DOES THE LACK OF TRADE MATTER?

THE ENDOWMENT EFFECT AND THE COASE THEOREM
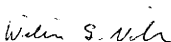
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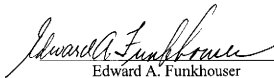
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ABSTRACT

Does the Lack of Trade Matter?

The Endowment Effect and the Coase Theorem.

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This paper studies the implications of the endowment effect on the Coase Theorem. The endowment effect places a sharp bend or kink in the traditional indifference curve. Applying this result to the traditional two-party exchange model using Edgeworth box analysis identifies and explains the large no-trade zone found in the endowment effect literature. The Edgeworth endowment model explicitly shows that the endowment effect does not result in an inefficient volume of trade as previously thought.

ACKNOWLEDGEMENTS

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INTRODUCTION[1]

This paper has four goals. First, I explain the Coase Theorem and the endowment effect. Second, I explore the endowment effect's influence on the traditional indifference curve. Third, using Edgeworth boxes, I present a two-party exchange model in the absence of the endowment effect. Finally, I explore the implications of the endowment effect on the two-party exchange model. Please note that in this paper, as in most writings on the Coase Theorem and the endowment effect, I use the criterion of Pareto efficiency — an allocation of resources in which no person's surplus can increase without decreasing another's.

The Coase Theorem: Definition

In 1960, Nobel Laureate Ronald Coase published "The Problem of Social Cost," in which he criticized the current approach among economists of the "Pigovian Tradition" to the problem of market failure. This article challenged the legal and economic professions' approach to problems regarding market failure and the legal implications thereof. The Coase Theorem, which states that *with insignificant transaction costs, resources will be allocated efficiently regardless of the initial assignment of property rights,* started a revolution of thought in the economic profession in the areas of transaction costs and exchange theory. I use the railroad-and-farmer example made famous by Coase in "The Problem of Social Cost" (1960) to illustrate his theorem.

In this example, a railroad runs adjacent to a farmer's field. Occasionally sparks fly from the trains and burn the farmer's crops. The farmer, having suffered loss of

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[1] This thesis follows the style and format suggested by the American Psychological Association.

income from the inadvertent burning of his crops, pursues a lawsuit for damages against the railroad owner. The severity of crop damage positively correlates with the number of trains run per day and, consequently, the judge hearing this case would have to issue the right to determine the number of trains run per day to either the farmer or the railroad owner. Traditionally, approaching the problem from an efficiency perspective, economists would have assigned this property right to the party incurring external costs (i.e., the farmer incurring the cost of lost income due to the railroad owner's actions). This conclusion seems logical at first because it seems fair. However, Coase pointed out that assigning the property right to the railroad owner would result in the same final allocation as assigning property right to the farmer, and he pointed out that this outcome would be efficient as well.

At first glance, one may think that assigning the property right to one party would result in the holder of the property right operating with no regard to the preferences of the other party. This logic led economists to think that assigning the property right to the injured party would rectify the externality. In fact, if this were true, then assigning the property right to the injured party might well only serve to reverse the externality. Rather than operating with no regard to the other party, both parties would actually exchange entitlements exactly until the marginal profit from the exchange declines to zero, provided insignificant transaction costs. If the railroad owner obtained the right to determine the number of trains run per day, then the farmer would have incentives to pay the railroad owner to decrease the number of trains run per day. Alternatively, assigning the property right to the farmer would encourage the railroad

owner to compensate the farmer for lost profits in exchange for the right to increase the number of trains run per day. In either case, the party purchasing additional rights will do so until the cost paid exceeds the benefit received. Such payments alter the division of welfare between parties, but leave the total social welfare unchanged.

The Coase Theorem has both proponents and opponents. Cooter (1989) holds that the range of market failure is too large to be encompassed by a theory of transaction costs as Coase asserts. He also asserts that government (the courts in this example) should serve to lubricate the exchange process rather than issue commands to the parties. The assignment of property rights by the courts, however, lubricates the exchange situations that have ended up on the court's dockets. Coase's suggestion that efficiency and causality are not linked does contradict the precedents in many court cases just as Cooter points out. This fact is not surprising, because economists, not the court system, are charged with identifying increasingly reliable means of understanding and lubricating the exchange process. It is not surprising then that the Coase Theorem has caused a larger stir in the field of economics than in the field of law.

Usher (1998) asserts that the Coase Theorem argues that the existence of costless exchange will allocate resources efficiently *in the absence of property rights*. Coase did not argue this point although his phrasing may not have excluded this logical interpretation. The evolution of the Coase Theorem in economics has clearly emphasized that property rights are necessary for efficient exchange, but that the assignment of those rights among the involved parties has no bearing on the outcome as long as transaction costs remain insignificant.

Defending Coase's methodology, Posner (1993, p. 210) argues that, "we need not accept Coase's methodological prescription in order to understand that it has served him well and in serving him well has served the economics profession — and allied disciplines, such as law — very well indeed." The Coase Theorem has met with skepticism in the literature because Coase relied on simple arithmetic modeling even though the field of economics has turned to more advanced mathematical and statistical models. However, we should not brush the Coase Theorem off as overly simple when faced with challenging data such as that presented in the endowment effect literature. After all, Posner recalls Whitehead's aphorism that, "It requires a very unusual mind to undertake the analysis of the obvious (p. 205)."

The Endowment Effect: Definition

Research conducted on the endowment effect has challenged the Coase Theorem's validity. The literature on the endowment effect states that when people are endowed with a good, they demand a much higher amount to sell it than they would pay to acquire it (Thaler, 1980; Thaler, 1992; Kahneman, Knetsch, and Thaler, 2000; Jolls, Sunstein, and Thaler, 2000). In 1990, two experiments run by Kahneman, Knetsch, and Thaler showed strong endowment effects (Kahneman, et al., 2000). Specifically, their experiments revealed that sellers demand roughly double the price that buyers are willing to pay. The consequent lack of trade observed by these researchers seems inefficient because it falls below the levels observed in the control markets.

The Endowment Effect: Possible Causes

Though the presence of the endowment effect is obvious in the research, its causes are not at all obvious. Propositions offered in the literature to explain the endowment effect include 1) the concept of loss aversion and the status quo bias borne out of the literature on framing and reference-dependent decision-making, 2) the concept of imprecise preferences and the belief that, over time, education and experience will correct the endowment effect, and 3) the concept of updating.

Tversky and Kahneman (1981) present the theory of reference-dependent decision-making. Loss aversion means that people prefer present endowments to switching bundles because such a switch involves a loss of the present endowment. In a 1991 publication, they show that reference point effects lead to allocations not predicted by the Coase Theorem. Samuelson and Zeckhauser's (1998) decision-making experiments overwhelmingly show people sticking with the status quo; the authors apply their results to the areas of periodic decision-making, search, soft selling, sticky prices, exit barriers, market competition, public policy, and scientific advancement. Brookshire and Coursey (1987) find that the magnitude of the loss-aversion phenomenon varies depending on whether the setting is market or non-market. They also find that the market acts as a disciplinarian of loss-aversion behavior. Jolls, et al., (2000) recommend that further research be conducted to formulate a better model than neoclassical economics provides so that prediction and the formation of policy may be improved.

Harbaugh, Krause, and Vesterland (2001) conduct a study on the existence of imprecise preferences based on the assumption that if people did exhibit an endowment

effect due to imprecise preferences, then education and experience over time should correct or decrease the magnitude of the endowment effect. Their results support the theory of reference-dependent preferences and do not show a decrease in the endowment effect through experience measured by age.

Lastly, and I believe as yet untouched in the literature, is the possibility that once endowed with a good, people update their use for that good and, simultaneously, their value of it. Further research on this possibility may help to narrow in on the cause or causes of the endowment effect.

The Endowment Effect Applied to the Coase Theorem

Examining the Coase Theorem in light of the endowment effect using the example of the farmer and the railroad owner, it seems logical that when the judge endows a party with the right to determine the number of trains run per day, that party would value the right more upon endowment. In this case, the party holding the property right would assign a value to the possession of that right. Therefore, any payment accepted from the farmer to induce the railroad owner to decrease the number of trains run per day would have to include compensation for the loss of the absolute property right. Therefore, in the presence of the endowment effect, the payment required to induce the railroad owner to forgo the running of each train would be higher than in the absence of the endowment effect.

This paper develops a new model that accounts for the endowment effect while sustaining the Coase Theorem. It addresses four questions. First, in the absence of the endowment effect, does the final allocation of resources depend on initial ownership?

Second, in the presence of the endowment effect, does final allocation of resources depend on initial ownership? Third, in the presence of the endowment effect, does efficiency depend on initial ownership? Finally, does the exhibition of the endowment effect by only one party change the answers to the preceding three questions?

THE MODEL

The Endowment Effect and Traditional Indifference Curves

Willingness to accept (WTA) refers to the amount of money a person will require to sell a good that he or she possesses while willingness to pay (WTP) refers to the amount of money a person will pay to acquire a good. Experiments by Kahneman, et al., (2000) demonstrate that the endowment effect increases a person's WTA but does not change that person's WTP.[2] The inequality of WTA and WTP is referred to in the literature as the WTA-WTP disparity. Morrison (1997) explores the effect of the WTA-WTP disparity on the traditional indifference curve in detail. She explores the possible complimentarity of substitution effects and the endowment effect in causing the WTA-WTP disparity. She finds that the endowment effect does exist, and in Morrison (1998), presents the results of an earlier paper as a defense of Knetsch's conclusion that the endowment effect is a major cause of the WTA-WTP disparity. Dubourg, Jones-Lee, and Loomes (1994) find a significant and persistent WTA-WTP disparity in their experiments; in over half of their usable cases, the WTA and WTP intervals do not overlap.

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[2] These experiments were run in 1990 and are explored heavily in Thaler (1992).

With the understanding that the endowment effect increases a person's marginal willingness to accept (MWTA) but does not affect the marginal willingness to pay (MWTP), I now examine the change in the traditional indifference curve (IC) caused by the endowment effect and illustrate the change in Figure 1.

[PLACE FIGURE 1 HERE]

IC_a represents a person's indifference curve in the absence of the endowment effect. The marginal willingness to accept on IC_a ($MWTA_a$) is defined as the marginal rate of substitution between good x and dollars at point A on IC_a when moving to the northwest. The $MWTA_a$ is the amount of money a person would be willing to accept in the absence of the endowment effect to sell a unit of good x. The marginal willingness to pay on IC_a ($MWTP_a$) is defined as the marginal rate of substitution between good x and dollars at point A on IC_a when moving to the southeast. The $MWTP_a$ is the amount of money a person would be willing to pay in the absence of the endowment effect for an additional unit of good x. As the endowment effect shows, when endowed with Q_1 of good x, $MWTA_a$ will increase while $MWTP_a$ remains the same. The rotation of IC_a about the endowment point A to a steeper curve (IC_b) will accomplish the necessary alteration of the traditional indifference curve. At point A,

(1) $MWTA_b > MWTA_a,$

and more importantly,

(2) $MWTA_b > MWTP_a.$

The traditional indifference curve (IC_a) is smooth at point A because $MWTA_a$ is equal to $MWTP_a$. The fact that these are no longer equal yields a *relevant combination curve* —

an indifference curve kinked at point A consisting of the IC_a to the southeast of A and IC_b to the northwest of A.

An Edgeworth Analysis

In the Absence of the Endowment Effect

In the absence of the endowment effect, an Edgeworth box illustrates a two-party exchange model that adheres to the Coase Theorem.

[PLACE FIGURE 2 HERE]

As Figure 2 illustrates, at a point, such as point A, above the contract curve in Region A, person 1 is on IC_1 and person 2 is on IC_2. At this point, person 1's marginal willingness to pay ($MWTP_1$) is greater than person 2's marginal willingness to accept ($MWTA_2$). Consequently, person 1 will buy units of good x from person 2 and both parties will continue this process until $MWTP_1$ equals $MWTA_2$. They will agree on a final allocation, like point C on the contract curve, where $MWTP_1$ equals $MWTA_2$ (i.e., $IC_1{'}$ and $IC_2{'}$ are tangent). The *contract curve is the set of all the points at which the two parties' indifference curves reach tangency*; all contracts on the contract curve are Pareto efficient. Therefore, according to this model, in the absence of transaction costs, only bundles of goods that lie on the contract curve will not be exchanged in a trade for another bundle; every bundle not located on the contract curve will accompany subsequent trade. In Region B, the situation is exactly the reverse of that in Region A.

Looking at this in another way, in Figure 2, $MWTA_1 = MWTP_1$ and $MWTA_2 = MWTP_2$ at every endowment point. Table 1 shows the possibilities or regions in the absence of the endowment effect.

[PLACE TABLE 1 HERE]

In addition, in the absence of the endowment effect, the final allocation does not depend on the initial division of goods. If the initial division of goods is point A, then it is probable that the final allocation, point C, would be the same as if the initial division of goods was point B. This result is probable but not absolute; the outcome could depend on the initial allocation of property rights. To date, no conclusive research exists on a method to determine the final allocation with the knowledge of the initial division of goods. Research in this area would expand our understanding of exchange theory. The possibility that the final allocation could depend on the initial division of goods does not contradict the Coase Theorem because Coase did not assert invariance of the final allocation regardless of the initial allocation of property rights.

In the Presence of the Endowment Effect

In applying the new relevant combination curves (RCC) to the Edgeworth box, the manifestation of the endowment effect becomes apparent. According to the relationship of person 1's MWTA to person 2's MWTP and vice versa, the RCC defines three regions and a *dual-contract curve* rather than the traditional two regions and contract curve.

[PLACE FIGURE 3 HERE]

Figure 3 shows that at point A, which corresponds to point A in Figure 2,

(3) $MWTA_2 < MWTP_1$.

In the area above the dual-contract curve (Region A), person 1 will purchase additional units of good x from person 2 as is the case in Figure 2. For endowment point B, all the

characteristics of the curves and the direction of trade are reversed. Trade will occur as person 1 sells some or all of good x to person 2 because

(4) $MWTA_1 < MWTP_2$

in Region B.

<center>[PLACE FIGURE 4 HERE]</center>

Figure 4 shows that at point U, a point on the upper bound of the dual-contract curve,

(5) $MWTA_2 = MWTP_1$.

Trade will not occur at an endowment on the upper bound of the dual-contract curve because the WTA area of RCC_2 is tangent to the WTP area of RCC_1 and the WTA area of RCC_1 and the WTP area of RCC_2 are not tangent but do converge at a single point. For endowment point L, all the characteristics of the curves are reversed. On the lower bound of the dual-contract curve,

(6) $MWTA_1 = MWTP_2$.

Trade will not occur because the WTA area of RCC_1 is tangent to the WTP area of RCC_2 and the WTA area of RCC_2 and the WTP area of RCC_1 are not tangent but do converge at a single point. The upper and lower bounds of this no-trade zone define the dual-contract curve.

The area inside the no-trade zone (Region I) has different characteristics from that inside Regions A and B.

<center>[PLACE FIGURE 5 HERE]</center>

Figure 5 shows that at point I, in Region I,

(7) $MWTA_2 > MWTP_1$ and

(8) $MWTA_1 > MWTP_2$.

Trade does not occur in Region I because neither person is willing to pay more than the

other person is willing to accept to gain another unit of good x. The kinked indifference

curves of person 1 and 2 intersect at a single point and allow no room for trade. The

WTA part of RCC_2 and the WTP part of RCC_1 are not tangent but do converge at one

point; the WTA part of RCC_1 and the WTP part of RCC_2 are not tangent but do converge

at a single point.

        Looking at this in another way, in Figures 3, 4 and 5, $MWTA_1 > MWTP_1$ and

$MWTA_2 > MWTP_2$ at every endowment point. Table 2 shows the possibilities or regions

in the presence of the endowment effect.

                    [PLACE TABLE 2 HERE]

        Note that even if only one party exhibits the endowment effect, the previous

results will still hold in the face of minor alterations to the marginal conditions because

either $MWTA_1$ and $MWTP_1$ or $MWTA_2$ and $MWTP_2$ will be equal.

        The dual-contract curve and the area inside of it comprise an expanded region of

no trade when compared to the exchange model in the absence of the endowment effect.

In the absence of the endowment effect, Region I does not exist and the upper and lower

bounds of the no-trade zone coincide to form a single contract curve. Consequently, the

presence of the endowment effect decreases trade. However, any allocation on or inside

the no-trade zone is a Pareto efficient Walrasian equilibrium. Consequently, the decrease

in trade does not correspond to a decrease in efficiency.

In the presence of the endowment effect, the final allocation apparently depends on the point of the initial division of goods. If the initial division of goods is above the dual-contract curve, then the final allocation on the upper bound or inside the dual-contract curve should be different than if the initial division of goods were below the dual-contract curve. This result is not absolute, however. The possibility that initial allocations above and below the dual-contract curve could result in the same final allocation somewhere inside the no-trade zone can not be ruled out since a reliable model to determine the final allocation given the initial endowment does not exist.

The Model and the Coase Theorem

When applied to Coase, the endowment effect does not contradict his theorem, which states that when there are no transaction costs, efficiency occurs no matter who is endowed with the good. Although the final allocation depends on which party holds the property right in the presence of the endowment effect, any allocation of property rights will result in a Pareto efficient outcome on or inside the dual-contract curve. This outcome corresponds to the model in the absence of the endowment effect because the final allocation on the dual-contract curve is efficient no matter who is endowed with the property right. In both the model with the endowment effect and without, efficiency occurs, no matter who is endowed with the property right.

The Model and the Evidence

The new model's prediction of decreased trade in the presence of the endowment effect is supported by Kahneman, et al., (2000). In their first experiment, students at Cornell University were given tokens and told the amounts at which they valued them.

Assigning values for the students provided a control for the demand and supply curves. When the market opened for trade, these induced value markets performed exactly as applied microeconomic theory predicted; The optimal level of trade occurred and each token worked its way to the highest-valued user. The control markets correspond to the exchange model in the absence of the endowment effect. In the second experiment, half of the students were given coffee mugs and told the bookstore list price. All participants completed a questionnaire designed to elicit the demand and supply curves of the buyers and sellers respectively. Surprisingly, trade volume fell far below that predicted; Sellers demanded roughly double the price that buyers were willing to pay. The experimental markets correspond to the new model in the presence of the endowment effect.

The Model and Transaction Costs

Both the traditional model and the model in the presence of the endowment effect assumed no transaction costs. The assumption of transaction costs would introduce to the traditional model a no-trade band surrounding the contract curve, as Figure 6 illustrates.

[PLACE FIGURE 6 HERE]

This band appears because the gains from trade in this region are less than the transaction costs. In the exchange model with transaction costs, all points not on the contract curve are inefficient. The presence of transaction costs simply means that the final allocation is more likely to be inefficient than in the absence of transaction costs. The new model also assumes no transaction costs which would introduce two no-trade bands to the new model — one above and one below the upper and lower bounds of the dual-contract curve respectively, as Figure 7 illustrates.

[PLACE FIGURE 7 HERE]

In this case, all points not on the bounds or inside of the dual-contract curve are inefficient. In this model, the presence of transaction costs simply means that the final allocation is more likely to be inefficient than in the absence of transaction costs. However, the final allocation is more likely to be efficient in the new model than in the traditional model when transaction costs are present in both because the new model has a larger number of efficient points of allocation than the traditional model (i.e., the no-trade region is larger).

CONCLUSIONS

The new model exhibits a much larger region of no trade than the model without the endowment effect. By applying the relevant combination curve to the two-party exchange model, the new model explains the results obtained by Kahneman, et al., (2000). In the presence of the endowment effect, the dual-contract curve encloses a larger no-trade region than the single contract curve in the absence of the endowment effect. Therefore, less trade occurs. In addition, the new model explicitly shows that every point inside the region of no trade bounded by the dual-contract curve is Pareto efficient. The lack of trade observed in the endowment effect literature only seems inefficient when compared to a Coase situation because a larger volume of trade would be expected. However, the new model puts the efficiency implications of the endowment effect to rest because it shows that final allocations satisfy the criterion of Pareto efficiency in the presence of the endowment effect. The lack of trade does not

demonstrate negative effects on efficiency. In fact, the lack of trade does not matter because the final allocation is still Pareto efficient. Therefore, the Coase Theorem holds even in the presence of the endowment effect, which simply increases the probability of variance in the outcome depending on which party is assigned the property right. This conclusion has not been discussed explicitly in the literature to date.

Table 1 Regions of the Traditional Model

Region	Marginal condition	Direction of trade
A	$MWTP_1 > MWTA_2$	1 buys from 2
Contract Curve	$MWTA_1 = MWTP_1 = MWTA_2 = MWTP_2$	No trade
B	$MWTA_1 < MWTP_2$	2 buys from 1

Table 2 Regions of the New Model

Region	Marginal Condition	Direction of trade
A	$MWTA_1 > MWTP_1 > MWTA_2 > MWTP_2$	1 buys from 2
Upper Bound	$MWTA_1 > MWTP_1 = MWTA_2 > MWTP_2$	No trade
I	$MWTA_1 > MWTP_2$ and $MWTA_2 > MWTP_1$	No trade
Lower Bound	$MWTA_2 > MWTP_2 = MWTA_1 > MWTP_1$	No trade
B	$MWTA_2 > MWTP_2 > MWTA_1 > MWTP_1$	2 buys from 1
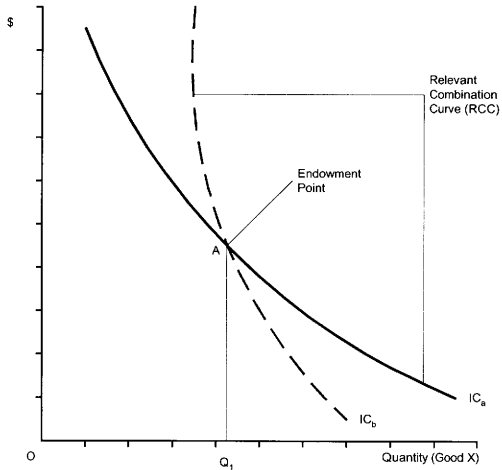
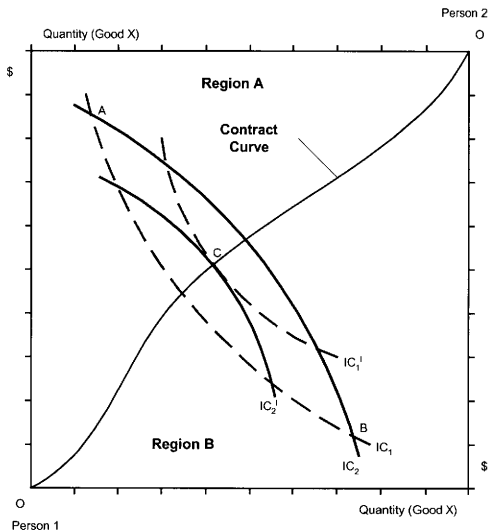Figure 1 The Relevant Combination Curve

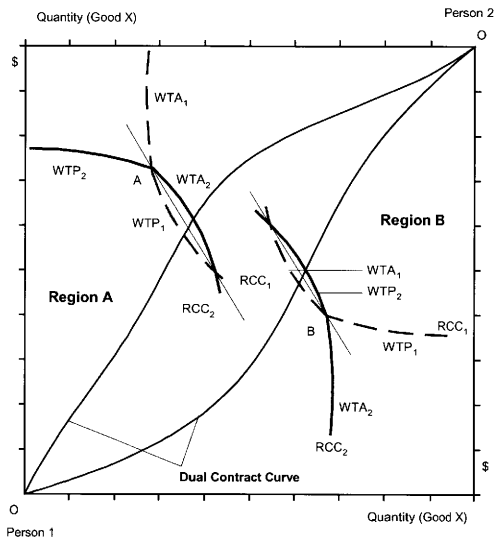<u>Figure 2</u> Edgeworth Box in the Absence of the Endowment Effect

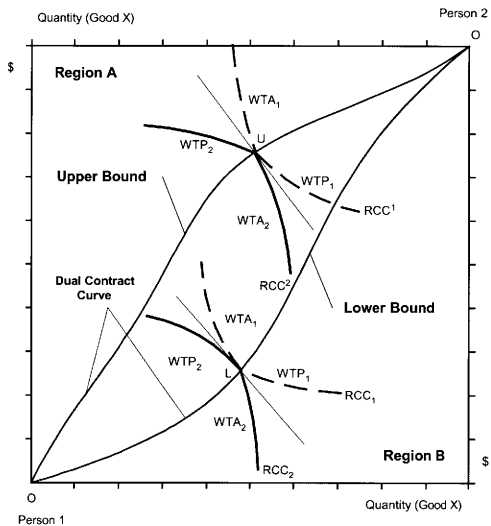Figure 3 Above and Below the Dual-Contract Curve

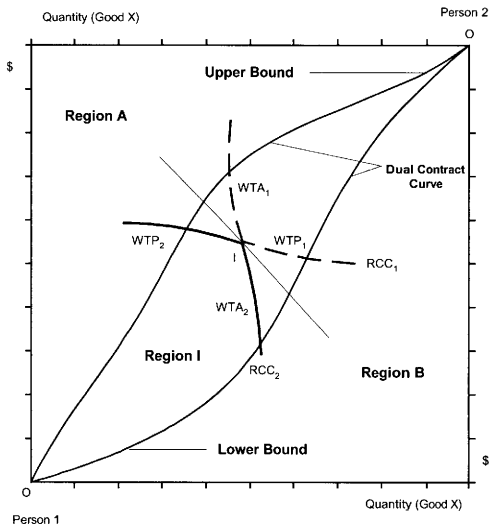Figure 4 The Bounds of the Dual-Contract Curve
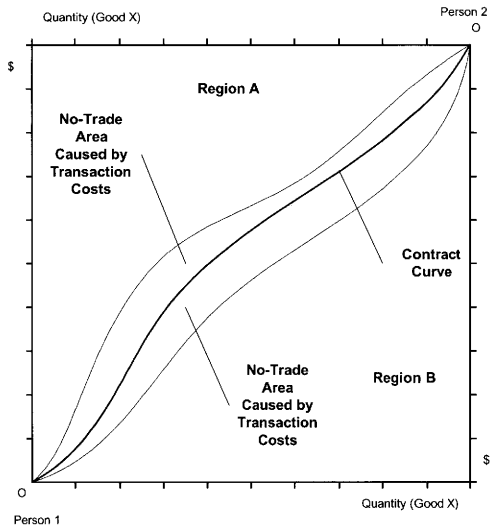
Figure 5 Inside the Dual-Contract Curve

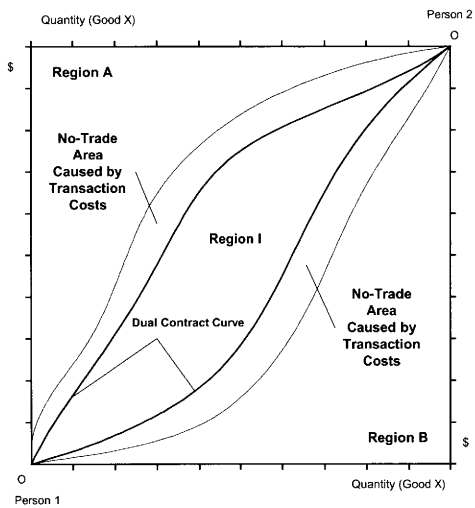Figure 6 Transaction Costs and the Traditional Model

Figure 7 Transaction Costs and the New Model

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