A Financial Analysis of Toll System Revenue: Who Pays & Who Benefits

January 2020

Prepared by the American Transportation Research Institute

ATRI American Transportation Research Institute

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ACKNOWLEDGEMENT

The authors wish to thank Joseph R. Petrucelli, CPA/CFF/CGMA/ABV, FCPA, CVA, MAFF, PSA, CFE of Petrucelli, Piotrowski & Co., Inc. for his helpful comments and critique of the earlier drafts of this work.

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LIST OF ACRONYMS

AADT – average annual daily traffic
AADTT – average annual daily truck traffic
ATRI – American Transportation Research Institute
BABs – Build America Bonds
CAFR – Comprehensive Annual Financial Reports
CPI – Consumer Price Index
EBIT – Earnings Before Interest and Taxes
EBITDA – Earnings Before Interest, Taxes, Depreciation, and Amortization
FAF – Freight Analysis Framework
FCC – Federal Communications Commission
FHWA – Federal Highway Administration
FPM- Freight Performance Measures
GAO – Government Accountability Office
GASB- Government Accounting Standards Board
GO Bonds – General Obligation Bonds
HFA – Highway Funding Analysis
HTF – Highway Trust Fund
IBTTA – International Bridge, Tunnel and Turnpike Association
IFTA – International Fuel Tax Agreement
IRP – International Registration Plan
ISTEA - Intermodal Surface Transportation Efficiency Act
KRF – Key Rating Factor
NHS – National Highway System
NI – Net Income
PPP – Public-Private Partnership
RAC – Research Advisory Committee
S&P – Standard & Poor's
VMT – Vehicle Miles Traveled

INTRODUCTION

In 2007 and 2017 the American Transportation Research Institute (ATRI) published comprehensive Highway Funding Analysis (HFA) reports on the state of highway funding in the U.S.

Each of the HFA reports focused on all aspects highway funding, with tolling being just one component of transportation infrastructure funding. The 2007 HFA report, for instance, explored inefficiencies in the cost of collecting toll revenues, juxtaposing toll collection costs of 21.9 to 30.3 percent of revenue in the early 2000s with federal fuel tax administrative costs of 0.2 percent of revenue.[1] The 2017 report expanded on that work, finding that tolling was overall the least effective method for funding a national system of highways when compared to five other sources of highway funding.[2]

While the previous HFA reports assessed tolling in the broader scheme of funding, a more in-depth analysis was needed to better understand whether tolling could be a viable alternative to traditional funding mechanisms, and what the implications of tolling on the trucking industry were. Recognizing this, in 2019 ATRI's Research Advisory Committee (RAC)[3] recommended that the organization analyze the efficacy of tolling in relation to infrastructure investment, primarily by answering two key questions: 1) who pays tolls; and 2) how is toll revenue allocated?

This report proffers a quantitative assessment of the financial relationship between toll facility operators and toll facility users on a national scale. This research developed and utilized national metrics for understanding the scale of revenue collected by toll systems, and how those monies are expended – ultimately identifying whether users pay an equitable level for the service that is received.

Tolling and the Trucking Industry

The Pennsylvania Turnpike offers a brief case study for why the trucking industry has growing concern over tolls. In 2019 it was reported that "the Pennsylvania Turnpike Commission [had] approved a 6% toll rate increase to keep pace with rising debt-

[1] Jeffrey Short, Dan Murray and Sandra Shackelford, *Defining the Legacy for Users: Understanding Strategies and Implications for Highway Funding,* American Transportation Research Institute, Alexandria, VA, May 2007.
[2] Jeffrey Short. *A Framework for Industry Funding,* American Transportation Research Institute, Arlington, VA, November 2017.
[3] ATRI's Research Advisory Committee is comprised of industry stakeholders representing motor carriers, trucking industry suppliers, labor and driver groups, law enforcement, federal government, and academics. The RAC is charged with annually recommending a research agenda for the Institute.

service costs," increasing the cost to travel the east-west length of the Turnpike to $422 per trip ($293 for E-Z Pass) for a truck.[4] [5]

The Commission self-approved this increase, though it cites Pennsylvania's General Assembly with necessitating the higher rates. This is because Pennsylvania legislators first passed Act 44 in 2007 which "required the [Turnpike] to provide PennDOT with $450 million annually for highways, bridges, and public transit" and later passed Act 89 in 2013 which redirected that full $450 million to mass transit.[6] The Pennsylvania Turnpike Commission states that due to these Acts, it "has been forced to raise toll rates for 11 straight years and has driven the agency's debt levels to more than $11 billion," and even suggests that the Turnpike "needs to provide relief to its customers."[7]

As a result truckers, many of whom are engaged in interstate commerce in primarily rural areas, are burdened with significantly high toll costs that in-part fund urban mass transit projects. The costs of using the Turnpike clearly go well beyond the services provided by the very fact that $450 million (or 37.6% of revenue) is diverted to mass transit.

Though the Pennsylvania Turnpike situation is arguably unfair to trucking, such examples have not deterred states from pursuing toll revenue from the trucking industry. Rhode Island legislators, for instance, made the unprecedented move in 2016 of introducing a truck-only tolling program on interstate highways. The state asserts that "the RhodeWorks bridge tolling program is a unique approach to repairing bridges by tolling only specific types of tractor trailers," and that "the tolls collected at each location in Rhode Island will go to repair the bridge or bridge group associated with that toll location."[8] In a lawsuit filed in 2018, however, plaintiffs including the American Trucking Associations argued that this program violates the Commerce Clause of the U.S. Constitution because it discriminates against out-of-state or interstate trucking entities and does not reflect a fair user fee to those who pay the toll.[9]

[4] Lamb, Eleanor. "Pennsylvania Turnpike Tolls to Rise – Again". Transport Topics. Arlington, VA. July 2019. Available online: https://www.ttnews.com/articles/pennsylvania-turnpike-tolls-rise-again

[5] Lamb, Eleanor. "Toll Rates Increase on Pennsylvania Turnpike, New York-New Jersey Crossing". Transport Topics. Arlington, VA. January 2020. Available online: https://www.ttnews.com/articles/toll-rates-increase-pennsylvania-turnpike-new-york-new-jersey-crossings

[6] "Act 44 Plan". Pennsylvania Turnpike Commission. Available online: https://www.ttnews.com/articles/toll-rates-increase-pennsylvania-turnpike-new-york-new-jersey-crossings

[7] Ibid.

[8] "The RhodeWorks Tolling Program". Rhode Island Department of Transportation. Available online: http://www.dot.ri.gov/tolling/index.php

[9] United States District Court for the District of Rhode Island. *American Trucking Associations, Inc; Cumberland Farms, Inc.; M&M Transport Services, Inc.; and New England Motor Freight, Inc. v. Peter Alviti, JR., in his official capacity as Director of the Rhode Island Department of Transportation.* Filed July 10, 2018.

Though the fate of the RhodeWorks truck tolling program is still undecided by the courts, other states including Connecticut are looking at similar concepts.[10] [11]

As these examples and others illustrate, trucking is often a target revenue source for those states that need money to close funding gaps. This is often an easy political decision since truck tolls are charged to businesses, not individuals or voters. Likewise, trucks often have no choice but to pay a toll due to lack of alternative routes. These sentiments are summarized in an article in Crain's Detroit Business, which discusses the viability of a tolling scheme in Michigan:

> "In every debate about road funding, some motorists and politicians are fixated on laying more of the cost of repairing and rebuilding roads at the feet of heavy trucks.
>
> Tolling is one way to do that, especially since there's not an easy way to bypass metro Detroit's freeways. And if I-69 and U.S. 23 were also incorporated into a toll road system, it would be pretty hard for out-of-state truckers to avoid paying Michigan's tolls.
>
> 'It would take a pretty stiff toll to divert someone off a 70- to 80-mile-an-hour freeway onto Grand River or U.S. 12,' said Aarne Frobom, a senior policy analyst [the Michigan Department of Transportation] who has studied tolling. 'And that's doubly true for truckers. As much as they object to tolls — which they do for a couple of reasons — they still won't use the parallel roads because it's just too slow for them to be productive.'"[12]

These statements describe both the targeting of interstate commerce to pay for local highways, as well as the idea that tolling certain roads could produce something of a monopoly by choosing to toll routes with limited viable alternatives. The topics of reasonable rates for use or equity are not mentioned.

[10] Lamb, Eleanor. "Trucking Scores a Win in Rhode Island Tolls Case". Transport Topics. Arlington, VA. December 2019. Available online: https://www.ttnews.com/articles/trucking-scores-win-rhode-island-tolls-case

[11] Lamb, Eleanor. "Connecticut Gov. Ned Lamont Proposes Truck Tolls". Transport Topics. Arlington, VA. December 2019. Available online: https://www.ttnews.com/articles/connecticut-gov-ned-lamont-proposes-truck-tolls

[12] Livengood, Chad. "Why Toll Roads in Michigan Might Not Be As Far-Fetched As You Think". Crain's Detroit. Detroit, MI. Jan 2020. Available online: https://www.crainsdetroit.com/voices-chad-livengood/why-toll-roads-michigan-might-not-be-far-fetched-you-think

Funding U.S. Infrastructure

The principal revenue sources to support roadway maintenance, construction and project finance in the U.S. are federal, state and local taxes on motor fuels, along with state-level vehicle registration fees. This user-based revenue approach provides much of the financial support for the 4.1 million miles of U.S. roadway – including the critical 220,000 miles of National Highway System (NHS).[13]

While user fees such as motor fuels taxes are the traditional tools for equitably funding the complex U.S. surface transportation system, there are a limited number of roads, bridges and tunnels in the U.S. where vehicles must also pay a toll. To collect this toll revenue, facility operators charge a fee through point-of-service transactions with individual drivers.

For the purpose of comparison, the 2017 federal Highway Trust Fund (HTF) Highway Account revenues of approximately $35 billion are collected through taxes paid by U.S. drivers across the myriad roadways used by motorists.[14] [15] These funds are allocated to the expansive national system of roadways, using revenue formulas and allocation programs.[16]

U.S. toll facility operators, on the other hand, control less than 6,000 miles of roadway[17] (the equivalent of 2.6% of the NHS) while collecting an estimated $18 billion in annual revenue.[18] In Table 1, highway account revenues and toll revenues are comparatively

[13]"Highway Statistics 2017: Public Road Mileage, Lane-Miles, and VMT 1900 – 2017". U.S. Department of Transportation, Federal Highway Administration, Policy and Governmental Affairs, Office of Highway Policy Information. Washington, DC. November 2018. Available online: https://www.fhwa.dot.gov/policyinformation/statistics/2017/vmt421c.cfm and;
"Highway Statistics 2017: National Highway System Length – 2017, Miles Open and Not Open to Traffic". U.S. Department of Transportation, Federal Highway Administration, Policy and Governmental Affairs, Office of Highway Policy Information. Washington, DC. August 2018. Available online: https://www.fhwa.dot.gov/policyinformation/statistics/2017/hm30.cfm

[14]The federal Highway Trust Fund Highway Account sources revenue from taxes on gasoline, diesel and other transportation fuels, as well as heavy vehicle use fees and excise taxes levied on the trucking industry.

[15] "Highway Statistics 2017: Federal Highway Trust Fund Receipts Attributable to Highway Users in Each State". U.S. Department of Transportation, Federal Highway Administration, Policy and Governmental Affairs, Office of Highway Policy Information. Washington, DC. January 2019. Available online: https://www.fhwa.dot.gov/policyinformation/statistics/2017/fe9.cfm

[16] These revenue formulas and allocation program also have challenges in terms of the distribution of funds – for a discussion of these issues see "Who Pays for Local Streets? Who Should Pay? Survey of New Jersey Municipalities", Transportation Research Record: Journal of the Transportation Research Board, No. 2670. Fall 2017. 24-32.

[17] "Tolling by the Numbers". International Bridge, Tunnel and Turnpike Association (IBTTA). Washington, DC. 2017. Available online: https://www.ibtta.org/sites/default/files/documents/MAF/2017_USEurp_Tolling%20in%20Numbers_0.pdf

[18] The methodology for identifying an $18 billion annual estimate is described later in the report.

applied to the NHS and U.S. toll road mileage to demonstrate clear differences in average annual revenue per mile, with toll facility revenues per-mile being more than 18 times those of the federal fuels tax.

Table 1: Comparison of Revenue per Mile

	Revenue Source	Mileage	Annual Revenue	Average Annual Revenue Per Mile
U.S. Toll Roads	Tolls	6,000	$18,000,000,000	$3,000,000
National Highway System	Federal Fuels Tax	220,000	$35,000,000,000	$159,091

The comparison of HTF revenues and U.S. toll revenues illustrates a large revenue delta between the two funding approaches. While it is well accepted that the U.S. transportation system is under-funded, the scale of tolling revenue suggests that more funds are collected by toll authorities than are reasonably required to maintain a facility. This illustrates one of the central questions posed in this research: how much revenue is required to fairly and equitably deliver surface transportation infrastructure? To answer this question, it is necessary to explore both the collection of the nation's toll revenues and how those revenues are ultimately allocated.

Research Objective and Approach

As noted, the objective of this research is to first document the collection and distribution of U.S. toll revenue – from toll payment to final allocation of revenue – for 21 U.S. toll systems that represent a significant share (81.77%) of U.S. toll industry estimated revenue. To accomplish this, the primary resources are the Comprehensive Annual Financial Reports (CAFR) published by toll operators for activity during their 2018 fiscal year. Specifically, much of the data is collected from the Changes in Net Position table that is typically included in a financial statement. The research team analyzed these financial documents and other available data to better understand who pays tolls and where the toll revenue is ultimately directed.

The research methodology first focuses on creating a single standardized reporting template for: 1) toll facility charges; 2) toll facility expenditures; and 3) toll revenue allocation. These toll authority figures were obtained from publicly available agency data. Given the considerable variation in reporting, the researchers applied their subject-matter expertise of toll agencies and financial metrics with best practice methods from public finance to create a standardized and comparable financial table that covers metrics for 21 toll collecting agencies. In all cases, the toll authorities were given an opportunity to review the data.

TOLL INDUSTRY BACKGROUND

The "User Pays" Concept

The nation's roadways are critical to individual motorists as well as the trucking industry, the latter of which delivers more than 70 percent of goods to consumers.[19] Most U.S. communities depend solely on trucking for essential products such as food, medicine and clothing. The trucking industry in turn depends on roadways of every type to help expedite the movement of freight. To pay for roadways, the trucking industry contributes a significant level of transportation-dedicated tax revenue through motor fuels taxes, registration fees, excise taxes, and heavy vehicle use taxes.

From a trucking industry perspective, the efficient collection and allocation of highway revenue is critical, and minimizing inefficient administrative costs for collecting transportation revenue (collection cost overhead) should be a key objective of all revenue agencies. From a road-user perspective, the ultimate objective should be to maximize the return of dedicated capital to infrastructure maintenance and management.

Infrastructure Financing through Bonds

As mentioned previously, roadways are for the most part funded through revenues collected by governments using motor fuels taxes and vehicle registration fees. Federal formula funding and grants, along with tolls, also play a role in covering the cost of roads. Additionally, money is borrowed from the private sector and the aforementioned revenues are used to set the terms of loans and pay principal and interest.

Issuing debt (borrowing money) is a key tool employed to cover the significant up-front costs of highway infrastructure development and improvement. Issuance of municipal bonds (a type of debt instrument) is a standard method used by states, local governments and toll operators to raise capital.

Bonds are not a source of revenue, but are merely a form of financing that allows a particular government entity to fund large capital expenditures over long periods of time. The alternative is to fund such projects out of current revenues as an expense item, which ultimately burdens *current* tax or fee payers for a capital improvement that may primarily benefit *future* tax or fee payers for many decades. To avoid this issue, the use of bonds in public finance allows for the concept of maturity matching – which matches the lifespan of an asset (such as a bridge) and its funding terms to the logical payer base by spreading costs over both current and future users.

[19] "American Trucking Trends 2019." American Trucking Associations. Arlington, VA. 2019.

Additionally, public agencies typically do not "save" funds such as tax revenues over years for the purpose of investing in large-scale public assets. This is due in part to political systems having a generally lower level of discipline in terms of spending compared to the private sector.[20] Bond funding reverses the financial process, spending first and then having a legally committed need to pay off the bond – irrespective of the political changes in the government or management changes at an agency.

As described below, there are two common types of municipal bonds utilized by government agencies for transportation funding:

- General Obligation (GO) Bonds: GO bonds are backed by the taxing ability of the issuer (e.g. state or local government); the issuer can secure debt through GO bonds based on its ability as a government entity to collect taxes and fees and manage the overall financial spending of the municipal entity.

- Revenue Bonds: Revenue bonds are bonds that finance income-producing projects and are secured by a specified revenue source. Revenue bonds specifically for highway transportation infrastructure are backed by the future toll payments from facility users.

Revenue bonds often carry greater risk than GO bonds, and therefore may offer higher yields for investors.[21]

Toll Roads as an Investment

Bonds represent a reasonable funding source for public agencies and have a long and well-documented use. For investors in bonds, and ultimately investors in toll roads, it is important to consider: 1) the funding sources that will support the bond issues (e.g. tolls); and 2) the general financial condition of the issuing authority or agency.

In the case of revenue bonds, one consideration is the ability of a public agency to "blend" non-revenue producing cost components into a revenue bond issuance that may undermine the general financial condition of the issuing agency. For investors, these additional non-revenue producing costs should be considered – particularly since users of facilities that earn revenue (e.g. toll roads) must bear the burden of these costs. Examples of these non- or low-revenue producing assets include non-road facilities

[20] This is due in part to changes in political party and priorities of publicly elected officials – which typically occurs in the short-run. Capital projects, on the other hand, tend to be long-run in nature.

[21] "Revenue Bonds". Morningstar. 2006. Available online: http://news.morningstar.com/classroom2/printlesson.asp?docId=5394&CN=sample
"Revenue bonds offer higher interest than do general obligation bonds. This is due to the fact that the income from the projects they fund cannot be predicted with certainty. This adds to the perception of lower safety. If the projects do not produce enough revenue, the bonds may default."

such as regional airports, canals, transit systems, ferry systems and regional economic development projects.

Bond issues may be grouped into various risk categories based on the overall financial health of the agency that issues the debt instruments. Fitch, Moody's, and Standard and Poor's (S&P) all provide rating for government and private sector debt issues (Table 2).

Table 2: Credit Rating Scale[22]

Moody's	S&P	Fitch	Rating Category
Aaa	AAA	AAA	Prime
Aa1	AA+	AA+	High grade
Aa2	AA	AA	
Aa3	AA-	AA-	
A1	A+	A+	Upper Medium grade
A2	A	A	
A3	A-	A-	
Baa1	BBB+	BBB+	Lower medium grade
Baa2	BBB	BBB	
Baa3	BBB-	BBB-	
Ba1	BB+	BB+	Non-investment grade speculative
Ba2	BB	BB	
Ba3	BB-	BB-	
B1	B+	B+	Highly speculative
B2	B	B	
B3	B-	B-	
Caa1	CCC+	CCC	Substantial risk
Caa2	CCC		Extremely speculative
Caa3	CCC-		Default imminent with little prospect for recovery
Ca	CC	CC	
	C	C	
C	D	D	In default
/			
/			

[22] "How Big Three US Credit Rating Agencies Classify Corporate Bonds and Loans by Credit Risk, or the Risk of Default". Wolf Street. Available online: https://wolfstreet.com/credit-rating-scales-by-moodys-sp-and-fitch/

Toll agencies and Public-Private Partnership (PPP) operations generally fall into what is considered the Investment Grade bonds (bonds rated BBB- and above on the S&P rating scale). Relatively few agencies obtain the top rating (AAA by S&P) as most toll road issues are revenue bonds with various levels of debt at the agency level, and a multitude of risks in terms of the revenue sources. Generally, older roads that have limited non-road financial burdens have higher ratings as compared to newer facilities with a less proven revenue stream and/or agencies with significant non-road operations that may or may not produce adequate revenue to shoulder the cost of these non-road operations.

One of the leading rating agencies, Fitch, conducted a 2017 peer review of many of the U.S. toll operators.[23] To aid in the comparability of toll roads, bridges and tunnels (i.e. "toll roads"), the Fitch review first grouped the 38 entities into the following categories:

- Large Networks and Monopolistic Urban Bridge Systems
  - Turnpike
  - Large Expressway
  - Monopolistic Bridge System

- Small Networks and Stand-Alone Toll Road Facilities
  - Small Expressway
  - International Bridge System
  - Stand-Alone

Next, five criteria referred to as Key Rating Factors (KRF) were used by Fitch to measure the investment quality of each of the toll roads.[24] The criteria are listed below with definitions.

1. Revenue Risk – Price: "The legal and political flexibility to increase tolls if required (price)."

2. Revenue Risk – Volume: "Traffic demand characteristics, including sensitivity to economic conditions, toll rate changes and other factors (volume)."

3. Infrastructure Development/Renewal: "The approach to maintaining and improving its infrastructure base (infrastructure development and renewal)."

4. Debt Structure: "Financial risk associated with the capital structure (debt structure)."

5. Debt Service: "The level of financial flexibility (debt service)."

[23] "Peer Review of U.S. Toll Roads: Attribute Assessments, Metrics, and Ratings". Fitch Ratings. September 2017. Available online: https://your.fitchratings.com/peer-review-us-toll-roads

[24] It should be noted that a sixth KRF was included (Completion Risk) but this metric was not applicable to any members of the peer group.

Of particular interest to the trucking industry and this research are the two revenue risk items. From a trucking industry perspective, these two KRF's ask the key questions: 1) does the toll authority have the ability to raise rates; and 2) to what degree are trucks dependent on the use of the tolled facility over free infrastructure, even during economic downturns? Further discussion of the two trucking-critical KRF's follows:

> Revenue Risk - Price (Toll Rates). If a toll operator has the ability to increase price with ease, then bonds issued by that entity have lower risk and may be more attractive to investors. An entity with free ability to increase price can meet revenue expectations simply by charging more as stated in a second Fitch report, which found that if toll authorities had "pricing flexibility," revenue was secure because price elasticity was found to be "lower than expected."[25] Toll operators controlling the facilities in the "large network and monopolistic urban bridge system" category were found to be best equipped to stabilize revenue when drops occurred because of low price elasticity. Drivers, particularly commuters, simply must pay the higher prices when implemented due to the lack of alternatives. Fitch further states that toll revenue grew 3.5 times faster than traffic between 2007 and 2017 "reflecting above-inflationary toll-rate increases and low-to-moderate volatility."[26]
>
> Revenue Risk - Volume. A second critical component of revenue is the number of vehicles paying a toll, or the volume of toll facility traffic. Many factors can influence volume. Proximity to major population centers or freight facilities will tend to increase volume. An economic downturn can decrease the number of commuters and commercial vehicles. A natural disaster such as a hurricane can temporarily reduce volume-related revenue for several days. A free alternative route may become more desirable if relative traffic volumes (and congestion) increase on the toll road.

These are all concerns for those who invest in revenue bonds backed by toll income. Commuters are key to maintaining steady volume and revenue – though trucks produce far more revenue per transaction. Thus, Fitch finds that "on major interstate turnpikes with mature traffic profiles, heavy vehicle traffic tends to be more volatile than light vehicles, which make up the bulk of commuter traffic."[27]

In Fitch's 2017 Peer Review, the senior lien ratings for 38 toll entities generally ranged from AA+ High Grade to BBB- Lower Medium Grade. None of the entities discussed in the report have a Prime investment grade of AAA, and one of the entities (the Dulles Greenway) is rated BB+, which is non-investment grade (also known as "junk").

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[25] Fitch Ratings. "10 Years in Infrastructure". June 2018. Available online: https://your.fitchratings.com/Toll-Roads-10-Years-in-Infrastructure.html

[26] Ibid. "median traffic growth on large US networks was 1.7% between 2007 and 2017, while revenue increased by 5.8% over the same period"

[27] Ibid.

The KRFs, such as volume and price, are given one of three ratings, stronger, midgrade or weaker. As shown below in Table 3, a toll entity that holds a strong position on volume and price tends to have a high bond rating.

Table 3: High Grade Price and Volume[28]

Entity	Senior Lien Rating	Volume	Price
Ohio Turnpike & Infrastructure Commission	AA	Stronger	Stronger
Florida Turnpike Enterprise (Florida DOT)	AA	Stronger	Stronger
Maine Turnpike Authority	AA–	Midrange	Stronger
Maryland Transportation Authority	AA-	Stronger	Stronger
Oklahoma Turnpike Authority	AA-	Stronger	Stronger
Harris County Toll Road Authority	AA	Stronger	Stronger
Illinois State Toll Highway Authority	AA-	Stronger	Stronger
Bay Area Toll Authority	AA	Stronger	Stronger
Triborough Bridge & Tunnel Authority	AA–	Stronger	Stronger

Those with lower ratings, on the other hand, tend to have a lower ability to keep volumes strong and increase prices, as shown in Table 4.

Table 4: Lower Medium Grade Price and Volume[29]

Entity	Senior Lien Rating	Volume	Price
ITR Concession Company LLC	BBB	Stronger	Midrange
South Jersey Transportation Authority	BBB+	Weaker	Midrange
Mid-Bay Bridge Authority	BBB+	Weaker	Midrange
Chesapeake Transportation System	BBB	Midrange	Midrange
Rickenbacker Causeway	BBB+	Weaker	Midrange
E-470 Public Highway Authority	BBB+	Midrange	Stronger
Elizabeth River Crossings LLC	BBB	Midrange	Midrange
Foothill/Eastern Transp. Corridor Agency	BBB–	Midrange	Stronger
Kentucky Public Transp. Infrastructure Authority	BBB–	Midrange	Midrange
North Carolina Turnpike Authority	BBB–	Midrange	Midrange
San Joaquin Hills Transp. Corridor Agency	BBB	Midrange	Stronger

[28] "Peer Review of U.S. Toll Roads: Attribute Assessments, Metrics, and Ratings". Fitch Ratings. September 2017. Available online: https://your.fitchratings.com/peer-review-us-toll-roads
[29] "Peer Review of U.S. Toll Roads: Attribute Assessments, Metrics, and Ratings". Fitch Ratings. September 2017. Available online: https://your.fitchratings.com/peer-review-us-toll-roads

The senior lien rating and volume/price ratings for all 38 locations can be found in Appendix A. Overall, Fitch finds that "toll roads can be very lucrative, which explains the private sector's interest," though admittedly there have been some toll operator defaults.[30] The list of bankruptcy filings related to toll roads includes the SH 130 Concession Co. in Texas (Highway 130), the ITR Concession Co. LLC in Indiana (Indiana Toll Road), and South Bay Expressway, L.P./California Transportation Ventures, Inc. in California (San Diego's South Bay Expressway).[31]

The issuers of debt (the tolling entities) benefit from good ratings associated with the three agencies. Higher ratings tend to allow an agency easier access to debt at less cost than those agencies with the lowest ratings.

[30] Fitch Ratings. "10 Years in Infrastructure". June 2018. Available online: https://your.fitchratings.com/Toll-Roads-10-Years-in-Infrastructure.html

[31] Corrigan, Tom. "Texas Toll-Road Operator Files for Bankruptcy". Dow Jones and Company, Inc. March 2016. Available online: https://wsj.com/articles/texas-toll-road-operator-files-for-bankruptcy -1456958991

Schmidt, Steve. "Toll Road Operator Files for Bankruptcy". San Diego Union-Tribune. CA. March 2010. Available online: https://www.sandiegouniontribune.com/sdut-south-bay-expressway-builders-file-chapter-11-2010mar23-htmlstory.html

Fitzgerald, Patrick and Randazzo, Sara. "Indiana toll-road operator files for bankruptcy". The Wall Street Journal. September 2014. Available online: https://www.wsj.com/articles/indiana-toll-road-operator-files-for-bankruptcy-1411395866

DATA SOURCES

Data Collection and Management

To provide a more complete understanding of the sources and use of toll agency revenues, the key resource utilized was the most recent CAFR from each of the 21 tolling entities, which covers some or all of 2018 depending on each entity's fiscal calendar. Within the CAFRs the research team focused on metrics found within the Changes in Net Position tables. Citations for the CAFRs reviewed for the core analysis are listed in Appendix B.

The CAFRs analyzed are by no means standardized across the agencies. For the purposes of this research, the authors extracted financial information from the CAFRs and created comparable financial results for all of the agencies examined. The analysis sections of this report will describe and define in more detail the research team's data standardization processes.

Ultimately, a single master spreadsheet was developed containing the key data points for each of the 21 tolling entities in the study group. When a data point was not available through the CAFR, the research team made an effort to develop reasonable estimates based on other publicly available data – including data published elsewhere by the same tolling entity. In the case of the in-state versus out-of-state truck analysis (See Toll Revenue Analysis section), no published data was identified, so the researchers estimated the distribution of truck trip types using an extensive truck GPS dataset.[32] This methodology was then cross-validated using electronic toll tag data, toll user survey data and limited agency reporting.

Data Verification

To verify the findings of the financial and operational data collection, a table was created for each of the individual tolling entities using the data compiled in the master spreadsheet. The table contained a blank column where the tolling entity could correct any of the compiled information. This table along with a letter describing the project was sent via express shipping (with a tracking number) to the Chief Financial Officers or other agency finance staff, asking each to corroborate or modify the financial analysis. An example of these letters can be found in Appendix C.

[32] Since 2002 ATRI has collected and processed truck GPS data and has used this data in support of myriad local, state and federal freight analyses. At present, the FPM database is comprised of more than 1 million anonymized GPS-installed trucks in North America, and contains spot speeds, timestamp, location, and anonymous truck identifiers at regular intervals. This resource provides the research team unique access to information related to key truck origins and destinations, route choices, and speeds.

From the 21 requests submitted by the research team, a total of nine letter recipients responded with corrections or verification. Using the information contained in these responses, the master spreadsheet was updated in preparation for the final analysis. For those entities not responding, the statistics remained unchanged in the master spreadsheet.

TOLL REVENUE TRENDS AMONG THE 21 SELECTED TOLLING ENTITIES

Study Sample

As previously noted, this report generates from the analysis of financial data from 21 large toll authorities operating in the U.S. The 21-system sample is used because some financial data (privately operated facilities, for instance) are not publicly available. Additionally, some toll operations are so small that inclusion of their data would have little impact on the financial metrics generated by this research.

The particular facilities selected by the research team include 21 significant toll operations from across the U.S. (herein referred to as the "study group"), representing more than 80 percent of U.S. tolling revenue. The selected facilities are shown in Figure 1. Based upon historical transportation growth patterns, the major toll facilities are clustered on the Eastern coast of the United States.

Figure 1: Map of Study Group Facilities

Revenue Trends of the Study Group

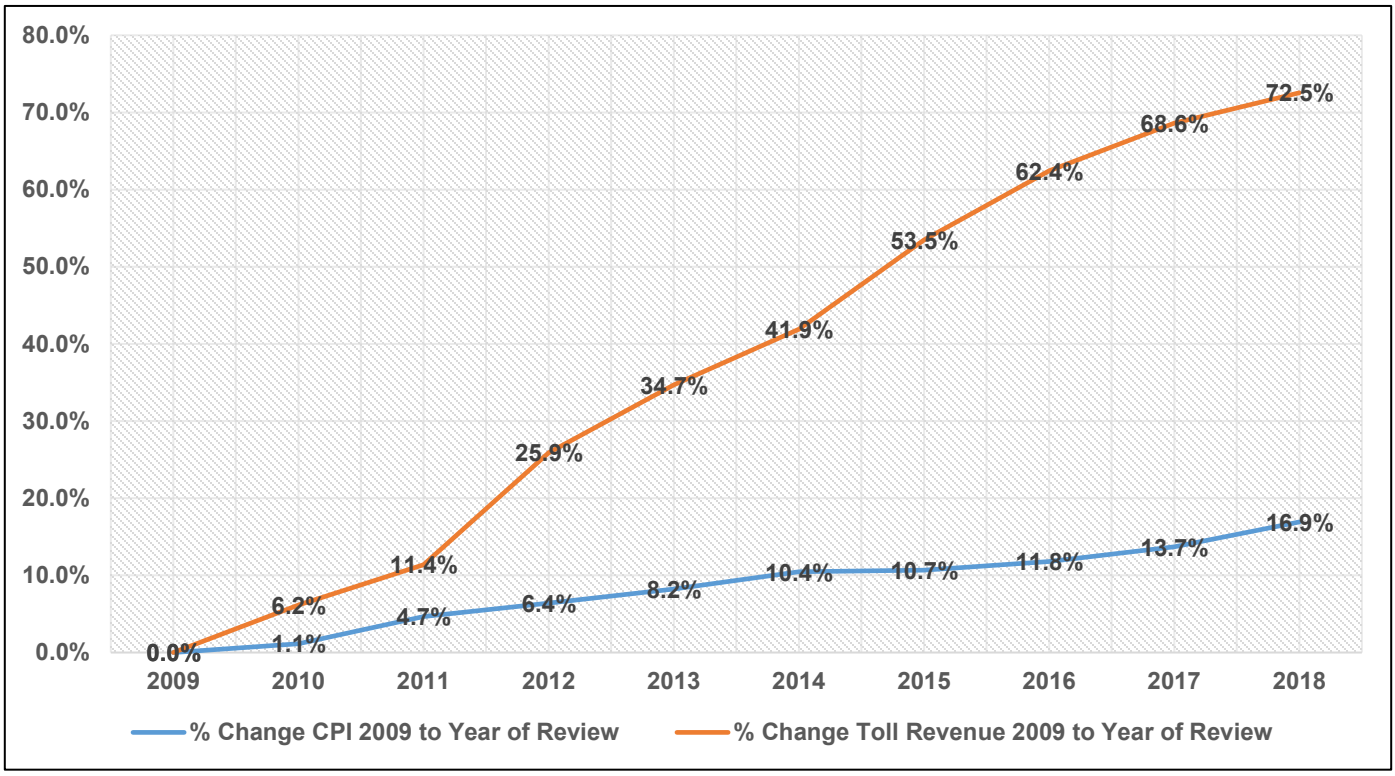
Annual toll revenue was the first data set collected for each study group facility, at which point the researchers generated a revenue trend analysis across a 10-year period (2009-2018). Table 5 displays toll revenue in both 2009 and in 2018 for the study group, along with the percent increase in revenue over the 10-year time period.

Table 5: Revenue Trends

		ANNUAL TOLL REVENUE		
Entity		**2009**	**2018**	**% Increase**
1	New Jersey Turnpike Authority	$952,419,000	$1,612,326,000	69.29%
2	Port Authority of NY/NJ B&T	$976,359,000	$1,689,985,000	73.09%
3	Metropolitan Transportation Authority	$1,332,000,000	$1,965,223,000	47.54%
4	New York State Thruway Authority	$611,600,000	$736,504,000	20.42%
5	Maryland Transportation Authority	$279,774,000	$724,847,000	159.08%
6	Delaware Turnpike (I-95)	$118,800,000	$135,048,183	13.68%
7	Illinois State Toll Highway Authority	$646,865,189	$1,411,520,072	118.21%
8	Pennsylvania Turnpike Commission	$615,604,000	$1,196,606,000	94.38%
9	Florida Turnpike Enterprise	$590,528,000	$1,017,303,000	72.27%
10	Oklahoma Turnpike Authority	$204,758,339	$317,716,266	55.17%
11	Harris County Toll Road Authority	$442,015,417	$740,272,353	67.48%
12	Bay Area Toll Authority (MTC)	$470,136,376	$727,350,000	54.71%
13	Ohio Turnpike	$187,278,000	$309,569,000	65.30%
14	Kansas Turnpike Authority	$79,474,841	$118,188,895	48.71%
15	North Texas Tollway System	$290,404,547	$841,491,016	189.77%
16	Delaware River Port Authority	$242,620,000	$335,588,000	38.32%
17	Central Florida Expressway Authority	$207,068,000	$442,065,000	113.49%
18	West Virginia Parkways Authority	$53,341,000	$95,288,000	78.64%
19	Maine Turnpike Authority	$100,451,393	$138,432,432	37.81%
20	Chesapeake Bay Bridge and Tunnel District	$45,105,820	$57,642,223	27.79%
21	Delaware River and Bay Authority	$77,272,070	$105,864,220	37.00%
Annual Total		**$8,530,505,992**	**$14,718,829,660**	**72.54%**

The findings show more than $14.7 billion in revenue collected by the study group; an increase of $6.18 billion across 10 years. The $6.18 billion represents a 72.54 percent increase in revenue over the 10-year period. For comparison, the percentage increase in the Consumer Price Index (CPI) for the same time period was 16.9 percent as shown in Figure 2 below.

Figure 2: Growth Trends in Toll Revenue vs CPI



As previously discussed, both traffic volumes and toll rates play a central role in a toll facility's ability to increase revenue year over year. While this large increase in revenue across the 10-year period was due in part to increased traffic volumes post-recession, the revenue growth far exceeds requisite traffic volumes. Additionally, there are instances such as the North Texas Tollway System where a large increase in miles of tolled roadway were added, thus increasing revenue.

All of that said, the willingness of toll roads to implement "above-inflationary toll-rate increases" (as Fitch states) cannot be ignored.[33] A noticeable jump in study group revenue occurs between the annual revenues for 2011 and 2012. This was due in part to a significant increase in toll rates implemented by the New Jersey Turnpike, which was noted in their 2012 Annual Report:

"Successfully implemented the second phase of the toll increase that was previously approved in 2008. On January 1, 2012, tolls were increased 53 percent on the New Jersey Turnpike and 50 percent on the Garden State Parkway. The additional revenue from the two-phase toll increase is not used to pay operating costs but rather goes to

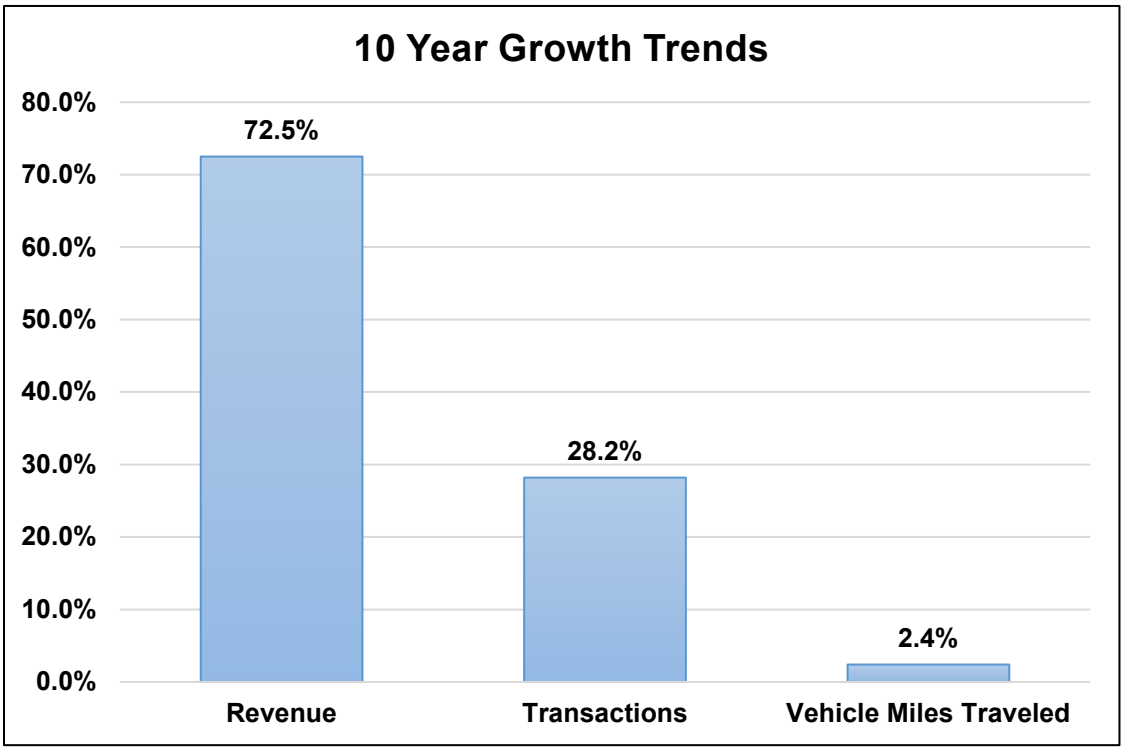
[33] "Peer Review of U.S. Toll Roads: Attribute Assessments, Metrics, and Ratings". Fitch Ratings. September 2017. Available online: https://your.fitchratings.com/peer-review-us-toll-roads

funding the New Jersey Turnpike Authority's on-going 10-year, $7 billion capital program and other transportation projects."[34]

Ultimately, New Jersey Turnpike revenue jumped more than 69 percent from 2009 to 2018, while the number of toll payment transactions only increased 3.8 percent and vehicle miles traveled (VMT) increased 9.0 percent.

Revenue/volume trends for the entire study group were also generated to compare transaction and VMT growth to the 72.5 percent growth in revenue. An analysis of 15 of the 21 locations that had available transaction trend data indicated an average 28.2 percent increase in transactions. For the eight locations where VMT trend data was available, VMT growth across the 10-year period averaged only 2.4 percent.

Figure 3: Growth Trends across Toll Metrics



Sample Size of the Study Group

A total U.S. toll revenue estimate was used to gauge the representativeness of the sample size of the study group. U.S. tolling industry revenue was estimated by the International Bridge, Tunnel and Turnpike Association (IBTTA) to be $13 billion in

[34] "New Jersey Turnpike Authority: 2012 Annual Report". New Jersey Turnpike Authority. Woodbridge, NJ. 2012. Available online: https://www.njta.com/media/1691/finannrpt2012.pdf

2013.[35] Annual revenue has since increased, as demonstrated in the revenue trend analysis.

To develop a more timely calculation, the research team looked at revenue reported by 50 individual U.S. toll entities during the 2016 fiscal year.[36] In 2016, total toll revenue for the 50 entities was $16.415 billion.[37] A 2018 figure for the 50 entities was then estimated by using a percent revenue increase from 2016 to 2018 of 6.24 percent, which resulted in a full industry estimate of $17.44 billion in revenue for the 50 entities.

Recognizing that there are additional smaller toll systems throughout the U.S., the research team determined that a rough (and likely conservative) estimate of $18 billion in toll revenue for 2018 was a reasonable assumption. Using that figure as the full toll facility population, the 21 locations that comprise the study group represent 81.77 percent of the toll industry's revenue at $14.7 billion annually.

[35] "2015 Report on Tolling in the United States". International Bridge, Tunnel and Turnpike Association. Washington, DC. 2015. Available online: https://www.ibtta.org/sites/default/files/documents/MAF/2015FactsInBrief_Final.pdf

[36] Agencies follow several fiscal calendars that do not always match the calendar year (e.g. July 1 2016 – June 30, 2017).

[37] These figures were based on data from the 2017 Fitch Peer Review (35 entities) along with 15 additional entities using data reported from their CAFR.

TOLL REVENUE ANALYSIS

As stated earlier, this report examines both toll industry revenue (who pays) as well as the final disposition of those same revenues (where does the money go). In the previous section, it was established that the U.S. toll industry collects approximately $18 billion in annual revenue. Using available data from CAFRs and other sources for the toll facility sample, as well as other sources such as truck GPS data and the U.S. Department of Transportation's Freight Analysis Framework (FAF)[38] to fill in gaps, the following analysis identifies statistics related to toll revenue sources, with a focus on the trucking industry's contribution to toll revenues. This represents a first good faith effort on the part of the authors to model and track the flow of toll revenue in the United States. The authors hope that this report will stimulate further research and standardization of financial reporting, which will make the metrics examined in this report even better in the future.

Data Sources and Methodology Specific to "Who Pays"

Every toll facility in the research sample charged a higher rate for commercial vehicles than for cars. Most of the CAFRs publish information describing the number of commercial vehicles and the number of cars that use tolled facilities. Based on available data, the research team focused on the metrics below related to vehicle type.

Transactions by Vehicle Type. This category measures the number of toll transactions by vehicle type, which establishes the percentage of trips conducted by commercial versus cars.

Revenue by Vehicle Type. This metric creates an estimate of how much toll revenue is generated from each vehicle type. While some toll authorities will specifically identify revenue derived from heavy-duty trucks, many will identify revenue as derived from commercial vehicles or by axle (two through six). For the purposes of this report, commercial vehicle revenue is categorized as sourced from trucks, as are vehicles with three or more axles.

Vehicle Miles Traveled (VMT) by Vehicle Type and Revenue per Mile. Again using the previously described categories, this metric reflects highway travel for the number of miles traveled, by vehicle type. These figures were often presented in the CAFR or supporting documents. In the case of facilities with only bridges, each bridge crossing was considered to have a standard length of 10 miles, and this mileage was typically derived from the transaction figure multiplied by the 10-mile length. When VMT was not available, particularly on tolled roadways, the FAF was utilized to determine average

[38] U.S. Department of Transportation - Federal Highway Administration. "FAF4 Network Database and Flow Assignment: 2012 and 2045." Nov. 2018. https://ops.fhwa.dot.gov/freight/freight_analysis/faf/faf4/netwkdbflow/index.htm.

annual daily traffic (AADT) and average annual daily truck traffic (AADTT) for roadways, thus providing an annual VMT estimate.

Out-of-State vs In-State Revenue. This metric relates to revenue from out-of-state versus in-state vehicles, although it was not found in the CAFRs. To address this gap, estimates were developed using empirical truck GPS data that was analyzed to determine trip origin and destination locations (see description of this analysis in Appendix D). Further calibration of these methods were performed by examining and juxtaposing the metric with the limited amount of data that is produced by tolling agencies.

Findings on "Who Pays"

Transactions

Transactions between toll facilities and toll road users generate costs to both parties. For the agencies, tolling systems have significant capital and operating costs that must be paid on an ongoing basis to collect user revenue. For toll road users, tasks related to paying a toll include stopping at a toll booth, having appropriate funds for payment, acquisition and management of electronic toll payment devices and accounts, and ensuring that payments are made to avoid fines. For an interstate trucking company traveling irregular routes, these tasks become more complex.

Based on available information, it was found that commercial vehicles generated more than one-third of a billion transactions (377,547,037) in 2018 at 19 out of the 21 locations.[39] The average paid per transaction was $10.22.

For light-duty vehicles, more than 5.1 billion transactions occurred, based on the review of 2018 CAFRs, with an average paid per transaction of $1.84.[40]

Thus, commercial vehicles pay approximately 550 percent more per transaction than light-duty vehicles.

Toll Revenue

The research team found that a total of $14.7 billion in toll revenue was collected by the study group. Of this, $4.208 billion or 28.5 percent is paid by commercial vehicles. Light duty vehicles paid 69.5 percent, or $10.236 billion. The remainder of the highway revenues (approximately 1.8%) were sourced from vehicles such as buses.

[39] Transactions from the Central Florida Expressway Authority and the Bay Area Toll Authority were not obtained and could not be estimated.
[40] Ibid.

VMT and Revenue per Mile

VMT is a metric that measures highway use. For the study group, annual commercial VMT was estimated at 9.3 billion miles, or 13.0 percent of total miles. Juxtaposing this figure with commercial toll revenue, it was found that the industry pays just over $0.45 cents per mile.

Alternatively, light-duty vehicles drove more than 62 million miles or 86.6 percent of all sample miles, and paid approximately $0.165 cents per mile. The remaining <1 percent of VMT was attributed to buses or other vehicles.

Revenue by Trip Type

Interstate commerce is an important consideration when discussing tolls. Interstate commerce is protected by the U.S. Constitution[41] which is critical considering those operating in interstate commerce may have less ability to influence choices made by toll authorities and elected officials than those domiciled in-state. Thus, those engaging in interstate commerce may tend to have fewer mechanisms to ensure that a fair price is paid in exchange for use of a toll facility.

To better understand the role of tolling in interstate commerce, an innovative analysis was developed and applied using truck GPS data to identify the distribution of trip types along these roadways. The analysis included identification of sample truck trips using each toll facility, anonymously tracing trip origin and destination patterns, and compiling final statistics for each of the toll entities. A detailed methodology is available in Appendix D.

Each trip was assigned to one of the following three trip types:

1) In-State Trips. These are tolled trips that never leave a state (or two states, in the case of a bridge that connects two states).

2) Through Trips. These are trips that pass through a state (or states in the case of a bridge that connects two states) and do not have an origin or destination “nexus” to the state or states where the toll is administered. In other words, these are trucks that use a toll facility without conducting any “local” business. It should be noted that through trucks are not exempt from fuel taxes and registration fees in states where operations are conducted, and therefore do not have a “free ride” as is often incorrectly stated when making the argument for tolling out-of-state trucks. A truck engaging in interstate operations will distribute fuel and registration fees to all states that it traverses as part of the International Fuel Tax Agreement (IFTA) and International Registration Plan (IRP). Both are reciprocity systems for taxes and fees for interstate trucking.

[41] United States Constitution (Article I, Section 8, Clause 3)

3) Origin or Destination (O/D) Trips. These are trips that have either an origin or a destination in the state or states where the toll facility is located, but the other end of the trip is outside of the toll facility's state.

As shown in Table 6, there was a variety of trip types within the study group. Local highway networks, such as those managed by the Central Florida Expressway Authority, tended to have in-state-only traffic. Other facilities, such as the I-95 Delaware Turnpike, are considered pass-through toll facilities (with 78.5% passing through). In summary, the largest truck trip category was Origin or Destination Trips (44%), followed by Through Trips (35%) and finally In-State Trips (21%).

Table 6: Trip Types by Location

Entity		In-State Trips	Through Trips	O/D Trips
1	New Jersey Turnpike Authority	5.1%	36.7%	58.2%
2	Port Authority of NY/NJ B&T	13.7%	31.8%	54.5%
3	Metropolitan Transportation Authority	0.3%	34.2%	65.5%
4	New York State Thruway Authority	15.6%	34.2%	50.2%
5	Maryland Transportation Authority	0.5%	56.3%	43.2%
6	Delaware Turnpike (I-95)	0.0%	78.5%	21.5%
7	Illinois State Toll Highway Authority	8.3%	41.1%	50.5%
8	Pennsylvania Turnpike Commission	6.9%	45.1%	48.1%
9	Florida Turnpike Enterprise	51.6%	0.0%	48.4%
10	Oklahoma Turnpike Authority	0.8%	71.2%	28.0%
11	Harris County Toll Road Authority	51.2%	11.2%	37.6%
12	Bay Area Toll Authority (MTC)	80.3%	4.7%	15.0%
13	Ohio Turnpike	7.3%	36.2%	56.5%
14	Kansas Turnpike Authority	10.1%	36.0%	53.9%
15	North Texas Tollway System	80.6%	4.9%	14.6%
16	Delaware River Port Authority	25.0%	14.4%	60.7%
17	Central Florida Expressway Authority	77.5%	0.0%	22.5%
18	West Virginia Parkways Authority	0.2%	77.7%	22.1%
19	Maine Turnpike Authority	0.5%	44.8%	54.7%
20	Chesapeake Bay Bridge and Tunnel District	2.2%	44.0%	53.9%
21	Delaware River and Bay Authority	3.6%	31.8%	64.6%
AVERAGE		**21%**	**35%**	**44%**

For each toll facility, annual truck revenue was next distributed across each of the three categories (in-state, through and O/D trips) to produce a revenue by trip type, as shown in Table 7.

Table 7: Interstate Commerce

	Intrastate Commerce	Interstate Commerce	
	In-State Trips	**Thru Trips**	**O/D Trips**
Percent of Total Trips	21.0%	35.0%	44.0%
Revenue by Trip Type	$881,119,286	$1,392,718,652	$1,934,343,234
	Intrastate Commerce	**Interstate Commerce**	
Intra vs Inter Revenue	$881,119,286	$3,327,061,886	
% Intra vs Inter	20.94%	79.06%	

Based on the analysis, it is estimated that 79.06 percent of truck trips using toll roads in the study sample were engaged in interstate commerce, and $3.327 billion in revenue is sourced from interstate commerce activity. For the study group as a whole, it can be concluded that a minority of truck trips – 20.94% – were in-state only.

Revenue Findings

Toll costs per mile for commercial vehicles are significant at $0.45 per mile. To put this figure in context, per-mile toll costs exceed every cost per mile metric from ATRI's 2018 operational cost survey with the exception of driver wages, which are $0.596 per mile.[42]

As discussed earlier, the broader U.S. transportation system is paid for through a variety of funding mechanisms, including federal and state fuel taxes, along with registration and excise fees. The table below shows that fuel taxes, registration fees and other highway user costs are substantially lower per mile than tolls. The federal fuel tax paid by trucking is approximately 4 cents per mile, for instance. Total support of infrastructure through federal and state transportation-related taxes and fees is $0.146 per mile as shown in Table 8. Per-mile toll costs, which are typically in addition to standard per mile fees and taxes, are more than three times this amount.

[42] Murray, Dan; et al. "An Analysis of the Operational Cost of Trucking: 2019 Update". American Transportation Research Institute (ATRI). Arlington, VA. November 2019.

Table 8: Trucking Industry Highway Funding Contributions[43] [44]

	Total U.S. Trucking Costs	Trucking Industry Cost Per Mile
Federal Fuel	$11,795,211,000	$0.040
Federal Other	$5,929,042,000	$0.020
State Fuel	$14,079,506,000	$0.047
State Registration	$9,851,486,000	$0.033
State Other	$1,912,693,000	$0.006
Total	**$43,567,938,000**	**$0.146**

Vehicles typically pay fuel taxes on top of tolls for the VMT that accrued on toll facilities. Based on the commercial VMT figure of more than 9.3 billion miles annually within the study sample, and a cost of 8.7 cents per mile for federal and state fuel taxes alone (as shown in the table above), it is estimated that trucks pay $811 million annually in federal and state fuel taxes while traveling across the study sample's toll facilities.

These taxes are collected **in addition** to the toll revenue paid on the given road segment. Assuming that the full cost of the road facilities used during the toll road trip were paid by the road toll, the fuel taxes collected are technically subsidizing other road and transit facilities.

Ultimately the discrepancy between the $0.45 per mile toll cost and the $0.146 per mile traditional funding cost for trucks raises key questions, including:

- How much of the total toll revenue is required to provide a highway facility?
- If non-tolled roadways can be maintained on considerably less funding, then why can't toll facilities?

[43] "American Trucking Trends 2019." American Trucking Associations. Arlington, VA. 2019.
[44] "Table VM-1 - Highway Statistics 2018". United States Department of Transportation Federal Highway Administration Office of Highway Policy Information. Washington, DC. 2018. Available online: https://www.fhwa.dot.gov/policyinformation/statistics/2018/vm1.cfm

TOLL REVENUE ALLOCATION ANALYSIS

The initial research determined that the sample group generated $14.7 billion in toll revenue from trucks for the 2018 fiscal year. The second task in this analysis sought to identify the true and direct costs for a given toll facility. In doing so an estimate was developed for other costs, particularly those that may not be reflective of the actual cost of providing a given roadway facility.

The common argument for tolling and other user fees is that funds that are collected are reinvested into maintaining and improving roadway systems. The CAFRs for the study sample were again analyzed to identify where toll revenue is directed. The following key metrics are used as the basis for the analysis. As described earlier, toll entities that were part of the study sample were provided an opportunity to amend the figures that ATRI identified for each category.

- Collection Costs
- Facility Costs
- Interest Expense
- Capital Infusion
- Depreciation
- Transfers

These metrics, along with toll revenue, are utilized to calculate various measures of profit and cash flow. While private firms are focused on profit generation and their financial statements are structured to provide measures of income and profit, governmental entities are not-for-profit.

The general definition of profit is a financial gain, and is found by measuring the difference between the amount earned and the amount spent in buying, operating, or producing something. Governmental entities generally focus on accountability in their financial statements as opposed to income or profit, and tend to focus on metrics such as fund balance, cash flow, net financial position and overall accountability.

The Government Accountability Office (GAO) uses accountability as a key financial and operational goal for government entities. The situation gets even more challenging when former publicly owned road assets that are now leased by private firms (vis a vis a PPP) are considered. This shifts financial statements from government non-profit GASB accounting to standard for-profit corporate GAAP financials.

The authors in this study have attempted to reconcile these various perspectives on the reporting of the financial data at tolling agencies. While no set of conventions will be universally accepted until industry standards are well established, the authors believe that the initial data collection and consolidation for this report represents solid financial practice and analysis. The issues of depreciation, bond principal and net income

calculation remain matters of interest and continue to have variation in reporting by agency. While the authors believe that the matters of variation in practice and reporting do not appear to have the potential to significantly alter the results presented below, practitioners and researchers in the area of public finance and toll systems operations are encouraged to contact ATRI if they identify any potential improvements to these methods

Appropriate Measures of Financial Performance of Toll Facilities

Finance professionals use various metrics to evaluate the financial health of an organization. These include measures of financial liquidity, asset management, debt management, profitability and potential market valuation. While all of these metrics can provide insights into various aspects of firm operations and the potential value of the firm (which might be appropriate in the case of privatized roads), the relationship between revenue collected and direct operational costs are the focus of this section. Therefore, measures of profitability and cash flow appear to be central to the analysis since they are most appropriate to assess financial condition and identify resources above the cost of toll facilities.

One of the leading metrics of firm profitability is EBITDA – Earnings before interest, taxes, depreciation and amortization. While this metric is a useful measure in general, other metrics such as Net Income or Net Cash Flow may offer more insight into the financial strength or weakness of toll facilities.

Net Cash Flow Description

In terms of general financial relationships, the following provide some standard financial metrics, and ultimately the relationship between EBITDA and Net Cash Flow:

- Revenue - Operating Costs = Earnings Before Interest, Taxes, Depreciation & Amortization (EBITDA)
- EBITDA - Depreciation & Amortization = Earnings Before Interest & Taxes (EBIT)
- EBIT - Interest Charges = Earnings Before Taxes (EBT), and
- EBT - Taxes = Net Income (NI)
- If depreciation and amortization are then added back to Net Income, the result is Net Cash Flow.
- Net Income + Depreciation & Amortization = Net Cash Flow

Financial metrics that include taxation costs such as depreciation and amortization make sense for profit-making entities, as taxes are an important component of costs. In addition, depreciation and amortization have significant impacts on the tax burden of the corporation.

For governmental or non-profit entities, however, non-tax status could suggest that a metric that excludes depreciation and amortization may better reflect true financial condition. Further, the depreciation measures may be "managed" by an agency for political or operational reasons, or to justify a given agency goal.

For a not-for-profit or governmental entity, however, depreciation and amortization represent a non-cash expense that arguably should be included in the calculation of Net Income to create the standard financial metric of Net Cash Flow. Thus, for the purposes of this report, Net Cash Flow likely provides the best understanding of the resources that are collected and their relationship to direct cost. As discussed earlier in this section, government financial statements should focus on accountability and not profitability.

Calculating Net Cash Flow

To best estimate direct road costs and the direct costs of road operations the first step is to calculate the elements of direct cost and direct revenue that arise from a given toll facility. In some cases, these facilities do not maintain separate, standalone financial statements, so the research team had to split out expenditures and costs from aggregate financial statements or estimate costs or revenues based upon usage metrics. The items analyzed included the following costs and revenue centers.

Facility Costs. All operating expenses, including collection costs, administrative, executive, patrol/safety/police, insurance, maintenance, preservation and construction. This cost center does not include depreciation. Members of the study sample reported these values often with different names. Of the $14.7 billion in total toll revenue, $4.764 billion or 32.4 percent of total revenue went to facility costs.

Collection Costs. Within facility costs are toll collection costs. For several facilities, this cost is explicitly listed as toll collection costs. In most cases, it is assumed that the "operations" line item represents toll collection costs. When operations costs are combined with maintenance or other costs, an estimate was developed by the research team using available information. A total of $2.325 billion, or 15.8 percent of total revenue, was dedicated to collection costs.

Interest Expense. The interest expense cost metric (also referred to as the capital cost metric) is the interest expense paid on debt, as well as fees related to paying or taking on debt. This cost does not include payment on principal. Interest expense for the study sample was $3.940 billion, or 26.8 percent of total revenue.

Capital Infusion. Capital infusion is not a cost; it is cash provided to the toll entity by a separate government entity (e.g. through grants or other mechanisms). Less than half (10) of the study group reported capital infusion in their CAFRs, and the total for the year was $1.087 billion. The majority of capital infusion dollars were from state government. Federal sources of capital infusion however made up 30 percent. One key federal source of capital infusion was the Build America Bonds (BABs) program that was created during the great recession in 2009.[45] This program offered bond issuers an interest rate subsidy program that paid bond issuers (in this case, toll facilities) directly from the U.S. Treasury. Of the $1.087 billion in capital infusion, $190.2 million or 17.5 percent was from BABs subsidies.

The Net Cash Flow is derived by subtracting the aforementioned costs from (and adding additional income to) total toll revenue as shown in the following equation:

- Net Cash Flow = (Toll Revenue – Facility Costs – Interest Expense) + Capital Infusion

Based upon these calculations for the 21 agencies reviewed, there was $7.1 billion in positive Net Cash Flow – representing 48.2 percent of toll revenue. Trucking paid $2.03 billion, or 28.5%, towards the Net Cash Flow figure.

A reasonable question is why these facilities are operating and justifying the current toll structure if the Net Cash Flows exceed a zero or breakeven level. Given that most agencies are government or quasi-government entities, the coverage of costs should be sufficient to justify a user-pays model.

Further, if these entities were operated as rate-regulated monopolies, it is highly unlikely that the standard by which they are regulated would support the level of Net Cash Flow observed in these toll agencies.

[45] "Build America Bonds". United States Federal Highway Administration Office of Innovative Program Delivery. Washington, DC. 2017. Available online: https://www.fhwa.dot.gov/ipd/pdfs/fact_sheets/techtools_build_america_bonds.pdf

Calculating Net Income Minus Transfers Out

Unlike profit-making firms, toll agencies in many cases have structural and ongoing financial relationships with State Departments of Transportation or other state and local government entities. As a result, funds may flow between the toll entity and other entities that may be capital or operating inflows or outflows. These outflows may represent significant expenditures of toll agency resources and may undermine or enhance the viability of a given toll facility.

To better understand this, the metric utilized was Net Income Minus Transfers Out. These transfers represent a donation of funds on a net basis from toll agencies to their parent state or local governments. As such, the payments create a significant financial drag on the toll facilities -- which in some cases results in financial distress or a need for additional borrowing.

Two additional metrics were required for each toll facility in order to calculate Net Income minus Transfers Out for the study group:

Depreciation. This is the figure reported by the facility representing the reduction in value of assets used for toll facility operations, particularly the annual decrease in value of highways and bridges due to use. This figure will, in rare instances, include items such as “amortization of intangibles.” Total depreciation reported by the study group was $2.538 billion, or 17.2 percent of revenue.

Transfers Out. Transfers out are payments to other government organizations from the toll entity. These payments were found to typically go to mass transit programs or state trust funds. A total of $3.013 billion (or 20.5% of revenue) was transferred out by nine entities as shown in Table 9. It should be noted that these payments are also known as interfund movements and/or inter-entity transfers.

Table 9: Transfers Out

Entity	Total	Total from Trucking
New Jersey Turnpike Authority	$193,000,000	$38,227,221
Port Authority of NY/NJ B&T	$753,585,000	$236,979,544
Metropolitan Transportation Authority	$926,722,000	$98,214,195
Delaware Turnpike (I-95)	$89,271,971	$21,425,273
Pennsylvania Turnpike Commission	$450,000,000	$196,148,054
Harris County Toll Road Authority	$127,615,000	$16,109,604
Bay Area Toll Authority (MTC)	$423,123,070	$126,936,921
Ohio Turnpike	$48,074,000	$28,224,075
North Texas Tollway System	$2,000,000	$600,000
Annual Total	**$3,013,391,041**	**$762,864,888**

To calculate net income, net cash flow is reduced by the amount of depreciation and amortization. To calculate net income minus transfers out, the research team deducted the value of the transfers out from net income.

The net income figure derived by subtracting the aforementioned costs from excess revenue as shown in the following equation:

- Net Income – Transfers Out = Net Cash Flow – (Depreciation & Amortization) – Transfers Out

Net Income minus Transfers Out was $1.548 billion, or 10.5 percent of total toll revenue.

Revenue Allocation Findings

The total toll revenue collected from all toll facility users by the study sample was $14.7 billion for fiscal year 2018. The study group's share of total U.S. toll industry revenue (estimated to be $18.0 billion) is substantial at 81.7 percent.

Figure 3 describes the distribution of toll revenues based on the described methodology.

The largest toll system cost center is facility operating costs (including collection costs) which was $4.764 billion or 32.4 percent of revenue. Within this figure, however, nearly half of the funds went to toll collections costs, which were found to be approximately $2.325 billion or 15.8 percent of total revenue.

Interest expense was the next largest, at $3.940 billion annually, or 26.8 percent of revenue. As discussed earlier, the use of bonds to finance capital projects is common, though revenue bonds may have higher rates. Additionally, states that take on debt with GO bonds for instance have a large tax base, and thus better credit scores. As an example, the State of Indiana has a AAA prime rating while the entity running the Indiana Toll Road has a BBB rating. It should be noted again that these costs include interest and fees related to debt issuance, but not principal payments.

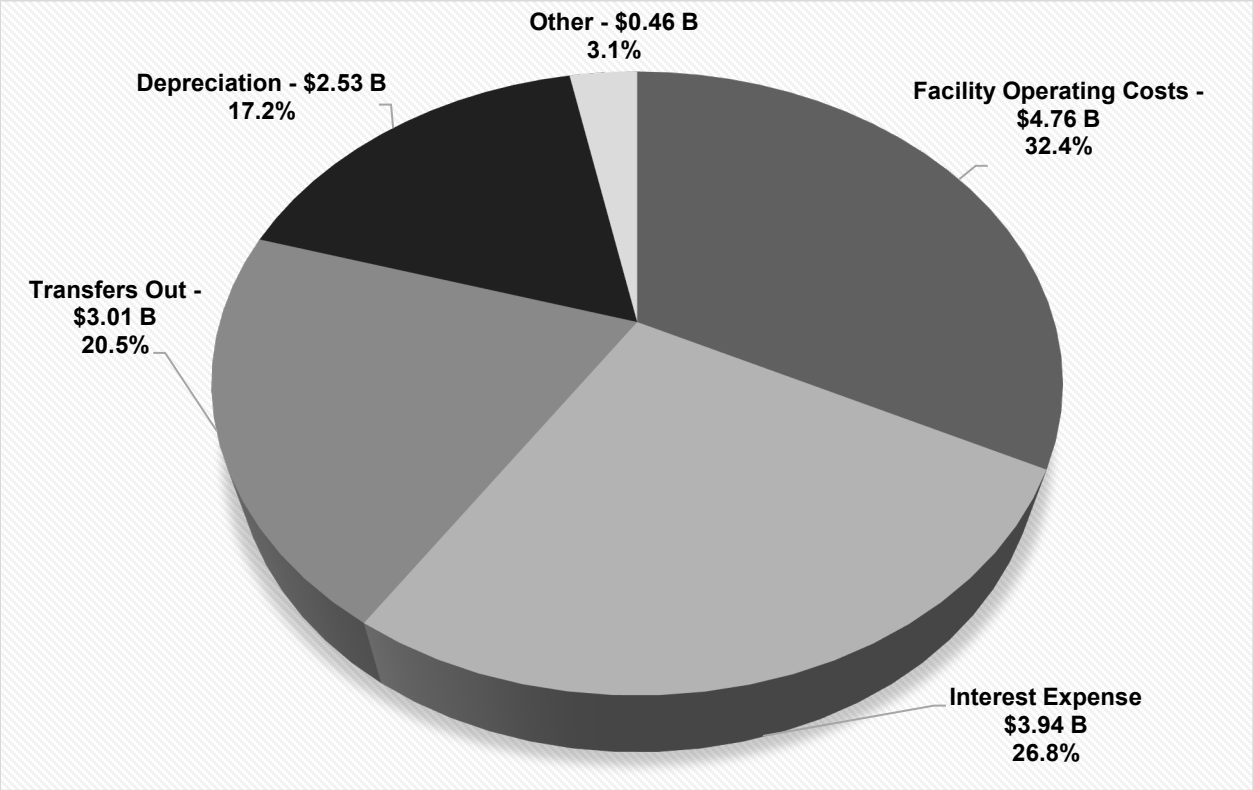
The third largest cost center is transfers out. This is simply a toll authority transferring funds out of the tolling authority to another entity. A considerable percentage, 20.5 percent, of total toll revenues were transferred ($3.013 billion).

Next, depreciation represented 17.2 percent of costs, or $2.538 billion. Depreciation is a non-cash expense that is of significant importance to profit-making firms. By allowing a deduction of depreciation from Net Income, firms are able to reduce their tax liability. In the case of not-for-profit or governmental entities, depreciation may allow the firm to more accurately understand the value and condition of their capital stock, as the

accumulated depreciation provides some understanding of the potential need for future capital investment.

Finally, 4.1 percent of costs fell outside of the categories of this analysis, and likely included items such as other inter-fund transfers.

Figure 4: Distribution of Toll Revenue and Capital Infusion



CONCLUSIONS AND FUTURE RESEARCH NEEDS

This report represents an important step in developing a comprehensive overview of the financial performance of toll agencies in the U.S. at an aggregate level. It provides an overview of both the revenue and the direct costs related to the provision of toll facility services.

Through this report, the research team has attempted to analyze and standardize the reporting of toll facility usage and revenue across 21 major U.S. toll facility providers. The data was assembled from standard financial reports where available, and was otherwise based upon reasonable assumptions and cross-agency comparative metrics when comprehensive and detailed financial reports were unavailable.

The research team submitted the estimates to the 21 individual toll agencies that were included in the analysis (the study group). The agencies were asked to review and provide any corrections or substantive comments to our metrics. Nine agencies responded to the requests and in all cases, their revisions represented minor adjustments to the metrics. The final report reflects the data as appropriately adjusted by the agencies that responded – the other data was left as calculated by the authors. In doing so reasonable estimates for cost, revenue and toll road user metrics were compiled.

The findings indicate that the 21 major tolling systems analyzed collect revenue in excess of the actual direct costs of operations and interest expense, with nearly 50 percent of toll revenue diverted to other uses. This excess revenue is diverted in a number of ways based upon the individual agency or state that supervises the toll entity. The magnitude of diversion and the lack of standard practice with regard to revenue diversion speaks to the disjointed control under which toll entities operate.

This is in stark contrast to the supervision and public policy standards that dominate the use of the fund such as federal fuel tax revenue and the supervision of the expenditures of these resources by agencies such as the Federal Highway Administration.

The key findings of this analysis are described below.

1. Equity Issues Related to Current Tolling Practices Continue to Exist

If toll facilities are to be operated as a profit center for the given governmental or private entity, then one must question on what basis the service is priced and what level of profit is appropriate and reasonable as a government monopoly or exclusive provider of a given travel route.

This raises the question of social equity as it pertains to the bundling of goods and services. When a toll provider bundles goods and services, it expects the user to pay for both the service provided (use of a toll road) as well as other services selected by the government entity that operates the toll facility. In this case, it transitions from a user-pays system to a taxation system. This is because the fee is not truly linked to a direct service provided; rather it is in fact a contribution to the general sources of funds that are used by the government entity to provide other services to the public (e.g. transit or funding of other transportation system components).

In a taxation system, one should consider a number of factors. These include issues of geographic equity, burden of taxation by income strata, issues of double and triple taxation and cost of collection and administration of the taxation system.

Tolls tend to be regressive in terms of the burden of taxation with lower income households paying a significantly higher percentage of household income for tolls as compared to higher income households. This burden occurs via two mechanisms. First, low-income households may be unable to afford to travel on toll facilities based upon cost. Second, for those low-income households who must use these facilities, there is a burden 3-5 times the burden of high-income households. In the consideration of taxation systems, regressivity is generally an issue to be avoided.

2. The Use of Tolling Requires Additional Governance and Oversight to Ensure Reasonable Cost Standards

Users of toll systems should have a reasonable expectation of proper governance and oversight of agencies to ensure fair pricing and rational basis for charges on direct and reasonable costs. That said, questions have been raised in lawsuits and other forums of proper financial regulation, fee calculation and regulation, excessive pricing, geographic or use discounts, price discrimination between in-state and interstate users and price discrimination between rate classes. Based on the diversity of reporting practices and uses of toll revenues, the gaps in national and state laws governing toll operations appear to be significant.

To remedy this, the question of best practices for proper firm structure and market regulations need to be addressed. The alternative is an unregulated tolling marketplace and price structure. This is generally inadvisable, however, as the facilities in question tend to have monopoly market power or significant control on competition.

Two alternative options exist when confronted with this significant control over competition. A first option is a user-pays system via a rate-of-return regulation, similar to a public utility. A second option is a tax-subsidized system via an enterprise fund, with examples being sports stadiums or food services program. Either option offers some level of protection to users in terms of protections against structural overcharging or rate gouging. Each system ties revenue back to the cost of service provision and provides cost coverage without excessive charges.

Toll facilities have demonstrated an ability to collect significant revenues, but not all of the funds are allocated to providing a service to users. If toll facilities are designed to be a user pay system, then comparisons to rate-regulated monopolies (that have rate-of-return regulation oversight) such as water supply systems or energy providers (natural gas systems and electricity providers) are appropriate. In those cases, the rate of profitability and return are regulated through various tests of return that are well established in the academic and regulatory literature.

For instance, energy providers are commonly regulated using a rate-of-return model that estimates reasonable charges based on the operating cost of a given network or facility. The literature on rate-of-return regulations is careful to define the appropriate rate base and the metrics of performance and costs that should be considered in a rate evaluation case. Further, there are clear standards of practice that exclude non-direct rate base elements for firms who have business units that are both rate-regulated and non-rate-regulated operations.

A 1993 guidance for ISTEA toll provisions when creating public-private partnerships suggests the following reasons for rate-of-return regulation in tolling:

"Under rate-of-return regulations, a maximum rate of return on investment is imposed rather than a maximum toll rate. Any earnings received in excess of the rate of return ceiling must be turned over to the State … The advantage of rate-of-return regulation is that it is precise in limiting investors' earnings. Earnings are limited to a pre-determined maximum regardless of actual interest expense, operating costs, or traffic levels."[46]

The test of reasonableness is based upon the amount of invested capital as well as reasonable and appropriate direct costs. The basis of this analysis is a fundamental understanding of these direct costs.

The tolling research contained in this report is an attempt to address the fundamental financial metrics that would provide the basis of a rate-of-return analysis. It is important to understand that in a true rate case, the validation of the appropriateness of a price change would be subject to external review by a regulatory agency, such as the Federal Communications Commission (FCC) for interstate telecommunications or a state public utilities commission for intrastate utilities. Such external review hearings are not simply pro-forma activities, but are formal reviews of the economic documentation provided by the entity to justify the change. Allowing an agency to self-certify a rate-change – which appears to be common practice in tolling – is tantamount to forgoing any formal review or validation of a rate increase request.

[46] "Guidance for State Implementation of ISTEA Toll Provisions in Creating Public-Private Partnerships". United States Department of Transportation Federal Highway Administration. November 1993.

3. There is a Lack of Standards for Financial and Accounting Reporting

One interesting aspect of the analysis provided through this report relates to the co-mingling of funds by toll entities. The standards of practice in governmental accounting promulgated by the Government Accounting Standards Board (GASB), as they relate to enterprise funds, are well established as good policy and practice.

Enterprise funds are separate accounting entities that are established by government entities to sell goods or services to the public for a fee, and are recommended as good practice by many governmental auditing entities. But major questions remain as to how well these standards of practice are utilized by toll entities.

The Office of the Washington State Auditor outlines in detail when it is appropriate to use enterprise funds based upon GASB standards:

"GASB has issued several pronouncements addressing various fund types, which is indicative of the importance of proper classification of activities. Specifically, GASB Statement 34 provides guidance on the use of proprietary funds, of which enterprise funds are one type. Paragraph 67 of that Statement states that if an activity meets any of the following three criteria, it must be reported in an enterprise fund. These criteria are:

- The activity is financed with debt that is secured solely by a pledge of the net revenues from fees and charges of the activity.
- Laws or regulations require that fees and charges be set to recover costs including capital costs (depreciation or debt service).
- There is a pricing policy that fees and charges be set to recover cost, including capital costs (depreciation and debt service).

These criteria should be applied in the context of the activity's principal revenue source."[47]

Given this standard, it appears that toll agencies in general should be applying enterprise fund accounting to the various entities that are captured within their overall operations – such as separating the mass transit, maritime port, airport or economic development functional entities from the financial reporting of the toll operating entity.

[47] "When should I use enterprise funds?". Office of the Washington State Auditor. Olympia, WA. Available online: https://www.sao.wa.gov/when-should-i-use-enterprise-funds/

In this report, the research team has segmented direct toll activities to create a proxy enterprise fund for the toll operating entity of these agencies. In doing so a number of instances were identified where the accounting practices were found to significantly deviate from GASB recommended practice. In some cases, massive co-mingling of assets and internal transfers masked the direct performance of a given toll segment or operating area. In other instances, toll revenues were co-mingled within a government entity that had general taxing ability as well as issued general obligation bonds. The research team has attempted to fairly and accurately unravel these transfers and activities and to create a near enterprise fund accounting of each toll entity.

Toll users, including the trucking industry, are spending billions of dollars annually to access toll facilities. Reporting “standards of practice” that protect the rights and resources of the toll facility users should be in place to ensure funds are invested appropriately into highways. Such standards should include clear and transparent metrics describing facility costs and revenue allocation, as well metrics describing users groups and user behavior.

4. Tolls Remain an Ineffective Means of Funding Highways

Previous research into tolling found large inefficiencies in collection costs when compared to fuel taxes. For instance, while some toll authorities in the early 2000s were dedicating 21.9 to 30.3 percent of revenue to toll administrative collections, the cost to states for administering a fuel tax was 1-2 percent and administering the federal fuels tax was only 0.2 percent.[48]

As revenues increased, collection costs as a percentage of total revenue has decreased to an average of 15.8 percent of toll revenue at the facilities studied in this report, or $2.325 billion in fiscal year 2018. Ten years prior, and assuming collection costs were the same, 27.5 percent of revenue would have been required to collect the $8.5 billion in 2009 for the study group. This change is likely attributable simply to the increased revenues.

The additional revenues, in general, are not going toward costs. As demonstrated through the net cash flow metric, more than 50 percent of toll revenues are going to other uses. This level of revenue diversion does not generally occur through other dedicated transportation funding mechanisms such as state and federal taxes and fees.

Tax systems such as the fuel tax are clearly and openly presented as tax systems – where there is not an expectation that the payer of the tax will get any direct benefit from the tax paid. User pay systems are different – the user is supposed to pay and that same user is supposed to be supplied with a known service. Given that the tolls are generally argued to be user fees – it posits the question: at what level of revenue diversion changes the system from a user fee to a tax?

[48] Jeffrey Short, Dan Murray and Sandra Shackelford, *Defining the Legacy for Users: Understanding Strategies and Implications for Highway Funding,* American Transportation Research Institute, Alexandria, VA, May 2007.

5. Tolling has a Significant Impact on Trucking industry Financials

The trucking industry is a major stakeholder in U.S. highway funding. The industry depends on roadways to deliver freight to consumers, and in turn through taxes, fees and tolls, the industry contributes to building and maintaining the surface transportation system. The allocation of those contributions only comes into question when funds are not efficiently and appropriately invested in roadway infrastructure.

This issue is best illustrated through the roadway use cost-per-mile calculation. Through traditional taxes and fees, the industry is estimated to pay 14.6 cents per mile in exchange for the use of public roadways. To drive 100 miles at this rate would cost $14.60. A truck that logs 100,000 miles annually might pay nearly $15,000 in taxes for the use of highways – a significant contribution.

Toll facilities are, on average, three times more costly than traditional funding, and typically the toll fee is collected on top of the traditional taxes contributed by the trucking industry. At the average toll rate per mile of 45.0 cents, 100 miles of travel might cost as much as $45.00. If 100,000 miles were driven annually at this per-mile toll rate, the annual cost would be approximately $45,000. Again, this would be over and above the traditional taxes and fees collected from each –truck – bringing the hypothetical annual cost to nearly $60,000.

Trucking paid $4.2 billion in 2018 towards the 21 toll facilities assessed in this analysis. Nearly half (48.2%) of these funds were diverted away from the direct costs associated with providing use of the toll facilities. Thus it could be surmised that the trucking industry is overpaying for toll services by at least $2.0 billion every year at the selected locations. This rationally counters any argument that tolls are a true user pays system since the user is paying a significant cost beyond what is required for roadway provision.

APPENDIX A

Table A1: Large Networks Rated by Fitch

Turnpike	Senior Lien Rating	Volume	Price
Ohio Turnpike & Infrastructure Commission	AA	Stronger	Stronger
Florida Turnpike Enterprise (Florida DOT)	AA	Stronger	Stronger
Maine Turnpike Authority	AA-	Midrange	Stronger
Maryland Transportation Authority	AA-	Stronger	Stronger
Oklahoma Turnpike Authority	AA-	Stronger	Stronger
New Hampshire Turnpike System	A+	Midrange	Midrange
Pennsylvania Turnpike Commission	A+	Stronger	Midrange
New Jersey Turnpike Authority	A	Stronger	Midrange
ITR Concession Company LLC	BBB	Stronger	Midrange
Large Expressway	**Senior Lien Rating**	**Volume**	**Price**
Harris County Toll Road Authority	AA	Stronger	Stronger
Illinois State Toll Highway Authority	AA-	Stronger	Stronger
Metropolitan Highway System (MassDOT)	A+	Stronger	Midrange
Central Florida Expressway Authority	A	Stronger	Stronger
Miami-Dade County Expressway Authority	A	Stronger	Midrange
Monopolistic Bridge System	**Senior Lien Rating**	**Volume**	**Price**
Bay Area Toll Authority	AA	Stronger	Stronger
Delaware River Joint Toll Bridge Commission	A+	Stronger	Stronger
Triborough Bridge & Tunnel Authority	AA-	Stronger	Stronger

Table A2: Small Networks Rated by Fitch

Small Expressway	Senior Lien Rating	Volume	Price
Fort Bend County Toll Road Authority	A+	Midrange	Stronger
Richmond Metropolitan Authority	A	Midrange	Stronger
Central Texas Turnpike System	A-	Stronger	Stronger
South Jersey Transportation Authority	BBB+	Weaker	Midrange
International Bridge System	**Senior Lien Rating**	**Volume**	**Price**
Laredo Intl. Toll Bridge System	A+	Midrange	Stronger
Buffalo & Fort Erie Public Bridge Authority	A+	Midrange	Stronger
Cameron County Intl. Toll Bridge System	A	Midrange	Stronger
McAllen Int. Toll Bridge System	A	Midrange	Stronger
Stand-Alone	**Senior Lien Rating**	**Volume**	**Price**
Alligator Alley Toll Road (Florida DOT)	A+	Midrange	Stronger
Golden Gate Bridge Highway & Transp. District	A+	Stronger	Stronger
Rhode Island Turnpike & Bridge Authority	A	Midrange	Midrange
Mid-Bay Bridge Authority	BBB+	Weaker	Midrange
Chesapeake Transportation System	BBB	Midrange	Midrange
Rickenbacker Causeway	BBB+	Weaker	Midrange
E-470 Public Highway Authority	BBB+	Midrange	Stronger
Elizabeth River Crossings LLC	BBB	Midrange	Midrange
Foothill/Eastern Transp. Corridor Agency	BBB-	Midrange	Stronger
Kentucky Public Transp. Infrastructure Authority	BBB-	Midrange	Midrange
North Carolina Turnpike Authority	BBB-	Midrange	Midrange
San Joaquin Hills Transp. Corridor Agency	BBB	Midrange	Stronger
Toll Road Investors Partnership II, LP (Dulles Greenway)	BB+	Midrange	Midrange

APPENDIX B: Citations for Fiscal Year 2018 CAFR's Analyzed for the Core Analysis

1. "Comprehensive Annual Financial Report for the Years Ended December 31, 2018 and 2017". New Jersey Turnpike Authority. 2018.
2. "Financial Statements and Append Notes for the Year Ended December 31, 2018". The Port Authority of New York and New Jersey. 2019.
3. "Annual Financial Report". The Port Authority of New York and New Jersey. 2010.
4. "2018 Comprehensive Annual Financial Report for the Years Ended December 31, 2018 and 2017". Metropolitan Transit Authority. 2019.
5. "Financial Statements: December 31, 2018 and 2017". New York State Thruway Authority. 2019.
6. "Audited Financial Statements". New York State Thruway Authority. 2011.
7. "2018 Comprehensive Annual Financial Report". Maryland Transport Authority. 2018.
8. "Financial Statements: June 30, 2018". State of Delaware Department of Transportation. 2018.
9. "Transportation System Senior Revenue Bonds, Series 2017". Delaware Department of Transportation. 2017.
10. "Comprehensive Annual Financial Report for the Year Ended December 31, 2018". The Illinois State Toll Highway Authority. 2019.
11. "Comprehensive Annual Financial Report: Fiscal Years Ended May 31, 2018 and 2017". Pennsylvania Turnpike Commission. PA. 2018.
12. "Comprehensive Annual Financial Report: Fiscal Years Ended June 30, 2018 and 2017". Florida Turnpike System. 2018.
13. "Comprehensive Annual Financial Report for the Years Ended December 31, 2018 and 2017". Oklahoma Turnpike Authority. 2019.
14. "Basic Financial Statements for the Fiscal Year Ended February 28, 2018". Harris County Toll Road Authority Enterprise Fund. Texas. 2018.
15. "Comprehensive Annual Financial Report for the Fiscal Years Ended June 30, 2018 and June 30, 2017". Metropolitan Transportation Commission. California. 2018.
16. "Comprehensive Annual Financial Report for the Years Ended December 31, 2018 and 2017: A New Era Dawns on the Ohio Turnpike". Ohio Turnpike and Infrastructure Commission. 2019.
17. "FY18 Annual Report: Investing in the Future". Kansas Turnpike Authority. 2018.
18. "Supplemental Reports: July 1, 2017 – June 30, 2018". Kansas Turnpike Authority. 2018.
19. "Financial Statements with Supplementary Information". Kansas Turnpike Authority. 2010.
20. "Onward and Upward: 2018 Comprehensive Annual Financial Report". North Texas Tollway System. 2019.
21. "2018 Comprehensive Annual Financial Report for Year Ended December 31, 2018 and 2017". Delaware River Port Authority of Pennsylvania and New Jersey. 2019.

22. “CFX Momentum: 2018 Comprehensive Annual Financial Report”. Central Florida Expressway Authority. 2018.
23. “Comprehensive Annual Financial Report: Fiscal Years ended June 30, 2018 and 2017”. West Virginia Parkways Authority. 2018.
24. “Financial Statements for the Years Ended December 31, 2018 and 2017”. The Maine Turnpike Authority. 2019.
25. “Historical Traffic Trends and Toll Revenue”. The Maine Turnpike Authority. April 2019.
26. “2009 Maine Turnpike Authority Annual Report”. Maine Turnpike Authority. 2010.
27. “Chesapeake Bay Bridge and Tunnel District: Basic Financial Statements and Management’s Discussion and Analysis, Supplementary Information June 30, 2018 and 2017”. KPMG. 2018.
28. “Comprehensive Annual Financial Report for the Years Ended December 31, 2018 and 2017”. Delaware River and Bay Authority. 2019.

Appendix C: Example of Letter to Toll Authority CFO

Jeffrey Short
Vice President

October 25, 2019

Toll Representative
Director of Finance
ABC Toll Authority
100 Main St.
Anytown, USA 12345

Dear Toll Representative,

As you may know, the American Transportation Research Institute (ATRI) is the 501(c)3 not-for-profit research arm of the freight industry. Our Research Advisory Committee, which is comprised of freight firms, government agencies, academic institutions, labor groups and business associations, has requested that ATRI staff assess the impacts of toll systems on both infrastructure funding and trucking industry operations. An important task of this initiative is to collect and assess financial data associated with toll system operations.

The primary source of our toll system data are the CAFRs published annually by toll operators. In addition to these financial statements, we have utilized supplementary data available in government publications. Finally, in some instances we use GPS data to produce estimates, particularly for in-state versus out-of-state commercial vehicle percentages.

We are hoping you could review the attached tables that describe the findings of this assessment for Toll Authority ABC. If there are any numbers that you believe we should modify or update, please send your revisions to me via email, fax or mail by November 22, 2019.

Sincerely,

Jeffrey Short

ABC Toll Authority

Please review the following metrics from our 2018 fiscal year findings in the table below (Fiscal year ending June 30, 2018). Once you have reviewed, please document any corrections in the "ABC Corrections" column and return to Jeffrey Short via email, fax (770-432-0638), or mail to the address below before November 22, 2019:

American Transportation Research Institute (ATRI), c/o Jeffrey Short

	ATRI Findings	ABC Corrections
	Transactions by Vehicle Type	
Passenger	50,000,000	
Commercial	6,000,000	
	Revenue by Vehicle Type	
Passenger	$ 300,000,000	
Commercial	$ 100,000,000	
	VMT by Vehicle Type	
Passenger	500,000,000	
Commercial	45,000,000	
	In- vs Out-of-State	
% Commercial In-State Only	30.0%	
% Commercial Thru Traffic	20.0%	
% Commercial Interstate to/from State	50.0%	
	Collection Cost Metrics	
Highway Revenue	$ 500,000,000	
Cost of Toll Collection	$ 75,000,000	
% Collection	15%	
Facility Costs	$ 150,000,000	
Capital Costs	$ 80,000,000	
Depreciation	$ 70,000,000	
Captial Infusion	$ 10,000,000	
Nonoperating Revenue	$ 22,000,000	
Investment Income	$ 27,000,000	
Excess Revenue =(Total Revenue - Facility Costs - Capital Costs + Capital Infusion)	$ 280,000,000	
% Excess	56%	
Net Income = (Excess Revenue - Depreciation - Transfers out)	$ 100,000,000	
% Net Income	20.0%	
Transfers out	$ 110,000,000	
% of Revenue	22.0%	

Appendix D: Truck GPS Analysis Discussion and Methodology

As part of this analysis, ATRI utilized its Freight Performance Measures (FPM) truck GPS data set.

ATRI's GPS data is based on embedded GPS devices that "stay with the truck." In comparison to national samples, ATRI's truck GPS data set is slightly over-represented by medium- to large-fleets; slightly over-represented by the truckload sector; and over-represented by combination trucks.

In summary, ATRI's GPS data can be described as:

- Over-represented among truck tractors (e.g. 89% Class 7/8) in terms of U.S. DOT registrations.
- Well representative by operating sectors (e.g. 62% Truckload) based on Trucking Trends 2017.[49]
- Well representative by Fleet Size (e.g. 89 percent are small/medium-sized) based on U.S. DOT truck registrations.

[49] "American Trucking Trends 2017." American Trucking Associations. Arlington, VA. 2017.

Table A3: ATRI GPS Data Composition (2016)

	SOURCE						
	ATRI's FPM Data			VIUS		ATA/FMCSA/POLK	
		Trucks	Fleets	Trucks		Fleets	
Sector	TL/Private	62%	68%	TL	77.4%	TL	48.7%
	LTL	12%	5%	LTL	22.6%	LTL	1.5%
	Other	27%	27%	Other	-	Other	49.8%
	TOTAL	**100%**	**100%**	**TOTAL**	**100%**	**TOTAL**	**100%**
Fleet Size	Small (1-50)	16%	69%	1-5	59.0%	6 or fewer trucks	90.6%
	Medium (50-250)	27%	20%	6-10	11.3%	7-20	6.7%
	Large (250-1,000)	22%	7%	11-20	9.3%	More than 20	2.7%
	Very Large (1000+)	36%	3%	21-50	9.8%		-
	-	-	-	50+	10.6%	-	-
	TOTAL	**100%**	**100%**	**TOTAL**	**100%**	**TOTAL**	**100%**
Truck Type	Tractor / Truck	**89%**	86%	Tractor (Class 7-8)	68.7%	Tractor (Class 7-8)	50.4%
	Straight Truck	**11%**	14%	Straight Truck (Class 3-5)	31.3%	Straight Truck (Class 3-5)	49.6%
	TOTAL	**100%**	**100%**	**TOTAL**	**100%**	**TOTAL**	**100%**

*Not all totals equal 100 percent due to rounding.

Truck Trip Statistics Methodology

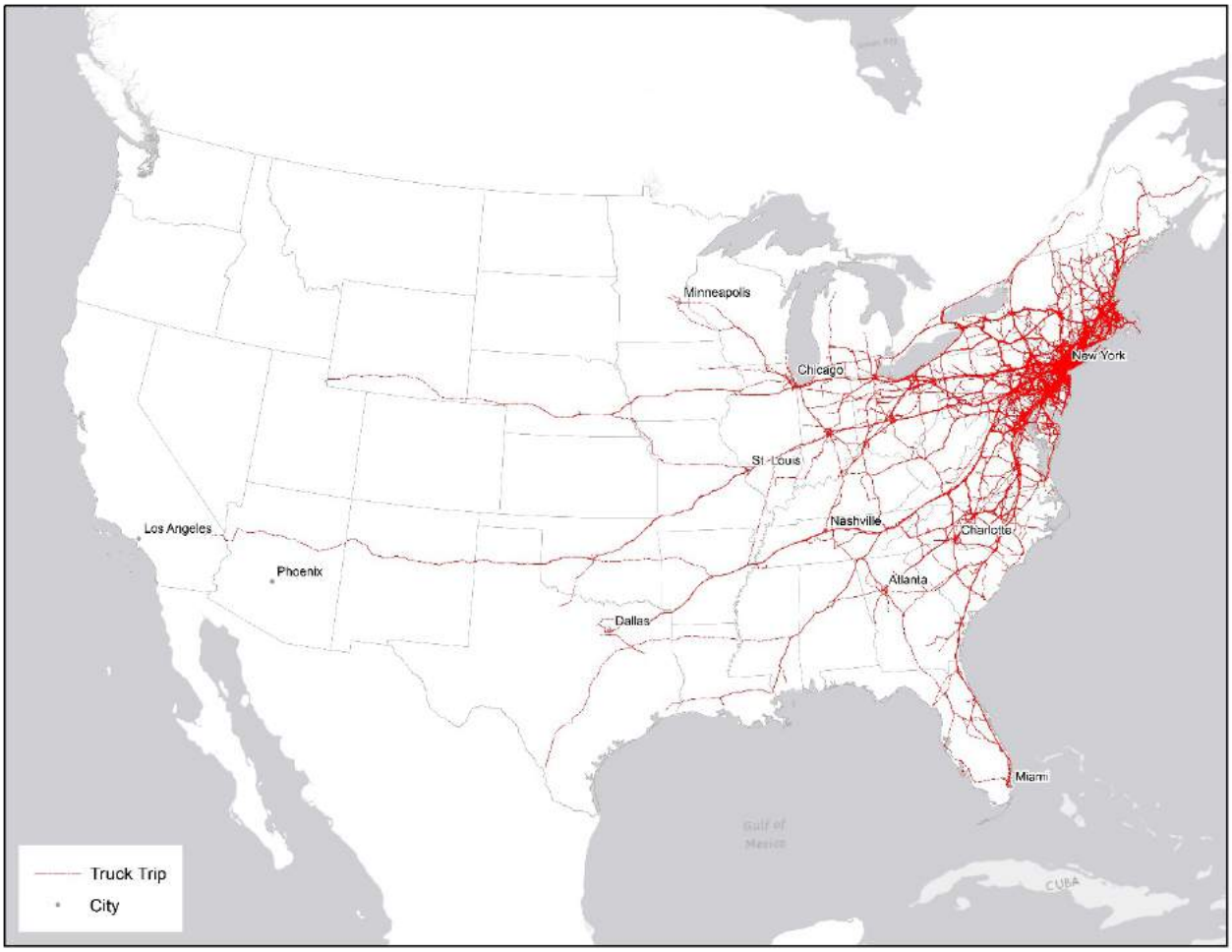
Data Preparation

A total of 21 toll facilities across the U.S. were analyzed with ATRI truck GPS data. The goal was to estimate the number of trips through a sample toll facility segment that were considered to be in-state trips, through trips, or trips consisting of one freight pickup or delivery related stop within the toll road state. To accomplish this task the research team chose sections of toll roads with limited or no exits and a section in which a truck would encounter a toll gantry. The majority of segments analyzed consisted of at least 10 miles of roadway, with the exception of tolls that involved bridges. GIS software and

files[50] were created for each segment of roadway and the data was selected from that roadway segment. Trucks that traversed any section of the toll road were then followed for three days (October 2, 2018 – October 4, 2018) in order to determine whether the trips of each truck were intrastate, through or single stops within the state of the toll authority.

Once the three days of data was compiled, GIS software was utilized to plot, via latitude and longitude, the truck GPS pings. These truck pings were then turned into lines by organizing each unique truck ID by the time stamp attached to each GPS ping record. This resulted in a series of lines that show a truck trip per unique truck, as seen in Figure D1.

Figure D1: Truck Trips that Utilized the George Washington Bridge



Once the individual truck GPS pings were converted to lines, intrastate trips could be determined by running a basic algorithm that defines which trips remained within the state of interest. In cases where a bridge crossed state lines, for example the George

[50] GIS software utilized: ESRI ArcMap

Washington Bridge between New Jersey and New York, both New Jersey and New York were considered in-state.

To estimate through trips, the start- and end-points of each trip were determined. Start/End locations that occurred within the state of interest were separately selected and utilized in sorting between through trips or one-stop trips. Trips with a start- or end-point within the toll authority state, were considered one-stop trips. While trips without a start or end within the state of interest, but traveled on the segment of roadway being analyzed were considered through trips.

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