations and other forms of price distortions are prevalent in many countries in the developing world. The consensus is that where there are market distortions, shadow prices should be used.[8]

The calculation of shadow prices is also subject to complications and much debate. Tradable goods in developing economies are an example of a class of goods for which it is difficult to obtain shadow prices. The problem arises due to the fact that exchange rates are required in the calculation of shadow prices for tradable goods. Unlike developed economies, the exchange rates of developing economies may fluctuate wildly and may not be reflective of the appropriate exchange rates. Cost-benefit analysis practitioners in developing countries must be mindful of the accuracy of their techniques in shadow price calculation.

C. Financial Markets

Like the labor and goods markets, the financial markets in developing economies are weaker than those in developed economies. Private banks usually wield considerable monopolistic power in the former, which they may exploit by charging interest rates above what a free market would produce, Yildirim and Philippatos, 2007). This bears on the issue of discounting, as the social discount rate takes into account both the opportunity cost of capital and a society's time preference. In developed economies, the opportunity cost of capital is usually estimated by the market interest rate. This is reasonable because financial markets in developed economies are generally mature enough to generate sufficient competition to drive down the market interest rate so that it truly reflects the opportunity cost of capital. Thus, it is less contentious to use the

[8] This issue is not a new one and there is an abundance of literature dealing with the matter. Boardman et al. (2006) provides a good summary of the literature and methods.

market interest rate to represent the opportunity cost of capital in calculating the social discount rate in developed economies. Unfortunately, the same cannot be said for developing economies.

Interest rates in developing economies are likely to be higher than the true opportunity cost of capital due to profiteering by private banks. If the social discount rate for developing economies is calculated using the market interest rate as the opportunity cost of capital, the result is a higher social discount rate than is appropriate. Consequently, both future benefits and costs are more heavily discounted and cost-benefit analysis is biased in favor of projects that yield short-term benefits and long-term costs.

The market power exercised by private banks is different from the way that time preference between developing and developed societies are influences by other social and economic factors. Populations in developing economies have shorter life spans and lower incomes. Thus, these populations often have a higher preference for current, rather than future, consumption when compared to the preferences of populations in developed countries. Developing societies are likely to have shorter time preferences and, all else being equal, their social discount rate will therefore be higher. This difference is not the result of some inefficiency in the market, but reflects genuine differences in individual preferences.

Overall, the nature of the labor, goods, and financial markets in developing economies clearly differs from those in developed economies. These differences can significantly affect the result and accuracy of a cost-benefit analysis, where certain valuation or discounting techniques are used. These distinctions between developed and developing economies should be kept in mind by analysts seeking to develop accurate measures of the costs and benefits of social policy in developing countries.

II. Relative Advantages and Disadvantages of Various Valuation Techniques in Conducting Cost-Benefit Analysis in Developing Economies

Valuation techniques in cost-benefit analysis may be broadly classified into two categories: revealed preference approaches and stated preference approaches. Revealed preference approaches are indirect methods that attempt to discern the values of items by observing how people behave. To find out the value people attach to a particular view, for example a sea view, a hedonic pricing—a revealed preference approach—may be employed. This involves comparing the prices of two houses that are similar in every aspect apart from the view. The price differential is then taken to be the value people attach to the view. Stated preference approaches are methods based on directly eliciting individuals' preferences. Going back to the example of valuing a view, a stated preference approach, the contingent valuation method, could be used. It would entail a survey requiring people to state how much they would be willing to pay for a view (Quah and Tan, 1999). Hedonic pricing and the contingent valuation method are the prototypical examples of each approach.

Neither method is perfect. Most revealed preference approaches, including hedonic pricing and the travel cost method, require strong assumptions of rationality, perfect information, and perfect mobility to be valid (Quah and Ong, 2009) while stated preference approaches, including contingent valuation method, are susceptible to a large number of behavioral effects (Kahneman and Knetsch, 1992; Carson et al, 2001) and methodological bias. In the context of a developing nation, such flaws may be magnified. We look at each approach in turn.

As illustrated in the previous section, incomplete accounting in the labor, goods, and financial markets in developing economies make the assumptions required by revealed preference approaches untenable. Stated preference approaches may not be entirely suitable for developing economies either. The behavioral effects may be even more pronounced in developing economies due to the relative rarity of people's experiences in survey participation. Research (List, 2003) shows that behavioral effects are, at least in part, brought about by a lack of experience with the decision-making circumstances. Therefore, the magnitude of behavioral biases in stated preference approaches is likely to be much more significant in developing nations. Methodological biases in stated preference approaches also tend to be larger in developing nations due to the lack of trained interviewers (Hanley and Barbier, 2009). One common problem is the inability—of both interviewers and interviewees—to differentiate between willingness to pay and ability to pay. Such misunderstandings are further exacerbated by cultural and linguistic differences. Additionally, surveys typically carry significant costs that cash-strapped governments will be hard-pressed to cover.

A third valuation technique, the paired comparison approach, may prove to be the best solution, as it avoids the obvious flaws of the above two classes of methods. The approach uses a survey to elicit individual preferences for public and environmental goods. Sets of elements are presented in pairs as discrete binary choices in a survey. The set may include gains, losses, activities, environmental resources, or anything else being scaled. Respondents choose the item that they feel is more important, in the sense that larger compensation should be paid for it than for the other.[9] The variance stable rank method is then used to derive the ranking. This method takes the total number of times an element is selected by all respondents and divides it by the maximum number of times it could have been selected. Ordinal rankings are derived based on the results, with some degree of discretion allowed since some elements may have the same ranking.

Since a paired comparison uses surveys like stated preference methods, it eschews the need for the strong assumptions required by revealed preference methods. It also avoids the key behavioral effect that plagues contingent valuation methods, which is known as the endowment effect. The endowment effect uses willingness to pay, which is obtained from a buyer's point of view; by contrast, willingness to accept is obtained from a seller's perspective. These different reference points result in different valuations (Knetsch and Sinden, 1984). Paired comparisons offer a third reference point—that of the selector. As no real or perceived loss occurs in this case, behavioral effects like loss aversion, which can impact the results of a willingness to accept survey, are avoided (Kahneman et al, 1999).

Detractors claim that the paired comparison method has the severe drawback of not providing a measure of the net benefits derived from a project. While the method may indicate a society's priorities, and may prove useful to policy makers in deciding which projects should take precedence over others, this method does not provide policymakers with information on how to get the maximum mileage out of their dollars. However, this concern can be addressed by including monetary items in the paired comparison choice set. Rankings of all items, both monetary and non-market, can then provide estimates of the upper and lower bounds of the monetary values of the non-market items.

[9] *See also* Murray B. Rutherford, Jack L. Knetsch, and Thomas C. Brown, *Assessing Environmental Losses: Judgments of Importance and Damage Schedules*, 20 HARV. ENVTL. L. REV. 51 (1998).

While neither revealed nor stated preference approaches are entirely suitable for developing nations, a paired comparison approach may prove to be a valid and useful option. Nonetheless, in conducting cost-benefit analysis, governments of developing economies will have to exercise caution in choosing the most appropriate valuation method for their purposes, in order to avoid distortions.

III. The Severity of the Limitations of Cost-Benefit Analysis for Developing Nations

A serious criticism of cost-benefit analysis is that it may result in foregoing equity in the pursuit of efficiency. In a typical cost-benefit analysis, the value of a dollar does not reflect who receives the benefits of a project or who pays its costs. Hence, it is conceivable that cost-benefit analysis could increase inequity by approving projects that yield net benefits even when most of the benefits accrue to the rich and most of the costs are borne by the poor. In a developed nation, this is not as big a problem as there are usually governmental channels, such as progressive taxation and estate taxes, to redistribute wealth and prevent the income gap from widening too much or too quickly. Developing nations, however, tend to lack such channels. In fact, prevalent corruption—a chronic problem for most developing nations—specifically prevents the formation of such channels since it is often in politicians' interests to line the pockets of their business-sector donors.

Additionally, income inequality is generally a larger problem for developing nations than for developed nations. When ranked by their Gini coefficients, the ten countries with the highest income inequality are all developing nations, while the majority of the ten countries with the lowest income inequality are developed nations.[10]

Cost-benefit analysis need not completely ignore equity. One commonly proposed strategy is to apply weights to costs and benefits, to reflect the relative importance of monetary values to different social classes. For example, benefits or costs accruing to low-income groups may be multiplied so that the costs and benefits to them are magnified, and projects in their favor will have better chances of being approved.

While this principle is basically sound, the application of this weighting is highly problematic. First, there is the technical issue of determining what weights should be employed to adequately address inequity. While it is clear that the greater the importance attached to inequity issues, the larger the weights should be, the appropriate number is often difficult to calculate. One possible solution is to infer the implicit weights attached to different social groups by examining existing policies. However, this solution is problematic, as it can merely reinforce existing biases, which may be completely unjustified in the first place.

A second concern is the possibility of abuse. With equity weighting, cost-benefit analysis could be manipulated to produce any result desired simply by adjusting the weights attached to a particular group's welfare. In developing countries, the possibility of abuse is higher due to the relative lack of checks and balances on ruling powers. This further renders the usage of weights to address the inequity issue unsuitable for developing economies, and consequently reduces the ability of cost-benefit analysis to take into account inequity issues in these economies.

[10] *See* HUMAN DEV. REPORT 2009, U.N. DEV. PROGRAMME, OVERCOMING BARRIERS: HUMAN MOBILITY AND DEVELOPMENT, http://hdr.undp.org/en/media/HDR_2009_EN_Complete.pdf.

Conclusion

As this discussion indicates, there are both similarities and differences between conducting cost-benefit analysis in developed and in developing countries. While the fundamental principles underlying cost-benefit analysis remain unchanged, the methodologies that are most appropriate in each context may differ. In fact, it is precisely in abiding by those principles that certain valuation techniques may become unsuitable. For example, it is specifically due to the desire to achieve accurate valuations—a cardinal principle of cost-benefit analysis—that the incompleteness of the labor, goods, and financial markets in developing economies may render revealed preference approaches unsuitable and inferior to stated preference and paired-comparison approaches.

In addition, the overall merits and limitations of cost-benefit analysis shift depending on the state of economic advancement. The need for cost-benefit analysis is indeed more pressing for developing economies, since they must contend with a number of conflicting and yet critically important goals, such as increasing economic growth while nonetheless conserving natural resources. However, cost-benefit analysis has severe limitations regarding equity concerns, which poses a pronounced challenge for developing economies utilizing the technique. The question then follows: should governments of developing economies employ cost-benefit analysis as a decision-making tool?

This analysis has argued that cost-benefit analysis can, and should, be used by the developing world. Cost-benefit analysis is a very useful tool for policymakers. Conducting the analysis requires asking important questions including: what costs and benefits should be measured and how to measure them; what communities will receive the benefits and pay the costs; how will uncertainties and equity issues be addressed; what are the appropriate investment decision criteria; and whether there are constraints on the results. Systematic decision-making that uses consistent and transparent methodologies are useful in formulating public policy, in both developed and developing countries.

At the same time, cost-benefit analysis can only fulfil its potential if three important issues are taken into account. First, cost-benefit analysis is only meant to be a guide and should not be the final or only arbiter of project proposals. Second, in conducting cost-benefit analysis, the appropriate valuation techniques must be selected. Finally, potential equity issues must be independently considered, and treated as an imperative complement to a robust cost-benefit analysis.

Bibliography

Beal, D.J. 1995. "A Travel Cost Analysis of the Value of Carnarvon Gorge National Park of Recreational Use." *Review of Marketing and Agricultural Economics*, 63 (3): 292-303.

Boardman, Anthony, et al. 2006. *Cost Benefit Analysis: Concepts and Practice*. 3rd ed. New Jersey: Pearson Prentice Hall.

Carson, Richard T., et al. 2000. "Contingent Valuation: Controversies and Evidence." *Environmental and Resource Economics*, 19: 173-210.

Dinwiddy, Caroline, and Francis Teal. 1996. *Principles of Cost-Benefit Analysis for Developing Countries*. Cambridge, CB: Cambridge University Press.

Fix, P., and J. Loomis. (1997). The Economic Benefits of Mountain Biking at One of Its Meccas: An Application of the Travel Cost Method to Mountain Biking in Moab, Utah. *Journal of Leisure Research,* 29.

Hanley, Nick, and Edward B. Barbier. 2009. *Pricing Nature: Cost-Benefit Analysis and Environmental Policy*. Massachusetts: Edward Elgar Publishing.

Kahneman, Daniel, and J. Knetsch. 1992. "Valuing Public Goods: The Purchase of Moral Satisfaction." *Journal of Environmental Economics and Management*, 22: 57-70.

Kahneman, Daniel, et al. 1999. "Economic Preferences or Attitude Expressions?: An Analysis of Dollar Responses to Public Issues." *Journal of Risk and Uncertainty*, 19: 1-3; 230-235.

Knetsch, Jack, and J.A. Sinden. 1984. "Willing to Pay and Compensation Demanded: Experimental Evidence of an Unexpected Disparity in Measures of Value." *The Quarterly Journal of Economics*, 99 (3): 507-521.

List, John A. 2003. "Does Market Experience Eliminate Market Anomalies?" *The Quarterly Journal of Economics*, 118(1): 41-71.

Mishan, E.J., and Euston Quah. 2007. *Cost-Benefit Analysis*. New York, NY: Routledge.

Quah, Euston, et al 2006. Use of Damage Schedules in Environmental Valuation, *Applied Economics (United Kingdom)*, Vol. 38, pp 1501-1512.

Quah, Euston. 1993. *Economics and Home Production*. Singapore, SG: Ashgate.

Quah, Euston, and Qiyan Ong. 2009. "Cities and Happiness in Environmental Goods." In *World Cities: Achieving Liveability and Vibrancy*, eds. G.L. Ooi and B. Yuen, 277-299. Singapore, SG: World Scientific.

Quah, Euston, and Tan Khye Chong. 1999. “Pricing a Scenic View: The Case of Singapore’s East Coast Park.” *Impact Assessment and Project Appraisal*, 17 (4): 295-303.

Quah, Euston, Tan Khye Chong, and E. Choa. 2006. “Use of Damage Schedules in Environmental Valuation.” *Applied Economics (United Kingdom)*, 38: 1501-1512.

Yildirim, H. Semih and Philippatos, George. 2007. “Efficiency of Banks: Recent Evidence from the Transition Economies of Europe, 1993-2000.” *European Journal of Finance*, 13: 123.