How to Utilize Hedging and a Fuel Surcharge Program to Stabilize the Cost of Fuel

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Summary: This project focuses on the impacts of fuel price volatility and its distribution throughout the supply chain, with the goal of stabilization. Hedging and fuel surcharges are analyzed as tools for stability, with research including: a market benchmarking survey, fuel surcharge component sensitivity testing and a simulation of varying derivative coverage lengths.

Introduction

Fuel prices have become a growing concern for companies around the world. With the expansion of supply chains beyond traditional borders, the dependence upon fuel has become a larger part of a good’s cost. Figure 1 shows how crude oil has outpaced inflation to become a growing cost component, when adjusted using the U.S. Department of Labor’s Consumer Price Index (CPI).

Figure 1 – Rising Cost of Fuel, Inflation Adjusted

This growing cost component is only the initial pain point, as the downstream economic impacts will carry through to employee wages via cost of living increases. Such a reinforcing spiral is a concern for companies trying to control costs.

KEY INSIGHTS

1. Fuel risk sharing is resurfacing as a tool to combat fuel price volatility, separating this cost from the total cost of transportation, much like the fuel surcharge.

2. If companies employ derivative strategies utilizing future contacts to combat fuel volatility, they should focus on long term over shorter term contracts.
In addition to fuel prices outpacing inflation, fuel price volatility is a concern. The unpredictability of fuel prices undermines a company’s ability to accurately forecast their transportation costs, which translates into poor product pricing or contribution margin issues, both translating into profit concerns.

Our project seeks a recommended solution to help manage the fuel price volatility issue. The common tools for managing fuel and volatility are explained, as well as the methodology of the analysis.

**American Truckload Transportation**

The transportation industry is segmented by mode, with transportation companies falling into at least one of these types: sea, air, rail, intermodal and over-the-road. The sea, air and intermodal segments have consisted of less competition due to the high capital investment costs in freighters, cargo planes and/or railroad tracks, creating a significant barrier of entry for new participants. The over-the-road mode is segmented even further by the volume of freight, into parcel, less-than-truckload (LTL) and truckload (TL). Our project focuses mainly on the TL portion of the transportation industry.

The industry is still highly fragmented, largely a result from the deregulation resulting from the Motor Carrier Regulatory Reform and Modernization Act, also referred to as the Motor Carrier Act of 1980 (MCA). Previously, carriers had to be certified on a state level in order to do business. This became a significant barrier of entry, limiting carriers to state or regional levels. The MCA removed this barrier, permitting several carriers to grow to the national level. This resulted in many small carriers, as 45% own only one truck, and 76% own less than seven trucks according to the Federal Motor Carrier Safety Administration (FMSCA). Figure 2 shows the motor carrier segmentation by carrier size for the 87% of carriers that specified their fleet size.

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Diesel Price</th>
<th>Fuel Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>$2.88</td>
<td>$23,052,670</td>
</tr>
<tr>
<td>2008</td>
<td>$3.81</td>
<td>$30,453,900</td>
</tr>
<tr>
<td>2009</td>
<td>$2.46</td>
<td>$19,708,970</td>
</tr>
</tbody>
</table>

Table 1 – Average Diesel Prices Circa 2007 - 2009

Given that fuel costs have outpaced inflation, raising prices is not an easy decision, depending upon the price elasticity of the product market. Instead, a stabilization solution provides longer term cost management. Yet price instability, with changes swinging to 24% and -55%, make such an idea difficult to conceive.
Fuel Surcharge

In order to stabilize the linehaul cost of transportation, the linehaul and fuel costs are separated, allowing the fuel component of the cost to fluctuate with the actual cost at the pump. The linehaul cost is the cost a carrier charges for a specific lane, and does not include fuel. A lane is defined as an origin-destination pairing. The fuel cost was formatted into a surcharge and structured to bring stability to transportation costs permitting easy comparison between different carrier rates.

A distance or linehaul based fuel surcharge is a simple math formula, shown in figure 3 below:

\[ FSC = INT \left( \frac{P - B}{E} \right) \times S \]

Figure 3 – Fuel Surcharge Formula

Survey

In order to get a understanding of the marketplace, and best practices, we conducted an industry survey. The following industries are represented: Aerospace, Chemical, Consumer Packaged Goods, Energy, Food & Beverage, Healthcare, Retail, Transportation, and other. Figure 4 and 5 show the distribution across industries, with the majority coming from Retail at just under 25%, and CY2009 Revenues, respectively. Figure 6 displays the results of those participants that utilize a fuel surcharge for all modes of transportation, and the rate that respondents base their fuel prices on.

Fuel Risk Sharing

While the use of a fuel surcharge to disperse risk is a common practice, applying that same concept beyond and further down the value chain is still a newer concept. Only 12% of the respondents indicated that they have established a fuel risk sharing program.

One way that several respondents handle fuel costs is via cost pass through, shown in figure 7, where fuel is treated as an overhead charge and directly passed through to the customer. This acts much like a fuel surcharge does for a carrier, but exists between the shipper and customer.
Shippers felt they should bear 25% of the fuel cost burden, and carriers should have a larger stake in this cost exposure, or 40% on average, with customers bearing the remainder (Figure 8). However, one way for shippers to change this dynamic would be to eliminate their fuel surcharge program, which currently is not practiced by any respondents. Nevertheless, some shippers are including fuel in their service contracts, locking in the fuel cost for a longer term, which does follow suit.

![Figure 8 – Fuel Cost Burden among Shippers, Carriers and Customers](image)

Hedging

Of the respondents, only 30% were found to be actively hedging any commodity - energy, agricultural, mineral or currency based. Almost half of the respondents hedge a major portion of their exposure, over 80%. None stated that they hedge beyond their full exposure, as they would be transitioning from a cost stabilization motive to that of a profit driven motive. Follow up interviews explain this better, as several stated that they are not in the financial sector, and exceeding their exposure would put them into that situation. The vast majority agreed that severe market conditions could motivate them to begin hedging.

Fourteen companies responded as actively hedging any oil based commodities, with six hedging non-energy commodities. Several of those companies indicated that they are active in multiple commodities, as two companies using the crack spread are doing so in conjunction with other commodities.

Additionally, companies hedging diesel fuel are also varying on exposure level, as over 70% of respondents are above 60% exposure, shown in Figure 9.

![Figure 9 – Hedging Exposure Levels](image)

Respondents were asked about the type of derivatives they hedge with a small portion stated they used non-conventional, or exotic, derivatives. Figure 10 shows the distribution of derivative preference, with six companies using more than one derivative type with little variation in preference between options, future, and swaps.

![Figure 10 – Derivative Type Preference](image)

Simulation

Incorporating the mean fuel consumption, 8 million gallons, from our survey we conducted a simulation to determine if long or short term future contracts provide the least risk for fuel volatility exposure. In our model, annual fuel consumption, LIBOR (London Interbank Offered Rate), net convenience yield and at-the-pump taxes can be changed to see their impact.

One drawback we encountered was that the Department of Energy (DOE) does not currently offer any forecasts for crude oil beyond December 2011, so 12-month and 18-month future contracts were only compared over a limited number of months in
each independently simulated year. For both simplicity and lack of information sake, it was assumed that consumption on the monthly level was uniformly distributed throughout the year. While this in known not to be true, consumption levels are not consistent across industries.

Keeping with the common elements of true fuel costs, the simulation includes a tax feature. Yet, since this tax is applied at-the-pump at the point of consumption, this variable does not have any impact on a decision to hedge or not, but it will help estimate fuel costs.

The forecasted DOE mean and standard deviations from June 2010 through December 2011, depicted in figure 11, demonstrate an overall stable market with varying fluctuations. Additionally, we forecasted, DOE trend for 2012 to create more data points to test the 18-month future contract.

Figure 12 shows the results of the simulation for a 3-month future contract. The LIBOR was set at 3% and net convenience yield at 8%, typical values for each. For this derivative, the expected return is $7,272,974, with a range of $52,193,214, showing a lot of volatility. Yet, as this shows, in more years than not, it was a good decision.

The 6-month future contract expectation, as depicted in figure 13, aren’t as high. In fact, this derivative has the worst outcome, with an expected return of $346,526, spanning $26,235,872 between the worst and best case simulated years. Even the median quartile showed a loss of $237,347. The six month futures contract was the only future contract length to show a loss in the median quartile.

The 12-month future contract performed best (Figure 14) resulting in an expected return of $26,449,970, over double that of the 3-month derivative. Yet with a range of $117,616,971 between good and bad years, there is a high element of risk.

The 18-month future contract also performed profitably (Figure 15) showing the highest expected return of $26,334,604 and a range of $121,811,342. However, it shows longer term contracts are not always preferable. We will touch more on this topic later.

**Figure 11 – DOE Forecasted Mean and Standard Deviation**

Since the survey displayed an array of exposure, the simulation was conducted for five exposure levels ranging from 0% to 100%. The 0% was used as a baseline for comparison, as this would always show pure spot market exposure and no future market exposure. The exposure levels are then compared to the baseline and displayed as a variance from this pure spot market exposure, showing how one would change their position from the spot market. For example, an exposure level of 50% would result in half the impact of an exposure level of 100%, and a linear relationship for all exposure levels.

Consumption levels can be interpreted in a similar linear relationship, using the conversion of 42 gallons to a standard crude oil barrel.

Figure 12 shows the results of the simulation for a 3-month future contract. The LIBOR was set at 3%
well as the worst case scenario. With a best case scenario performing over twice as against rate fluctuations, as seen in figure 18, along with the sensitivity of rates. The 6-month contract is depicted in figure 5.20. As one would think from this derivative's lack luster performance before, it does not show strength suggested by the formula, have an offsetting relationship, where a 10% LIBOR and 10% net convenience yield has the same impact as a 0% LIBOR and 0% net convenience yield. Considering this offset characteristic, figure 20 looks at the net impact on each coverage length.

Figure 18 – 12-Month LIBOR Net Convenience Yield Sensitivity

Finally, the 18-month future contract, displayed in figure 19, backed away from the results of the 12-month derivative. Yet, one must keep in mind that for this derivative, there was limited data due to the DOE’s limited monthly forecast.

Figure 19 – 18-Month LIBOR Net Convenience Yield Sensitivity

Notice that the LIBOR and net convenience yield, as suggested by the formula, have an offsetting relationship, where a 10% LIBOR and 10% net convenience yield has the same impact as a 0% LIBOR and 0% net convenience yield. Considering this offset characteristic, figure 20 looks at the net impact on each coverage length.
contracts. As a reminder, literary research has advised that shorter term investments were favorable. Yet the market survey showed companies across industries prefer longer term positions.

Reviewing both the above analysis and academic research, fuel surcharges are commonly used for good reason, with their ability to shift the fuel burden off the carrier. Additionally, the sensitivity of the escalator with respect to the carrier’s fuel efficiency has a large influence over the intended objective of the fuel surcharge. Lastly, hedging does show to be a good consideration for companies with high fuel cost exposure.

**Conclusion**

The underlying element of this paper has been the risk associated with fuel prices, regardless of a company’s activity in a fuel surcharge, risk sharing, or hedging program, as one would be subject to market risk if not participating in any. Additionally, as with other business situations, risk entails trade-offs. The trade-off for the fuel surcharge has been that that shipper takes on the fuel price volatility burden and in exchange they receive standardized and consistent linehaul rates, making business easier to conduct and carriers easily comparable. This situation has shown preferable as is proof by its market acceptance. Yet, the shipper should use the fuel surcharge, and especially the escalator, to motivate carrier behavior beneficial to the shipper, such as acceptable fuel efficiency.

Risk dispersal programs, on the other hand, are not as embraced. Fuel risk sharing is resurfacing as a tool to combat fuel price volatility, separating this cost from the total cost of transportation, much like the fuel surcharge. Yet, pushback from the customer had slowed acceptance.

When compared to a fuel risk sharing program, hedging is not implemented by as many companies. We researched to find if any trends might emerge when looking at companies by size, industry, risk tolerance, or prior experience to hedging. Respondents from large and small companies did not voice a clear preference, as industry also had mixed activity with no clear direction. However, when looking at companies with high exposure levels, those that hedge 60% or more of their expected consumption, all companies were in a food related industry. Additionally, those that were hedging in the past have continued to hedge, and vice versa. While many respondents cited large fluctuations as a motive to start hedging, none have started to hedge following the severe market volatility of 2008. If one were to infer that experience is a drawback, many do so internally rather than using outside professionals. Ultimately, companies are risk adverse and timid when looking at the fuel dilemma and have found comfort in maintaining the status quo. Those not hedging are scared by the horror stories of those that have tried, as all have had downsides at one point or another. Although, confirmed by our simulation, companies have wisely been employing longer term contracts over shorter term to their advantage.

Our research has confirmed that dealing with fuel price volatility is a risky situation. Many companies have tried, and failed, to conquer the issue. Yet, time tested risk dispersal has shown merit. The fuel surcharge has provided competitive transportation rates, evidence explaining why most respondents don’t have their own fleet. The fuel surcharge shifts the fuel risk from the carrier to the shipper.

Hedging permits a similar option to the shipper, but by shifting that risk back to the market. One can do well as long as the long term perspective is maintained. As our simulation confirmed, much like reality, sharp market corrections can ruin the best of positions and create short term losses. Yet, there are more good years than bad, and the expected return is considerably positive.