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THE COASE THEOREM, OR THE COASIAN LENS? AN APPLICATION TO GMO REGULATION

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THE COASE THEOREM, OR THE COASIAN LENS? AN APPLICATION TO GMO REGULATION

ABSTRACT

We develop a property rights-transaction costs framework called the Coasian Lens (CL). We argue the CL captures Coase's seminal ideas (1937; 1960) more closely than the Coase Theorem. We use the CL to examine how regulation of genetically modified organisms (GMOs) may affect contract structures in the global agri-food chain.

Keywords: agricultural contracting, Coase Theorem, genetically modified organisms (GMOs).

JEL CLASSIFICATIONS: Q13, L14.

I. INTRODUCTION

The work of Coase (1960) has been frequently referenced in both law and economic studies. In "The Problem of Social Cost" Coase (1960) provided a framework for examining the economics of externalities in which the allocation of property rights and the importance of incorporating transaction costs into economic analysis took center stage. In particular, Coase argued that explicitly recognizing transaction costs was necessary in order to explain why firms exist and why law matters (Coase, 1988). The result of his work has become known as the COASE THEOREM. The Coase Theorem states: "When property rights are well defined and transacting is costless, resources will be used where they are most valued, regardless of how property rights are initially allocated and which of the transactors assumes liability for his or her effects on the other "(Barzel, 1997, p. 77).

Despite the popularity of the Coase Theorem, Coase himself has said the Coase Theorem was not created by him: "I did not originate the phrase, the 'Coase Theorem,' nor its precise formulation, both of which we owe to Stigler" (Coase, 1988, p. 157). Coase's objection to the

Coase Theorem is based on the fact that advocates use it in a way that is completely contrary to Coase's scholarly objectives.[1] Advocates of the Coase Theorem start with the assumption of zero transaction costs and argue that deviations from the predictions of the Coase Theorem must be attributed to the existence of transaction costs. This is in contrast to Coase, who takes positive transaction costs as given and property rights as often vaguely defined to show how institutions, be they markets, firms, governments, or other, arise to minimize transaction costs. Indeed, if the allocation of resources can occur without transaction costs, which use of the Coase Theorem implies, then the firm and the law lose their meaning in the short and long run (Coase, 1988).

We present a framework for examining issues of externalities and market failure consistent with Coase's (1937; 1960) seminal papers on the study of organization, law and regulation. We label this approach the "Coasian Lens." The Coasian Lens is based on an examination of the property right dimensions of a transaction and what Coase (1937) describes as the degree of transaction dissimilarity to show how property rights, transaction costs, and economic organization are related. To our knowledge, the Coasian Lens represents the first attempt at an alternative to the Coase Theorem that we believe more closely follows transaction costs-property rights reasoning used by Coase.

Organization of this paper is as follows. In Section II, we develop our Coasian Lens framework. Section III presents an application of the Coasian Lens in the global agri-food chain to examine how regulation of genetically modified organisms (GMOs) may affect vertical contract structures in the U.S. grain supply chain. By regulation, we mean the establishment of a purity standard, or threshold, for non-GMO grains (e.g., corn and soybeans) through mandatory

[1] "The Theorem has never been formally proved," (Medema and Zerbe, 2000, p. 839).

labeling laws by countries such as the European Union and Japan. Threshold simply refers to a regulatory standard set for an acceptable amount of genetically modified organisms (GMOs) found in food or feed products. Under mandatory labeling regimes for GMOs, a threshold serves as a triggering mechanism for labeling and is set by law. Voluntary labeling also uses a threshold to trigger labeling, but labeling and the set value for a threshold are both determined voluntarily by agribusiness firms operating in global markets for GMOs. Section IV concludes.

II. THE COASIAN LENS

In his article on the theory of the firm, Coase (1937) introduced the concept of transaction costs to show how they explain the existence of firms. According to Coase, there are costs associated with market exchanges. These costs, which have become known as transaction costs, can be economized by incorporating transactions within the firm. The reason is that firm organization "supercedes" the price mechanism as a means of coordinating economic activity, thus saving on the (transaction) costs "of discovering what the relevant prices are" (p. 390). However, there are also (transaction) costs associated with firm organization, which involves the direction of production by an "entrepreneur-co-ordinator" instead of an exchange transaction within the market. Internal transaction costs "increase with an increase in the spatial distribution of the transactions organized, in the dissimilarity of the transactions, and in the probability of changes in the relevant prices" (p. 397). Of the three reasons offered by Coase for why internal transaction costs increase, the dissimilarity of transactions is the least understood, in part because Coase did not define transaction dissimilarity. We argue that transaction dissimilarity is an important determinant of economic organization and that it can be operationalized through an

examination of a transaction's property right dimensions of control, the process of which we define as the Coasian Lens.

A transaction emerges as having property right dimensions of control, which may be defined, allocated, and enforced through contract structure (Libecap, 1993). Structure refers to the actual terms of a contract and each term defines, allocates, or enforces a property right. Cheung (1970, p. 50) concluded: "The stipulations, or terms, which constitute the structure of the contract are, as a rule, designed to specify (a) the distribution of income among the participants, and (b) the conditions of resource use. Under transferable rights, these stipulations are consistent with, or determined by, competition in the marketplace". We submit, however, the distribution of income depends on enforcement of property rights. Therefore the transferability of a right (and its economic value) depends on enforcement—lack of enforcement erodes the possibility of encouraging competition in the marketplace and prevents the sufficient delimitation of property rights to establish market contract equilibriums. If, however, conditions of resource use and enforcement result in market contract equilibriums, then: "the structure of the contract will be such that the marginal gain and cost are equal" (Cheung, 1970, p. 50).

But Cheung (1970) also suggested contract structure has many elements constituting gains and costs—and the structure of a contract can be voluminous. He stated: "…the elements constituting gains and costs, are multiple and the marginal equalities of a constrained maximization are several. Since to satisfy one particular marginal equality, one or more contractual stipulations, implicitly or explicitly, are required, pages of stipulations in one contract can be found" (Cheung, 1970, p. 51). The insight here is that each party to a contract

allocates and appropriates property rights in an economizing way because each allocation and appropriation has a marginal benefit and cost; one partner allocates a right for some marginal benefit and the other appropriates the right at some marginal cost. Further, changing the structure of a contract through the inclusion or exclusion of a term or some change to an existing term has a marginal cost and benefit effect on contractual partners—the change may shift marginal benefits and costs between partners by changing the definition, allocation, or enforcement of rights. The purpose of contract structure is therefore to govern a set of marginal equalities associated with resource use (Cheung, 1970).

Although there are many dimensions of property rights of control, we focus on two that are particularly important for every transaction: 1) Excludability and 2) transferability. We show that the degree of a transaction's excludability and transferability are determined by the marginal benefits and marginal costs of each.

EXCLUDABILITY

Early studies by Coase (1960), Alchian (1973), and Cheung (1970) focused on the ability of an agent to 'enjoy' a piece of property—it is the right to access or use an input for an internal production process. High (low) usability refers to broadly (narrowly) defined rights of access to contract for control of an input. In the property rights literature, the right of access to use an input may be likened to the idea of communal rights—broad rights to use an input, but exclusion of others is low. The reason has to do in part with the magnitude of transaction costs in crafting a contract with the 'others' to be excluded. Such costs discourage the formation of exclusive

rights. Thus, high usability, broadly defined communal rights are characterized by low excludability, while narrowly defined "private" rights are characterized by high excludability.

For instance, Cheung (1970), North and Thomas (1971), and Alchian and Demsetz (1973) have suggested that the existence of a use right to an input must precede the contracting of a more exclusive right. Therefore as more exclusive rights are defined and allocated via contract to control an input, use (communal) rights decrease. Similarly, the communal right system creates a 'free rider' problem; new users cannot be excluded (Alchian and Demsetz, 1973). Alchian and Demsetz (1973) concluded access to a freeway was an example of the free rider problem because drivers had the communal right to access the freeway at any time and did not have the right to exclude others. Further, "…each person has the private right to the use of a resource once it is captured or taken, but only a communal right to the same resource before it is taken" (Alchian and Demsetz, 1973, p. 22). The insight here is Alchian and Demsetz suggest there is a progressive delimitation of use (communal) to exclusive (private) property rights—more exclusive rights exist only if initial use rights exist (Cheung, 1970).[2]

We assume that there are declining marginal benefits associated with increasing the excludability of transactional rights (i.e., restricting use by moving away from communal toward exclusive rights) and that the marginal costs associated with increasing excludability increases. The particular degree of excludability is determined at the point at which marginal benefits equal marginal costs. Moreover, an increase in marginal benefits will result in an increase in

[2] Alchian and Demsetz (1973) also suggest the solution to the free rider problem is to convert communal to private rights if the marginal cost of delimitation of a communal right is equal to or greater than the marginal benefit of the converted private right.

excludability, while an increase in the marginal costs will result in movements toward greater access and more communal rights.

TRANSFERABILITY

Transferability refers to the ability of an property right holder to convey or "transfer" use and excludability rights to others in this sense: a communal (use) right may be transformed into an exclusive (excludable) right, and that exclusive right may then be transferred. Thus, there exists a positive correlation between more a exclusive right and the degree of transferability associated with that right—the more exclusive a right becomes, greater transferability is enabled. Yet, the correlation does not exist unless enforcement of an exclusive right is sufficient to protect its value (Cheung, 1970); transferability diminishes as enforcement wanes. North and Thomas (1971) concluded: "…twelfth-century England experienced a relative rise in the value of land which led to efforts to convert the existing right structure into one that allowed for exclusive ownership and transferability".

Therefore, the transferability aspect of property rights can vary from low enforcement to high enforcement. We assume that the marginal benefit of enforcement declines and the marginal cost increases as enforcement increases. The degree of enforcement, and thus the degree of a transaction's transferability, is determined at the point at which marginal benefits equal marginal costs. An increase in marginal benefits of enforcement will increase the transferability of a transaction, while an increase in marginal costs will diminish transferability.

TRANSACTIONAL DISSIMILARITY

Transactions can be characterized by different degrees of excludability and transferability. Therefore transactions differ because they define, allocate, and enforce different property right dimensions of control over an input, evidenced by differing degrees of excludability and transferability.

In figure 1, we have labeled two different points as representing how transactions differ based on property right dimensions. To illustrate, assume there are two transactions, A and B, and each transaction is facilitated by a contract that specifies property right dimensions of control over an input. Transaction A represents a contract where there are relatively high marginal benefits to excludability but relatively low marginal benefits from transferability. Transaction B, on the other hand, is characterized by relatively low marginal benefits from transactional excludability but high marginal benefits from transferability. We would say these transactions are relatively dissimilar because they differ substantially in both the excludability and transferability dimensions. As a result, a degree of transaction dissimilarity exists between these transactions and it is defined by the 'asymmetry' between excludability and transferability property right dimensions. Transaction B', in contrast, is less dissimilar to transaction A than is transaction B because B' differs from A only in the degree of transferability.

There are two important points to be made from this analysis. First, economic agents who place a greater value on excludability and/or transferability rights – that is, who have greater marginal benefits or lower marginal costs of excludability, or who have greater marginal benefits or lower marginal costs from enforcement of transferability rights – will have greater interests in acquiring excludability and transferability rights, other things being equal. Thus, we can expect

that changes in relative benefits and/or costs of excludability or transferability rights for economic agents will result in changes in contracting forms or governance structures so as to facilitate the transfer of such rights. Moreover, we can infer changes in relative benefits and costs of excludability or transferability rights from changes in organizational structures observed in the market. In the discussion below of regulation and vertical coordination of non-genetically modified organisms (GMOs), Sykuta and Parcell (2003) noted elevator firms in the agri-food chain preferred a buyer-call over a harvest delivery contract structure over time.[3] Interesting, over that same period thresholds for non-GMOs also decreased in major export markets (e.g., Japan, European Union). We believe as thresholds for non-GMO content decreased, the marginal benefits of excludability increased more for elevator firms than farmers. Because elevators are typically first points of delivery in the agri-food chain, the ability to (and value capture from) coordination and segregation of non-GMOs depends on ownership of excludable rights over deliveries to prevent commingling and contamination. We would say the marginal benefits of excludability increased more for elevators than farmers as thresholds for non-GMO supplies decreased. We believe this is why we observed a change in contract forms, or governance structures to coordinate non-GMOs.

Second, according to Coase, internal transaction costs increase as the degree of dissimilarity increases. That is, if transaction A occurs within the firm, then the costs of vertically integrating transaction B' would be less than the cost of vertically integrating B, because B is more dissimilar to A than is B'. Therefore, we would expect transaction B' to be integrated within the firm and transaction B to be coordinated through the market. The idea is the vertical boundary of the firm increases (decreases) if the asymmetry, or the degree of

[3] We explain each contract in greater detail in the next section.

transaction dissimilarity, decreases (increases). For example, an elevator firm would prefer to organize non-GMO supplies using a buyer call contract instead of harvest delivery. The idea is the elevator firm integrates, or controls, the supply of non-GMOs using the buyer call contract structure because it is less dissimilar compared to transactions already under control by the elevator. In figure 1, we might say point A represents transactions under control by the elevator and the choice to be made is which contract structure should be used to control non-GMO supplies. Given this setup, B represents a harvest delivery contract and B' would represent a buyer call contract. The elevator would therefore use the buyer call contract because it is less dissimilar.

III. REGULATION OF GMOS AND VERTICAL CONTRACT STRUCTURES: AN EMPIRICAL INQUIRY

While it is true some producers across the globe have rapidly adopted first generation genetically modified (GM) crops, it is equally true such adoption has coincided with countries installing different labeling regimes and thresholds for products containing GMOs (Kalaitzandonakes, 2000; Pew, 2003).[4] In the U.S. and Canada, voluntary labeling and thresholds have regulated GM markets, while the European Union (EU), Japan and others have regulated GM markets through mandatory labeling with stringent thresholds. As a result, agribusiness firms have mitigated market uncertainties by funneling non-GM crops with explicit thresholds through the global agri-food chain using new forms of economic organization, such as

[4]Threshold refers to a regulatory standard set for an acceptable amount of GM material found in GM products. Under mandatory labeling regimes for GM products, a threshold serves as a triggering mechanism for labeling and is set by law. Voluntary labeling also uses a threshold to trigger labeling, but labeling and the set value for a threshold are both determined voluntarily by agribusiness firms operating in global markets for GM products.

identity preservation (IP). Simply put, IP is a system of management and trade that allows the source and nature of materials to be identified as they move through the supply chain (Buckwell et al 1998).

To our knowledge, only Sykuta and Parcell (2003) have systematically recognized variations in contract structure in the agri-food chain as they relate to regulation of GMOs. Sykuta and Parcell used a transaction costs framework developed by Mahoney (1992) to explain why contract structures vary when organizing transactions between farmers and elevators. The study made two key contributions. First, the Sykuta and Parcell study represents the first attempt to use transaction costs reasoning to understand differences in contract structures. The study unearthed several important and testable hypotheses other researchers can build upon. Perhaps more importantly, the study also charted a path, or a process, for contracts and organization researchers to follow to understand the connections between organizational economic theory and its application to the empirical nature of agricultural (production) contracts. We contend the process followed by Sykuta and Parcell unfolds in three steps. First, identify the actual contracts used in the agri-food chain. Next, use transaction costs theory to explain differences in contract structures (e.g., terms). Finally, use those differences as a basis for understanding the allocation of value, risk, and decision rights as transactors are exposed to sources of uncertainty.

In what follows, we examine a non-GMO transaction between farmer and elevator management using the Coasian Lens. In particular, we discuss how to use the lens, how the lens relates to the taxonomy constructed by Sykuta and Parcell (2003), the idea of transaction dissimilarity, and choice of contract structure when organizing non-GMO transactions.

Throughout the discussion, our empirical inquiry is to understand how vertical contract structures between farmer and elevator management may be affected by lower thresholds for non-GMO supplies—a form of increased regulation of agricultural biotechnology.

APPLICATION OF THE COASIAN LENS

Applying the Coasian Lens to the farmer-elevator non-GMO transactions is completed in a series of steps, which defines the process of using the lens. Two important insights emerge from applying the lens to the contract structures identified in Sykuta and Parcell's study. First, examining terms of each structure provides an understanding of how complete each transaction is in terms of possible enforcement cost differences and how sources of uncertainty affect contractual choice between farmer and elevator. Second, and important from our perspective, the degree of transaction dissimilarity can be identified between contract structures based on differences between the actual terms used in these contracts. The idea is an empirical proxy for the degree of transaction dissimilarity can be the asymmetry in property right dimensions of control allocated between contract structures: the greater the asymmetry, the greater the degree of asymmetry of control between farmer and elevator because of differences in terms of the actual contracts.

Sykuta and Parcell (2003) examined non-GMO soybeans grown under identity preserved programs offered by several different elevator firms. In total, fourteen terms were reported across two different contract structures. We argue there is a distinction between contract structures based on the delivery window term; the distinction represents a degree of dissimilarity between contract structures as well. For example, a contract with a harvest delivery window

represents a close proxy for a market contract structure, while a contract with a buyer-call delivery window represents a managerial contract structure. As a result, use of a harvest delivery contract by the elevator represents a market transaction that has less vertical control over non-GMO supplies than a buyer-call delivery contract. The buyer-call contract provides the elevator with greater control over when non-GMO supplies arrive, volume per delivery, and duration of deliveries (e.g., one or two week delivery period). Harvest delivery provides the elevator with less vertical control because the farmer has the right to deliver non-GMO supplies at harvest; commodity corn and soybeans as well as non-GMO supplies can therefore arrive during harvest. As such, the farmer has the greater vertical control using a harvest delivery contract. Using the logic of the Coasian Lens, we explain these distinctions in greater detail.

EXCLUDABILITY-TRANSFERABILITY

A buyer call right provides the elevator with an increased ability to exclude and transfer non-GMO soybeans. An elevator can dedicate bins, pits, and other assets to be used during the window specified to prevent commingling and reduce other opportunities for contamination (e.g., mixing of non-GMO with GMO supplies). We argue the elevator prefers greater excludability and transferability property rights over non-GMO supplies to assure contractual performance; this corresponds to high excludability and transferability preferences by the elevator for a managerial, or buyer-call, contract structure. However, a buyer-call right provides the farmer with decreased ability to exclude and transfer non-GMO soybeans because the elevator manager has control over the delivery window so the farmer may not deliver supplies during harvest or any other time other than the buyer-call window. Under the buyer-call contract

structure, we argue the farmer prefers low excludability and transferability property rights over non-GMO supplies to assure contractual performance.

But the harvest delivery window represents a different tradeoff of property rights of control over non-GMO supplies between farmer and elevator. If a harvest delivery contract structure is chosen as the coordination mechanism for non-GMO supplies, we argue the preferences for excludability and transferability property rights reverse between farmer and elevator. Use of the harvest delivery contract structure represents a farmer's preference for high excludability and transferability; non-GMO supplies can therefore be delivered when the farmer chooses, not the elevator. As a result, the elevator's preference must be for low excludability and transferability because the right to delivery belongs to the farmer, not the elevator.

Though we have argued the delivery window represents a distinction between vertical control over non-GMO supplies between farmer and elevator, other terms found in the taxonomy developed by Sykuta and Parcell (2003) also correspond to the Coasian Lens. For example, terms such as number of acres produced and quality indicators such as heat damage, splits, and percent of GMO (threshold) correspond to the types of uses, or usability, of non-GMO supplies. We suggest the elevator has greater rights of usability than the farmer under both harvest delivery and buyer-call contract structures. From planting to harvest on-farm, the non-GMO contracts specify how production practices should be conducted to assure the desired threshold of GMO content is achieved. Isolation distances, border rows, seed variety, chemicals, and other on-farm practices are specified in these non-GMO contracts. As a result, we conclude the elevator has the greater set of rights over usability because it determines the appropriate set of

on-farm production practices to assure contractual performance. Therefore, an elevator has greater rights of usability under both contract structures.

SOURCES OF UNCERTAINTY

The remaining terms provided by Sykuta and Parcell's taxonomy also represent some important sources of uncertainty found within these contract structures. For example, because growing conditions vary during the year, yield uncertainty exists. In addition, the level of GMO contamination represents an important quality dimension and a source of uncertainty for farmer and elevator. Perhaps despite all of the production practices that can be followed to assure a non-GMO threshold, the chance for contamination is largely uncontrollable. Depending on isolation of non-GMO supplies from GMO, contamination varies by farm, seed variety, and uncontrollable environmental factors such as wind at the time of pollination, humidity, and the location of neighboring fields of GMO crops. Despite the farmers' best efforts to follow the contractual guidelines for on-farm production practices, eliminating the possibility of exceeding a non-GMO threshold at delivery is impossible to eliminate. Further, despite all elevator precautions to prevent contamination of non-GMO supplies, mishandling mistakes while dumping trucks at the pits as well as barge or other load out operations can increase contamination levels in non-GMO supplies. Finally, testing errors to determine if an incoming truck or an outgoing barge (rail car, or truck) are equal to or below a threshold for non-GMO content may occur.

GMO contamination translates into failure to meet contractual performance for possibly the farmer or elevator. GMO contamination represents a significant source of uncertainty and

has transaction cost implications for both farmer and elevator. The level of transaction costs is directly related to the liability each shares under contract structures for not delivering the appropriate volume and threshold for non-GMO supplies. If the farmer is liable and deliveries fail a strip test (used by the elevator for each arriving truck load of non-GMO supplies), replacement costs associated with searching and bargaining for alternative non-GMO supplies with the appropriate threshold may be exorbitant. Since most non-GMO production is under exclusive contractual arrangements between other farmers and elevators, identifying excess non-GMO supplies may be costly, if not impossible to secure through contracts. Once found, testing costs would also be incurred as well. If the elevator is liable and a delivery by a farmer fails a strip test, search, bargaining, and testing transaction costs could also be excessive. The elevator may have contractual arrangements downstream with other end-users, so contractual performance failure due to a higher threshold for non-GMO supplies means the elevator would have to search, bargain, and possibly test new non-GMO supplies to assure its contractual performance requirements with end-users. Again, this may be extremely costly for the elevator, if not impossible. As the crop season progresses, finding additional supplies may be increasingly more difficult (and costly) if an elevator and farmer choose to organize delivery of non-GMO supplies using a buyer-call contract structure. The idea is during peak harvest excess non-GMO supplies with the appropriate threshold may be more readily available than later in the season.

TRANSACTION DISSIMILARITY, GMOS AND VERTICAL BOUNDARIES

We have examined each dimension of the Coasian Lens as applied to the vertical contract structures between farmer and elevator. The last step in the process of applying the lens is to examine the degree of dissimilarity between contract structures. We have argued a natural

distinction exists between harvest delivery and buyer-call contract structures for non-GMO supplies in the vertical chain. The idea is an asymmetry exists between excludability and transferability property right dimensions of control over non-GMO depending on the use of the buyer-call or harvest delivery contract structures. Because an asymmetry exists, we submit a degree of dissimilarity also exists.

We believe lowering a non-GMO threshold leads to an increase in the marginal costs of enforcing buyer-call and harvest delivery contract structures. Elevators may expend more resources to search for farmers that have adequate isolation to prevent contamination of non-GMO supplies, especially in the case of corn due to pollen flow. In addition, elevators may expend more resources to test for non-GMO levels given contractual performance hinges heavily on supplies having the contracted for non-GMO level. Further, elevators may expend some resources to adapt business processes to design new handling routines for non-GMO supplies with lower thresholds—use of dedicated bins, pits, and transportation, for example.[5] Those adaptations may result in sizable opportunity costs because using dedicated assets may lead to losses in asset utilization (e.g., bins). As a result, we believe elevators may prefer the use of buyer call contracts over harvest delivery because the value (net of these transaction costs) will be higher. Simply put, elevators will choose the contract structure that is 'less' dissimilar under these regulations for non-GMOs.

We have featured the comparative contracting choice faced by elevator management in figure 1. The idea is elevator management will prefer to use contract B' (buyer call) instead of B

[5] By business processes, we mean those actions that firms engage in to accomplish some business purpose or objective (Ray et al 2004). The elevator's actions to adapt business processes would be to minimize the risk (and transaction costs) of contaminating non-GMO supplies.

(harvest delivery) because it is less dissimilar compared to A (those contracts already under control by the elevator). These observations, however, point to the need to conduct an empirical examination of changes in transaction costs given a change in a non-GMO threshold under harvest delivery and buyer call contract structures. We believe this type of an empirical approach to the study of economic organization and regulation in the agri-food chain is consistent with Coase (1937; 1960).

IV. CONCLUDING REMARKS

The construction of the Coasian Lens, we have argued, establishes the type of empirical approach to the study of industrial organization we believe Coase (1937; 1960) advocated. Given Coase's dissonance with the Coase Theorem, we suggest the more fitting term is: The Coasian Lens. Further, we have shown how the lens can be applied in the agri-food chain and in particular how regulation of GMOs may affect vertical contract structures between farmer and elevator management. In sum, we believe the framework can be applied to several other contracting problems in agriculture. But as Coase (1937) has noted, the true test of any set of assumptions in economics depends on answers to the questions Joan Robinson (1932, p.12) asked: "Are they tractable? And: Do they correspond with the real world?"

The next step is to formally develop a comparative contracting framework to operationalize the transaction costs-property rights logic of the Coasian Lens. But that is the subject for another paper.

REFERENCES

Alchian, A.A. "Some Economics of Property Rights." Il Politico 30, (4): 816-29. Reprinted in Armen A. Alchian, *Economic Forces at Work*. Indianapolis, Ind.: Liberty Press, 1977.

Alchian, A.A., and H. Demsetz, "The Property Right Paradigm," *Journal of Economic History*, 1973, 33(1): pages 16-27.

Barzel, Y. *Economics of Property Rights*. Cambridge: Cambridge University Press, 1997.

Buckwell, A., G. Brookes and D. Bradley. "Economics of Identity Preservation for Genetically Modified Crops", CEAS 1745/GJB. Wye, U.K.: CEAS Consultants (Wye) Ltd. 1998.

Cheung, S.N. "The Structure of a Contract and the Theory of a Non-Exclusive Resource." *Journal of Law and Economics*, 13(April 1970): pages 23-42.

Coase, R.H. "The Nature of the Firm," *Economica 4* (November 1937): pages 386-405.

Coase, R.H. "The Problem of Social Cost," *Journal of Law and Economics* 3(1960): pages 1-44.

Coase, R.H. "Notes on the Problem of Social Cost," *The Firm the Market and the Law*, R.H. Coase, ed. Chicago: University of Chicago Press, 1988.

Kalaitzandonakes, N., "Agrobiotechnology and Competitiveness". *American Journal of Agricultural Economics*, 82(5) (2000): pages 1224-33.

Libecap, G. *Contracting for Property Rights*. Cambridge: Cambridge University Press, 1993.

Mahoney, J. "The Choice of Organizational Form: Vertical Financial Ownership versus Other Methods of Vertical Integration." *Strategic Management Journal* 13(July 1992): 559-84.

Medema, S.G. and R.O. Zerbe Jr., "The Coase Theorem." *Enclopedia of Law and Economics*. B. Bouckeart and G.D.Geest, eds. Edward Elgar and the University of Ghant (2000): pages 836-892.

North, D. and R. Thomas, "The Rise and Fall of the Manorial System: A Theoretical Model," *Journal of Economic History*, XXXI (December 1972): 777-803.

Ray, G., J.B. Barney, and W. Muhanna, "Capabilities, Business Processes, and Competitive Advantage: Choosing the Dependent Variable in Empirical Tests of the Resource-Based View", *Strategic Management Journal*, 25(2004): pages 23-37.

Robinson, J. *Economics is a Serious Subject.* Cambridge, Eng.: W.Heffer & Sons, 1932.

Pew Initiative on Food and Biotechnology, "U.S. vs. EU: An Examination of the Trade Issues Surrounding Genetically Modified Food". Internet site: http://www.pewagbiotech.org (Accessed November 10, 2003).

Sykuta, M. and J. Parcell, "Contract Structure and Design in Identity-Preserved Soybean Production," *Review of Agricultural Economics*, 25(December 2003): pages 332-350.

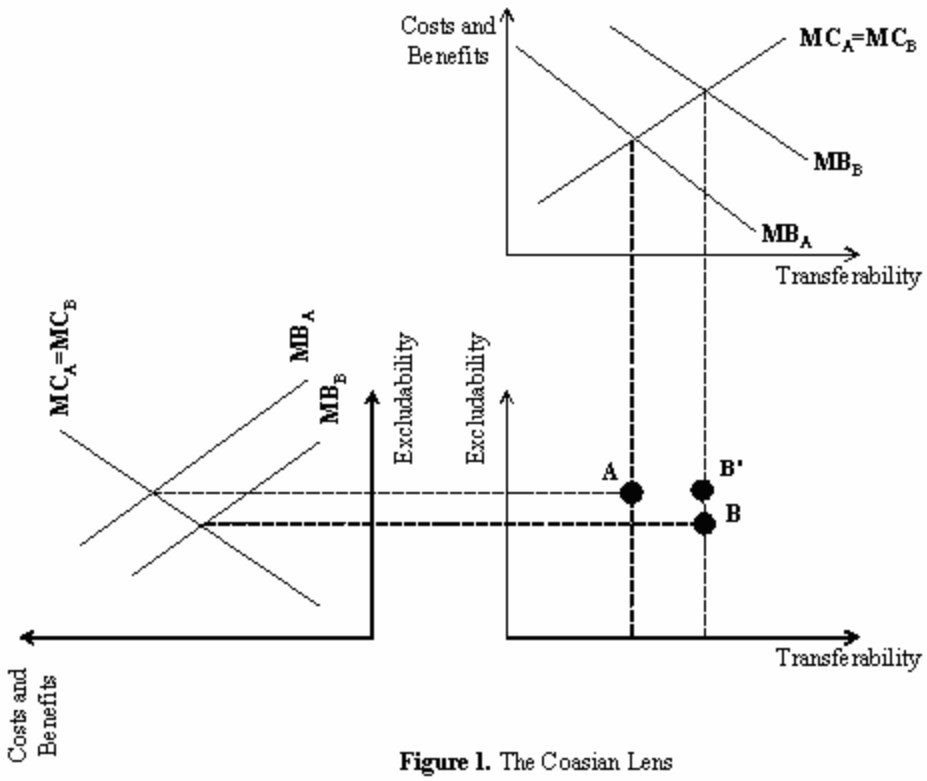

Figure 1. The Coasian Lens