

Truck Tolling: Understanding Industry Tradeoffs When Using or Avoiding Toll Facilities

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Abstract

This report presents the findings of a study to determine the value that shippers, trucking companies, and truck drivers seek from toll roads. To execute this research, a profile of the trucking business was developed, inclusive of shippers, trucking companies, and third party logistic service providers. Then, a research team conducted interviews with these businesses and distributed an internet survey to a broad array of industry representatives to gather statistically valid findings of their willingness to pay for toll roads, given specific parameters for the value they would receive in time savings. There were 965 respondents to the internet survey and more than 200 interviews which followed a common format also suitable for statistical analysis. In completing the surveys, truck drivers stated an extremely low willingness to pay even a token toll for different time savings scenarios. The research found that because respondents had such overwhelmingly negative attitudes about toll roads, they were not able to ascribe a true value to the benefits that toll roads provide. Where some drivers did express a willingness to pay for toll roads, the reasons seemed to be that they were familiar with toll roads or could clearly see the time savings benefits of a toll road in certain situations. The broad conclusion was that toll roads are viewed negatively because a large cross section of the trucking business cannot monetize toll road benefits.

Executive Summary

There is a long history of using tolls to finance roads, bridges and other infrastructure. In America, toll road financing diminished in the 1950s, in favor of using fuel taxes to fund the Interstate Highway System and other freeway/expressway facilities. Toll road financing has reemerged in recent years, due in part to severe limitations of these fuel tax revenues.

While toll financing offers a way to finance critical infrastructure in lieu of fuel tax revenue, shippers and the trucking industry represent some of the most ardent critics of toll road finance. There have been forums sponsored by the Transportation Research Board and the Federal Highway Administration to build understanding of toll road financing and the views of the trucking industry. This research project was sponsored to foster a further understanding of trucking industry's tradeoffs when using or avoiding toll facilities.

The objective of this research is to identify the value that goods movement businesses seek from the transportation roadway network and their willingness to pay tolls for that value. To explore this objective, the research team developed a classification of the primary "actors" in the trucking transaction, including shippers, trucking companies, and truck drivers. Further, the trucking business was classified by different attributes, such as the type of trucking services. These parameters are described below.

Position in the Trucking Transaction

- Driver (representing the employee who has the primary interface and decision with tolling)
- Dispatcher/fleet manager (representing management)
- Shipper/receiver/third-party logistics agent (3PL): representing the cargo owner, and/or the entity that arranges freight transportation, including cost and service parameters, and possibly accessorial charges such as for fuel and tolls.

Type of Trucking Service

- Local delivery
- Drayage
- Specialized
- Local LTL
- Private Fleet TL
- For hire TL, Carrier/contract
- For hire TL, self employed Owner Operator

Other Factors

- Toll reimbursement policies
- Party responsible for trip routing (owner, dispatcher, driver)
- Industry Tenure
- Typical Haul Mileage

- Typical Driving Environment
- Opportunity/Familiarity with Toll Roads

To execute this research project, three primary modes of data collection were used: 1) extensive literature review and outreach to leaders representing trucking companies, shippers, and third party logistics providers. This outreach provided insight and helped to develop survey instruments for the next phases of data collection; 2) an electronic web based survey was distributed to a broad range of trucking industry and shipper interests; 3) truck drivers were interviewed at industry trade shows.

Findings

The research effort gathered data points from more than 1,000 individual surveys, plus structured interviews with carriers, third party logistics companies, shippers and truck drivers. The findings were overwhelmingly negative across all strata of the trucking industry: there is not a single segment of the trucking industry which showed any positive attitudes about toll roads or the benefits they might offer, either in congestion relief, time savings or reduced shipping cost.

The negative opinion of toll roads and tolling as a finance method were so strong, it was determined that some respondents are “principled objectors” to toll roads, meaning that their passionate opinions could affect their attitudes about using toll roads. This passion is reflected in the overwhelming agreement to the following statements:

- “Toll roads are too expensive”
- “Toll roads exist mainly to make money for the government”
- “Toll roads are too expensive for what they provide”
- “I avoid toll roads whenever I can”

Conversely, there was overwhelming disagreement with these positive statements about toll roads:

- “Toll roads are a more fair way of funding maintenance and construction”
- “Toll roads help drivers comply with hours of service rules”
- “Toll roads improve on time performance”

While it is simplistic to state that “truck drivers do not like toll roads,” the finding was stated so passionately that it colored all other research findings. The “willingness to pay” survey construct, for example, sought to examine the elasticity of toll prices for three typical truck driving scenarios, which provided time and cost savings. Overwhelmingly, the vast majority survey respondents expressed an unwillingness to pay any toll for various time and cost saving scenarios. Thus the research method could not identify a particular segment of the trucking industry which is more likely than another to pay tolls.

Research revealed a few instances where certain types of truckers, trucking operations, or other attributes, provided some more likelihood to use toll facilities. A “familiarity” with toll roads (drivers with the opportunity to use a toll road more than 10 percent of the time) showed some willingness to pay a toll; and in a congested urban situation, both dispatchers and drivers expressed willingness to pay

for the time savings offered by a toll facility. These findings provide an opportunity to expand the understanding of toll road benefits, leveraging users who are already familiar with toll facilities.

Shippers received particular emphasis in the interview and outreach portion of this research, even though they did not respond to the internet survey in significant numbers. Shippers generally expressed no interest or involvement in a trucking company or driver's decision to use toll roads, even though the shipper would ultimately be paying for toll charges (theoretically) in the freight charges for a shipment. Rather than taking interest in toll road charges or dictating whether or not to use toll roads, shippers expressed that they simply wanted a rate quote for their freight shipment, given the service parameters they specified, and have all accessorial charges (such as tolls) included in the rate quote. Shippers did not care whether or not a toll was included in the rate quote. If there was any opposition from tolls expressed by the shipping community, it was that they wanted rates to be all inclusive, and minimize accessorial charges, like tolls, which had to be accounted for separately.

Conclusions

Trucker's perceptions of the value of toll roads is likely a direct reflection of the nature of their system of compensation, particularly toll road reimbursement, or lack thereof. For a great many drivers, there is no reimbursement for tolls paid "out of pocket" and those toll costs cannot be passed on to a shipper or third party broker.

There are trucking companies that can assess toll costs and evaluate the costs and benefits of using tolled routes. These are likely larger carriers, with company drivers that are reimbursed for their tolls.

On the other hand, there is a vast population of smaller trucking firms and independent owner-operators, who seek loads from brokers on an ad hoc basis. For this population, the choice of using a toll road is not just time savings, but the ability to monetize those time savings. In other words, if payment is being made by the mile or by the load, is time savings worth anything to the individual driver? Depending on the length of haul and driver's hours of service limits, even a large time savings (e.g., one hour) might not have value to a driver, if that driver cannot otherwise productively use that hour of time savings for another customer.

Public policymakers should also be mindful of the cost of truck tolls compared to drivers' wages. From an academic perspective, the toll road decision is a straightforward cost/benefit calculation, where the cost-per-hour of truck operation (capital depreciation, driver wages, and other variable costs) clearly justifies the time savings of a toll road alternative. From the perspective of a truck driver, a trip on toll roads between Chicago and Philadelphia could incur toll charges of about \$238 for the trip. With two trips per week, toll charges could easily exceed \$800. If one considers the average salary for a truck driver being \$35,000 to \$50,000 annually, the out of pocket cash burden of toll charges is a very real issue, whether or not the driver receives reimbursement.

Possible Options

The research findings highlight the depth of passionate opposition to truck tolls, perhaps more clearly than surmised at the beginning of the effort. Policy makers will face opposition from the trucking industry in any discussion of expanded toll finance policies, or individual toll road proposals.

The least resistance to truck tolls come from where truck toll facilities make intuitive sense to the trucking industry—either through the clear and convincing identification of time savings, and/or where the toll facility offers a clear value proposition; e.g., allowing longer combination vehicles, or heavier loads, as opposed to tolling existing capacity.

Even where the value proposition of toll facilities can be clearly demonstrated, policy makers will face opposition from truck drivers who have a “principled objection” to tolling.

To address such principled objection, or otherwise ease the industry into a greater acceptance of toll roads, a state department of transportation or toll authority might seek greater flexibility in charging commercial vehicles. Some options could include:

- Being as flexible as possible in charging trucks for tolls, such as through the free distribution of transponders; ease of creating an account with the toll authority; and flexibility in payment terms.
- For new toll facilities, developing a multi-year (for example, 10 year) “ramp up” period for truck tolling, where trucks are first charged no tolls to use the facility, but tolls gradually increase over time to develop the trucking industry’s experience and acceptance of tolling. The public sector could subsidize such a “ramp up” period through availability payments.
- Cross subsidies between automobiles and commercial trucks. While economic cross subsidies are anathema to many economists and policy makers, there may be other public considerations (such as congestion and safety of parallel routes) that make a cross subsidy more palatable.

Chapter 1 Background

An economic rationale has long been made for the use of tolls as a funding mechanism for roadways, bridges, and tunnels in the United States. Additionally, tolling is advocated as a means of allocating scarce roadway capacity among users and achieving an array of other policy and environmental objectives. Toll facilities can improve traffic flow along congested corridors and facilities and raise new revenue for investment in transportation infrastructure and services. However, significant concerns remain among key stakeholders regarding the value of tolling.

Goods movement businesses (trucking companies, shippers, and receivers) represent some of the most ardent critics of using tolls to address the nation's congestion, environmental, and roadway transportation infrastructure needs. As the national discussion of transportation investment and financing needs progresses, particularly in light of congressionally-established commissions to address such issues, research was needed to understand how goods movement businesses assess tradeoffs in using or avoiding tolled facilities. Recent TRB forums that brought advocates and analysts of tolling together with trucking industry representatives highlighted the lack of understanding by advocates and analysts of the business of trucking. Some interviews with freight stakeholders have been conducted through FHWA and are documented in Issues and Options for Increasing the Use of Tolling and Pricing to Finance Transportation Improvements, Final Report, Work Order 05-002, prepared for FHWA Office of Transportation Policy Studies, June 9, 2006.

This research project, "Truck Tolling: Understanding Industry Tradeoffs When Using or Avoiding Toll Facilities" (Jointly Funded as NCHRP Project 19-09), was sponsored to foster a further understanding of industry tradeoffs when using or avoiding toll facilities.

NCHRP 19-09 Research Objective

The objective of this research is to identify the value that goods movement businesses seek from the transportation roadway network and their willingness to pay tolls for that value.

Hypothesis

The goods movement industry is not homogeneous. Shippers, third party logistic service providers, and trucking companies have some influence over "who pays the freight" and how. Trucks and drivers can be operated by a company for hauling its own products (i.e., a private fleet); "for hire" carriers are trucking companies (for example, Schneider, Swift) that haul cargo for other businesses; and the trucking industry can further be classified by the type of transportation services they provide, such as truckload, less-than-truckload/parcel, drayage and specialty.

The hypothesis of this research is that by classifying the trucking business in a number of dimensions, a "willingness to pay" tolls could be established for each of a number of actors in the trucking transaction. Shippers and third party logistics providers were identified as other sectors to examine, to determine their willingness to pay tolls or influence over a trucking company's decision to use or avoid toll facilities.

This research considered the following factors that might impact the willingness to pay tolls.

Position in the Trucking Transaction

- Driver: representing the employee who has the primary interface and decision with tolling
- Dispatcher/fleet manager: representing a truck driver's manager, who would direct a driver to use or avoid a toll route
- Shipper/receiver/third-party logistics agent (3PL): representing the cargo owner, and/or the entity that arranges freight transportation, including cost and service parameters, and possibly accessorial charges such as for fuel and tolls.

Type of Trucking Service

- Local delivery
- Drayage
- Specialized
- Local LTL
- Private Fleet TL
- For hire TL, Carrier/contract
- For hire TL, self employed Owner Operator

Other Factors

- Toll reimbursement policies
- Party responsible for trip routing (owner, dispatcher, driver)
- Industry Tenure
- Typical Haul Mileage
- Typical Driving Environment
- Opportunity/Familiarity with Toll Roads

Methodology

To examine the research hypothesis, the research team utilized three primary research methods. The first was a literature review and telephone interviews with trucking companies, 3PL's, and shippers to determine their attitudes about tolling and factors that would influence their use of toll facilities. Information derived from this research helped to shape the instrument used for the web-based survey and personal surveys at industry trade shows.

The second research method was a survey, distributed through a project website, which examined respondents' attitudes toward toll roads and willingness to pay for them. The survey was publicized through industry trade newsletters, social media websites, and state trucking associations.

The third research method involved conducting short, personal interviews at trucking industry trade shows in Charlotte, North Carolina and Dallas, Texas.

The three modes of research used standard definitions of the trucking business and types of trucking operations. Since they used different survey approaches, the data could not be combined into one database for statistical analysis. Rather, statistical analysis was performed where appropriate to the data, and from these analyses, a narrative was developed to address the research objective.

Profile of Businesses that are Involved in Toll Decision Making

Transportation policy makers tend to view trucks or the trucking industry as homogeneous, but in fact the industry is tremendously varied, and a profile was required to help examine the factors that influence different industry segments' rationale in making decisions to use or avoid toll facilities. Since the trucking industry is in fact heterogeneous, a classification of the different types of trucking firms and customer-carrier relationships is instrumental in identifying the "willingness to pay" for tolls.

Business Classifications

The research team examined the common types of businesses involved in trucking transactions, and then interviewed a sample of those businesses, to investigate their decisions involving fleet routing and the decision to use or avoid toll roads. For purposes of this exercise, the research team considered the following "stakeholders" in the trucking transaction:

- Shippers
- Private Fleet Truck Operations
- For-Hire Truckload Companies
- For-Hire Less Than Truckload (LTL) Trucking Companies (includes Parcel, Express)
- Drayage/Cartage Companies
- Brokerage/Third Party Logistics Companies
- Specialized Trucking Companies

While this classification is helpful to the discussion, note that there are a number of cases that defy the classification; for example, independent owner-operators are involved in almost every industry segment, augmenting company drivers for a private fleet, for example, or hiring out as small truckload operators. Although exceptions to this industry classification are inevitable, the classification allows for deeper understanding of the factors involved in using or avoiding toll facilities.

It is also instructive to consider the size of the U.S. truck fleet. While trucking conjures images of five-axle semi tractor-trailers, the fleet is diverse in terms of the size of trucks and their configuration. Table 1 below provides statistics on the U.S. truck inventory based on Census data (2002).

Table 1: U.S. Truck Vehicle Inventory, 2002

	Thousands of Trucks	Gross Vehicle Weight Rating	Examples		
Light Trucks					
Less than 6,001 lb	62,617.3	Class 1	Full Size Pickup, Minivan, SUVs		
6,001 to 10,000 lb	17,142.3	Class 2	Crew Size Pickup, Full Size Pickup, Minivan, Step Van, Utility Van		
Medium Trucks					
10,001 to 14,000 lb	1,142.1	Class 3	City Delivery, Mini Bus, Walk-In		
14,001 to 16,000 lb	395.9	Class 4	City Delivery, Conventional Van, Landscape Utility, and Large Walk-In		
16,001 to 19,500 lb	376.1	Class 5	Bucket, City Delivery, and Large Walk-In		
Light-heavy Trucks					
19,501 to 26,000 lb	910.3	Class 6	Beverage, Rack, School Bus, Single Axle Van		
Heavy Trucks					
26,001 to 33,000 lb	436.8	Class 7	Furniture, High Profile Semi, Medium Semi Tractor, Refuse, Tow, City Buses		
33,001 to 40,000 lb	228.8				
40,001 to 50,000 lb	318.4				
50,001 to 60,000 lb	326.6				
60,001 to 80,000 lb	1,178.7			Class 8	Cement Mixer, Dump, Panel, Fire, Tanker, Heavy Semi Tractor, Refrigerated Van, Semi Sleeper
80,001 to 100,000 lb	68.9				
100,001 to 130,000 lb	26.4				
130,000 lb or more	6.3				
Total, Class 3 - 8:		5,415.3			
Notes: Average vehicle weight is the empty weight of the vehicle plus the average load of the vehicle; excludes vehicles owned by Federal, state, or local governments; ambulances; buses; motor homes; farm tractors; unpowered trailer units					
Source: U.S. Census Bureau, 2002 Economic Census: Vehicle Inventory and Use Survey: United States, EC02TV-US (Washington, DC: 2004).					

Shippers

The trucking transaction begins with a shipper: the manufacturer or value-added producer of products, shipments from a warehouse, shipments from a port, or shipments from an intermodal facility. The shipment could be carried by a company's own trucking fleet, or carriage could be contracted to a for-hire trucking company on a contract basis.

The terms of sale in a trucking transaction determine which party pays for transportation costs. "FOB Origin" or "FOB Destination," for example, indicates that the price of the shipper's product includes delivery at the shipper's expense to a specified point. This designation determines the responsibility and basis for the payment of freight charges, as well as the point at which the ownership of cargo passes from seller to buyer. With many variations, the two main terms of sale are:

- FOB Origin: the buyer pays the freight charges and assumes title to the cargo upon pickup from the seller.
- FOB Destination: the seller pays the freight charges and owns the cargo until delivery to the buyer.

Large shippers tend to control the terms of transportation due to the savings they can negotiate based on large volumes and economies of scale.

Three shippers were interviewed to investigate the treatment of truck tolls in their transportation contracts. One company is a major supplier to a large fast food restaurant chain; one company is a multi-national baker of cookies and snack crackers; and one company is a large retailer catering to small markets in the Upper Great Plains states. None of these shippers had any provisions to recognize tolls in their contracts; information on toll charges was not collected, and toll charges were not reimbursed as a separate line item in their freight contracts.

With freight contracts silent on tolls, the implication is that shippers feel that the route selection and the hands-on knowledge of tolling charges is a responsibility of the carrier, leaving the decision on routing (and toll road avoidance) to the carrier. The more prominent concerns of the shipper are reliability and cost; shippers specify the parameters of service they need (e.g., delivery windows) and seek the best cost from competing carriers. To the extent toll roads are part of the routing, toll charges become part of the price, and the shipper is unaware if the price does or does not include tolls.

Private Fleet

Private fleet operations typically refer to a fleet of trucks owned and operated by a company to carry out their primary business; for example, Wal-Mart or Safeway. Private fleets typically operate both Truckload (TL) and Less than Truckload (LTL) operations. Safeway might deliver one trailer to one store (TL) or have a driver make stops at several stores delivering a specific commodity (LTL). In the case of produce, the load would possibly be considered specialized, since a refrigerated trailer would be used. Firms with private fleets have chosen to take control of their own trucking services rather than use the services of for-hire motor carriers, often as a way of increasing reliability and service for regular route customers.

Drivers of private fleet vehicles are generally company employees and are not short-term contractors. This direct ownership arrangement allows private fleet operators to manage the transportation of goods, often with specialized equipment and services, more closely. The fleets are dispatched and managed by a fleet manager in charge of routing and communication with customers and drivers. Private fleets are typically managed as a division of a company's overall transportation department.

Most private fleet routes are predictable and structured based on repetitive movements linking a distribution center to stores. Some trucks are routed back to the distribution center via an inbound vendor location in an effort to reduce empty miles. Local and regional hauls account for almost half of all truck revenues and are the dominant arrangement for private carriers, in contrast to the longer hauls usually handled by the other types of carriers. Many private fleet hauls are less than 100 miles, with an industry segment average length of haul at 51 miles (U.S. Internal Revenue Service, 2011).

Private trucking fleets make up the vast majority of commercial trucks on the nation's roads. According to the National Private Truck Council's report titled "America's Private Fleets" (Schulz, 2010), over 79 percent of the commercial truck fleet in the United States is represented by private trucks (excludes Class 1 and 2 from Table 1 above).

Private Carriers are overwhelmingly concerned with their delivery performance. Private fleets often have to deliver to stores or destinations when labor will be available to off-load and inventory the delivery. One example might include a delivery to a restaurant where inbound trucks are only accepted during off-peak hours. To fill additional transportation needs, private fleets are sometimes supplemented by for-hire trucking fleets to perform additional services on a contract basis.

Solutions for controlling operating costs are constantly under review by private fleet owners seeking to maximize the efficiency of their operations. The utilization of new technology, such as fuel consumption monitoring systems, is one example of a method fleet owners use to help address operational costs. Other ways fleet managers and owners are coping with increasing operating costs include cutting out operating inefficiencies originating from old or malfunctioning equipment, or re-routing drivers to better routes. Fleet managers interviewed as part of a University of Michigan Transportation Research Institute study titled, "*Analysis of the Potential Benefits of Larger Trucks for U.S. Businesses Operating Private Fleets*" reported fuel cost, congestion, improved distribution efficiency, and driver availability as their main concerns about operating a private fleet in the coming years, consistent with the concerns of other private fleet operators stated above (Schulz, 2010).

Three private fleet operators were interviewed to determine their qualitative opinion of toll road value. One was a fleet that transports beverages for a large brewery; one provides fresh bakery and food service items; and a third which moves retail merchandise to stores in 13 northern and western states.

Two of the private fleet operators engage company employees as drivers; for distribution routes which use toll roads, their tractors are equipped with transponders. The toll costs are absorbed as part of the operating cost within the company's overall cost for transportation. These companies indicated that toll costs are a small percentage of the total route cost, so their drivers were not encouraged or instructed to avoid toll facilities. Fleet managers were more concerned about asset productivity and driver productivity as measured by hours of service rules, than avoiding a toll.

In the other case, the fleet operator outsourced most of the routes to a truckload carrier, which managed the fleet of company-owned trailers. In this case, the fleet operator directed that all tolls be included in the rates charged by the truckload service provider, and therefore was not directly involved in the route—and toll road avoidance issues. This case illustrates that, even with private fleets, operations can be outsourced to another party.

For-Hire Truckload

"For Hire" Truckload (TL) Carriers are trucking companies (for example, Schneider, Swift) that haul cargo for other businesses. In the past, there was more specialization of for-hire carriers in either TL or LTL operations, but with consolidation in the industry, most of the largest for-hire companies now operate

both TL and LTL divisions. This section focuses on the TL operation, which simply means that haul between shipper and receiver is a full TL, rather than a LTL load with multiple pickups or deliveries.

Full truck loads moving in enclosed dry van trailers are the most prevalent vehicle in the commercial truck fleet (Alam, Maks, et al., 2007). The types of goods carried by dry vans include mostly packaged or palletized cargo, general merchandise, tools, machines, consumer products or other dry packaged products. Cargos such as paper products are a good example of the commodities carried by dry van trucks (i.e. no need for special handling, driver skills, etc). The vast majority of dry van hauls (92 percent) are less than 500 miles (Bryan, Joseph, et al., 2007).

A prominent operational issue cited by drivers of for-hire TL business is long waiting times at pick-up and drop-off points. Since for-hire drivers are paid by the mile, and are evaluated on service performance, drivers can't afford to be late for pick-up or delivery appointments. Appointments are often made at the shipper or receiver's convenience and this potentially leaves drivers with dead time in their schedules. In response to changes in hours of service regulations, trucking companies have increased accessorial fees for driver wait time at the customer's dock in an effort to improve driver productivity and reduce the time a driver spends waiting for freight.

Important metrics used in the TL industry include average length of haul, empty "deadhead" miles, revenue per loaded mile, revenue per shipment, and shipments per business day (Cottrell, 2008). Generally, these metrics have to do with the efficiency of trucking operations in terms of how loaded trucks are over their total distance traveled to complete a haul. Trucking companies strive to minimize the amount of empty miles traveled in order to maximize revenue.

Irregular route truckload carriers typically charge rates by the mile (some large carriers hire Independent Contractors (IC's) on a load-by-load or short-term basis to fill in when demand is high.) Irregular route drivers are essentially for-hire truckload drivers, who are almost always paid by the mile, not salaried. Pay scales vary based on type of work, team drivers get paid more than random route drivers, who are paid more than private fleet or "dedicated" route drivers. Many large trucking company operators have multiple business units which offer different types of trucking services to help the parent company provide a full set of transportation services for customers, in an effort to be a "one stop shop" for trucking.

Most carriers are unable to recoup tolls as a separate line item on invoices, although some larger more sophisticated companies, with intricate activity-based costing models, can accurately assess tolls by location and time of day. As a general practice, carriers must estimate tolls (some tolls vary by time of day) and include them in the base cost of service. For some transportation contracts, carriers are able to capture tolls, if they are large (for example the \$40 per truck George Washington Bridge toll).

Trucking companies consistently face increasing operations costs associated with fuel, insurance and equipment costs. To offset these increases, companies focus on driver productivity, asset utilization, and fuel consumption through seeking the shortest routes with the highest average highway speeds. These attributes result in the best driver and equipment utilization, which translates into lower operating costs.

The research team interviewed three full truckload carriers which were representative of the industry. A large truckload carrier (12,000 drivers, full logistics services) indicated that their shippers ask them to put the tolls in the rate structure to simplify bid response calculation. They also indicated that for “incremental freight,” which may fall outside of contract bids, tolls are listed in the accessorial sheets. Carriers estimated that only 90 percent of the toll revenue billed, is collected as billed—some shippers cut the invoice and dispute the tolls.

A regional carrier in the southern U.S. reported that tolls are not a big enough issue to warrant special treatment. Rather, including tolls in their base rate is easiest and reduces the administrative burden for the carrier and the shipper.

A smaller carrier (30 drivers) operating in the central states reported that they would reimburse drivers if they presented a toll receipt, but they had no way to pass these tolls onto shippers. While the company uses toll transponder tags in the Upper Midwest, it had no standard accessorial sheets to pass on tolls to customers in other areas of the country. This is typical of smaller companies which are not making sophisticated cost calculations for carrying a load; instead, the carrier might run a quick calculation of time and mileage with a line item for “other” where tolls would be included. Any ability to shrink the costs in the “other” category translates directly into net revenue.

For-Hire LTL Trucking (includes Parcel, Express)

LTL trucking means that more than one shipment is contained within the shipped trailer. This requires the driver to make more than one “delivery” as part of the same shipment. While parcel delivery is typically LTL (though a UPS tractor-trailer delivering a trailer full of packages from one sorting facility to another is TL), the most typical type of LTL shipment is a large truck delivering pallets of cargo directly from a warehouse or other logistics facility to manufacturers or retailers. Depending on the size of the business, they will have an employee with a forklift to unload their specific shipment, or the driver will unload using a forklift or other equipment.

The three main service offerings in the package or parcel market are overnight air, two-three day air, or ground shipping. Parcel carriers are also called “integrated carriers” since they integrate different modes (trailer trucks, local delivery trucks, rail, air, etc.) to deliver their cargo on time and in the most efficient manner.

From an operating perspective the parcel business is comprised of two segments: local pick-up and delivery and line haul. Local pick-up and deliveries are often contracted out to IC’s, while line haul services which connect sorting hubs are handled by IC’s or company drivers. Typical trips would include moves from a hub or sort center to a customer office or retail strip mall location (local), or the line haul service which moves between hubs or sort centers.

Parcel carriers often own and maintain transportation fleets. Pricing for shipments is based primarily on weight of the parcel being shipped, as well as the distance over which the parcel must travel to its final destination (Morlok, et al., 2000). The most important performance metrics in the industry have to do with cost and parcel time-in-transit (Kewill, 2008).

Based on the nature of the service, many shippers' packages are loaded into a single vehicle; the ability to pass tolls on at the package level does not exist today, so carriers build tolls into their rates. Carriers view increasing tolls and fees as part of their cost structure and pass congestion delays and toll expenses on as part of the costs of doing business.

The research team contacted LTL firms in New England and along the East Coast to interview based on the density of toll routes in that part of the country. One carrier who operates exclusively in the Northeastern quadrant of the U.S. with an annual revenue of \$400 million and 6,000 trailers reported that they spent over \$1 million in tolls on turnpikes and bridges in 2009. On the topic of avoiding toll roads, the carrier estimated that since their labor cost is approximately \$60 per hour (direct labor, with no equipment costs included) it would make no sense to avoid a \$5 toll. Where tolls are greater—such as the George Washington Bridge which is \$40—they must include the charge in the base rate or agree to the toll as an accessorial fee as a condition for shipment. For example, this carrier has set a minimum fee of \$130 to go anywhere in Manhattan.

Other issues highlighted the interest in parcel and expedited pick-up and delivery shippers' avoidance of tolls. Based on several interviews, the location of the hubs, sort centers and customer store/kiosks locations, toll routes are not always the most direct path between route collection points. Some companies observed that large national carriers have much less exposure to tolls, as measured by "tolls as a percentage of total revenue," than local or regional carriers. Interviews with the regional carriers validated that observation.

In summary, LTL firms view reliability as their most important metric, and speed a secondary concern. There is an acceptance of tolls generally, and carriers are willing to pay, provided that there is a clear relationship to asset efficiency, a positive relationship to drivers' hours of service compliance and reduced fuel consumption.

Drayage/Cartage Companies

Drayage or "cartage" trucking involves the transport of trailers or containers between facilities within the same geographic region, typically for further transportation outside of the region via trucks or other transportation modes (Tioga Group, 2009). A common haul involves the movement of cargo containers from a freight facility such as a port, rail terminal, airport, or border crossing to a different freight facility or warehouse. Drayage hauls are generally over relatively short distances and involve mostly intra-city trips since freight facilities are typically located in urban areas, though in some instances longer trips occur between cities. A survey at the Port of Houston showed the average dray haul was 60 miles and the average number of trips to the port per day was 3.2. Similar studies in the New York – New Jersey region calculated the average dray haul at 75 miles, with the average trucker making 2-3 trips per day (Tioga Group, 2009).

The most important operational metric used in the drayage industry is truck turn time (Tioga Group, 2009), which is defined as the duration it takes a drayage truck to complete a transaction such as picking up an import container or dropping off an export container, excluding time in gate queues.

Many drayage companies act as brokers who hire IC's to move loads between rail terminals and customers, or between port terminals and rail terminals or between equipment depots and customers or rail terminals. Toll reimbursement, if any, tends to vary based on regional factors. Bridges and tunnels are a common toll item but most tolls are included in the rate structure.

The majority of drayage firms are paid by the move and not by the mile, so driver productivity is very important. Tolls are typically not reimbursed for short movements, or inter-terminal transfers, but for longer distance shipments (for example from Chicago to Indianapolis or Chicago to Milwaukee, tolls are reimbursed.

To further explore the question of toll road avoidance in this industry segment, drayage companies in Philadelphia, Chicago and Los Angeles were interviewed. In California bridge tolls are the dominate toll type and they are included in the drayage company's rate. For a Philadelphia-based drayage company, tolls for shipments crossing the George Washington Bridge in New York City are charged to the customer; this company reported that up to 15 percent of the line item bridge tolls invoiced per year go unpaid by the shipper and have to be written off as uncollectable. The drayage carrier speculated that due to the large number of drayage companies in the area, and the wide array of business practices, customers can get away without paying; they "short pay" the invoice, and carriers find it exceedingly difficult to collect the balance.

The largest drayage company in the United States is based in Chicago, with 80 percent of their business being cross town shuttles between rail yards. Average length of haul is 20 miles, with 70 percent of revenue paid by the railroads. Work is paid for as a flat fee. The broker pays the IC's a percentage of a set fee and does not reimburse for tolls locally for movements between rail yards. IC's will often choose to pay tolls locally if the improved productivity will allow them to get one more load per day. For interstate runs to a pick-up or customer delivery, tolls are often billed to the customer as a separate line item.

The interviews reveal the preponderance of IC's involved in this market segment. Drayage companies are primarily brokers who dispatch IC's against assets they do not own. So a key variable here is the labor solution—IC's—and the toll road decisions of IC industry drivers.

Brokerage/ Third Party Logistics Companies

Logistics involves the process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods, from the point of origin to the point of consumption. Third party logistics companies (3PL's) are, in general, responsible for managing the above functions for large manufacturers or other entities in need of outside expertise in supply chain management.

The Council of Supply Chain Management Professionals (CSCMP) defines a 3PL as, "A firm which provides multiple logistics services for use by customers." Preferably, these services are integrated, or "bundled" together by the provider. These firms facilitate the movement of parts and materials from suppliers to manufacturers, and finished products from manufacturers to distributors and retailers. Among the services provided by 3PL's are transportation, warehousing, cross-docking, inventory management, packaging, and freight forwarding.

The services provided by 3PL's are in contrast to traditional transportation contracts involving only two parties: shipper and carrier. In general, many companies break from this traditional relationship in order to achieve cost reductions, or increases in the efficiency of their transportation or supply chain activities. Among the detailed reasons cited by the International Warehouse Logistics Association for using the services of 3PL's are:

- Reduced total delivered cost for customers
- Local expertise in new markets
- Improved customer service through shorter shipment times
- Reduced inventory costs through better management
- Cost benefits through volume shipping discounts
- Improved focus on core competency
- Increased shipment visibility
- More scalable logistics operation and cost model
- Improved variety of technology and services
- Risk reduction
- Increased expertise in supply chain security
- Reduced inventory holding costs

As noted in a prominent 2009 study on 3PL's, shipper respondents most frequently outsource logistics activities that can be characterized as transactional, operational and repetitive, and less frequently those that are more strategic, customer-facing and information technology intensive (Langley, Jr., 2009). These include domestic and international transportation customs brokerage, warehousing, and forwarding.

Shippers want responsive supply chains capable of reacting more quickly to changing customer preferences. Some important metrics for shippers to measure the success of 3PL relationships are cost reductions in inventory, logistics, and fixed assets. Other metrics include decreases in order cycle time, and increases in order fill rate percentage, and order accuracy percentage. Total landed cost is another important metric used by the sector, which can be defined as the sum of all costs associated with producing and delivering products to the point where they produce revenue (Bianco, 2006).

3PL's typically begin their relationship with shippers by taking over the management of the company's carrier contracts. After a short introductory operation period the 3PL typically begins to optimize the freight across multiple modes and at that time may begin to change modes, carriers and freight routes. 3PL's hire carriers to move the freight; tolls are expected to be included in the base rate. This category of transportation has many types of carriers and carrier relationships. Some movements are short haul and paid by the load or the trip; other contracts are based on mileage.

Toll payments are subject to contract terms. Typically the tolls are expected to be part of the rate with the exception of certain areas of New York where bridge tolls can be very expensive. One 3PL creates rates on a zip code to zip code matrix; tolls are not separated as a line item because it would increase the administrative costs of managing the transaction.

3PL's get paid based on a variety of metrics which include cost savings and service performance. Due to these two factors tolls are typically seen as a cost of doing business and are included in the carrier rates. 3PL's manage all types of carriers which include full Truckload, LTL, Parcel, Heavy Haul, Containers and some air cargo.

Specialized Trucking Operations

Specialized trucking provides freight transportation services for shippers who require "specialized" or single purpose equipment. The cargo maybe considered "specialized" because of shipment characteristics relating to size, weight, shape, etc. Specialized freight includes fuels, refrigerated/heated goods, some types of forest products, and dangerous/hazardous materials. Specialized trucking equipment includes flatbed trailers, tankers, or refrigerated trailers, as well as item-specific equipment like car carriers, livestock trailers, industrial glass racks, etc. This segment also includes the furniture-moving industry, which hauls used household, institutional, and commercial furniture. Like general freight trucking, specialized freight trucking is subdivided into local and long-distance transportation of freight.

Most commonly, the loads carried by specialized trucking involve construction materials, gravel, ready-mix concrete, grain, milk, petroleum products, and garbage or waste (US DOT, 2000). The transportation of specialized freight differs from the handling of normal freight in that the product being carried is typically not transloaded (unloaded and shifted to another trailer), but is typically only loaded and unloaded once over the haul. This reduces the risk of damage to the goods being hauled.

The research included interviews with three specialized carriers based in Oklahoma, with fleets ranging from 150 – 200 trucks, and license to operate in 34 southern states. These companies handle products which range from heavy oil drilling rigs to tank trucks which require periodic washing. Company officials noted that toll roads are used if they are the most direct route, and expressed little concern about the cost of tolls in the context of overall operating costs.

Perspective from Trade Associations

The Owner Operators Independent Drivers Association (OOIDA) representatives highlighted the fact that 96 percent of the trucking companies in the U.S. operate twenty or fewer trucks and are not well positioned to collect toll reimbursement if they do not contract directly with a shipper. If they are contracted to provide service to a larger trucking company who has a direct relationship with the shipper, being reimbursed for tolls is more likely.

Another representative of the OOIDA spoke about toll charges in relation to invoicing, observing that shippers and carriers are careful to leave no "open" or undefined service provisions for variable charges, in an effort to reduce the uncertainty of freight charges or payments. Any charge which is variable (for example a toll charge which may vary by route time of day) creates exceptions in the payment cycle. Most large companies have many rate transactions on a daily basis (driven by different lanes, weights and products). Most invoices are computerized to accelerate cash transactions. Any exception to an automated billing process results in manual oversight and slow payments.

Analysis and Summary

There was consensus across all segments of the trucking community regarding the need to maximize driver productivity and reduce fuel costs. Tolls in general are a small percentage of the total cost of trucking, compared to the cost of driver recruiting and retention, fuel, insurance, equipment and the administrative costs of invoicing. In most cases the costs of toll avoidance is generally not economically justifiable. Certain exceptions occur when the time between a pickup and delivery have extra time built into the move to optimize the loading or unloading facility operations. Newer hours of service regulations increase emphasis on productivity, providing another incentive to pay tolls.

Most shippers avoid the issue of tolls on the premise that the actual route selected is the carrier's decision, based on service requirements for any given lane or truck movement. While the shipping community does not advocate avoiding tolls, their contracting policies generally do not recognize tolls. Shippers expect the carriers to build toll costs into their base rates. Toll prices, by their nature, can vary and this variability can create exceptions in the payment cycle. Based on the high volume of transactions for truck movement, most shippers do not want any charges on an invoice that cannot be electronically settled in the billing process. A few exceptions to this finding include "New York surcharges," which capture a premium rate for certain urban zones based on the toll charges and congestion fees associated with freight moving to or from New York City.

The shippers' attitudes toward tolling makes intuitive sense: those interviewed wanted to reduce the variability in rates charged on repetitive routes. Variability in the billing process leads to increased administrative burdens in the settlement of revenue for the transportation process. A common message from shippers was that it is up to the carrier to know their rate structure and since they are out on the nation's highways daily, it is up to them to know their highway costs.

The trucking industry is generally opposed to tolling, sometimes referring to tolls as a "double tax," because they also pay fuel taxes. However, this general opposition is exacerbated in situations where 1) revenues are diverted to purposes not related to improving the highway (even worse when revenues are diverted to non-transportation purposes), and 2) tolls are posted at state borders in an attempt to avoid impacting the voters in a particular state.

No particular segment of the industry—shipper, carrier, or 3PL—indicated that their trucks either actively used or avoided tolls. Rather, the use of toll roads is often an individual decision of truck drivers. Where toll roads offer value for money in terms of congestion, non-stop toll payment, and road quality, then there are incentives for truck drivers to pay tolls. Still, there appear to be some psychological factors involved in the toll decision, which are not purely economic.

Distance could be a factor in avoiding toll roads. The type of fleet and the distance it travels can dramatically impact the likelihood of paying tolls. There are a number of computer software programs for routing which also calculate the amount of toll charges, mileage, and travel time. Longer distance truck operations often have more alternatives to avoid tolls, and still be on time, than trucking operations in congested urban areas.

IC's, or owner operators, are estimated to account for 11 percent of the 3.2 million truck drivers in the US (Estimates of the US truck driver population vary widely depending on source. The 3.2 million figure comes from the Bureau of Labor Statistics based on the 2000 US Census; at the higher end of the spectrum, the Federal Motor Carrier Administration estimates the US truck driver population at 5.6 million (Commercial Motor Vehicle Facts, April 2011)). They are involved in every segment of the industry, and are often used to supplement trucking capacity. These IC's often lack the staff, software and/or sophistication to recoup toll charges, unlike large carriers who can document the costs, and make the case with shippers in select instances for toll recovery. Some IC's have been successful in including toll reimbursement provisions in sub contracted work. The fact that tolls are ignored in most transportation services contracts have been primarily driven by the administrative difficulties that toll charges represent. The fact that tolls are not uniformly passed through to the shipper, like fuel surcharges, provides some incentive to avoid toll roads.

Chapter 2 Research Approach

Given the industry’s complexity, there are a number of motivating factors in play in toll road choice, including the type of trucking operation (e.g., private fleet versus for-hire) or the driver’s relationship with his or her employer (e.g., company driver, versus independent owner/operator). This section of the report outlines the research approach.

Targeting Actors in Trucking Business Transactions

The data collection effort attempted to capture a representative sample of the many actors involved in the trucking transaction and their influence on toll payment. The “Survey Construct” section (below) describes the actual survey instrument and questions. The survey contained “branches” that directed the respondents to discrete survey questions depending on their answers. From the initial screen, the opening question asks respondents to qualify themselves in one of three ways:

- Driver
- Trucking Company (employee other than driver)
- Shipper/Receiver/3PL

The first branching rule designated drivers, and how their relationship to the trucking company might affect their willingness to pay tolls. If the driver is an independent owner/operator, propensity for toll payments might differ from, say, company drivers in the package delivery sector. In the survey instrument, a branch for drivers will ask for a self-identification of the type of company they work for, or the institutional structure in which they operate—independent owner/operator, dedicated contract carrier, and other pertinent questions.

The second main branch in the survey asked the survey respondent to identify the type of carrier they represent, consistent with this typology.

The third primary branch was for the beneficial cargo owner—a shipper, receiver or third party logistics agent. Questions in this part of the survey focused on their contracts with carriers and provisions for toll reimbursement.

The section below describes these three primary audiences in more detail, and the conduit for contacting industry representatives to take the survey.

Drivers

Researchers contacted drivers through associations like the OOIDA and ATA, as well as through those organizations’ publications and newsletters. Through interactions at truck shows, drivers were surveyed in person and also invited to the project website to take the survey. Finally, the research team used social media and internet blogs to communicate the survey to the trucking industry. This included a Facebook® page with links to other trucker-oriented community pages, and truck websites with discussion boards, such as www.truck.net.

Trucking Companies

The research team was assisted by the American Trucking Associations, which provided state association contacts in the states below, which in turn distributed the survey to their membership databases.

- California
- Connecticut
- Florida
- Massachusetts
- Maryland
- Michigan
- New Jersey
- New York
- Illinois
- Indiana
- Kansas
- Ohio
- Oklahoma
- Pennsylvania
- Texas

Another conduit for trucking companies was the National Private Truck Council, which represents private motor carrier fleets. There are approximately 650 firms represented in the National Private Truck Council's membership database.

The third conduit for trucking companies is the Truckload Carriers Association, providing a focus on the truckload segment of the industry: dry van, refrigerated, flatbed, intermodal container, and end-dump carriers.

Beneficial Cargo Owners, Third Party Logistics Providers, Freight Intermediaries

The research team contacted the Council of Supply Chain Management Professionals for distribution of the survey to its membership. The Council is a worldwide association involved in research and collaboration on supply chain management issues. Its membership totals 8,500 worldwide, though the survey would focus on just U.S. membership. Members of the research team also attended the National Industrial Transportation League annual meeting; the League has extensive activities in surface transportation policy development and advocacy.

Survey Construct

The truck tolling survey was constructed using Ultimate Survey software. The survey required about 10 minutes to complete, which was within the tolerance of most respondents. Appendix B contains an outline of the survey.

Survey Distribution

The online survey was hosted through a project website. With the assistance of organizations such as the American Trucking Associations, links to the project website and survey were distributed to target audiences via electronic mail.

Quality Control

The survey program, *Ultimate Survey*, has built-in quality control mechanisms. The survey required complete responses for submittal. The research team also identified multiple responses from the same computer (IP address) to hedge against a respondent or group of respondents “flooding” the survey with multiple responses (on the other hand, some companies or drivers might share a computer, so instances of multiple responses from the same IP address underwent review to ensure legitimacy.)

Website for Survey

The research team created a public website www.trucktolling.org. While the website provided background on the study purpose, its main function was to serve as the host of the survey. Visitors who landed on the webpage had the ability to take the survey if they so desired. For surveying target audiences, however, the research team relied on electronic mailings, which linked respondents directly to the survey page itself.

Shipper, Trucking Company, and Driver Interviews

The survey results provided a data set for review and analysis by the research team and oversight panel. To accompany this quantitative analysis, qualitative interviews were conducted with target audiences, primarily at industry trade shows. As with the survey, the target audiences are drivers, trucking companies, and shippers.

The in-person interviews did not follow the online version verbatim, due to time limitations on personal surveys. Rather, the in-person interviews gathered critical demographic information, such as private fleet driver versus independent owner-operator, and provided open-ended questions to probe attitudes about tolling in a qualitative manner. Appendices C and D contain the instrument for these surveys. The following dates and venues were used for in-person surveys:

Weigh Station and Rest Area Survey, Greater Chicago Area, June 21 to July 2, 2010

The Greater Chicago area was chosen as a test of the survey instrument in a field setting. Three sites offer the opportunity to intercept truck drivers whom have both taken and avoided toll routes in the Chicago area, as well as long haul truckers.

- Highway 41 weigh station in Waukegan, Illinois
- I-94 Rest Area, Kenosha, Wisconsin (Exit 347)
- Illinois Tollway Lake Forest (Illinois) Oasis, I-294

Great American Truck Show, Dallas, Texas, August 26-28, 2010

The Great American Truck Show was held at the Dallas Convention Center and drew over 46,000 attendees. The survey team rented a booth and conducted in-person interviews with drivers, and distributed postcards with the survey website for people who wanted to fill out the survey online.

Council of Supply Chain Management Professionals, San Diego, California, September 26-29, 2010

The Council of Supply Chain Management Professional is an organization of shippers, Third Party Logistics Providers, carriers and educators. This event draws 3,000-5,000 per year. It is estimated that 60 percent of the attendees are shippers, and the remaining 40 percent is roughly equally divided among the other categories of participants. At this event, a member of the research team distributed postcards which provided information for taking the survey online, and addressed a number of educational sessions to describe the intent of the research and encourage participation in the survey.

Great American Truck Show, Charlotte, North Carolina, October 8-9, 2010

The Charlotte Truck Show was selected to draw specialized carriers, as the event was targeted at construction vehicles, bulk commodity haulers, and off-road operators. Preregistration indicated that the event attracted about 20,000 participants, with the majority of drivers being owner operators, and about 25 percent being company drivers.

TRANSCOMP Exhibition, Fort Lauderdale, Florida, November 13-17, 2010

This event was jointly sponsored by the National Industrial Transportation League (NITL) and Intermodal Association of North America (IANA). The NITL has a group of shippers, highly interested in transportation issues and has a transportation sub-committee. The IANA group is dominated by rail, ocean, truck and Intermodal Marketing Companies. During committee meetings, a member of the research team made presentations about the research and solicited participation from the attendees.

Chapter 3 Findings and Applications

Web-Based Survey Analysis

The survey described in Chapter 2 featured three sections: a demographic and operating characteristics section, a stated pricing section, and an attitudinal section. A total of 965 web-based surveys were completed by a wide range of industry participants (with 661 surveys considered valid and included in this analysis). See Appendix B for the survey instrument and distribution.

The initial demographics and operating characteristics section of the survey was designed both to capture baseline data for benchmarking and to serve as a tool for routing respondent to appropriate “revealed preference” items in the second section of the survey. The third, attitudinal section of the survey was designed to capture non-econometric influences on respondent behavior with regard to toll usage.

Figure 1 and Figure 2 below show the respondents’ position within the trucking transaction, and the type of trucking operation (respectively).

Figure 1: Position in the Trucking Transaction

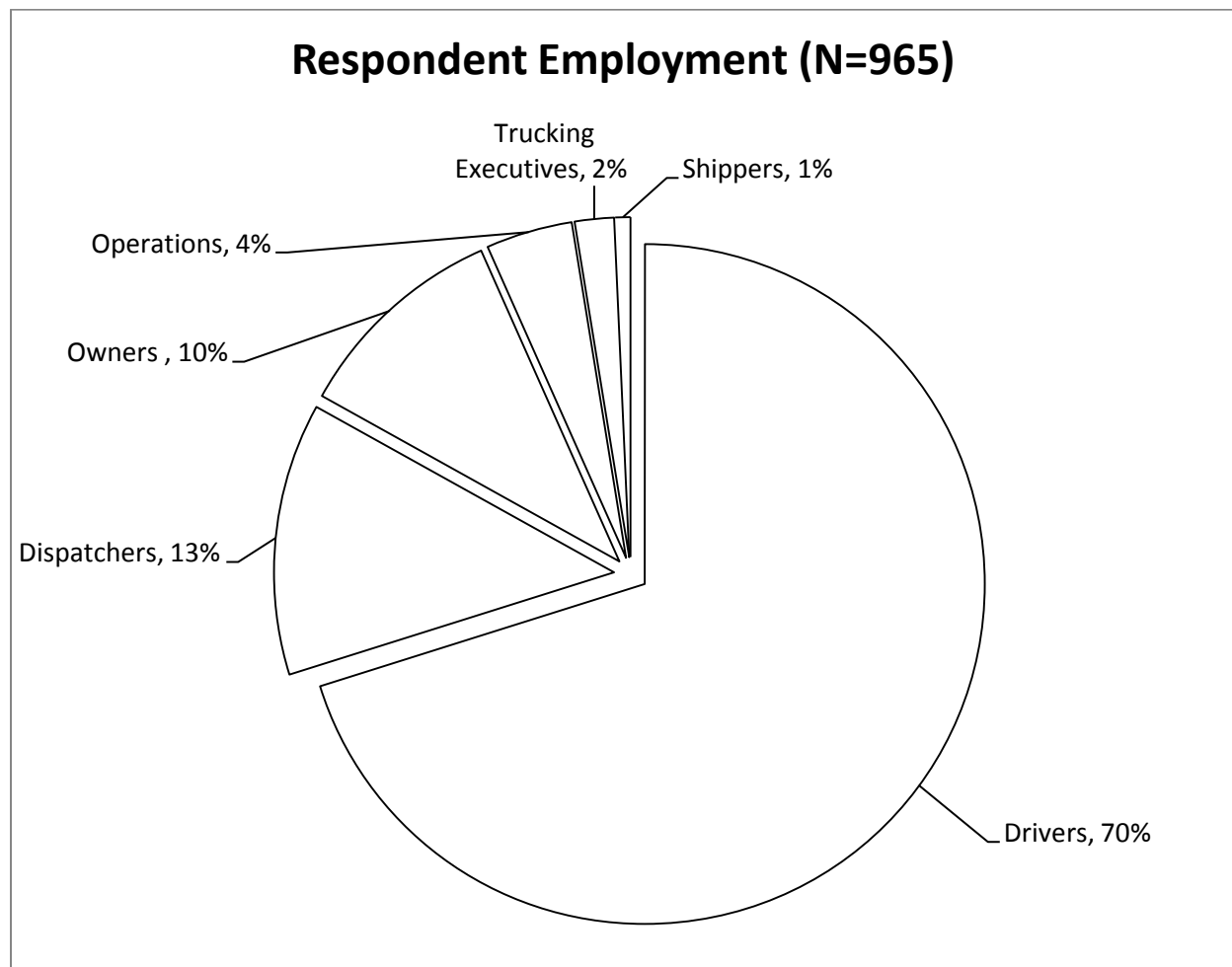
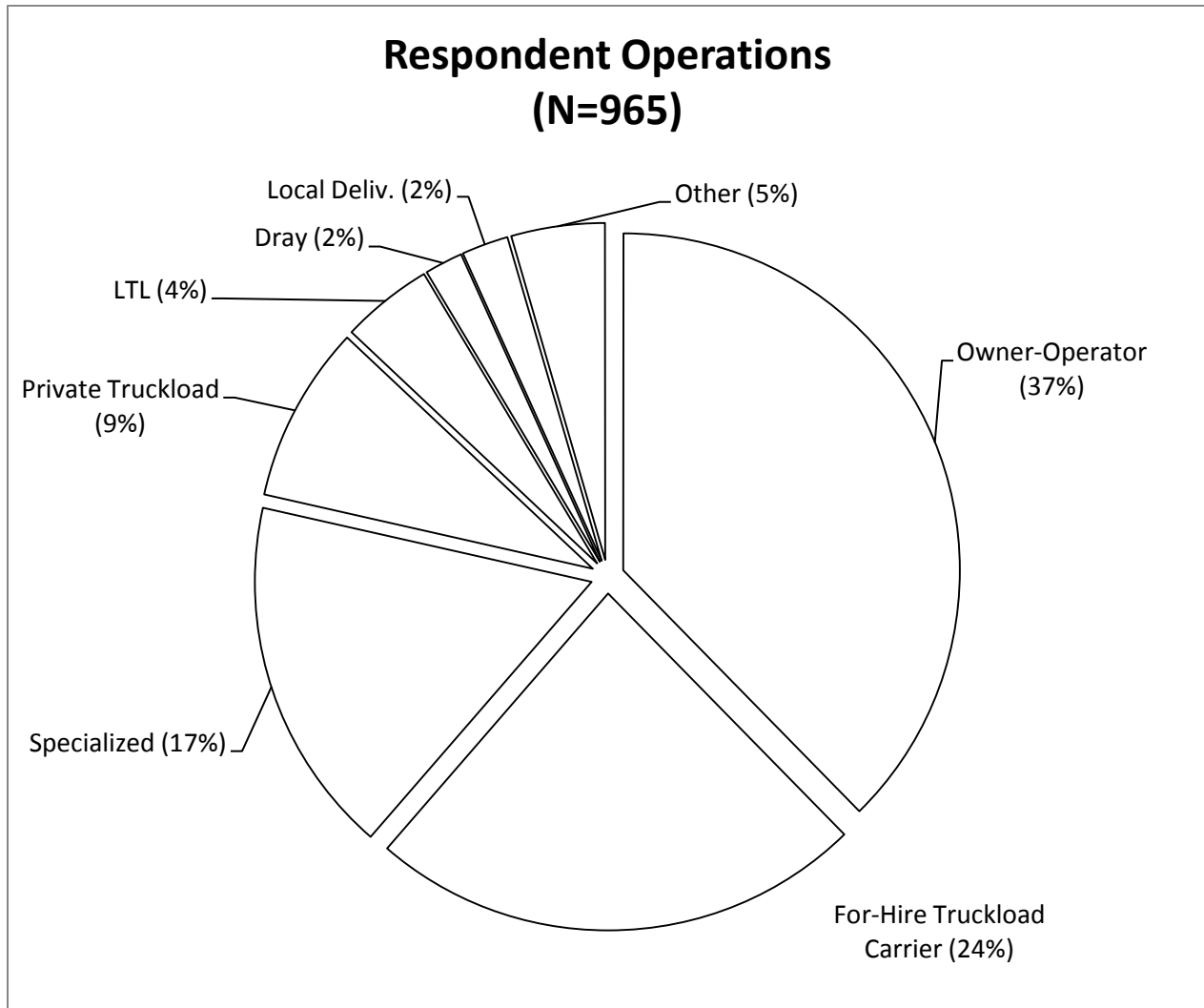


Figure 2: Type of Trucking Operation



While the revealed preference section of the survey used a standard stepwise model for establishing pricing levels for each respondent, the way scenarios were described was somewhat unique for this type of study. Typically, revealed preference transportation surveys will attempt to price an existing or proposed roadway: a proposed feeder highway accessing a port, for example. Since this project was directed at a national audience and national, regional, and local trucking firms, the project team designed “typical” tolling scenarios and focused pricing on the stated benefits of a roadway. Hence, respondents were given hypothetical scenarios that would typically save a given number of minutes and/or miles of travel. This allowed the respondent to focus on the proposed benefits and place the typical scenario into a “mental model” of a similar road they have used in the past.

Online surveys asked respondents about their willingness to pay tolls on three toll road scenarios: Turnpike, Bypass, and Bridge. The turnpike scenario described a long-distance tolled highway, similar to existing facilities such as the Pennsylvania Turnpike, Massachusetts Turnpike, and the New Jersey

Turnpike. The “bypass” scenario described a tolled highway designed to allow quick traversal across an often congested urban area, similar to existing facilities such as the Texas highway 45 and I-66 in the Washington, DC region. The bridge scenario described a toll bridge designed to traverse a physical obstacle such as a body of water.

Respondents were given an estimated time savings for each scenario and then asked if they would pay the toll if it was set at a given amount. The amount the toll was set at ranged from \$0.50 to \$32.00 depending on the scenario.

For each scenario, a “hedonistic price” was developed based on respondents’ stated willingness to pay (The term “hedonistic price” describes two characteristics—intrinsic value and external factors—which together determine the price that consumers are willing to pay.) Beyond the hedonistic price analysis, eight factors were evaluated based on their impact on the willingness to pay for tolled road facilities:

- Employment Position: Driver vs. non-driver (dispatcher, operations staff, ownership, etc.)
- Industry Segment: Truckload vs. Non-truckload
- Industry Tenure: More than 10 years vs. 10 years or less
- Annual Miles Driven: Less than 100,000 vs. 100,000 or more
- Typical Haul Mileage: Less than 500 miles vs. 500 miles or more
- Typical Driving Environment: Urban vs. Rural
- Opportunity to Access Tolls: 10% or less of current miles could be on tolled roads vs. more than 10% of current miles could be on toll roads
- Owner-Operator Identification: Member of OOIDA vs. Non-OOIDA member

Survey Results from Web Based Survey

The data were analyzed to determine if the correlation between willingness to pay and each independent variable was most likely random chance or a statistically independent indicator. In the tables below, a ‘Sig’ of 0.10 or less indicates that there is a less than 10 percent chance that the correlation is due to random chance and therefore is considered statistically significant. These statistically significant factors are highlighted in bold text. All other factors are considered inconclusive whether or not the variable affects willingness to pay tolls. The beta coefficient or ‘B’ column indicates the magnitude of effect that variable has on the willingness to pay tolls. A larger beta indicates a larger effect on the willingness to pay tolls. A negative beta indicates a negative correlation.

Due to the relatively small number of cases collected with complete pricing information, analysis was conducted using a multinomial logistic regression model rather than the preferred linear regression. In designing the model, all dependent pricing variables were coded into three categories: no willingness to pay (\$0.00 price), marginal willingness to pay (\$0.50 price), and real willing to pay (price greater than \$0.50). Those with a marginal willingness to pay are represented in the ‘token’ column, while those with a true willingness to pay are represented in the ‘real’ column.

Turnpike Scenario

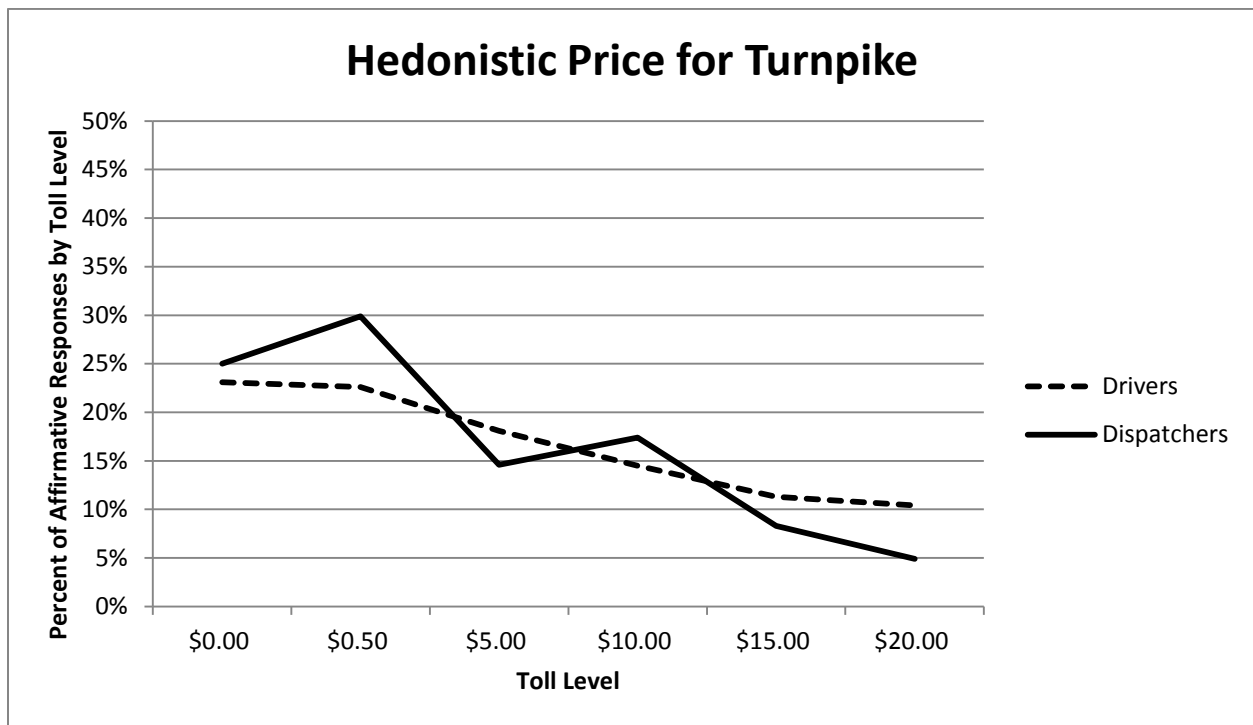
The first scenario was nicknamed the “turnpike” scenario because it described a long-distance tolled highway, similar to existing facilities such as the Pennsylvania Turnpike, Massachusetts Turnpike, and the New Jersey Turnpike. Typically these pieces of infrastructure are used to travel long distances

through areas with lower speed alternative roadways induced by traffic congestion (New Jersey) or a lack of high-speed alternative roadways (Pennsylvania). The scenario was described as follows to respondents:

While delivering an interstate load, you need to travel across a long distance in an area where the only viable route options are tolled interstate freeways and non-tolled secondary roads. Examples of these areas include parts of New Jersey, Pennsylvania, New York, and Oklahoma. Using the tolled freeway to travel **100 miles consistently reduces travel time by 30 minutes** compared to traveling on secondary roads. If the toll for the route was **\$10 per 100 miles**, would you consistently use the tolled route?

A simple graph (Figure 3) of the price distribution for the turnpike scenario shows that responses were skewed toward paying no toll or only nominal tolls for this scenario.

Figure 3: Hedonistic Price for Turnpike Scenario



Statistically analyzing the eight independent variables, only the “Opportunity to Access Tolls” had a significant effect within the model:

Table 2: Turnpike Scenario Statistical Analysis

Turnpike Scenario	Willingness to Pay			
	'Token'		'Real'	
<i>Factor</i>	<i>B</i>	<i>Sig</i>	<i>B</i>	<i>Sig</i>
Employment Position: Driver	0.721	0.404	0.255	0.702
Industry Segment: Truckload	0.388	0.526	-0.147	0.782
Industry Tenure: More than 10 years	-0.369	0.472	-0.105	0.795
Annual Miles Driven: Less than 100,000 or more	0.359	0.458	-0.62	0.124
Typical Haul Mileage: 500 miles or more	-0.259	0.684	-0.015	0.977
Typical Driving Environment: Urban	0.231	0.752	-0.018	0.974
Opportunity to Access Tolls: More than 10% of current miles could be on toll roads	0.968	0.023	-0.326	0.355
Owner-Operator Identification: Member of OOIDA	-0.526	0.249	0.316	0.385

It appears that for turnpike styled tolled infrastructure, there may be a small effect of having experience in tolled environments (greater than 10% of miles potentially drivable on toll roads) and willingness to pay nominal fees (\$0.50) rather than being a principled objector. This effect does not extend to willingness to move out of the token bracket to higher toll rates. This provides some evidence that regular experience with toll roads reduces the likelihood of principled objection to tolling.

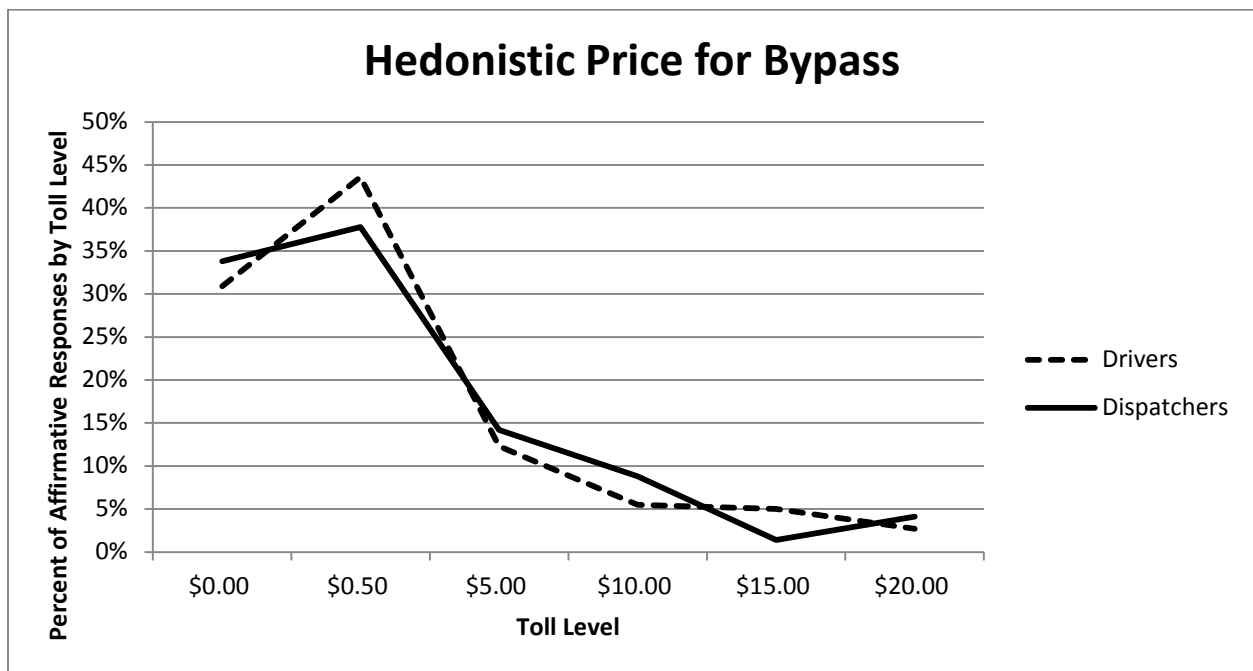
Bypass Scenario

The next scenario was nicknamed the “bypass” scenario because it described a toll highway designed to allow quick travel through an often congested urban area. The scenario was described as follows to respondents:

Midway through your hours-of-service driving shift you approach the outskirts of a large city. You must pass travel through the city to reach your ultimate delivery point later in the day. You have the option of using an existing interstate highway to travel through the city or a newly constructed tolled highway. Using the tolled highway to travel through the city **consistently reduces travel time by 15 minutes** during normal traffic conditions. If the toll for the route was \$10, would you consistently use the tolled route?

The hedonistic price to take a bypass (Figure 4) was even more heavily skewed than the “turnpike” scenario, with “\$0.00” or “\$0.50” making up more than 40 percent of the responses.

Figure 4: Hedonistic Price for a Bypass Scenario



Among the eight factors analyzed, only “Typical Haul Mileage” had a statistically significant effect within the model:

Table 3: Bypass Scenario Statistical Analysis

Bypass Scenario	Willingness to Pay			
	'Token'		'Real'	
<i>Factor</i>	<i>B</i>	<i>Sig</i>	<i>B</i>	<i>Sig</i>
Employment Position: Driver	-0.824	0.233	0.902	0.184
Industry Segment: Truckload	0.638	0.184	-0.639	0.199
Industry Tenure: More than 10 years	-0.485	0.22	-0.15	0.706
Annual Miles Driven: Less than 100,000 or more	0.018	0.961	-0.189	0.623
Typical Haul Mileage: 500 miles or more	0.369	0.478	-0.976	0.045
Typical Driving Environment: Urban	0.255	0.478	0.207	0.695
Opportunity to Access Tolls: More than 10% of current miles could be on toll roads	0.404	0.226	-0.051	0.886
Owner-Operator Identification: Member of OOIDA	-0.155	0.667	-0.106	0.774

It appears that for the bypass scenario, there may be a small effect of having longer typical hauls (500 miles or longer) and unwillingness to pay toll fees (greater than \$0.50). This effect does not extend to principled objection. Longer hauls may find these bypass routes less valuable, as small variations in travel time due to congestion can be smoothed out over longer trips.

Bridge Scenario

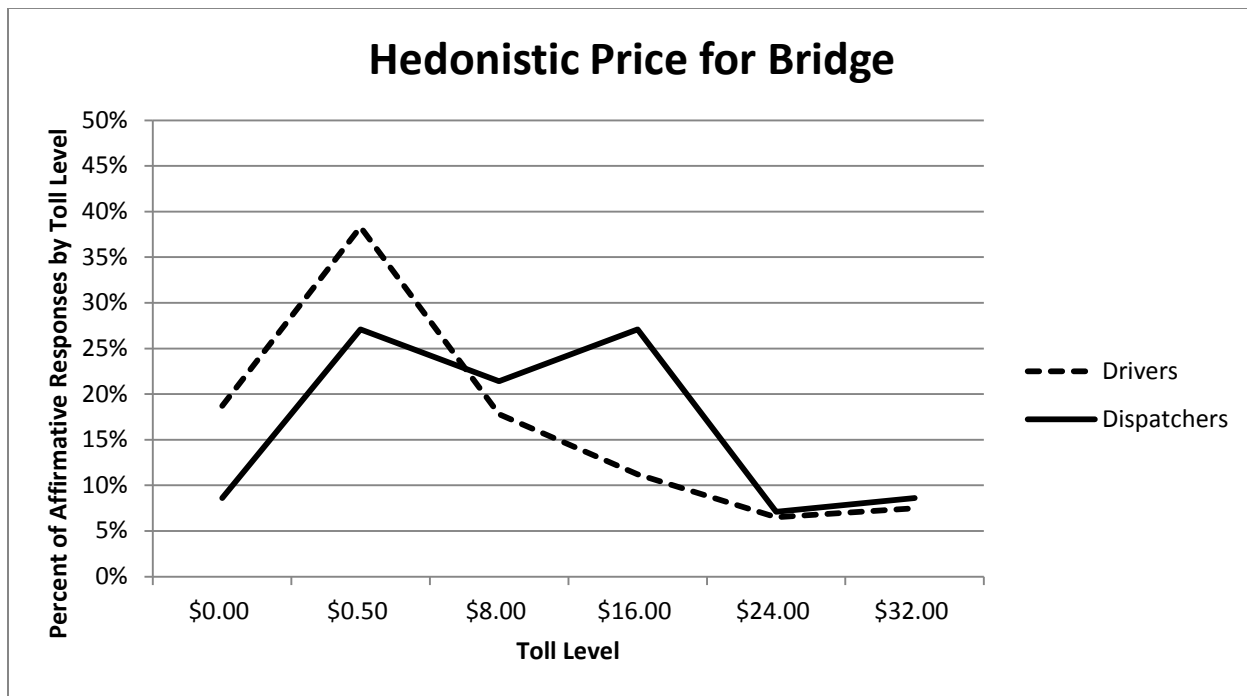
The next scenario was nicknamed the “bridge” scenario because it described toll bridge across a physical obstacle such as a body of water. The scenario was described as follows to respondents:

Your delivery requires you to cross a large body of water via one of two bridges. The first bridge is most direct for your route, but requires a \$16 toll. The second bridge requires you to extend your route by 10 miles and 20 minutes. Would you spend **\$16 to take the tolled bridge?**

Among drivers, the willingness to pay tolls for this scenario was similarly skewed toward low payment, though a fair percentage of truck drivers (29 percent) were willing to pay \$8 or more for the toll alternative. Interestingly, almost 50 percent of dispatchers were willing to route

trucks to the toll bridge in this scenario, which might reflect management placing a greater value on time than drivers (see Figure 5).

Figure 5: Hedonistic Price for the Bridge Scenario



Turning again to statistical analysis, among the eight factors, both “Typical Driving Environment” and “Owner Operator Status” had a statistically significant effect within the model.

Table 4: Statistical Analysis of Bridge Scenario

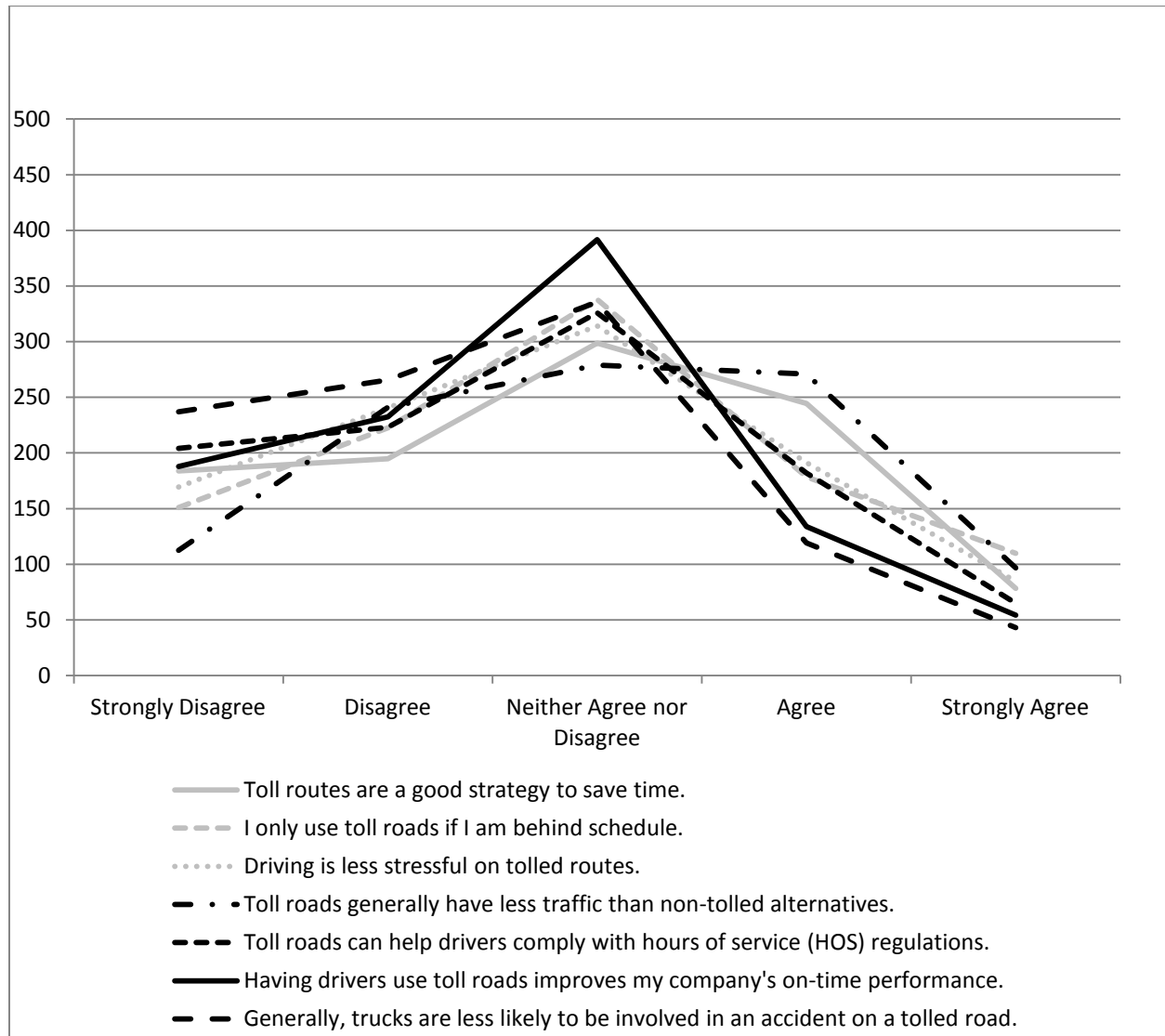
Bridge Scenario	Willingness to Pay			
	'Token'		'Real'	
<i>Factor</i>	<i>B</i>	<i>Sig</i>	<i>B</i>	<i>Sig</i>
Employment Position: Driver	-0.648	0.99	1.672	0.171
Industry Segment: Truckload	14.801	0.991	0	NA
Industry Tenure: More than 10 years	0.344	0.622	-0.627	0.293
Annual Miles Driven: Less than 100,000 or more	0.073	0.903	0.836	0.11
Typical Haul Mileage: 500 miles or more	0	NA	0	NA
Typical Driving Environment: Urban	-0.328	0.691	1.179	0.044
Opportunity to Access Tolls: More than 10% of current miles could be on toll roads	-0.164	0.785	-0.795	0.108
Owner-Operator Identification: Member of OOIDA	1.249	0.059	-0.482	0.383

It appears that for a toll bridge scenario, principled objection is driven by owner-operator status (OOIDA membership) and willingness to pay higher toll fees (greater than \$0.50) is influenced by frequency of driving in urban environments. For some owner-operators who disagree with tolling, bridge infrastructure may be the only tolled infrastructure they are forced to pay when accessing certain urban areas, making their objection more strongly stated here, whereas urban drivers may be exhibiting a bit of the “closeness makes the heart grow fonder” phenomenon seen in the turnpike scenario with long-haul drivers.

Trucking Industry Attitudes about Tolling

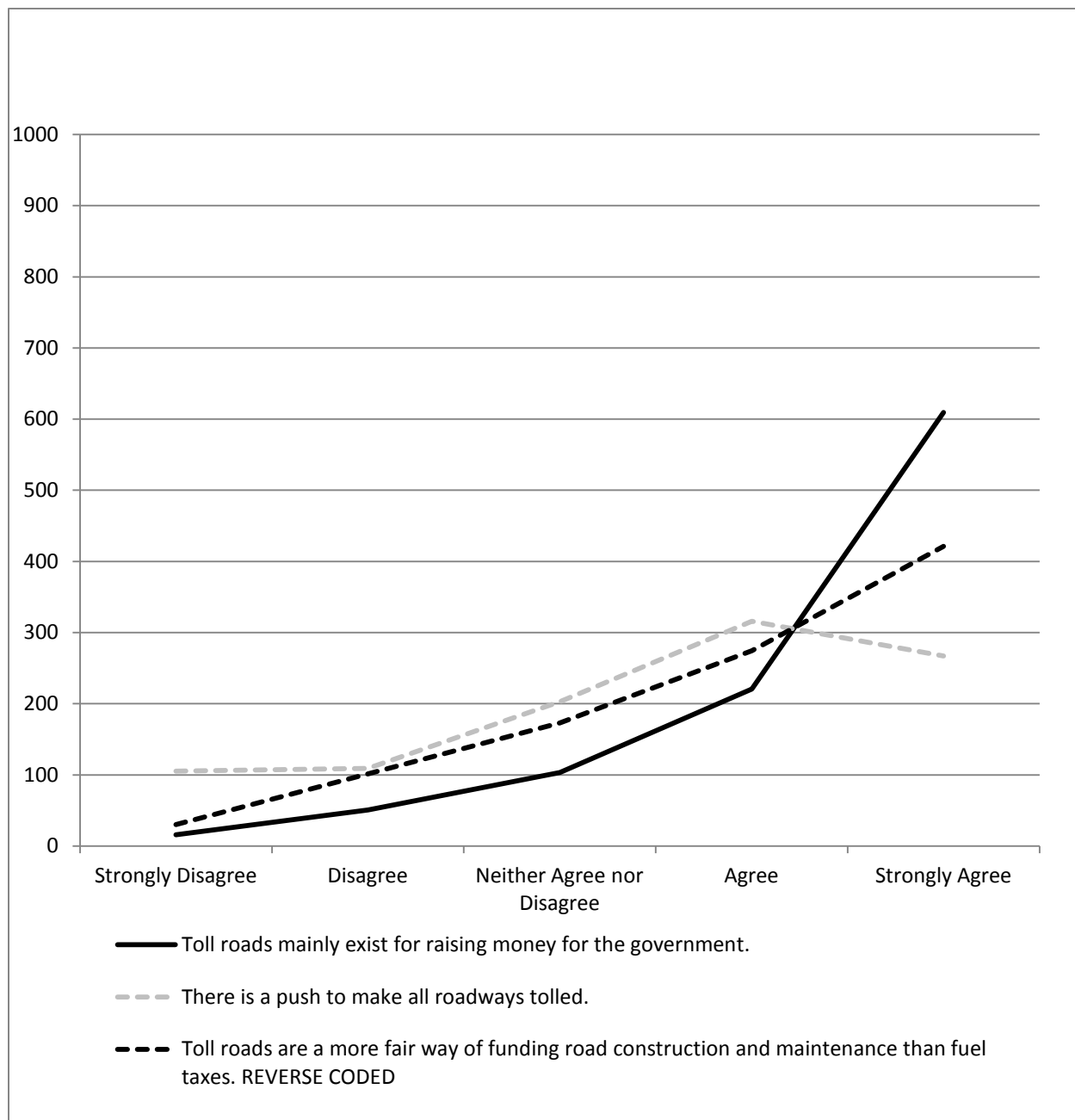
Within the opinion section of the online survey, respondents were asked whether they agreed or disagreed with a number of statements about tolls. The simple frequency of responses was revealing as to the respondents' "depth of passion" about different questions related to toll facilities. Figure 6 below shows a relatively normal distribution of options about a number of toll-related decision issues.

Figure 6: Distribution of Responses for Certain Tolling Questions



As opposed to the normal distribution curves shown in the previous figure, there were three questions related to the public sector motivation to develop toll roads, each of which elicited strong, negative attitudes about toll roads.

Figure 7: Distribution of Responses Regarding Toll Facilities and Government Finance



For further analysis, the attitudinal responses to the survey were assigned a numeric value:

- Strongly agree: 5
- Agree: 4
- Neither agree nor disagree: 3
- Disagree: 2
- Strongly Disagree: 1

The following table (Table 5) shows the average responses for each statement for various groups within the data set. A higher score indicates a higher general consensus with that statement whereas a lower score indicates a general disagreement with that statement.

Table 5: Truck Industry Opinions Concerning Toll Roads in the U.S.

		Toll routes are a good strategy to save time	Toll roads are too expensive	Toll roads exist mainly for raising money for the government	Toll roads are too expensive for what they provide	I avoid toll roads whenever I can	I only use toll roads if I can get reimbursed	I only use toll roads if I am behind schedule	Traffic is worse on secondary roads once toll roads are opened	The availability of preferred facilities affects my decision to take a tolled route	Driving is less stressful on tolled routes	Toll roads generally have less traffic than non-tolled alternatives	I am willing to drive far outside of my way to avoid a toll	Toll roads can help drivers comply with hours of service regulations	Having drivers use toll roads improves my company's on-time performance	Reimbursing tolls is an administrative burden	There is a push to make all roadways tolled	Toll roads are a more fair way of funding road construction and maintenance than fuel taxes	Generally, trucks are less likely to be involved in an accident on a tolled road	Trucks face heightened enforcement of regulations on toll roads	The ability to pay tolls electronically using a transponder makes me more likely to use a toll road	If I take a toll road I can't access my preferred service providers	Electronic tolling simplifies record keeping		
Which best describes your job in the trucking industry?	Driver - All	2.9	4.7	4.5	4.6	4.4	3.4	2.9	3.7	3.1	2.8	2.9	3.4	2.6	2.6	na	na	na	2.4	3.2	3.1	3.6	3.3		
	Driver - Specialized	2.9	4.8	4.5	4.6	4.4	3.4	2.9	3.8	3.1	2.8	3.0	3.4	2.6	2.6	na	na	na	2.4	3.2	3.1	3.7	3.3		
	Driver - Less-Than-Truckload	3.1	4.6	4.6	4.8	4.1	4.0	2.9	3.8	3.7	3.0	2.9	3.0	2.8	3.0	na	na	na	2.4	3.3	3.5	3.1	3.4		
	Driver - Private Fleet Truckload	3.0	4.7	4.5	4.6	4.2	3.8	2.4	3.9	2.9	2.6	3.0	3.2	2.9	3.0	na	na	na	2.6	3.1	3.4	3.6	3.5		
	Driver - For-Hire Carrier/Contract	2.8	4.7	4.6	4.7	4.3	3.7	2.9	3.6	3.3	3.0	3.1	3.3	2.7	2.7	na	na	na	2.6	3.4	3.4	3.6	3.5		
	Driver - For-Hire Owner Operator	2.9	4.8	4.4	4.6	4.5	3.1	3.0	3.7	2.8	2.6	2.7	3.5	2.5	2.5	na	na	na	2.3	3.3	2.6	3.5	3.0		
	Driver - Other (incl. Drayage & Local)	3.5	4.7	4.6	4.6	4.6	3.1	2.8	3.9	2.9	3.2	3.3	3.4	2.9	2.9	na	na	na	2.8	2.9	3.4	3.7	3.6		
	Non-Driver - All	2.7	4.5	4.1	4.3	na	na	na	na	na	na	na	na	3.1	na	2.7	2.6	3.8	3.5	2.0	2.5	3.1	3.0	3.7	3.3
	Dispatcher / Fleet Manager	2.8	4.5	4.0	4.2	na	na	na	na	na	na	na	3.2	na	2.9	2.7	3.9	3.4	2.1	2.7	3.2	3.1	3.5	3.4	
	Shipper / Receiver / 3PL	2.0	4.0	3.9	3.3	na	na	na	na	na	na	na	2.1	na	2.0	2.1	3.3	3.1	2.1	2.4	3.1	2.4	3.9	2.7	
	Trucking Executive	2.5	4.6	3.9	4.4	na	na	na	na	na	na	na	3.3	na	2.4	2.8	3.8	3.8	2.2	2.7	3.2	3.4	3.8	3.5	
Fleet Owner	2.7	4.7	4.3	4.5	na	na	na	na	na	na	na	3.0	na	2.6	2.4	3.6	3.8	1.9	2.3	3.0	2.8	3.8	3.1		
Other Trucking Professional	3.0	4.5	4.1	4.3	na	na	na	na	na	na	na	3.2	na	3.0	2.9	4.0	2.9	2.2	2.5	3.5	3.4	3.8	3.7		
What is your willingness to pay tolls?	Real Willingness to Pay	3.3	4.6	4.2	4.3	4.0	3.5	3.0	3.6	3.2	3.1	3.1	2.8	3.1	3.0	3.6	3.3	2.5	2.7	3.2	3.6	3.5	3.7		
	Nominal Willingness to Pay	2.6	4.8	4.4	4.7	4.7	3.3	3.0	3.9	3.2	2.6	3.0	3.8	2.4	2.4	3.9	3.9	1.8	2.3	3.2	2.5	3.8	3.0		
	No Willingness to Pay	2.0	4.8	4.6	4.7	4.7	3.3	2.4	3.9	2.6	2.3	2.7	4.1	2.0	2.0	4.1	3.8	1.3	1.9	3.3	2.1	3.7	2.6		
What is the length of your typical haul? (Drivers Only)	250 miles or less	3.1	4.8	4.6	4.5	4.3	4.0	3.1	3.8	3.3	2.8	2.7	3.3	2.8	3.0	na	na	na	2.7	3.1	3.6	3.5	3.7		
	251 - 500 miles	2.8	4.7	4.5	4.5	4.3	3.4	2.9	3.7	3.1	2.8	2.9	3.3	2.6	2.6	na	na	na	2.4	3.2	3.1	3.5	3.2		
	501 - 1,000 miles	2.9	4.7	4.5	4.6	4.3	3.4	2.9	3.8	3.2	3.0	3.0	3.2	2.8	2.7	na	na	na	2.5	3.4	3.1	3.6	3.4		
	1,001 - 1,500 miles	2.9	4.8	4.5	4.7	4.5	3.4	2.8	3.6	2.6	2.5	2.7	3.6	2.3	2.6	na	na	na	2.5	3.4	3.0	3.4	3.1		
	1,501 - 2,000 miles	2.8	4.9	4.5	4.9	4.5	3.6	3.3	3.9	3.1	2.4	2.7	3.4	2.4	2.7	na	na	na	2.3	3.6	2.9	3.6	3.0		
more than 2,000 miles	3.1	4.8	4.7	4.7	4.7	3.0	2.7	4.1	3.1	2.6	3.0	3.7	2.4	2.2	na	na	na	2.3	2.8	2.4	4.0	2.8			
How many years have you worked as a commercial driver? (Drivers Only)	5 years or less	2.9	4.7	4.5	4.5	4.2	3.2	2.4	3.6	3.1	2.6	2.9	3.3	2.8	2.7	na	na	na	2.2	3.2	3.0	3.7	3.2		
	6 - 10 years	3.1	4.8	4.5	4.6	4.4	3.8	3.0	3.6	3.4	2.9	2.9	2.9	2.6	2.6	na	na	na	2.6	3.2	3.3	3.6	3.4		
	11 - 20 years	3.0	4.7	4.5	4.6	4.3	3.3	2.9	3.8	2.8	2.8	3.0	3.5	2.5	2.6	na	na	na	2.4	3.3	3.0	3.4	3.3		
	21 - 30 years	2.8	4.8	4.5	4.6	4.3	3.4	3.0	3.9	2.9	2.8	3.0	3.4	2.6	2.6	na	na	na	2.4	3.3	3.1	3.5	3.2		
more than 30 years	2.9	4.8	4.6	4.8	4.6	3.4	3.0	3.7	3.2	2.8	2.7	3.5	2.7	2.7	na	na	na	2.4	3.2	2.9	3.7	3.2			
What percentage of the time could be spent on toll roads? (Driver Only)	5% or less of the time	2.7	4.7	4.4	4.5	4.6	3.4	2.8	3.7	3.0	2.6	2.9	3.5	2.3	2.5	na	na	na	2.4	3.3	2.9	3.5	3.1		
	6% - 10% of the time	3.2	4.7	4.5	4.6	4.1	3.4	2.9	3.9	3.0	3.0	2.9	3.1	2.8	2.8	na	na	na	2.5	3.1	3.1	3.6	3.5		
	11% - 25% of the time	3.0	4.8	4.6	4.8	4.3	3.3	2.9	3.8	3.1	2.8	2.9	3.3	2.7	2.6	na	na	na	2.4	3.2	3.1	3.7	3.4		
	26% - 50% of the time	2.7	4.8	4.6	4.7	4.4	3.2	3.0	3.5	3.1	2.7	2.6	3.5	2.5	2.6	na	na	na	2.3	3.3	3.0	3.5	3.1		
more than 50% of the time	3.2	4.9	4.6	4.8	4.5	3.6	3.0	3.7	3.1	3.1	3.1	3.5	2.8	2.9	na	na	na	2.7	3.3	3.1	3.5	3.3			
What sort of environment do you typically drive in? (Driver Only)	Almost entirely rural	3.0	5.0	4.9	4.9	4.9	3.8	3.4	3.9	2.7	2.8	2.9	3.6	2.9	2.6	na	na	na	2.9	3.8	2.9	3.6	2.9		
	Mostly rural with some urban	2.9	4.8	4.5	4.6	4.5	3.3	3.0	3.8	3.0	2.8	2.9	3.4	2.6	2.5	na	na	na	2.6	3.0	2.9	3.5	3.2		
	Equal amounts rural and urban	2.9	4.8	4.6	4.7	4.3	3.4	2.9	3.7	3.1	2.8	2.8	3.4	2.5	2.6	na	na	na	2.3	3.3	3.1	3.6	3.3		
	Mostly urban with some rural	3.0	4.7	4.3	4.5	4.2	3.3	2.6	3.4	3.2	3.0	3.2	3.3	2.6	2.8	na	na	na	2.5	3.6	3.2	3.7	3.3		
Almost entirely urban	3.2	4.8	4.4	4.6	4.3	4.1	2.5	3.8	3.7	3.1	3.3	3.1	2.8	3.3	na	na	na	2.9	3.3	3.3	3.3	3.5			

Shading Key
 5 - Strongly Agree
 4 - Agree
 3 - Neither Agree or Disagree
 2 - Disagree
 1 - Strongly Disagree

General Findings

An assessment of the data found that actors in the trucking transaction generally strongly agreed with the following statements:

- Toll roads are too expensive
- Toll roads exist mainly for raising money for the government
- Toll roads are too expensive for what they provide
- I avoid toll roads whenever I can

Members of the actors in the trucking transaction generally agreed with the following statements:

- Traffic is worse on secondary roads once toll roads are opened
- If I take a toll road I can't access my preferred service providers

Members of the actors in the trucking transaction generally disagreed with the following statements:

- Toll roads can help drivers comply with hours of service regulations
- Having drivers use toll roads improves my company's on-time performance
- Generally, trucks are less likely to be involved in an accident on a toll road
- Toll roads are a more fair way of funding road construction and maintenance than fuel taxes

Members of the actors in the trucking transaction generally neither agreed nor disagreed with the statement 'Toll routes are a good strategy to save time.'

There were no significant differences in attitudes between drivers and non-drivers of the questions asked.

Shorter haul, urban drivers felt that there were benefits from using a transponder for tolling whereas longer haul, rural drivers generally saw less benefit from using a transponder. Evidence of this attitude was shown through drivers responses to the following two statements, which appeared to be affected by the typical haul length: 'The ability to pay tolls electronically using a transponder makes me more likely to use a toll road' and 'Electronic tolling simplifies record keeping.'

- Drivers whose typical haul was short tended to agree with these statements whereas drivers whose typical haul was long tended to disagree with these statements.
- Drivers who drove more in urban environments than rural tended to agree with these statements whereas drivers who drove more in rural environments than urban tended to disagree with these statements.

It is possible that a longer length of haul impacts the number of different toll roads a driver may encounter, and therefore the number of different toll systems which require a different transponder and account. A shorter average length of haul—for example urban driving environments—might only encounter one toll facility and therefore only need to maintain one toll transponder and account.

Rural drivers generally agree with the statement ‘I only use toll roads if I am behind schedule,’ whereas urban drivers tended to disagree with that statement. This may indicate that urban drivers have other factors that affect the decision of whether or not to take a toll road—such as delivery points and routing—whereas rural drivers do not see any benefits from toll roads other than time savings.

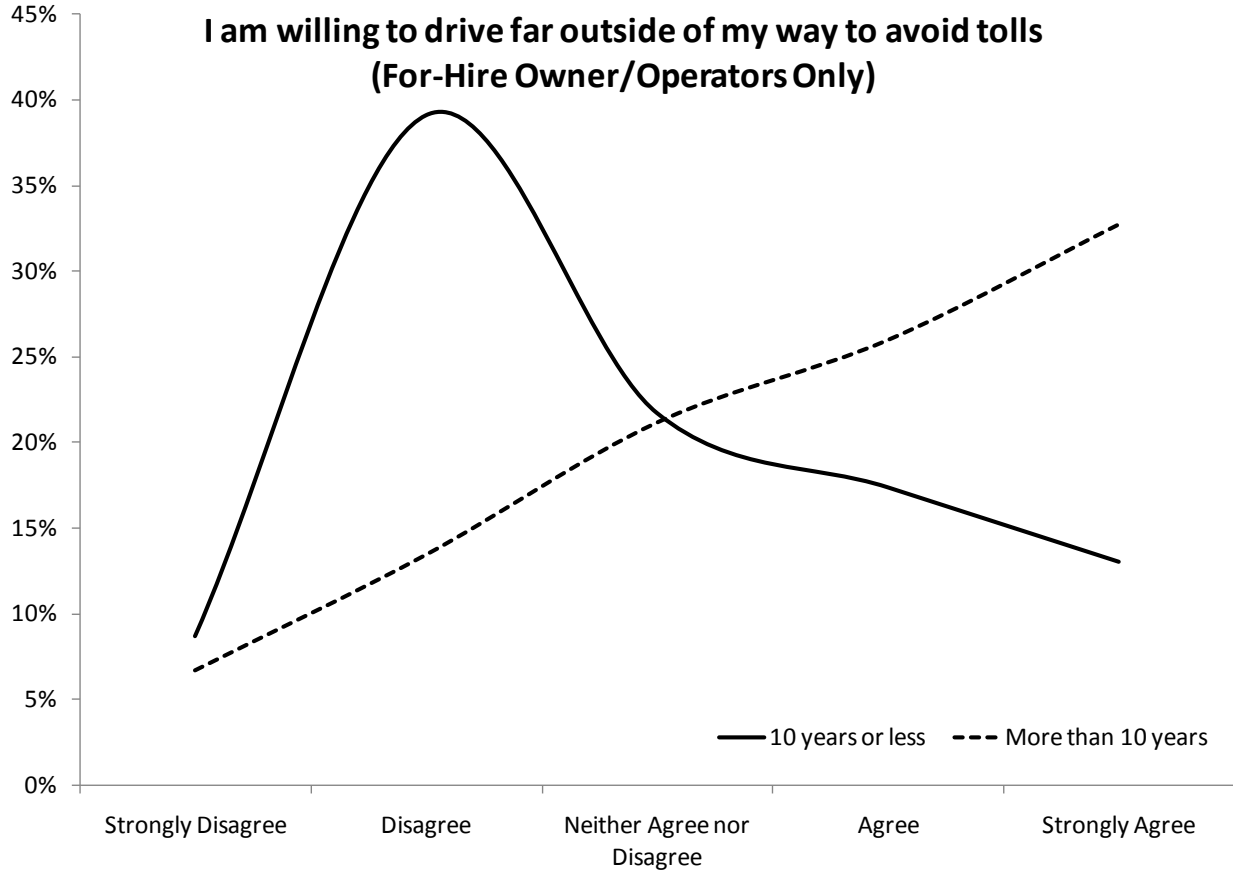
Urban drivers generally agree with the statement ‘The availability of preferred facilities affects my decision to take a tolled route’ whereas rural drivers tended to disagree with that statement. This may reflect the same general conclusion as shown in the paragraph above: urban drivers may have more factors to consider than time savings; whereas time savings may be the main determining factor for rural drivers.

Specific Findings

While the average response offers an insight in to the general opinions of the industry, some statements warranted further analysis to understand the data beyond what a simple average revealed.

Question 12: I am willing to drive far outside of my way to avoid tolls

When analyzing responses to the above statement, it was found that responses varied by driver type and years of experience. Over half of the owner/operator drivers either ‘agreed’ or ‘strongly agreed’ with the above statement whereas carrier/contract drivers showed a relatively normal distribution centered on ‘neither agree nor disagree’ with the same statement.

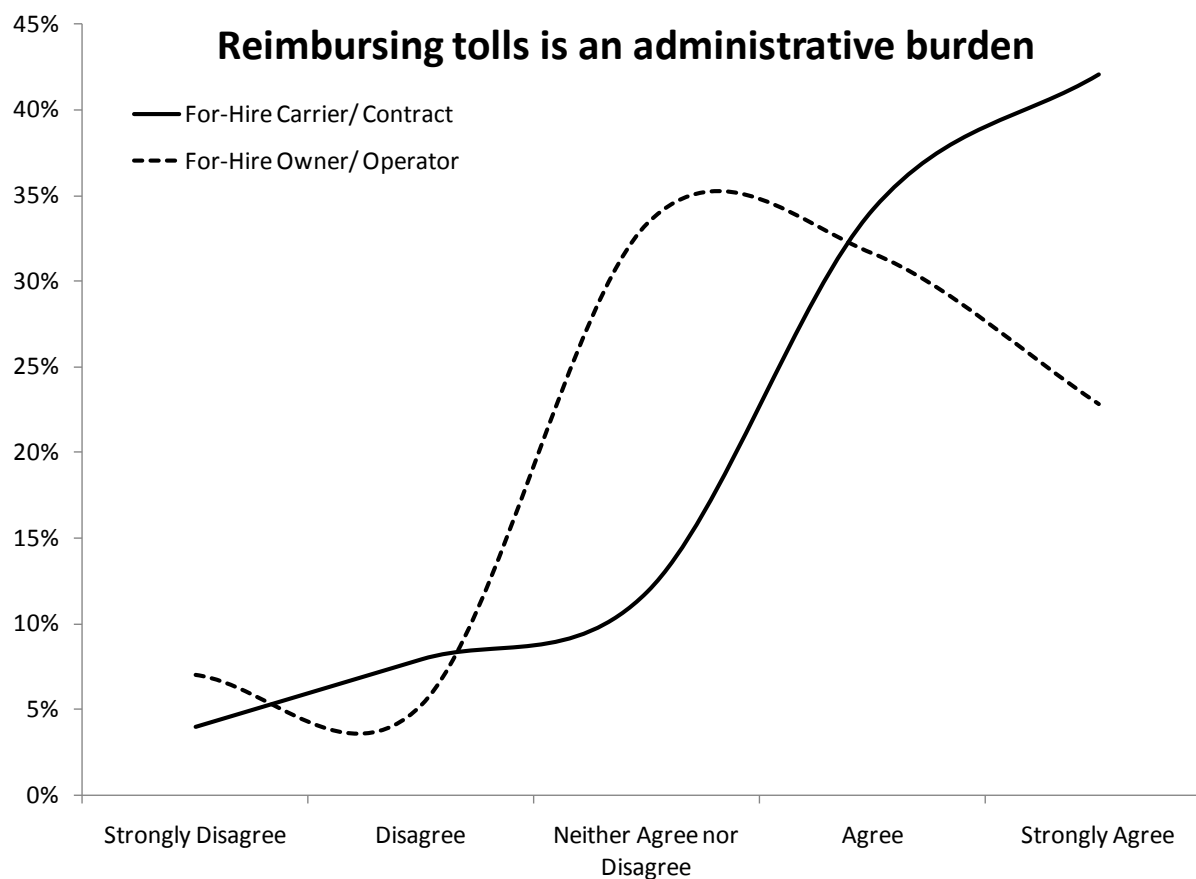
Figure 8: Affect of Driver Experience on Toll Avoidance

Analyzing the responses of the owner/operator drivers further revealed that opinions concerning the above statement differed even more when years of experience was taken in to consideration. Owner/operators with 10 years or less of experience typically 'disagreed' with the statement whereas owner/operators with more than 10 years of experience generally 'agreed' or 'strongly agreed' with the statement. It appears that long-time owner/operators are much more likely to add miles to their route in order to avoid a toll than their less experienced counterparts who seem to generally accept tolls.

Question 15: Reimbursing tolls is an administrative burden

The above statement was only asked of non-drivers within the trucking business. Responses from for-hire owner/operator companies differed greatly from for-hire carrier/contract operations. While only approximately 12% of each group disagreed or strongly disagreed with the statement, 42% of carrier/contract operators strongly agreed with the statement whereas only 23% of owner/operators strongly agreed. This may indicate that carrier/contract operators feel a heavier administrative burden due to operating more trucks on more varied routes and therefore encountering different toll systems than owner/operators feel affect their business.

Figure 9: Opinion on Administrative Burden of Tolls



Personal Surveys at Trucking Industry Trade Shows

Data for this analysis were obtained through independent surveys conducted at trucking industry trade shows in Charlotte, North Carolina and Dallas, Texas (see Appendices “C” and “D” for the survey instruments). Through these surveys, truckers were polled on various characteristics of their company’s operations, and most importantly, whether or not they choose to use an un-tolled route in lieu of a toll road. To interpret these results, statistical analysis was used to answer four main questions:

- 1) Does the type of firm (independent owner-operator, company driver, other) influence toll avoidance?
- 2) Does the company’s type of trucking operation (Less than Truckload (LTL), full truckload, et al) influence toll avoidance?
- 3) Does toll reimbursement or ability to pass tolls on to customers influence toll avoidance?
- 4) Does the party responsible for trip routing (owner, dispatcher, or driver) influence toll avoidance?

The Charlotte and Dallas surveys each included a slightly different set of questions. After the survey was tested at the Dallas truck show, updates were made to improve the effectiveness of the survey

instrument itself. Therefore it was not statistically valid to comingle the results. An independent analysis was conducted for each set of responses and results of each analysis are reported separately.

Methodology

The results presented in this section are based on binomial logit regression analysis conducted using EViews software—EViews is a PC-based statistical modeling tool specifically designed to conduct regression analysis of various types, including binomial logit regression modeling. All of the results in this analysis are interpretations of the regression outputs at a 95-percent confidence level, meaning there is a 95-percent certainty of the results being correct.

Logistic regression is a statistical method commonly used to predict the likelihood of an event occurring based on a number of given variables. In this case, the event occurring is the avoidance of a toll road, and the variables include ownership, operation, and reimbursement policies. “Binomial” refers to the fact that there are only two possible outcomes that the regression can predict; in this case, whether a driver will avoid a toll road or not avoid a toll. The results of a logit model allow an analyst to determine which variables, if any, increased the probability of a decision being made and by how much. In short, logit regression modeling identifies which factors best explain the likelihood of toll avoidance, and the magnitude of each factor’s influence.

Each question examined was conducted as a separate model, holding all other factors constant unless otherwise stated (to “hold all else constant” is to ignore all other known and unknown variables which may influence the relationship between the variable in question (e.g. type of firm) and decision to take a toll road). This means that one cannot compare the coefficient magnitudes of one model against the magnitudes of another; they must be taken in isolation with their individual model.

In the results below, which show probability of an event presented as magnitude of influence, it is important to note how to interpret the figures; interpreting a finding as being “8.3 times more likely” can be explained in two steps:

1. Of the options respondents were given (e.g., independent owner-operator, company driver, other), this statistic compares those who answered “independent owner-operators” to those who answered the other two options combined.
2. If an independent owner-operator is 8.3 times more likely than all other respondents to avoid a toll road, he will do so 8.3 times for every one time all other respondents (company drivers and “other”) do collectively.

Although the magnitudes of the probabilities can be calculated from the logit regression coefficients, they must be observed with caution. These impacts can change in any given model depending on how many, and which types of other variables are included. A better way of looking at these magnitudes is to assess the relative differences among the variables, which allows one to see which variable had the strongest influence over the probability of toll avoidance strictly in comparison only to the other variables examined.

Results from each survey are presented in the following sections first with a summary, followed by detailed answers to the questions outlined earlier in this section.

Charlotte

Analysts working on this research project attended the Charlotte Diesel Super Show, October 8 and 9, 2010, at the Z-Max Dragway in Concord, North Carolina. The analysts staffed a booth situated with other vendors, and intercepted attendees for their voluntary responses to the toll road survey.

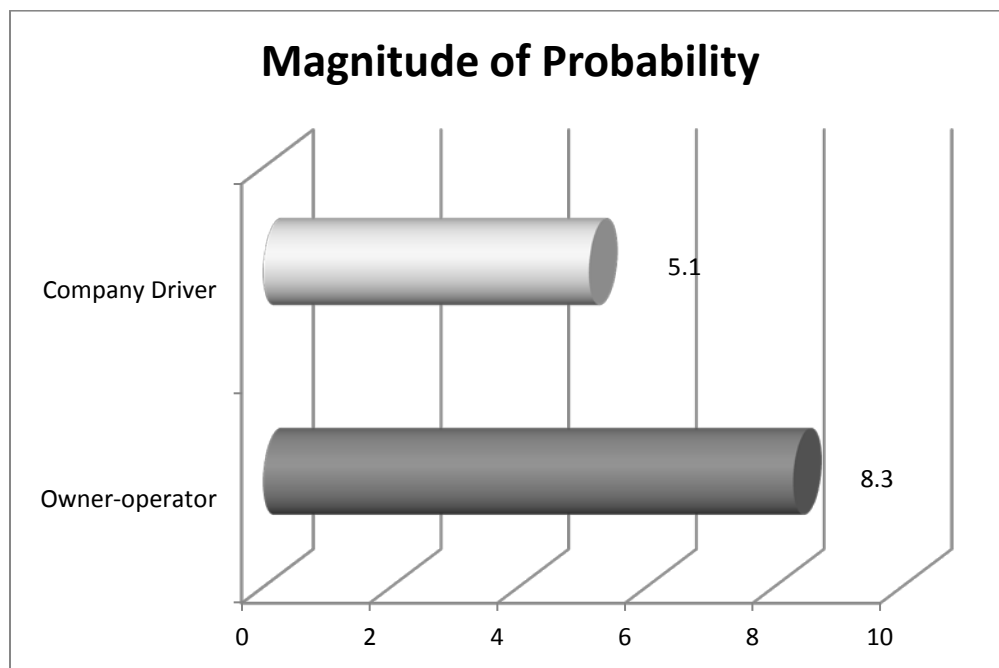
Does the type of firm influence the decision to take a toll road?

At the Charlotte truck show, respondents could classify themselves as working for three different types of trucking firm:

- Independent Owner Operator
- Company Driver
- Other

Respondents identifying as independent owner-operator or company driver showed an increased probability of toll avoidance. Independent owner-operators were 8.3 times more likely than all other respondents to have chosen a free and/or alternate route instead of taking a toll road. Company drivers also showed an increased probability of toll avoidance, although less so at 5.1 times more likely than all other respondents. Respondents identifying as “other” were neither more nor less likely to have avoided a toll than all other respondents at a statistically significant level.

Figure 10: Probability of Avoiding Toll Road, by Type of Firm



These responses suggest that overall, respondents who have independence over routing are much more likely than any other type of operation to choose a free route over a toll road. Similarly, respondents

identified as company drivers are still more likely to avoid a toll than all other respondents, suggesting that, in general, most drivers in either situation are likely to have avoided a toll road.

Does the company's type of trucking operation (LTL, full truckload, specialized, drayage, other) influence the decision to take a toll road?

This question required a slightly different analytical approach because respondents were able to select more than one option:

- LTL
- Full Truckload
- Specialized
- Drayage
- Other (please specify)

For purposes of this analysis, responses in which the respondent selected “drayage” were excluded due to an insufficient sample size.

Of the remaining trucking types, the only statistically significant factor was among respondents who selected “full truckload.” These drivers were 16.3 times more likely than all other respondents to have chosen a free and/or alternate route instead of taking a toll road. All other responses, including LTL, specialized, and “other” did not influence the probability of avoiding a toll at a statistically significant level.

Does toll reimbursement or ability to pass tolls on to customers influence the decision to take a toll road?

Two questions assessed whether toll reimbursement affected the decision to take a toll road:

- Do you get reimbursed for tolls? (yes, no)
- Does the cost of the tolls you pay get passed on to the customer? (yes, no, don't know)

Based on surveys from all Charlotte respondents, neither toll reimbursement nor passing tolls on to customers influenced whether a respondent chooses to use a free and/or alternate route instead of taking a toll road. On face value, this appears to be counterintuitive, as one may expect that drivers who are not reimbursed would be more likely to avoid tolls. Similarly, one may expect drivers who are reimbursed to prefer toll roads under the assumption that it is the fastest route.

There may be other factors involved to explain these results. For example, toll reimbursement in and of itself wouldn't factor into a routing decision, if in fact a driver did not have the cash in-pocket to pay the toll.

Does the party responsible for trip routing (owner-operator, dispatcher, driver, other) influence the decision to take a toll road?

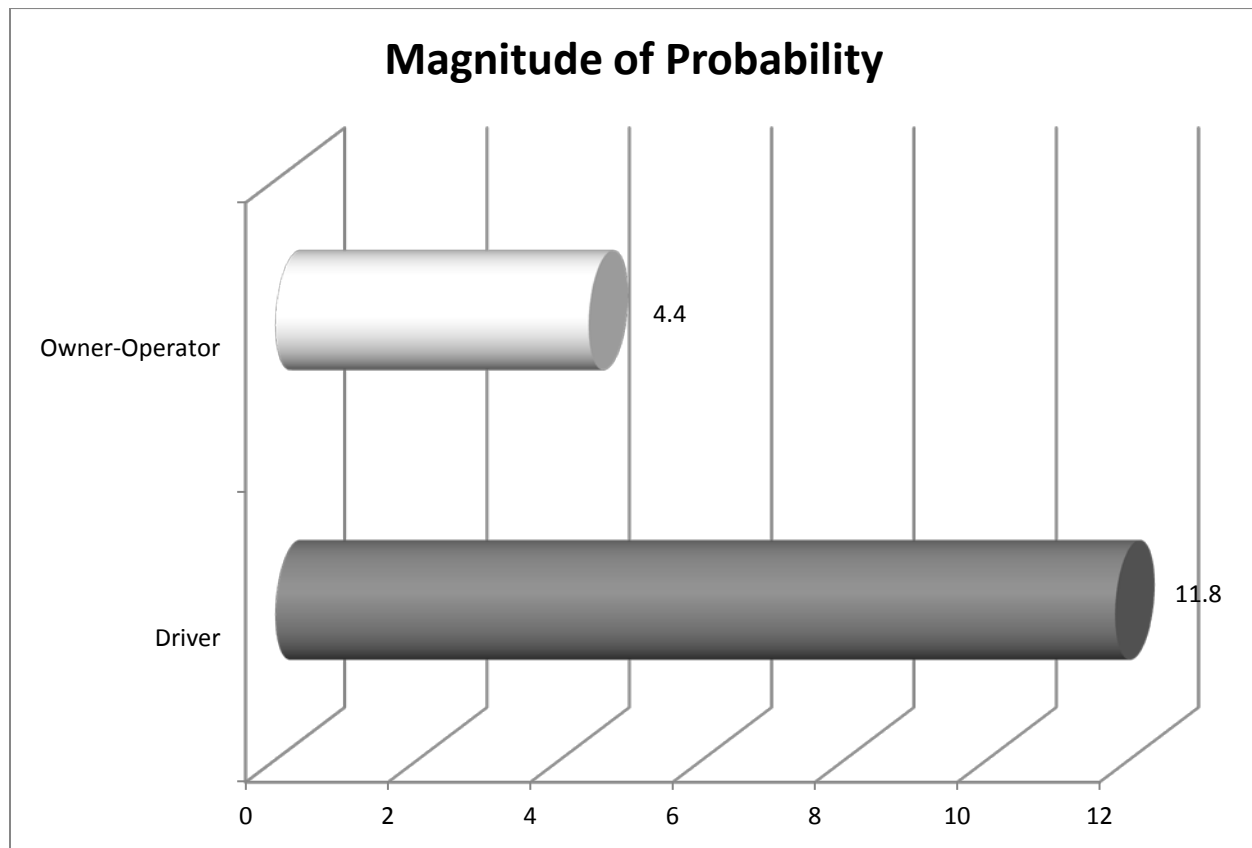
The Charlotte survey queried “who has control over truck routing?”

- Owner/operator

- The driver
- The dispatcher
- Depends on the situation (please explain)

Respondents who indicated that the driver had control over trip routing were 11.8 times more likely than all other respondents to avoid a toll. Respondents who identified the owner-operator as responsible were 4.4 times more likely than other all respondents to avoid a toll. These strong magnitudes, particularly among driver control, suggest that the party responsible for choosing the trip route is a powerful determinant of toll toad avoidance.

Figure 11: Toll Road Avoidance, by Responsibility for Routing (Charlotte)



It should be noted that due to the wording of the question, it is possible for “driver” and “owner-operator” to have the same meaning. In all cases, the owner-operator of a vehicle is also the driver and as a result of this ambiguity, the respondent’s choice to select “driver” rather than “owner-operator” may have been arbitrary. Responses indicating dispatcher responsibility or that responsibility “depends on the situation” did not influence the probability of avoiding a toll at a statistically significant level.

Summary of Results from Charlotte

- Those acting as independent owner-operators were the type of respondent most likely to avoid a toll. This is followed by company drivers, which also increased likelihood, but not as strongly.

- Those performing full truckload operations were the type of respondent most likely to avoid a toll. LTL, specialized, drayage, and all other types did not have any statistically significant influence over toll avoidance.
- Neither toll reimbursement nor passing toll costs onto customers predicted a respondent's likelihood of avoiding a toll at a statistically significant level.
- Respondents were most likely to avoid a toll when the control over trip routing was left to the driver, followed by those whose routing decisions were made by the owner-operator. Although oftentimes the owner-operator and the driver are the same entity, respondents who selected "driver" may also be company drivers, and as such the two must be considered independently for purposes of this analysis.

Dallas

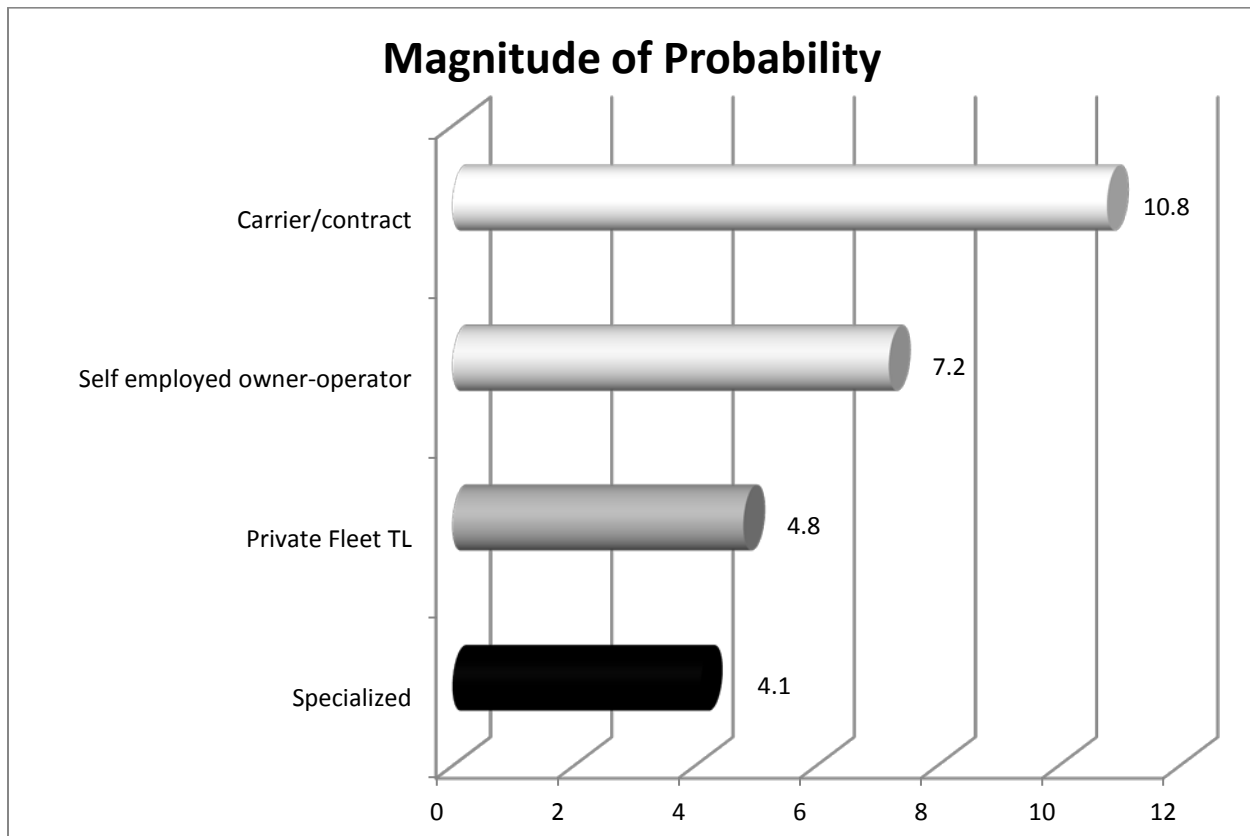
Analysts working on this research project attended the Great American Trucking Show, August 26 – 28, 2010, at the Dallas Convention Center in Dallas Texas. The analysts staffed a booth situated with other vendors, and intercepted attendees for their voluntary responses to the toll road survey.

- Several types of trucking operations increased the likelihood of toll avoidance relative to all other respondents. In order of magnitude, they include: 1) other operation type; 2) for hire truckload, carrier/contract; 3) for hire truckload, self-employed owner-operator; 4) private fleet truckload; and 5) specialized.
- Toll reimbursement did not influence the likelihood of toll avoidance across all respondents.
- Respondents were most likely to avoid a toll when control over trip routing was left to the driver. When responsibility for trip routing was left to the company, respondents were neither more nor less likely to avoid a toll.

Does the type of firm influence the decision to take a toll road? Does the company's type of trucking operation (LTL, full truckload, et al) influence the decision to take a toll road?

Unlike the Charlotte survey, respondents in Dallas were not asked directly what type of firm they worked for. Instead, respondents could identify themselves as owner-operators when asked to describe their company's operation. The following company operation types were statistically significant in their influence of toll avoidance:

Figure 12: Toll Road Avoidance, by Type of Firm (Dallas)



The strongest influence over likelihood of toll avoidance is for those selecting “Other operation type,” followed by “For hire TL, carrier contract.” However, the “Other” category has broad meaning and does not have enough consistent responses to interpret further. Also, some responses in the “Other” category may fall into the other identified categories.

Overall, for-hire truckload drivers, whether carrier/contract or self-employed owner-operator, appeared to be the most likely to avoid a toll. This is consistent with the Charlotte survey, where those identified as owner-operator were the most likely to avoid a toll. Because the category options between the two surveys were different, it is not feasible to directly compare the two.

Does toll reimbursement influence the decision to take a toll road?

The Dallas survey differed from Charlotte in that respondents were not asked about the ability to pass the cost of tolls directly on to customers. Additionally, respondents in Dallas were asked to provide more detail into toll reimbursement, with four different scenarios and a four-point scale from “always” to “never.” Respondents were asked if they are reimbursed when a) they take a toll to save time; b) they take a toll road because there is no alternative route; c) they take a toll road because a dispatcher directs them to; or d) they take a toll for any reason.

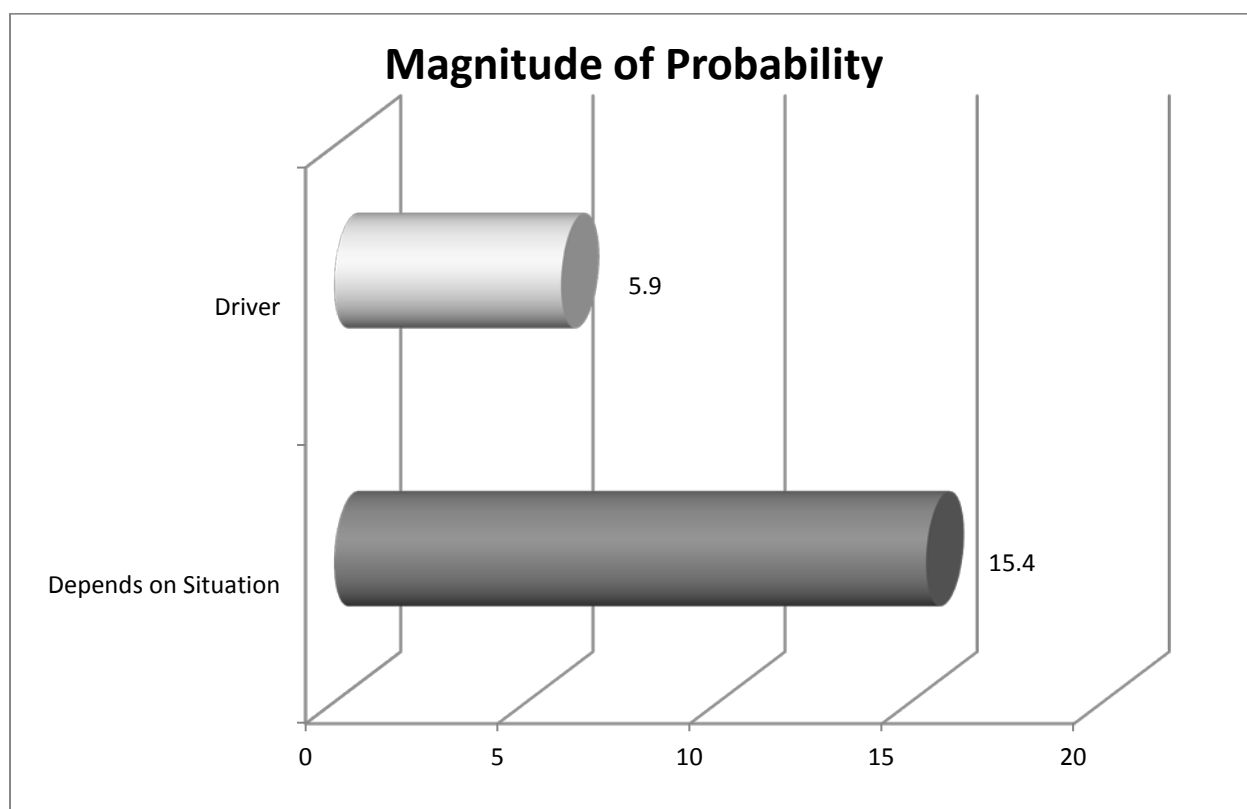
Based on surveys from all respondents, there was no evidence to suggest that toll reimbursement influenced whether a respondent had avoided a toll road. Like in the Charlotte survey, this again

appears counterintuitive, as one would expect there to be a statistically significant relationship due to the reasons mentioned previously. Because both surveys suggested no relationship, it becomes more plausible that that toll reimbursement does not play a significant role in influencing whether or not a driver will use or avoid a toll road, and that the other variables examined are more effective at explaining the likelihood of toll avoidance.

Does the party responsible for trip routing (driver, company, other) influence the decision to take a toll road?

Respondents who selected “driver” or “depends on the situation,” were statistically more likely to avoid a toll if all else is held constant. Drivers who made their own routing decision were 5.9 times more likely than all other respondents to avoid a toll road. Drivers who selected “depends on the situation” were 15.4 times more likely than all other respondents to avoid a toll road.

Figure 13: Toll Avoidance, by Party Responsible for Routing (Dallas)



That driver-routing increased the likelihood of toll avoidance is consistent with the Charlotte survey, suggesting there is something about the driver’s behavior and attitudes towards tolling that influences them to avoid tolls. Conversely, companies who make routing decisions do not appear to guide their drivers to avoid tolls one way or another.

The “routing depends on the situation” option likely derives its strong magnitude due to the trip allowing for an alternative toll-free route to be considered should one be available. Many drivers elaborated on this reply by explaining that these circumstances often involved both the driver and

company deciding together which route to take. Others indicated that the commodity type or sensitivity of time would alter the routing decision.

Shipper/Beneficial Cargo Owner Attitudes

In spite of extensive outreach to shippers, the web-based survey did not get enough responses to draw statistically valid data. So instead, the research team relied on previous portions of the research, where shippers were interviewed about their role in toll transactions and willingness to pay, and follow up interviews at the Council of Supply Chain Management Professionals and National Industrial Transportation League.

The research found that shippers prefer to deal on a basis of service and price, with a minimum of surcharges or extra cost items to account for. Shippers expect that their third party logistics service providers, or their trucking companies, will include toll charges in their bid. Decisions on routing, or whether or not to use toll routes, are most often left to the trucking company, whose bid must reflect their assumptions about the need and benefit of using toll facilities to meet the shipper's cost/service demands.

Key Findings

The research developed a large dataset which could be analyzed and parsed to develop the most important findings. Overall, the research team was operating under the hypothesis that one or more of the following factors would affect the willingness to pay tolls:

Position in the Trucking Transaction

- Driver (representing the employee who has the primary interface and decision with tolling)
- Dispatcher/fleet manager (representing management)
- Shipper/receiver/third-party logistics agent (3PL): representing the cargo owner, and/or the entity that arranges freight transportation, including cost and service parameters, and possibly accessorial charges such as for fuel and tolls.

Type of Trucking Services

- Local delivery
- Drayage
- Specialized
- Local LTL
- Private Fleet TL
- For hire TL, Carrier/contract
- For hire TL, self employed Owner Operator

Other Factors

- Toll reimbursement policies
- Party responsible for trip routing (owner, dispatcher, driver)
- Industry Tenure
- Typical Haul Mileage
- Typical Driving Environment
- Opportunity/Familiarity with Toll Roads

Attitudes about Toll Roads

While sophisticated analytical techniques provide statistical certainty for survey analysis, the starting point should begin with attitudes about toll roads, because these attitudes might color all other survey responses. The negative opinion of toll roads and tolling as finance policy were so strong, the research team ascribed some respondents as “principled objectors” to toll roads, meaning that their passionate opinions could affect their attitudes about using toll roads. This passion is reflected in the overwhelming agreement to the following statements:

- “Toll roads are too expensive”
- “Toll roads exist mainly to make money for the government”
- “Toll roads are too expensive for what they provide”
- “I avoid toll roads whenever I can”

Conversely, there was overwhelming disagreement with these positive statements about toll roads:

- “Toll roads are a more fair way of funding maintenance and construction”
- “Toll roads help drivers comply with hours of service rules”
- “Toll roads improve on time performance”

Due to the principled objection to tolls of many survey respondents, the research team believes that some survey data is skewed, with lower willingness to pay tolls than would otherwise be observed.

Other Findings

There was a divergence in the responses of Owner/Operator drivers, regarding their willingness to avoid a toll road, based on their tenure in the industry. Those drivers with 10 years or less in the industry were far less likely to avoid toll roads, than were those drivers with 10 or more years in the industry.

Regarding tolls as an administrative burden, there was a divergence between for-hire carrier/contract respondents, and for-hire owner operators; in this instance, 42 percent of carrier/contract operators strongly agreed that reimbursing tolls is an administrative burden, whereas only 23 percent of owner/operators responded similarly. One explanation might be that owner operators have far less paperwork or number of employees to reimburse, so the question was moot to them.

Statistically Significant Web-Based Survey Analysis

The survey administered through a web portal provided respondents with three hypothetical toll road scenarios, each with associated time savings and toll charges. Respondents had the ability to select different toll rates for each scenario, which would in turn reflect their “willingness to pay” tolls in exchange for certain level of mileage or time savings. While the survey respondents were presented with realistic toll options (e.g., up to \$32 in one of the scenarios), their stated willingness to pay skewed toward \$0.00 or \$0.50, which was nowhere near to the value of time presented in the scenario. The research team believes this skew toward very low tolls reflects a principled objection mentioned earlier.

There were a few scenarios which revealed, with statistical significance, that certain drivers would be willing to pay some toll in exchange for time savings.

Turnpike/Long Distance Toll Road Scenario

The turnpike scenario involved the option of using a toll road over a distance of 100 miles, or secondary roads that would increase travel time by 30 minutes. In this scenario, the research team found that drivers who were familiar with toll road alternatives in their daily work were willing to pay a “token” toll amount. No other factor showed statistical significance in the willingness to pay tolls.

Bypass Scenario

The bypass scenario envisioned a toll road alternative that would reduce travel time by 15 minutes over a long haul drive. This scenario drew statistically significant conclusions from long haul drivers (500 miles or more typical), who showed strong unwillingness to pay more than a token toll amount. The reason for this unwillingness to pay might be that long haul truckers factor in delays over their trip length, such that the bypass scenario presented did not offer a strong value for the toll.

Bridge Scenario

The bridge scenario produced a number of interesting results; it presented an urban environment, with a toll bridge alternative for \$16, versus a free bridge that added 20 minutes to the trip.

In a simple hedonistic stated preference for this scenario, there was a significant difference between drivers and dispatchers in their willingness to take the toll bridge. Dispatchers were much more willing to take the toll bridge route than drivers, perhaps reflecting that dispatchers perceived a greater value for time benefit in this instance.

This drivers who described their typical driving environment as “urban” expressed a strong willingness to pay a “real” toll for this scenario, rather than just some token amount. This could be explained by the urban drivers being more familiar with toll bridges and recognizing their time savings value.

In Person Survey Analysis

Type of Trucking Driver: Analysis from the Charlotte Truck Show indicated that Owner-Operators were 8.3 times more likely to avoid a toll road than all other types of firms; and that Company Drivers were 5.1 times more likely.

Analysis from Dallas showed carrier/contract 10.8 times more likely to avoid tolls; owner operator 7.2 times more likely; private fleet TL 4.8 times more likely; and specialized 4.1 times more likely

The only statistically significant response here was drivers who selected full truckload, which were 16.3 times more likely than other respondents to avoid tolls.

Ability to pass tolls to customers/get reimbursed: No significant responses (Charlotte or Dallas)

Responsibility for Trip Routing: Driver was 11.8 times more likely to avoid a toll road, than owner operator or dispatcher, though driver and owner/operator could be one in the same here (Charlotte).

Driver 5.9 times more likely in Dallas, and ‘depends on situation’ is 15.4 times more likely.

Shipper/Beneficial Cargo Owner Attitudes

The research did not reveal any bias on the part of shippers, or third party logistic service providers, to use or avoid toll roads. Rather, shippers are requested a bid based on their service requirements, and expect trucking companies or third party logistic service providers to price tolls or any other ancillary charges into their bid.

Chapter 4 Conclusions and Suggested Research

The research revealed a number of intriguing findings and helped to identify some niches in the goods movement industry where there is willingness to pay tolls. The findings might have been tempered, however, by overall negative attitudes about toll roads. Opportunities and constraints emerging from this research are discussed below.

Negative Attitudes about Toll Roads

Across all segments of the trucking industry—including different types of drivers, and different types of trucking operations—there are overwhelmingly negative attitudes about toll roads. These attitudes were so pervasive that they might have negatively affected receiving a true response to willingness to pay scenarios.

As this report is being developed, there are forecasts for drastic decreases in the federal-aid highway program, which would leave toll finance as the most viable alternative to a fuel-tax finance system. In addition, there are a number of innovative proposals for truck lanes to segregate traffic flow, which could be toll-financed. Truck drivers' attitudes about toll roads create a significant constraint to industry acceptance of such toll road proposals and policies.

The negative perceptions of toll roads reflect some long-standing biases:

- That the highway system “has already been paid for,” which ignores the investment needs in pavement and bridge reconstruction, and new capacity
- Tolls are just a way to raise revenue for the government, which ignores that nearly all tolls are directly linked to finance a road or bridge—i.e., a direct user fee

Current federal law is a reflection of political attitudes toward tolling. Expanding toll finance for existing interstate highways is limited to three projects under a “pilot” program. This is not a widespread embrace of tolling by the body politic.

On the other hand, advocacy for toll financing is limited to only a few institutions, such as some academics, free-market advocacy organizations, and financial advisory companies. Where negative attitudes are a constraint to expanding toll financing, there is also the need—if not opportunity—for a sustained policy and public education effort, which would attempt to make toll finance more palatable to certain user groups.

User Groups with some Amenability toward Tolls

Research revealed a few instances where certain types of truckers, trucking operations, or other attributes, provided some more likelihood to use toll facilities.

- Those drivers familiar with toll roads (opportunity to use a toll road more than 10 percent of their time) were willing to pay some token amount for a toll
- In a congested urban situation, both dispatchers and drivers used to an urban driving environment, expressed willingness to pay a “real” toll amount for the time savings offered by a toll facility

The research team's supposition is that "familiarity" with toll facilities produced a greater willingness to pay tolls. This finding is drawn from the fact that drivers who could take a toll road for 10 percent or more of their trips, were willing to pay a token toll amount, which probably reflects that this population does indeed use toll roads. Similarly, drivers in an urban setting expressed a strong willingness to pay a real amount for the time saved in the "bridge tolling scenario," which again could be a reflection of familiarity with toll roads.

These findings provide an opportunity to expand the understanding of toll road benefits, leveraging users who are already familiar with toll facilities.

Toll Payment and Reimbursement

The research team thought that the ability to pass toll charges onto customers, or the ability to be reimbursed for tolls by customers, would positively impact toll road acceptance. This decidedly was not the case, as reimbursement or pass through had no effect. Apparently, the transaction of paying the tolls, then waiting for reimbursement, remains a burden to overcome.

Interviews conducted in the first part of the research effort indicated that some drivers and/or drayage companies experience a high incidence of "short payment" of invoices by shippers. Essentially, shippers were refusing to pay for tolls, either in attempt to cut their costs, or because the trucking company did not offer proper documentation of toll charges. While there was no investigation of how widespread this practice is, its negative effect on toll road acceptance would be understandable.

Also, the research considered how tolls charges represent cash out-of-pocket for truckers and trucking companies. For example, a fully loaded, five axle tractor trailer, traveling from Chicago to Philadelphia by way of the Indiana, Ohio and Pennsylvania toll roads, would experience cash toll charges of about \$238 for the trip. Toll charges could easily exceed \$1,000 per week. If one considers the average salary for a truck driver being \$35,000 to \$50,000 annually, the out of pocket cash burden of toll charges must be considered, whether or not the driver receives reimbursement.

Electronic toll collection certainly makes it easier to pay for tolls, and many industry observers believe that the market penetration of electronic toll collection (and trucks equipped with transponders) will increase in the coming decades. It is possible that electronic toll collection will improve the ability to pass toll charges through to shippers, but it is difficult to estimate this impact.

Shippers

Ultimately, the cost of transportation is reflected in all the goods produced and consumed. Somehow, cargo owners "pay the freight," and pass that cost onto the ultimate consumer. To the extent that a trucking company is unable to pass toll costs onto the shipper, toll charges become more than just an administrative nuisance and in fact reduce a trucking company's revenue, profit, and owner's equity.

In the course of this research, shippers made it very clear that they do not oppose toll roads, but rather, they prefer all toll charges to be reflected in the trucking company's bid. If such toll "pass through" to shippers could be made easier for drivers and trucking companies, toll roads might become more palatable.

Concepts to Aid Toll Road Acceptance and Development in the Freight Community

From the research, there emerge a few concepts to overcome the opposition to toll roads by different segments of the freight industry.

“Transition” to Toll Facilities for Trucking Companies

The research shows that there is greater acceptance of toll facilities, where the trucking industry has more familiarity with them—either in driving in urban environments with toll roads, or having the opportunity to use them on a regular basis.

Many policy changes, such as the imposition of tolls, provoke negative reactions due to a psychological “status quo bias.” Such would be the case if imposing tolls on an existing facility, or developing truck lanes.

A potential solution would be to develop a transition period to “ramp up” tolls on a new facility. While some toll roads have used a short ramp up period (e.g., one month), the vision suggested here is to have a long ramp up period, on the order of five to 10 years, before truck tolls were fully implemented. The intent would be to impose very low tolls at first to get the trucking industry more familiar with the concept of tolling, transponder equipment, and toll accounting. Truck tolls would be fully imposed at the end of a long (5 or 10 year) ramp up period. The cost of such an implementation could be included in the overall cost of a long term concession, or covered by the public sector through an availability payment structure.

Offering Additional Value over the Status Quo

It is fairly clear that the general public and trucking companies do not want to pay tolls for highways and bridges that they once received for “free.” This partially explains the reason that some sectors of the transportation community accept the concept of tolls for new capacity, but not for existing capacity.

Additional benefits could make toll roads attractive to trucking companies; for example, a clearer value-for-money benefit for trucking companies, by developing toll roads with higher weight limits and/or longer combination vehicles. A concept for a network of heavy/long combination trucks was developed by the *Reason Foundation*, and has been embodied at least in part in some FHWA “Corridor of the Future” plans.

Toll Policy Awareness, Education and Outreach

The transportation community faces a perennial challenge in “making the case” for adequate transportation investments. The American Association of State Highway and Transportation Officials, the American Road and Transportation Builders Association, and other organizations provide regular analysis of investment needs and estimates of the economic return on investment. A similar advocacy for toll funding and financing is basically nonexistent in most transportation policy development, as constituent groups seem content to finance roads through traditional grant programs, and turn to toll finance as a last resort. In contrast to the aforementioned efforts to advocate for tax-based funding programs, there appears to be a clear need and opportunity to communicate the benefits of toll facility finance and development, those being:

- Faster and more certain delivery of critical infrastructure
- Congestion relief
- More expansive truck service facilities
- Higher weight limits and allowance for longer combination vehicles

Suggestions for Additional Research

The survey method used in this research sought to determine specific price points at which various actors in the trucking transaction would use or avoid a toll road. By using hypothetical scenarios, however, survey respondents expressed virtually no willingness to pay a toll, and thus the value of a toll road could not be determined.

The stated preferences of survey respondents—especially truck drivers—run counter to empirical observations. Specifically, there are various parts of the country with both toll roads and expressways which are optional routes for trucks, and the use and avoidance of toll roads can be observed.

There are two possible deficiencies with asking trucking companies or truck drivers their stated preference to pay a toll:

- Some trucking companies and truck drivers cannot calculate, implicitly or explicitly, the value of a toll road option;
- For some trucking operations—especially large private fleets and TL carriers—the cost of tolls is readily calculated and figured into the rate structure, such that the truck driver does not have to consider toll road costs.

To provide granularity in the value derived from toll roads, three types of additional research are suggested:

1. Truck driver intercept interviews. In this survey method, researchers would intercept truck drivers at known locations which offer a decision between a toll road and a “free” route. Examples would include a rest area or truck stop. Researchers would intercept truck drivers and ask for voluntary responses to key profile questions, using the industry parameters developed in this report; and short questions for the route they are choosing for their trip, and justification for route choice. Research conducted over two or three days should produce at least 200 valid responses. Locations for the research should include at least six different geographic areas of the county, with probable locations including the greater Chicago area, the New York metropolitan area, and points along rural toll routes which are known diversion points. This survey methodology would generate a sample size of at least 1,200, which should be valid for statistical analysis.
2. Focused interviews with officials in the accounting and/or pricing departments of large private fleet and TL carrier operations. With this survey method, the appropriate accounting/pricing personnel from six to ten trucking operations would be identified and contacted for a focused interview to determine how toll rates are calculated in freight rates, and how the routing

decision (toll road or other) is communicated to the operations unit of the companies—dispatchers and truck drivers.

3. Focused interviews with six to ten independent owner-operator trucking operations, which have a relatively small fleet of trucks (less than 20). While the interview would be similar to ones with officials from larger private fleet and TL carrier operations, a further objective of these interviews would be to understand the accounting and cash flow restrictions of smaller companies, which is thought to lead to toll road diversion. Also, the research would seek to understand the methods used by smaller companies to formulate rate quotes, how tolls are taken into consideration in those rate quotes, and the companies' ability to monetize the benefits of toll roads.
4. Specific impacts of electronic tolling: electronic tolling technology has reached a high level of viability and market penetration at most major toll facilities. As trucking firms increase their deployment of toll tags, it is worthwhile to estimate specific impacts on toll road use, and forecasting additional toll road utilization as truck tolling becomes even more ubiquitous.

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Appendix A: Literature Review

The objective of NCFRP 19: Truck Tolling--Understanding Industry Tradeoffs When Using or Avoiding Toll Facilities is to identify the value that goods movement businesses seek from the transportation roadway network and their willingness to pay tolls for that value. This literature review examines the extent to which existing journals, program accounts and industry research sources have confronted those same issues. To accomplish this, literature was selected with an eye for concerns noted by trucking specialists. Documents were sourced from the TRB's TRIS database, as well as DOT websites and the research team's internal documents. While there is a large body of literature on traffic modeling in general, only broad generalizations exist for predicting the percentage of trucks that will take or avoid a toll facility.

Standard Methods of Modeling Truck Toll Traffic

In the feasibility studies and environmental impact statements reviewed, a well-developed set of methods are used to produce toll traffic and revenue forecasts. Although these methods are accepted practice, their variability (particularly during the ramp up period) demonstrates the difficulty of making *any* traffic forecast accurately. The document *Estimating Toll Road Demand and Revenue* found that only two of 26 toll roads opened in the US between 1986 and 2004 were able to forecast revenues within 10 percent (Kriger, et al., 2006). Furthermore, it was noted that results did not improve with newer facilities or for a given authority.

Most toll revenue forecasts begin with a model that describes current traffic flow. In the case where the facility already exists, the model is typically taken as the baseline for volume and percentage of trucks (Washington State Department of Transportation, 2010). When there isn't a facility already, analysts amalgamate a baseline using local traffic count observations and predictions from nearby regional models. These methods are intended to describe the pre-tolling traffic flow, so that planners can estimate how tolling might affect traffic flow and generate revenue.

Planners predict traffic flow and revenue potential from assumptions about user preference. The most common survey types—stated preference and revealed preference—attempt to quantify how travelers respond to different toll scenarios. Stated preference surveys estimate the value of time by determining how road price affects route selection by asking respondents for their preferences (URS Corporation, Vollmer Associates, 2005). In this way, stated preference surveys estimate the value of time and how that value changes throughout the day.

These analyses are used for developing a *value of time* (VOT) matrix. VOT is the financial value travelers ascribe to their travel time (Kriger, et al., 2006). Forecasters use VOT as the driver's rational route choice decision. A driver elects to use a tolled facility, rather than a non-tolled route, from a cost-benefit decision rationalizing that individual's highest economic advantage. The matrix is comprised of categories including trip purpose, mode, income level, direction, or time of day.

Analyses that measure freight VOT are often supplemented by industry wage data for freight vehicle drivers. In most cases, VOT is adjusted to 50 percent of the average gross wage rate, though there are

also studies where VOT is offset by as little as 22 percent or as much as 100 percent of the wage rate (Washington State Department of Transportation, 2010). A criticism of this method is that even an adjusted value of time doesn't capture an individual driver's preferences; a truck cannot have a VOT, only a driver or firm can. Neither do they account for the wide range of incentives that affect a driver's route choice (Kriger, et al., 2006). Methods for establishing toll-rates—the calculated auto toll multiplied by the number of axles (Washington State Department of Transportation, 2010)—assume a freight carriers' value of time is derived by the same factors that influence route selection for total mixed population. This is often too simplistic.

Factors Affecting Truckers' Willingness to Pay Tolls

The willingness of a truck driver to pay a toll is typically discussed in terms of price elasticity and diversion. Price elasticity is a general economic term defined as the change in quantity demanded divided by the change in price. Price elasticity is discussed in toll revenue models to assess how much revenue will change given an incremental price change.

Figure 14: Price Elasticity of Demand

$$E_d = \frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}} = \frac{\Delta Q_d / Q_d}{\Delta P_d / P_d}$$

Price elasticity of tolls for trucks varies greatly by facility, observed at 0, or completely inelastic at the low end, up to -0.95 at the upper limit in the documents reviewed (McKnight, et al., 1992). For toll facilities, price elasticity is usually discussed in terms of diversion. Diversion is the change in behavior due to a toll facility. Diversion can take the form of choosing an alternate route, changing the time of day of travel, changing the mode of transportation (e.g. rail), or canceling the trip altogether. The discussion below outlines some the factors affecting the willingness to pay tolls, with estimates of elasticity where available.

Alternative Routes

One of the largest factors determining the price elasticity and diversion of trucks from tolled facilities is the availability of alternative routes. A study of the New York Tri-Borough area bridges and tunnels revealed price elasticity ranging from 0 (completely inelastic) to -0.95 (elastic) for trucks depending on the size of truck and bridge studied (McKnight, et al., 1992). The Verrazano Narrows Bridge has no reasonable alternative routes for truckers, causing price inelasticity and low diversion since truckers are veritably forced to pay tolls. At the other end of the spectrum, tolling of I-80 in Wyoming is expected to cause 46 percent of freight traffic to divert at the revenue-maximizing truck toll of \$116 per trip (Parsons Brinckerhoff, 2009).

Inflexibility of Receivers

Freight companies have cited the inflexibility of receivers as a reason for not diverting to another time of day or alternate route. One study evaluating the time of day pricing initiative of the PANY/NJ found that 6.1 percent of carriers shifted their time of travel in response to new toll rates. A majority of carriers

that did not change behavior (67 percent) cited the inflexibility of receivers to accept off-peak deliveries as the key reason. Carriers suggested that, in order to move truck traffic to off-peak hours in significant numbers, comprehensive policies targeting receivers and carriers must be implemented (Holguin-Veras, et al., 2005):

[The commercial focus group was] very skeptical that they could influence the receiver to accept goods off-peak if that was not the receiver's typical schedule. They believed that receivers would only do it if the receiver got a big benefit from it and the trucker benefited from going at night. Otherwise, the receiver would have to put on more personnel to accomplish the same task with no apparent incentive.

Time of Day

Peak period of travel is different for trucks than it is for automobiles (Kriger, et al., 2006). While truck traffic remains relatively constant throughout the workday, automobile traffic tends to peak between 7am and 10am and 4pm to 7pm in urban areas. These times represent lower reliability for trucks as the general congestion can cause delays.

Urban Compared to Rural Environments

Urban freight movements are generally more time sensitive as daily delivery schedules must be met in congested conditions. Urban trucking is dominated by shorter, local delivery movements, with drivers who are familiar with the road system, alternative routes, toll facilities, and traffic patterns. Truckers can easily evade toll roads if a suitable alternative exists, but as we discuss in section on local delivery in Section 2, delivery schedules, reliability, and operating costs (especially fuel consumption) are more important factors than using or avoiding a toll road.

Compared to urban areas, rural roadways typically provide a venue for large numbers of long distance hauls. Over longer distances, carriers and truckers frequently have more route options. Accordingly, diversion rates are higher on rural roads, as seen in the case of the Ohio Turnpike, and predicted in the case of Virginia I-81.

Special Restrictions: Oversize and Overweight Trucks

There are three subgroups of trucks with special restrictions: over dimensional vehicles operating under a permit, longer-combination vehicles (LCV's) regulated to certain roads, and non-permitted (illegal) overweight vehicles.

Over dimensional vehicles operate under a permit from a state authority, which specifies the route a vehicle must take. Routes are determined by considerations such as overhead clearance, turning radii, and bridge weight limits. If a toll facility is the route specified in a permit, drivers will generally conform to the route specified.

LCV's have a different regulatory regime, with states heavily regulating where such trucks can operate. For example, triple trailer combinations, which are legal in many western states, are generally banned in the eastern U.S. A prominent exception is the Ohio Turnpike, where triple trailers are legal, but must be broken down (to single or double trailers) elsewhere in Ohio. As with over-dimensional permitted

vehicles, legal compliance with routing is quite good, and LCV drivers rarely, if ever, deviate from their legal route.

There are of course some truck operators that exceed legal weight limits, without permits. There are economic incentives to exceeding legal weight and enforcement of weight limits is never perfect. The tradeoff between toll charges and greater truck productivity was the subject of a 2002 study, which suggested that by allowing longer combination vehicles, a toll facility may encourage operators to switch from hauling a standard combination vehicle to long-combination vehicle (LCV), reducing operating costs and increasing productivity (Samuel, et al., 2002).

Border Crossings

Border crossings and truck toll diversion are a unique case of study. For the busiest border crossings, congestion delay is severe and there is little opportunity for diversion. The border crossing between Detroit, MI and Windsor, Ontario is an example: the Ambassador Bridge is a toll facility but there are few alternative truck routes.

In Texas, the Camino Columbia Toll Road (SH 255) outside of Laredo eventually faced foreclosure when toll revenue did not reach predicted levels. The 21.8-mile facility was primarily intended as a bypass for trucks, although passenger vehicles are allowed on the roadway as well. Truck tolls were originally set at \$16, with truck traffic expected to be 1,500 per day. Truck traffic never materialized, however, with actual volumes only reaching 40 to 100 trucks daily, leading to foreclosure of the \$90 million facility. After foreclosure, the roadway was sold at auction to one of its investors, John Hancock Life Insurance, for \$12.1 million, and was subsequently sold to Texas Department of Transportation (TxDOT) for \$20 million (Cortez, 2004).

The Camino Columbia Toll Road officials cited numerous reasons for failure of the roadway. The project was initially conceived to relieve heavy congestion on I-35 in Laredo. But concurrent to the toll road opening, TxDOT opened the new “World Trade Bridge,” which was closer to Laredo and I-35 and attracted much more traffic: 6,300 trucks per day of the total 7,800 handled by all Laredo border crossings. Toll road officials also hoped that the North America Free Trade Agreement would eliminate cross border drayage, allowing direct flow of commerce between the U.S. and Mexico without an exchange of equipment and drivers at the border; so far, that provision of NAFTA has not been implemented.

TxDOT reopened the roadway with tolls of \$2 for automobiles and \$2 for each additional axle (\$10 for most trucks). In June 2009, tolls were increased and the facility decided to implement all-electronic tolling. The road continues to struggle to attract traffic, averaging only 870 vehicles per day (Samuel, December 2003).

In the Niagara area of New York, two toll bridges, the Lewiston-Queenstown Bridge and the Peace Bridge serve freight traffic entering Canada. The delays at these toll bridges have prompted two projects aimed at relieving congestion: a potential widening of the Peace Bridge and the conversion of an old railroad bridge to a crossing for freight dubbed the Harriet Tubman Truckway (HTT). William

Truesdale, a former regional director of the U.S. government's border crossing operations and head of the company behind the HTT, had the following opinion of truck tolls at border crossings:

Toll costs are often not the major consideration at border crossings. Waiting in line for customs, immigration, and security checks is often a much larger cost. An hour's delay may be \$100 cost for a truck (Samuel, July 2003).

Although little in the way of literature exists about border crossings effect on tolls and diversion, it appears that a truck driver's willingness to pay tolls might be eclipsed by the wait times associated with the border crossing itself, rather than the toll to use the road or bridge. There are also differences between Mexican and Canadian border crossings. With a prohibition on Mexican trucking firms operating in the U.S., border crossings are limited to drayage operations that drop trailers at warehouses and terminal facilities just over the border. U.S.-Canadian truck traffic, by contrast, involves long haul trucks which operate across the border through to destinations in either country.

Type of Carrier

The only traffic forecasting literature addressing differences in the type of carrier evaluated the simple distinction of independent owner/operators, and private carriers. Independent owner/operators are defined as trucking operations where the truck driver is self-employed. This segment of truckers typically has more discretion in deciding whether or not to pay a toll, and may or may not be reimbursed for toll expenses.

Private carriers, as described in this document, are companies operating fleets of trucks, either on a "for-hire" basis or to support their own business operations. Private carriers are more inclined to have set routes and/or policies in place determining whether or not a truck will use a toll road on a given route. A trucking value-of-time study found that 1) for-hire fleets tend to have higher values of time than company private fleets and 2) companies with hourly pay seem to be associated with higher values of time compared with fixed salary- or commission-based companies. This same study determined that the size of shipment did not seem to affect the carriers' willingness to pay a toll (Kawamura, 2000).

Standard Bid, Tariff, and Contract Language

The research team analyzed contracts for a variety of carriers, shippers, and third party logistics arrangements. Examples were as diverse as a contract for hauling medical waste, sample broker-carrier agreements, and parcel company contracts. To protect the confidential nature of these business agreements, the parties are not identified and the focus of the analysis is limited to toll payment provisions and route specification (i.e., any specification regarding the use or avoidance of toll routes).

In the case of the medical waste hauler, compensation is made on a per-trip schedule. The contract specifies that the carrier is responsible for all costs and expenses, including "fuel, personnel compensation and benefits, tractor maintenance and repair, depreciation, **tolls**, taxes and assessments and all other expenses" (emphasis added). The contract is silent on toll routes, other than the direction that the carrier will transport trailers "...in the shortest practical time consistent with safety and by the shortest practical route to their destinations..." Assuming that the shipper received quotes or bids for these services, it is clear that the carrier had to develop an estimate of its costs for this service, and build

toll charges (if any) into its price. But nothing in the contract specifically addresses the use or avoidance of toll roads, nor is there a separate payment provision.

The broker-carrier agreements were silent on toll charges, other than implying that “other accessorial charges” are to be included within the specific rates charged by the carrier. The brokers’ responsibility is to offer a minimum frequency of shipments to the carrier at an agreed upon rate, which in one example includes the following:

“Rates or charges, including but not limited to stop-offs, detention, loading or unloading, fuel surcharges, or other accessorial charges, tariff rates, released rates or values, or tariff rules or circulars, shall only be valid when their terms are specifically agreed to in a writing signed by both Parties.”

The carriers’ responsibilities include providing drivers and equipment for transport, having insurance, and taking responsibility for the cargo while in transit. Also included in the agreements are general contract requirements such as the time period of the agreement, definition of key terms, contract dissolution, and method of dispute resolution. As with the previous example, there were no special provisions to separately account for or pay toll charges.

A number of parcel delivery company contracts were reviewed, but none had specific provisions relating to tolls or specifying routes. This reflects the nature of the parcel delivery business, where packages from literally thousands of customers are collected, sorted and delivered each day. With parcel carriers involved in both local delivery and line-haul services, and each individual customer having a relatively small financial stake in the transportation business decision, it is not practical for customers to dictate (or concern themselves with) routing and toll payment decisions.

If there was a special concern reflected in these contracts, it was for fuel surcharges. Some contracts include a schedule of fuel surcharges as a percent of the overall rate; in accordance with certain diesel fuel price thresholds, contract rates change on a percentage basis. The greater emphasis on fuel versus toll cost is easily understood, as fuel costs exceed toll costs by a wide margin, and fuel costs can be highly volatile.

The research team also examined data related to for-hire carriers and their treatment of toll charges. Two types of for-hire carriers are more likely to charge tolls to shippers as accessorial charges, rather than include them in base rates: Dedicated Contract Carriers and Expedited Carriers. A recent industry technology summit identified five types of payment arrangements for toll charges:

1. Toll cost not included in base rate (carrier estimated zero toll cost when quoting base rate)
2. Toll cost included in base rate (carrier estimated a particular toll cost when quoting base rate)
3. Actual toll reimbursed as an accessorial, according to supporting documentation (image of toll invoice or toll receipt)
4. Toll reimbursed as an accessorial, according to a pre-agreed toll rate chart
5. Toll reimbursed as an accessorial, according to a pre-agreed particular toll calculation program (such as PC*MILER or IntelliRoute)

Of these five, types 3 through 5 may or may not have an option for the shipper to reimburse the carrier for toll cost back to the terminal or to the next pickup.

The review of these contracts is revealing. For the most part, the documents are silent on routing and toll issues, leaving those details to the carrier, who in turn builds toll charges (if any) into its bid. From the shipper's or broker's perspective, this makes intuitive sense. It would be a greater administrative burden to specify routes, which would in turn require some verification that the carrier is taking the specified route. Similarly, specifying the use or avoidance of toll roads would require contract provisions—such as special toll payment terms—that would add complexity to the billing process. It is far easier from a contracting and operations standpoint to relegate those decisions to the carrier, and let their price reflect the routing/toll road decision.

Psychological Factors

The underlying assumption in all toll modeling is that potential toll users will make rational economic decisions. The reality is that users may not make rational economic decisions because psychological factors, such as toll aversion, may unduly affect the decision-making process. Unless there is explicit direction otherwise, the decision whether or not to pay a toll is a human one.

Some individuals have an aversion to the idea of tolling. As one independent owner/operator stated, "Toll roads are a bad idea. ...money should come from the government with taxes. I pay taxes to fund roads and everything. Paying money for tolls is giving them extra money out of my pocket." Generally speaking, these views are fairly common among owner/operators and less so for private carriers (Goodin, et al., 2004). This introduces a real issue where the utilization of a toll facility could be diminished despite economic incentives to use the facility. This phenomenon is difficult to model and largely ignored in traffic analysis although it can represent a real reduction in toll revenues.

Other factors may be even more difficult to quantify: a particular user's preference for a certain stop being on a particular route, apprehension due to unfamiliarity with the toll systems, or a carrier not realizing the true economic savings of the toll facility in time and reliability. All of these could potentially lead a carrier to choose one route over another without making a purely economic determination.

Deficiencies of Current Toll Estimation Methods

Many toll revenue models simply assume the same methodology for estimating toll revenues as automobiles. While assuming a higher value of time for trucks is standard industry practice, methods for developing that value of time varies widely. A common treatment for including truck or commercial traffic is to factor the resultant automobile forecasts on each link according to the observed proportion of trucks or commercial vehicles in the observed traffic mix (according to traffic counts). Although this provides a simple technique for capturing the "full" mix of traffic on a particular facility, on its own it provides no way to account for tolling, other changes to the transportation system, or changes in demand.

Consequences of Inaccurate Toll Estimation

Trucks typically pay 200% - 1,000% the automobile toll rate at toll facilities (Kriger, et al., 2006). This translates to a significant effect on revenue: an inaccurate estimation of truck users will have a larger effect on revenue per vehicle than the same miscalculation of automobile traffic. The overall effect on revenue depends on the facility type and expected traffic mix. From the perspective of the financial community, a more detailed truck traffic analysis was recommended in one report as the higher revenue margin created by trucks is an important component of a forecast, especially when trucks are projected to be a significant percentage of traffic (Kriger, et al., 2006).

Literature Review Summary

Very little in the literature addresses the question of trucks using or avoiding toll facilities, other than sensitivity models that predict diversion. In terms of traffic and revenue forecasting, little distinction is made between types of trucks and their willingness to pay for tolls. While this is presumably fine for traffic forecasting, there are other non-economic reasons for predicting trucking behavior, such as the development of programs and facilities to address air quality and congestion concerns. With the literature on the subject largely deficient, the line of investigation must focus on studying individual segments of the industry, which is the topic of the next section.

Appendix B: Web Based Survey Instrument and Distribution List

The electronic survey was distributed through www.trucktolling.org. Internal to the survey program itself, there were a number of “jumps” that took the survey respondent from one section to another depending on their response. For example, if a survey respondent selected “driver,” all remaining questions were worded for and germane only to drivers. The text below reproduces the content of the survey, but the precise language of the survey was tailored to those who self-identify as drivers, dispatchers, or shippers/3PL’s.

1. Position in the trucking transaction
 - Driver
 - Dispatcher/fleet manager
 - Shipper/receiver/3PL

2. Type of trucking services
 - Local delivery
 - Drayage
 - Specialized
 - Local LTL
 - Private Fleet TL
 - For hire TL, Carrier/contract
 - For hire TL, self employed Owner Operator

3. Which unions or trade organizations do you or your company belong to?
 - Teamsters
 - Company union
 - Other union
 - Owner Operator Independent Driver Association
 - American Trucking Associations
 - Truckload Carriers Association
 - Other

4. How many miles do you typically drive in a year?
 - Less than 25,000
 - 25,001 - 50,000
 - 50,001 - 75,000
 - 75,001 - 100,000
 - 100,001 - 125,000
 - 125,001 - 150,000
 - More than 150,000

- Don't Know
5. Describe the length of typical haul
- Less than 500 miles
 - 501-1,000 miles
 - 1,001-1,500 miles
 - 1,501-2,000 miles
 - More than 2,000 miles
6. What types of facilities do you most frequently transport goods to/from?
- Port
 - Rail Facility
 - Airport
 - Warehouse / Distribution Facility
 - Facility Accessing Border Crossing
 - Customer Facility
7. How many years have you worked as a driver?
- Less than 1 year
 - 1-2 years
 - 3-5 years
 - 6-10 years
 - 11-20 years
 - 20-30 years
 - More than 30 years
8. In what state is your truck licensed?
9. How many trucks are in your fleet?
- 1-5 trucks
 - 6-20 trucks
 - 21-50 trucks
 - 51-100 trucks
 - 101-200 trucks
 - 200-500 trucks
 - 501-1,000 trucks
 - 1,001-10,000 trucks
 - More than 10,000 trucks
 - Don't know

10. Who has control over truck trip routing (which roads to take, when and where to stop, etc.) within your company?

- The driver has full control
- The driver has most of the control
- The driver and the company have the same amount of control
- The company has most of the control
- The company has full control

11. What sort of environment do you typically operate in?

- Almost entirely rural
- Mostly rural with some urban
- Equal amounts rural and urban
- Mostly urban with some rural
- Almost entirely urban

12. When you need to take an alternative route, how is route determined?

- Dispatcher provides route
- Personal navigation system
- Consult a map
- Talk to other drivers

13. How are tolls reimbursed in each of these situations?

	Tolls are always reimbursed in full	Tolls are sometimes reimbursed in full	Tolls are rarely reimbursed in full	Tolls are never reimbursed	Not applicable to my driving situation
When I pay a toll to save time or avoid congestion, although a slower alternate route is available	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I pay a toll because there isn't a viable alternate route (bridge, tunnel, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I pay a toll because a dispatcher directs me to use a tolled route	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I choose a tolled route, for any reason	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. In what region do you do the most driving?

- Tri-State Area
- Los Angeles Metro Area
- San Francisco Bay Area
- Chicago Region
- Upper Great Lakes Region

- Mid-Atlantic Region
- South Florida Region
- New England Region
- Atlanta/Charlotte Region
- Portland/Seattle Region
- Other, Please describe:

15. Approximately what percentage of the time you spend driving could be spent on toll roads. Said otherwise: If you chose to take every tolled road facility on your route, what percentage of your driving time would take place on these tolled roads?

- 0%-5%
- 6%-10%
- 11%-25%
- 26%-50%
- 51%-75%
- 76%-100%

16. In which ways is performance measured at your company? (Please check all that apply.)

- On-Time performance
- Miles traveled per day
- Loads transported per day
- Customer satisfaction
- Increased operating efficiency

17. Please consider this hypothetical scenario:

A new tolled route is opened in the area you typically drive. Consistently using the route will typically allow you to make one additional "turn" (load pick-up and drop-off) during a normal working shift and remain compliant with FMCSA Hours-of-Service regulations. If the toll for the route was \$5, would you consistently use the tolled route?

- Yes
- No
- This scenario doesn't make sense for my driving situation

18. Please consider this hypothetical scenario:

Midway through your hours-of-service driving shift you approach the outskirts of a large city. You must pass travel through the city to reach your ultimate delivery point later in the day. You have the option of using an existing interstate highway to travel through the city or a newly constructed tolled highway. Using the tolled highway to travel through the city consistently

reduces travel time by 15 minutes during normal traffic conditions. If the toll for the route was \$5, would you consistently use the tolled route?

- Yes
- No
- This scenario doesn't make sense for my driving situation

19. Please consider this hypothetical scenario:

While delivering an interstate load, you need to travel across a long distance in an area where the only viable route options are tolled interstate freeways and non-tolled secondary roads. Examples of these areas include parts of New Jersey, Pennsylvania, New York, and Oklahoma. Using the tolled freeway to travel 100 miles consistently reduces travel time by 30 minutes compared to traveling on secondary roads. If the toll for the route was \$5 per 100 miles, would you consistently use the tolled route?

- Yes
- No
- This scenario doesn't make sense for my driving situation

If the toll for the same route was \$2.50, would you consistently use the tolled route?

- Yes
- No

If the toll for the same route was \$1.50, would you consistently use the tolled route?

- Yes
- No

If the toll for the same route was \$1.00, would you consistently use the tolled route?

- Yes
- No

If the toll for the same route was \$0.50, would you consistently use the tolled route?

- Yes
- No

20. Do you agree or disagree with the following statements?

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Tolls routes are a good strategy to save time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Toll roads are too expensive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Toll roads exist mainly for raising money for the government.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Toll roads are too expensive for what they provide.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I avoid toll roads whenever I can.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I only use toll roads if I can get reimbursed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I only use toll roads if I am behind schedule.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Traffic is worse on secondary roads once toll roads are opened.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The availability of preferred facilities (fueling, food & beverage, repair services, sleeping areas) affects my decision to take a tolled route.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Driving is less stressful on tolled routes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Toll roads generally have less traffic than non-tolled alternatives.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am willing to drive far outside of my way to avoid a toll.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Toll roads can help drivers comply with hours of service (HOS) regulations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having drivers use toll roads improves my company's on-time performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reimbursing tolls is an administrative burden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is a push to make all roadways tolled.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Toll roads are a more fair way of funding road construction and maintenance than fuel taxes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Generally, trucks are less likely to be involved in an accident on a tolled road.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trucks face heightened enforcement of regulations on toll roads.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The ability to pay tolls electronically using a transponder makes me more likely to use the toll road.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I take a toll road I can't access my preferred service providers (fuel stops, restaurants, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electronic tolling simplifies record keeping.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Survey Distribution List

ATA and State Trucking Associations

- National HQ - American Trucking Association
- California Trucking Association
- Motor Transport Association of Connecticut
- Florida Trucking Association
- Illinois Motor Truck Association
- Indiana Motor Truck Association
- Kansas Motor Carrier Association
- Maryland Motor Truck Association
- Massachusetts Trucking Association
- Michigan Trucking Association
- New Jersey Motor Truck Association
- New York State Motor Truck Association
- Oklahoma Trucking Association
- Ohio Trucking Association
- Pennsylvania Truck Associations
- Texas Motor Transportation Association

Print Media

- Journal of Commerce
- Transport Topics

Trucking Companies

- A&B Freight Line
- AAA Cooper Transportation
- ABF Freight System
- A-C Motor Express
- Duie Pyle
- Anderson Trucking Service
- Arnold Transportation Services
- Averitt Express
- B&G Delivery System
- Barr Freight System
- Barr-Nunn Transportation
- Beaver Express Service
- Bennett International Group

- Benton Express
- Boyd Bros. Transportation
- Bulkmatic Transport
- C.R. England
- Cain Express
- Cape Cod Express
- Charlie Transportation Systems
- Celadon Trucking Services
- Central Freight Lines
- Central States Trucking
- Central Transportation International
- Challenger Logistics
- Chief Truck Lines
- Clark Freight Lines
- Comcar Industries
- Concord Transportation
- Con-Way Freight
- Con-Way Truckload
- Covenant Transport
- Cowan Systems
- Crete Carrier
- CRST International
- Crystal Motor Express
- Cushing Transportation
- Dart Transit
- DATS Trucking
- Day & Ross
- Daylight Transport
- Dayton Freight Lines
- Dependable Highway Express
- Dohorn Transfer
- Empire Truck Lines
- Engels Trucking
- Epes Transport System
- Epic Express
- Estes Express Lines
- Evans Distribution Systems
- Evans Network of Companies
- Fast Way Freight System
- Fedex Freight

- FFE Transportation Services
 - FMI Trucking
 - Forward Air
 - GMG Transportation
 - Gordon Trucking
 - H.R. Salem Transport
 - Hess Trucking
 - Holland
 - Hot Shot Delivery
 - Interstate Distributor
 - J.B. Hunt Transport Services
 - Kane is Able
 - KLLM Transport Services
 - KMX International
 - Knight Transportation
 - Lakeville Motor Express
 - Land Air Express of New England
 - Landstar Express America
 - Landstar Inway
 - Lynden International
 - Lynden Transport
 - M&S Express
 - Marten Transport
 - Mason Dixon International
 - Matheson Trucking
 - Milan Express
 - Mountain Valley Express
 - National Retail Systems
 - NEMF
 - New Century Transportation
 - New Penn Motor Express
 - New York Carolina Express
 - NFI Industries
 - O.S.T. Trucking
 - Oak Harbor Freight Lines
 - Old Dominion Freight Line
 - Pacer International
 - Pacific Alaska Freightways
 - Palletized Trucking
 - Paschall Truck Lines
 - Peninsula Truck Lines
 - Pitt Ohio Express
 - Prime
 - R+L Carriers
 - Reddaway
 - Refrigerated Food Express/RFX
 - Roadrunner Transportation Services
 - Ruan
 - Ryder System
 - Safeway Transportation
 - SAIA
 - Schilli Transportation Services
 - Southeastern Freight Lines
 - Southern Cal Transport
 - Southwestern Motor Transport
 - Sterling Transportation
 - Stevens Transport
 - Stevens West
 - Sunline Express Systems
 - Swift Transportation
 - Texas Star Express
 - Todd Transit
 - Transforce
 - Transways Motor Express
 - UPS Freight
 - US Express Enterprises
 - USA Truck
 - Vitran Express
 - Waggoners Trucking
 - W.W. Rowland Trucking
 - Ward Trucking
 - Watsontown Trucking
 - Werner Enterprises
 - Western Express
 - Willis Shaw Express
 - Wilson Trucking
 - YRC Worldwide
- Websites and Social Media**
- www.truck.net

- www.truckstopandtrucking.com
- www.TheTrucker.com
- www.eTrucker.com
- www.mytruckingspace.com/
- www.truckersnews.com/
- www.thetruckersreport.com
- www.truckinginfo.com/
- Social Networking
- Facebook
- Twitter

Truck Stops

- Duke
- Flying J
- Pilot
- Travel Centers of America

Other

- Council of Supply Chain Management Professionals
- 2011 Mid-America Truck Show
- National Industrial Transportation League
- National Private Truck Council
- National Truckers Association
- Owner Operator Independent Drivers Association
- Truckload Carriers Association
- Truck Writers of North America
- United Highway Carriers Association (UHCA)
- USA – Truck
- Industrial Workers of the World - Motor Transport Workers Industrial Union 530
- Teamsters - Freight Division

Appendix C: In-Person Survey Instrument for the Charlotte, NC Truck Show

About this Study:

The National Academy of Science operates the Transportation Research Board (TRB), funded by the federal government. TRB conducts research on current transportation issues, such as funding, policies, and federal programs.

Participation is voluntary and we do not record the respondent's name or company. For more information about this study, please contact Howard Wood, Principal Consultant, Parsons Brinckerhoff, (614) 791-5178, or wood@pbworld.com.

1. Describe your company's operation

- Independent Owner Operator
- Company Driver
- Other _____

2. What type of trucking do you perform?

- LTL
- Full Truckload
- Specialized
- Drayage
- Other _____

3. Describe your typical length haul

Per load average miles: _____

Type of Facilities Served

- Customer Facility
- Warehouse / Distribution Facility
- Terminal (Rail, Water or air)
- Other _____

4. Within your company, who has control over truck trip routing (which roads to take, when and where to stop, when to take a toll road)?

- Owner/Operator
- The driver
- The dispatcher
- Depends on the situation (please explain)

5. Do you have an electronic toll tag (transponder)

- Yes
- No

If yes who pays for the monthly bill? _____

6. Do you get reimbursed for tolls?

Yes

No (Why not?_____)

7. Does the cost of the tolls you pay get passed on to the customer?

Yes

No

Don't know

8. Have you ever chosen a free/alternate route instead of taking a toll road?

No

Example _____ of
Where/Why?_____)

9. Why would you take a toll road ?

- Avoids congestion
- Saves Time
- Safer to travel on toll roads than back roads
- More reliable
- Other _____

10. Other comments or opinions about toll roads?

Appendix D: Truck Tolling Study Survey, Dallas, TX

About this Study:

The National Academy of Science operates the Transportation Research Board (TRB), funded by the federal government. TRB conducts research on current transportation issues, such as funding, policies, and federal programs.

Policy makers are increasingly looking to toll funding as a method to pay for new highway infrastructure. However, there is a significant proportion of truck traffic that bypasses toll roads. Through this study, TRB seeks to find out what factors are involved in drivers' choosing to use or avoid a toll road.

Participation is voluntary and we do not record the respondent's name or company.

For more information about this study, please contact Howard Wood, Principal Consultant, Parsons Brinckerhoff, (614) 791-5178, or wood@pbworld.com.

1. Describe your company's operation

- Local delivery
- Drayage
- Specialized
- Local LTL
- Private Fleet TL
- For hire TL, Carrier/contract
- For hire TL, self employed Owner Operator
- Other _____

2. Describe your typical haul

Length: _____

Type of Facilities Served

- Port
- Rail Facility
- Airport
- Warehouse / Distribution Facility
- Facility Accessing Border Crossing
- Customer Facility
- Other _____

3. Within your company, who has control over truck trip routing (which roads to take, when and where to stop, when to take a toll road)?

- The driver
- The company
- Depends on the situation (please explain)

4. How are tolls reimbursed in each of these situations?

Tolls are Reimbursed:				
	Always	Sometimes	Rarely	Never
When I pay a toll to save time, although a slower route is available	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I pay a toll because there is no alternate route	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I pay a toll because a dispatcher directs me to	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I use a toll route, for any reason	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Have you ever avoided a toll road?

- No
- Yes (If so, why? _____)

6. When do you take toll roads?

- Always

- Never
- If the toll is reasonably low (provide amount: _____)
- If my company reimburses me
- If my company provides a toll tag/transponder
- If there is congestion or construction on the free routes
- If my load is time sensitive
- If my hours of service is timed out
- Other _____

7. Other comments or opinions about toll roads?
