Creating Value from Uncertainty: A Study of Ocean Transportation Contracting
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Introduction

The industry of containerized ocean transportation follows a boom and bust business cycle. The practices within the industry pitch shippers and carriers up against each other, with each making its fortune when the other one is doing badly. It is an industry that accepts uncertainties that are specific to the industry as given, instead of creating a cooperative environment that can eliminate the uncertainties. It is an industry stuck in historical inefficiencies.

The first shipment of containers sailed from New York to Houston on April 26, 1956. Today they are the predominant way of ocean shipping of traded goods. The world fleet estimate is around nine million twenty-foot equivalent units (TEUs – a standard measure for container capacity) and is growing by around 10% per year. The industry practices stem from the 1870s when the steamships started to offer a more reliable ocean transportation that was less dependent on the weather. During that time shipping was considered to be critical for the success of a country and was consequently protected by governments. Deregulation that started in 1998 in the USA is changing this environment.

In a time of high demand and low capacity, as the case is now in the beginning of 2005, the ocean carriers have the opportunity to use their leverage to keep the old system going or to lead changes that can benefit the industry as a whole. These are changes that could affect the relationship along the whole transportation chain, stretching from inland transportation through the ports and the carriers to the shippers.

Containerized ocean transportation and how it is changing

Analyzing the industry using Michael Porter’s five forces\(^1\) framework, indicates that the containerized ocean transportation should be a good industry to be in. The forces are shown in figure 1.
Figure 1: Porter’s five forces for the industry of containerized ocean transportation

First, the rivalry between carriers has been relatively little, as they have been able to cooperate in conferences that allocate volume between the carriers and set prices over specific lanes. The only force to counteract this cooperative environment is a high barrier to exit as containerships are expensive and can only be used to transport containers. Second, threat of substitute products, such as air cargo, is low as the price difference and capacity constraints make it unattractive. Third, bargaining power of customers has traditionally been low, although that may be changing due to deregulation. Finally, there are high capital barriers to entry as well as market barriers to entry in the form of cooperation between existing players on the market. The only players in the industry that are exerting some real power that affect the carriers business position are the large ports and large customers like Wal-Mart.

Given the positive environment for carriers it is therefore counter-intuitive that they should ever have low operating margins. But they have. The industry average operating profit as a percentage of income for 1994 to 2002 was highest 7.0% in 2000 and lowest 3.5% in 2002. The explanation is overcapacity, which in the decade up until 2004 was not supported by the demand and left the carriers fighting for accounts through lowering of their prices.
Adjusting Porter’s explanation of overcapacity in industries to the industry of containerized ocean transportation reveals that its main reason is that in a boom the carriers over-invest. The over-investment is spurred by two things: economies of scale and long lead times. The cost per TEU on a transpacific route is 30% more on a 1000 TEU containership than on a 2000 TEU containership, and it takes two to three years to have a ship delivered so they are ordered on the basis of a long term forecast. Another reason for overcapacity is that some conferences require their members to have a minimum capacity, a measure designed to keep smaller carriers outside of the conferences.

The dramatic increase in traded cargo from Asia to USA and Europe has wiped out the over-capacity on these routes and the carriers in general reported high profits in 2004. These profits increased in the first quarter of 2005. However, the industry shows a sign of repeating its mistake by over-investing in capacity. The orders on hand for new containerships more than quadrupled between January 2003 and January 2004 in terms of TEUs. The average size of the ships being ordered is also rising. In order to secure capacity the carriers are also chartering ships at a higher price for a longer period of time than before. Of the 3000 TEU to 4000 TEU containerships chartered in 2004, 60% where chartered for 40 months or more, up from only 6% in 2003.

While this is happening, the access to container terminals in ports has become a competitive advantage. The largest ports in North America and Europe are lagging far behind the Asian ports in terms of throughput. And still the large ports in the United States do not have plans for expansions comparable to the ports in Asia. The biggest opportunity for increased throughput for the US ports is to increase their productivity, which is up to four times lower than in some ports in Asia. There is however no indication that this is happening and it is forecast that the congestion at the ports will increase.

Contracts between shippers and carriers are set up one year at a time, starting on May 1 every year. The shipper pays a base rate per container on a specific lane. In addition to that the carrier collects surcharges for any extra cost that is uncertain when the contract is made.
Industry specific and exogenous uncertainty related to cost

Some of the main uncertainties affecting the industry are uncertainty in demand, fuel prices, currency fluctuations, congestion problems, the business cycle itself, and inland transportation costs. The uncertainties can be split into two main categories. The first category has uncertainties that are specific to the industry, i.e. they can be managed by the players in the industry. The second category has uncertainties that are exogenous to the industry, i.e. they are outside the control of the industry players.

One of the recurring themes in supply chain management literature is how difficult it is to forecast demand. This applies both to a new product introduction as well as more mature markets. This is an industry specific uncertainty and the way carriers guard themselves against it is by having the shipper guarantee a minimum quantity commitment (MQC). During times of excess capacity these MQCs are a small part of the actual volume shipped, but rise during times of under-capacity. In 2004 the MQC was close to the actual volume shipped.

Another type of industry specific uncertainty is caused by congestion in ports, which leads to operational problems. Costs of this are handed over to the shipper in the form of a congestion surcharge. Handling fees, cost of inland transportation to ports, changes in spot prices of feeder services, are also charged to the shipper in the form of a surcharge. There are many more surcharges with the cost for security checks being one of the more recent additions.

Fuel prices are highly volatile and represent an exogenous uncertainty. Although there are advanced mechanisms in the financial markets to hedge against the fuel price fluctuations, it is still the norm to charge the shipper specifically for fuel price increases.

Currency fluctuations are another type of exogenous uncertainty. If the currency in the country of operations changes unfavorably compared to the contract currency the shipper receives an extra charge.

These two categories of uncertainty need to be dealt with in different ways.
Managing industry specific uncertainty through incentives

Shippers frequently mention relationship building with the carriers to help manage capacity and demand better. One form of such cooperation is presented in a paper on “intercompany operating ties”\(^2\). In order to unlock value the intercompany operating ties must stretch through the whole channel to manage the product flow, eliminate excess inventory, and facilitate information sharing.

From this perspective the container can be defined as the product that is “manufactured” when it is filled for shipment or even earlier, when it is brought to the manufacturing site. In order to unlock value in the industry of containerized ocean transportation it is necessary to consider the whole channel of the shipper – the origin side inland transportation – the port of origin – the carrier – the port of destination – the destination side inland transportation – and the receiver. For example, instead of ports building huge yards to carry thousands of containers, in effect creating a huge buffer inventory, it is conceivable to think of a system where the containers flow without ever stopping in an inventory.

The incentive structure within containerized ocean transportation does not encourage the channel partners to seek out and eliminate the causes of uncertainties. Figure 2 shows how the incentives in the industry of containerized ocean transportation are aligned today and introduces the concept of an incentive barrier.

The incentive barrier is created when company A is charged with a fee for a situation it is not in control of and which is not significant enough for A to change its behavior. Therefore, company B is not under any pressure not to charge the fee. The cost that the fee is meant to cover does not originate with company B, but with company C, which has some kind of a situation incurring extra cost. What this implies is that since B knows that it can pass the extra cost on to A, it is willing to accept the extra charge from C. Although a fee can sometimes be a solution to a problem it is less so if the one paying the fee has no alternatives to react to it. If C was more restricted from solving its inefficiency problems through an extra charge, it would have more of an incentive to resolve the root causes of the problem.
Figure 2: A barrier removes any incentives the industry players may have to change their behavior in order to unlock value.

The critical thing is for shippers and carriers to realize that there is nothing obvious about their suppliers being able to raise prices whenever a problem occurs.

**Hedging exogenous uncertainty through shipping derivatives**

Trading of derivatives for dry and wet bulk shipping rates increased by 70% to USD 30 billion between the years 2003 and 2004, and is forecast to increase by another 70% from 2004 to 2005. The dry and wet bulk transportation prices are linked to the prices of the commodities themselves. There is a strong market for derivatives of those commodities, which in turn has led derivatives traders to try to hedge against the volatility of the transportation part of the commodity’s cost. ³

Just as in dry and wet bulk there is a price volatility for containerized freight, which might attract interest in derivatives from those wanting to hedge against it. One point of view, expressed by a carrier practitioner, is that containers can be looked upon as commodities. Looking at ocean transportation of containers from that point of view enables the creation of an index for transportation of containers over specific lanes.
The power of this idea is that a derivatives market for container shipments combines uncertainties into one metric. Instead of having industry players try to hedge internally against currency fluctuations, fuel price fluctuations, and other exogenous uncertainties, and thereby compete with large financial institutions that are specialized in each separate market, they can hedge against a metric that is specific to their industry, a metric that they have the advantage of knowing well.

Value is waiting to be unlocked

Carriers and shippers need to break out of the current paradigm and start cooperating on a level that creates value by removing inefficiencies. In order for this to succeed they must make sure that the cooperation stretches throughout the transportation chain from door to door. This can only be achieved if incentives are aligned so that the industry has a clear perception of where the value lies. The thesis states that flexibility is an asset that has been severely undervalued in the industry and suggests a real options approach to value it correctly. Knowing where the value is in the chain is the first step towards creating an incentive system that will lead to a restructuring that will unlock value.

