# Risk Sharing in Contracts: The Use of Fuel Surcharge Programs

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## Abstract

Various industries employ risk sharing contracts to manage the risks and volatility associated with commodity prices, inaccurate customer demand forecasts, or unpredictable events. For example commodity futures that enable hedging, vendor buy-back programs, and insurance policies are examples of risk sharing contracts. The volatility in the price of fuel in the latter part of the twentieth century to the present has required the various parties involved in the trucking industry to employ risk-sharing contracts as an addendum to payment for services in the form of fuel surcharges. Fuel surcharges are effective in the sense that their structure transfers risk of fuel price volatility from carrier to shipper, and that industry participants typically understand the implications and reasoning behind the fuel surcharges. That said, there is no universal industry standard, and current fuel surcharge schedules remain based off of legacy diesel fuel prices in the range of $1.10-1.50 per gallon. Through mathematical analysis of a large shipper's annual costs, interviews with large shippers that have recently made transformations in their fuel surcharge schedules, a survey that gathered the thoughts and opinions of approximately one hundred motor carrier representatives, and multiple interviews with motor carrier representatives, the authors conclude that the fuel surcharge system can be improved for industry-wide benefit. Transition to a zero trigger point-based fuel surcharge schedule, the use of a carefully selected escalator, and the use of the national Department of Energy (DOE) retail price of diesel will prevent underbidding on lanes, increase transparency, reduce administration, and further increase the resilience of the United States truckload (TL) industry.

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# 1 Introduction

## 1.1 Diesel Fuel: Features, Supply, Demand and Price Trends

Diesel fuel is the second largest petroleum product after gasoline. In 2009, 17% of all petroleum products and 7% of all energy used in the United States was diesel fuel (EIA, 2011a). Diesel fuel offers greater power density than other fuels, thereby making it the fuel of choice in agriculture, construction and also for freight transportation. As a transportation fuel, Diesel offers a wide range of performance, efficiency, and safety features. Since diesel fuel is less flammable and also less likely to stall than gasoline, the military also uses it for fueling vehicles such as tanks and trucks. Many industrial facilities, large buildings, institutional facilities, hospitals, and electric utilities depend on diesel generators for backup and emergency. Since diesel fuel is so widely used, it is easy to understand why many industries come under severe cost pressure when diesel fuel prices rise.

Demand of diesel fuel is largely dictated by world economic growth. Due to various positive features of diesel fuel over gasoline, diesel is beginning to expand its user base even in the passenger vehicle industry. Over half of new car and light-duty truck sales in Europe are now diesel based. World-wide demand is being further fueled by the use of diesel for electric power generation in many parts of the world such as China and South America (EIA, 2011b).

On the supply side, the Organization of the Petroleum Exporting Countries (OPEC) possess about two-thirds of the world's estimated crude oil reserves and hence can sometimes exert significant influence on prices by setting an upper production limit on its members (EIA, 2011b). The US imports about 60% of its oil consumption (CIA World Fact Book, 2011); hence, oil prices spike in response to disruptions in the international and domestic supply of crude oil.

Until 2004, the average price of diesel fuel was generally lower than the average price of gasoline, except during some cold winters when the demand for distillate heating oil tended to be high. Since 2004, the price of diesel fuel has frequently been higher than the price of regular gasoline year round, largely due to higher demand growth for diesel compared to that of gasoline.

Laws and regulations within the U.S. can influence the price of diesel fuel. Cleaner diesel fuel requirements have resulted in higher cost of production. And, factors such as federal and state taxes, local supply and demand patterns, distance from Gulf coast (source of ~50% of diesel fuel in the U.S.), and regional fuel specifications also influence prices (EIA, 2011b).

United States vehicle fleets are so heavily dependent on petroleum and since there are few economically viable alternative fuels available, the price of transportation fuels tends to be more volatile than prices of other commodities (EIA, 2011b). Furthermore rapid price spikes and the lack of accurate predictability of price trends pose very challenging risk management issues to the transportation industry.

## 1.2 Transportation Industry in the U.S.

The U.S. transportation industry was a $688 billion industry in 2009, of which $542 billion was spent on trucking goods across the U.S. (CSCMP, 2011). In 2009, the U.S. Gross Domestic Product (GDP) was $14.33 trillion of which ~5% is accounted by the transportation industry. (CIA World Fact Book, 2011)

The trucking industry can be split into private and for-hire sectors, and the for-hire sector can be further divided into Truckload (TL) and Less Than Truckload (LTL) sectors. Truck load carriers pick up a load from the shipper and directly transport the truck load to the destination.

Truck load operations are categorized by the attributes of the product being transported into either general freight or special freight. General freight is transported in regular trailers. Refrigerated trailers and dump trucks are examples of equipment used to transport specialized freight (FHWA, 2001).

In 2006, 87% of all goods were delivered by the U.S. trucking industry, and the industry accounted for 84% of the nation's freight bill. These statistics make it clear that the trucking industry is the back-bone of the movement of goods in the U.S. As such, the U.S. economy and this industry are inextricably linked. Total truck miles driven in the US have been shown to be dependent upon economic growth (ATRI, 2008).

The operational costs of trucking can be categorized into two groups: fixed costs and marginal or incremental costs. In a study done in 2008, the average total incremental costs per mile for a motor carrier were found to be $1.73. Of the, $1.73 cost per mile (CPM), fuel costs accounted for 63.4 cents per mile, making up ~36% of the incremental costs, and this percentage has been steadily increasing (Table 1). Diesel fuel costs in 2008 averaged $3.80 per gallon, ranging from $2.33 per gallon to $4.76 per gallon. The rising fuel costs have brought the trucking industry under immense pressure and have led to consolidation of various small players, bankruptcies and have also increased focus on lean operations (ATRI, 2008).

Table 1. Rising Fuel Costs for the Motor Carrier

| Year | Costs Per Mile from fuel costs |
|---|---|
| 2006 | 42 cents |
| 2007 | 54.5 cents |
| 2008 | 63.4 cents |

## 1.3 Fuel Surcharges

Fuel surcharges were first introduced in the transportation industry in the mid 1970s when the U.S. Department of Energy (DOE) created the National Retail Average. Surcharges disappeared for a couple of decades before becoming a permanent line item on a carrier's invoice in the mid 1990s, when the price of diesel reached $1.15/gallon (Schulz, 2006). A percentage of line haul rate surcharge and a dollars per mile surcharge are two of the most common fuel surcharges used in the transportation industry. In our research, we limit the scope to the latter.

We state that the formula of the fuel surcharge (FSC) is given by Equation 1. Also, note from this point forward the authors will use the term FSC to mean fuel surcharge.

$$\text{FSC} = \text{INT}\left(\frac{\text{FuelPrice} - \text{Trigger Point}}{\text{Escalator}}\right) * \text{Basis} \tag{1}$$

The fuel price is the agreed-upon price of fuel between trading partners. The industry standard for the price of fuel is based on the Department of Energy (DOE) published US average retail price or one of eight regional average retail prices. The national average price is the average of fuel prices from a sample of 350 retail diesel outlets, including truck stops and service stations from around the country (EIA, 2011c). The trigger point is a negotiated price between trading partners. If the fuel price goes above this point, the FSC is paid by the shipper. If the fuel price is below the trigger point and the FSC schedule includes a "negative FSC" element, then the carrier would have to pay the shipper a surcharge. This concept of a, "negative FSC," is also sometimes referred to as a, "symmetric FSC." Basis is normally defined as $.01 per mile. The definition of the escalator is also negotiated between trading partners and represents the fuel efficiency of the carrier's equipment.

To understand how an FSC can impact a carrier's operations, consider the following example of two carriers: one called "Efficient Carrier" and the other called "Inefficient Carrier". Note this example does not represent actual operating carriers; rather, it is a model used to illustrate how an FSC passes the cost of fuel through to the shipper and to illustrate the effects of fuel volatility on a carrier's profitability.

This example is for a two year contract. During the first year, the price of fuel is $3.00/Gallon and during the second year the price of fuel is $4.00/Gallon. It is assumed that fuel represents 36% of a carrier's variable when the price of fuel is $3.00/Gallon and 43% of variable costs when the price of fuel is $4.00/Gallon. In order to keep this example simple, excluding fuel, the variable costs do not change between the two years. Also, variable costs, excluding fuel, are identical for the efficient carrier and inefficient carrier.

Concerning the compensation scheme between the hypothetical shipper and two carriers, suppose the line-haul rate is $2.50/Mile and the FSC structure uses a trigger point of $1.15, a basis of $.01/Mile, an escalator of $.055/Gallon.

The respective carriers are assumed to operate 250 days per year and drives 500 miles per day, thus billing 125,000 miles per year. It is assumed that the truck efficiency of "Efficient Carrier's" fleet is 6.0 miles per gallon (MPG) and the truck efficiency of "Inefficient Carrier's" fleet is 5.0 MPG. (Note: The definition of actual truck efficiency is a complicated and contentious issue. A detailed analysis will follow. For this model, 6.0 MPG and 5.0 MPG efficiency were chosen to represent carriers operating above and below the fuel surcharge escalator).

Table 2. Assumptions Made for the Example

| | |
|---|---|
| Distance | 125,000 Miles |
| Eff Carrier MPG* | 6.0 |
| Ineff Carrier MPG* | 5.0 |
| Line-Haul Rate | $2.50/Mile |
| Trigger Point | $1.20 |
| Basis | $.01/Mile |
| Escalator | $.055/Gallon |

Examination of the Table 3 demonstrates that the line-haul revenue does not change (as is standard in TL contracts), but the FSC revenue does change. Note that the absolute gross margin of "Efficient Carrier" increases by 1.2% when fuel rises to $4.00 and the absolute gross margin of "Inefficient Carrier" drops by 1.57% when fuel rises.

Also of note is that the shipper's costs increase $22,000 or 6% when the price of fuel increases.

Table 3. A Snapshot of a Hypothetical Carrier's Income Statement

| | Efficient Carrier | | Ineffecient Carrier | |
|---|---|---|---|---|
| Price of Fuel | $ 3.00 | $ 4.00 | $ 3.00 | $ 4.00 |
| Line-Haul Revenue | $ 312,500 | $ 312,500 | $ 312,500 | $ 312,500 |
| FSC/Mile | $ 0.33 | $ 0.51 | $ 0.33 | $ 0.51 |
| FSC Revenue | $ 40,909 | $ 63,636 | $ 40,909 | $ 63,636 |
| **Total Revenue** | **$ 353,409** | **$ 376,136** | **$ 353,409** | **$ 376,136** |
| Fuel Costs | $ 62,500 | $ 83,333 | $ 75,000 | $ 100,000 |
| Other Variable Costs | $ 133,333 | $ 133,333 | $ 133,333 | $ 133,333 |
| **Total Costs** | **$ 195,833** | **$ 216,666** | **$ 208,333** | **$ 233,333** |
| **Gross Margin** | **$ 157,576** | **$ 159,470** | **$ 145,076** | **$ 142,803** |
| Absolute Gross Margin Delta | | 1.20% | | -1.57% |

Another hypothetical example worth examining is if there is no FSC built into the contract. In this case, the shipper's costs will not increase by $22,000 or 6% if fuel price were to increase from $3.00 per gallon to $4.00 per gallon. As can be seen in Table 4, a carrier could

potentially see its absolute gross margin percentage drop from 13% to 17%, dependant on its efficiency. This significant decrease in gross margin can lead to insolvency for carriers.

Table 4. Change in Gross Margin with No FSC Built into the Contract

| | Efficient Carrier | | Ineffecient Carrier | |
|---|---|---|---|---|
| Price of Fuel | $ 3.00 | $ 4.00 | $ 3.00 | $ 4.00 |
| Line-Haul Revenue | $ 312,500 | $ 312,500 | $ 312,500 | $ 312,500 |
| FSC/Mile | $ 0.33 | $ 0.33 | $ 0.33 | $ 0.33 |
| FSC Revenue | $ 40,909 | $ 40,909 | $ 40,909 | $ 40,909 |
| **Total Revenue** | **$ 353,409** | **$ 353,409** | **$ 353,409** | **$ 353,409** |
| Fuel Costs | $ 62,500 | $ 83,333 | $ 75,000 | $ 100,000 |
| Other Variable Costs | $ 133,333 | $ 133,333 | $ 133,333 | $ 133,333 |
| **Total Costs** | **$ 195,833** | **$ 216,666** | **$ 208,333** | **$ 233,333** |
| **Gross Margin** | **$ 157,576** | **$ 136,743** | **$ 145,076** | **$ 120,076** |
| Absolute Gross Margin Delta | | -13.22% | | -17.23% |

Concerning the price of fuel in the above example, the price fluctuation actually mirrors the observed change in the price of fuel over the course of the research conducted to write this thesis. The study began in early October, 2010 and ended in May, 2011. During the week of October 4th, 2010, the national average price of diesel fuel was $3.00 per gallon and in early April, 2011, diesel crossed into the $4.00 range (EIA, 2011c).

This example when taken into context of the broader economy demonstrates the utility of FSC programs, and it also raises some of the contentious aspects of FSC programs. For example, many fast food restaurants in the U.S. offer a $1.00 value meal which enables customers to purchase a variety of goods for $1.00. This pricing scheme has tended to remain constant during short-term volatility in fuel pricing. For example, the McDonald's double cheeseburger was sold for $1.00 for six years straight until December 2008, when rising costs forced McDonald's to raise the price to $1.19 and offer a different version of the item with one less slice of cheese for the $1.00 price (Los Angeles Times, 2008). In other words, given a long-

term steady increase in the price of fuel, a $1.00 value item could very well turn into the $1.19 value item. But, for short-term changes in the price of fuel, restaurants offering a $1.00 value item, for fear of losing customers, seem to not have the ability to raise prices. This implies that revenue streams remain constant while transportation costs increase. This increase in transportation costs either needs to be absorbed by the shipper or the carrier.

The potential of rapid increase in transportation costs coupled with the inability to pass higher prices to the end consumer in the short-term creates significant pressure to both shippers and carriers. This risk is shared between these two parties by the employment of FSCs as an addendum to line-haul rates. The line-haul rates serve as a way to fix costs over a two year contract between shipper, and the FSC servers as a variable portion to keep carriers solvent. In summary, if consumers of the $1.00 value item refuse to pay higher prices for short term price variations in fuel; must the shippers bear all of the costs for an increase in fuel price? Or, should carriers be expected to lose some portion of their gross margin percentage as the price of fuel increases?

Ultimately, the question, re-stated is: how should the TL industry structure FSCs? Is the purpose of the FSC to enable total "pass-through" of fuel costs from carrier to shipper, or strictly ensure the carriers remain solvent? With an FSC system in place, the shippers are bearing additional risk of high fuel prices. Given this situation, should carriers be afforded the opportunity to add a premium to the price of fuel in order to profit for services rendered? These concepts will form the focus of this thesis and will be addressed from the following perspectives.

First, with a very small probability of the price of fuel falling back to $1.15, should the industry use a trigger point at the current price of fuel, or perhaps at $0.00? What impact would

a change in trigger point cause to the industry? Besides the financial implications to shippers and carriers, would a change to the trigger point, also, cause operational and accounting challenges?

Second, can a carrier's true fuel costs or efficiency (miles per gallon) be determined? There are several factors that will modify what a carrier's true costs are, including, mileage driven, dead-head miles (the miles travelled by a carrier while not carrying a load), and payment terms. These factors will all influence the escalator. How should mileage be determined? Mileage on a lane can be defined by industry standard terms of "shortest miles" which is the shortest path route on highways between points A and B, "practical miles" which is the length of truck-preferred highway miles between points A and B, or "actual miles" which is the actual length of the lane travelled by a carrier (to include out-of-route miles for maintenance and other non-client related business). Generally speaking, "shortest miles" will always be less than or equal to "practical miles" which will always be less than or equal to "actual miles." What percentage of dead-head miles, if any, should be paid by the shipper or included in calculation of the FSC? And, finally, concerning the escalator, should the fact that the carrier pays for fuel at the pump, but is not compensated until being paid by the shipper influence the FSC?

Third, what should serve as the standard for the price of fuel? Should the US average retail fuel price be considered or a regional fuel price? What breakdown of business would best suit a regional FSC?

This thesis will seek to address these issues with mathematical analysis and research into the current state-of-affairs. The literature review will provide an industry-wide perspective. Following this, two shipper companies' experiences with a trigger point transition will be

examined. Then, separate chapters will each evaluate each component of the fuel surcharge equation.

Finally, one last aspect of bidding behavior, called "the winner's curse" needs to be introduced. It is a critical element of auction bidding, which is the format with which shippers use to award lanes to carriers. The term advanced by Richard Thaler (1981) is explained as follows in his paper "Anomalies: The Winner's Curse":

> Suppose many oil companies are interested in purchasing the drilling rights to a particular parcel of land. Let's assume that the rights are worth the same amount to all bidders, that is, the auction is what is called a common value auction. Further, suppose that each bidding firm obtains an estimate of the value of the rights from its experts. Assume that the estimates are unbiased, so the mean of the estimates is equal to the common value of the tract. What is likely to happen in the auction? Given the difficulty of estimating the amount of oil in a given location, the estimates of the experts will vary substantially, some far too high and some too low. Even if companies bid somewhat less than the estimate their expert provided, the firms whose experts provided high estimates will tend to bid more than the firms whose experts guessed lower. Indeed, it may occur that the firm that wins the auction will be the one whose experts provided the highest estimates. If this happens, the winner of the auction is likely to be a loser. The winner can be said to be "cursed" in one of two ways: (1) the winning bid exceeds the value of the tract, so the firm loses money; or (2) the value of the tract is less than the expert's estimate so the winning firm is disappointed. Call these winner's curse versions 1 and 2 respectively. Notice that the milder version 2 can apply even if the winning bidder makes a profit, as long as the profit is less than expected at the time the bid was made. In either version the winner is unhappy about the outcome, so both definitions seem appropriate. (Thaler, 1988, p. 192)

From the above passage, the winner's curse can be interpreted as follows: in a bidding scenario when the bidders do not have full and complete information, the winner of the bid most likely placed a higher value on the object than its true worth.

This concept is critical to the transportation business because if a carrier underestimates the future price of fuel, does not understand FSC schemes, or underestimates the cost of doing

business with a shipper, then the carrier might bid too low on a contract and fail to secure a profit margin (an effect of the "Winner's Curse"). This is a failure for all parties because while the shipper will enjoy low transportation rates, the shipper will eventually be forced to identify a new carrier when the current carrier elects to or is forced to stop serving the given lane.

## 2 Literature Review

Fuel surcharges serve to share the risk of fuel price volatility between carrier and shipper. Due to the highly competitive nature of the truckload transportation industry, smaller carriers often do not have the liquidity to handle rapid spikes in fuel prices. Figure 1 (ATR, 2011) suggests that the number of total trucking failures is correlated to the price of Diesel fuel. The FSC enables a pass-through of fuel costs from the carrier (who actually purchases diesel fuel at the pump) to the shipper.

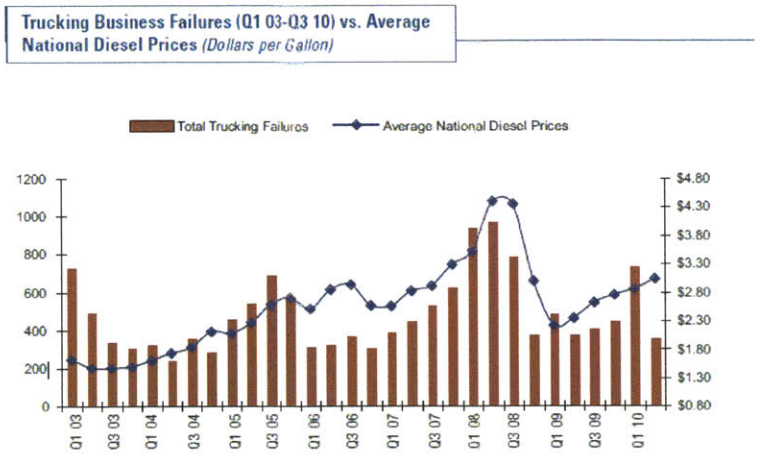



Figure 1. Trucking Business Failures vs Average National Diesel Prices (ATR, 2011)

Schulz (2006) asserts that FSCs have become an essential element of the shipper / carrier compensation scheme, and that this state of affairs continues to be the standard. Support for this assessment is given in the form of quotations from industry insiders, all of whom agree that without FSCs, the entire carrier industry would suffer and a significant number of carriers would go bankrupt.

Schulz also identifies an important reason why shippers are willing to accept the oscillating nature of surcharges. The sharing of risk from carriers to shippers prevents the

massive amount of bankruptcies that occur during a fuel price spike, which helps maintain the competitive nature of the trucking industry.

Despite the fact that FSCs serve as a means to prevent a large amount of bankruptcies during times of high fuel prices, there is evidence that high fuel prices create tension within the industry. This is shown from legislative action that took place in the spring of 2008. Due to constituent pressure, including from the Owner-Operator Independent Drivers Association, U.S. Senator Olympia Snow, R-Maine, and U.S. Senator Sherrod Brown, D-Ohio, introduced the Trust in Reliable Understanding of Consumer Costs (TRUCC) Act in April, 2008. This act, never voted into law, would have required, "the entirety of any FSC to be disclosed as a line item in the freight contract and passed to the motor carrier or other party directly responsible for paying at the pump" (Dills and Dunn, 2008, p.12-13). The intentions of the act were to prevent freight brokers from taking a cut of the FSC rather than fully compensating carriers. This issue always existed, but became more important as the price of fuel increased.

While FSCs are acknowledged to be absolutely necessary to the industry, it should be noted that there is no single uniform FSC table employed across the industry. CH Robinson Worldwide Incorporated, a publically listed (NASDAQ: CHRW) 3rd Party Logistics Provider, demonstrates the lack of an industry standard with respect to FSC schedules in its 2010, 10-K Annual report, which reads:

> "Changing fuel costs may have an impact on our net revenue margins. In our truckload transportation business, which is the largest source of our net revenues, rising fuel prices may result in a decreased net revenue margin. While our different pricing arrangements with customers and contracted carriers make it very difficult to measure the precise impact, we believe that fuel costs essentially act as a pass-through cost to our business. In times of higher fuel prices, our net revenue margin percentage declines"(p. 15).

Schulz (2006) identifies the fact that while FSCs are common in the transportation industry, there is no uniform practice of a FSC pricing scheme. An example is that Gary Girotti, of Chainalytics said, "Some [Shippers] prefer keeping their base rates as low as possible, while others feel they gain additional leverage when surcharges are negotiated into the overall rate."

Shehadi and Witalec (2010) further this point in a thesis on FSCs and fuel hedging. In a survey of forty-three companies involved in transportation, 75% employ FSC programs. While 84% of the companies that employ FSC programs rely on a standard fuel price, the Department of Energy (DOE) national retail price, there is no single industry standard for the trigger point or escalator. The trigger point (referred to as peg rate by the original authors), escalator, and FSC ranges are displayed in Table 5.

Table 5. Results from Shehadi and Witalec (2010) Fuel Surcharge Survey

| | Peg Rate | Escalator | Surcharge |
|---|---|---|---|
| Minimum | $ - | $ 0.05 | $ 0.01 |
| 1st Quartile | $ 1.15 | $ 0.05 | $ 0.01 |
| Median | $ 1.20 | $ 0.05 | $ 0.01 |
| 3rd Quartile | $ 1.25 | $ 0.06 | $ 0.01 |
| Maximum | $ 2.33 | $ 0.07 | $ 0.05 |

In summary, because of the effectiveness and utility of FSCs, the TL industry is functional and capable of handling rapid fuel changes. That said there are a number of issues to evaluate and explore in order to answer whether or not the formulation of FSCs can be modified in order to benefit the entire industry.

# 3 Methods

The authors utilized surveys, in-depth structured interviews, and analytical models to better understand FSC programs. Interviewed subjects represent major shipping companies, publicly traded carriers, privately-held carriers, and 3PL providers. All surveys and interview results are anonymous and respondents are given fictional names in the thesis.

## 3.1 FSC Equation

For truckload (TL) transportation the most common FSC program employed is to calculate the FSC based off of the price of fuel, a pre-established trigger point, also, called a peg (for the duration of this paper the nomenclature 'trigger point' will be used), an escalator, and a basis.

$$\text{FSC} = \text{INT}\left(\frac{\text{FuelPrice} - \text{Trigger Point}}{\text{Escalator}}\right) * \text{Basis} \tag{2}$$

We argue that the following equivalent equation of FSC is simpler and more intuitive:

$$\text{FSC} = \left(\frac{\text{FuelPrice} - \text{Trigger Point}}{\text{Efficiency}}\right) \tag{3}$$

Taking a second look at Equation 2 with units we note that

$$\text{FSC}\left(\frac{\$}{\text{mile}}\right) = \text{INT}\left(\frac{\text{FuelPrice}\left(\frac{\$}{\text{gallon}}\right) - \text{Trigger point}\left(\frac{\$}{\text{gallon}}\right)}{\text{Escalator}\left(\frac{\$}{\text{gallon}}\right)}\right) * \text{Basis}\left(\frac{\$}{\text{mile}}\right) \quad (4)$$

$$\frac{\$}{\text{mile}} = \left(\frac{\frac{\$}{\cancel{\text{gallon}}}}{\frac{\$}{\cancel{\text{gallon}}}}\right) * \frac{\$}{\text{mile}} = \frac{\$}{\text{mile}} \quad (5)$$

The above analysis would imply that

$$\text{Efficiency} = \frac{\text{Escalator}}{\text{Basis}} \quad (6)$$

From this point forward in the thesis, all of the FSC related analysis will utilize Equation 3. This FSC equation employs fewer variables and is linear which we think is simpler compared to non-linear integer step function of Equation 2. An FSC schedule using either equation can be presented in the same tabular form. Also, it should be noted that the authors will use the term "Escalator" throughout the paper. This concept of escalator is equivalent to the definition of "Efficiency" in Equation 6 and is defined in terms of miles per gallon. This is to maintain consistency with industry participants.

Before proceeding, it is worth clarifying the concept of a "negative FSC" or a "symmetric FSC". We have discussed how FSCs are paid if the price of fuel is above the established trigger point. Given the current state of affairs, because the average price of fuel is well above the industry average trigger point, there is no need to establish "negative FSCs"; however, when the FSC program was established, and fuel was closer to the industry average trigger point, the situation often arose when the price of fuel was less than the trigger point. Because of this

situation, trading partners established "negative FSCs," which would contractually obligate the carrier to compensate the shipper if fuel fell below a certain point (not necessarily the trigger point). Evidence suggests that "negative FSC" programs are not employed universally. For this reason, when analyzing trigger points, this thesis will evaluate the effects of utilizing and not utilizing such a program.

Given this introduction to the FSC equation, one aspect of subsequent chapters will be to analyze each component of the FSC equation. The purpose is to identify how modification to each component would impact the cost structure of agreements between shippers and carriers. Attention will be given to evaluating the effects of using a $0.00 trigger point, how to set an escalator, and when to consider using the U.S. national average fuel prices versus using a particular regional fuel price as the fuel standard.

### 3.2 Industry Research: Perspectives of Shippers and Carriers

Beyond exploration of the theoretical nature of the FSC structure, the authors conducted field research with industry participants to understand the shippers and carriers attitudes toward FSC programs.

On the shipper side, the authors interviewed two large food and beverage shippers and a 3PL that have either carried out or are considering transformations to their FSC programs. To complement this qualitative research, the authors also conducted extensive mathematical analysis on three years of revenue data provided by one of the shippers.

To understand the carrier attitudes toward FSC programs, the authors designed and distributed a web-based survey (Appendix 1: Carrier Survey). Carrier information was obtained from various sources including professional networks such as the Council of Supply Chain

Management Professionals (CSCMP), the sponsoring company's carrier list, interested company's carrier lists, and personal contacts. Interested companies include those shippers that identified themselves as interested in the survey results, and as such provided their carrier contact lists to the authors for distribution. Invitations to take the survey were sent by two different methods. The first was a targeted approach, in which, a shipping company provided information of its contracted carriers and the specific name and title of a point-of-contact at each carrier. The carrier representatives were then contacted by the authors in an email. In total, 771 targeted invitations were sent. The targeted invitations yielded 101 responses, of which 72 were complete responses and 29 were partial responses. The second invitation method was a general approach. A web-link was provided to interested parties (including both carriers and shippers). This method was used sparingly throughout the research and yielded 21 responses. Of these 21 responses, 13 were complete responses and 8 were partial responses. Particular care was taken to ensure that the identity of carriers that responded to the survey was not revealed.

## 4 The Shipper Perspective

In order to understand the benefits of employing a zero trigger point-based fuel surcharge, as well as understand the challenges associated with the transition, two large shippers were interviewed. Both companies reported smooth transitions; however, one shipper elected to make the transition in the middle of a negotiated contract (contracts last one to two years), and the other shipper executed the transition during a bidding period. Experiences and insights of these two companies follow.

Shipper BBB executed a very rapid transition to a $0.00 base FSC in the Spring of 2010. On March 19th, 2010, Shipper BBB proactively contacted all of its carriers and dictated the change in FSC schedule with an implementation date of May 3rd, 2010. The process of moving the trigger point from $1.40 to $0.00 while keeping their escalator the same, with a $.28/mile increase in the FSC and a corresponding $.28/mile decrease in line-haul rates can be characterized as smooth and without incident. The ease of the transition can be attributed to the fact that the leader of the evolution had prior experience in managing this transition at another large food and beverage shipping company.

Shipper BBB's primary purpose for switching to a $0.00 based trigger point was to better identify the actual annual fuel expenditure in order to have tighter control on fuel expenditure in order to enable fuel hedging. Secondary reasons include: to simplify accounting, to meet the requirement for increased transparency in carrier billing, and to isolate the cost of fuel from the competitive bidding process. A concern of Shipper BBB was that in an environment with increased fuel prices, a savvy carrier could benefit from the increased costs and increase their margins without actually increasing quality-of-service.

Concerning communications with carriers, Shipper BBB stressed to the carriers to focus on the total compensation (line-haul in addition to the FSC) in order to ensure the transition is revenue neutral. With respect to implementation, first, Shipper BBB emphasized that the entire logistics team needed to be aware of the change in order to prevent the acceptance of line-haul rates that were not in line with expected line-haul rates. Second, shipper BBB thought it more advantageous to strictly state what the change in line-haul rate should be.

The point that Shipper BBB elected to modify its pre-negotiated contract mid-cycle, as opposed to waiting for a new biding cycle is significant. From Shipper BBB's perspective, this simplified the process because Shipper BBB felt that it had tighter control to guarantee the total compensation (line haul plus FSC) did not change; however, it established the precedent to Shipper BBB's carriers that negotiated contracts can be modified mid-cycle. Because of this precedent, there is risk associated with this decision.

Shipper BBB also identified the need to adjust the prior year's data and metrics to properly track performance of each lane. Overall, shipper BBB identified that the evolution achieved the targeted goal: an understanding of the true cost of fuel to the carriers.

Another large food and beverage shipping company, Shipper CCC executed a similar modification to its FSC schedule scheme by executing a transition from a $1.10 trigger point to a $0.00 trigger point. Shipper CCC's ultimate goal was to ensure the cost of fuel is passed directly to the shipper, so that Shipper CCC could award contracts to carriers and measure carrier performance by quality-of-service factors such as effectiveness of the cold-chain, on-time arrival rate, mean delivery time, delivery time variability, etc., rather than on fuel pricing.

The implementation of a new FSC schedule by Shipper CCC can also be described as methodical and successful. The evolution was led by a member of the supply-chain strategy group and did not require significant corporate involvement or sponsorship. Shipper CCC's primary advice to a shipping company considering modification to FSC, is to execute the modification during a bidding period (As in during the negotiation process). By executing the change during the normal bidding period, Shipper CCC was able to dictate terms of what the expected outcome of the process should be to carriers. In other words, Shipper CCC explicitly stated that a ~$.17/mile increase in the FSC schedule caused by a reduction of the trigger point to $0.00 should consequently lead to a reduction in the line-haul rate of the carrier by the same $.17/mile. That said, given that the line haul rate is a function of many variables influenced by both economic factors as well as operational efficiency of the carrier, and these variables can change significantly between two-year bid cycles, the line haul rate quoted by a carrier is subject to change by a different amount from $.17/mile.

Shipper CCC proactively managed all the communications regarding the change in FSC program with the carriers. Premium carriers were briefed in face-to-face meetings. During the multiple rounds of bids, Shipper CCC was able to identify the carriers that did not fully understand the new pricing scheme by their non-compliance to the change in line-haul rate. This method made for a "manage-by-exception" environment that facilitated the transition. After the bidding process was complete, Shipper CCC had two internal administrative issues to attend to: 1) update the Transportation Management System, and 2) ensure all the prior year's data reflected the changes in the FSC schedule.

Also, of note is that Shipper CCC conducted quantitative analysis in order to understand the average fuel efficiency of its carriers. Shipper CCC polled its carriers and took an average to

determine this value. In chapter 6, we will present analysis to understand why this activity is important to structuring an FSC. Shipper CCC acknowledged the importance of matching the FSC fuel efficiency standard with the actual fuel efficiency of a given fleet, but said that a system which treats every fleet/vehicle as having a unique fuel efficiency rating would be too difficult to manage. This gives rise to the question of how a shipper should match the FSC fuel efficiency to the actual fleet efficiency. Should the shipper match the mean of the fleet efficiency? The mode? Perhaps the maximum expected efficiency or the worst efficiency?

Overall, Shipper CCC reported that the transition appeared to be revenue neutral (though, given the natural market volatility over a two year period and multiple factors that will lead to an increase or decrease in transportation costs, this is impossible to verify). Some smaller carriers had issues understanding the change; however, overall, most carriers had no issue complying. The internal issues of these carriers included additional administrative work in order to reconfigure the billing process. In summary, in this case the transition was a very smooth evolution. Shipper CCC attributes this to executing the change during the bidding process, as well as good communications both externally to carriers and internally within the company.

Given that two shippers successfully transitioned to a new FSC schedule, and have shown that it is possible to transition to a new FSC schedule, it is now worth investigating what aspects a shipper should take into consideration when evaluating a transition. Each component of the fuel surcharge schedule, trigger point, escalator, and fuel standard will now be addressed in respective chapters.

# 5 Trigger Point

As stated previously, the trigger point is a negotiated price between trading partners. If the fuel price goes above this point, the FSC is paid by the shipper. If the fuel price is below the trigger point and the FSC schedule includes a "negative FSC" element, then the carrier would have to pay the shipper a surcharge. This concept of a, "negative FSC," is also sometimes referred to as a, "symmetric FSC." The trigger point is also called the peg or the base. In this thesis, it will only be referred to as the trigger point.

## 5.1 The Trigger Point Industry Standard

Before beginning the discussion on where the trigger point should be, it is worth noting that despite the absence of one single number that serves as the industry standard trigger point, the survey results indicate that there appears to be an industry standard range. The following question in the survey helped identify this: "Most shippers use a trigger point in the range of $1.10-$1.50. One aspect of this study is to validate this assumption. Please identify the range of trigger points that the majority of your shippers employ." The results of this question can be seen in Figure 2 and demonstrates that the vast majority of trigger points fall between $1.10 and $1.50. This finding is consistent with the findings of Shehadi and Witalec (2010), who found that the interquartile range of trigger points used in the industry is from $1.15 to $1.25.

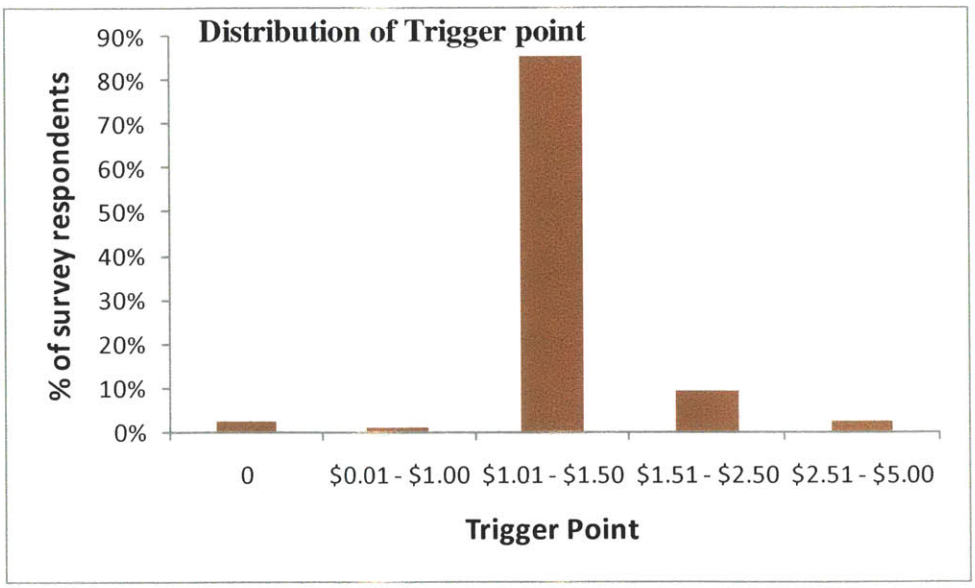



Figure 2. Distribution of Trigger Point; Data Collected from Carrier Survey

### 5.2 Revenue Neutrality Is the Null Hypothesis

The following analysis demonstrates the effects on carrier bidding behavior if the trigger point is modified from $1.15 to $0.00, assuming that the transition is "revenue neutral." Revenue neutral is the concept that upon transition to the $0.00 trigger point, whatever amount the FSC table increased by, the carrier should reduce its bid by that same amount. This means that ultimately line haul rates and FSC schedules are compensating. As stated previously in this paper, two large shipping organizations that already transitioned their trigger point to $0.00 claimed that it was a revenue neutral transition.

For the remainder of this thesis, the concept of revenue neutrality will serve as the null hypothesis. Because two large shippers observed revenue neutrality in their transactions, and revenue neutrality seems to be the logical natural reaction from the carriers, revenue neutrality is considered the expected outcome. Per standard statistical hypothesis testing, the null hypothesis

will not be rejected until sufficient properly gathered data can prove the case otherwise. The latter part of each chapter and the thesis will focus on experimental design in which carriers across the industry were surveyed and interviewed to understand how they would react to a modification to FSC schedules.

### 5.3 Investigating the Effects of a Revenue Neutral Transaction

By investigating a large shipper's 2010 two significant costs (Line Haul and FSC), we can project what a revenue neutral transition could look like if the shipper decided to move to a $0.00 trigger point. By simply dividing the trigger point ($1.15) by the defined fuel efficiency (5.0MPG), we can subtract $.23/Mile for all line haul movements, and add $.23 to the paid out FSC. This revenue neutral equation will lead to the exact same aggregate paid amount for every trip. A demonstration of a lane that pays $2.50/Mile for the line-haul and an FSC of $.40/Mile can be seen in Equations 7-11:

$$LineHaul = \frac{\$2.50}{Mile} \quad FSC = \frac{\$.40}{Mile} \tag{7}$$

$$Trigger\ Point = \frac{\$1.15}{Gallon}, Escalator = 5.0MPG \tag{8}$$

$$Adjustment = \frac{Trigger\ Point}{Escalator} = \frac{1.15}{5.0} = \$.\frac{23}{Mile} \tag{9}$$

$$LineHaul - Adjustment = \frac{\$2.50}{Mile} - \frac{\$.23}{Mile} = \frac{\$2.27}{Mile} \tag{10}$$

$$FSC + Adjustment = \frac{\$.40}{Mile} + \frac{\$.23}{Mile} = \frac{\$.63}{Mile} \quad (11)$$

By examination of Figure 3, two significant conclusions can be reached. The first, as previously stated, is that if the carriers bid in a revenue neutral fashion, then total aggregate costs for the shipper will not change (black line). The second significant point is that the variance in the aggregate pricing will also not change. (This statement is subject to the fact that if there is an established "negative FSC" between shipper and carrier, the variance never changes. If there is no "negative FSC" arrangement between the shipper and carrier, as long as fuel does not cross below $1.15, the variance will also not change.) This point is further evaluated in section 5.5.

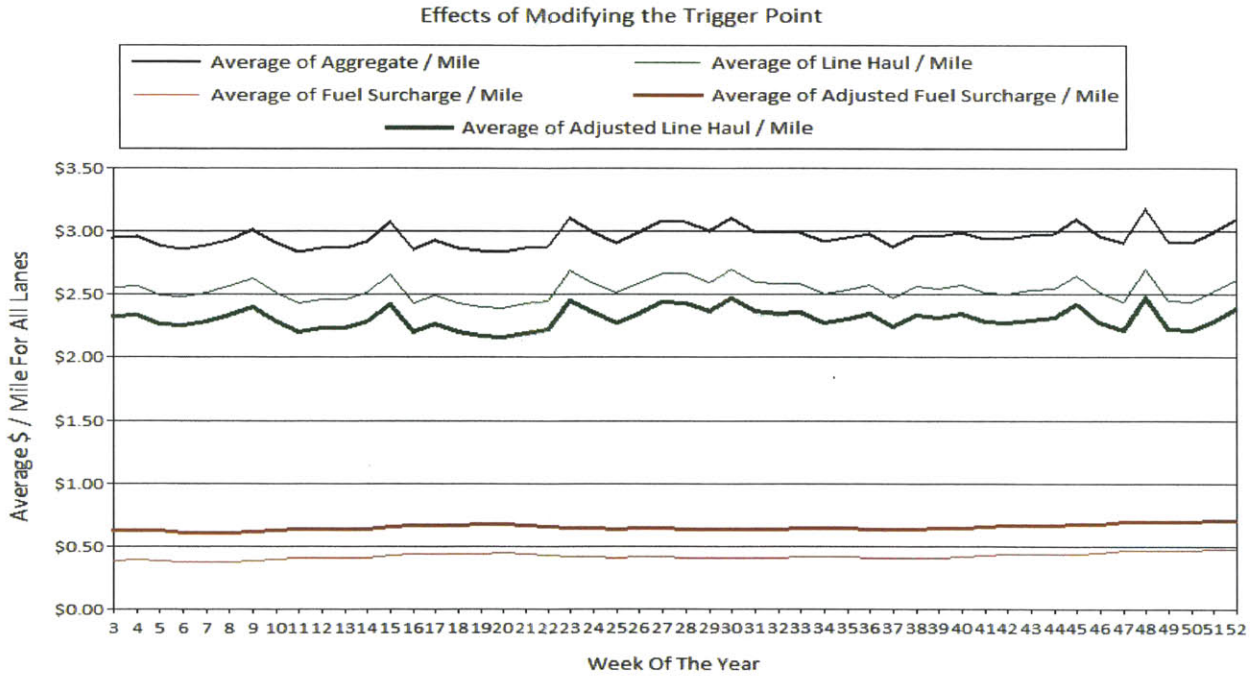



Figure 3. Effects of Modifying the Trigger Point: Revenue Neutrality

### 5.4 Quantifying the Risk Premium of Moving the Trigger Point from $1.15 to $0.00

An underlying assumption across the transportation industry is that the price of diesel fuel will not fall below $1.15 per gallon in the near future (Near future will be defined as length of time of a standard contract, which is one to two years.). If this assumption is employed, then the variance in FSC paid between a FSC based off a $1.15 trigger and one based off of a $0.00 will not change. That said, no matter how small or unlikely, the probability that fuel will fall below $1.15 per gallon does exist and is greater than zero (though very small).

In those agreements where there is no concept of a "negative surcharge" written into the contract, if the price of fuel is at $1.00 the carrier still gets compensated at a fuel cost of $1.15. Because of this fact, by moving the trigger point from $1.15 to $0.00, the carrier's risk is increased, and the value of the FSC schedule in the eyes of the carrier is actually slightly reduced. In summary, if fuel falls below $1.15 per gallon, a FSC schedule based off of a $1.15 trigger point is more valuable to a carrier than one based off of a $0.00 trigger point.

In order to quantify this amount, we seek to identify a market that will handle out-of-the-market put options and identify what the price of a put with a fuel strike price of $1.15, as well as minimum number of gallons to purchase (Financial transactions of this sort will normally have a minimum purchase.). The output of this bid, or approximation, will dictate the cost the carrier bears for the transition from a $1.15 to a $0.00 trigger point. As such, this quantity will dictate to the carrier how they should raise their line-haul rate to compensate for the added risk. Though this market exists for options with fuel prices in the range of $2.00-$4.00, because $1.15 is considered "out-of-the-money," any valuation of this option will be very small. Not only will the price of the underlying option be very small, but the cost of such an option will be mostly

made up of the premium charged by the seller of the option (an investment bank) to handle the transaction.

In negotiated agreements with a "negative FSC," the price of fuel falling below the trigger point will not modify the risk carried by the carrier, and this put-option analysis is not applicable.

### 5.5 Investigating a $2.90 Trigger Point

To understand the effects of moving the trigger point from $1.15 to $0.00, it is worth investigating what happens if the trigger point were to be set forward rather than to zero. A trigger point of $2.90 was chosen because on October, 4, 2010, the 52-week average of diesel fuel was $2.90. In analysis of a commonly executed lane of Shipper AAA, between Lithia Springs, Georgia, and Conroe Texas, Figure 4 shows the actual weekly spend across the year 2010. In red is the actual line-haul cost paid, and in blue is the actual FSC cost paid.

In the previous example, assuming the revenue neutral transaction, to evaluate the effects of a $0.00 trigger point, we subtracted a certain amount from the line-haul, and added that same amount to the FSC. For this example, assuming a $2.90 trigger point, the analysis is not as simple. The reason for this can be understood by evaluating the purple line in Figure 4. Because the trigger point is set to $2.90, the FSC awards $0.00 whenever fuel is below $2.90. This was the case for a large part of 2010. Because of this fact, the FSC line is actually dampened or flattened out. By comparing the blue line and purple line, it can be inferred that the aggregate sum of the line haul and FSC will be dampened or less volatile if a trigger point of $2.90 is utilized.

Figure 4 demonstrates that if the trigger is moved forward to the current 52-week mean diesel price (as of October 4, 2010), revenue neutrality is not observed. The key insight from Figure 4 is the change of the spiky blue line (based on a $1.15 trigger point), representing the original FSC to a very smooth purple line, representing the new FSC. When these FSC amounts are added to their respective line-haul rates (red and green), the aggregate will not be equal (like in Figure 3). Instead, the line-haul plus FSC based on a $2.98 trigger point will have less volatility.

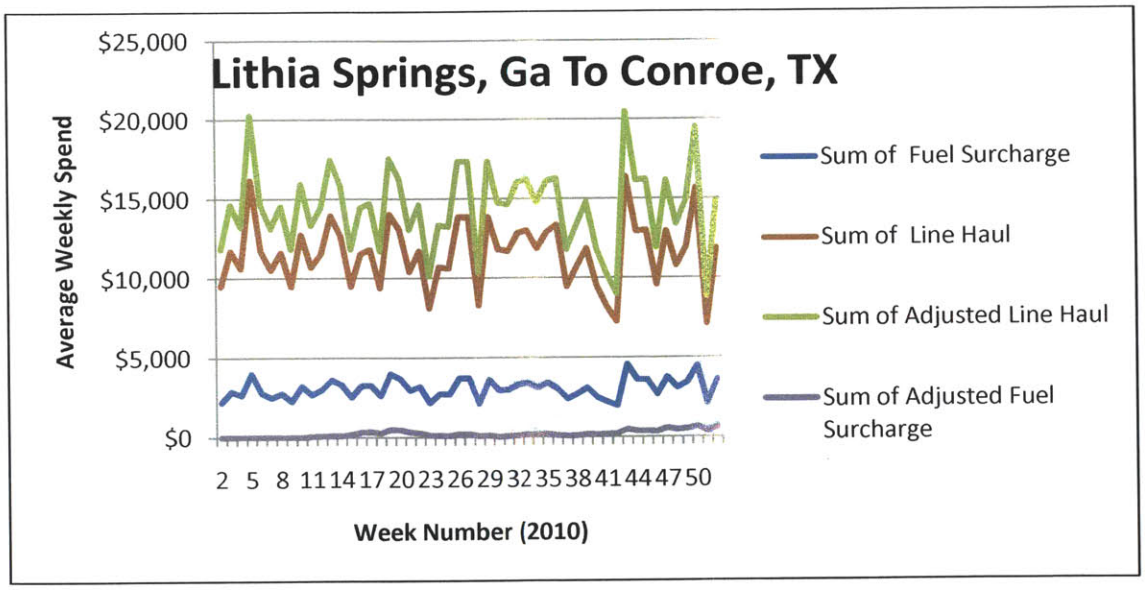



Figure 4. Fuel Price Volatility at Different Trigger Points

What this conclusion implies is that moving a trigger point forward to the 52-week average of fuel (as what was done in the 1990's when $1.15 was established as a common trigger point) without establishing a "negative FSC" will modify the current system of risk sharing between shipper and carrier. This result implies that moving the FSC forward will complicate FSC schedules in the following ways:

1) It is difficult to determine what the "current price" of fuel is. Fuel is very volatile and getting consensus on an industry standard, with options being anywhere in the range of $2.50 or higher would be very difficult.
2) If no "negative-FSC" system is created between trading partners, the risk sharing component of the agreement changes. (Again, evaluate the blue line vs. the purple line of Figure 4 to verify this conclusion.) This means that carriers will have to lower their line-hauls by some amount that would be dependent on a two-year fuel forecast. As previously stated, the revenue neutral modification is only applicable because of the assumption that fuel will not fall below the trigger point. If this assumption does not exist (as is the case of a higher trigger point, like $2.98), the associated modification to the line-haul is not as simple and requires some sort of fuel forecast.
3) If the trigger point is moved forward, and the trading partners involved want to avoid the situation previously described in statement 2, then a "negative FSC" system must be created. This system will increase accounting and administrative requirements of all parties. The authors did not research the extent of this administrative burden.

### 5.6 Industry Perspective on a Modification to a Zero Trigger Point Based FSC

In an effort to understand carrier support or opposition to a zero trigger point based FSC, the carriers that took the survey were asked, "Would you favor a zero trigger point based FSC schedule?"

The FSC survey conducted shows that roughly 52% of carrier respondents support a modification to a zero trigger point based FSC schedule while 48% oppose it. Of the respondents that opposed the transition to a zero-based FSC trigger point, only 18% (16

respondents of the total) demonstrated strong opposition, while the remaining 30% (26 respondents of the total) indicated light opposition.

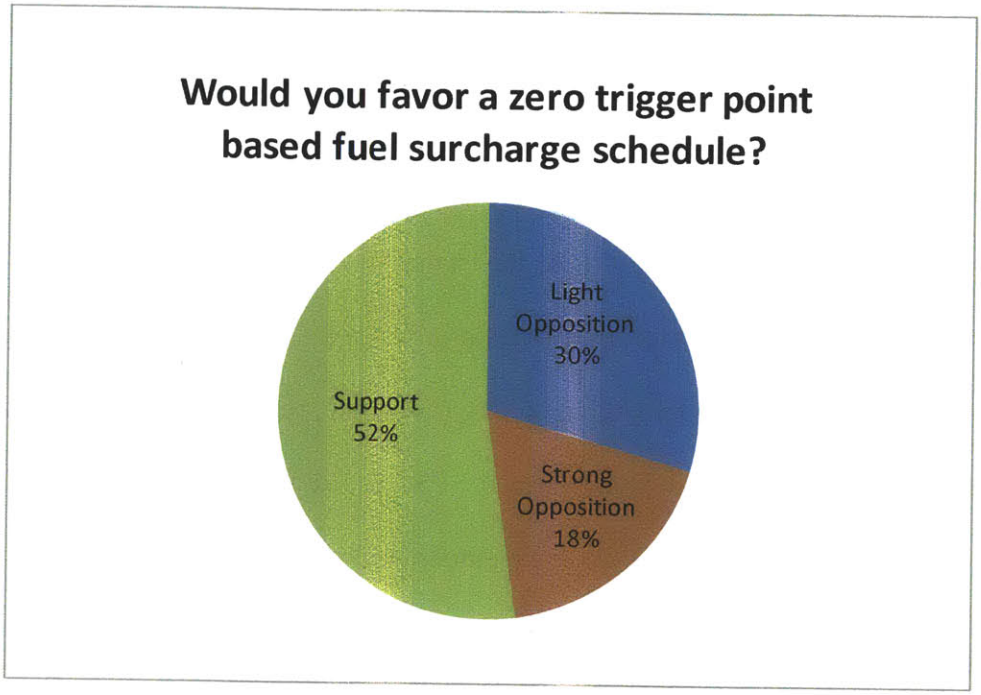



Figure 5. Distribution of Responses to the Question: Would You Favor a Zero Trigger Point Based FSC?

To better understand the opposition to the modification, survey participants that opposed the transition were selected for individual interviews. Of those interviewed there were two categories that the majority of participants fell into and one category that a few fell into. The first category, ADMIN HURDLE, is comprised of carriers that felt the positive impact made by the change does not out-weigh the one-time administrative cost of changing systems. The second category, STONGLY OPPOSED, is comprised of those that opposed the modification because it will significantly influence their business in a negative way. The third category, OTHER OPPOSITION, consisted of individuals who were opposed to the modification standard for various reasons other than those held by the STRONGLY OPPOSED group. The views of the individuals from the OTHER OPPOSITION group tended to be unique (in the sense that

other survey respondents did not mention these issues), but are necessary to present in order to give a complete view of the survey respondents perspective.

### 5.6.1 The ADMIN HURDLE Group: Positive Impact Made by the Change Does Not Out-Weigh the One-Time Administrative Cost of Changing Systems.

A common theme emerged from the ADMIN HURDLE group after multiple interviews: these carriers indicated that a modification to the trigger point standard does not and would not influence their day-to-day operations or profit margins. Another common theme that emerged was that carriers seek certain compensation on any given lane, regardless of the line-haul/FSC pricing scheme. In other words, no matter how the FSC schedule is set, the carrier will respond with a line-haul bid that will get them the same amount of aggregate revenue per lane.

PRIVCAR001with a fleet size of 15-30 trucks, opposed a transition to a zero trigger point in the survey, and, in a follow-up interview acknowledged that a trigger point transition from $1.15 to $0.00 will not influence the risk sharing agreement between carrier and shipper and, as long as the aggregate rate per lane does not change, a change in trigger point is acceptable. PRIVCAR001, then, indicated there would be a one-time administrative hurdle.

A family owned carrier serving a handful of West Coast states, PRIVCAR005, indicated that the company has an, "all in," per mile price that needs to be achieved to make the company profitable, and this "all in" price can be achieved by modifying the line-haul bid from a given shipper given FSC. Specifically, this carrier stated,

> We currently have 31 different FSC schedules that we work off of. The reason is that most companies have adopted/created their own FSC schedule so if you want to get reimbursed for fuel, you must play their game...When I have a potential new customer contact me for pricing, the first thing that I ask for is a copy of their FSC program. Then, I work up their line haul pricing accordingly.

Another family owned carrier, PRIVCAR007, describes a similar process:

> When we quote rates, if the customer has an FSC program that they use, then we look at their schedule, and compare it to the one we use. We then take the difference and add (or subtract in the case of the customer FSC program that pays more than ours) the difference to the line-haul rate that we quote. The dollars are the same (line-haul plus FSC) at that level of DOE fuel. The only difference is the line-haul rate is lower for a customer who uses a zero base FSC program because there is more comp [compensation] in the FSC. This causes confusion if only the line-haul rates are compared.

A large carrier, PRIVCAR010, acknowledged the lack of standards in the industry, and said that they simply modify their line-haul to reach their "preferred rate." PRIVCAR 010 said, "The challenge with all FSC scenarios is that there are no standards. We have a standard, every shipper has a standard but none of them are the same. The triggers are different, the escalators are different, some shippers use Breakthrough Fuel[1] some use a zero trigger point, some use monthly averages for the DOE, etc. The list goes on and on." Despite this lack of industry standard, PRIVCAR010 has a standing operating procedure in dealing with FSCs: "When creating rates for shippers with a zero trigger point, we have to start with our preferred rate for the lane and then make our adjustments for the fuel."

PRIVCAR011, a large carrier with 1,850 power units, when asked about FSC schedules, responded with similar logic: "Specifically, I do not really prefer one FSC scale over another. We just factor it in and adjust the bid accordingly."

A very large carrier, PRIVCAR008, which executes complex pricing analysis as a standard procedure, said that "we are indifferent to where an FSC starts. We are only looking to

[1] Breakthrough Fuel employs advanced technology to replace fuel surcharges by providing the actual cost of fuel on a give lane at a certain period in time. URL https://www.breakthroughfuel.com/web/guest

mitigate risk with an FSC." The implication being that the position of the trigger point between $1.15 and $0.00 will not modify the risk sharing agreement between this carrier and its shippers. PRIVCAR008 also warned that a modification to a zero trigger point could be received negatively by employees as performance incentive compensation schemes could be influenced. For example, annual bonuses tied to line-haul revenue would have to be adjusted.

Finally, a publically held carrier, PUBLCAR001 demonstrated that a transition to a zero trigger point did not significantly influence operations when a shipper client that procured $70 million of transportation services switched to a zero trigger point standard. What is unique about this situation is that PUBLCAR001, due to its size and bargaining strength will sometimes in a "carriers market" dictate its FSC to its shipper clients. For example, PUBLCAR001's FSC schedule clearly states, "Pursuant to the contract between [PUBLCAR001] and _____ this addendum shall supersede and/or replace any previous item referencing FSC." PUBLCAR001, also, has an interesting clause in its FSC schedule concerning the regional pricing of fuel that says, "The California FSC will apply when the California Fuel Price is $.0151 or greater than the US National Average diesel fuel price, as published by the Department of Energy (DOE)." Regional fuel pricing will be discussed later in this thesis; however, the important point worth noting is that PUBLCAR001, in certain bargaining situations, has the ability to dictate terms to their clients. Despite a preference for dictating FSC schedule terms (in a market favorable to carriers), PUBLCAR001 demonstrated the ability to conform to the terms of its largest client (the $70 million shipper) and operate with a zero trigger point. Also, of note, is that PUBLCAR001 acknowledged the requirement to educate and train Wall Street financial analysts tracking the company as well as investors; however, there appeared to be no negative repercussions of the transition.

Also, 3PL001, a publically traded provider of logistics solutions was asked, "would a publically held company suffer or benefit from [a transition to a zero trigger point], or would [the transition] be neutral." 3PL001 responded that "I am not sure how the market would react. You would think it would be a non-event if explained properly, but you never know." From this response, it can be inferred that the transition to a zero trigger point based FSC would be a non-significant event.

### 5.6.2 The STRONGLY OPPOSED Group: Strong Opposition to A Zero Trigger Point

The group that strongly opposes the transition to a zero trigger point based FSC, is comprised of carriers that employ an independent contractor (I/C) model, also, called an "owner-operator" model. The concept of this I/C model is that owners of trucks exclusively lease their services and equipment to a specific carrier for a specific amount of time. The carrier, in turn, identifies business and lanes for the carriers and distributes out work to these truck operators. The reason behind the opposition to the modification of the FSC trigger point is that the pay structure of this model tends to award the entire FSC to the tractor "owner-operator," and only awards some fixed percentage of the line-haul rate. For example, if a carrier currently compensates 100% of the FSC at $.50/mile and 75% of the line-haul at $2.50/mile, then the transition to a zero trigger point (100% of the FSC at $.74/mile and 75% of the line-haul at $2.26) would not be revenue neutral.

One publically listed carrier that has the (I/C) operations model, PUBLCAR002, identified this issue as potentially having a very large impact on their business. PUBLCAR002 sees the administrative issues of changing to a zero trigger point based system as so large that despite having 6,500 FSC tables on file (as in, between all of their customers, there is a total of

6,500 different systems), the benefits of standardization to a $0.00 trigger point are not worth the effort.

PUBLCAR002 has a very robust client base and has demonstrated the ability to be flexible in doing business with different FSCs. For example, PUBLCAR002 executes 20% of a U.S. Government agency's hazardous material (HAZMAT) requirements despite the fact that this US agency employs a $2.50 trigger point. Another example is that approximately one third of PUBLCAR002's 2010 $2.5 billion revenue comes from inter-modal shipping. This implies a familiarization with percentage of revenue FSC schedules as well.

Despite demonstrating the ability to work with shippers with different trigger points, PUBLCAR002, while making efforts to recruit and retain drivers, must have one standard compensation scheme for its owner-operator fleet of approximately 8,000 trucks and 7,500 owners. Any modification to the FSC/line-haul balance implied by switching to a zero trigger point will have implications to the profit margin of an (I/C) based carrier.

While PUBLCAR002 is absolutely opposed to a transition to a zero-based trigger point, the company representative did acknowledge that if the PUBLCAR002's customers mandated the transition, then PUBLCAR002 would be forced to adjust. Also, PUBLCAR002 noted that this switch would cause a change in the structure of quarterly and annual earnings report because FSCs are counted as "contra-expenses" and not revenue. PUBLCAR002 indicated this change would need to be explained to Wall Street analysts and investors; however, it would most likely not cause any change to the perceived valuation of the company.

### 5.6.3 The OTHER OPPOSITION Group: Other Opposition to a Zero Based FSC Schedule

There are carriers that opposed the zero based fuel schedule because it would expose their costs and limit their ability to profit off of one of their highest spends. For example, PRIVCAR007 said:

> "I do not understand the reasoning to put the cost trigger at zero. Each carrier must use fuel to provide its service, so there has been the cost of fuel in all trucking services since gas and diesel engines took over for horse and buggy. A practice such as this indicates that the largest cost of operation should be 'reimbursed' as a 'pass-through' at cost. And, that's assuming the formula actually covers the cost."

The implication here is that this carrier expects the ability to mark-up their costs by a certain percentage and the existence of a FSC prevents this.

BROKER002 is willing to fundamentally alter the current risk-sharing situation of FSCs in order to reduce "accessorial billing." BROKER002 stated, "The higher amount (FSC) might one day allow us to get back to the point where we are not having to charge a FSC. Each opportunity for accessorial billing creates more opportunity for things to go wrong."

These views, though not common in the carrier community, are nevertheless worth noting.

### 5.7 Benefits of a Zero Trigger Point to Carriers Identified in Interviews

While a common theme identified is that there is a one-time administrative hurdle with the transition to a zero trigger point FSC schedule, some interviewed carriers did acknowledge significant advantages to moving to zero trigger point.

The most common benefit perceived by carriers is the one as described by PRIVCAR002: "I suppose I prefer anything that makes calculating lane rates easier. If a

surcharge is significantly above or below average, you have to make adjustments to the line haul rates for that customer." This benefit was quantified by PRIVCAR005:

> As far as the man hours involved to manage the various FSC programs, we've pretty much automated the process so it really doesn't take us long to administer...and for that I say 'thank you' to Mr. Gates and his wonderful Excel spreadsheets...Our dispatch system is automated with the FSC tables so it's a fairly simple process not taking more than 20 minutes or so per week.

This idea of simple automation and use of Excel was repeated by PUBLCAR002 (which maintains 6,500 FSC tables in their database), who acknowledged that a team member had a programmed Excel spreadsheet with macros that did all of the required adjustments.

Though transitioning to a zero trigger point-based FSC will enable carriers to avoid a few simple calculations (performed in Excel), this reason is not enough to advocate the change. That said, there are significant advantages identified by carriers of moving to a zero trigger point FSC. PRIVCAR011 identified itself as a sophisticated carrier with respect to internal understanding of revenues and costs. PRIVCAR011 uses the same method previously mentioned of identifying an, 'all-in' rate and then adjusting. That said, PRIVCAR011 suspects some of its competitors do not have this capability.

> I do believe that 'some' of our competition do not understand the impact of varying fuel programs and just bid 'market rates' without respect to either fuel programs or cost. I believe some of our competition does it blindly, as described above...This I know. When a customer sends out "round 2" bid numbers some of the numbers are absurd. There was much absurdity during 2009 and 2010, understandably and with some reason. When a customer sends out absurd numbers in 2011, there is a loss of credibility in my view.

PRIVCAR011 is essentially identifying the "winner's curse" in a bid. This claim by PRIVCAR011 is that because its competitors do not fully understand how to adjust their line-

haul to match certain shippers FSC schedules, these same competitors will bid a line-haul that is too low. Too low of a line-haul will result in poor profit margins on a lane. If a carrier is running a lane and earning poor profit margins the only alternatives available are to stop servicing the lane or to go bankrupt. In this situation, no side of the transaction benefits.

Another advantage for carriers to switch to a zero trigger point FSC was identified by BROKER001. The perspective of BROKER001 is that a zero trigger point FSC will increase transparency between shipper and carrier. The zero trigger point will allow shippers to better understand carriers' costs. In this situation, BROKER001 believes that they can better explain increase in rates to their customers: "[Shipper] managers understand the direct correlation of fuel and rates and many managers are allowed the flexibility of fuel costs in their budgets. Rates are rising now because of capacity: High demand for trucks, low supply. Unfortunately, managers do not always understand how capacity affects rates."

### 5.8 Trigger Point Conclusion

Modifying the trigger point of a FSC scheme to $0.00 provides significant advantages to the TL industry. These benefits include increased visibility of fuel expenditure as well as a simpler FSC that will help prevent "the winner's curse." These are benefits for shippers and carriers. Concerning execution of the modification, carrier interviews and perspectives indicated acceptance of the revenue neutral nature of the transition.

That said, the benefits of a zero trigger point-based FSC can only be achieved if the zero trigger point becomes an industry standard. Multiple companies, a critical mass, must move to this standard to provide benefits to shippers and carriers alike. If only a handful of select companies move to a zero trigger point-based FSC, then the individual moves by companies will

only serve to further confuse the situation as carriers will have to deal with one more unique FSC.

## 6 Escalator (Or Efficiency)

The role of the escalator in the FSC schedule equation is significant, and as the trigger point moves closer to zero, it becomes more significant. This concept can be understood by examining the chart in Figure 6. Three different trigger points are examined ($0.00, $1.15, and $2.98). $1.15 is a common industry used trigger point, we are examining moving to a trigger point of $0.00, and a trigger point of $2.98 is displayed for comparison purposes. Three different lines originate from these three trigger points, the middle line (black) is the FSC schedule that results with a 5.0 miles per gallon (mpg) escalator. The top line (red) is the fuel costs of a carrier that operates at an efficiency of 4.0 mpg and the bottom line (green) is the fuel costs of a carrier that operates at an efficiency of 6.0 mpg. The significant point is that as the price of fuel rises, for each respective trigger point, the delta between the efficient carrier and FSC (difference between black and green line) and the delta between the inefficient carrier and FSC (difference between black and red line) increases.

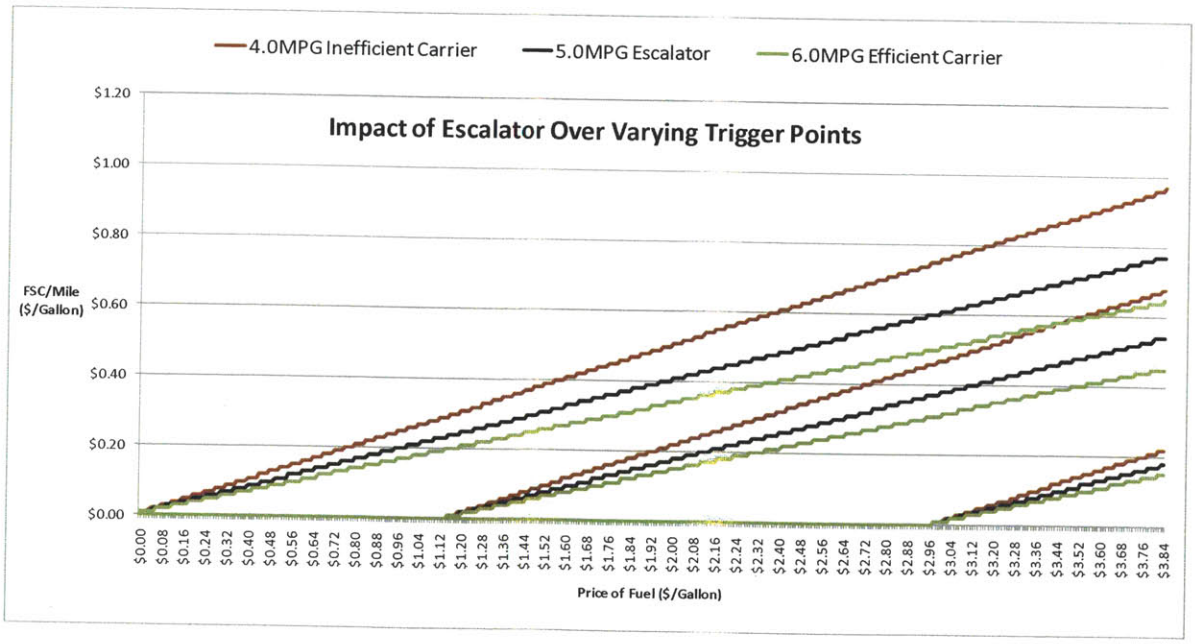



Figure 6. Impact of Escalator Over Varying Trigger Points

For example, in Figure 6 if the price of fuel is $3.60, the delta between the black and red lines is significantly higher (as well as the delta between the black and green lines) when the trigger point is $0.00 compared to a trigger point of $2.98. This indicates that if the trigger point is pushed towards $0.00, more attention is required in selecting an escalator.

This analysis that escalators have a significant impact motivates the re-occurring question: what is the purpose of an FSC? As discussed throughout this thesis, FSCs are employed to pass risk from carrier to shipper. Moving beyond this concept, FSCs can also serve as a tool for shippers to understand their contracted carriers' total fuel expense required to conduct business operations. This knowledge enables shippers to execute fuel hedging strategies. In other words, under the current system with an industry standard trigger point in the range of $1.10-$1.50 and an arbitrary escalator, shippers can only estimate their carriers fuel expense to a certain degree of accuracy (due to the fact that the current trigger point causes some percentage of fuel to be, "baked-in" to the line-haul and that arbitrarily set escalators can lead to discrepancies between actual expenditure of fuel and compensation for expenditure of fuel).

If the purpose of a zero trigger based FSC is to provide for an accurate total pass through of fuel costs from carrier to shipper, then a FSC schedule should seek to minimize this delta between the established FSC schedule and the carriers' actual costs. If a FSC schedule does not do this, then carriers will adjust their line-haul bids by decreasing their line-haul bid to gain a competitive advantage (if the FSC schedule pays higher than actual fuel costs) or by increasing their line-haul bid in order to make up for fuel costs (if the FSC schedule pays lower than actual fuel costs). As seen in Figure 7, simple arithmetic demonstrates that the shipper should set their escalators as close as possible to their carriers' actual efficiency in order to minimize the delta.

$$\Delta = \left| \frac{(FuelCost - TriggerPoint)}{CarrierEfficiency} - \frac{(FuelCost - TriggerPoint)}{DefinedEfficiency} \right|$$

$$\Delta = \left| \frac{DefinedEfficiency * (FuelCost - TriggerPoint)}{DefinedEfficiency * CarrierEfficiency} - \frac{CarrierEfficiency * (FuelCost - TriggerPoint)}{CarrierEfficiency * DefinedEfficiency} \right|$$

$$\Delta = \left| \frac{(DefinedEfficiency - CarrierEfficiency) * (FuelCost - TriggerPoint)}{DefinedEfficiency * CarrierEfficiency} \right|$$

$As DefinedEfficiency \rightarrow CarrierEfficiency,$

$\Delta \rightarrow 0$

Figure 7. Analysis Depicting Where Efficiency Should Be Set

This conclusion implies that shippers should not use unrealistic fuel efficiency escalators to establish FSC schedules in order to incentivize carriers to be more fuel-efficient. If this is done, carriers that operate with fuel efficiency significantly below the FSC schedule will be forced to adjust their line-haul bids to compensate. This action is counter to the purpose of a FSC and will prevent shippers from understanding their true fuel costs required for planning purposes.

### 6.1 Factors That Influence the Escalator

There are many factors that influence how an escalator should be set. Again, if given that the FSC should seek to serve as a, 'pass-through' of costs from the carrier to the shipper, the escalator should best match the carrier's true costs. As introduced in chapter 1, there are several factors that will modify a carrier's true cost including but not limited to mileage driven, dead-head miles, and payment terms. The remainder of this sub-section seeks to define and explain these concepts. Carrier perspective and associated analysis will follow.

Given that generally speaking, "shortest miles" will be less than or equal to "practical miles," which will be less than or equal to "actual miles," depending on the market conditions and which side has more bargaining power, if a FSC schedule is based on shortest miles, then logic dictates that a carrier should seek a lower escalator than one based on actual miles. Also, one more point of contention is that in certain circumstances 53-foot trailers cannot travel the 'practical miles' route, which means the fuel spend will be higher than actually compensated. Counter to this reasoning is that shippers should only pay a calculated route based off of established standards (pick-up location, delivery location, highways, zip codes, household goods moving tables, etc.), and how the carrier maneuvers between pick-up and delivery while taking fueling, maintenance, and quality-of-life requirements (lodging location, etc.) is strictly left to the carrier.

The amount of dead-head miles driven by a carrier will of course lead to increased fuel expense and how shippers choose to factor in a carrier's dead-head miles will influence how an escalator is set. As stated previously, dead-head miles are those driven by a carrier with no paying load, and as such not being paid for driving. Figure 8 is an example of line-haul miles versus dead-head miles where a shipper is compensated for lanes between points A to B and C to D. One practice is to add 10% or 15% to the FSC in order to compensate carriers for their dead-head. Shippers compensate for dead-head miles by adjusting the fuel efficiency (escalator) rather than count the dead-head mileage driven by carriers,. Another practice is for shippers to not compensate for dead-head miles. In this case, a higher escalator is used which will lower the FSC paid.

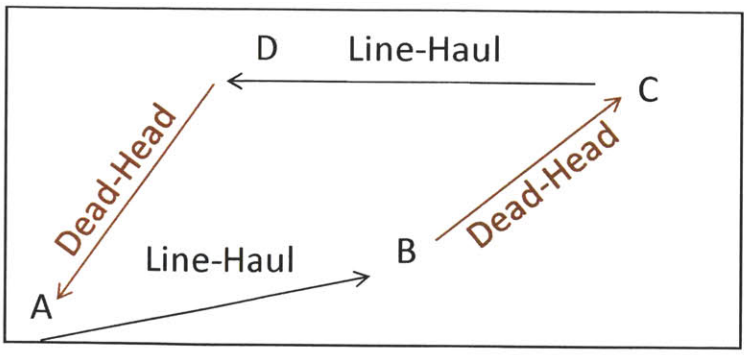



Figure 8. Dead-head Diagram.

The final aspect that will influence an escalator (beyond carrier efficiency) is payment terms. Given that the FSC is intended to share the risk of volatile fuel prices from carrier to shipper in the form of a fuel pass-through, one aspect mentioned by the carriers is that fuel is paid for at the tank; however, shippers do not compensate carriers until thirty days or longer after actual delivery. This issue of cash flow becomes more significant as the price of fuel increases. Delayed payment would also seem to have a larger impact on smaller carriers who do not maintain the same cash flow and who do not have the same access to capital as larger carriers. This cash flow issue could help explain an increase in bankruptcies of carriers during spikes in oil prices.

How these factors directly or indirectly influence the escalator tend to vary on the bargaining agreement and strength of the negotiating sides in any given situation. In order to better understand the interactions between shipper and carrier, it is worth understanding the perspectives' of various carriers.

### 6.2 Identification of Escalator as Critical to Bidding

Even though the focus of this research is the trigger point in the FSC equation, multiple survey respondents and interview participants often changed the subject to the escalator without

prompting. For example, PRIVCAR001, in a phone interview about the inconsequential nature of modifying the trigger point, volunteered the fact that PRIVCAR001 avoids shippers with an escalator of 6 miles per gallon (MPG). The fact that this information was volunteered demonstrates the importance this carrier places on the escalator portion of a FSC schedule. PRIVCAR006 identified the fact that the scale of the FSC (escalator) forces an unnatural increase in the line-haul rate to compensate. PRIVCAR007 stated, "The 5 cent escalator is necessary, even though most line-haul equipment actually performs at a higher MPG than 5." This concept will be developed further in the section, but is placed here to, again, show a carrier's concern over the escalator. A very large private carrier, PRIVCAR008, stated that, "As long as the slope of a FSC matches our cost, we are indifferent to where a FSC starts." Another very large carrier, PRIVCAR010, continued this theme by stating, "The biggest problem with FSC programs are the escalators. Escalators above 5 MPG cause the disparity in the FSC calculation to expand over time as fuel cost increases. This forces carriers to overcharge on the line-haul at lower fuel prices in the hopes of recouping future losses as fuel prices increase." The survey respondents demonstrated much more concern over the escalator, and it is worth investigating what drives the desired escalator.

### 6.3 Opposition to Compensating Actual Fuel Spend (Dollar Amount Paid by the Carrier at the Pump) and Opposition to Using Actual Carrier Efficiency.

Given that the fuel efficiency escalator is comprised of many variables and is seen as significant to carriers, it is worth, first, evaluating a few simpler methods to determine how to compensate carriers and why some interviewed carriers object to these methods. These methods include compensating carriers for their actual fuel spend at the pump, using the odometer as the metric to identify miles travelled, and using carrier efficiency.

A common question posed by the shipping community is: Why should the FSC schedule be based off of the Department of Energy (DOE) On-Highway diesel retail price if it is understood that carriers (especially large carriers) purchase fuel at a wholesale price? A similar, but different, argument from the shipping community is that since carriers understand their fuel costs because accounting systems track each invoice paid at the pump, then the carriers should simply base the FSC off of actual fuel price paid and provide invoices and accounting data as proof. The fundamental point in both of these arguments is that if the structure of an FSC is to provide complete and accurate "pass-through," then it is logical for the shipping community to expect that carriers should not be afforded the opportunity to mark-up the cost of fuel. In other words, since fuel is treated specially by being taken out of the line-haul rate and listed as a separate line-item on the final bill to the shipper for the purpose of risk mitigation, then the shipper should refuse any increase in fuel price levied by the carrier and pay directly per either wholesale pricing or actual invoices paid at the pump. Theoretically, this data sharing is an idea that could be executed; however, in practice, as demonstrated by the next example, it would not be accepted by the carrier community.

PRIVCAR003 demonstrated the ability to track the expenditure of every gallon of fuel with complicated satellite technology and engine equipment. This carrier acknowledged that the satellite system is consistent, and that the company has complete awareness of their fuel expenditure. PRIVCAR003 has an intricate system that tracks miles driven, active time, down-time, fuel throughput through the truck engines, fuel tax miles, which enables the company to calculate fuel efficiency to the third decimal point (for example 5.093 miles per gallon). This carrier stated that identifying efficiency to the third decimal point is critical given the number of miles executed. Due to the cost of fuel, this carrier's management reviewed fuel expenditure on

a monthly basis, but has recently begun executing weekly reviews. PRIVCAR003 demonstrates excellent control over their fuel expenditure and acknowledged that most FSC schedules are fair. That said, this carrier also made the assertion that because FSC schedules are based off of practical miles instead of actual miles, when the price of fuel increases, the carrier's profit margins are reduced (or, higher fuel prices causes the carrier to lose money).

PRIVCAR003 is a carrier that explicitly stated it does not wish to earn profit off of fuel expenses, which is the most common but not universal response observed in the survey. That said, given its ability to track fuel and the situations in which the price of fuel decreases their profit margins (due to mileage being based off of practical miles instead of shortest miles), it would be logical for PRIVCAR003 to be completely transparent in their interactions with shippers and disclose their actual fuel expenditure. PRIVCAR003 executed this plan with an undisclosed shipper and reported that in exchange for providing data and facts to said shipper, the shipper responded by demanding a reduction in PRIVCAR003s FSC schedule or line-haul. So, despite the ability to track fuel efficiency to the third decimal place, PRIVCAR003 will no longer provide these data to shippers because their impression is that the shippers will use the data against them. This experience of PRIVCAR003, though only one data point, suggests that regardless of how effective it would be to structure FSCs on the actual price of diesel paid by carriers (as opposed to the DOE retail price), this method has little chance of success because it is dependent on information that carriers will most likely not share. Thus, it should be acknowledged that while this method has potential, it is simply not practical.

Also of note is that the company Breakthrough Fuel attempts to identify a carrier's true cost of fuel through precise analysis of a given lane with the use of public information (as opposed to PRIVCAR003 sharing its guarded data with its shippers).

Another simple technique to calculate fuel expenditure, besides the one previously mentioned, would be to use actual carrier efficiency. This section started with the discussion that an escalator must match carrier efficiency; otherwise, line-haul rates will be influenced. Despite the logic of this argument, there was considerable resistance from carriers on this point.

First, it is worth identifying if there is an industry standard for fuel efficiency. Quantitative data from the survey, as well as follow-up interviews with the carriers, suggest that the fuel efficiency for dry van equipment is certainly above 6.0 miles per gallon (MPG), and refrigerated loads are also most likely to be in the 6.0 MPG range. Prior to discussing the survey results and the interview results, it is worth noting that there appears to be a reluctance to disclose fleet efficiency. Of the near one hundred carriers that took the survey, only thirty-six provided their fleet efficiency estimate of dry van equipment, and only nineteen provided their fleet efficiency estimate of refrigerated equipment. Also, it should be noted that there is incentive for carriers to provide a biased estimate of their carrier efficiency. As operating businesses, carriers will seek to gain as much revenue as possible (whether through line-haul or FSC revenue streams). As such, carriers benefit by rounding their reported efficiency down instead of up (for example, rather than reporting efficiency as 5.87, carriers will most likely round to 5.8 instead of 5.9). Given the uniform benefit across all carriers to round-down, it is expected that the average efficiency reported from the survey will have a downward bias rather than being unbiased. The authors make no effort to quantify this discrepancy, but rather simply acknowledge the presence of a biased estimator.

The quantitative data for fuel efficiency was gathered in the survey using the two questions shown in Figure 9. The survey was programmed in a manner that only allowed integer data. Given that fuel efficiency of current equipment is most likely somewhere between 4 MPG

and 7 MPG (a conservative estimate—a more precise interval is most likely somewhere between 4.8 MPG and 6.8 MPG), the ability to use decimal points to provide a much more precise answer would have increased the effectiveness of the survey question. That said, despite the lack of precision, the data still enable statistical inference.

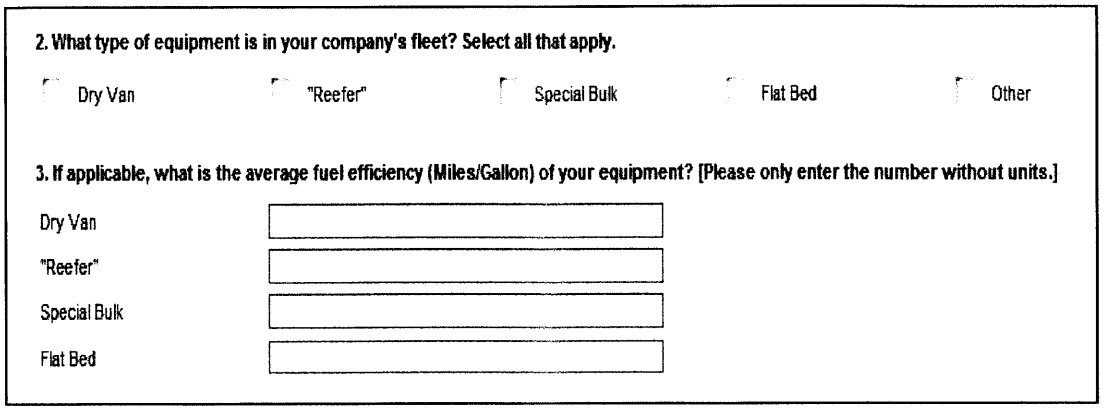



Figure 9. Fuel Efficiency Questions in the Carrier survey

The results of the survey can be seen in Figure 10. Of interest is that most respondents entered 6 MPG due to the inability to use decimal points. Some respondents entered numbers like 68 MPG which the survey authors assumed to mean 6.8 MPG. Figure 10 indicates that more carriers were comfortable with inputting 6 MPG as their fuel efficiency for dry van equipment rather than 5 MPG, and refrigerated equipment seems to, also, be around 6 MPG.

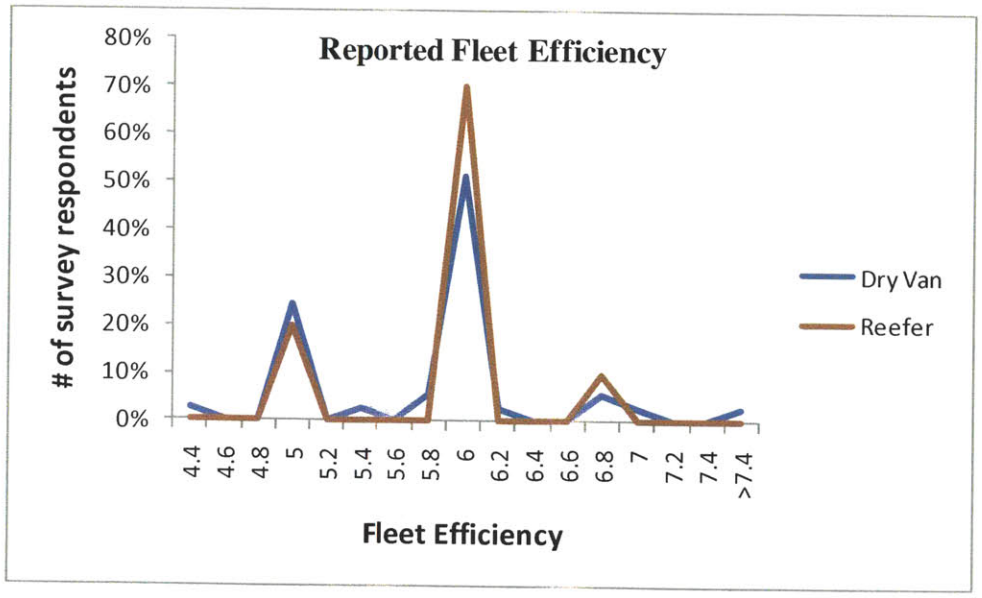



Figure 10. Fleet Efficency Distribution: Data Collected from the Carrier Survey

If 6 MPG is accepted as an industry approximation for carrier efficiency, then why can this not serve as the escalator as discussed in the beginning of this chapter? PRIVCAR007 identifies several reasons:

1) "MPG for most vehicles [is] calculated using odometer miles. A freight bill is generally not cut using odometer miles, rather some mileage guide. Even if a mileage guide of "Practical" miles is used, the actual odometer miles are most always greater because of rest stops, meal breaks, actual address discrepancies, etc."

2) "FSC are not collected on empty miles. Empty miles can be 10% to 15% of the total miles incurred, when using a mileage guide. A [shipper] will try to rationalize that he does not need to compensate for empty miles. It is true that a freight bill is not cut for empty miles, but the reality is, the freight bill includes the cost of the empty miles incurred to provide the service. A motor carrier uses the revenue it collects to pay for the miles that are incurred to provide the service that it provides. So, in practicality, shippers compensate their carriers through the freight charges that it pays to a carrier, the costs of empty miles. When fuel costs increase, the cost of empty miles increase. Carriers that know their costs know that they need to recover their increase in cost through a FSC."

3) "Fuel is consumed for driver comfort in extreme temperatures. Cab comfort while the driver is on rest break is a large consumer of fuel. Even though carriers have invested heavily in technology that consumes less fuel (APU's) than the truck engine, these new technologies are very costly to purchase, and to maintain.

PRIVCAR007 further stated that when provided a FSC schedule based off of a 6.0 MPG escalator, the company would like to offset this risk by 'baking-in' a rate increase on the line-haul. That said PRIVCAR007 acknowledged that "In reality during the last few years we haven't done this much simply because market forces would not allow us. This will be something that we need to put in practice." This implication is critical for the shipping community to understand. PRIVCAR007 is suggesting that 'market forces,' or their competition, are potentially bidding too low on FSC schedules based off of a 6.0 MPG escalator. If PRIVCAR007 is correct, then a rapid spike in fuel prices could put multiple carriers at a significant disadvantage, leading to bankruptcy or service failure on a given lane.

As the carrier community seems to reject the techniques listed above (share actual fuel invoices of fuel purchased, or base the FSC escalator off of actual efficiency), what then is the proper technique of defining an escalator? The survey sought to answer this question by directly asking carrier survey respondents.

**Carrier FSC Preference**

In the survey, carriers were asked a question that seeks to identify whether they favor, are neutral towards, or disfavor bidding on FSCs that are either, "Generous," "Average," or "Below Average." The expected results from this line of questioning were that carriers would simply

favor "Generous" FSCs, and disfavor "Below Average," FSCs. The results are shown in Figure 11.

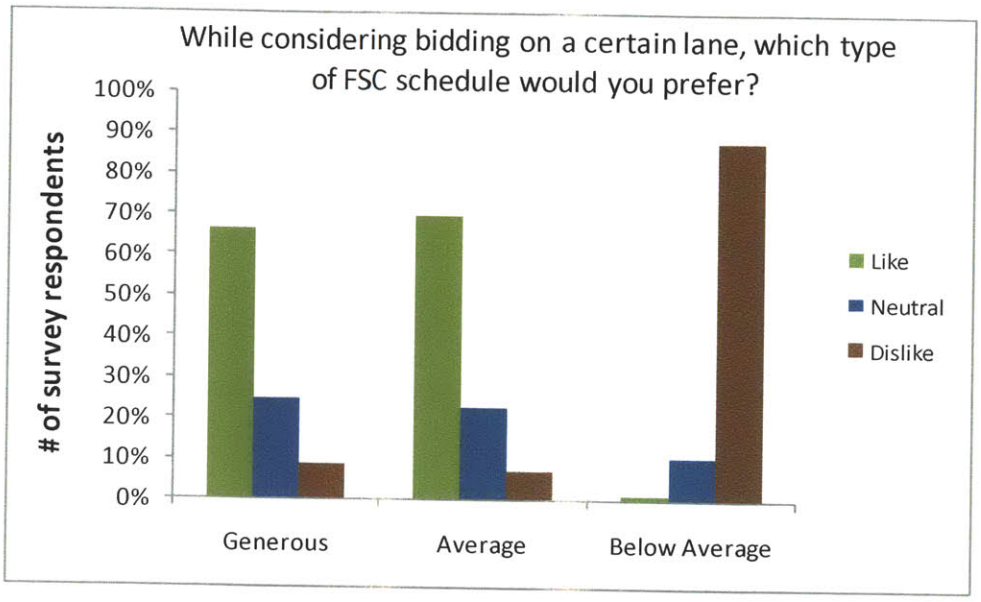



Figure 11. FSC Rating: Data Collected from the Carrier Survey

The results demonstrate two noteworthy opinions amongst the survey respondents. The first is that carriers simply do not favor below average FSC schedules. This result was expected and reflected in the comments made by the carriers later interviewed (as documented in the preceding section). The second noticeable trend is that from the carriers' perspective, there is not a significant difference between a "Generous" FSC and an "Average" FSC.

A representative of 3PL001, a publically traded provider of logistics solutions, provided the following explanation:

> There are two things to think about. First the market controls the price of a load since we have something approaching perfect competition in the TL arena. If you believe this than you should get as much of the market price as you can into your line haul. Each carrier will have a slightly different profile when it comes to fuel economy and dead head so each will think that a particular multiplier [escalator] is more or less generous than what they need…I see FSCs as a way to allow

> pricing to stay neutral to changes in the cost of fuel. That is why I like a multiplier that is as realistic as possible since it makes the equation more neutral. If you have an overly generous multiplier you end up putting part of your line haul into fuel. If pricing goes down now you are getting a below market rate and if pricing goes up you have an above market rate both of these situation will have to be addressed or you will find yourself either not making money but having plenty of freight (priced too low) or not making money and having no freight (priced too high).

This explanation, supported by the survey results, suggests that carriers not only pay a significant amount of attention to the escalator; but also that carriers have economic incentive to favor an escalator at market rate. The significance of the escalator to carriers implies that when considering an industry standard for a trigger point, it might also be effective to set an industry standard escalator.

### 6.4 Different Perceptions of How to Set an Escalator

To this point we have identified that: 1) the escalator matters, 2) many factors should be considered when setting an escalator, and that 3) there is an indication that an industry standard could benefit the shipper and carrier community alike. At this point it is worth identifying, quantitatively, what a proper escalator is.

Carrier survey respondents were asked what constitutes a best-in-class escalator (as provided by the shipper to a carrier), an average escalator, and a below-average escalator. Fuel price was given to be $3.75 per gallon. No trigger point was stated in the question on the survey and, thus, the authors assumed a trigger point of $1.15. It should be noted that this assumption is certainly not correct for all data points; however, it does provide a good baseline for statistical inference.

Table 6. Summary Statistics of Fuel Efficiency for Dry Van and Reefer Fleets

| | | Below Average | Average | Above Average |
|---|---|---|---|---|
| Dry Van | Average | 5.73 | 5.16 | 4.63 |
| | StdDev | 0.58 | 0.47 | 0.53 |
| Reefer | Average | 5.32 | 4.75 | 4.17 |
| | StdDev | 0.50 | 0.42 | 0.48 |

Summary statistics indicate that for dry van transportation an average FSC schedule uses a 5.16 escalator, and for temperature controlled transportation an average value of 4.75 is appropriate. Figure 12 and Figure 13 demonstrate the distribution of the survey findings.

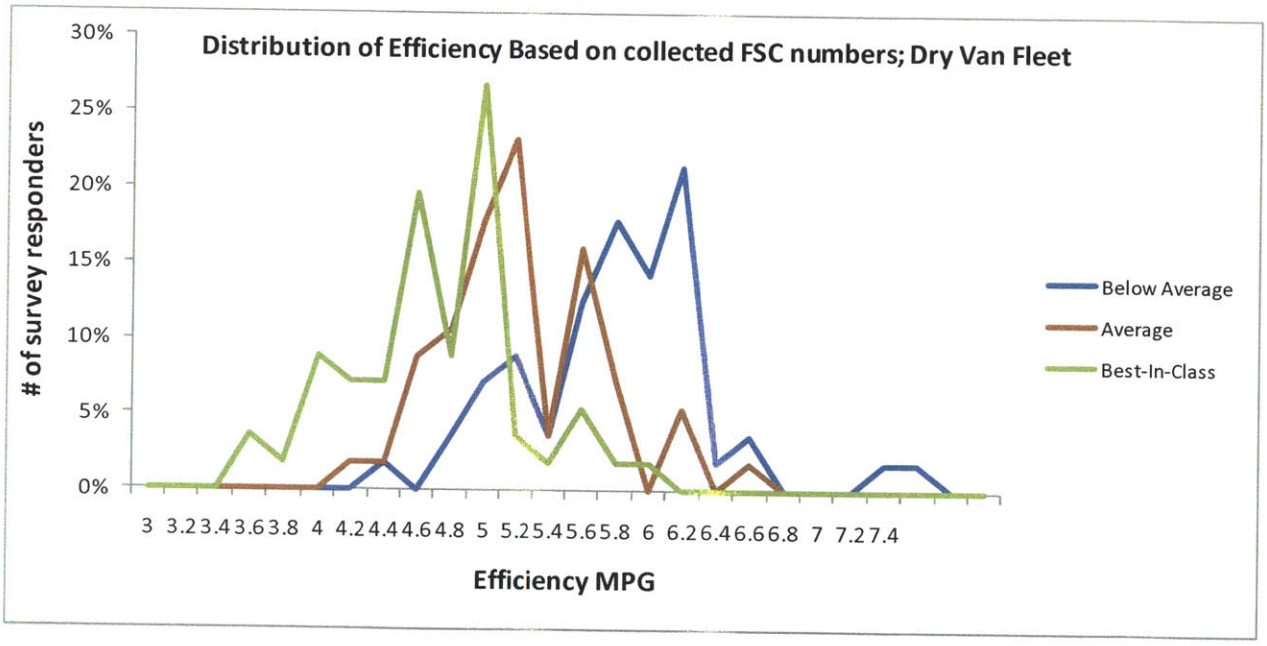



Figure 12. Distribution of Efficiency Based on FSCs for Dry Van Fleet; Data Collected from the Carrier Survey

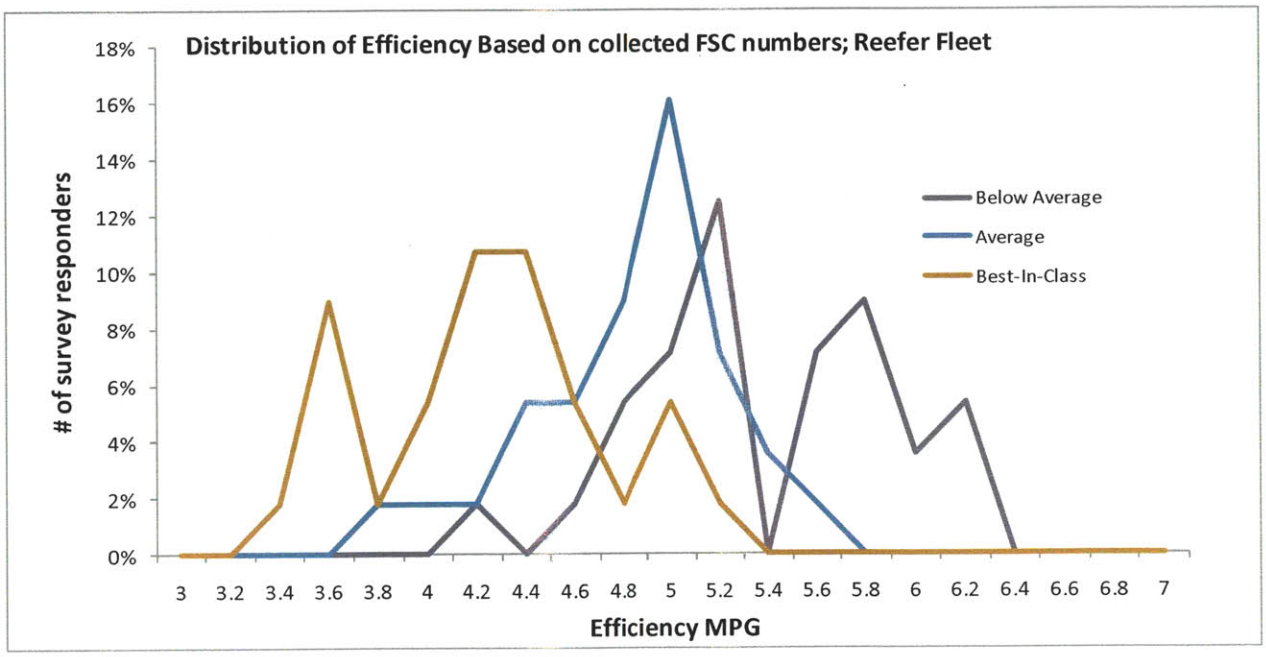



Figure 13. Distribution of Efficiency Based on FSC for Reefer Fleet; Data Collected the from Carrier Survey

In follow-on interviews, multiple carriers put forth ideas that are worth investigating in how to properly set a fuel escalator. PUBLCAR001 stated that there seems to be a trend where shippers with their own private fleets, due to a firm understanding of operational costs, provide more generous FSCs (a smaller escalator). 3PL001, a publically held 3rd Party Logistics provider, echoed this exact concept. If this were indeed the case, perhaps an industry standard based on the average escalator of twenty largest shippers in the U.S. with privately operated fleets would be appropriate. Another concept mentioned is that non-asset based carriers would be willing to accept a less generous FSC (a high escalator) than asset based carriers. One data point that supports this is that PUBLCAR002, a carrier that employs the 'owner-operator' model, acknowledged having a fleet fuel efficiency average of 6.13 and views a 6.0 MPG escalator as compensatory.

### 6.5 Escalator Conclusion

Of the three variables in the FSC equation (trigger point, price of fuel, and escalator), the escalator is clearly the most contentious amongst shippers and carriers alike. The reasons behind this contention are due to the following:

1) There are so many factors that are considered when computing an escalator that there seems to be no logical single answer.
2) A modification to the escalator directly influences costs to shippers and revenues of carrier, and this impact is significantly escalated when the price of fuel rises. In other words, as shippers and carriers both feel increased cost pressure at the fuel pumps, the role of the escalator comes under much more scrutiny.

The authors recommend that shippers, through collaboration and communication with other shippers, should seek to establish an industry standard escalator. If not a single number, perhaps an efficiency range could be established (For example, rather than making an industry standard of 5.3, it might be appropriate to establish a range from 5.1-5.5). As the survey results indicate, some carriers are opposed to generous surcharges while the majority of carriers seem to be almost indifferent to generous surcharges. For this reason, it appears that by awarding generous surcharges, shippers are not gaining any service for the extra compensation. On the other hand, carriers are very opposed to escalators that do not properly compensate. As such, a shipper should seek to provide an at-market FSC in order to keep their carriers whole in periods of rapid fuel spikes and ensure that they are not paying money (a generous FSC) for no additional service. This at-market FSC could be a point estimate, or a range of possible values between what is considered generous and what is considered below market.

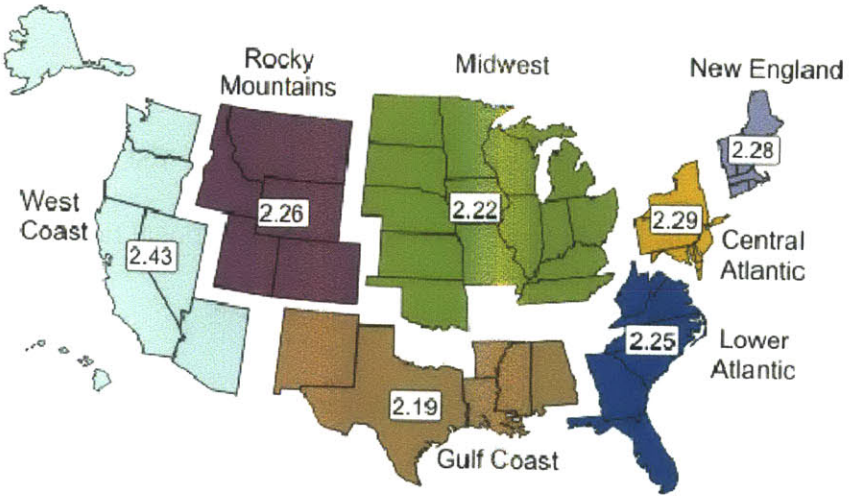
Given the earlier discussion of revenue neutrality (with respect to the trigger point) and the difficulty in identifying a perfect escalator, it should be identified that main challenges to shippers is not choosing a perfect escalator, but simply identifying an escalator that is appropriate (most likely in the range from 4.5MPG to 6.5MPG) and will be used by a significant amount of shippers around the nation. Stated plainly, consensus of an escalator is much more important than identifying the perfect escalator as revenue neutrality will ensure line-haul rates are modified appropriately.

Industry consensus on an escalator will simplify carriers' ability to differentiate FSC schedules that will maintain their profit margin in periods of high fuel volatility. This will, again, help reduce the likelihood of certain carriers from underbidding and thus being subject to "the winner's curse."

That said, in order to identify a good industry standard, the authors suggest further research into the topics identified in this chapter. If, as PUBLCAR001 stated, shippers with private fleets do indeed produce the most accurate escalators, then this would be a good bench-mark to start with.

## 7 Regional Fuel Pricing

With respect to defining regional fuel prices, the US department of energy (DOE) divides the U.S. into eight regions: New England, Central Atlantic, Lower Atlantic, Gulf Coast, Mid-West, Rocky Mountains, West Coast and California. Figure 14 depicts the different regions. Please note that in this figure West Coast and California regions are shown as one region. The following analysis seeks to identify when it is appropriate for a shipper or carrier to utilize regional pricing instead of national pricing.




Source: Energy Information Administration, *Average Monthly Data, 2005.*

Figure 14. Distinct Fuel Regions in the U.S.

The average fuel price as published by the department of energy every Monday differs in these regions and is higher or lower than the U.S. average retail fuel price. The Average of the difference between the individual regional prices and the weekly published U.S. average retail price over 2008 and 2009 is shown in Table 7.

Table 7. Average difference between the Fuel Prices (in cents) in various regions and U.S. Average retail price

| | New England | Central Atlantic | Lower Atlantic | Mid West | Gulf Coast | Rocky Mountain | West Coast | California |
|---|---|---|---|---|---|---|---|---|
| 2008 | +21.8 | +18.7 | +0.2 | -4.5 | -4.7 | -1.0 | +6.5 | +12.2 |
| 2009 | +16.2 | +15.4 | -2.6 | -3.4 | -4.7 | +1.0 | +9.9 | +14.0 |

This data suggest that if a shipper has most of its business in California and was paying an FSC based on California fuel prices, then by switching to the U.S. average fuel price, the shipper could potentially save ~13 cents per gallon of fuel charged.

Shipper AAA's revenue streams were analyzed to see if the FSC calculated based on the U.S. average fuel price versus the FSC calculated based on the regional fuel price would be significantly different. Shipper AAA's data are shown in Table 8:

Table 8. Composition of Shipper AAA's lanes

| Year | Total Lanes | Dry lanes | Reefer | Other lanes |
|---|---|---|---|---|
| 2008 | 174095 | 66216 | 101044 | 6835 |
| 2009 | 201946 | 72003 | 121830 | 8113 |
| 2010 | 228191 | 77848 | 143361 | 6982 |

The other lanes category constitutes lanes that were dead-head lanes or lanes that had more than one purchase order associated with them. These lanes were not considered for this analysis. Further breakdown of the lanes reveals that ~47% of lanes originated in the Mid-West region, and this pattern is consistent across 2008, 2009 and 2010.

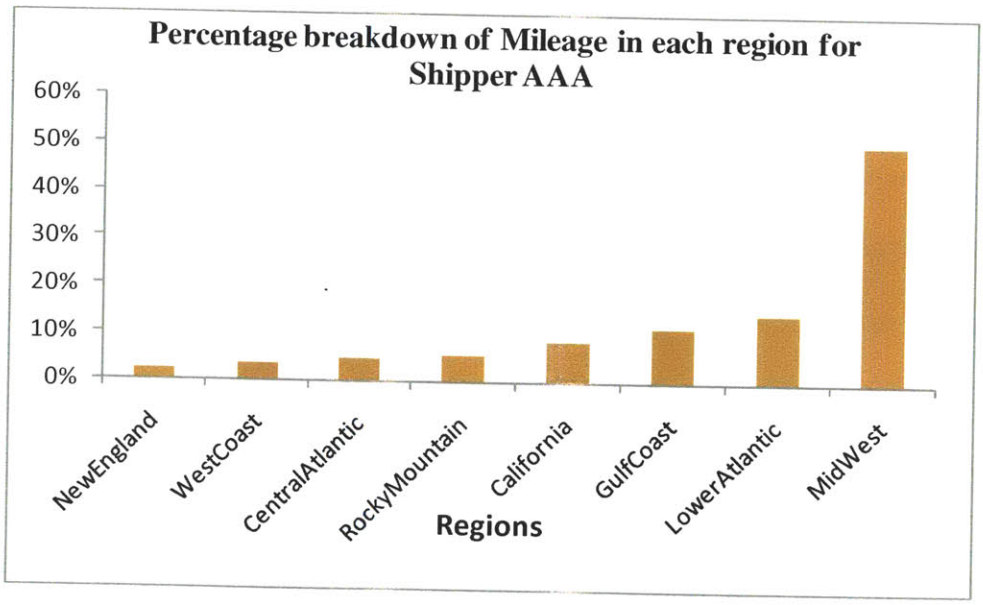



Figure 15. Shipper AAA's Business Mix Across Regions by Mileage

The FSC for each lane based on the U.S. average fuel price and the origin region fuel price were calculated. If shipper AAA were to pay an FSC based on the Mid-West regional price for all the lanes originating in the Mid-West, then the company could potentially realize cost savings. The data are summarized in Table 9.

Table 9. Shipper AAA's Potential Savings

| Year | Lane Info | Calculated US Based FSC | Calculated Midwest Regional FSC, all other regions based on US FSC | Potential Savings | Potential Savings per year |
|---|---|---|---|---|---|
| 2008 | Dry | **$20,365,035** | **$20,209,919** | $155,115 | |
| | Temp | **$37,316,175** | **$37,005,068** | $311,106 | $466,222 |
| 2009 | Dry | **$9,565,304** | **$9,464,051** | $101,253 | |
| | Temp | **$22,164,618** | **$21,896,624** | $267,993 | $369,246 |
| 2010 | Dry | **$14,300,413** | **$14,203,790** | $96,623 | |
| | Temp | **$35,555,822** | **$35,311,393** | $244,429 | $341,051 |

This analysis makes the uncertain assumption that when the shipping company decides to switch the FSC from the US average fuel price to the Mid-West regional fuel price, the carriers will make no changes to their line haul bids. To validate this assumption, the survey asked carriers how they respond to a regional-based FSC. Figure 16 shows that 79% of the carriers that responded to the survey adjust their line-haul when bidding on a quote that contains a FSC based on regional price of fuel. Given such a strong response rate, the assumption that carriers will not modify their bid must be rejected.

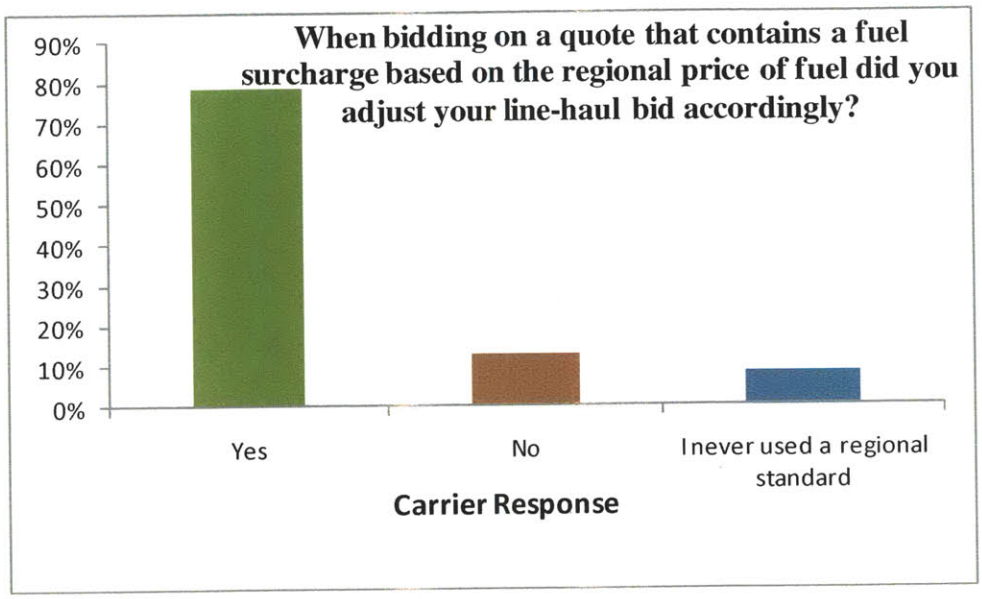



Figure 16. Most Carriers Adjust Their Line Haul Bid when They Encounter Regional Fuel Prices

Against this backdrop of shipper AAA's data, we will examine some of the carrier responses. These responses were not given in interviews, but rather anonymously entered in the survey. As such, a different naming convention will be used than from the previous chapters. Carrier777 wrote, "Companies that utilize "Breakthrough Fuel" typically will see an increase in line haul rates." Breakthrough Fuel is a company that provides transportation energy management solutions, such as fuel recovery programs, to shippers to enable them to evaluate

their energy strategy (Breakthrough, 2011). As such, it can be inferred that techniques used by shippers to reduce the FSC will be countered with higher line-haul rates.

Carrier 888 wrote, "Regional usually only applies to shipments originating or destined to the West Coast. National average applies to all other shipments." This response is to be expected as West Coast regional fuel price is on an average 6 cents or more higher than the US average fuel price.

From this discussion, it can be inferred that if the Shipper AAA were to use the Mid-West regional fuel price to calculate FSC for lanes originating in the Mid West region, then any potential savings would be offset by the corresponding higher cost in line-haul. This conclusion is consistent with the null-hypothesis of revenue neutrality.

Because evidence seems to imply that revenue neutrality will hold, it seems that despite the added precision provided by regional fuel pricing, the aggregate price of a lane (line-haul plus FSC) will not change. As such, it is recommended for national shippers that the national price of fuel, as computed by the DOE, remain the industry standard.

# 8 Conclusion and Recommendations

The current FSC system very effectively shares the risk of fuel price volatility between carrier and shipper, and it is commonly understood by the industries participants. All sides of the agreement (shippers, carriers, and brokerage agents) seem to have a firm understanding of the potential outcome of the FSC regardless of the fluctuations in fuel pricing. This fact prevents bankruptcies of carriers in high-price fuel environments and increases the resiliency of the U.S. transportation industry. That said, as identified in the literature review, there was significant tension that arose in the industry in 2008 when the price of diesel fuel passed into the $4.00 per gallon range.

Given this state of affairs, the question is ultimately whether or not shippers and carriers should bear the one-time administrative cost of switching from the current industry standard of $1.00-$1.50 to the trigger point of $0.00. And subsequent follow-on question: whether or not it is beneficial to attempt to set a standard for an escalator.

The opening of the FSC survey asked how carriers take into consideration shipper FSC's when bidding on line-hauls. The results were not surprising as carriers indicated they take the FSCs into consideration. Figure 17 demonstrates this finding.

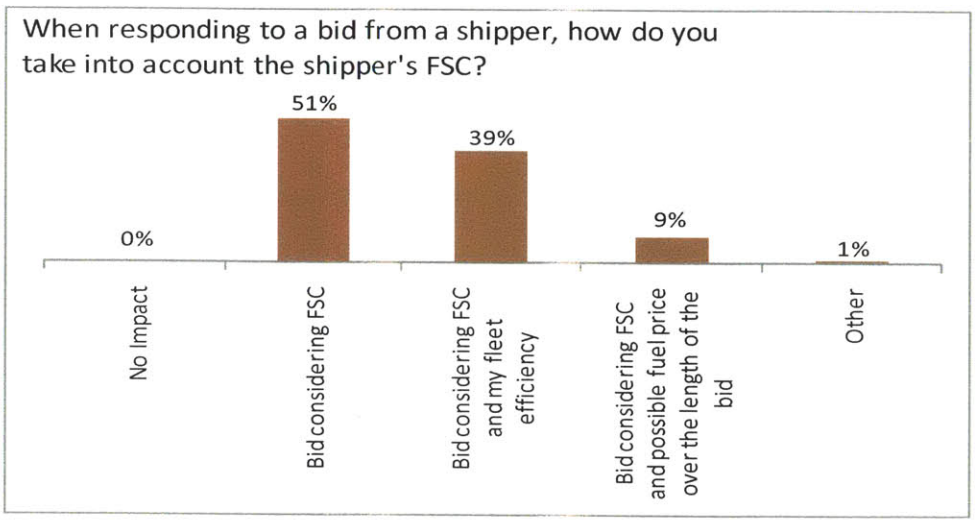



Figure 17. Carriers Support the Revenue Neutrality Hypothesis

Given that carriers do take FSCs into consideration, the FSC survey included three FSC questions that asked a carrier how it would adjust its line-haul bid to changes in a shipper's trigger point and escalator. The purpose of the question was to identify to what extent carriers take FSCs into consideration. These questions can be seen in the Appendix to this thesis.

The questions vary in difficulty. The first question seeks to identify how a carrier would adjust to a shipper's adjustment in trigger point from $1.20 to $0.00. This is a straight-forward question, and if the assumption of revenue neutrality was employed, then the answer should have been $.24 given an escalator of 5.0MPG. (Note, the correct answer to Question 1 was $.24, but the authors gave credit for choosing the answer that corresponds to $.20-$.23 as well.)

The next question was more difficult and asked how a carrier would adjust if a shipper did not modify the trigger point, but did modify the escalator from 5.0MPG to 6.0MPG. This is a difficult question because the price of fuel over the length of the hypothetical contract (1-2 years) is unknown. That said, the carrier would certainly need to raise their line-haul to maintain

revenue neutrality, and that left only two possible responses. Given the current price of fuel and recent history of fuel, only the last answer was the most appropriate.

The final question combined a change in trigger point and a simultaneous change in escalator. This question is ultimately a combination of questions one and two, and the participant should first set the trigger points equal to each other, and then conduct similar analysis to question two.

The survey authors took all the responses and classified the answers as either "correct," or "not correct." The results can be seen in Figure 18.

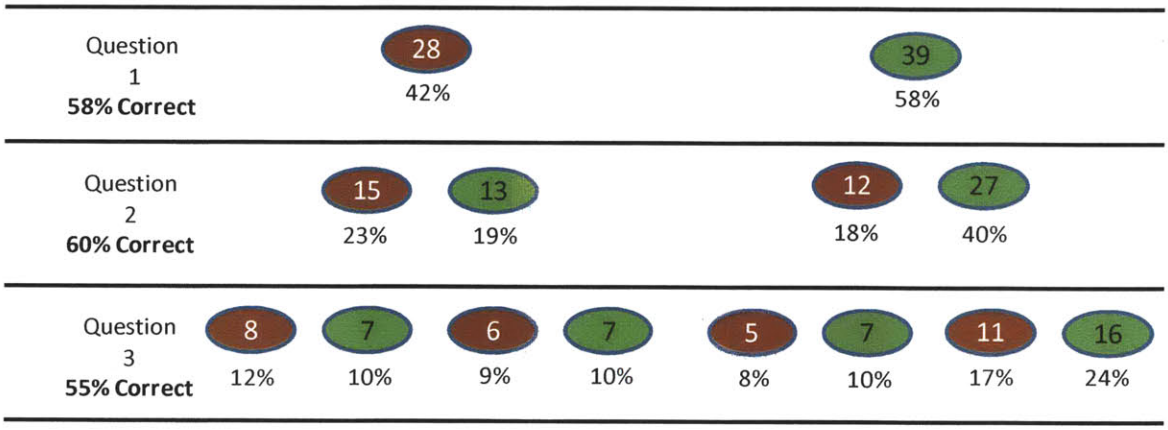



Figure 18. Results of the Math Questions in the Carrier Survey

The significant take-away from these results is that the mathematics behind the FSC structure is not easy. Only 24% of the survey respondents got all three answers correct. Furthermore, given the results of this survey, the Chi-Squared test at 10% significance cannot reject the hypothesis that the answers listed in the "Question 3" row of Figure 18 are drawn from a uniform distribution with probability equal to 1/8. What this means is that at 10% significance, if an experimenter flipped a fair coin three times to represent getting each question right or wrong, the given results could very well appear. (Note: Chi-Squared distribution at 10%

significance with 7 degrees of freedom produces 12.02. The test statistic, which is the difference between observed values and expected values squared divided by expected values, is equal to 10.5. For this reason, the null hypothesis, a uniform distribution across the eight possible fields cannot be rejected). In other words, the collective respondents to the survey did not outperform a fair coin. It is very likely that survey participants were not closely watching their mathematical operations while taking a survey of no consequence; however, the results demonstrate that the questions were not easy and the correct answers were not intuitive.

For this reason, we advocate an industry change to a zero trigger point based FSC as well as identification of an industry standard for the escalator. Identification of one perfect escalator might not be possible, but perhaps a range between generous FSCs and below-market FSCs could be identified. The benefits of reduced complication in the FSC equation will enable shippers and carriers to completely isolate fuel from the negotiation and enable all sides to focus on transportation market forces. This outcome will lessen administrative requirements necessary for tracking multiple FSC schedules, ensure parties with unsophisticated fuel prediction methods do not underbid a lane (thus, leading to the "winner's curse") and enable all parties to instantly differentiate upward or downward pressure on lane pricing on the basis of fuel and transportation market conditions.

We also recommend that rather than shippers independently modify their respective FSCs, they collaborate and transition within a single timeframe (for example, over the span of twelve to eighteen months) as a group. Individual companies transitioning to a zero trigger point-based system will not lead to the benefits of an industry transition covered in this thesis. Rather, it is the industry standard that will lead to benefits to all parties. As such, a critical mass of shippers must transition to a zero trigger point based FSC while simultaneously

communicating to and encouraging other shippers to transition. Methods to expedite a transition to an industry-wide-zero-based FSC include presentations at industry conferences and publication of articles in industry trade journals. As the number of shippers using a zero based FSC increases, the number of carriers aware of the benefits will also increase.

The authors recommend the following topics for future research:

1) Identify whether or not certain shippers do or do not award generous FSCs. This research should start with validating the conjecture that shippers with private fleets offer more generous surcharges. From here, the research could progress in one of many directions.
2) Identify a proper escalator that can serve as the industry standard. Given this thesis conjecture that there is no ideal escalator, research could be conducted to find an appropriate number and gather consensus. For example, if shippers with their own fleets do offer a similar escalator, then this would be a good candidate for an industry accepted escalator.
3) Apply the concepts of TL uniform FSCs to the less-than-truckload (LTL) industry. LTL FSCs cause a significant amount of controversy. Airlines and LTL freight providers have been challenged by customers for using FSCs as a revenue stream. If collaboration amongst TL shipper competitors can lead to an industry standard then perhaps competitors in the LTL arena can collaborate to establish industry norms. This effort will reduce friction amongst airline providers and air travelers as well as consumers of LTL services and LTL providers while enabling risk sharing between parties.

Transportation is a critical element of the U.S. economy. As such a fully functional U.S. economy is dependent on a resilient TL transportation industry that is able to function regardless

of the price of fuel. Risk sharing from carriers to shippers through negotiated FSC agreements enables this resiliency. This thesis has addressed through shipper perspectives, carrier perspectives, and mathematical analysis that the FSC system can be improved for industry-wide benefit. Industry-wide standards including a zero trigger point-based FSC, a uniform escalator range, and use of the national DOE price of fuel will prevent underbidding on lanes, increase transparency, reduce administration, and further increase the resilience of the U.S. TL industry.

# 9 Appendix 1: Carrier Survey

## Fuel Surcharge Survey

1.

This survey is part of an MIT graduate thesis project focusing on how modification to fuel surcharge (FSC) schedules influences line-haul bidding behaviour. In other words, we want to understand how carriers will react to a shipper modifying the trigger point or escalator in a fuel surcharge schedule.

Some large and influential shippers have recently transitioned to a fuel surcharge schedule based off of a zero trigger point (Trigger Point = $0.00). The purpose of this survey is to enable carriers to voice their opinions concerning this change. Data collected will help the industry understand the impacts of using a zero trigger point.

The survey should take 3-5 minutes to complete.

The results of individuals submissions are anonymous and your participation is greatly appreciated.

If you have any questions or concerns please feel free to contact the survey authors directly.

The results of this survey will be open to public viewing, and you will have the opportunity to receive the results by entering your optional contact information at the end of the survey.

Regards,
Madhavi Kanteti, madhavik@mit.edu
Jordan Levine, jtlevine@mit.edu

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Fuel Surcharge Survey

2. General Questions

# The Fuel Surcharge Equation:

$$FSC = \left(\frac{Fuel\ Price - Trigger\ Point}{Escalator}\right)$$

Units:
Fuel Price – $/Gallon
Trigger Point – $/Gallon
Escalator = Miles/Gallon

* 1. When responding to a bid from a shipper, how do you take into account the shipper's FSC?

- The shipper's FSC has no impact on my bid.
- I adjust my line-haul bid accordingly by increasing/decreasing it in proportion to the shipper's FSC.
- I adjust my line-haul bid accordingly by increasing/decreasing it in proportion to the shipper's FSC while taking into consideration my equipment's fuel efficiency.
- I forecast the price of fuel over the length of the bid and analyze how this will impact my revenue generation and costs.
- Other

Additional Comments

Page 2

## Fuel Surcharge Survey

**2. While considering bidding on a certain lane, which type of FSC schedule would you prefer?**

| | 1 (Strongly Disfavor) | 2 | 3 (Neutral) | 4 | 5 (Strongly Favor) |
|---|---|---|---|---|---|
| An FSC schedule above market standards (A "generous" FSC schedule). | ○ | ○ | ○ | ○ | ○ |
| An FSC schedule at market standard (An FSC schedule similar to most other shippers' FSC schedules). | ○ | ○ | ○ | ○ | ○ |
| An FSC schedule below market standards. | ○ | ○ | ○ | ○ | ○ |

Additional Comments

**3. Most shippers use a trigger point in the range of $1.10-$1.50. One aspect of this study is to validate this assumption.**
**Please identify the range of peg rates that the majority of your shippers employ.**
**Please add clarification, if needed.**

- ○ $0.00
- ○ $0.01 - $1.00
- ○ $1.01 - $1.50
- ○ $1.51 - $2.50
- ○ $2.51 - $5.00
- ○ $5.01 or Higher

Additional Comments

Page 3

## Fuel Surcharge Survey

**4. Woud you favor a zero trigger point based fuel surcharge schedule?**

- ○ Yes
- ○ No

Why or Why Not?

**5. For Dry Freight:**

**Please provide what you would consider to be your average, above average (Top 25%) and Best-In-Class (Top 5%) shipper fuel surcharge (FSC) per mile schedules assuming $3.75 per gallon fuel cost. PLEASE ENTER THIS AS CENTS PER MILE:**

Average Shipper FSC per mile

Above Average Shipper FSC per mile

Best-In-Class FSC per mile

**6. For temperature controlled freight:**

**Please provide what you would consider to be your average, above average (Top 25%) and Best-In-Class (Top 5%) customer fuel surcharge per mile (FSC) schedules assuming $3.75 per gallon fuel cost. PLEASE ENTER THIS AS CENTS PER MILE:**

Average Shipper FSC per mile

Above Average Shipper FSC per mile

Best-In-Class FSC per mile

# Fuel Surcharge Survey

## 3. Fuel Surcharge Comparisons

The next three questions will cover three scenarios that compare the fuel surcharges of two shippers. The purpose is to identify how you take into consideration different fuel surcharge schedules when bidding on a lane.

For example, one large shipper that we interviewed previously had a trigger point of $1.40 and an escalator of 5.0 miles per gallon. This shipper elected to modify the trigger point from $1.40 to $0.00. The shipper told its carriers to decrease their respective line-haul rates by $.28 (or 1.40[$/Gallon]/5.0[MPG]).

We would like to identify carriers' perception of this modification to the fuel surcharge schedule by exploring the following three scenarios.

Assume all questions occur in real time. The price of fuel is today's price of fuel, and the price of fuel for the duration of this bid (assumed 1-2 years) is unknown.

THIS FIRST SCENARIO SEEKS TO IDENTIFY HOW MODIFICATION TO A FUEL SURCHARGE TRIGGER POINT WILL INFLUENCE BIDDING.

Fuel Surcharge Schedule

Shipper A
Trigger Point = $1.20
Fuel Efficiency Escalator = 5.0 MPG

Shipper B
Trigger Point =$0.00
Fuel Efficiency Escalator = 5.0 MPG

## Fuel Surcharge Survey

**1. Assuming that the lanes are identical in every respect other than the Fuel Surcharge Schedule mentioned above, how would your line-haul bid differ for shipper B? Please refer to the table below for assistance.**

- ○ Greater than $0.28 per mile lower than for Shipper A
- ○ $0.24-$0.28 per mile lower than for Shipper A
- ○ $0.23-$0.20 per mile lower than for Shipper A
- ○ $0.19-$0.01 per mile lower that for Shipper A
- ○ Same as shipper A
- ○ $0.01-$0.19 per mile higher than for Shipper A
- ○ $0.20-$0.23 per mile higher than for Shipper A
- ○ $0.24-$0.28 per mile higher than for Shipper A
- ○ Greater than $0.28 per mile higher than for Shipper A

Other (please specify)

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## Shipper A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $ 1.11 | $ 1.15 | $ - | $ 2.46 | $ 2.50 | $ 0.26 | $ 3.81 | $ 3.85 | $ 0.53 |
| $ 1.16 | $ 1.20 | $ 0.00 | $ 2.51 | $ 2.55 | $ 0.27 | $ 3.86 | $ 3.90 | $ 0.54 |
| $ 1.21 | $ 1.25 | $ 0.01 | $ 2.56 | $ 2.60 | $ 0.28 | $ 3.91 | $ 3.95 | $ 0.55 |
| $ 1.26 | $ 1.30 | $ 0.02 | $ 2.61 | $ 2.65 | $ 0.29 | $ 3.96 | $ 4.00 | $ 0.56 |
| $ 1.31 | $ 1.35 | $ 0.03 | $ 2.66 | $ 2.70 | $ 0.30 | $ 4.01 | $ 4.05 | $ 0.57 |
| $ 1.36 | $ 1.40 | $ 0.04 | $ 2.71 | $ 2.75 | $ 0.31 | $ 4.06 | $ 4.10 | $ 0.58 |
| $ 1.41 | $ 1.45 | $ 0.05 | $ 2.76 | $ 2.80 | $ 0.32 | $ 4.11 | $ 4.15 | $ 0.59 |
| $ 1.46 | $ 1.50 | $ 0.06 | $ 2.81 | $ 2.85 | $ 0.33 | $ 4.16 | $ 4.20 | $ 0.60 |
| $ 1.51 | $ 1.55 | $ 0.07 | $ 2.86 | $ 2.90 | $ 0.34 | $ 4.21 | $ 4.25 | $ 0.61 |
| $ 1.56 | $ 1.60 | $ 0.08 | $ 2.91 | $ 2.95 | $ 0.35 | $ 4.26 | $ 4.30 | $ 0.62 |
| $ 1.61 | $ 1.65 | $ 0.09 | $ 2.96 | $ 3.00 | $ 0.36 | $ 4.31 | $ 4.35 | $ 0.63 |
| $ 1.66 | $ 1.70 | $ 0.10 | $ 3.01 | $ 3.05 | $ 0.37 | $ 4.36 | $ 4.40 | $ 0.64 |
| $ 1.71 | $ 1.75 | $ 0.11 | $ 3.06 | $ 3.10 | $ 0.38 | $ 4.41 | $ 4.45 | $ 0.65 |
| $ 1.76 | $ 1.80 | $ 0.12 | $ 3.11 | $ 3.15 | $ 0.39 | $ 4.46 | $ 4.50 | $ 0.66 |
| $ 1.81 | $ 1.85 | $ 0.13 | $ 3.16 | $ 3.20 | $ 0.40 | $ 4.51 | $ 4.55 | $ 0.67 |
| $ 1.86 | $ 1.90 | $ 0.14 | $ 3.21 | $ 3.25 | $ 0.41 | $ 4.56 | $ 4.60 | $ 0.68 |
| $ 1.91 | $ 1.95 | $ 0.15 | $ 3.26 | $ 3.30 | $ 0.42 | $ 4.61 | $ 4.65 | $ 0.69 |
| $ 1.96 | $ 2.00 | $ 0.16 | $ 3.31 | $ 3.35 | $ 0.43 | $ 4.66 | $ 4.70 | $ 0.70 |
| $ 2.01 | $ 2.05 | $ 0.17 | $ 3.36 | $ 3.40 | $ 0.44 | $ 4.71 | $ 4.75 | $ 0.71 |
| $ 2.06 | $ 2.10 | $ 0.18 | $ 3.41 | $ 3.45 | $ 0.45 | $ 4.76 | $ 4.80 | $ 0.72 |
| $ 2.11 | $ 2.15 | $ 0.19 | $ 3.46 | $ 3.50 | $ 0.46 | $ 4.81 | $ 4.85 | $ 0.73 |
| $ 2.16 | $ 2.20 | $ 0.20 | $ 3.51 | $ 3.55 | $ 0.47 | $ 4.86 | $ 4.90 | $ 0.74 |
| $ 2.21 | $ 2.25 | $ 0.21 | $ 3.56 | $ 3.60 | $ 0.48 | $ 4.91 | $ 4.95 | $ 0.75 |
| $ 2.26 | $ 2.30 | $ 0.22 | $ 3.61 | $ 3.65 | $ 0.49 | $ 4.96 | $ 5.00 | $ 0.76 |
| $ 2.31 | $ 2.35 | $ 0.23 | $ 3.66 | $ 3.70 | $ 0.50 | $ 5.01 | $ 5.05 | $ 0.77 |
| $ 2.36 | $ 2.40 | $ 0.24 | $ 3.71 | $ 3.75 | $ 0.51 | | | |
| $ 2.41 | $ 2.45 | $ 0.25 | $ 3.76 | $ 3.80 | $ 0.52 | | | |

## Shipper B

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $ 0.01 | $ 0.05 | $ 0.01 | $ 1.71 | $ 1.75 | $ 0.35 | $ 3.41 | $ 3.45 | $ 0.69 |
| $ 0.06 | $ 0.10 | $ 0.02 | $ 1.76 | $ 1.80 | $ 0.36 | $ 3.46 | $ 3.50 | $ 0.70 |
| $ 0.11 | $ 0.15 | $ 0.03 | $ 1.81 | $ 1.85 | $ 0.37 | $ 3.51 | $ 3.55 | $ 0.71 |
| $ 0.16 | $ 0.20 | $ 0.04 | $ 1.86 | $ 1.90 | $ 0.38 | $ 3.56 | $ 3.60 | $ 0.72 |
| $ 0.21 | $ 0.25 | $ 0.05 | $ 1.91 | $ 1.95 | $ 0.39 | $ 3.61 | $ 3.65 | $ 0.73 |
| $ 0.26 | $ 0.30 | $ 0.06 | $ 1.96 | $ 2.00 | $ 0.40 | $ 3.66 | $ 3.70 | $ 0.74 |
| $ 0.31 | $ 0.35 | $ 0.07 | $ 2.01 | $ 2.05 | $ 0.41 | $ 3.71 | $ 3.75 | $ 0.75 |
| $ 0.36 | $ 0.40 | $ 0.08 | $ 2.06 | $ 2.10 | $ 0.42 | $ 3.76 | $ 3.80 | $ 0.76 |
| $ 0.41 | $ 0.45 | $ 0.09 | $ 2.11 | $ 2.15 | $ 0.43 | $ 3.81 | $ 3.85 | $ 0.77 |
| $ 0.46 | $ 0.50 | $ 0.10 | $ 2.16 | $ 2.20 | $ 0.44 | $ 3.86 | $ 3.90 | $ 0.78 |
| $ 0.51 | $ 0.55 | $ 0.11 | $ 2.21 | $ 2.25 | $ 0.45 | $ 3.91 | $ 3.95 | $ 0.79 |
| $ 0.56 | $ 0.60 | $ 0.12 | $ 2.26 | $ 2.30 | $ 0.46 | $ 3.96 | $ 4.00 | $ 0.80 |
| $ 0.61 | $ 0.65 | $ 0.13 | $ 2.31 | $ 2.35 | $ 0.47 | $ 4.01 | $ 4.05 | $ 0.81 |
| $ 0.66 | $ 0.70 | $ 0.14 | $ 2.36 | $ 2.40 | $ 0.48 | $ 4.06 | $ 4.10 | $ 0.82 |
| $ 0.71 | $ 0.75 | $ 0.15 | $ 2.41 | $ 2.45 | $ 0.49 | $ 4.11 | $ 4.15 | $ 0.83 |
| $ 0.76 | $ 0.80 | $ 0.16 | $ 2.46 | $ 2.50 | $ 0.50 | $ 4.16 | $ 4.20 | $ 0.84 |
| $ 0.81 | $ 0.85 | $ 0.17 | $ 2.51 | $ 2.55 | $ 0.51 | $ 4.21 | $ 4.25 | $ 0.85 |
| $ 0.86 | $ 0.90 | $ 0.18 | $ 2.56 | $ 2.60 | $ 0.52 | $ 4.26 | $ 4.30 | $ 0.86 |
| $ 0.91 | $ 0.95 | $ 0.19 | $ 2.61 | $ 2.65 | $ 0.53 | $ 4.31 | $ 4.35 | $ 0.87 |
| $ 0.96 | $ 1.00 | $ 0.20 | $ 2.66 | $ 2.70 | $ 0.54 | $ 4.36 | $ 4.40 | $ 0.88 |
| $ 1.01 | $ 1.05 | $ 0.21 | $ 2.71 | $ 2.75 | $ 0.55 | $ 4.41 | $ 4.45 | $ 0.89 |
| $ 1.06 | $ 1.10 | $ 0.22 | $ 2.76 | $ 2.80 | $ 0.56 | $ 4.46 | $ 4.50 | $ 0.90 |
| $ 1.11 | $ 1.15 | $ 0.23 | $ 2.81 | $ 2.85 | $ 0.57 | $ 4.51 | $ 4.55 | $ 0.91 |
| $ 1.16 | $ 1.20 | $ 0.24 | $ 2.86 | $ 2.90 | $ 0.58 | $ 4.56 | $ 4.60 | $ 0.92 |
| $ 1.21 | $ 1.25 | $ 0.25 | $ 2.91 | $ 2.95 | $ 0.59 | $ 4.61 | $ 4.65 | $ 0.93 |
| $ 1.26 | $ 1.30 | $ 0.26 | $ 2.96 | $ 3.00 | $ 0.60 | $ 4.66 | $ 4.70 | $ 0.94 |
| $ 1.31 | $ 1.35 | $ 0.27 | $ 3.01 | $ 3.05 | $ 0.61 | $ 4.71 | $ 4.75 | $ 0.95 |
| $ 1.36 | $ 1.40 | $ 0.28 | $ 3.06 | $ 3.10 | $ 0.62 | $ 4.76 | $ 4.80 | $ 0.96 |
| $ 1.41 | $ 1.45 | $ 0.29 | $ 3.11 | $ 3.15 | $ 0.63 | $ 4.81 | $ 4.85 | $ 0.97 |
| $ 1.46 | $ 1.50 | $ 0.30 | $ 3.16 | $ 3.20 | $ 0.64 | $ 4.86 | $ 4.90 | $ 0.98 |
| $ 1.51 | $ 1.55 | $ 0.31 | $ 3.21 | $ 3.25 | $ 0.65 | $ 4.91 | $ 4.95 | $ 0.99 |
| $ 1.56 | $ 1.60 | $ 0.32 | $ 3.26 | $ 3.30 | $ 0.66 | $ 4.96 | $ 5.00 | $ 1.00 |
| $ 1.61 | $ 1.65 | $ 0.33 | $ 3.31 | $ 3.35 | $ 0.67 | $ 5.01 | $ 5.05 | $ 1.01 |
| $ 1.66 | $ 1.70 | $ 0.34 | $ 3.36 | $ 3.40 | $ 0.68 | | | |

Prev Next

# Fuel Surcharge Survey

## 4. Fuel Surcharge Comparisons

THIS SCENARIO SEEKS TO IDENTIFY HOW MODIFICATION TO THE ESCALATOR WILL INFLUENCE BIDDING.

For the next question, please see the following two fuel surcharge comparisons.

Shipper C
Trigger Point = $1.20
Fuel Efficiency Escalator = 5.0MPG

Shipper D
Trigger Point =$1.20
Fuel Efficiency Escalator = 6.0MPG

**1. Shipper C and Shipper D both use a $1.20 trigger point. But, Shipper D decides to use a 6.0MPG escalator whereas Shipper C maintains a 5.0MPG escalator.**

**How would you modify your line haul rate per mile for Shipper D relative to Shipper C on a given lane?**

- ○ $0.0-$0.05 per mile less than Shipper C
- ○ $0.05-$0.1 per mile less than Shipper C
- ○ Same as Shipper C
- ○ $0.0-$0.05 per mile more than Shipper C
- ○ $0.05-$0.1 per mile more than shipper C

Other (please specify)

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## Shipper C

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $ 1.11 | $ 1.15 | $ - | $ 2.46 | $ 2.50 | $ 0.26 | $ 3.81 | $ 3.85 | $ 0.53 |
| $ 1.16 | $ 1.20 | $ 0.00 | $ 2.51 | $ 2.55 | $ 0.27 | $ 3.86 | $ 3.90 | $ 0.54 |
| $ 1.21 | $ 1.25 | $ 0.01 | $ 2.56 | $ 2.60 | $ 0.28 | $ 3.91 | $ 3.95 | $ 0.55 |
| $ 1.26 | $ 1.30 | $ 0.02 | $ 2.61 | $ 2.65 | $ 0.29 | $ 3.96 | $ 4.00 | $ 0.56 |
| $ 1.31 | $ 1.35 | $ 0.03 | $ 2.66 | $ 2.70 | $ 0.30 | $ 4.01 | $ 4.05 | $ 0.57 |
| $ 1.36 | $ 1.40 | $ 0.04 | $ 2.71 | $ 2.75 | $ 0.31 | $ 4.06 | $ 4.10 | $ 0.58 |
| $ 1.41 | $ 1.45 | $ 0.05 | $ 2.76 | $ 2.80 | $ 0.32 | $ 4.11 | $ 4.15 | $ 0.59 |
| $ 1.46 | $ 1.50 | $ 0.06 | $ 2.81 | $ 2.85 | $ 0.33 | $ 4.16 | $ 4.20 | $ 0.60 |
| $ 1.51 | $ 1.55 | $ 0.07 | $ 2.86 | $ 2.90 | $ 0.34 | $ 4.21 | $ 4.25 | $ 0.61 |
| $ 1.56 | $ 1.60 | $ 0.08 | $ 2.91 | $ 2.95 | $ 0.35 | $ 4.26 | $ 4.30 | $ 0.62 |
| $ 1.61 | $ 1.65 | $ 0.09 | $ 2.96 | $ 3.00 | $ 0.36 | $ 4.31 | $ 4.35 | $ 0.63 |
| $ 1.66 | $ 1.70 | $ 0.10 | $ 3.01 | $ 3.05 | $ 0.37 | $ 4.36 | $ 4.40 | $ 0.64 |
| $ 1.71 | $ 1.75 | $ 0.11 | $ 3.06 | $ 3.10 | $ 0.38 | $ 4.41 | $ 4.45 | $ 0.65 |
| $ 1.76 | $ 1.80 | $ 0.12 | $ 3.11 | $ 3.15 | $ 0.39 | $ 4.46 | $ 4.50 | $ 0.66 |
| $ 1.81 | $ 1.85 | $ 0.13 | $ 3.16 | $ 3.20 | $ 0.40 | $ 4.51 | $ 4.55 | $ 0.67 |
| $ 1.86 | $ 1.90 | $ 0.14 | $ 3.21 | $ 3.25 | $ 0.41 | $ 4.56 | $ 4.60 | $ 0.68 |
| $ 1.91 | $ 1.95 | $ 0.15 | $ 3.26 | $ 3.30 | $ 0.42 | $ 4.61 | $ 4.65 | $ 0.69 |
| $ 1.96 | $ 2.00 | $ 0.16 | $ 3.31 | $ 3.35 | $ 0.43 | $ 4.66 | $ 4.70 | $ 0.70 |
| $ 2.01 | $ 2.05 | $ 0.17 | $ 3.36 | $ 3.40 | $ 0.44 | $ 4.71 | $ 4.75 | $ 0.71 |
| $ 2.06 | $ 2.10 | $ 0.18 | $ 3.41 | $ 3.45 | $ 0.45 | $ 4.76 | $ 4.80 | $ 0.72 |
| $ 2.11 | $ 2.15 | $ 0.19 | $ 3.46 | $ 3.50 | $ 0.46 | $ 4.81 | $ 4.85 | $ 0.73 |
| $ 2.16 | $ 2.20 | $ 0.20 | $ 3.51 | $ 3.55 | $ 0.47 | $ 4.86 | $ 4.90 | $ 0.74 |
| $ 2.21 | $ 2.25 | $ 0.21 | $ 3.56 | $ 3.60 | $ 0.48 | $ 4.91 | $ 4.95 | $ 0.75 |
| $ 2.26 | $ 2.30 | $ 0.22 | $ 3.61 | $ 3.65 | $ 0.49 | $ 4.96 | $ 5.00 | $ 0.76 |
| $ 2.31 | $ 2.35 | $ 0.23 | $ 3.66 | $ 3.70 | $ 0.50 | $ 5.01 | $ 5.05 | $ 0.77 |
| $ 2.36 | $ 2.40 | $ 0.24 | $ 3.71 | $ 3.75 | $ 0.51 | | | |
| $ 2.41 | $ 2.45 | $ 0.25 | $ 3.76 | $ 3.80 | $ 0.52 | | | |

## Shipper D

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $ 1.11 | $ 1.15 | $ - | $ 2.46 | $ 2.50 | $ 0.22 | $ 3.81 | $ 3.85 | $ 0.44 |
| $ 1.16 | $ 1.20 | $ 0.00 | $ 2.51 | $ 2.55 | $ 0.23 | $ 3.86 | $ 3.90 | $ 0.45 |
| $ 1.21 | $ 1.25 | $ 0.01 | $ 2.56 | $ 2.60 | $ 0.23 | $ 3.91 | $ 3.95 | $ 0.46 |
| $ 1.26 | $ 1.30 | $ 0.02 | $ 2.61 | $ 2.65 | $ 0.24 | $ 3.96 | $ 4.00 | $ 0.47 |
| $ 1.31 | $ 1.35 | $ 0.03 | $ 2.66 | $ 2.70 | $ 0.25 | $ 4.01 | $ 4.05 | $ 0.47 |
| $ 1.36 | $ 1.40 | $ 0.03 | $ 2.71 | $ 2.75 | $ 0.26 | $ 4.06 | $ 4.10 | $ 0.48 |
| $ 1.41 | $ 1.45 | $ 0.04 | $ 2.76 | $ 2.80 | $ 0.27 | $ 4.11 | $ 4.15 | $ 0.49 |
| $ 1.46 | $ 1.50 | $ 0.05 | $ 2.81 | $ 2.85 | $ 0.28 | $ 4.16 | $ 4.20 | $ 0.50 |
| $ 1.51 | $ 1.55 | $ 0.06 | $ 2.86 | $ 2.90 | $ 0.28 | $ 4.21 | $ 4.25 | $ 0.51 |
| $ 1.56 | $ 1.60 | $ 0.07 | $ 2.91 | $ 2.95 | $ 0.29 | $ 4.26 | $ 4.30 | $ 0.52 |
| $ 1.61 | $ 1.65 | $ 0.08 | $ 2.96 | $ 3.00 | $ 0.30 | $ 4.31 | $ 4.35 | $ 0.52 |
| $ 1.66 | $ 1.70 | $ 0.08 | $ 3.01 | $ 3.05 | $ 0.31 | $ 4.36 | $ 4.40 | $ 0.53 |
| $ 1.71 | $ 1.75 | $ 0.09 | $ 3.06 | $ 3.10 | $ 0.32 | $ 4.41 | $ 4.45 | $ 0.54 |
| $ 1.76 | $ 1.80 | $ 0.10 | $ 3.11 | $ 3.15 | $ 0.32 | $ 4.46 | $ 4.50 | $ 0.55 |
| $ 1.81 | $ 1.85 | $ 0.11 | $ 3.16 | $ 3.20 | $ 0.33 | $ 4.51 | $ 4.55 | $ 0.56 |
| $ 1.86 | $ 1.90 | $ 0.12 | $ 3.21 | $ 3.25 | $ 0.34 | $ 4.56 | $ 4.60 | $ 0.57 |
| $ 1.91 | $ 1.95 | $ 0.13 | $ 3.26 | $ 3.30 | $ 0.35 | $ 4.61 | $ 4.65 | $ 0.57 |
| $ 1.96 | $ 2.00 | $ 0.13 | $ 3.31 | $ 3.35 | $ 0.36 | $ 4.66 | $ 4.70 | $ 0.58 |
| $ 2.01 | $ 2.05 | $ 0.14 | $ 3.36 | $ 3.40 | $ 0.37 | $ 4.71 | $ 4.75 | $ 0.59 |
| $ 2.06 | $ 2.10 | $ 0.15 | $ 3.41 | $ 3.45 | $ 0.37 | $ 4.76 | $ 4.80 | $ 0.60 |
| $ 2.11 | $ 2.15 | $ 0.16 | $ 3.46 | $ 3.50 | $ 0.38 | $ 4.81 | $ 4.85 | $ 0.61 |
| $ 2.16 | $ 2.20 | $ 0.17 | $ 3.51 | $ 3.55 | $ 0.39 | $ 4.86 | $ 4.90 | $ 0.62 |
| $ 2.21 | $ 2.25 | $ 0.18 | $ 3.56 | $ 3.60 | $ 0.40 | $ 4.91 | $ 4.95 | $ 0.62 |
| $ 2.26 | $ 2.30 | $ 0.18 | $ 3.61 | $ 3.65 | $ 0.41 | $ 4.96 | $ 5.00 | $ 0.63 |
| $ 2.31 | $ 2.35 | $ 0.19 | $ 3.66 | $ 3.70 | $ 0.42 | $ 5.01 | $ 5.05 | $ 0.64 |
| $ 2.36 | $ 2.40 | $ 0.20 | $ 3.71 | $ 3.75 | $ 0.42 | | | |
| $ 2.41 | $ 2.45 | $ 0.21 | $ 3.76 | $ 3.80 | $ 0.43 | | | |

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# Fuel Surcharge Survey

## 5. Fuel Surcharge Comparisons

THIS SCENARIO SEEKS TO IDENTIFY HOW MODIFICATION TO A FUEL SURCHARGE TRIGGER POINT AND ESCALATOR WILL INFLUENCE BIDDING.

For the next question, please see the following two fuel surcharge comparisons.

Carrier E
Trigger Point = $1.20
Fuel Efficiency Escalator = 5.0MPG

Carrier F
Trigger Point =$0.00
Fuel Efficiency Escalator = 6.0MPG

**1. Shipper E employs a $1.20 trigger point and a 5.0MPG escalator. Shipper F decides to use a $0.00 trigger point and a 6.0MPG escalator.**

**How would your line haul rate per mile for Shipper F differ from your line haul rate for Shipper E? Assume price of fuel to be $3/Gallon**

- ○ $0.25 per mile less than Shipper E
- ○ $0.25-$0.15 per mile less than Shipper E
- ○ $0.15-$0.01 per mile less than Shipper E
- ○ Same as Shipper E
- ○ $0.01-$0.15 per mile more than Shipper E
- ○ $0.15-$0.25 per mile more than Shipper E
- ○ $0.25 per mile more than Shipper E

## Shipper E

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $ 1.11 | $ 1.15 | $ 0.00 | $ 2.46 | $ 2.50 | $ 0.26 | $ 3.81 | $ 3.85 | $ 0.53 |
| $ 1.16 | $ 1.20 | $ 0.01 | $ 2.51 | $ 2.55 | $ 0.27 | $ 3.86 | $ 3.90 | $ 0.54 |
| $ 1.21 | $ 1.25 | $ 0.02 | $ 2.56 | $ 2.60 | $ 0.28 | $ 3.91 | $ 3.95 | $ 0.55 |
| $ 1.26 | $ 1.30 | $ 0.03 | $ 2.61 | $ 2.65 | $ 0.29 | $ 3.96 | $ 4.00 | $ 0.56 |
| $ 1.31 | $ 1.35 | $ 0.04 | $ 2.66 | $ 2.70 | $ 0.30 | $ 4.01 | $ 4.05 | $ 0.57 |
| $ 1.36 | $ 1.40 | $ 0.05 | $ 2.71 | $ 2.75 | $ 0.31 | $ 4.06 | $ 4.10 | $ 0.58 |
| $ 1.41 | $ 1.45 | $ 0.06 | $ 2.76 | $ 2.80 | $ 0.32 | $ 4.11 | $ 4.15 | $ 0.59 |
| $ 1.46 | $ 1.50 | $ 0.07 | $ 2.81 | $ 2.85 | $ 0.33 | $ 4.16 | $ 4.20 | $ 0.60 |
| $ 1.51 | $ 1.55 | $ 0.08 | $ 2.86 | $ 2.90 | $ 0.34 | $ 4.21 | $ 4.25 | $ 0.61 |
| $ 1.56 | $ 1.60 | $ 0.09 | $ 2.91 | $ 2.95 | $ 0.35 | $ 4.26 | $ 4.30 | $ 0.62 |
| $ 1.61 | $ 1.65 | $ 0.10 | $ 2.96 | $ 3.00 | $ 0.36 | $ 4.31 | $ 4.35 | $ 0.63 |
| $ 1.66 | $ 1.70 | $ 0.11 | $ 3.01 | $ 3.05 | $ 0.37 | $ 4.36 | $ 4.40 | $ 0.64 |
| $ 1.71 | $ 1.75 | $ 0.12 | $ 3.06 | $ 3.10 | $ 0.38 | $ 4.41 | $ 4.45 | $ 0.65 |
| $ 1.76 | $ 1.80 | $ 0.13 | $ 3.11 | $ 3.15 | $ 0.39 | $ 4.46 | $ 4.50 | $ 0.66 |
| $ 1.81 | $ 1.85 | $ 0.14 | $ 3.16 | $ 3.20 | $ 0.40 | $ 4.51 | $ 4.55 | $ 0.67 |
| $ 1.86 | $ 1.90 | $ 0.15 | $ 3.21 | $ 3.25 | $ 0.41 | $ 4.56 | $ 4.60 | $ 0.68 |
| $ 1.91 | $ 1.95 | $ 0.16 | $ 3.26 | $ 3.30 | $ 0.42 | $ 4.61 | $ 4.65 | $ 0.69 |
| $ 1.96 | $ 2.00 | $ 0.17 | $ 3.31 | $ 3.35 | $ 0.43 | $ 4.66 | $ 4.70 | $ 0.70 |
| $ 2.01 | $ 2.05 | $ 0.18 | $ 3.36 | $ 3.40 | $ 0.44 | $ 4.71 | $ 4.75 | $ 0.71 |
| $ 2.06 | $ 2.10 | $ 0.19 | $ 3.41 | $ 3.45 | $ 0.45 | $ 4.76 | $ 4.80 | $ 0.72 |
| $ 2.11 | $ 2.15 | $ 0.20 | $ 3.46 | $ 3.50 | $ 0.46 | $ 4.81 | $ 4.85 | $ 0.73 |
| $ 2.16 | $ 2.20 | $ 0.21 | $ 3.51 | $ 3.55 | $ 0.47 | $ 4.86 | $ 4.90 | $ 0.74 |
| $ 2.21 | $ 2.25 | $ 0.22 | $ 3.56 | $ 3.60 | $ 0.48 | $ 4.91 | $ 4.95 | $ 0.75 |
| $ 2.26 | $ 2.30 | $ 0.23 | $ 3.61 | $ 3.65 | $ 0.49 | $ 4.96 | $ 5.00 | $ 0.76 |
| $ 2.31 | $ 2.35 | $ 0.24 | $ 3.66 | $ 3.70 | $ 0.50 | $ 5.01 | $ 5.05 | $ 0.77 |
| $ 2.36 | $ 2.40 | $ 0.25 | $ 3.71 | $ 3.75 | $ 0.51 | | | |
| $ 2.41 | $ 2.45 | $ 0.25 | $ 3.76 | $ 3.80 | $ 0.52 | | | |

## Shipper F

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $ 0.01 | $ 0.05 | $ 0.01 | $ 1.71 | $ 1.75 | $ 0.29 | $ 3.41 | $ 3.45 | $ 0.57 |
| $ 0.06 | $ 0.10 | $ 0.02 | $ 1.76 | $ 1.80 | $ 0.30 | $ 3.46 | $ 3.50 | $ 0.58 |
| $ 0.11 | $ 0.15 | $ 0.03 | $ 1.81 | $ 1.85 | $ 0.31 | $ 3.51 | $ 3.55 | $ 0.59 |
| $ 0.16 | $ 0.20 | $ 0.03 | $ 1.86 | $ 1.90 | $ 0.32 | $ 3.56 | $ 3.60 | $ 0.60 |
| $ 0.21 | $ 0.25 | $ 0.04 | $ 1.91 | $ 1.95 | $ 0.33 | $ 3.61 | $ 3.65 | $ 0.61 |
| $ 0.26 | $ 0.30 | $ 0.05 | $ 1.96 | $ 2.00 | $ 0.33 | $ 3.66 | $ 3.70 | $ 0.62 |
| $ 0.31 | $ 0.35 | $ 0.06 | $ 2.01 | $ 2.05 | $ 0.34 | $ 3.71 | $ 3.75 | $ 0.62 |
| $ 0.36 | $ 0.40 | $ 0.07 | $ 2.06 | $ 2.10 | $ 0.35 | $ 3.76 | $ 3.80 | $ 0.63 |
| $ 0.41 | $ 0.45 | $ 0.08 | $ 2.11 | $ 2.15 | $ 0.36 | $ 3.81 | $ 3.85 | $ 0.64 |
| $ 0.46 | $ 0.50 | $ 0.08 | $ 2.16 | $ 2.20 | $ 0.37 | $ 3.86 | $ 3.90 | $ 0.65 |
| $ 0.51 | $ 0.55 | $ 0.09 | $ 2.21 | $ 2.25 | $ 0.38 | $ 3.91 | $ 3.95 | $ 0.66 |
| $ 0.56 | $ 0.60 | $ 0.10 | $ 2.26 | $ 2.30 | $ 0.38 | $ 3.96 | $ 4.00 | $ 0.67 |
| $ 0.61 | $ 0.65 | $ 0.11 | $ 2.31 | $ 2.35 | $ 0.39 | $ 4.01 | $ 4.05 | $ 0.67 |
| $ 0.66 | $ 0.70 | $ 0.12 | $ 2.36 | $ 2.40 | $ 0.40 | $ 4.06 | $ 4.10 | $ 0.68 |
| $ 0.71 | $ 0.75 | $ 0.13 | $ 2.41 | $ 2.45 | $ 0.41 | $ 4.11 | $ 4.15 | $ 0.69 |
| $ 0.76 | $ 0.80 | $ 0.13 | $ 2.46 | $ 2.50 | $ 0.42 | $ 4.16 | $ 4.20 | $ 0.70 |
| $ 0.81 | $ 0.85 | $ 0.14 | $ 2.51 | $ 2.55 | $ 0.43 | $ 4.21 | $ 4.25 | $ 0.71 |
| $ 0.86 | $ 0.90 | $ 0.15 | $ 2.56 | $ 2.60 | $ 0.43 | $ 4.26 | $ 4.30 | $ 0.72 |
| $ 0.91 | $ 0.95 | $ 0.16 | $ 2.61 | $ 2.65 | $ 0.44 | $ 4.31 | $ 4.35 | $ 0.72 |
| $ 0.96 | $ 1.00 | $ 0.17 | $ 2.66 | $ 2.70 | $ 0.45 | $ 4.36 | $ 4.40 | $ 0.73 |
| $ 1.01 | $ 1.05 | $ 0.18 | $ 2.71 | $ 2.75 | $ 0.46 | $ 4.41 | $ 4.45 | $ 0.74 |
| $ 1.06 | $ 1.10 | $ 0.18 | $ 2.76 | $ 2.80 | $ 0.47 | $ 4.46 | $ 4.50 | $ 0.75 |
| $ 1.11 | $ 1.15 | $ 0.19 | $ 2.81 | $ 2.85 | $ 0.48 | $ 4.51 | $ 4.55 | $ 0.76 |
| $ 1.16 | $ 1.20 | $ 0.20 | $ 2.86 | $ 2.90 | $ 0.48 | $ 4.56 | $ 4.60 | $ 0.77 |
| $ 1.21 | $ 1.25 | $ 0.21 | $ 2.91 | $ 2.95 | $ 0.49 | $ 4.61 | $ 4.65 | $ 0.77 |
| $ 1.26 | $ 1.30 | $ 0.22 | $ 2.96 | $ 3.00 | $ 0.50 | $ 4.66 | $ 4.70 | $ 0.78 |
| $ 1.31 | $ 1.35 | $ 0.23 | $ 3.01 | $ 3.05 | $ 0.51 | $ 4.71 | $ 4.75 | $ 0.79 |
| $ 1.36 | $ 1.40 | $ 0.23 | $ 3.06 | $ 3.10 | $ 0.52 | $ 4.76 | $ 4.80 | $ 0.80 |
| $ 1.41 | $ 1.45 | $ 0.24 | $ 3.11 | $ 3.15 | $ 0.52 | $ 4.81 | $ 4.85 | $ 0.81 |
| $ 1.46 | $ 1.50 | $ 0.25 | $ 3.16 | $ 3.20 | $ 0.53 | $ 4.86 | $ 4.90 | $ 0.82 |
| $ 1.51 | $ 1.55 | $ 0.26 | $ 3.21 | $ 3.25 | $ 0.54 | $ 4.91 | $ 4.95 | $ 0.82 |
| $ 1.56 | $ 1.60 | $ 0.27 | $ 3.26 | $ 3.30 | $ 0.55 | $ 4.96 | $ 5.00 | $ 0.83 |
| $ 1.61 | $ 1.65 | $ 0.28 | $ 3.31 | $ 3.35 | $ 0.56 | $ 5.01 | $ 5.05 | $ 0.84 |
| $ 1.66 | $ 1.70 | $ 0.28 | $ 3.36 | $ 3.40 | $ 0.57 | | | |

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# Fuel Surcharge Survey

## 6. Regional Analysis

One element of the fuel surcharge schedule that we have not yet discussed is the definition of the price of fuel. Our assumption is that the majority of fuel surcharge schedules are based off of the Department of Energy (DOE) published average price of fuel for the entire United States (the national average) updated every week.

The DOE also publishes regional averages (listed in the table below). This information can be found at, "http://www.eia.doe.gov/oog/info/wohdp/diesel.asp".

Please consider this information when answering the following questions.

Weekly Retail On-Highway Diesel Prices
(Dollars per gallon, including all taxes)

| Region | 02/07/11 | 02/14/11 | 02/21/11 |
|---|---|---|---|
| U.S. | 3.513 | 3.534 | 3.573 |
| East Coast | 3.555 | 3.587 | 3.620 |
| New England | 3.717 | 3.749 | 3.769 |
| Central Atlantic | 3.652 | 3.700 | 3.734 |
| Lower Atlantic | 3.501 | 3.524 | 3.557 |
| Midwest | 3.476 | 3.479 | 3.517 |
| Gulf Coast | 3.455 | 3.489 | 3.502 |
| Rocky Mountain | 3.459 | 3.511 | 3.568 |
| West Coast | 3.610 | 3.671 | 3.729 |
| California | 3.727 | 3.747 | 3.799 |

**1. Do you, or have you ever, worked with a shipper that implements a fuel surcharge based on the regional average price of fuel instead of the national average fuel price?**

- 0%
- 1%-10%
- 11%-20%
- 21%-30%
- 31%-50%
- 51%-100%

## Fuel Surcharge Survey

**2. If you answered yes to the above question, please select which regional fuel price the shipper used to calculate the the fuel surcharge schedule. Select all that apply.**

- ☐ New England
- ☐ Central Atlantic
- ☐ Lower Atlantic
- ☐ Gulf Coast
- ☐ Midwest
- ☐ Rocky Mountain
- ☐ West Coast
- ☐ California

**3. When bidding on a quote that contains a fuel surcharge based on the regional price of fuel did you adjust your line-haul bid accordingly?**

- ○ Yes
- ○ No
- ○ I never used a regional standard

Additional Comments

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# Fuel Surcharge Survey

## 7. Demographic Information

**1. How many trucks are in your company's fleet?**

- ○ 1-5
- ○ 6-15
- ○ 15-30
- ○ 30-80
- ○ 80-100
- ○ 100-500
- ○ 500+

**2. What type of equipment is in your company's fleet? Select all that apply.**

☐ Dry Van ☐ "Reefer" ☐ Special Bulk ☐ Flat Bed ☐ Other

**3. If applicable, what is the average fuel efficiency (Miles/Gallon) of your equipment? [Please only enter the number without units.]**

Dry Van

"Reefer"

Special Bulk _____

Flat Bed

**4. What is your company's approximate annual revenue?**

- ○ $0 - $100K
- ○ $100K - $500K
- ○ $500K - $2.5M
- ○ $2.5M - $50M
- ○ $50M+

**5. Would you like to receive the survey's findings?**

- ○ Yes
- ○ No

**6. If you elected to receive the survey results, please enter your contact information (Name and email address).**

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