

RESOURCE PAPER

Information for Transportation Economic Analysis

State of the Art and Relevance for Decision Making

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The U.S. economy has enjoyed a long period of overall economic growth since 1994, and policy makers and citizens alike have hopeful expectations of continued productivity improvement, with full employment, nearly full use of productive capacity, and rising real incomes combined with reduced income disparity. Whether such hopes can be sustained is the basic political question of the day. Whether sustained growth can continue without insupportable social and environmental costs is the overriding question in the long run. Transportation is an enabling and limiting factor in both the immediate case as well as over the longer run, in which production and productive techniques may change.

The views of economists appear to differ as to the key forces responsible for growth. Perhaps exogenous changes in technology, combined with increases in population and the labor force participation rate, have been the primary growth engines. Human capital advances may have played a part, with more educated and capable workers. Computers and automation have had a role. Perhaps, though, new and more targeted investment, spurred by institutional changes and aided by an increased money supply, has proven the most important stimulant to economic growth.

The debate among economists may go on, but transportation, as a derived demand, clearly has expanded its capabilities to meet the needs of a growth economy. Expanded capabilities have come about through the use of improved technology but also due to the competitive impacts unleashed by regulatory change. Despite evidence of congestion and service deficiencies, today's highway, rail, and air services are generally of greater capacity as

well as of overall higher quality compared with those of a decade or two ago. The management of transport firms and government organizations likewise appears to have improved effectiveness and responded to demands with a broadened array of services.

In turn, an improved transportation system has reduced many costs of production, raising business profitability. Transportation is a mixed public-private service, and government investment spending in transportation has been needed to support economic expansion; that investment, many believe, also has raised the long-term rate of economic growth. [For reviews of some of the recent studies, see Jacoby (1) and Beshers (2).]

Transportation is an enabling factor in economic growth and in enhancing industrial competitiveness, which can be an overriding policy factor for the United States, as globalization of production and distribution accelerates with uneven impacts worldwide on national economies and labor forces. Transportation organizations increasingly recognize economic growth as a transportation goal. [For examples, see Magid (3), *Transportation and the Economy* (4), and *Transportation for a Competitive America* (5). There are also state examples, such as *Transportation: The Heartbeat of Wisconsin's Economy* (6).]

But transportation plays another, less global role as part of the public sector, because government transportation activity in the United States as elsewhere in the world is expected to provide leverage to achieve social goals at every geographic or political strata. Transportation expenditures and services are asked at national, state, or local levels to facilitate welfare reform, narrow regional

wealth or opportunity disparities, manage growth, and help produce more livable cities or neighborhoods. Transportation provides employment, facilitates changed land uses, links businesses and employees, broadens distribution, enhances recreation, and in short is called upon to put in place the agenda of every political body.

It is no wonder that the information requirements are vast for those who must manage the process of making transportation investment and service decisions in the public interest. Transportation is necessary to support overall economic growth and activity in the national economy, but it also is expected to serve other goals of the community, support the desires of those who use its services, and do all this with the least expenditure of scarce resources. It may not be an easy task to ensure that a transit service be run on time and efficiently, that a highway project be constructed on a life-cycle basis appropriate to the demands of a forecast mix of traffic, or that an air traffic control system be safe and effective for all varieties of commercial as well as general aviation. Yet it takes far more knowledge to blend those transit services to the needs of a community in which some interest groups wish to change land-use patterns while at the same time others would like to enhance the mobility of targeted customers. It is more difficult to build and administer correctly when the highway is required to support the needs of just-in-time trucking, serve as an urban growth boundary, and stimulate the use of high-occupancy vehicles.

Do we have the information required to make satisfactory decisions about how best to apply transportation resources? If not, what information is desired, what might it cost, and how might it be obtained? Is research needed to decide either information needs or cost-effective ways of gathering that information? At the beginning of the past decade, the U.S. General Accounting Office (GAO) in a report describing five important transportation issues gave first position to "investing wisely to rebuild and enhance surface transportation infrastructure" (7, pp. 6-12). This issue was seen as encompassing (a) federal restructuring permitting modal trade-offs, as enabled by creation of the U.S. Department of Transportation's Bureau of Transportation Statistics and its Office of Intermodalism under 1991's Intermodal Surface Transportation Efficiency Act (ISTEA)¹; (b) optimizing the investment of available funding; and (c) seizing emerging technological opportunities. We will address these questions, keeping in mind recent progress made under ISTEA and the Transportation Equity Act for the 21st Century, and conclude with our research recommendations to provide and communicate the information necessary for decision making.

It is clear that the work of the federal Department of Transportation (DOT) over the past decade has increased our store of transportation information through such efforts as resuming and expanding commodity flow surveys, developing an initial transportation satellite account, and

initiating an American Travel Survey to provide intercity passenger information. Further important DOT efforts are underway. On the other hand, the decade also has brought a loss of information once provided by the federal economic regulatory agencies, and the 2000 U.S. Census may prove of less use for transportation planners than those of the past. Some state and local transportation agencies have stepped up their data efforts, perhaps stimulated by federally mandated transportation plans, although my observations suggest state data activities vary widely, and in some cases data once routinely obtained are no longer gathered. Data efforts may have been lost due to agency downsizing, or because of reduced budgets. However, lower-cost electronic methods of obtaining data may permit data restoration. As a general principle, more redundancy in data, with collection at different levels of government, should be encouraged to produce better answers.

Better transportation information about shipments and travelers, however, even if widely available, does not necessarily mean better knowledge of transportation interactions. Transportation information alone may not illuminate how transportation supports the achievement of nontransportation goals.

Better information at the national level also may not result in superior decisions if, for whatever reason, that information is not put to practical use. As I reviewed the literature on economic analysis for transportation for this conference, I was struck by two points: (a) how much attention currently is being paid to economic questions in transportation by policy makers and the press, and (b) how much literature recently has been generated on the subject by researchers. We are fortunate to have excellent reviews in our conference resource papers of some elements of these relationships, but I would like to focus more narrowly on the research of the past few years as managed by the Transportation Research Board (TRB).

TRANSPORTATION ECONOMIC RESEARCH PRODUCTS

It is impressive to note the large amount of applied research on transportation and economics managed in approximately the past 5 years by TRB. It would seem to me that any research recommendations that proceed from this conference ought to build upon this recent work. It may well be that I have missed or neglected some important components of the research, but following are what I believe to be the more important studies and reports that have come to my attention (the list also includes a few studies from slightly earlier in the past decade that are relevant and important²):

* *National Cooperative Highway Research Program (NCHRP) Report 342: Primer on Transportation, Productivity and Economic Development (1991).*

- NCHRP *Research Results Digest 200: Objectives and Decision Criteria for Infrastructure Investment* (1994).
- *Special Report 246: Paying Our Way: Estimating Marginal Social Costs of Freight Transportation* (1996).
- NCHRP Report 389: *Macroeconomic Analysis of the Linkages Between Transportation Investments and Economic Performance* (1997).
- *Transportation Research Circular 477: Assessing the Economic Impact of Transportation Projects: How To Choose the Appropriate Technique for Your Project* (1997).
- *Conference Proceedings 14: Information Needs To Support State and Local Transportation Decision Making into the 21st Century* (1997).
- NCHRP Report 418: *Research on the Relationship Between Economic Development and Transportation Investment* (1998).
- NCHRP Report 40: *Guidance for Estimating the Indirect Effects of Proposed Transportation Projects* (1998).
- NCHRP Synthesis 267: *Transportation Development Process* (1998).
- NCHRP Report 421: *Economic Trends and Multimodal Transportation Requirements* (1999).
- NCHRP Synthesis 269: *Road User and Mitigation Costs in Highway Pavement Projects* (1999).

We have additional TRB-managed work directly relevant to the issue of revenue for transportation (the topic of the resource paper by David Gillen):

- NCHRP Report 377: *Alternatives to Motor Fuel Taxes for Financing Surface Transportation Improvements* (1995).
- *Conference Proceedings 15: Transportation Finance for the 21st Century* (1997).
- NCHRP Report 416: *Alternative Approaches to the Taxation of Heavy Vehicles* (1998).
- TCRP Report 34: *Assessment of the Economic Impacts of Rural Public Transportation* (1998).
- TCRP Report 31: *Funding Strategies for Public Transportation* (1998).

The list of research products I have shared is idiosyncratic, and it does not include each recent TRB product or those underway for which results have not been published. Moreover, the list includes nothing from the many papers published annually in the *Transportation Research Record*. The list certainly does not extend to the vast amount of research published in academic journals, provided by consultants for clients, or produced by transportation agencies primarily for internal use.

The logical question would seem to be: when we have such a volume of recent activity, do we need more research? Have we investigated the wrong issues, or investi-

gated too narrowly? Has the research been unsuccessful? Is the work, in various ways, incomplete?

Fortunately, as we analyze the research that has been done, to address new research needs, we will have available to us the majority of the researchers who have produced or reviewed this body of economic work or served on NCHRP and Transit Cooperative Research Program (TCRP) panels in this field. We can build together on the extensive and diverse body of work done by these talented experts to fill gaps and improve techniques.

OBSERVATIONS FOR DISCUSSION

What strikes me is that rather than building upon and improving our economic research, we may need to take this work in a different direction. The answers to the questions of why we perceive additional research is needed to better understand transportation's impact on the economy and to understand the use of economics in making transportation decisions may be "all of the above." Based on my observations and experiences in government, however, I suspect we call for more research primarily because we neither communicate nor fully understand the research findings to date. Time pressures are simply too great; capable staff are too few. While further research is certain to be worthwhile, particularly because of the complexity of transportation interactions, the research has so far stopped short of technology transfer and therefore is not influencing the behavior of those entrusted with making transportation expenditures. The inability to communicate may be surprising because NCHRP and TCRP reports are designed especially to be practical, accessible, and readable. However, the fault is less with the research products or their presentation than with the reception of the research. We need to return to the GAO's foremost issue for the post-ISTEA era and focus more strongly on communicating investment trade-offs through better, and more understandable, technical assistance to those who are making expenditure decisions. This observation leads me to several hypotheses that I suggest be incorporated into the discussion:

Hypothesis 1. Communication of economic research results needs to be of first priority.

Hypothesis 2. Communication should be foremost to those at the technical level in state DOTs and metropolitan planning organizations, who understand their unique local circumstances and are best equipped to put the research findings to work. Those with technical expertise can then share their knowledge with decision makers and interest group representatives.

Hypothesis 3. Communication is greatly aided by examples and case studies.³

Hypothesis 4. For communication to be fully effective, organization change and institutional strengthening

may be required. More technical personnel could be added and consultants used. The location and communication channels of technical people within the agency or their reporting responsibilities could be changed.

Hypothesis 5. Decision makers should be accessible and seek technical advice on economic questions. Important resource allocation decisions should call upon economic analysis. Just because "maintenance is absolutely necessary" or "safety is our first priority" is not reason to shield an expenditure decision from trade-off analysis. Economic advice needs to be balanced with other considerations, but it should not be missing from decision making for lack of communication.

CONCLUSION

Filling gaps and improving the techniques of economic analysis are important research goals. We should hope to carefully set our priorities for advancing the state of models and providing needed data. But just as necessary is communicating economic knowledge to those who are making and influencing transportation decisions. For successful communication we may need to refocus our attention from basic or even applied research to organizational change in federal, state, and local relationships.

NOTES

1. These offices were seen as needing to define the federal role in transportation problem-solving, provide technical assistance to states and localities, and develop and disseminate data.

2. For greater completeness, *NCHRP Research Results Digest 233* (October 1998) lists and summarizes 24 recent National Cooperative Highway Research Program and Transit Cooperative Research Program economic research projects.

3. A field in which effective case studies have been provided is that of the impact of highway bypasses on communities. For examples, see *NCHRP Research Results Digest 210: Effects of Highway Bypasses on Rural Communities and Small Urban Areas* (1996) and Yeh (8).

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