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Issue Report

Economic Returns to Rural Infrastructure Investment

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The findings and opinions expressed in this paper are those of the authors and do not represent those of Farm Foundation, ERS, USDA or BNSF.

Theory and Practice of Prioritizing Infrastructure Projects

As the nation discusses infrastructure investments, a frequent question is how to prioritize limited financial resources with projects that have the greatest need and/or potential returns.

To gain insights to prioritization policies and practices, we studied methods used by U.S. federal agencies in the water and transportation sectors, as well as federal investment programs in Canada and Australia. We focus on the use, importance and development of a Benefit-Cost Analysis (BCAs) to prioritize project alternatives.

Under a BCA, the total costs of an infrastructure project are compared with the total potential benefits—economic, social, environmental—to determine the relative value of a project. All the costs and benefits are quantified and reported as a ratio of benefits to costs. While this metric is useful in comparing virtually any set of public alternatives, it is particularly valuable for infrastructure as it can compare projects across regions or within different sectors.

The methodology

A BCA is a useful decision-making tool. The methodology used to develop a BCA has been studied widely in academic literature, though considerable disagreement still exists, especially on the selection of discount rates used to bring future costs and benefits to the present. This is a particularly esoteric but

extremely important factor in any BCA methodology as any change to it can significantly alter the outcome of studies. Recently, BCAs have increased in importance—at least in the United States. The ban on congressional earmarks has at least formally transferred federal investment decision making from the politics of Congress to the technical rigor of the Executive bureaucracy. How federal agencies prioritize projects, and thus BCAs, is likely to increase in importance in the future.

There are difficulties in applying BCAs. One is that an *ex ante* estimate of estimating the costs and benefits of complex infrastructure projects is extremely difficult. Studies have shown that many planning estimates are extremely inaccurate. Another difficulty is that there is, quite literally, no upper bound of complexity or alternatives analysis that can be applied to a BCA for an infrastructure project. This lends an extraordinary amount of flexibility to the BCA preparers and thus, the potential for other considerations, such as politics, to drive outcomes. When the quantification of factors such as environmental or social costs and benefits is added to the analysis, as they are currently in the United States, BCAs become even more complex and flexible.

We found a significant degree of variability in the BCA development process between the water and transportation sectors in the United States, and between the national programs we studied. Our review did not focus as much on the specific quantitative methodology, but rather on how the BCAs were used, what level of government prepares the analysis, and the complexity of the analysis.

BCAs in the United States

Within the United States, we found that the use of BCAs, and the public or academic criticism of them, was significantly higher in the water resources sector when compared to the transportation sector. BCAs have a long history of use by federal water resources agencies, most notably the U.S. Army Corps of Engineers (Corps). The Corps' BCAs have also received considerable criticism by outside groups and internal audits, resulting in a series of revisions over the last 20 years, all of which increased the complexity of the analysis. While streamlining reforms have been implemented more recently, they do not include a decrease in the quantitative economic, social and environmental factors included in the analysis process.

BCAs are completed for some federal transport projects. Most are done by the states and differ between local sponsors. Our review indicated that BCAs are only used as part of a federal analysis in a few more recent transportation grant programs. While the U.S. Department of Transportation (USDOT) has promoted the use of BCAs and provided rough guidelines, the main use of BCAs has been in appraising applications for two discretionary grant programs—the Transportation Investment Generating Economic Recovery (TIGER) and Infrastructure for Rebuilding America (INFRA). Despite the promotion of its use by the USDOT, state agencies have only used BCAs when required to attract federal funding. State departments of transportation have found the use of BCAs challenging due to institutional, resourcing and technical issues.

BCAs in Canada, Australia

Our review of international prioritization programs also produced some interesting points of comparison. [Editor's note: Canada and Australia use the term cost-benefit analysis, rather than benefit-cost analysis. For clarity, this paper will reference benefit-cost analysis, or BCA, for all countries.]

In Canada, BCA has been adopted mainly to support regulatory decisions as evidenced when the Canadian government required that a BCA be done out for all significant regulatory proposals to assess the potential impacts on the environment, workers, businesses, consumers, and other sectors of society.

Canada's federal approach to infrastructure prioritization has been mainly passive in relation to the adoption of BCA techniques. Federal decisions have focused more at the project level—on "'shovel-readiness"—rather than on the strategic or wider objectives/implications of infrastructure investments. The Canadian system passes responsibility for project selection from the federal level to the provinces, territories and municipalities to conduct their own BCA on required investments, or use another method to prioritize investments. Prioritization decisions are largely left to the provinces, and most funding for infrastructure in Canada is also local or provincial. For some national grant programs in Canada, an economic analysis is just one of several factors that influence spending decisions. Others include the procurement model used and the project's readiness for development.

Australia's robust prioritization analysis for federal infrastructure projects includes a BCA. Detailed guidance is provided for state and local governments in developing applications for federal funding.

Prioritization in Australia differs from that in the United States in several key ways. The first is the agency doing the prioritizing. The national government established a new agency, Infrastructure Australia, to oversee and manage federal infrastructure spending priorities across regions and across sectors. No similar cross-sectoral planning agency exists in the United States. Infrastructure Australia provides guidance to state and local project sponsors in submitting applications for federal funding, publishes its assessments of those applications, and maintains an online, rank ordered project priority list of the top projects to receive funding. The ranking system includes a project's BCA as one of three factors, with the other two being strategic fit in the national infrastructure plan and deliverability of the project.

The second way in which this federal prioritization differs in Australia when compared to the United States is in the use of the prioritization process in actual decision making. Elected representatives in Australia did not cede decision making on infrastructure investments to the agency—they may follow Infrastructure Australia's priority list or deviate from it. However, Infrastructure Australia's analysis informs the public discourse in those cases in which elected representatives choose not to follow the conclusions and recommendations of the agency.

BCAs in priority setting

Our review of the relative practices of federal agencies across sectors and with similar federal investment programs internationally sheds some light on the use of quantitative federal assessments to determine investment priorities. The relatively high degree of scrutiny and academic or oversight criticism of the BCA policies at the Corps of Engineers and in the water sector generally, relative to other infrastructure sectors, may be due to the simple fact that BCAs at the Corps truly matter. Scores determine what projects receive Congressional authorization. Arguments around methodology of an analysis as broad, complex and error-prone as BCAs may simply be proxies for arguments around the type and location of projects that receive federal funding.

There are additional indicators that the end of the earmark ban and the formalization of BCA policies in the water sector has not necessarily removed the politics of Congress from the investment decision process. The Corps "backlog" of projects is an indicator of this. The agency currently has a slate of many billions of dollars that have been authorized but have not yet received actual federal funding. We contend that this is a bit of a barometer of the gulf between what the BCA process has determined ought to be federal priorities, and the projects in which elected representatives actually choose to invest.

There is no natural upper bound of complexity for an analysis like a benefit cost analysis.

This study highlights a few issues for programs that rely on a complex economic and environmental analysis to select and prioritize infrastructure investments.

- As complexity increases transparency naturally decreases.
- There is no natural upper bound of complexity for an analysis like a BCA. Agencies must decide how broad and complex of an analysis is "enough." In the United States, this process has been continually revisited since the early 1990s, with the recurring conclusion that more analysis is necessary.
- The use of other metrics and procedures may produce more efficient outcomes for new infrastructure prioritization programs in the United States. One procedure of note is the use in Australia of executive economic analysis to inform citizens, rather than drive investments. Elected officials still retain the authority to make the decisions they were elected to make.
- Other metrics beyond a BCA score may provide a useful signal of the projects economic value to state and local sponsors. Deliverability was a common decision-making theme in the Australian and some of the Canadian programs reviewed. This may be a useful signal, as the local public sponsor's readiness to develop a project may be a strong indicator of how much local leaders think that it will benefit their economy.
- Likewise, the recently proposed federal infrastructure plan by the Trump administration would select projects based on an alternative set of criteria, in which the weighting of projected economic or social benefits would entail only 5% of the total score. Evidence that the project will secure non-federal revenue for construction and operations are meanwhile weighted at 50% and 20% of the project's score, respectively. Such metrics measure the "willingness to pay" on the part of state and local project advocates for the very projects for which they are requesting federal support. They may be a useful signal of the benefits local elected officials hope to receive from the investment.

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