An Analysis of the Operational Costs of Trucking

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Submission Date:
August 1, 2009

Word Count: 6,163
Number of Tables: 5
Number of Figures: 1

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ABSTRACT
In response to mounting infrastructure improvement needs and dwindling state budgets, policy makers, led by the U.S. Department of Transportation (USDOT), have begun embracing innovative financing strategies. If the time/distance value of operating a truck is overstated, the benefits to the industry of these strategies (for example, congestion pricing) are likely over-stated too. Alternatively, programs that underestimate truck costs may also underestimate the benefits of increased program funding. There is a lack of accurate and publicly available information on the operational costs of trucking, defined as the full marginal cost of operating a truck one mile or one hour in standard operating conditions. Accurate cost figures are needed as inputs to transportation planning models to ensure that benefits to users are not over-inflated or that critical investment needs are not downplayed. The research objective focused on the identification of current, accurate motor carrier costs that derive from transportation system operations. ATRI developed, beta-tested and distributed a survey to a cross-section of for-hire motor carriers, representing the predominant industry sectors. Survey responses were aggregated and analyzed. When necessary, costs per mile (CPM) were converted to costs per hour (CPH) using an industry accepted average operating speed. Total marginal costs for the industry were $1.73 per mile and $83.68 per hour. Marginal costs were divided into vehicle- and driver-based. Top costs for carriers were diesel fuel/oil, driver wages and truck/trailer lease or purchase payments. The Specialized sector had the highest total marginal CPM, followed by the Less-than-Truckload (LTL) and Truckload (TL) sectors.
BACKGROUND

There are numerous statistics that document the trucking industry’s critical role in the U.S. economy. In 2006, the $645.6 billion U.S. trucking industry accounted for nearly 84 percent of the nation’s freight bill (1); delivered 87 percent of all goods, and employed almost 9 million people. Furthermore, more than 80 percent of cities and communities in the U.S. are served exclusively by trucks – making the industry a critical distribution lifeline for the large majority of the country’s population. The trucking industry is highly reliant on the more than 4 million miles of roadway that compose our ubiquitous surface transportation system.

The transportation system, while generally viewed as efficient and stable, is under constant pressure. Vehicle trips and vehicle miles traveled (VMT) for both cars and trucks have increased dramatically, placing serious constraints on system capacity. While the national spotlight is often placed on the 50,000 mile interstate system (2), first authorized by President Eisenhower in 1955, the remaining 4 million miles of U.S. roadway are typically in worse stages of disrepair. Counties and local units of government, many in rural areas with declining tax bases, are often responsible for maintaining road segments that provide important connectivity between distant population centers or freight ports and marketplaces.

In large metropolitan areas, congested roadways and related air quality issues are the norm. In these environments, large trucks may be viewed as extraneous, dispensable components of the traffic mix. When transportation challenges arise, auto drivers can proactively utilize transit or reactively vote down less desirable solutions. Neither option is viable for large trucks and/or truck drivers.

The formal position of most public sector transportation managers and planners is that any future increase in system capacity is predicated on a dramatic new infusion of revenue. Without new revenue, it will be challenging to maintain the existing system, let alone build new capacity.

The new transportation funding and policy positions that are being promulgated by the U.S. Department of Transportation (USDOT) propose new revenue generation tools that presume a decline in the use of the fuel tax. While the trucking industry is a strong proponent of funding and maintaining an efficient national transportation system, it is equally emphatic that transportation funding derived from transportation user fees is strategically expended on critical infrastructure, thus supporting the “User Pays” philosophy.

Several recent analyses including one conducted by the American Transportation Research Institute (ATRI) (3) indicate that the newest iteration of non-traditional financing strategies result in dramatic funding inefficiencies and infrastructure declines, based on a “revenue return to infrastructure” indicator; the net effect leaves the transportation system in continuing disarray while creating transportation-related inflation for users and consumers alike (3).

RESEARCH OBJECTIVE

In relation to trucking industry transportation usage and operating costs, there are likely instances where the benefits of innovative financing tools are over-stated based on excessive truck incremental costs. In other scenarios, inaccurate marginal costs downplay the impact of critical investment needs.

The ATRI Research Advisory Committee (RAC) identified and conceptualized this research to provide stakeholders with an improved understanding of the marginal costs of
trucking. The goal of this initiative is to identify current, accurate motor carrier costs that derive from transportation system operations. The research intentionally focuses on the quantifiable actual costs associated with truck operations, rather than the more abstract and qualitative measure of the “value of travel time”. To be relevant to a range of public- and private-sector stakeholders and analysts, the costs need to be stratified by industry sector, fleet size and regions of operation. The resulting data and analysis is intended to serve several purposes:

- Motor carriers can use these figures for high-level benchmarking of their own operations;
- Government agencies can use these figures as inputs for infrastructure improvement analyses.

Marginal costs provide more accurate “unit-level” inputs for transportation infrastructure analysis. As compared to fixed costs, marginal costs are more consistent for both private fleets and for-hire motor carriers (i.e. generally market pressures and externalities standardize costs such as diesel fuel, labor rates, tire costs, etc.). Fixed costs, on the other hand, are rarely conditioned on transportation system-related marginal unit costs. Additionally, for-hire carriers and private fleets may allocate fixed costs differently. In order to provide inputs for trend analysis, key cost center projections are also included.

TRUCKING INDUSTRY MACRO-ECONOMICS

As noted, the trucking industry is inextricably linked to the U.S. economy and is greatly affected by economic cycles. Multiple analyses have shown a clear relationship between total truck miles traveled and economic growth (5). In addition, interstate and intrastate trucking industry deregulations during the last two decades prompted an enormous increase in the number of motor carriers operating in the U.S. (1). This surge has transformed the landscape of the industry into an operating environment that is fiercely competitive with thin profit margins. To survive, motor carriers must exercise vigilant cost containment of all expenses, both fixed and marginal. To some extent, carriers may adopt operational efficiencies to decrease fixed costs. However, these improvements have a much more significant impact on aggregate marginal costs.

Understanding industry economics and marginal costs is critical for transportation planning and investment, but the complexity and diversity of the trucking industry makes data aggregation and/or comparative analyses very challenging. A fleet may range from one or two trucks to tens of thousands. Diversity within the industry is further bolstered by numerous sectors with vastly different business models. The impact is equally disparate when the ranges of marginal operating costs are considered.

Marginal Versus Fixed Costs

Unlike manufacturing, a significant portion of the trucking industry’s costs are marginal (also referred to herein as incremental). To further complicate matters, not all fixed costs are static. Examples of these types of costs may include non-capitalized information technology expenditures, truck wash expenses or management incentive payments. In addition, fixed costs per mile decline as vehicle miles traveled increase, whereas marginal costs remain, for the most part, static.

To simplify cost definitions and provide more accurate data inputs for cost/benefit analyses, ATRI defined marginal costs as those costs associated with operating a truck one mile or one hour in standard operating conditions. While different operations and accounting
practices may allocate costs differently, it is necessary to capture and standardize costs that are commonly considered as marginal by trucking industry financial experts.

To that end, certain quasi-operational costs are included. Examples of quasi-operational costs, which have been unitized and incorporated into the cost figures, are certain driver benefits, vehicle capital costs and truck insurance premiums. All marginal costs have been cross-tabulated by unique factors such as fleet size, operating sector and operating region.

Fixed costs vary greatly by both carrier size and industry sector, and usually do not relate directly to the marginal unit costs of operating a truck (e.g. a photocopy machine is needed whether the fleet has 10 trucks or 45 trucks).

Previous Findings
Several research initiatives have conducted in-depth analyses of commercial motor vehicle operators’ value of travel time, while a few studies have made an effort to quantify the cost of motor carrier operations (Figure 1). Underscoring the downward price pressures on motor carriers and the competitive environment of the industry, several studies found that the industry must continually improve efficiencies to remain viable.

One specific Federal Highway Administration (FHWA) report indicated that, while rates charged by motor carriers were relatively unchanged from 1990 to 2000, the average constant dollar total expenses for Class I carriers declined from $1.51 per mile in 1990 to $1.34 per mile in 2000 (5). Motor carrier costs declined while inflation increased (in the period 1990 – 2000), which can be attributed to the competition caused by industry deregulation. Further, the study forecasts that carrier CPM will increase five to six cents per mile by 2005, namely due to increases in the cost of fuel. A second study found that both U.S. and Canadian carrier revenues per mile remained flat, while significant efficiency gains helped offset rising costs per mile (6).

FHWA’s Highway Economic Requirements System State Version (HERS-ST v.4.3) is a tool provided to states to determine “what if” scenario comparisons for infrastructure improvements. According to FHWA, the latest release of the software employs an estimate of the value of travel time for Class 8 trucks at $32.15 per hour (Christopher Chang, unpublished data).

A 2003 research initiative to determine the impacts of seasonal load restrictions in Minnesota surveyed carriers and identified an average value of travel time of $49.42 per hour, a figure that would clearly be higher were it updated to reflect current diesel fuel prices (7). Similarly, Small et al surveyed motor carriers to quantify the impacts of another mobility constraint, traffic congestion. Results indicated that motor carriers placed a premium of travel time savings during congested conditions of $144.22 to $192.83 per hour, and savings in late schedule delays at $371.33 per hour (8). These findings illustrate the subjective nature of the value of travel time.
The TRB authors did note that travel in congested conditions results in both longer and less predictable travel times. The study proposes an explanation for these high travel time figures; that the industry weights travel time savings in congested conditions more highly than overall travel time savings.

Another potential explanation for high costs is the industry’s perception that congestion-related delays significantly increase other key cost centers, namely fixed costs. Examples of fixed costs that may increase with congestion include:

- idle dock labor at trucking company terminals awaiting delayed trucks;
- the need to dispatch additional equipment and drivers to maintain service levels to other customers;
- the increased opportunity costs of inefficiently used drivers and equipment that could be generating additional revenue.

The Texas Transportation Institute (TTI) found that the commercial vehicle cost of congestion, in both lost time and fuel, was $77.10 per vehicle hour (9). This figure is derived by computing vehicle hours of delay and TTI’s estimate of commercial vehicle time value.

**METHODOLOGY**

The first task of the ATRI research focused on identifying literature related to freight and motor carrier costs. Not surprisingly, there is a considerable dearth of information on motor carrier operational costs. The benefit of the literature review was primarily as a reference to identify obsolete costs or alternative approaches to quantifying the marginal costs of trucking in previous research and analyses. It also provided some guidance into those areas of motor carrier costs that were of greatest interest to transportation system managers.
The second task of the research focused on development of an industry survey that would address the relevant costs; particularly costs that might be unique to different fleet sizes or sectors. The research processes are described in greater detail in the following section.

Survey Methodology

The Research Team developed a preliminary survey based on common industry metrics, and then beta-tested it with motor carrier financial officers, or those with intimate knowledge of motor carrier cost structures. The final revised survey was then distributed to a representative group of for-hire carriers, representing Truckload (TL), Less-than-Truckload (LTL) and Specialized carriers. Survey questions targeted average aggregate carrier cost per mile or cost per hour for 2008.

Motor carriers were selected through ATRI’s internal database of industry contacts as well as from carrier databases of State Trucking Associations (STAs). To augment data collection efforts, ATRI included the American Trucking Associations’ National Accounting and Finance Council (NAFC) carrier membership in the survey distribution. All respondents predominately operate in the U.S. ATRI invited approximately 100 motor carriers to participate in the study. A total of 43 surveys were completed and returned to ATRI.

Surveys were distributed electronically and by regular mail, with instructions to return completed surveys electronically or via fax. All responses were carefully reviewed by ATRI for clarity and completeness. In certain instances, respondents were contacted to clarify any ambiguous responses.

To reflect differing industry business models, compensation schema and accounting practices, the survey solicited components and sub-components of carrier Costs per Mile (CPM) and Cost per Hour (CPH). In instances where compensation was based on schema other than hours or miles (e.g. shipments), ATRI worked with respondents to develop a reasonable conversion formula.

In some instances, line-item CPM figures were converted to, and incorporated into, “total CPH” since some operational costs are mileage-based (rather than time-specific). In these instances, an industry-agreed upon average operational speed of 52.05 miles per hour was used. National average speeds were calculated using 2008 data from the ATRI/FHWA Freight Performance Measures program. The figure was then validated among motor carriers from various sectors of the industry to determine average tractor speeds. Though urban operational speeds are lower, significant portions of truck travel occur in rural areas with free-flow speeds.

CPH figures represent motor carrier in-transit hourly costs. These costs are incurred during the operation of a truck and exist regardless of whether these costs are reimbursable. An example of a cost incurred by carriers with no revenue offset are empty miles (commonly known as deadhead miles), typically comprising 12 to 20 percent of total carrier miles. The research collected several hundred unique data metrics.

Trucking Industry Sector Descriptions

Although the survey sample was stratified by industry sector, fleet size and region of operation, the primary variable was industry sector. Therefore, the analysis is tailored toward those industry breakouts. Future research efforts will focus on more detailed analyses of cost fluctuations by sector, fleet size and region of operation.

In total, survey respondents represent over 55,700 trucks, accruing more than 5.7 billion miles annually in the U.S. The publicly distributed industry sector cost differences referenced...
herein were grouped into the following predominant industry sectors: Truckload (TL), Less-than-Truckload (LTL) and Specialized/Other. Table 1 juxtaposes ATRI survey respondents by industry sector with the U.S. for-hire trucking industry sector breakout (10).

<table>
<thead>
<tr>
<th>Industry Sector</th>
<th>ATRI Survey Respondents</th>
<th>U.S. Trucking Industry (10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truckload</td>
<td>51%</td>
<td>52%</td>
</tr>
<tr>
<td>Less-than-Truckload</td>
<td>21%</td>
<td>24%</td>
</tr>
<tr>
<td>Specialized/Other</td>
<td>28%</td>
<td>24%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

TL carriers, the prevalent sector in the for-hire industry, have a relatively straight-forward business model. TL carriers move full or dedicated loads of freight, typically from one shipper to one consignee (or destination). The majority of TL carriers have either regional or national operations.

LTL carriers have a more complex business model, as evidenced by higher fixed and operating costs. LTL carrier pick up and delivery (P&D) drivers pick up smaller shipments, typically from one to several pallets within a metropolitan area, and return to their home terminal. The shipments are unloaded and cross-docked with other shipments going to similar locations. LTL line haul drivers then haul the shipments between terminals. At the destination terminal, the trailer is unloaded and reconsolidated for LTL P&D drivers, who deliver the shipments to the final destination. Higher operating costs for this sector of the industry can be attributed to:

- the marginal costs associated with frequent pick up and delivery operations in traffic-congested urban areas;
- the increased overhead costs of handling many, smaller shipments several times, dock personnel labor costs and the need for trucking terminals in metropolitan areas;
- labor costs that are typically associated with LTL-focused collective bargaining contracts.

Specialized carriers include flatbed trailers, tank trucks and agricultural-based carriers. Included in this sector are carriers dedicated to hauling specialized commodities including government munitions and radioactive waste, as well as carriers utilizing specially permitted oversize/overweight loads.

Specialized carriers may also have higher fixed and marginal costs than other sectors of the industry. These increased costs typically derive from specially-engineered equipment, lower tractor miles per gallon and/or the use of longer combination vehicles (LCVs). However, it should be noted that some TL and LTL carriers utilize LCV configurations. In these instances, the cost impact is included in the aggregated costs based on data provided by the motor carriers.
SURVEY ANALYSIS OF OPERATING COSTS

Respondent Fleet Demographics
In terms of carrier filings, the vast majority of motor carriers in the U.S. operate less than twenty trucks (1). However, in terms of truck registrations, driver employment, and freight tonnage, medium to large carriers are responsible for the large majority of freight operations. Therefore, the survey respondents’ fleet demographics, which are weighted toward medium-sized and large carriers, are generally representative of national figures. Motor carriers in these size categories also possess relatively sophisticated accounting systems, allowing for more in-depth data collection. Table 2 presents the distribution of respondent carriers by company size.

<table>
<thead>
<tr>
<th>Annual Trucking Related Revenue</th>
<th>Frequency</th>
<th>Percentage of Total Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small (less than $10 million)</td>
<td>3</td>
<td>7%</td>
</tr>
<tr>
<td>Medium ($10 million-$100 million)</td>
<td>24</td>
<td>56%</td>
</tr>
<tr>
<td>Large (greater than $100 million)</td>
<td>16</td>
<td>37%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>43</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Also reflective of the U.S. trucking industry, respondents operate a multitude of vehicle configurations from straight trucks to LCVs, though the standard 5-axle tractor/semitrailer is by far the most common combination vehicle type operated (11). As is the case among ATRI survey respondents, within the 4-5 axle tractor/semitrailer group, the 5-axle tractor/semitrailer configuration comprises 90 percent of heavy duty vehicles operated in the U.S. (Table 3). Lower VMT for straight trucks is indicative of the urban P&D operating scenarios under which these vehicles most often operate.

<table>
<thead>
<tr>
<th>Truck Type</th>
<th>Percent of Total Trucks</th>
<th>Average Miles per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight Truck</td>
<td>1.4%</td>
<td>3,949</td>
</tr>
<tr>
<td>4-5 Axle Tractor/Semitrailer</td>
<td>91.1%</td>
<td>8,816</td>
</tr>
<tr>
<td>6-Axle Tractor/Semitrailer</td>
<td>6.5%</td>
<td>9,036</td>
</tr>
<tr>
<td>LCVs (Doubles/Triples)</td>
<td>1.0%</td>
<td>8,299</td>
</tr>
</tbody>
</table>

To stratify marginal costs by region, carriers were asked to provide total fleet miles traveled in each region of the U.S. To assess the impacts of congestion on marginal costs, carriers were asked to estimate the percentage of travel in urban areas for each region.

A comparison of commercial truck registrations in the United States shows the regions with the highest percentage of registrations are the Southeast and the West (1). The regions with the highest percentage of miles traveled were the Midwest and the Southeast. The regions with the highest estimated percentages of urban mileage were the Midwest and the Northeast.
2008 Marginal Costs per Mile

Driver pay has historically been the highest marginal expense for all sectors of the trucking industry. However, due to the recent and dramatic increase in energy costs in 2008, diesel fuel CPM may equal or exceed driver pay as the top marginal cost for many motor carriers. Marginal costs per mile are generally divided into two groups, vehicle- and driver-based. Significant operational costs include:

- Vehicle-based
  - Fuel and Engine Oil
  - Truck/Trailer Lease or Purchase Payments
  - Repair and Maintenance
  - Fuel Taxes
  - Truck Insurance Premiums
  - Tires
  - Licensing and Permits
  - Tolls

- Driver-based
  - Driver Wages
  - Driver Benefits
  - Driver Bonuses

Fuel and Engine Oil Costs

In 2003, diesel fuel and engine oil CPM was 19.8 cents (12). By 2006, fuel costs had escalated to 42 cents per mile (13). Respondents indicate that 2007 CPM rose to 54.5 cents. Since then, the price of both crude oil and diesel have experienced a spectacular rise that has been attributed to concern over global supply and demand, the falling value of U.S. currency and oil market speculation. Motor carriers typically combine fuel and engine oil costs, although engine oil costs are a very small percentage of this cost center. A separate ATRI survey of almost 800 motor carriers found that this was the top issue for the industry in 2008 (14). It should be noted that the decline in fuel prices will impact the gross estimates used herein, but these declines are expected to be short-lived and related specifically to an economic slowdown.

Diesel prices crested in July, 2008 when diesel averaged $4.79 per gallon. Survey respondents indicate that diesel CPM for 2008 (October YTD) was 63.4 cents, a 16 percent increase over 2007 and a 220 percent increase over 2003 costs. More recently, motor carriers have levied fuel surcharges to recover some of the fuel cost increases. Survey respondents indicated that, after fuel surcharge revenue is applied, diesel fuel CPM is 21.9 cents.

Truck/Trailer Payments

This cost is considered a quasi-operational cost, part marginal and part fixed. There is anecdotal evidence that the most common motor carrier response to traffic congestion and mobility constraints is to add more tractors and trailers to maintain service levels. Truck/trailer lease or purchase payments averaged 20.6 cents per mile. Not surprisingly, the Specialized sector, which commonly operates more expensive, specially-engineered equipment, had a significantly higher CPM for this category than the other two sectors. Conversely, the LTL sector had the lowest CPM.
A plausible explanation for the LTL sector’s lower CPM is that these carriers commonly utilize lower cost equipment such as day cabs and pup trailers. Conversely, TL fleets largely consist of more expensive equipment such as tractors equipped with onboard technologies, full sleeper berths and 53-foot trailers. A second explanation is that LTL carriers may operate older equipment than other sectors, though this study does not corroborate that theory. However, the LTL sector’s repair and maintenance (R&M) CPM may offer additional insight.

**Repair and Maintenance (R&M)**

A motor carrier’s R&M costs may be impacted by several factors. For example, newer trucks and trailers require fewer engine repairs than older equipment, but often have higher R&M costs generating from sophisticated in-cab communication systems and onboard safety systems. Carriers note that these costs may increase R&M CPM by 25 to 30 percent.

Vehicle configurations, the use of specialized trailers and a carrier’s operating environment may also affect R&M costs. Medium to large motor carriers ostensibly view in-house maintenance functions as more cost-effective than third party maintenance providers, though a comparison of TL and LTL CPM for in-house maintenance personnel and parts versus outside maintenance CPM suggests this may be questionable (13). R&M CPM for all sectors averaged 9.2 cents, though the median CPM was 7.7 cents, suggesting significant variation. R&M CPM in 2003 was 7.2 cents per mile (12). Specialized carriers had the highest R&M CPM while the TL sector had the lowest. Slightly more than 25 percent of respondents indicated that these costs vary by region. Respondents identified the Midwest as having the lowest R&M costs, while the West had the highest.

**Fuel Taxes**

Interstate motor carriers, both private and for-hire, must remit fuel tax payments quarterly under the International Fuel Tax Agreement (IFTA). Payments are apportioned based on the carrier’s mileage in each state. Currently, the federal fuel tax rate for diesel is 24.4 cents per gallon. The average state fuel tax rate per gallon of diesel is 24.1 cents (15). Between 1992 and 2006, the average state fuel tax rate increased 16 percent. The ATA estimates total state and federal diesel fuel taxes levied on trucks of all weight classes was $18.1 billion in 2007 (Tavio Headley, unpublished data). Fuel tax CPM averaged 6.2 cents.

**Truck Insurance**

Similar to truck/trailer lease or purchase payments, truck insurance could be considered a quasi-marginal cost of trucking for several reasons. First, many larger carriers utilize umbrella policies or self-insurance, which does not readily equate to per-truck unit costs. In addition, property and auto-liability insurance costs still apply while a truck sits unoccupied at facilities. Nevertheless, this cost center is included since most insurance coverage and liability is ultimately vehicle-specific.

Truck insurance premium CPMs for all sectors averaged 6 cents. Again, TL carriers had the lowest average CPM, with the Specialized carriers’ CPM being 130 percent higher than the TL sector.

**Tires**

Tire CPM may indirectly reflect operational characteristics of the carrier. An ATA study found that the average tire CPM in 2006 for both the TL and LTL sector carriers was 2.66 cents (13),
whereas ATRI’s 2008 results reveal tire CPM have increased to 3.0 cents per mile. Recently the
cost of tires has increased as oil prices have escalated (tires are a petroleum-based product). Tire
CPM remains less than one percent of total carrier costs (13).

ATRI survey findings indicate that the TL sector had the lowest tire CPM – less than half
the LTL sector average. These results reflect those documented by ATA in their analysis of
2006 carrier cost data which also found that LTL tire CPM were significantly higher than TL
cPM (13). Only seven percent of survey respondents indicated that tire costs vary by region.

Licensing and Overweight-Oversize Permits
There are a myriad of credentials used by the trucking industry, including the International
Registration Plan (IRP), the International Fuel Tax Agreement (IFTA), hazmat and
oversize/oversize (OS/OW) permits. OS/OW permits are typically used by the Specialized
sector, though TL and LTL carriers may also require the use of these permits at times. Average
licensing and permit CPM for all carriers was 2.4 cents, although average permit costs for
Specialized carriers alone are considerably higher.

Tolls
Tolls can be a significant cost for motor carriers and are highly dependent on a carrier’s region of
operation and, to a lesser extent, type of operation. For example, one respondent’s fleet travels
in the Southeast 90 percent of time and has an average toll CPM of .01 cents per mile.
Conversely, another travels in the Northeast and the Midwest 88 percent of the time, resulting in
a 7 cent per mile toll cost.

Typically motor carriers attempt to avoid tolling whenever possible; namely because
shippers are highly unlikely to reimburse a carrier for toll expenses. Specialized carriers had
significantly higher toll CPMs than either the TL or LTL sectors. The region with the highest
toll CPM was the Northeast, followed by the Midwest.

Driver Pay Rates
The long-term issues of driver shortage and low retention rates are well documented (16). These
challenges are attributed to an aging work force, shrinkage of traditional driver labor pools and
the difficult lifestyle of truck driving. The long-term need for truck drivers is expected to
increase by 19 percent between 2002 and 2012 and the driver shortage could rise to 111,000 by
2014 (16), although these figures may be delayed by the recent economic slowdown. To attract
and retain quality drivers, motor carriers must increasingly offer competitive driver wages.

The U.S. Department of Labor’s Bureau of Labor Statistics estimates that the mean
national average pay for heavy duty truck drivers is $37,560 and the hourly mean pay rate is
$18.06 per hour (17). In general, most over-the-road company drivers are paid on a per-mile
basis while LTL P&D drivers are paid by the hour. Other driver compensation rate structures
include a flat rate and a percentage of the gross revenue generated by the load.

Survey respondents indicate that average driver pay per mile is 44.1 cents per mile. The
average pay per hour for drivers was $16.59. Carriers with unionized drivers had higher pay per
mile and pay per hour rates. While several historical datasets for driver compensation reflect
slightly higher rates than identified in this more recent survey, ATRI hypothesizes that the
present economic conditions have temporarily depressed driver pay.

The average pay per mile for a team driver is 24.5 cents, which conceptually translates to
a single driver rate of 49 cents per mile, 11 percent higher than the average single driver pay rate.
Many carriers pay each team driver for the total miles traveled in a week. In addition, 70 percent of respondents indicated that driver pay rates do not vary by region, though the remaining respondents indicated that driver pay rates in the Northeast and the West were higher than the national average.

Many motor carriers supplement company driver resources with third party independent drivers. Two common examples are owner-operators and independent contractors. Owner-operators typically own their equipment (i.e. tractor and trailer) and either operate under their own “authority” or as a contract driver to a motor carrier. Conversely, independent contract drivers typically do not own a truck and are paid to drive company-owned trucks. Respondents indicated that third-party contractors are paid in a myriad of ways.

Independent contractors may be paid by the mile, a flat rate per load or a percentage of gross revenue for the load. Based on survey data, the average independent contractor pay rate per mile is 97.5 cents, which does not include any available fuel surcharges. Unlike company drivers, this compensation rate includes both the third party independent contractor’s fixed and marginal costs.

Eighty-four percent of respondents do not pay drivers or third party independent contractors for traffic congestion-related delay. However, several respondents highlighted that drivers paid by the hour receive de facto compensation for congestion- and incident-related delays.

Driver Benefits

Driver benefit costs include all costs attributed to employee benefits for drivers. These costs include FICA (7.5% for each dollar of wages earned), unemployment taxes and worker’s compensation taxes, among other costs. ATRI requested that respondents provide a total CPM figure for employee benefits.

Driver Bonus Payments

Many motor carriers offer truck driver bonuses or incentive pay. Most driver bonus/reward pay structures are based on performance metrics that may include an exemplary driving record, on-time delivery percentages or other driver scorecard metrics. Slightly less than one third of survey respondents (30%) utilized a formal driver bonus. The average Driver Bonus CPM was 3.6 cents per mile, with the highest being in the LTL sector followed by the Specialized sector.

Total Marginal Costs

In aggregate form, ATRI survey respondents indicate that the majority of motor carrier costs are marginal, though fixed expenses can contribute significantly to total costs per mile or hour. Marginal costs fluctuate by sector:

- the Specialized sector had the highest total marginal cost, followed by LTL, and then the TL sector;
- total marginal costs for the Specialized sector are 43 percent higher than the TL sector.

As shown in Table 4, ATRI survey findings indicate that the average marginal cost per mile (CPM) is $1.73 and average cost per hour (CPH) is $83.68. CPH figures are based on respondents’ actual driver hourly pay rates.
TABLE 4 Total Cost Summary Table

<table>
<thead>
<tr>
<th>Motor Carrier Marginal Expenses</th>
<th>CPM</th>
<th>CPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle-based</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel-Oil Costs</td>
<td>.634</td>
<td>$33.00</td>
</tr>
<tr>
<td>Truck/Trailer Lease or Purchase Payments</td>
<td>.206</td>
<td>$10.72</td>
</tr>
<tr>
<td>Repair and Maintenance</td>
<td>.092</td>
<td>$4.79</td>
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<tr>
<td>Fuel Taxes</td>
<td>.062</td>
<td>$3.23</td>
</tr>
<tr>
<td>Truck Insurance Premiums</td>
<td>.060</td>
<td>$3.12</td>
</tr>
<tr>
<td>Tires</td>
<td>.030</td>
<td>$1.56</td>
</tr>
<tr>
<td>Licensing and Overweight-Oversize Permits</td>
<td>.024</td>
<td>$1.25</td>
</tr>
<tr>
<td>Tolls</td>
<td>.019</td>
<td>$.99</td>
</tr>
<tr>
<td>Driver-based</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driver Pay</td>
<td>.441</td>
<td>$16.59</td>
</tr>
<tr>
<td>Driver Benefits</td>
<td>.126</td>
<td>$6.56</td>
</tr>
<tr>
<td>Driver Bonus Payments</td>
<td>.036</td>
<td>$1.87</td>
</tr>
<tr>
<td>Total Marginal Costs</td>
<td>$1.73</td>
<td>$83.68</td>
</tr>
</tbody>
</table>

General Trends in Marginal Operating Costs

Research respondents indicated that several major marginal cost centers would in the latter part of 2008, or are expected to decrease in 2009 (Table 5). The basis for the marginal expense decreases includes lower driver wages and related benefits, delayed maintenance and tire replacement costs, and other internal cost-reduction strategies. External factors include lower fuel prices and an unexpected increase in average truck travel speeds (i.e. reduced braking and idling). The projected declines in 2009 expense growth may also suggest respondents’ belief that the current economic recession will also have a deflationary effect on the price of truck components and loan interest rates; all leading to reduced marginal costs for operating a truck. However, respondents generally noted that these price depressions derive strictly from the current economic conditions and thus are considered short-term trends.

TABLE 5 Cost Center Trends

<table>
<thead>
<tr>
<th>Key Cost Center Trends</th>
<th>2007 over 2006 Actual</th>
<th>2008 over 2007 Projected</th>
<th>2009 over 2008 Projected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle-based</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel-Oil (after fuel surcharge)</td>
<td>38%</td>
<td>16%</td>
<td>16%</td>
</tr>
<tr>
<td>Truck/Trailer Lease or Purchase Payments</td>
<td>10%</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Repair and Maintenance</td>
<td>6%</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Truck Insurance Premiums</td>
<td>3%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>Tires</td>
<td>12%</td>
<td>8%</td>
<td>6%</td>
</tr>
<tr>
<td>Tolls</td>
<td>6%</td>
<td>9%</td>
<td>9%</td>
</tr>
<tr>
<td>---------------</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Driver-based</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driver Pay per Mile</td>
<td>5%</td>
<td>2%</td>
<td>4%</td>
</tr>
<tr>
<td>Driver Pay per Hour</td>
<td>3%</td>
<td>2%</td>
<td>9%</td>
</tr>
<tr>
<td>Driver Bonuses</td>
<td>1%</td>
<td>6%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Fuel and Tires

Respondents indicated that over time fuel costs will continue to be one of the fastest growing expenses, though the increases for 2009 are expected to be similar to those in 2008. This may be explained by declining commodity prices (as of October 2008 oil prices were averaging well under $100 per barrel) and by more aggressive use of fuel surcharges in the future. Respondents expect that tire cost increases will moderate similarly. However, both fuel and tire costs may be impacted by the strength of the U.S. dollar. One study found that the strength (or lack thereof) of the U.S. currency caused significantly higher fuel costs for U.S. carriers compared to Canadian carriers (12% vs. 26%, respectively) (6). In addition, a lower-valued dollar makes imports more expensive.

Truck/Trailer Lease or Purchase Payments, R&M and Truck Insurance

Given the economic slowdown that began in 2007 and continued throughout 2008, respondents indicate that even though economic activity has decreased, equipment costs and insurance costs will continue to rise. Juxtaposed with relatively modest increases in future R&M costs and truck insurance, the research suggests that motor carriers will further reduce net capacity by simply retiring older equipment rather than replacing it and carriers’ belief that the cost of new equipment will continue to rise. Continuing a trend that began in 2007, Class VIII retail truck sales continue to decline over record tractor sales in 2006 (18).

Tolls

The respondents’ estimate of escalating toll costs reflects the industry’s awareness of the current infrastructure funding debate. Based on recent declines in VMT for large trucks and the related fuel tax declines that will impact the state and federal trust funds, public debate on how to fund infrastructure maintenance and improvements will likely increase. Transportation funding and tolls have been top ten industry issues for each of the last four years (14).

Driver Pay and Driver Bonuses

The ATA found that driver wages increased an average of seven percent annually from 1998 to 2003 (19). ATRI survey respondents indicated that 2006-2008 cost increases are significantly below this figure. Again, this is likely due to the slowing economy and the resulting freight volume decreases, which create temporary downward pressure on driver wages. The overall high cost of fuel and increases in driver benefit costs likely inhibit driver pay increases.

Respondents’ prediction that driver wages will increase more in 2009 than 2008 may reveal a belief that the economy will rebound in 2009, thus increasing driver wage pressures. In times of economic uncertainty, motor carriers may opt for increased driver bonuses to retain drivers. Driver bonuses can be more easily phased-out during difficult economic times.
CONCLUSION

ATRI’s research documented and tabulated multiple financial and operating datasets from industry stakeholders as a means of disseminating accurate, real-world operational cost information to key decision makers. The ultimate objective is to ensure that appropriate transportation analyses and investment formulas are targeted, and predicated upon realistic benefits to the transportation system and its users.

The research found that the actual cost of operating a truck one mile or one hour in standard operating conditions may be stratified into two primary areas, vehicle- and driver-based costs. Due to the industry’s diverse range of operations, there are significant differences in marginal costs between the primary sectors of the industry. Additionally, carriers forecast that most marginal costs will increase at a rate faster than the overall inflation rate once economic conditions improve.

As all levels of government struggle with growing fiscal constraints and congestion, the criticality of accurate, real-world inputs into planning and programming decision-making processes and funding strategies becomes even more important to transportation planners and the industry alike.
REFERENCES


9. Texas Transportation Institute. 2007 *Annual Urban Mobility Report*, Appendix A. College Station, TX.


