

# **The Importance of Transportation Forecasting**

**Jack Wells**

**Chief Economist**

**U.S. Department of Transportation**

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Transportation infrastructure lasts a long time.

That is the fundamental truth that makes transportation forecasting important.

On June 8 of this year, we had the groundbreaking for the “Access to the Region’s Core” tunnel project, known as ARC, under the Hudson River between New Jersey and New York. This is the first rail tunnel under the Hudson since the North River tunnels under the Hudson were completed by the Pennsylvania Railroad in 1910.

Needless to say, those tunnels, along with the Hudson and Manhattan Railroad tunnels (now the PATH tubes), built in 1908 and 1909, are still operating, often at full capacity, one hundred years later. And we can expect the ARC tunnel to still be operating a hundred years from now.

So when we build transportation infrastructure, we need to look far ahead, and that means, we need to forecast.

Transportation infrastructure is inherently long-lived. There are very few cases of transportation infrastructure being abandoned (though it does happen, especially a large number of railroad abandonments that have taken place since the Staggers Act was passed in 1980), so when we pull the trigger to build a new piece of infrastructure, we need to have a high level of confidence that we are building it in the right place.

It doesn’t always happen.

### Problems with Transportation Forecasts

In 1985, the U.S. Army Corps of Engineers finished the Tennessee-Tombigbee Waterway. On the face of it, the concept seemed sound – the waterway would dramatically shorten the route for waterborne traffic heading down the Tennessee River toward the Gulf of Mexico. The concept was first seriously considered in 1945, when the Corps first calculated a projected benefit-cost ratio for the project, estimating that its benefit-cost ratio would be between 1.08 and 1.24. When the project began construction in 1975, the Corps projected that the Waterway would cost \$323 million to build and would carry 28 million tons of traffic annually when it opened, and 56 million 20 years later. In fact, the Waterway cost \$2 billion to build (6 times the forecast), and 20 years

after it opened it was only carrying 7 million tons of traffic per year, one-eighth of what was forecast.

Similarly, in 1990 Don Pickrell wrote a report for the then Urban Mass Transit Administration, later published in 1992 as “A Desire Named Streetcar”, that concluded that transit proposals had systematically underestimated costs and overestimated ridership. The effects of this article ripple outward still, and the Department is now under a Congressional mandate to systematically review the cost and ridership forecasts of transit projects to see how close the actual results come to the forecasts.

So we’ve definitely had problems with our forecasts in the past. To some extent, this is due to political pressure to low-ball the forecasts of costs and exaggerate the forecasts of ridership. It’s also due to a perception that the political system is biased against investment, and that it’s necessary to under-forecast the costs to compensate for this bias against investment. Our budgetary system does not have a capital budget – all the costs of an investment that will produce returns for a century or more have to be scored in the handful of years over which the project is built. So forecasters do not operate in an ivory-tower environment in which truth is the only desideratum. It is sometimes said that if “Boss Shepherd” had not stolen the money to rebuild the City of Washington at the turn of the 19<sup>th</sup> Century, we’d still have open sewers flowing alongside Constitution Avenue and pigs grazing on the Mall. So to some extent it is a matter of faith that producing accurate forecasts leads to the best public policies. It is a matter of faith and a matter of responsibility to the public who expects us to provide the best advice we can provide.

### The Growing Focus on Federal Forecasting

At the federal level, we have often paid little attention to transportation forecasting. Many of our transportation programs are formula programs where we have assumed that states and localities know best what their transportation needs are, so we have designed the programs to allocate certain sums to each state or locality, and then we largely leave it to the localities to decide what projects to fund. It then becomes a state or local responsibility to forecast transportation needs and select transportation projects. Even in cases where the federal government selects the projects, such as the Federal Transit Administration’s New Starts program, we leave it to the applicant to forecast its needs and come to the Federal Government with a proposed project, backed by supporting ridership and cost forecasts. As Don Pickrell has observed, perhaps it would have been better if we had taken more of a hands-on approach to determining transit needs.

There have been, of course, exceptions. The Federal Aviation Administration’s Spring Forecast Conference is a big event, with all the heavy hitters in the aviation world showing up to find out what FAA is predicting for the various sectors of the aviation world over the next 15 years. Not that they rely entirely on the FAA – the major aircraft manufacturers, like Boeing, all have robust forecast efforts, and the airlines must of necessity develop forecasts to decide how many aircraft of various types to buy. But the FAA forecast is a major benchmark, and the entire aviation world pays attention to it.

The reason why the FAA puts as much effort as it does into its forecast, of course, is that the FAA is singularly responsible for the operation of the U.S. aviation system. Federal law preempts state regulation of aviation more thoroughly than is the case in any other mode of transportation. Alone among the modes of transportation, the FAA not only inspects the safety of operations of the private air carriers, but guides them through a complete government-provided air traffic control system that is unique among the modes of transportation. To equip this air traffic control system adequately, FAA must forecast traffic levels more than a decade in advance, so that it will know how many aircraft it will need to control through its en route centers and TRACONs, and so that it can invest in the facilities and equipment that it will need to provide adequate capacity for this traffic flow.

Other federal modal administrations prepare forecasts, but it is done more out of curiosity, to provide talking points for their administrators' speeches. The Federal Highway Administration's Office of Freight Operations has for the last several years prepared the Freight Analysis Framework, which forecasts freight flows out 20 years – not just for trucking, but for all modes of freight transportation. But we don't actually use the FAF forecasts for any real decisionmaking. The forecasts help to inform the political process in a general way, and provide ammunition for politicians who want to spend more on transportation infrastructure.

Similarly, FHWA's Highway Economic Requirements System (the HERS model), aggregates local forecasts of states and localities to produce an implicit forecast for national highway traffic volumes over the next 20 years, and the HERS Model uses this forecast to project highway investment needs over that period. FTA does something similar with its TERM model. Of course, the political process routinely underfunds the needs that are identified through these models, so it's not clear that they are being used to support any actual decisionmaking.

This may be about to change in a significant way.

It has been becoming increasingly clear to many in the transportation community that the traditional localized approach to deciding on where to make transportation infrastructure investments is not meeting the Nation's needs. As the cost of transportation has fallen, supply chains have lengthened, and businesses increasingly rely upon distant suppliers to support their production of goods and services, while consumers increasingly draw upon a globally outsourced production network. Passengers, similarly, travel farther as their incomes increase (yes – incomes will increase again). Passenger-miles per capital have grown 37 percent since 1990. So both the freight and the passenger system have become increasingly interstate and intercontinental.

Yet the decisionmaking process for transportation investments continues to reflect local needs and interests. The needs of local commuters and shoppers continue to trump the needs of interstate passenger and freight networks. More and more people on Capitol Hill, in trade associations, and even in state and local governments are realizing that we really do have national transportation needs that require national transportation solutions.

The 2005 SAFETEA-LU legislation made a somewhat abortive effort to recognize this need by enacting the Projects of National and Regional Significance Program (or PNRs). The \$1.7 billion program was intended to provide funding at the national level for projects that addressed national needs, such as the CREATE project in Chicago or the extensions of the Alameda Corridor project in Southern California. But progress is always characterized by two steps forward and one step back, so at the same time that the Congress enacted a truly progressive piece of legislation, they took one step back by earmarking every last dime of the \$1.7 billion, mostly for local projects that couldn't begin to claim that they were of national or regional significance. The projects have been slow to get started because most of them are only partially funded.

The Obama Administration is prepared to take the next step, and the Congress seems prepared to follow. The American Recovery and Reinvestment Act (that is, the stimulus bill) includes a \$1.5 billion program for national needs projects anywhere in the country, for any surface mode of transportation, including rail and port projects that have not traditionally been eligible for federal funding. The deadline for applications was last week, and we have something like 1,500 applications, for probably \$50 billion or so in work, competing for a \$1.5 billion pot of money. We will be sifting through these applications over the next two months and trying to separate out the projects that truly meet national and regional needs from the ones that would be nice to have but fail the test of producing significant economic payoffs from our investment.

The Senate, where this program originated, has proposed a \$3 billion extension of this program in the Fiscal Year 2011 Transportation Appropriations Bill, so this concept appears to have legs. Chairman Oberstar on the House side has committed himself to a \$5 billion expansion of the Projects of National and Regional Significance Program, and he has committed himself to prohibit any earmarks in the next reauthorization bill. In May Senator Rockefeller introduced S. 1036, which would require the development of a National Surface Transportation Performance Plan, including initiatives to improve transportation modeling, research, data collection, and analysis. The Obama Administration has proposed a National Infrastructure Bank that is designed to address these national needs in transportation infrastructure.

So we are experiencing a significant shift in the locus of transportation infrastructure decisionmaking. What had been largely a state and local decisionmaking process is now becoming increasingly a federal decisionmaking process. Don't get me wrong – states and MPOs will still play an important role. But they will no longer be the exclusive decisionmakers in transportation infrastructure investments, and federal agencies will begin to play a more significant role.

At the same time, the quality standard in transportation infrastructure decisionmaking is rising. The FHWA has been trying for years to get states and localities to make greater use of economic analysis techniques in making their transportation investment decisions. We have urged them to use Asset Management techniques to guide their resurfacing and rehabilitation programs. We have urged them to use cost-benefit analysis when considering a capacity expansion investment.

It's been a tough sell.

A lot of states – perhaps 30 – make some use of benefit-cost analysis, or cost-effectiveness analysis, or asset management, in their transportation investment decisions. But for many it appears to be merely an exercise, and the actual investment decisions do not seem to be guided by the analysis.

The White House in the Obama Administration has made clear that it expects all discretionary transportation infrastructure programs to be guided by benefit-cost analysis. After all, in 1994 the Clinton Administration had issued an Executive Order requiring that all federal decisions on infrastructure investment be based on benefit-cost analysis. But when we drafted the guidelines for the \$1.5 billion surface transportation discretionary program (now called the TIGER Discretionary Grant Program), we did not include a benefit-cost analysis requirement, because we thought time did not permit the preparation of such analyses under the tight time deadlines that we were working under in the Recovery Program.

But the White House did not agree.

When the guidelines came back from the White House, they had a strict benefit-cost analysis requirement, though it was graduated somewhat in relation to the size of the requested grant. Similarly, when we sent over the guidelines for the high-speed rail program, we had a minimal benefit-cost analysis requirement included. When it came back, that requirement was substantially strengthened. Finally, when we drafted the language for an 18-month extension of SAFETEA-LU, the one substantive provision that the White House wanted to include was a provision preparing the states to greatly expand their capacity to conduct benefit-cost analysis and asset management. The White House has made clear that it expects all federal transportation infrastructure investment decisions to be guided by economic analysis.

You can't do good analysis without good data, and, in particular, you can't do good benefit-cost analysis without a good forecast of what the costs of the project are going to be and what traffic volumes it will attract. Which brings us to forecasting. Forecasting will play an increasingly important role in the work of all federal surface transportation agencies, especially those with infrastructure investment responsibilities. Because those agencies will not just be handing the money out to states and MPOs to spend – they will be making those investment decisions themselves, and they will be expected by the White House to make those decisions based on good analysis and good forecasts.

Nor is transportation forecasting needed just to guide infrastructure investments. While benefit-cost analysis for infrastructure investment is still a relatively novel application in the overall picture of transportation infrastructure investment, it is a well-established part of the safety regulatory environment. We've been doing benefit-cost analysis for safety regulations since the 1970s, and each of our safety regulatory agencies has a full-time staff that prepares benefit-cost analyses. Analyzing the safety risks in any mode of

transportation requires forecasting the exposures in that mode, which requires forecasting traffic volumes for the particular kind of traffic that creates that exposure (for example, transportation ton-miles for Toxic-by-Inhalation chemicals).

So forecasting is very quickly becoming an essential skill for federal transportation infrastructure agencies. Agencies will no longer be able to be agnostic about what forecasting techniques work and which do not. Congress and the GAO and the Inspector General's Office will be looking over their shoulders and second-guessing them on their investment decisions, and they'd better have a good explanation for why they made the decisions they did.

So if forecasting is going to become a more important part of the work of the federal DOT, are we ready for it? The answer is – Not as ready as we should be.

For one thing, we lack the basic data that are needed to do good transportation forecasting. It is often said that forecasting is only a very sophisticated version of extrapolating the past into the future. But you can't extrapolate the past unless you know what the past was, and in many cases we lack the data even to describe the past, much less the future. The time came three years ago to do a new National Household Travel Survey. The last NHTS in 2001 had been weakened by reduced funding for the long-distance survey, so that we could not collect a large enough sample to estimate traffic flows on particular origin-and-destination routes. In 2006, we didn't have enough money to even do the long-distance survey, so we didn't do it at all. So a couple of months ago when the Secretary called to ask how many passengers traveled between Los Angeles and Las Vegas, we had to go all the way back to the American Travel Survey in 1995 – 14 years ago – to get an estimate.

While we have succeeded in carrying out the Commodity Flow Survey for freight transportation every five years, it also suffers from too small a sample size to develop estimates for small areas. It also has serious gaps for certain kinds of commodities, such as imports and agricultural commodities, so we're really getting only a partial picture of the freight transportation universe.

We also have methodological problems with our transportation forecasts. Our standard models for travel demand forecasting on particular routes assume that the price of using the route is fixed. Yet increasingly, we are turning to congestion pricing on our most heavily traveled urban corridors, where the price varies according to the volume of traffic. The conventional models are not designed to handle this kind of forecasting environment. Four years ago we held a workshop to examine what was needed to enrich our travel demand forecasting methodologies to handle these problems, but progress in addressing them has been slow.

Forecasting transportation flows, of course, depends on our ability to forecast the various parameters that affect transportation flows, and these are often inherently difficult to forecast. I often ask my colleague, Arthur Rypinski, who will be speaking later today, what is going to happen to the price of petroleum, and he just as often tells me that, if he

could answer that question, do I think he would be working for the Government? Even if we knew what the price of crude oil was going to be, the influence of that on transportation flows is difficult to forecast. Last year, when the price of fuel spiked, we saw all kinds of reactions that were to some extent predictable but that had not fully been anticipated – supply chains shortened, distribution networks were revised, modal choices shifted, sourcing decisions changed. Even when prices fell again, some of these changes remained in place, so these decisions turn not just on what the price of fuel is, but on what people think it will be.

These decisions are also importantly affected by political decisions. If cap-and-trade goes into effect, businesses will increasingly have opportunities to profit from reducing their carbon footprint, so they will take another hard look at their supply chains to see how many ton-miles they can squeeze out of them. Political decisions also affect the capacity that is available in different modes. We tend to make “unconstrained” forecasts of traffic volumes in different modes, based on the assumption that capacity will magically increase to accommodate the volume of traffic that wants to move on a particular route. But we all know that transportation capacity can not be magically increased, that capacity constraints have been growing in our transportation system for the past 25 years, and that they are likely to become more serious over the next 25 years. So forecasting will increasingly be influenced by growing capacity constraints in different modes that will depend importantly on political decisions.

Climate Change will be a key influence affecting all of these factors. If climate change gets measurably worse, the political pressure to slow it down will become more powerful, and that will have important effects on transportation. It will affect fuel prices as well as a host of other factors affecting transportation.

So the issues that we will be looking at later today are important factors affecting our ability to prepare accurate forecasts of transportation flows, and to plan for our transportation infrastructure investment needs. I look forward to this discussion, and I look forward to seeing the improvements in transportation forecasting that all of you will be developing!