Studying and Forecasting Tolls is Inefficient, Unproductive and Expensive

ALLIANCE FOR
TOLL-FREE INTERSTATES

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The Alliance for Toll-Free Interstates (ATFI) was formed to educate the public about the negative impact that tolling existing interstates has on our communities and businesses. ATFI exists to provide detailed information to the media, policymakers and individuals on why tolling existing interstates will not solve our transportation needs.

As part of our ongoing effort to educate the public, we have begun creating comprehensive research reports concerning economic and governmental issues as they relate to tolling. In this report, *Studying and Forecasting Tolls is Inefficient, Unproductive and Expensive*, we analyzed the relevant research to determine the efficacy of governments financing their own tolling studies. Overwhelmingly, the research found that studying tolling possesses glaring errors, bias and failings for governments.

We hope that this analysis will help guide the discussion as legislatures across the United States consider spending taxpayer dollars on tolling studies. The research conclusively shows that government-sponsored tolling studies are rife with worrying economic and political externalities that inherently influence the studies' results, and consequently, the transportation future of residents and businesses.

Highlights

- In a 2014 analysis in the journal *Transportation*, researchers found "With rare exception, actual toll road traffic in many countries has failed to reproduce forecast traffic levels."[1]
- According to a 2006 report from The Denver Post, "there is no incentive for the [tolling] estimates to be accurate. Even when wrong, the bonds are simply refinanced and the consultants are paid again for their work on new studies to support the new bonds."[2]
- According to a 2010 literature review, academics at the University of Texas concluded "tolled projects tend to suffer from substantial optimism bias in forecasts, with predicted traffic volumes exceeding actual volumes by 30% or more about half of the time."[3]
- The National Cooperative Highway Research Program (NCHRP) has stated there is "no standardization in the toll road demand and revenue modeling and forecasting processes."[4]

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[1] J.M. Rose and D.A. Hensher. "Toll roads are only part of the overall trip: the error of our ways in past willingness to pay studies." *Transportation* 41 (4), 819-837. 2014.

[2] Chuck Plunkett. "Roads to Riches." The Denver Post. May, 28 2006. Accessed January 13, 2016 at http://www.denverpost.com/news/ci_3871773

[3] Jason D. Lemp & Kara M. Kockelman. "Understanding and Accommodating Risk and Uncertainty in Toll Road Projects: A Review of the Literature." University of Texas (Austin), Transportation Research Record: Journal of the Transportation Research Board. January 11, 2010.

[4] National Cooperative Highway Research Program. *NCHRP Synthesis 364: Estimating Toll Road Demand and Revenue: A Synthesis of Highway Practice*. Transportation Research Board of the National Academies. 2006. Accessed January 15, 2016 at http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_364.pdf

Tolling Studies Fail to Meet Projected Expectations

Transportation: Tolling Forecasts are Wrong Even After Ten Years

According to a 2014 article in the journal *Transportation*, researchers found "With rare exception, actual toll road traffic in many countries has failed to reproduce forecast traffic levels, regardless of whether the assessment is made after an initial year of operation or as long as 10 years after opening."[5]

Transportation Research Board: Toll Road Traffic is Often Over-Estimated & Hurts Revenue

A 2013 research paper presented to the Transportation Research Board found that studying toll road development was risky and easily susceptible to over-forecasting:

> In many cases, the use of toll roads, after they opened, was lower than originally forecasted, with an over-estimation of traffic by 20-30% in the first five years of operation. Furthermore, forecasting errors for truck traffic were larger compared to those for light vehicles. This uncertainty, often over-forecasting flows and revenue, contributes to increased risks in the development of toll roads.[6]

Journal of the American Planning Association: Traffic Estimates are Almost Always Wrong

In a 2005 study examining traffic estimates of over 200 projects in 14 countries, researchers found:

> Very high statistical significance that forecasters generally do a poor job of estimating the demand for transportation infrastructure projects…For half of all road projects, the difference between actual and forecasted traffic is more than ±20%. The result is substantial financial risks, which are typically ignored or downplayed by planners and decision makers to the detriment of social and economic welfare.[7]

NHCRP: Traffic and Revenue Forecasts are Too Simple and Have Major Gaps

According to a 2012 report from the National Cooperative Highway Research Program (NCHRP), "The extensive analysis done in this research of travel models and network simulation tools…has revealed a highly diverse picture, with a large proportion of applications with simplified methods."

With respect to traffic and revenue studies across the United States, the NCHRP study finds several "major gaps," including:

- "There is a great deal of variation in approaches"

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[5] J.M. Rose and D.A. Hensher. "Toll roads are only part of the overall trip: the error of our ways in past willingness to pay studies." *Transportation* 41 (4), 819-837. 2014.

[6] Yichen Sun, Tomer Toldeo, Katherine Rosa, Moshe Ben-Akiva, Katie Flanagan, Ricardo Sanchez and Erika Spissu. "Decision Making Process and Factors Affecting Truck Routing." Transportation Research Board of the National Academies. 2013. Accessed at http://amonline.trb.org/13-4404-1.2524738?qr=1

[7] Flyvbjerg, B., M.K.S. Holm, and S.L. Buhl. "How (in) Accurate Are Demand Forecasts in Public Works Projects? The Case of Transportation." Journal of the American Planning Association, Vol. 71, No. 2, 2005, pp. 131–146.

- Studies often involve simplification that "might be acceptable for some analyses of intercity highways, it is more difficult to defend for forecasting most of the metropolitan and urban facilities."
- "In some cases there is an inconsistency between the travel times and costs used for the trip distribution and mode choice models, in that the travel times reflect priced conditions while the toll cost itself does not enter the impedance function."
- "There is no consensus on whether road pricing costs should be shared among vehicle occupants and, if so, how."[8]

Denver Post: Over 85% of Tolls Roads Fail to Meet Expectations

In a 2006 report by The Denver Post, "Even with adjustments for the break-in period in the opening years, 86 percent of new toll roads in eight states failed to meet expectations in their first full year. By year three, 75 percent - 15 of the 20 that have been open that long - remained poor performers."[9]

Fitch Ratings: Many More Projects Fail to Meet Forecasts Than Exceed Forecasts

In a 2003 Report from Fitch ratings, citing some successful toll projects, the researchers conclude "there are many more examples of such projects where actual traffic and revenue performance has significantly lagged the original forecast."[10]

NHCRP: Costs and Traffic Estimates Usually Underperform

An analysis of data by the National Highway Cooperative Research Program (NHCRP) concerning 26 tolls roads found "Most of the results demonstrate an underperformance," and "Even with the availability of updated forecasts, only a small number of projections are within 10% of the actual revenues."[11]

Over 20 Different Ways to Skew Revenue Forecasts

In Robert Bain's article examining tolling studies, Bain lists 21 ways studies can be wrong, concluding "Just because the model reports certain results does not mean that they have to be assumed to be credible."[12]

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[8] National Cooperative Highway Research Program. *NCHRP Report 722: Assessing Highway Tolling and Pricing Options and Impacts, Volume 2.* Transportation Research Board of the National Academies. 2012. Accessed February 19, 2016 at http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_722v2.pdf

[9] Chuck Plunkett. "Roads to Riches." The Denver Post. May, 28 2006. Accessed January 13, 2016 at http://www.denverpost.com/news/ci_3871773

[10] Cherian George, William Streeter and Scott Trommer. "Bliss, heartburn, and toll road forecasts." Fitch Ratings. November 12, 2003. Accessed on January 15, 2016 at http://virginiadot.org/projects/resources/I-81_Fitch_Report.pdf

[11] National Cooperative Highway Research Program. *NCHRP Synthesis 364: Estimating Toll Road Demand and Revenue: A Synthesis of Highway Practice*. Transportation Research Board of the National Academies. 2006. Accessed January 15, 2016 at http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_364.pdf

[12] Robert Bain. "Big numbers win prizes." Project Finance International. Accessed January 26, 2016 at http://bit.ly/1UoK3Ou

Tolling Studies Suffer from 'Optimism Bias'

University of Texas: Predicted Traffic Volumes for Tolling Projects Overestimate by 30%

A literature review by the University of Texas discovered "These studies found that tolled projects tend to suffer from substantial optimism bias in forecasts, with predicted traffic volumes exceeding actual volumes by 30% or more about half of the time. Moreover, projects with greater uncertainty tend to overestimate year-one traffic volumes more and stabilize at lower final traffic volumes."[13]

Traffic Forecasts Average Over 25% Compared to Actual Data

According to a Reston Citizens Association study analyzing tolling proposals in Virginia, the study found:

> 'Optimism bias,' the overestimating of toll road traffic and revenue in forecasts, is endemic in the industry. One industry expert estimated the mean forecast error at 25%-30% above actual traffic based on data from 104 toll roads worldwide.[14]

Wall Street Journal: With Traffic Predictions "Nothing Was Real"

In 2013, a featured story on toll roads in the Wall Street Journal found "Many investors paid too much, based on the notion that tolls provided a reliable income stream and that toll revenue would only increase as Americans drove more miles."

Tony Kennon, the Mayor of Orange Beach, Ala., whose town invested in a tolling project in 2013, said "Nothing was real," regarding traffic predictions. The Journal also quoted a toll road investors saying "With traffic forecasts, you check them and you hope you're halfway right."[15]

Project Finance International: Projects Fail Expectations Due to Overly Optimistic Studies

According to a 2006 report from Robert Bain in Project Finance International, "a number of high profile investor financed toll roads around the world are currently failing to meet expectations. This has less to do with the present economic climate and more to do with a market readiness to be seduced by hopelessly optimistic traffic and revenue projections."[16]

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[13] Jason D. Lemp & Kara M. Kockelman. "Understanding and Accommodating Risk and Uncertainty in Toll Road Projects: A Review of the Literature." University of Texas (Austin), Transportation Research Record: Journal of the Transportation Research Board. January 11, 2010.

[14] Reston Citizens Association. "Wilbur Smith Associates' Traffic and Revenue Forecasts: Plenty of Room for Error." January 27, 2012. Accessed on January 26, 2016 at http://www.scribd.com/doc/79582705/RCA-Study-Wilbur-Smith-Traffic-amp-Revenue-Forecasts-012712

[15] Ryan Dezember and Emily Glazer. "Drop in Traffic Takes Toll on Investors in Private Roads." The Wall Street Journal. November 20, 2013. Accessed February 11, 2016 at http://on.wsj.com/1QjTrz3.

[16] Robert Bain. "Big numbers win prizes." Project Finance International. Accessed January 26, 2016 at http://bit.ly/1UoK3Ou

NHCRP: Transportation Analysts Don't Know What Questions to Ask in Order to Forecast

An analysis by the NHCRP focused on tolling studies found "the transportation community who are making investment decisions regarding tolled facilities do not always know which questions to ask of their modeling and forecasting efforts."[17]

NHCRP added there is "no standardization in the toll road demand and revenue modeling and forecasting processes."[18]

The Economic Incentives for Studying Tolling Create Errors and Bias

Governments Shop for the Study They Want

The Denver Post quoted "Robert Bain, a London-based analyst for bond-rating agency Standard & Poor's who has conducted international studies of toll roads," saying, "Big numbers win big prizes," and that "Quite often, people shop around until they find the people who provide the numbers."[19]

Accuracy is Not Rewarded or Expected

Robert Bain notes "In short, the [tolling] procurement process in general – and bid evaluation criteria specifically – reward high traffic and revenue forecasts, not accurate ones."

Bain added:

> If there really was as little uncertainty in the forecasts as some sensitivity tests, confidence intervals and P95s have suggested, traffic advisers could remove the legal disclaimers from their reports and could cancel their professional indemnity insurance. These trends have not been observed to date.[20]

Research Firms Are Paid After Tolls Are Built for Work Their Initial Study Supported

The Denver Post reported on states promising contracts to research firms that conduct the initial tolling studies:

> In South Carolina, the company hired to prepare projections for Greenville's Southern Connector also was promised a pair of contracts worth millions of dollars if the bonds sold.
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> In Florida, too, the state's tolling officials hired their traffic consultant to do additional work for three of the roads funded by its studies.[21]

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[17] National Cooperative Highway Research Program. *NCHRP Synthesis 364: Estimating Toll Road Demand and Revenue: A Synthesis of Highway Practice*. Transportation Research Board of the National Academies. 2006. Accessed January 15, 2016 at http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_364.pdf

[18] *Ibid.*

[19] Chuck Plunkett. "Roads to Riches." The Denver Post. May, 28 2006. Accessed January 13, 2016 at http://www.denverpost.com/news/ci_3871773

[20] Robert Bain. "Big numbers win prizes." Project Finance International. Accessed January 26, 2016 at http://bit.ly/1UoK3Ou

[21] Chuck Plunkett. "Roads to Riches." The Denver Post. May, 28 2006. Accessed January 13, 2016 at http://www.denverpost.com/news/ci_3871773

Expert DOT Forum: Tolling Studies are Not Subject to Any Review

A 2005 Expert Forum on Road Pricing and Travel Demand Modeling, which was sponsored by the Office of Transportation Policy U.S. Department of Transportation, found "Financiers appear to have confidence in the revenue forecasts of only a few consultants, who use proprietary techniques not subject to the scrutiny of peer review and publication."[22]

University of Texas: Tolling Studies Simply Ignore Important Factors

A literature review by the University of Texas found "the robustness and heterogeneity (across travelers and trip types) of value of travel time (VOTT) estimates are generally ignored, but may be crucial in producing accurate forecasts." [23]

Tolls Roads Have a Track Record of Failure

Tolls Roads in Orange County: Unworkable Since Inception

In a 2012 study by the Pacific Research Institute concerning tolls roads in Orange County, CA, researchers concluded "The original financial plans for the 241 and 73 toll roads were based on overly optimistic growth assumptions and did not leave a financial cushion for TCA to operate under reduced utilization or economic downturns."

The study makes clear the tolls roads were in trouble from the outset, noting "Problems with cost over-runs have existed throughout the toll roads' existence," and:

- "Original plans for the toll roads estimated costs of $858 million, which have since risen to more than $4 billion."
- "TCA's [Transportation Corridor Authorities] original projections regarding funding from developers, however, overstated the funding to be received from developers, and underestimated the costs to be borne by the drivers."
- "TCA's projections regarding the amount of development impact fees available to fund the toll roads have also been subject to extensive revisions and significant fluctuations."[24]

California's San Joaquin Hills Turnpike: An Example of Bad Bonds and Underperformance

According to a 2003 article from the Los Angeles Times, "Toll revenue for the struggling San Joaquin Hills turnpike through western Orange County will earn less than half the money predicted when the highway was refinanced six years ago."

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[22] Volpe National Transportation Systems Center. "Expert Forum on Road Pricing and Travel Demand Modeling." Office of Transportation Policy, U.S. Department of Transportation. Alexandria, VA. November 14, 2005. Accessed on January 15, 2016 at http://1.usa.gov/23tCdcD.

[23] Jason D. Lemp & Kara M. Kockelman. "Understanding and Accommodating Risk and Uncertainty in Toll Road Projects: A Review of the Literature." University of Texas (Austin), Transportation Research Record: Journal of the Transportation Research Board. January 11, 2010.

[24] Donna Arduin and Wayne Winegarden, Ph.D. "Orange County Toll Roads: Serious Concerns Should Lead to Significant Review by State and Local Officials." Pacific Research Institute. April 2013. Accessed on February 19, 2016 at http://www.thenewspaper.com/rlc/docs/2013/ca-octoll.pdf.

The article added, “Figures for the highway show the gap between actual and projected revenue has been widening steadily over the last few years, prompting two Wall Street ratings agencies to lower their assessments of San Joaquin Hills bonds to junk status.”[25]

Denver’s Northwest Parkway: An Example of Skewed Economic Incentives

A 2006 report from the Denver Post makes clear the troubling economics of studying toll roads and paying for them with bonds:

> One of the major differences between a traditional, taxpayer-constructed road and the public-private partnerships that create toll authorities such as the Northwest Parkway is that the contractors hired to build the toll road are required to cover many of the startup costs.
>
> Because of this arrangement, the firm chosen to build the Northwest Parkway was required to cover the costs of hiring various consultants, including the contract with Vollmer to conduct the traffic and revenue study.
>
> The firm, now known as Washington Group, also paid most of a $1.1 million fee engineering firm Carter & Burgess charged for an environmental-impact study.
>
> The result is that Washington Group knew upfront that it would lose the money it spent if the bonds didn't sell and the road wasn't built.
>
> If the bonds did sell, however, the construction company would win an immediate fee of $7.75 million, and the company would move forward on a project worth $191.6 million.[26]

Virginia’s Pocahontas Parkway: An Example of Lost Revenue and Bad Business

In 2012 the owner operators of the Pocahontas Parkway in Virginia “devalued the nine-year-old divided highway and bridge by a full third because of lower than expected revenue.”[27]

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[25] Dan Weikel. “Tollway Forecast: a Rough Road.” LA Times. August 6, 2003. Accessed February 9, 2016 at http://articles.latimes.com/2003/aug/06/local/me-tca6.

[26] Chuck Plunkett. “Roads to Riches.” The Denver Post. May, 28 2006. Accessed January 13, 2016 at http://www.denverpost.com/news/ci_3871773

[27] Mark Holmberg. “Economy, not ghosts, haunt Pocahontas Parkway.” WTVR CBS 6. June 18, 2012. Accessed on February 12, 2016 at http://wtvr.com/2012/06/18/economy-not-ghosts-haunt-pochantas-parkway/