

The Impact of Coronavirus on U.S. Toll Roads

I. Introduction

The COVID-19 pandemic has significantly altered the ways people work and travel. This is partly in response to state governments' restrictions to reduce the spread of the virus. In fall 2020, a domestic capstone team of four Master of Public Administration (M.P.A.) fellows at Cornell Institute for Public Affairs, working in consultation with Fitch Ratings, researched the impact of the pandemic on the use of toll roads in the U.S.

We organized the study as follows: Section II examines data and research approaches, Section III presents the results, and Section IV includes observations.

II. Data and Methodology

We were interested in three questions:

- Did the pandemic impact the usage of all public roads and toll roads differently in states that had varying levels of pandemic-related travel restrictions?
- Did the pandemic similarly impact the use of toll roads by passenger vehicles and commercial vehicles?
- Did the pandemic impact the average length of trips on toll roads?

We attempted to answer these questions using statewide monthly vehicle miles traveled (VMT) data collected by the U.S. Department of Transportation and monthly toll transaction data collected by toll road operators. We compared 2020 data with 2019 data (with 2019 being our baseline year).

Our study included five U.S. states; California, Florida, New Jersey, Pennsylvania, and Texas. We selected these states because they imposed varying levels of travel restrictions, with California and New Jersey implementing the more restrictive policies, Florida and Texas with less restrictive policies, and Pennsylvania implementing moderate policies. We provided more detailed definitions of low, moderate, and high restriction levels in the next section below.

Table 1 - Data Selection for Sample U.S. States

Travel Restriction	State	Name of Toll Road
Less Restrictive	Texas	• North Texas Tollway Authority
	Florida	• Florida Turnpike • Sunshine Skyway • Alligator Alley
Moderate Restrictive	Pennsylvania	• Pennsylvania Turnpike
More Restrictive	California	• Foothill/Eastern Toll Roads • San Joaquin Hills Toll Road
	New Jersey	• New Jersey Turnpike

Travel Restrictions: High

California imposed travel restrictions in March. The state ordered residents to stay at home except for essential needs such as food, prescriptions, and health care. The state also ordered nonessential businesses such as bars, gyms, dine-in restaurants, and convention centers shut down. In May, the state conditionally eased these restrictions.

In March, New Jersey placed restrictions on domestic travel for state employees and ordered the closure of all private and public schools, indoor shopping malls, and nonessential retail businesses until further notice. In May, Gov. Phil Murphy signed an executive order that allows schools to reopen for in-person activities and local businesses to restart their operations. For example, N.J. Turnpike and Garden State Parkway resumed collecting cash payment of tolls in May. In June, the state government required travelers from states with a high infection rate arriving in New Jersey to quarantine for 14 days.

Travel Restrictions: Moderate

In April, the Pennsylvania state government imposed a set of restrictions that required out-of-state travelers from areas with high rates of infection to self-quarantine for 14 days upon returning to Pennsylvania. Beginning in July, the state began to reopen, yet it put back travel restrictions in place in October due to a second outbreak.

Travel Restrictions: Low

In April, the Florida state government began implementing a series of policies to limit movement, such as work-from-home policies. These policies were effective in May, but the government later phased out the restrictions and reopened the state month by month. As of October, there are no statewide travel restrictions in Florida.

In March, Texas state and local governments imposed statewide restrictions on public gatherings and large group events, travel, business, and work. These restrictions impacted traffic volume (VMT) in Texas and toll transactions of the North Texas Tollway Authority (NTTA) through mid-March to late May.

Table 2 - Criteria of State Restriction Level

Restriction Level	Business	Face Mask	Stay-at-home policy	Quarantine Requirements for Out-of-state Travelers
Low	Mostly open	No restriction	No restriction	Only for travelers from a few high-risk states
Moderate	Mixed	Sometime required	Advisory	Only for travelers from designated high-risk areas
High	Mostly closed	Mandatory	Order/Curfew	14 days for all

For the first question, we looked at the monthly VMT in each subject state (which reflects the usage of all roads in a state) and monthly toll transactions (which reflect the usage of the toll roads). This allowed us to determine a) whether the pandemic similarly impacted all public

roads and toll roads and b) whether the usage of all public roads and toll roads reflected the severity of travel restrictions imposed by the states.

We used toll transactions data broken out into passenger and commercial vehicles for two of the subject toll roads. From our analysis, we were able to determine if the pandemic similarly impacted usage of toll roads by passenger vehicles and commercial vehicles. The same two toll roads also provided monthly toll revenue data, broken out into passenger and commercial vehicles. These toll roads base their toll rates on distance traveled; dividing toll revenue by toll transactions allowed us to determine the relative length of trips when we compared 2020 to our base year of 2019.

Table 3 - Data Availability

	TX	FL	PA	CA	NJ
VMT (Y2019 & 2020)	X	X	X	X	X
Toll Transactions (aggregate) - (Y2019 & 2020)	X	X	X	X	X
Toll Transactions - Passenger & Commercial (Y2019 & 2020)			X		X
Toll Revenues - Passenger & Commercial (Y2018 & 2019 & 2020)			X		X

To determine the impact of the pandemic on usage, we compared the traffic data of 2020 with the data from the same time period in 2019 (which was our base year). We divided the 2020 usage metrics by the 2019 usage metrics to arrive at a percentage of 2019 use. For example, a percentage of 80% indicates that 2020 was 80% of 2019.

III. Findings & Discussion

i. VMT Changes

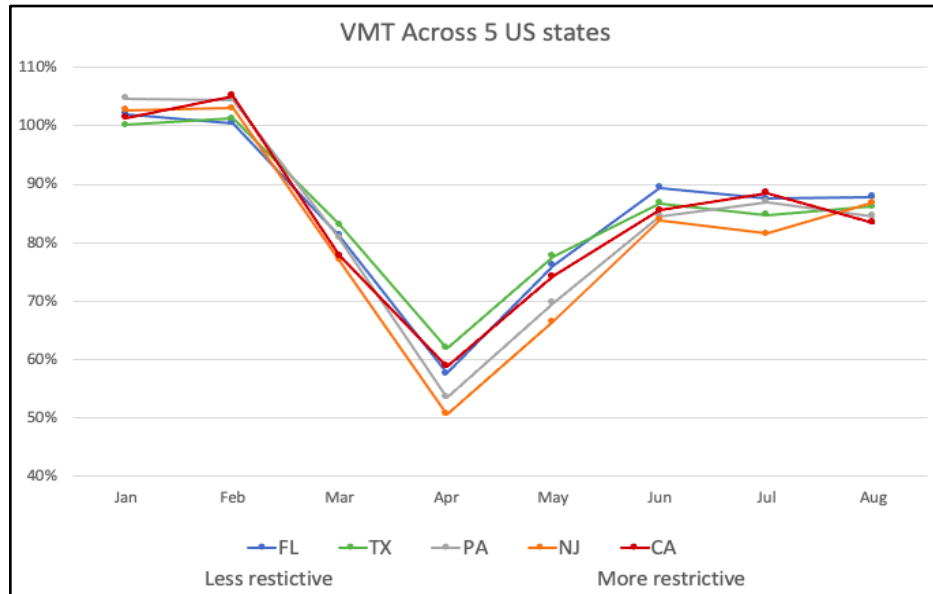


Figure 1 - VMT Comparisons across Five States

Figure 1 indicates the 2020 VMT percentage change in monthly VMT in California, Florida, New Jersey, Pennsylvania, and Texas compared to the same periods in 2019. Each of the states exhibited a similar pattern; a significant fall off usage and an equally significant recovery, albeit on back to approximately 85% of pre-pandemic (2019) levels.

The pandemic had less impact on the least restrictive states (Florida and Texas) than New Jersey and Pennsylvania which were more restrictive. California, however, did not follow the expected pattern.

ii. VMT vs. Toll Transactions

To answer the first research question, we compared VMT and toll transaction data by plotting them in one graph for each of the subject states. Here, VMT represents roads in general, and toll transactions represent toll roads.

a. Florida

We analyzed VMT and toll transactions from three of the main toll roads in Florida: (1) Florida Turnpike, (2) Sunshine Skyway, and (3) Alligator Alley. Florida Turnpike is the major statewide toll road. Sunshine Skyway, known as the Bob Graham Sunshine Skyway Bridge, is a regional toll road in Florida. It connects St. Petersburg, Florida to Terra Ceia. Alligator Alley is the Interstate 75 toll road in Florida state, running from Miami Lakes border to Sault Ste. Marie in the Upper Peninsula of Michigan mainly along the coast and used by tourists.

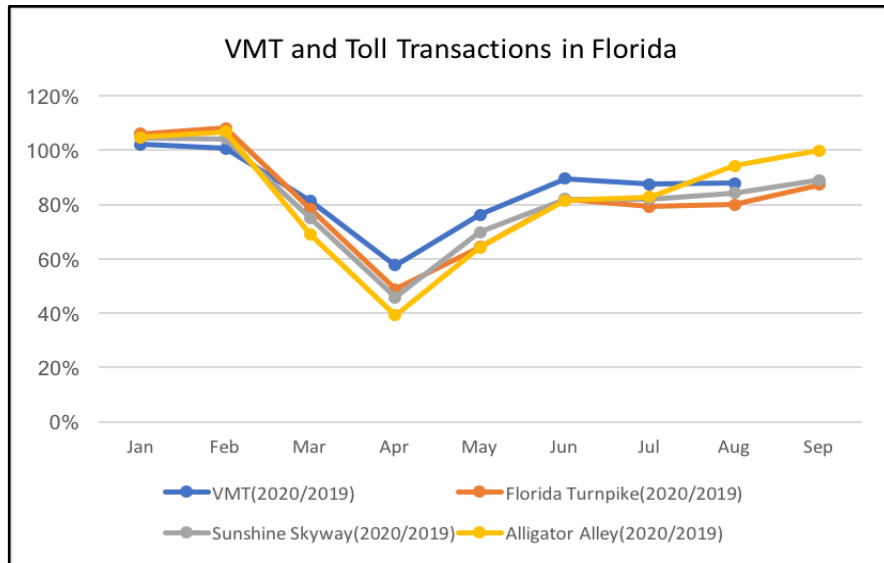


Figure 2 - VMT and Toll Transactions in Florida

Based on our data, the pandemic had more impact on the three toll roads in Florida than roads in general. After the outbreak of COVID-19, VMT and all three toll roads suffered a significant decrease from February to April. Both VMT and toll transactions recovered from April 2020 to June 2020, with the pace of recovery slowing since June 2020. These trends were consistent with the implementation and elimination of travel restrictions in Florida by the state government. We also found that among three toll roads, Alligator Alley, a road more heavily traveled by tourists, suffered the largest decrease during the pandemic.

b. Texas

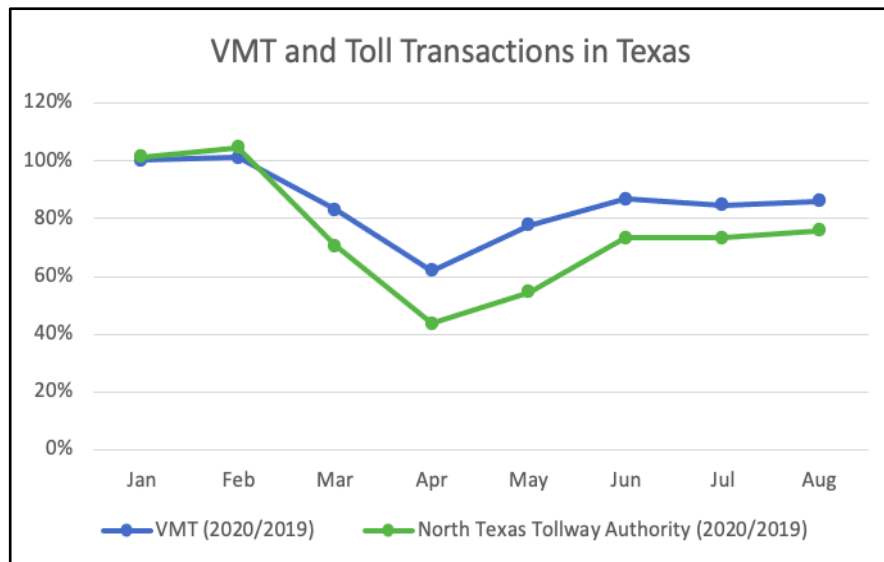


Figure 3 - VMT and Toll Transactions in Texas

Figure 3 also indicates that the pandemic had a greater impact on the North Texas Tollway than general roads in Texas.

c. Pennsylvania

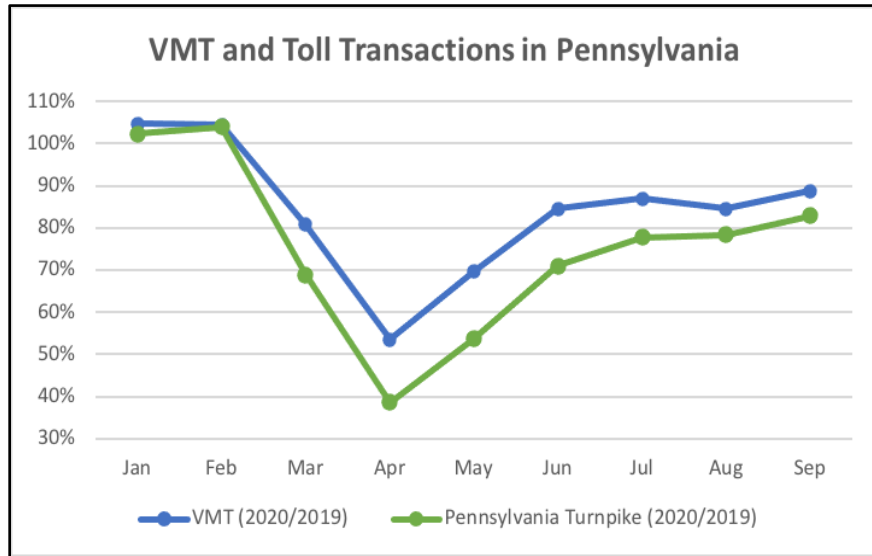


Figure 4 - VMT and Toll Transactions in Pennsylvania

Figure 4 shows that the pandemic had significantly more impact on the Pennsylvania Turnpike usage than statewide VMT.

c. California

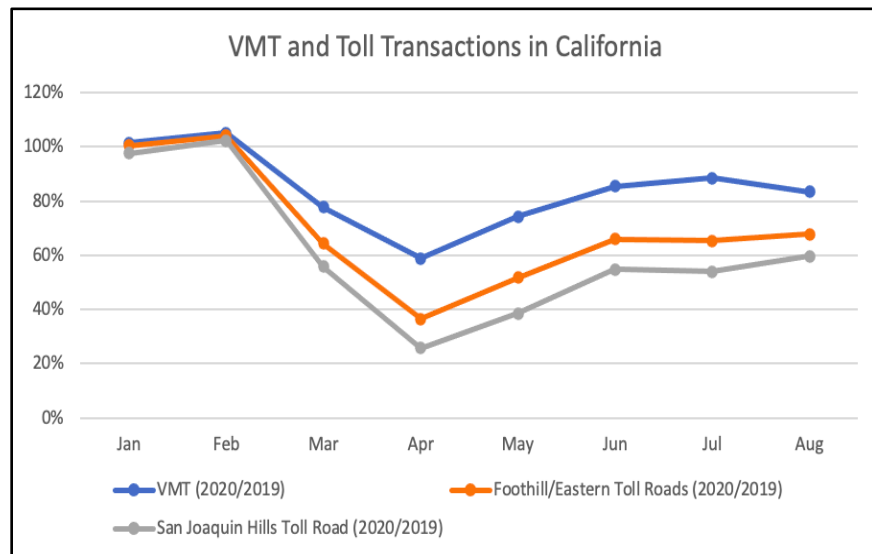


Figure 5 - VMT and Toll Transactions in California

Figure 5 shows that the pandemic had more impact on the two toll roads than general roads in California. The state’s travel regulations resulted in a reduction in both VMT and toll transactions.

d. New Jersey

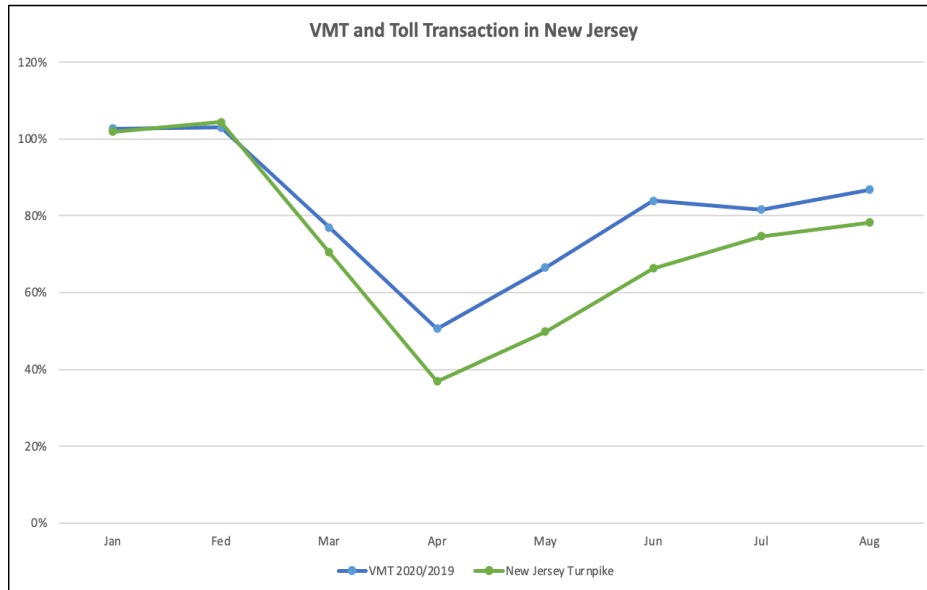


Figure 6-VMT and Toll Transactions in New Jersey

Like the previous four subject states, Figure 6 also shows that the pandemic had more impact on the toll road than roads in general. The pandemic caused a sharp reduction in road traffic in March and April. Then starting from April, VMT and toll transactions began to recover. However, the gap between VMT and toll transactions had scarcely narrowed.

Table 4 - Summary of Each State's VMT % & Toll Transaction %

Travel Restriction Level	State		Lowest Point	August 2020
High	NJ	VMT	51% (April)	88%
		Toll Transactions (TX) New Jersey Turnpike	36% (April)	79%
	CA	VMT	59% (April)	83%
		Toll TX Foothill/Eastern Toll Roads	37% (April)	68%
		San Joaquin Hills Toll Road	26% (April)	60%
Moderate	PA	VMT	53% (April)	84%
		Toll TX Pennsylvania Turnpike	39% (April)	78%
Low	TX	VMT	62% (April)	86%

		Toll TX	North Texas Tollway Authority	44% (April)	76%
	FL	VMT		59% (April)	89%
		Toll TX	Florida Turnpike	50% (April)	80%
	Sunshine Skyway		48% (April)	85%	
	Alligator Alley		40% (April)	95%	

In conclusion, it appears that in all states, the pandemic had more adverse impact on usage of toll roads than roads in general (Table 4). All five states experienced the most drastic decline in both VMT and toll transactions in April. The rate of recovery became gradually stable as the states implemented strict statewide travel restrictions. Even by August, the 2020 VMT and toll transactions did not reach the same level as 2019.

iii. Toll Transactions by Vehicle Type

We obtained data for the Pennsylvania and New Jersey Turnpikes' toll transactions by vehicle type to answer the second question, i.e., what was the impact of the pandemic on different classes of vehicle users.

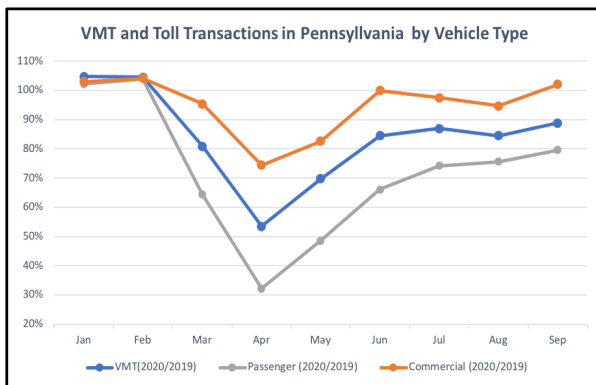


Figure 7 - VMT and Toll transactions in Pennsylvania by Vehicle Type

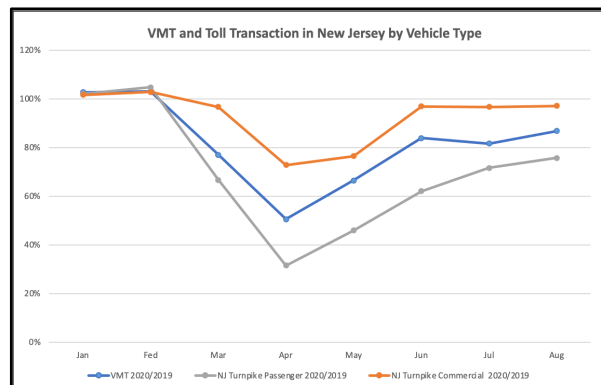


Figure 8 - VMT and Toll Transactions in New Jersey by Vehicle Type

In both states, we found that the pandemic had a much more severe impact on passenger vehicle transactions on toll roads, compared to commercial vehicle transactions (Figure 7 & 8).

iv. Average Distance Travelled on Toll Roads by Vehicle Type

We used toll revenue data from the Pennsylvania and New Jersey Turnpikes to demonstrate whether the pandemic impacted the average length of trips on toll roads. We used an average revenue/transaction as an indicator of the average travel length for passenger or commercial

vehicles. The toll is calculated according to the distance travelled on the toll road. Considering that there was no significant toll rate increase during the year 2020, a decrease in revenue/transaction implies shorter trips on toll roads occurred during a specific time period.

a. Pennsylvania: Travel Distance by Vehicle Type

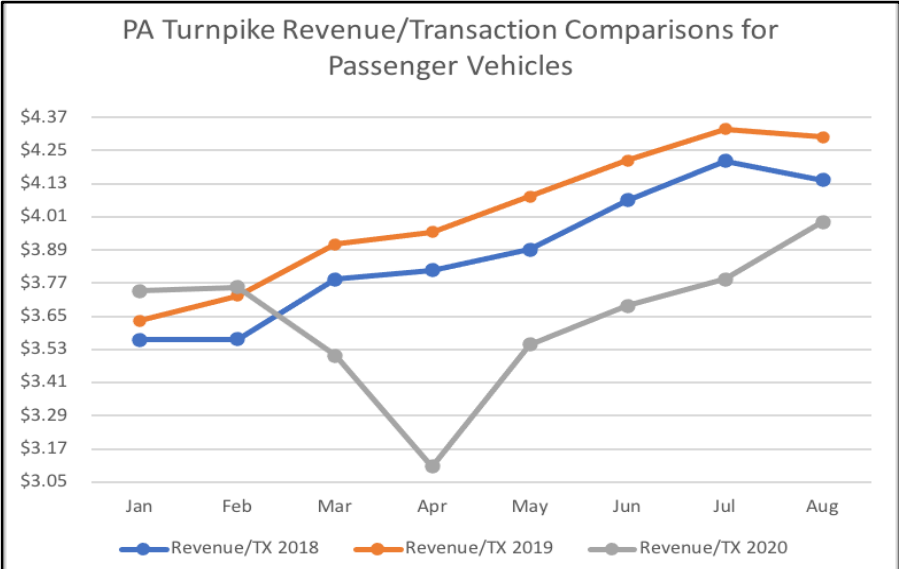


Figure 9 - PA Turnpike Revenue/Transaction Comparisons for Passenger Vehicles

Figure 9 shows the average revenue per passenger vehicle transaction from January to August for the years 2018, 2019, and 2020. The graph shows that one of the major consequences of the pandemic was shorter passenger trips on the Pennsylvania Turnpike.

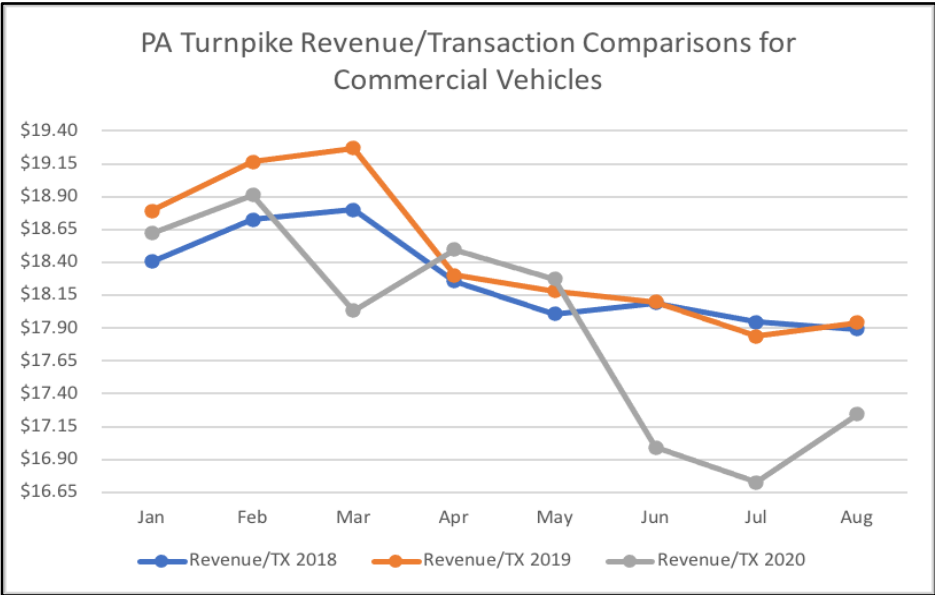


Figure 10 - PA Turnpike Revenue/Transaction Comparisons for Commercial Vehicles

The revenue/transaction for commercial vehicles is much more complicated compared to the passenger vehicle. The toll revenues for trucks are a function of the travel miles, the truck's weight, and number of axles. Hence the revenue/transaction for commercial vehicles may not be a good estimator of the average length of each trip.

b. New Jersey: Travel Distance by Vehicle Type

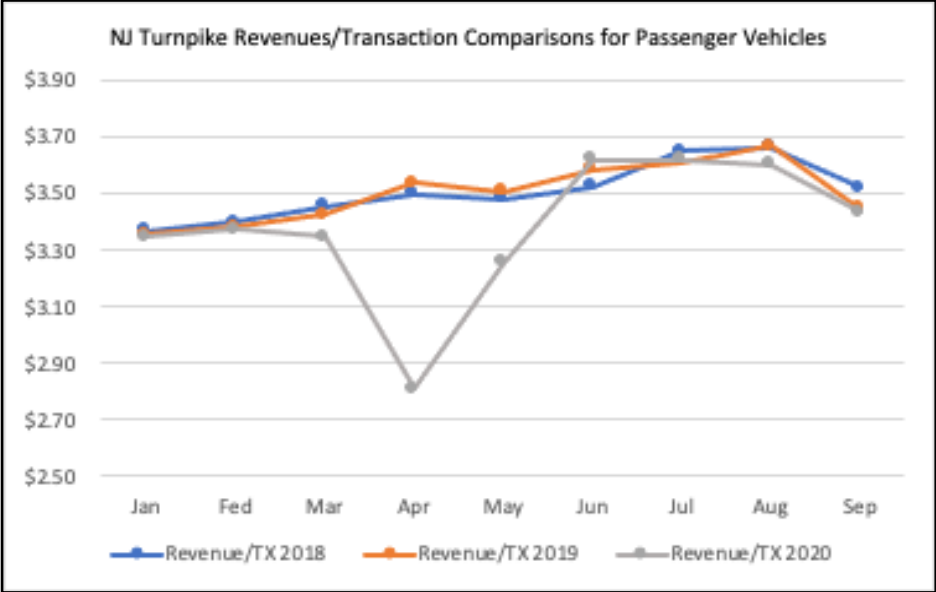


Figure 11 - NJ Turnpike Revenues/Transaction comparisons for passenger vehicles

As shown in Figure 11, we found a significant decrease in the distance traveled for passenger vehicles from March to April 2020 when New Jersey started ordering people to stay home to limit the spread of the coronavirus.

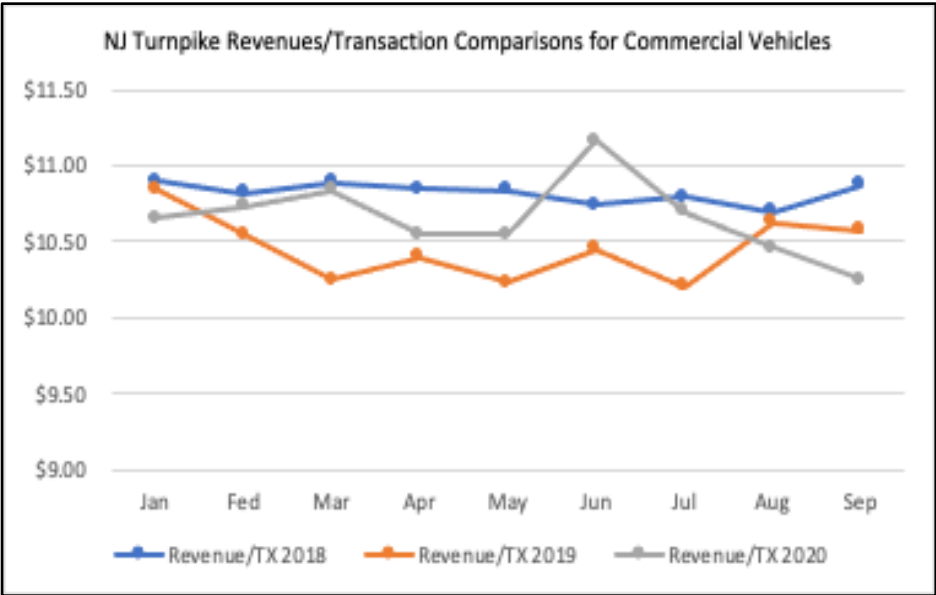


Figure 12-NJ Turnpike Revenues/Transaction comparisons for commercial vehicles

Like Pennsylvania, tolls for commercial vehicles are associated with the distance traveled and other factors, such as the height of the vehicle and the total number of axles of a vehicle, compared to passenger vehicles. Thus, the average revenue/transaction may not completely estimate the distance traveled of commercial vehicles.

IV. Conclusions

We focused on answering three questions: (1) Did the pandemic impact the usage of all public roads and toll roads differently in states that had varying levels of pandemic-related travel restrictions? (2) Did the pandemic similarly impact the usage of toll roads by passenger vehicles and commercial vehicles? (3) Did the pandemic impact the average length of trips on toll roads? Our study selected five states with different levels of restrictions for data analysis.

Our research showed that in terms of toll road usage, the early stages of the pandemic, nationwide stay-at-home restrictions significantly impacted road usage. With subsequent differences in policy by each state since April, there has been some recovery in the usage of toll roads. The data for these five states, both VMT and toll transactions, showed a similar trend that started with a dramatic decline after February, reached the lowest point in April, and then picked up rapidly from May and slowed to a crawl by July.

Concerning the first question, as shown in Table 4, we found that the pandemic significantly impacted usage on all roads, including toll roads, both in terms of timing and magnitude of pandemic-related travel restrictions. The recovery was quick, but usage remained at a lower level than in 2019. The impact on toll roads appeared to be greater than roads in general, and the recovery had not been as robust. States, except California, with less severe restrictions appeared to have experienced a smaller impact on road usage.

Regarding the impact on the usage of toll roads by vehicle type, our analysis showed that the pandemic had a significantly greater impact on the usage of toll roads by passenger vehicles than commercial vehicles.

Lastly, we found that the pandemic caused the length of passenger trips on toll roads to be shorter. However, further research is needed to determine commercial vehicle trip length.

It is imperative for planners to make deliberate investments that will allow toll road operators to rebound effectively after the pandemic. For example, planning future transportation/infrastructure projects by considering the new patterns of mobility and remote lifestyle will help toll road operators recover from the financial crisis, instead of merely extending roads to alleviate traffic congestion.

1. References

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2. Data Sources

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Florida Turnpike, Alligator Alley, and Sunshine Skyway: <https://www.sbafla.com/bond/Financial-Information/Revenues-and-Estimates>

Foothill / Eastern and San Joaquin Hills: <https://thetollroads.com/about/investor/transactions>

New Jersey Turnpike Authority: <https://www.njta.com/investor-relations/traffic-revenue>

North Texas Tollway Authority: https://www.ntta.org/whatwedo/fin_invest_info/financial_Info/Pages/Financial-Information.aspx

Pennsylvania Turnpike: https://www.paturnpike.com/business/investors_fcr.aspx