

## *Presidential Address/Adresse présidentielle*

### **Cost-Benefit Analysis and Regional Science: A Case of Comparative Neglect**

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I take it to be desirable that presidential addresses reflect on the state of the discipline, or at least some part of it. Let me state at the start, though, that I do not feel competent to reflect on the state of our multidisciplinary field in its entirety. The very breadth of regional science makes such a task too forbidding. Indeed, as a mere economist I would certainly not presume to be able to provide valuable insights into most of the contributions from geography, history, engineering, political science, planning, public administration, and the other disciplines that make up the field. This, by the way, may sound surprising to those of you who recall John Kenneth Galbraith's observation that, while economists may not know very much about a particular matter, that has rarely prevented them from having a lot to say about it.

Rather than addressing the science as a whole, then, I will focus on one small part of it: the art and science of cost-benefit analysis (CBA), particularly its use as a technique of regional science. CBA is both an art and a science because, although it is founded on the principles of the dismal science of (neoclassical) economics, its implementation requires considerable creativity, and the analyst invariably has to search for imaginative ways of approximating application of the basic principles with inadequate data.

The address will review the historical record of the recognition and use of CBA as an instrument of regional analysis. While the method has enjoyed substantial and expanding use in practice over the last 30 years, as well as major recognition by academic economists as a form of applied economic analysis, it is only now beginning to receive

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more than merely passing attention by the academy of regional science. The address will suggest some possible explanations for this treatment.

### Purpose and Use of CBA

The cost-benefit method is used primarily as a guide to resource allocation when government intervenes in the market to provide goods and services or to influence (by way of taxes, subsidies, or regulations) their private provision. These are situations in which the private market is said to fail because of externalities, so-called public goods or economies of scale, or because of the relevance of non-economic objectives, notably distributional equity. In such situations, government intervenes in an attempt to correct for market failure, using CBA as an aid in its decision making. CBA also may be used to evaluate the economic or social impact of private action (for example, investment in research and development), whether or not government intends to become involved.

As a form of regional analysis, the technique is in principle useful in the following ways. First, it provides a framework for evaluating the impact of projects or programmes on levels of welfare in the region in which the initiative occurs, or in the system of regions affected. This category of analysis involves estimation of consumer and producer surpluses in terms of the usual willingness-to-pay or willingness-to-accept measures of benefit and cost. It also may involve evaluation of incremental regional income possibly promoted by the initiative. A second type of CBA addresses the impact of projects or programmes designed primarily to promote interregional equity (in terms of employment and income opportunities) on efficiency in resource use in the economy as a whole. Included here are analyses of regional development initiatives such as advance factory construction, infrastructure improvements, capital investment incentives, labour employment subsidies, direct controls on the location of economic activity, labour migration schemes, and even labour force training and retraining programmes.

### Brief History of CBA as a Technique of Regional Science

CBA began to receive important academic recognition, though not as a form of regional analysis, in the late fifties with the virtually simultaneous publication of seminal attempts to embed its principles in the concepts of neoclassical welfare economics (Eckstein 1958; Krutilla and

Eckstein 1958; McKean 1958). Initial interest focused primarily on use of the method for evaluating water resource development projects, although applications soon extended into other fields, several of them with obvious links to urban and regional analysis: transportation infrastructure planning, housing and urban renewal, recreation, education and training, health, migration, environmental planning and regional development programme evaluation. From the sixties to the eighties, this growing use of CBA was reflected in a spate of reviews by economists in both survey articles and textbooks (for example, Mishan 1971, 1975, 1982a; Pearce and Nash 1981; Prest and Turvey 1965; Squire and Van der Tak 1975; Sugden and Williams 1978).

The growing use of CBA in practice was also reflected in the survey literature of regional analysis/regional planning. For example, a few brief pages on the technique appeared in selected regional/urban economics texts (Butler and Mandeville 1981; Richardson 1969, 1978a) and in discussions of methodologies for spatial planning (Lichfield 1970; Lichfield et al. 1975). Also, there were early reviews of its application in land-use studies in Britain (Peters 1968) and in regional policy evaluation (OECD 1971), and there was one thorough review in a later volume on the economics of town and country planning (Willis 1980).

Yet only minimal attention was paid to the method in the survey literature of regional science. Prominent journal surveys of regional economics prepared in the sixties and seventies (Brown 1969; Meyer 1963; Richardson 1978b) omitted reference to CBA entirely despite the fact that in each case other techniques of regional economic analysis were reviewed. Similarly, early texts on the methods of regional planning (Bendavid 1972; Hall 1970; Isard et al. 1960, 1972; Masser 1972) and most of the standard texts on regional economics (Hoover 1975; Hoover and Giarratani 1984; Richardson 1969), including the Canadian ones (Anderson 1988; Bradfield 1988), also excluded reference to CBA. It was not until the late eighties and early nineties that books dedicated to the method as an instrument of regional analysis appeared (Davis 1990; Schofield 1987), along the lines of earlier books that focused on other methods of regional analysis.<sup>1</sup> While there is a suggestion, therefore, of some wider recent recognition in the profession, this does not herald the final stamp of approval from regional scientists, for some continuing antipathy toward the technique remains.

Two questions are worth asking at this point. The first is: Why was there a history of neglect of CBA in the academic survey litera-

1. Examples of such earlier books include: Richardson (1972), input-output analysis; Adams and Glickman (1980), regional econometric modeling; Rietveld (1980) and Voogd (1983), multicriteria analysis; and Isard (1960, 1972), a variety of different methods.

ture of urban/regional economics and planning when the technique was accepted in the general literature of applied economics outside the regional context and its use burgeoned in practice? The second question is why might there be justification for some greater acceptance at last, even if pockets of resistance among regional scientists remain. Each of these questions is addressed in turn.

### Relative Neglect of CBA in Regional Science

As likely reasons for its relative neglect, some perceived technical limitations and philosophical or ideological objections to the use of CBA seem particularly relevant in the context of spatial analysis and planning. Two main technical shortcomings of CBA have been stressed in the literature on urban, regional, and environmental planning (see, for example, Lichfield 1970; Lichfield et al. 1975; McAllister 1980)—shortcomings said to make the method unsuitable for taking into account factors important in the spatial planning context. Mentioned specifically are (1) intangible and incommensurable effects, and (2) social objectives other than aggregate economic efficiency (for example, distributional equity or environmental protection).<sup>2</sup>

On the matter of intangible effects, CBA in principle requires that benefits and costs be measured in money terms so that different effects become commensurable and a bottom-line benefit-cost ratio, net present value, or internal rate of return can be computed. This requirement obviously poses daunting challenges—for example, as to the value of life, time, cultural heritage, and environmental amenities or disamenities. These are all examples of intangibles that arise frequently in the context of spatial planning. For instance, highway and railway developments improve travel safety and time and affect the environment; proposals to exploit forest, water, and mineral resources damage the environment and may violate aspects of cultural heritage; urban redevelopment schemes may enhance pedestrian safety and traffic flow while endangering the architectural integrity of the built environment and impinging on urban open spaces. If many

2. A third technical limitation of CBA has been identified in connection primarily with its use for evaluating national regional development programmes (Bartels et al. 1982; Marquand 1980), although this limitation may apply to its application to many large-scale initiatives. The point is made that the method is not well equipped to handle the myriad effects generated by a major undertaking because it is essentially a partial equilibrium technique that assumes that the general environment in which an undertaking occurs is not affected materially by the undertaking. Conventional wisdom (for example, Prest and Turvey 1965) is that use of the method is therefore better restricted to small-scale initiatives where primary effects are relatively clear and secondary effects minimal.

such factors cannot be measured in money terms, except very speculatively, it is easy to suggest that the formal CBA is not so useful and that less elegant but more comprehensive multicriteria methods such as the planning balance sheet (PBS) or the goals achievement matrix (GAM), which display all effects in monetary as well as, where necessary, non-monetary terms without a single bottom line, are preferable. In these situations, the catchy phrase “a horse and rabbit stew” has been used to describe CBA. According to this analogy, great care is taken to measure precisely in money terms a small proportion (the rabbit) of total impacts, and then the horse of intangibles is thrown into the pot, leaving an analysis of rather dubious flavour. Another colourful description of CBA as it attempts to deal with intangibles is the characterization of the 1970 Roskill Commission analysis of alternative sites for a third London airport as “nonsense on stilts” (Self 1970).

As for the second perceived technical deficiency of CBA—its focus in its traditional form on aggregate economic efficiency effects (the aggregate of benefits and costs no matter to whom they accrue)—the value of the method can clearly be questioned if it is important to know who gains and who loses, a question often asked in urban and regional planning. As it was put in one commentary, “From the point of view of the regional analyst, the difficulty with cost-benefit analysis is that it ignores the spatial distribution aspects of costs and benefits” (Butler and Mandeville 1981:113). While this assertion never was necessarily true, it is correct to say that in its traditional form CBA could be subject to this criticism.

The philosophical or ideological, as opposed to technical, concerns that may explain resistance to CBA in academic regional science circles can be expressed in four arguments. First, the attempt in CBA to put a monetary value on everything is said to betray a primitive materialistic ideology that should be rejected (Davis 1972). Thus, attempts to place a monetary value on life, health, cultural heritage, scenic views, wildlife, virgin forests, or any of the other intangibles that are regarded by many people as being priceless, are seen as being not only difficult but also offensive. “Attempts to quantify the value of such things”, it is maintained, “threaten or destroy (their) special status” (Campen 1986:59), and, as emphasized earlier, such intangibles tend to figure significantly in the field of urban and regional planning.

A second argument is that CBA, as indicated earlier, derives its rationale from the principles of neoclassical welfare economics, which lie at the heart of mainstream economics. This makes the method unpalatable to those who resist the assumptions and assertions of mainstream neoclassical economics (for example, Ball 1979). As Campen (1986) points out in his review of the radical critique of CBA,

its purpose can be viewed not so much as a means of helping to promote the public interest (its supposed purpose according to the mainstream view), but also as a means of justifying policies and programmes that favour the capitalist class (the so-called selection function of CBA) and of reinforcing the institutional structure (the market system and the social relations) of capitalist production (the reinforcement function of CBA). It is not perhaps unreasonable to suppose that these views may have had a proportionately stronger impact on planning, geography, and some of the other professions that form part of regional science than on economics, given the overwhelming dominance of the neoclassical paradigm in the latter. If so, this would help explain the greater visibility of CBA in survey material in economics than in regional science.

A third argument against CBA has been that the method has the potential to preempt political decision making, replacing it with decision making by technocrats (Self 1975; Wildavsky 1966), or "econocrats" to use Self's term. The argument is that the technical complexities of the method may compel decision makers to accept the imperatives of the bottom line of the analysis instead of attempting to balance the interests of affected parties as expressed through the political process. It is noteworthy that an influential diatribe that used this argument came from within the ranks of planning professionals (Self 1975), and, given that spatial planning is an activity in which public participation through the process of public hearings is of major importance, it is perhaps not surprising that observers in the planning profession may not always have seen their area as fertile ground for use of the method.

Finally, a likely explanation for the comparative neglect of CBA in regional science—particularly among regional economists rather than other professionals in the discipline—is that an influential body of conservative opinion in the economics profession has always held that CBA should be confined, as it was in its traditional form, to analysis of aggregate efficiency effects alone—that is, effects on the economy as a whole but not any of its constituent parts such as regions. Thus, Harberger (1971), a leading proponent of CBA, argued that to ignore consideration of distributional matters in using CBA is simple, robust (it answers practical problems), and consistent with a long tradition in economics in which the economist accepts that he or she is not professionally qualified to address non-economic matters. To do otherwise, argued Mishan (1974, 1982b), perhaps the doyen of CBA, obscures the essential efficiency dimension of issues, which it is the responsibility of the economist to identify. Another argument (Musgrave 1969) was that the distributional consequences of decisions could be corrected if necessary through the tax transfer system, but

public investment decisions should be based on aggregate efficiency considerations alone, precisely the criterion that conventional CBA was designed to address.

Added to these views of front-rank CBA theorists of the 1960s and 1970s were arguments made by water resource economists in the 1970s against incorporation of social, environmental, and regional distribution effects into analyses of water resource projects, the area of application in which CBA had its main roots. Freeman and Haveman (1970) suggested that it was not important to recognize regional development as a concern of water resource planning since there was no evidence that plentiful water or the availability of inland waterway transport exerted a significant effect on regional growth. These authors also argued that in order to determine for the purpose of aggregate efficiency analysis whether benefits and costs attributed to any region were national efficiency effects or merely interregional transfers, it was necessary to measure impacts on all regions in the system, a requirement that meant enormous difficulties of measurement. Besides, the only meaningful equity consideration, it was alleged, is the distribution of income among individuals—an arguable assertion that "place" as opposed to "people" prosperity is irrelevant. Moreover, if the regional development objective were admitted into water resource planning, it should be introduced into all policy choices if suboptimization in public expenditure planning is to be avoided. Finally, measurement of regional costs and benefits was said to be relevant only to the allegedly impossible extent that differential regional weights were developed to reflect the relative social value of costs and benefits to different regions. Rehashing more or less the arguments of Freeman and Haveman, Chicchetti et al. (1973:724) concluded that measurement of the regional, environmental, and social impacts of water resource developments was "redundant and methodologically unsound".

### Justification for Greater Acceptance of CBA

In recent years, the CBA technique seems to have secured some greater acceptance. Three main reasons underlie this greater acceptance, or, at least, explain why such acceptance might be justified even if scepticism about its value is still found in certain quarters.

The first reason is that considerable progress has been made over the last decade or so in measuring intangible benefits and costs, one of the main technical shortcomings of the method. Approaches fall into two groups: those that rely on revealed preferences and those that rely on expressed preferences for intangible benefits or the avoidance of

intangible costs. The *revealed preference approach* involves inference of implicit values from actual behaviour; the *expressed preference approach*, also known as the contingent valuation method, involves asking people what the value to them is of a beneficial or adverse contingency.

Over time these methods have been refined and extended into new applications. The model design and econometric method of the revealed preference method have been refined. Moreover, the hedonic (or implicit) price approach, traditionally used for valuing environmental amenities or disamenities from the relationship between the value of properties and their environmental attributes, has been extended to estimation of the value of life—an approach that provides a more complete measurement of the value of life than the traditional human capital or discounted lifetime earnings approach. In terms of the value of life and leisure time, an accumulating pool of results has allowed agencies (in particular ministries of transportation) to sanction specific values (or ranges of value) for use in their cost-benefit analyses. Thus, revealed preference methods now appear to carry more credibility than was the case earlier.

At the same time, the expressed preference approach to the estimation of the value of intangibles also has earned increased credibility over the last decade. Scarcely recognized at one time by economists because of the various biases that can infiltrate questionnaire surveys, the method has been extensively tested with encouraging results, particularly in the area of environmental amenities (Brookshire and Crocker 1981; Brookshire et al. 1982) and the cost of injuries and death (Jones-Lee et al. 1985). Recent applications have occurred not only in these areas but in others as well. Examples include the intangible inconvenience of being relocated in a housing development scheme (Flowerdew and Rodriguez 1979) and the benefit of protecting wildlife habitats (Brookshire et al. 1983; Willis 1990). A major advantage of the contingent valuation approach over the revealed preference approaches is that it provides a means of getting at the option, bequest, and existence values associated with many environmental and recreational amenities.

The second reason for the recently greater recognition of CBA as an instrument of spatial analysis is that the simpler forms of multicriteria analysis that have been widely implemented in practice (for example, the PBS, GAM, and U.S. Water Resources Council Principles and Standards) are now regarded by some commentators as really only modifications or extensions of the traditional cost-benefit method. Traditional CBA and these broader forms of analysis are all seen from this viewpoint as components of the same benefit-cost genre. The multicriteria matrix display models incorporate both intangible impacts

and distributional effects, the two exclusions perceived to be the main limitations of traditional CBA in the context of spatial planning. But these models tend to obscure the efficiency dimension that traditional CBA highlights. In other words, the two approaches may be seen to be more complementary than competitive. Thus, CBA is now defined in some works (for example, Davis 1990; Schofield 1987) in such a way as to include both the conventional methodology and multicriteria matrix display models developed specifically for use in urban and regional planning.

The third reason for greater recognition is that positive lessons have been learned from the unremitting growth in the use of CBA over time, these lessons themselves being at once the stimulus for, as well as the result of, this growth. First, it has been demonstrated that reasonably robust frameworks of analysis exist in a number of areas of urban and regional planning, with many of the items of benefit and cost included in these frameworks being measurable with tolerable accuracy. Examples of areas in which specific models have gained fairly wide acceptance are transportation (where cost-benefit models are available as software packages), urban renewal and redevelopment, water resource development, recreation, health and educational services, and (even though this is stated with less confidence) local or regional development policy (for details, see Schofield 1987).

A second lesson from use of CBA is that such an analysis has provided useful guidance even in circumstances in which intangibles are significant. It has become apparent that precise measurement of all items of benefit and cost is not in many cases the *sine qua non* of useful analysis. If the balance of items measured with reasonable accuracy is negative (positive) and it is known that the balance of unmeasured or only approximately measured intangibles is also negative (positive), then it is clear that the undertaking is inefficient (efficient). A good recent example of this situation is a study of the economics of the Grand Canal project that would convert all or part of James Bay into a freshwater lake (Muller 1988). The study showed the net measured effects to be negative when the net unmeasured impacts on the environment were also agreed to be negative. It was therefore clear that the project was not worthwhile. Even when the balance of measured and unmeasured effects conflict, or when the balance of unmeasured effects is not easy to judge, it is undoubtedly better to have some information on an issue than to have no information at all. Decision makers can then ponder the trade-offs on the basis of benchmark information rather than having to operate in a factual vacuum. For example, given a negative net balance of measured items, they know what the net unmeasured effects have to be worth at a minimum in order to make an undertaking worthwhile.

In addition, the use of sensitivity analysis has turned out to be a valuable way of providing usable information about items of benefit and cost that, although measurable, cannot be measured with full accuracy because of uncertainty. This involves presenting ranges of value for items where uncertainty prevails.

A third lesson from practice is that the CBA has proved to be useful specifically as an instrument for regional analysis. For one thing, the aggregate viewpoint of the economy as a whole required of the traditional analysis may be defined at the regional level in cases where the primary impact of the project or programme is regional. Thus, provincially or municipally funded undertakings designed for provincial or municipal benefit can be analyzed from the local point of view using the conventional methodology. Even when the national perspective has to be taken, it may also be illuminating as well as feasible to disaggregate costs and benefits according to regions significantly affected. Indeed, for water resource developments in the United States it has become mandatory to analyze regional distribution along with income class, environmental, and national efficiency impacts (U.S. Water Resources Council 1973), despite the arguments outlined earlier of prominent conservative theorists and certain water resource economists.<sup>3</sup> In different ways, therefore, CBA has been used quite literally as an instrument of regional analysis.

A fourth lesson from practice is that CBA does not appear to have preempted political decision making as feared by some early commentators. For reasons already discussed, its results are often too inexact, or too narrowly conceived, to allow decision makers to rely thoughtlessly on its results. Presented with the results of a CBA, they are still required to exercise judgement on a variety of matters such as the reliability of measures used in the analysis, the significance of unmea-

3. The fact is that the arguments of these authors reveal an implicit judgement in favour of underrating the importance of distributional equity relative to economic efficiency as a social goal. Accordingly, their arguments have not been universally accepted. In addition, a number of their arguments can be challenged on grounds other than disagreement with the underlying value judgement. Thus, while it may be possible in principle to leave the matter of distribution to be addressed through the tax transfer system (Musgrave 1969), desirable corrections may not be made through this mechanism in practice so that it may be preferable to address distributional concerns additionally through public expenditure decisions. The availability of plentiful water or inland waterway transport may not significantly promote regional growth (Freeman and Haveman 1970), but it may generate regionally varied increases in welfare surpluses. It is not necessary to estimate costs and benefits for all regions in the system, or by region for all policy choices (Freeman and Haveman 1970), given that tolerable rather than absolute accuracy is sufficient for useful analysis. Nor is it essential to introduce differential weights for effects in different regions if regionally disaggregated analysis is undertaken (Freeman and Haveman 1970). Information on unweighted distribution effects is in itself useful; decision makers can apply their own implicit weights if they wish.

sured items relative to measured ones, and the importance of objectives not encompassed by the analysis. Moreover, my impression is that decision makers have turned out to be not half so gullible and so vulnerable to the supposed tyranny of econocrats as was feared at one time. Indeed, they are probably only too aware of the limitations of the method, given all the critical press that it has received over the years.

## Conclusion

If I come across as an apologist for CBA, I make no apologies. In my view, the method offers a useful approach to evaluating projects and programmes in the regional context. But that is not to say that it is without limitations or that it is less useful in some circumstances than others. Despite advances made over time, there remain the difficulties associated with measuring intangibles, incorporating social objectives other than economic efficiency into analyses, and tracing the full set of effects generated by an undertaking. For these reasons, we should not expect to achieve complete accuracy in measurement in most cases. Moreover, in some cases we may not get very far at all in terms of measuring costs and benefits. It can be maintained, however, that it is still better to have some information about an issue than to have no information at all, provided, of course, that the key assumptions, sources of data, and methods of estimation used are made explicit.

The technique is, then, like most of the mechanical or medicinal aids that we rely on much of the time: helpful in context, of less value for certain jobs than for others, useless for some, and definitely to be used with care. As such, it seems no different than other techniques of regional analysis that have enjoyed much readier acceptance in the profession—for example, input-output analysis, regional econometric modeling, and multicriteria/matrix display analysis. Even so, the technique is always likely to have its detractors as an instrument of regional science: those with a deeply rooted distaste for horse and rabbit stew, a dislike of attempts to monetize certain intangibles, an aversion to neoclassical economic thinking, a fear of being deceived by econocrats, or a conviction that real CBA should avoid identification of regional distribution effects. For me, though, the method is one of several worthwhile instruments in the tool kit of regional science.

## References

- Adams, F. G., and N. J. Glickman. 1980. *Modelling the Multiregional Economic System*. Lexington, Mass.: D. C. Heath.
- Anderson, F. J. 1988. *Regional Economic Analysis*. Toronto: Harcourt, Brace, Jovanovich, Canada.
- Ball, M. 1979. "Cost-Benefit Analysis: A Critique". In F. Green and P. Nore (eds.), *Issues in Political Economy*. London: Macmillan.
- Bartels, C. P. A., et al. 1982. "Estimating the Impact of Regional Policy: A Review of Applied Research Methods", *Regional Science and Urban Economics*, 12(1):3-41.
- Bendavid, A. 1972. *Regional Economic Analysis for Practitioners*. New York: Praeger.
- Bradfield, M. 1988. *Regional Economics*. Toronto: McGraw-Hill Ryerson.
- Brookshire, D., and T. D. Crocker. 1981. "The Advantage of Contingent Valuation Methods for Benefit-Cost Analysis", *Public Choice*, 36(2):235-252.
- Brookshire, D., et al. 1982. "Valuing Public Goods: A Comparison of Survey and Hedonic Approaches", *American Economic Review*, 72(1):165-177.
- . 1983. "Estimating Option Prices and Existence Values for Wildlife Resources", *Land Economics*, 59(1):1-15.
- Brown, A. J. 1969. "Surveys of Applied Economics: Regional Economics, with Special Reference to the UK", *Economic Journal*, 79(316):759-796.
- Butler, G. J., and T. D. Mandeville. 1981. *Regional Economics*. St. Lucia: University of Queensland Press.
- Campan, J. T. 1986. *Benefit, Cost, and Beyond*. Cambridge, Mass.: Ballinger.
- Chicchetti, C. J., et al. 1973. "Evaluating Federal Water Projects: A Critique of Proposed Standards", *Science*, 181(24 August):723-728.
- Davis, B. 1972. "Society at Work", *New Society*, 22(16 November):405.
- Davis, H. C. 1990. *Regional Economic Impact Analysis and Project Evaluation*. Vancouver: UBC Press.
- Eckstein, O. 1958. *Water Resource Development*. Cambridge, Mass.: Harvard University Press.
- Flowerdew, A. D. J., and F. Rodrigues. 1979. "Benefits to Residents from Urban Renewal: Measurement, Estimation and Results", *Scottish Journal of Political Economy*, 25(3):285-300.
- Freeman, A. M., and R. H. Haveman. 1970. "Benefit-Cost Analysis and Multiple Objectives: Current Issues in Water Resources Planning", *Water Resources Research*, 6(6):1533-1539.
- Hall, P. 1970. *The Theory and Practice of Regional Planning*. London: Pemberton.
- Harberger, A. C. 1971. "Three Basic Postulates for Applied Welfare Economics", *Journal of Economic Literature*, 9(3):785-797.
- Hoover, E. M. 1975. *An Introduction to Regional Economics*. New York: Knopf.
- Hoover, E. M., and F. Giarratani. 1984. *An Introduction to Regional Economics*. New York: Knopf.
- Isard, W., et al. 1960. *Methods of Regional Analysis*. Cambridge, Mass.: MIT Press.
- . 1972. *Ecologic-Economic Analysis for Regional Development*. New York: Free Press.
- Jones-Lee, M. W., et al. 1985. "The Value of Safety: Results of a National Sample Survey", *Economic Journal*, 95(377):49-72.
- Krutilla, J. V., and O. Eckstein. 1958. *Multiple Purpose River Development*. Baltimore: Johns Hopkins University Press.
- Lichfield, N. 1970. "Evaluation Methodology of Urban and Regional Plans: A Review", *Regional Studies*, 4(2):151-165.
- Lichfield, N., P. Kettle, and M. Whitbread. 1975. *Evaluation in the Planning Process*. Oxford: Pergamon Press.
- McAllister, D. M. 1980. *Evaluation in Environmental Planning*. Cambridge, Mass.: MIT Press.
- McKean, R. N. 1958. *Efficiency in Government through Systems Analysis with Emphasis on Water Resources Development*. New York: Wiley.
- Marquand, J. 1980. "Measuring the Effects and Costs of Regional Incentives". Paper 32, U.K. Department of Industry.
- Masser, I. 1972. *Analytical Methods for Urban and Regional Planning*. Newton Abbot, England: David and Charles.
- Meyer, J. R. 1963. "Regional Economics: A Survey", *American Economic Review*, 53(1):19-54.
- Mishan, E. J. 1971. *Cost-Benefit Analysis*, 1st ed. London: Allen and Unwin.
- . 1974. "Flexibility and Consistency in Project Evaluation", *Economica*, 41(161):81-96.
- . 1975. *Cost-Benefit Analysis*, 2nd ed. London: Allen and Unwin.
- . 1982a. *Cost-Benefit Analysis*, 3rd ed. London: Allen and Unwin.
- . 1982b. "The New Controversy about the Rationale of Economic Evaluation", *Journal of Economic Issues*, 16(1):29-47.
- Muller, R. A. 1988. "Some Economics of the Grand Canal", *Canadian Public Policy*, 14(2):162-174.
- Musgrave, R. A. 1969. "Cost-Benefit Analysis and the Theory of Public Finance", *Journal of Economic Literature*, 7(3):797-806.
- OECD (Organization for Economic Cooperation and Development). 1971. *Cost-Effectiveness Analysis and Regional Development*. Paris: OECD.
- Pearce, D. W., and A. J. Nash. 1981. *The Social Appraisal of Projects*. London: Macmillan.
- Peters, G. H. 1968. *Cost-Benefit Analysis and Public Expenditure*. London: Institute of Economic Affairs.
- Prest, A. R., and R. Turvey. 1965. "Cost-Benefit Analysis: A Survey", *Economic Journal*, 75(4):683-735.
- Richardson, H. W. 1969. *Regional Economics*. London: Weidenfeld and Nicolson.
- . 1972. *Input-Output Analysis and Regional Economics*. London: Weidenfeld and Nicolson.
- . 1978a. *Regional and Urban Economics*. Harmondsworth: Penguin.
- . 1978b. "The State of Regional Economics: A Survey Article", *International Regional Science Review*, 3(1):1-48.
- Rietveld, P. 1980. *Multiple Objective Decision Methods of Regional Planning*. Amsterdam: North-Holland.
- Schofield, J. A. 1987. *Cost-Benefit Analysis in Urban and Regional Planning*. London: Allen and Unwin.
- Self, P. 1970. "Nonsense on Stilts: Cost-Benefit Analysis and the Roskill Commission", *Political Quarterly*, 41(3):249-260.
- . 1975. *Econocrats and the Policy Process*. London: Macmillan.
- Squire, L., and H. G. Van der Tak. 1975. *Economic Analysis of Projects*. Baltimore: Johns Hopkins University Press.
- Sugden, R., and A. Williams. 1978. *The Principles of Practical Cost-Benefit Analysis*. Oxford: Oxford University Press.

- U.S. Water Resources Council. 1973. "Water and Related Land Usages: Reestablishment of Principles and Standards for Planning", *Federal Register*, 38.
- Voogd, H. 1983. *Multicriteria Evaluation for Urban and Regional Planning*. London: Pion.
- Wildavsky, A. 1966. "The Political Economy of Efficiency: Cost Benefit Analysis, Systems Analysis and Program Budgeting", *Public Administration Review*, 26(4):292-310.
- Willis, K. G. 1980. *The Economics of Town and Country Planning*. London: Granada Publishing.
- . 1990. "Valuing Non-Market Wildlife Commodities: An Evaluation and Comparison of Benefits and Costs", *Applied Economics*, 22(1):13-30.