## 4. Measurement — As a Contracting Problem[1]

*A. Measurement is Costly & Potentially Wasteful*

Whenever two parties trade, they must measure the thing that is transferred. When the trade is effected, there is an incentive for the buyer to deflate the quantity or quality recorded for the sale and for the seller to inflate these measures. Moreover, the buyer has an incentive to over measure and to reject components of the sale that represent less than the average value of the bundle.

Where quality is costly to measure, minimizing this cost while protecting the integrity of contracts is valuable. For instance, if a vendor offers lumber in a bin for sale at $1 per board foot, buyers have an incentive to pick through the bin to find the higher quality pieces. If the vendor sets the price of $1 based on the average quality of the lumber, then half of the lumber will be sold and the other half ignored until the price is reduced. If the vendor raises the price to, say, $1.5, a competitive disadvantage may result and only a fraction of the lumber will then look attractive to the consumer.

More precisely, the buyer's behavior can be decomposed into a two-step process. First, the buyer chooses the vendor based on the expected quality of the average unit and per-unit price offered. That is, the buyer searches across vendors on the basis of the expected quality/price ratio and chooses the vendor that offers the highest average value per dollar. Second, the buyer picks through the lot offered by the vendor, sorting to find pieces of higher than average quality. This sorting continues so long as the value of the marginal increase in quality exceeds the marginal cost of sorting.

Sorting of this sort is wasteful. If sorting is profitable, then nearly each item is sorted by each buyer in addition to the sorting performed by the seller. The full cost of the good is the posted per-unit price plus the cost of sorting. If the average item is sorted multiple times the average cost is raised by the multiple of the sorts. Costs can be lowered by stopping sorting by the buyer. One way that the vendor solves this problem is by making it costly for the buyer to pick through the stock. The vendor sells in lots, sight unseen. This leads to the rational suppression of information—selling a pig-in-a-poke.

Since sorting is profitable when variance is high, the seller can stop buyer sorting by reducing quality variations. If quality variations cannot be obliterated, then the seller can bundle goods so that the there is no variation across bundles in the average quality per bundle even though within each bundle the variation is large.

If the seller suppresses information about product quality in order to stop buyer sorting, the buyer may be uncertain about the average quality as well and, thus, uncertain about the choice of vendor. Brand names and reputation are a way to solve this problem. (Oscar Mayer bacon)

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[1] Barzel, Yoram. "Measurement Cost and the Organization of Markets," *Journal of Law & Economics*, April 1982, 27-48.

Sometimes buyers have a lower cost of sorting than do sellers. Even so, it is not necessarily efficient for buyers to sort before the purchase because multiple sorts may still be wasteful. If the quality dimensions are idiosyncratic to the buyers, then multiple sorts are efficient. If the dimensions are common, multiple sorts are inefficient. When buyers have the cost advantage in sorting on common dimensions, warranties are a way of stopping pre-purchase, multiple sorts.

## B. Measurement Cost & the Structure of Contracts

Measurement cost can be used to explain the existence of the firm. The firm centers the sorting authority in the manager/owner. Otherwise, each resource supplier to the firm would have to measure the quality of the input by each other supplier. Multiple sorts are inefficient. This, however, does not add much to our understanding of the firm over and above Alchian & Demsetz/Coase.

Measurement cost can also be used to explain the nature of many contracts that we see between firms. A notable example is that of book publishers and writers. The standard contract involves a royalty rate between the publisher and the writer. The writer is paid a percentage of the sales of the book. Often this percentage increases as total sales grow. Also, it is common for the writer to receive a advance from the publisher in up-front cash against the future royalties. Why is this contract structured in this fashion?

It is not risk aversion. Measurement cost explains it. The writer has the most knowledge about the value of the book. This knowledge is most acute in the dimension of whether the book is a best seller or merely good. If the publisher has to pay for this value up front, then it must take measurements which are costly. Similarly, the activities of the publisher in bringing out the book affect the initial sales. These activities are similar across the many writers the publisher deals with. The cash advance is a way of paying the writer so that he does not need to measure these efforts. Cash is advanced against royalties as a way for the publish to get its money back if the book sales reach some minimum level. The prediction is seasoned authors of boiler plate books like murder mysteries will get big advances, possibly not against royalties, where as green authors will get all their money as royalties—they make money only if and when the sales roll in.

The patent rights are similar. It is commonly the case that patent rights are leased on a royalty basis from the patent holder. For instance, an individual holding a patent on a machine design will be paid a royalty by a large corporation for each of the items they produce. This is true even for an exclusive lease.

This does not seem to make any sense? In would seem that the individual would prefer to sell the patent outright. This would capitalize the expected value of the design and move the risk of demand fluctuation from the individual to the corporation. Since the corporation can more easily bear this risk, because its stock and bond holders can fully diversify in the securities markets, such a lump sum payment seems efficient. Moreover, a lump sum payment would make the corporation producing and marketing the good full residual claimant to the efforts that they can control.

The explanation for the royalty payment must lie in the fact that the patent holder has the best idea about how useful or profitable the patent will be. Because the inventor has this information and not the corporation, the inventor must bear the risk. The corporation is not willing to pay the inventor the asking price in one lump sum because there is no way to know if the inventor is telling the truth or just telling stories.[2]

There is only a subtle difference between the information-measurement problem and the problem of shirking/opportunistic behavior. The book publisher or patent user might reasonably be portrayed as worrying about shirking/opportunism or, alternatively, as being unwilling to undertake costly measurement. Even if there are few distinguishing differences between the arguments, the idea of measurement gives additional flavor to the overall theory. Two other examples show the value of this added breadth.

The DeBeers corporation sells diamonds. Their virtual monopoly in the sale of diamonds is no longer driven by a monopoly in mining the stones. Rather, the fact that diamond mining companies choose to sell their stones through the DeBeers' network seems to reflect the particular effectiveness of the selling organization. The facts of the selling organization are as follows:

DeBeers invites diamond buyers to purchase stones from them. The buyers submit bids for quantities in various ranges of quality. DeBeers prepares packages of stones which are then presented to the buyers on a take-it-or-leave-it basis. There is no negotiation over price. The buyers can inspect the stones. Only if a stone in a sight is grossly mislabeled (not of the general quality requested), can the buyer request that the stone be replaced. The buyer can refuse the bundle. However, that buyer will never be again invited to purchase from DeBeers.

The other example is the booking of movies.[3] Before outlawed by the courts, movies were sold as a blind block by producers to theaters. Producer-distributors negotiated with theaters for a package of movies with a particular schedule over the coming year. Since the movies were not yet made, the booking of the block was obviously blind. The contract involved a sharing of revenues from ticket sales. The standard contract called for the share received by the producer-distributor to increase to its maximum value only after some trigger level was reached.

Measurement is at issue in both of these cases. In the DeBeers case, the diamond buyers have an incentive to reject the sight if its average quality is not greater than the price per carat, or to reject the sub average stones in the sight. To stop them from doing this, DeBeers makes it profitable to be an invited diamond buyer. This means that most of the time, the average quality exceeds the average price. Sometimes it does not, but the buyer just sucks that up. On the other hand the

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[2] Once the patent is proven, we expect that it will be acquired by a corporation and leased by this entity to multiple users on a royalty basis. Efficient pricing of patents and the like should be done on a per-unit of output basis. Even so, this does not always happen. It is common for individuals to continue to hold patents, which also seems only explicable on the basis of measurement. Possibly, only the inventor knows the likelihood that the invention can be superceded.

[3] Kenney, Roy W., and Klein, Benjamin. "The Economics of Block Booking," *The Journal of Law & Economics*, October 1983, pp. 497-540.

buyer has to worry about DeBeers shorting him and then not making it up in the future. However, the brand name of DeBeers insures that this won't happen. The no-negotiation buying scheme reduces the amount of diamond inspection and is efficient as a result.

In the movie case, the producer-distributor has to protect against the exhibitor rejecting a picture or cutting short a run once the movie's true drawing power is revealed. The producer makes a series of movies for the season. Some are good, some are not so good. Total revenue is maximized by showing not only the best but also the so-so. Even so, the exhibitor has an interest in substituting out of the mediocre. To stop this, the producer makes the exhibitor sign a block contract. On the other hand, to ensure that the producer lives up to its promise to devote a certain level of resources to movies throughout the season, the contract front loads the revenues to the theater. This way, the theater gets the larger share of profits from the dog movies and the producer has to make a few big hits to make its money.

In general, these stories tell us that the suppression of information maybe valuable but it creates the potential for opportunism on the part of the seller. To solve this problem the seller can use sharing contracts, brand names and warranties. Brand names bond performance by creating a price premium that will depreciate if the seller distributes a product that has lower quality than that expected by the customer. Brand names require that the manufacturer measures the product prior to sale. If it is cheaper for the customer to measure the product after the sale, then the brand name product will have a higher cost than a product that is warranted. Because it has higher cost, it can only compete in markets where that higher cost is a smaller percent of total price, that is, in the high quality end of the spectrum.