



Provided by the author(s) and University of Galway in accordance with publisher policies. Please cite the published version when available.

Title	Conservation Research and Policy with Non-Trivial Transaction Costs and Incomplete Contracting
Author(s)	Steele, Scott R.
Publication Date	2008
Publication Information	Steele S. R. (2008) "Conservation Research and Policy with Non-Trivial Transaction Costs and Incomplete Contracting" (Working Paper No. 0135) Department of Economics, National University of Ireland, Galway.
Publisher	National University of Ireland, Galway
Item record	<a href="http://hdl.handle.net/10379/327">http://hdl.handle.net/10379/327</a>

Downloaded 2024-04-17T22:52:57Z

Some rights reserved. For more information, please see the item record link above.



*Conservation Research and Policy with Non-Trivial Transaction Costs  
and Incomplete Contracting<sup>1</sup>*

Scott R. Steele<sup>2</sup>

**Working Paper No. 0135**

**December 2008**

Department of Economics  
National University of Ireland, Galway

<http://www.economics.nuigalway.ie>

---

<sup>1</sup> For comments on previous versions I am grateful to Daniel W. Bromley, Gerry Boyle, and members of the Department of Economics at NUI, Galway.

<sup>2</sup>Scott R. Steele, Department of Economics and Business, Berea College, Berea KY 40404; Email: [scott\\_steele@berea.edu](mailto:scott_steele@berea.edu); Phone: +01 859-985-3652

## **Abstract**

Achieving conservation in the agricultural sector is difficult. The primary complicating factor is the large number of public-good environmental services that can potentially be provided by large numbers of individuals working the land under diverse economic and ecological circumstances. The complexity of the problem implies that additional consideration be given to transaction cost economics and the theory of incomplete contracting. The implications of incomplete contracting and transaction costs theory on the development, implementation, and evaluation of conservation policies are considered. Organizational analysis of the agricultural conservation problem yields three propositions and suggests unique research priorities.

**JEL Classification:** Q15, Q18

**Keywords:** Conservation, agriculture, transaction costs

*A message sent back home, describing the scene, would speak of “large green areas interconnected by red lines.” It would not likely speak of “a network of red lines connecting green spots.”*

--Herbert A. Simon (1991, p. 27)

## **Section 1. Introduction**

The theories of “incomplete contracting” and transaction cost economics have been in regular use in the field of economics and law for the last fifteen to twenty years (Williamson 2002). In agricultural research and policy, applications have been sporadic but are growing (MacDonald, Ahearn and Banker 2004). However, with respect to conservation in the agricultural sector, the implications of incomplete contracting and transaction costs on policy outcomes are rarely considered. In this paper I argue that consideration of incomplete contracting and transaction cost theory yield propositions to help guide the development and design of conservation policy in the agricultural sector. Although speculative in nature, these findings suggest that research on conservation policy be expanded to include consideration of incomplete contracting and transaction costs.

Four sections follow these introductory remarks. Section 2 is used to introduce organizational theory and its relation to the conservation problem in agriculture. Section 3 highlights three interlinked but separate propositions that surface when organizational economics is used as a theoretical foundation to investigate the conservation problem in agriculture. Section 4 pushes the analysis further by describing two promising policy approaches arising, in part, as a response to the organizational issues raised in this paper. The final section offers summary comments and highlights research priorities.

## **Section 2. The Conservation Problem as an Organizational Problem**

The opening quote of this paper is drawn from Herbert A. Simon’s seminal article *Organizations and Markets*. In this article Simon imagines the message a Martian would likely send home after viewing the earth through a telescope designed for viewing social structures (1991). Through the telescope firms reveal themselves as solid green areas and market transactions as red

lines. Simon's thought experiment highlights the significance of hierarchies (firms) as an important—perhaps the primary—organizational mode of exchange in human societies. With this hypothetical anecdote Simon emphasizes the primary distinction—between markets and firms—holding the organizational approach together. From an organizational perspective, two ideal-type modes of exchange are generally posited: (1) market exchange and (2) hierarchical exchange<sup>3</sup>.

Market exchange takes place through markets where prices prevail. Through the market, for example, I can pay (a market price) to have a law brief written. To achieve this I will need to find a provider, negotiate the terms of exchange, and likely formalize the exchange with a contract. Although the transaction may proceed without incidence, on occasion I will need a third party to enforce the market agreement. The organizational approach recognizes a law brief as a “complex good” for which it is impossible to write a complete contract regarding the precise nature of the document or the alternative terms of exchange that will prevail in every conceivable state of the world. Williamson states the point as follows: “*All complex contracts are unavoidably incomplete*. For this reason parties will be confronted with the need to adapt to unanticipated disturbances that arise by reason of gaps, errors and omissions in the original contract” (2002; emphasis in original). Market exchange is an ideal-type mode of exchange often used to exchange goods and services when the “costs” (implications) of incomplete contracting are manageable and when transaction costs are not too excessive.

On the other hand, if I have employed a lawyer I can have the same law brief written by drawing on hierarchical relations—I will ask my employee to write the law brief. In the latter case the lawyer and I will not write a *specific* contract for procurement of the document in question—a general employment contract will dictate the nature of our exchange and presumably the employment contract will allow me to request such a document. Moreover, if there are many documents to be produced, the hierarchical mode of exchange is likely to dominate the market mode

---

<sup>3</sup> For a critical discussion and of this taxonomy see Kyle Bruce and Judith Jordan, "Between Markets and Hierarchies: Towards a Better Taxonomy of Hybrid Organizational Forms?," Technology Analysis and Strategic Management 19.1 (2007).

of exchange. In such cases, the hierarchical mode will be a cost minimizing approach for achieving the required set of exchanges. Although transaction costs are not driven to zero in the hierarchical case, this simple example highlights Coase's insight that in some instances hierarchical modes of exchange economizes on transaction costs. According to Coase: "The main reason it is profitable to establish a firm would seem to be that there is a cost of using the price mechanism" (1937). In a hierarchical mode of exchange a series of "transaction costs" are avoided; consequently, the creation of a firm and associated employment contract *may* yield a superior outcome. It is this fundamental insight, as it relates to conservation, which forms the departure point for this paper.

Conservation of soil productivity, water quality, unique habitats, wetlands, biological diversity and important cultural heritage in the agricultural sector is of growing importance. Throughout the agricultural world, environmental services are provided by millions of individual landowners and farm managers. The level of such environmental services is determined not only by choices made in regard to animals raised and crops grown. The extent of ecological services is determined by a multitude of actions which are fundamentally difficult to observe by regulators interested in achieving conservation ends. In particular, for example, the environmental impact of pesticides and fertilizers is closely associated with difficult to observe field-level conditions and to the skill and efforts of farm operators (also difficult to observe) in reducing the negative impacts associated with the use of such inputs.

At heart, therefore, the conservation problem in agriculture is difficult because it revolves around the provision of many environmental public-goods and involves many providers with differing motives in a variety of economic and ecological circumstances. Further, the problem is challenging because the quality and quantity of conservation is dependent upon a variety of difficult to observe behaviors and conditions. To simplify the discussion that follows, I denote actors in the conservation problem as *conservation agents* and *landowners*. A *conservation agent* is "any entity that wishes to encourage *landowners* to supply environmental services" and a *landowner* is "any

entity that is in the position (de jure or de facto) to supply environmental services” (Ferraro 2008). In most circumstances, for this work, the conservation agent is the state acting on behalf of ordinary citizens. Landowners, on the other hand, are farmers, farm employees, farm managers and the like who make decisions affecting the quality and quantity of environmental services supplied.

Using this terminology let us consider how the conservation problem in agriculture is similar to the example above where the goal was to find the best mode of exchange for producing a law brief. Two primary similarities warrant discussion. First, conservation services and legal briefs are complex multifaceted goods that can vary tremendously in quality. Second, in both circumstances a principal (either a conservation agent or enterprise owner) will be attempting to engage an agent (either a landowner or lawyer) to provide a good. In both cases it is theoretically possible to begin writing a contract that: (1) describes precisely the features of the legal brief and environmental service to be provided; (2) details a series of contingencies that could affect the relationship; and (3) specifies payment for service and alternative obligations under every potential state of the world. In short time, however, the actors in the exchange will recognize the expense and difficulty of writing such a contract *and* recognize the *unavoidable incompleteness* of any such contract (Williamson 2002). Even ignoring the public-good nature of the conservation problem, therefore, the conservation problem can be seen in organizational terms where the aim is to determine the best mode of exchange for achieving the objectives in question.

### **Section 3. Conservation Policy, Incomplete Contracts, and Transaction Costs**

In this section I discuss three interrelated propositions that are likely to receive additional consideration in the future as demand for conservation grows and as the complexity of the conservation problem in agriculture is better understood. These propositions surface when the conservation problem is viewed from an organizational perspective where incomplete contracts are understood as pervasive and transaction costs are seen to be real. The three propositions are as follows:

*Proposition #1: “Holdup problems” can prevent desirable conservation investments.*

*Proposition #2: Transaction costs affect the mode of exchange for conservation services.*

*Proposition #3: Social capital in the form of trust (or lack thereof) affects the mode of exchange for conservation services.*

*Proposition #1: “Holdup problems” can prevent desirable conservation investments*

The finding that administrative or hierarchical management is sometimes superior to market exchange is perhaps the most prominent finding of transaction cost economics (Coase 1937; Williamson 2002). This fundamental insight is the foundation of transaction costs economics.

Efforts to formalize this insight have yielded a series of alternative research streams. One of the most influential such streams is the “property rights approach” of Grossman, Hart and Moore (Hart, Moore and Baird 2007; Hart 1995; Hart and Moore 1990; Grossman, Hart and Casson 1996). The property rights approach is based on the idea that incomplete contracts facilitate a type of opportunism that may be *too costly* to remain unresolved. In a mitigation effort, according to the property rights approach, we witness the development of organizations, such as firms or governments, to curb ex-post opportunism (Jacoby and Mansuri 2008; Williamson 1975). The opportunism at issue in the property rights approach is thought to arise as a result of relationship-specific investments. Relationship-specific investments are investments made by “economic agents<sup>4</sup>” that depend upon the continuation of a specific relationship. As such, incomplete contracting and relationship-specific investments generate *appropriable* quasi-rents (Klein, Crawford and Alchian 1978; Williamson 1975; Milgrom and Roberts 1992). Once relationship-specific investments have been made, the party having made such investments is susceptible to “holdup” by the opportunistic agent on the other end of the exchange relationship.

A brief example helps illustrate the point. Assume Firm A is providing inputs for Firm B. Firm A and Firm B recognize an opportunity to reduce Firm A’s costs if Firm B moves its factory

---

<sup>4</sup> In this paper “economic agents” may denote any entity (firm, individual or government) that can take purposeful economic action.



close to Firm A or alters its production in a way to allow Firm A to use Firm B's inputs more effectively. In principle, assume that such a relationship-specific investment is *economical* in that both firms could be made better off if the investment were to occur. However, fear of *ex post* opportunism (holdup) by Firm A may prevent Firm B from making the investment. If relationship-specific investments are under consideration and contracts are incomplete, Firm B will be concerned that Firm A may attempt to renegotiate the exchange relationship in an effort to extract the quasi-rents created as a result of Firm B's relationship-specific investment (an investment that is valuable if the relationship with Firm A continues but not valuable—or at least not as valuable—in an alternative exchange relationship). If, in a particular exchange relationship, certain relationship-specific investments are potentially economic and fear of holdup prevails, the property-rights approach suggests that some type of vertical integration is likely.

Relying on this framework, the property rights approach argues that relationship-specific investment affects the nature of economic organizations. Klien et al., for example, state the point as follows:

...as assets become more specific and more appropriable quasi-rents are created (and therefore the possible gains from opportunistic behavior increases), the costs of contracting will generally increase more than the costs of vertical integration. Hence, *ceteris paribus*, we are more likely to observe vertical integration (1978).

Williamson, on the other hand, uses the term *discriminating alignment* in arguing that there is a place for each mode of exchange but that each is appropriate in differing circumstances (2005). In brief, according to the property rights approach, firms arise as an institutional response to mitigate holdup problems. Without integration to mitigate the problem, sub-optimal levels of relationship-specific investment will prevail.

In the agriculture literature, this insight has recently been employed by Gow and Swinnen to explain the under-performance of agriculture in the transitional economies of Eastern and Central

Europe (1998). In this case, Gow and Swinnen argue that “the break-up of the pre-reform vertically integrated, centrally planned, contracting system with the agri-food supply chain” is causing difficulties because substantive holdup problems, previously resolved through hierarchical modes of exchange, have emerged (Gow and Swinnen 1998). More recently, Jacoby and Mansuri apply the property rights approach to analyze the affects of incomplete contracts on the investment decisions of tenant farmers in Pakistan (2008).

In the next few paragraphs I defend *Proposition # 1*—that holdup problems can prevent desirable conservation investments—by explaining the problems surrounding the provisioning of relationship specific investment. The problem in the area of conservation is, as elsewhere—“when contracts are incomplete, specific investments may be undersupplied due to the threat of opportunistic expropriation by one of the trading partners” (Jacoby and Mansuri 2008). While not always the case, many conservation-compatible farming practices are likely to rely on relationship-specific investments.

Lambert and Sullivan describe the conservation problem in agriculture succinctly:

Operators of all types and sizes of farms have adopted conservation-compatible farming practices and installed conservation structures. Many farmers do so for sound business reasons—to protect the productive capacity of their farmland, to reduce seed, fertilizer, and other input costs, or to save time and labor. However, the costs of conservation practices that primarily create off-site benefits to society—in the form of cleaner air, improved water quality, and a healthier ecosystem—often pose significant barriers to their adoption by farm operators (Lambert and Sullivan 2006).

Although in some cases the direct costs of adopting conservation-compatible practices can be small, adoption will remain elusive if the practice involves additional risk, indirect costs, or substantial initial investment. Some conservation-compatible practices can increase variability in returns. In such cases, risk premiums may be necessary to achieve adoption

(Kurkalova, Kling and Zhao 2006). Moreover, substantial opportunity costs can affect adoption decisions. Adopting conservation-compatible practices can involve significant opportunity costs if such practices require additional time and effort or if *learning* such practices is difficult and/or time consuming. Finally—and directly related to the holdup problem described above—conservation practices may require substantial initial investments. For example, particular farm implements, drip irrigation, grass rivers, terraces, tree plantings, and certain “management-intensive conservation practices” require significant initial investments in time, money, and effort (Lambert 2006). Many of these investments may be relationship-specific and at risk of holdup.

In the following I consider two *candidate investments* that may be (1) economic, (2) relationship-specific, and (3) susceptible to holdup-type problems. If conservation practices rely on relationship-specific investment, holdup problems are likely to impinge on conservation efforts in the agricultural sector. First, however, I will clarify what I mean by relationship-specific in this unique case. Organizational analysis of the conservation problem in agriculture shows that the state is a primary player in determining the *economic viability* of many agricultural enterprises. As Zilberman argues, in spite of the popular view that agriculture is a classic case of free enterprise, “the evolution of agriculture has been strongly influenced by government policy” (1999). Without the comprehensive intervention of government policy, the basic organization of agriculture—crops grown, animals raised, inputs used, levels of intensification, and operation size—would likely be very different from what we now observe. Although analysis of this counterfactual is beyond the scope of this paper, it is not difficult to imagine that the irrigation systems and harvesting combines used in the corn-belt today have an economic value largely dependent on the ongoing relationship between the state and agricultural firms. If the state unilaterally—and dramatically—altered the terms of the relationship by, for example, eliminating price supports, much of the

capitalized value in farm implements would dissipate. As such, from an organizational perspective, a great deal of the value of farm implements can be considered relationship-specific in that such investments are, in principle, susceptible to ex post opportunism or holdup<sup>5</sup>.

The provision of conservation services can be greatly assisted with capital goods tailored to improve conservation outcomes. Conservation-compatible farm implements are, therefore, one candidate relationship specific investment. Some such investments are likely to be ecologically important and relationship-specific in the sense that the investments would not be forthcoming—because of holdup fear—unless the landowner can be assured of a long-term commitment by the conservation agent. Drip irrigation, for example, and technology to perform site-specific precision farming are costly and although there are *some* private incentives to adopt, adoption rates are likely to be suboptimal as the off-site benefits of adoption may not influence the landowner's decision calculus (Isik 2004).

A second candidate relationship-specific investment is related to site location and human capital. It may be desirable, for example, that certain agricultural activities take place in certain areas to preserve rural landscape and cultural heritage or to achieve certain ecological goals. To preserve the multifunctional attributes of agriculture (Batie 2003), for example, conservation agents may seek individuals to farm certain areas committing themselves, and their families, to an agrarian lifestyle. Further, this may be an investment that some economic agents would be willing to make if they could be assured that the conservation agent would continue to support rural agriculture.

A brief example may clarify the idea. The European Union, in particular, often aims to have some of its marginal land farmed using traditional farming techniques. The goal in such a case is to prevent the land from becoming wilderness. From a European perspective,

---

<sup>5</sup> It is reasonable to ask why the landowners would risk holdup in this situation and I attempt to offer an explanation in an alternative paper (xxxx 2008)

traditionally farmed landscapes provide important public-good aesthetic benefits, maintain cultural heritage, and support public-good rural development objectives (Baylis et al. 2008). The organizational puzzle in this case is to determine the best way to achieve the desired result.

Begin with the assumption that certain individual may be willing invest in a rural lifestyle by developing appropriate skills and learning to appreciate open spaces in exchange for relatively small amounts of state support. However, without state support such individuals are assumed to be unwilling to make such investments. Without public policy, therefore, the theory of public-goods predicts that the level of traditional farming on marginal lands will be suboptimal.

The foregoing examples describe situations where conservation outcomes are based on the levels and types of investments economic agents are willing to make. As a result of the public-good nature of conservation-compatible farming, landowners cannot be expected to make socially optimal investments. The policy response in such cases has generally focused on “creating markets” and contracts with green payments and cost-sharing subsidies to encourage landowners to make the desired levels and types of investments in conservation-compatible farming.

Although such programs have been somewhat successful, my aim here is to suggest that incomplete contracting and transaction costs may impinge on the overall long-term success of such policies. To illustrate, consider the goal of maintaining traditional farm practices on marginal lands. One direct way to achieve the goal is for the state to offer 30, 40, or 50-year contracts detailing the obligations of each party under various contingencies. But, and this is the point, this contract will be costly to write and remain incomplete.

The last 25 years of agri-environmental policy illustrate the difficulty of this approach. When a conservation agent attempts to construct a long-term contract it encounters difficulty

in that it cannot be assured of the nature of the ecological services that will be in high demand in the future or how ecological science will develop and influence public priorities. In such cases, it can be argued that *general principles*, as opposed to *specific rules*, may be a more appropriate means for achieving long-term objectives. Organizational economics provides the framework for analyzing the tradeoffs between over-arching under-specified contracts and rule-based contracts attempting to account for every possible contingency.

As relationship-specific conservation investments are unlikely to reach optimal levels in a world of incomplete contracting, it is important to consider the extent to which landowners and the state can build and maintain an over-arching exchange relationship to buttress relationship-specific investments. Thus the organizational analysis of the conservation problem highlights the need to further analyze the ongoing exchange relationship between the state and landowners. Moreover, the nature of the exchange relationship can affect conservation in unique and surprising ways.

As discussed above, conservation policy is generally based on cost-sharing or green payments where the conservation agent agrees to subsidize the adoption of the technology to compensate the landowner for additional costs and uncertainties about the returns from adoption (Isik 2004). This type of market-based solution calls for conservation agents to purchase environmental services from landowners either directly through green payments or by assisting in initial investments.

However, the policy process, and uncertainty about the process itself, may have an impact on the state's ability to achieve desirable conservation goals. Isik has argued this point and explains:

Uncertainty about whether there will be a public policy, when such a policy will be implemented, or the extent to which it will provide incentives to farmers in the future would impact farmers' investment decisions. While the debate on whether to institute

a subsidy program proceeds in the administration, the Congress, the media and academia, farmers may wait upon the outcome and this waiting implies a delay in the control of non-point pollution (Isik 2004).

In the absence of an over-arching exchange relationship, landowners can be expected “to game” the system taking full advantage of the policy process.

The problem above is akin to the problem that occurs in firms where an employee recognizes a value-enhancing innovation but may be unwilling to proceed in implementation unless he/she is *assured* of a specific and appropriate reward. Depending on the nature of the exchange relationship, the employee may proceed with the innovation immediately based on trust and confidence that the employer will reward thoughtful initiative. On the other hand, the employee/employer relationship may be contractually prescribed in such a way that the employee will not proceed with the innovation unless and until the innovation has been approved and is appropriately incorporated into the prescribed contractual relationship. There are tradeoffs involved in either case and the principle of discriminating alignment will determine the nature of the relationship at a particular time, in a particular industry. To speed up innovation in firms, therefore, it may be advantageous to have an agreement providing *general principles* on the types of decisions employees can make and the types of support and rewards forthcoming from employers. In such a case, the employee will not need to know the precise rewards structure associated with her adoption decision—she can trust, on the basis of an over-arching exchange agreement, that her principle-based efforts will be appropriately rewarded.

The organizational approach suggests that the above “gaming problem” in agriculture might be mitigated somewhat if the state could legitimately commit to supporting agricultural conservation efforts in the context of an underspecified over-arching agreement with landowners. In such a case, when new technologies arise, landowners might not need to wait

for the policy process to terminate with an offer of a new cost-sharing program or green payment. In the context of an over-arching exchange relationship, the landowner may have the incentive to make the investment and learn the new technology with confidence that the state, as conservation agent, will fulfill its end of the underspecified contract related to the provision of environmental goods.

The discussion in this section yields a proposition derived by analyzing the conservation problem in organizational terms and suggests research priorities. Concerns about relationship-specific investment, holdup, and policy uncertainty point to the need for carefully analysis of the alternative modes of exchange defining the relationship between conservation agents and landowners. Further, the analysis suggests that holdup problems associated with incomplete contracts may be a barrier to conservation and, therefore, that additional analysis should aim to (1) qualify and quantify the significance of holdup problems in agricultural and (2) evaluate the potential to mitigate holdup through the use of alternative modes of exchange.

*Proposition #2: Transaction costs affect the mode of exchange for conservation services*

Much of agri-environmental conservation policy is based on the principle that “conservation agents” will generally be willing to purchase some environmental services from “landowners.” This idea is based on the principle that, in the absence of policy, positive externalities—in the form of environmental services—provided by landowners will be *undersupplied* as a result of their public-good nature and the lack of a price mechanism to encourage provision. Standard externality theory, based on the principle of market failure, suggests that landowners can provide environmental services at prices below their value<sup>6</sup>. As a result, even though it may not be possible to objectively determine which behaviors are deserving of compensation and which ought to be mandated by

---

<sup>6</sup> I will not discuss here whether the concept of “market failure” as employed in neoclassical welfare economics is conceptually sound. See, however, Daniel W. Bromley, "Environmental Regulations and the Problem of Sustainability: Moving Beyond 'Market Failure'," *Ecological Economics* 63.4 (2007).



regulation, the state will likely be willing to purchase some environmental services from landowners (Dobbs and Pretty 2004; Bromley 1997). These basic observations are clearly in the purview of standard environmental economics and numerous “solutions” have been proposed (Russell, Powell and van den Bergh 1999).

A large amount of theoretical work illustrates that, in principle, flexible market-based systems can achieve cost-minimizing conservation. Nevertheless,

it important to note that...economic incentives mechanisms cannot be shown superior a priori, either on a first or second best basis, to some other regulatory path.

Superiority is often presumed, but that presumption usually rests on an incomplete accounting of costs and an under-appreciation of the complexity of institutions that are necessary to administer incentive-based systems (Batie and Ervin 1999).

Transaction cost economics points to some potential practical problems with the development of markets—and market-based instruments—for the provision of environmental goods in agriculture. Consider the multitude of actions a landowner can take that will affect the quantity and quality of environmental services associated with his/her land management activities. Not only can the corn-belt farmer effect the rate of soil erosion and loss of soil productivity, he/she can use water wisely (or unwisely), protect (or not) streams and rivers from nitrate runoff, provide habits (or not) for rare or desirable species, and expand (or not) biological diversity. And this list is not comprehensive. Without policy, therefore, it can be argued that corn-belt farmers are producing—and will continue to produce—“socially inefficient” levels of environmental services.

Although the ambitious environmental and resource economist may propose solutions to these public-good problems, the development of markets to appropriately price these environmental goods and services is not free. Transaction cost economics suggests that the costs of developing and running these markets should not be ignored—transaction costs are real costs.

The costs of organizing exchange through markets can be large. In the case of designing markets for conservation we have the typical transaction costs associated with searching, negotiating, monitoring, and enforcement. Further, however, unlike the market for the legal services discussed above, markets for conservation services in agriculture are underdeveloped or non-existent and require the development of legal and institutional structures. Given the large number of goods and services conservation agents would like to purchase from land-owners, the transaction costs associated with conservation markets would seem to be significant.

When transaction costs are recognized as real, markets, hierarchies, and hybrid alternatives are recognized as alternative modes of exchange to be considered on their merits. According to transaction cost theory, long-term underspecified employment contracts are likely to arise when the costs of using the price mechanism become too large as a result of uncertainty and complexity, a small number of traders, and asset specificity (de Bruin and Moore 2005). Although conducting exchange within a firm does not eliminate transaction costs, it may economize on costs and, in some instances, be preferable to conducting the same exchange with the price mechanism. Often referred to as agency costs, there are also additional costs to hiring employees who may shirk in their efforts. As such, the main economic problem in organizational economics consists in determining how best to organize exchange—through markets, through hierarchical organizations, or through some alternative hybrid. As such, the principle of *discriminating alignment* should prevail in efforts to align circumstance and modes of exchange.

To achieve conservation goals in the agricultural sector, therefore, conservation agents must consider the advantages of purchasing a wide variety of ecological service through market-like mechanisms and the advantages of establishing alternative modes of exchange to support conservation. Consideration of these issues leads to the final proposition I highlight here—the role of trust and social capital in reducing transaction costs.

*Proposition #3: Social capital in the form of trust (or lack thereof) affects the mode of exchange for conservation services*

A series of articles (Quddus, Goldsby and Farooque 2000; Wilson 2000; Chloupkova, Svendsen and Svendsen 2003; de Bruin and Moore 2005) have followed Fukuyama's influential *Trust: The Social Virtues and the Creation of Prosperity* (1995) emphasizing the potential relation between transactions costs and trust. The relation is proposed to be simple in that reserves of "trust" can reduce transaction costs in a number of important ways. Summarizing Etzioni's (1988) position, de Bruin and Moore argue

that higher levels of individual and societal moral commitment leads to lower transaction costs because there is less need to purchase hedge protection against a broken promise (contract) or spend money on lawyers to draft or enforce contracts. Higher levels of moral commitment, therefore, lead to increased productivity and economic growth as fewer resources are dedicated to 'policing' economic activity (2005, p. 293).

In the area of conservation these insights highlight the need to study the role of trust between conservation agents (primarily the state) and landowners (primarily farm managers) in determining the potential levels and costs of conservation. As Arrow observed over 35 year ago:

Ethical elements enter in some measure into every contract; without them, no market could function. There is an element of trust in every transaction;...It is not adequate to argue that there are enforcement mechanisms, such as police and the courts; these are themselves bought and sold, and it has to be asked why they will in fact do what they have contracted to do (1973, p. 24).

As such, policy analyses should consider the potential significance of trust (or lack thereof) in facilitating efforts to achieve conservation in the agricultural sector.

In this context it warrants notice that landowners' current provision of environmental services *may* be beyond what is legislatively required. Many landowners may currently believe that they have social obligations, or moral obligations, to pursue certain conservation efforts that are not obviously rational from a short-term individual maximizing perspective. One explanation for such behaviour—if it exists—is based on the idea of trust. Farmers in most of the OECD countries have been involved in a unique long-term relationship with their governments since the advent of extensive agricultural policy in the early 1940s. This relationship may be based to a large degree on trust; landowners trust the state to provide resources and support while the state trusts landowners to pursue actions of central concern to the public at large. For approximately forty years landowners were encouraged, and incentives were provided, to bring about farm intensification and agricultural industrialization. Although some details have changed—the public now wants, in addition to a plentiful supply of safe food, “clean water, clean air, sufficient wildlife, good habitats, scenic landscapes and recreational opportunities” (Lovejoy 1999)—the relationship between the state and landowners remains essentially the same.

The foregoing organizational analysis of the conservation problem in agriculture yields a series of propositions. First, holdup problems may hinder conservation efforts. The adoption of conservation-compatible practices in agriculture is about providing appropriate incentives but it is vital to recognize that adoption decisions take place within a social and political context where the mode of exchange is not pre-determined. Second, the complexity of the conservation problem suggests that research and policy agents need to consider the transaction costs of addressing the multifaceted conservation problem through the creation of markets and compare this to alternative options. Third, the level of trust or mistrust characterizing the relationship between conservation agents and landowners will impact the potential modes of exchange that can be used in efforts to achieve desired conservation

outcomes. Further, if trust is an endogenous variable, it may important to analyze whether specific actions can assist in building the trust required to buttress certain institutional modes of exchange.

#### **Section 4: Organizational Economics, Conservation and Emerging Policy Approaches**

The bulk of work in agri-environmental conservation is focused on the creation of markets for the provision of ecological services with little consideration given to the potential costs (transaction costs included) of developing and maintaining such markets. In addition, (1) the problem of relationship-specific investment in conservation and (2) the importance of trust between conservation agents and landowners are currently inadequately addressed by research and policy agents. The aim of this paper is to suggest that organizational analyses and organizational considerations are underappreciated in the agricultural/conservation literature and need to be further incorporated into research and policy development.

In this section, to further illustrate the value and importance of organizational concerns, I highlight two emerging policy approaches that seem to be based, to some extent, on practical transaction cost concerns and organizational considerations. So, although I am arguing that the organizational approach is generally underappreciated and underutilized, some policy approaches can be seen to be promising as certain features of these policies can be commended from the organizational perspective. The two emerging approaches include: (1) the Ontario Environmental Farm Program [EFP] and (2) auctions for the right to provide environmental services.

The EFP<sup>7</sup> program was established in the early 1990s with the objective of enabling “farm managers to highlight the environmental assets on their farms by delimitating areas of specific environmental value and setting attainable objectives for the improvement of environmental conditions within a reasonable time frame” (Yiridoe 2000, p. 102). Three features of the EFP are of

---

<sup>7</sup> For a detailed history of the programme see Guy M. Robinson, "Canada's Environmental Farm Plans: Transatlantic Perspectives on Agri-Environmental Schemes," *Geographical Journal* 172.3 (2006a), Andrea Knierim, "Farm Management Systems and Voluntary Action: What Can Germany Learn from Canada?," *International Journal of Agricultural Resources, Governance and Ecology* 6.3 (2007).

primary importance. First, the EFP is foundationally “bottom-up” with farming groups playing an important role in setting the agenda for the design of the program and individual farmers conducting farm assessments and developing action plans with the advice of program coordinators or private consultants (Knierim 2007). Participation in the EFP is voluntary and, if followed completely, involves a six-stage sequence as indicated in Table 1 (Robinson 2006b). The “bottom-up” nature of the EFP and the self-evaluation process highlight the importance of trust in this complex exchange relationship. Although self-evaluation may be susceptible to opportunism, it also reduces transactions costs and the regulator’s information burden as individual farmers are best situated, with the assistance of experts, to evaluate environmental performance and environmental risk on their land.

Table 1. Six-stage sequence of the EFP

<i>Stage</i>	<i>Actions</i>
1 Introductory workshop	Site evaluation; assessing potential concerns
2 Complete farm review	Review farm operations; complete relevant worksheets.
3 Second workshop	Consider possible actions; learn how to develop a realistic plan
4 Complete action plan	Identify actions for all ‘Fair’ or ‘Poor’ rated situations; develop timetable for action
5 Peer review	Add suggestions/ask for changes; return plan to farmer; send information anonymously to OFC
6 Implementation of plan	Put plan into action; re-evaluate each year

Source: (Robinson 2006b)

Given the importance of the self-evaluation pillar in the EFP, trust can be seen to be an important component of the policy. Further, however, the development of the program itself—being generally participatory and “bottom-up”—may have allowed for the building of trust and social capital which in turn allows for some reliance on trust as the exchange relationship continues into the future.

Second, although there are extensive administrative and bureaucratic costs to the six-step EFP program, these transactions costs may be smaller than the transaction costs that would be associated with establishing an entire series of markets for the environmental services provided by

farmers under the EFP. The EFP incorporates—in a single contract—many potential conservation goods that would need separate markets if each was “purchased” individually. The EFP program may have developed as an institutional response to potentially excessive transaction costs. The program can be used to achieve a multifaceted conservation goal where a multitude of environmental services are incorporated in a single, over-arching exchange.

A third consideration of the EFP also points to the EFP program as a response to organizational concerns. As the program was essentially developed by landowners and supported through a grant from Agriculture and Agri-Food Canada, the specific actions of the landowners in this context are not legislatively determined and fixed for future years. That is, the program itself is flexible in the sense that Environmental Farm Programs can adjust to changing circumstances as *specific* legislation was not written to dictate that *certain* environmental goods are to be provided in particular ways using particular technologies. Such a program can be viewed as drawing on the organizational considerations from above in that a long-term exchange relationship is established allowing changing circumstances to alter activities, rewards, and obligations within the context of an ongoing exchange relationship. There is a valuable type of flexibility in this mode of exchange that is not generally present in simplified contractual-based market exchange. From an organizational perspective, Canada’s EFP program appears to be an attempt to develop an alternative mode of exchange for environmental services that is neither purely market-based nor hierarchical. Auctions for the provision of environmental services may be seen in similar terms.

The use of auctions as a means for securing environmental goods has been increasing (Ferraro 2008; Latacz-Lohmann and Van der Hamsvoort 1997; Latacz-Lohmann and Van der Hamsvoort 1998; Rousseau and Moons 2008; Schilizzi and Latacz-Lohmann 2007; Timothy N. Cason 2004). Auctions have a series of advantages and can, if designed correctly, achieve desirable outcomes. As Latacz-Lohmann and Van der Hamsvoort indicate, “auctions are the main quasi-market institution used to arrange the provision of public-type goods by private enterprises” (1997;

Rousseau and Moons 2008). Auctions have a fundamental advantage over regulation in that they employ market principles—allowing conservation to be achieved at lower costs—and place a much lower informational burden on regulators. With auctions, regulatory agencies are not required to determine the opportunity costs of providing environmental services because landowners are assumed to consider opportunity costs when making bids. The process is simple in that “bidders offer to change their land use management practices and their bids indicate the minimal amount (subsidy) they require as compensation for this alteration” (Rousseau and Moons 2008, p. 184).

The Conservation Reserve Program [CRP] in the United States was, perhaps, the initial application of this approach for conservation. Under such an approach, conservation agents receive bids (referring to annual rental payments) from landowners willing to remove land from agricultural production for payment as indicated on the bid. One complicating factor of this process is that landowners are actually offering different goods to the conservation agent (even if they offer an equal amount of land) because the land on offer by alternative landowners will, when removed from production, deliver different environmental benefits. To address this issue the CRP program uses an environmental benefit index [EBI] to compare like with like in an effort to minimize the costs for achieving soil conservation goals (Rousseau and Moons 2008).

The CRP program is relatively simple in that the conservation agent has a single objective—removing land from production to maintain soil productivity<sup>8</sup>. Nevertheless, more complex auction scenarios have been developed. The BushTender program in Australia is an example where an auction process is being used to economize on transaction costs in the pursuit of conservation goals. The idea in the BushTender program is that “landholders competitively tender for contracts to improve their native vegetation” (Rousseau and Moons 2008, p. 188). In such a case, although the goal of the conservation agent is singular—to protect native vegetation—the landholders are able to tender bids to meet the goal in numerous ways. Such an opportunity allows for important

---

<sup>8</sup> This is not literally true as the CRP is also designed to reduce output increasing prices of agricultural commodities.



differentiation and flexibility where landowners offer programs of action corresponding to their particular goals and circumstances.

Although not yet fully employed in conservation policy, multiple-item auctions clearly appear feasible; landowners—or groups of landowners—would simply make tenders to conservation agents describing the types of environmental services they propose to provide and how they will provide them. Landowners would then request a “price” for the services on offer. In the end, the bids would be evaluated on the overall quality of the conservation contract on offer.

From a transaction costs perspective the advantages of such conservation auctions are primarily related to the “bundling” of a series of environmental services into one over-arching contract. Experience with such an approach is likely to determine how precise the contract needs to be to achieve the desired outcome and minimize shirking. The theory of incomplete contracts and transaction costs suggest that the optimal specificity of legal rules (or contracts) will depend on a wide number of factors including the reserve of trust that can be drawn upon to supplement the exchange between the conservation agent and landowners.

The organizational perspective suggests that multiple-item auctions for the provisioning of environmental services and Ontario’s Environmental Farm Plan program *may* be valuable approaches for achieving conservation in the agriculture sector. Such approaches recommend themselves as they may economize on transactions costs, retain long-term flexibility, and support investments in conservation-compatible farming. Nevertheless, multiple-item auctions and programs like Ontario’s Environmental Farm Planning program are likely to be under-utilized until a theoretical foundation is available to assist in the evaluation of such policies. While I do not purport to provide a comprehensive theoretical foundation, the discussion in this paper aims to show the potential of organizational economics in providing a theoretical foundation for exploring alternative modes of exchange in the pursuit of conservation goals.

## Section 5: Conclusions

Although the importance of incomplete contracting and transaction costs on exchange is recognized in most areas of economics, the organizational aspect of the conservation problem in agriculture is underappreciated. Conservation in the agricultural sector is a complex problem extending through time and, as a consequence, the impact of incomplete contracting and transaction costs may be particularly insidious. In the end, the organizational perspective I offer in this paper yields important insights and propositions that need to be recognized in the design and implementation of policy. The first important proposition is that holdup problems may limit the quantity and quality of conservation in the agriculture sector because some desirable conservation investments may not be “purchasable” with short-term incomplete contracts. As such, modes of exchange recognizing the potential problems of relationship-specific investments in the face of incomplete contracting need further consideration. Second, as transactions are real, over-arching under-specified contracts delimiting general principles need to be considered as they may, in certain circumstances, be superior to a multitude of detailed contracts for a multitude of environmental services. Third, trust (or a lack thereof) will influence the feasibility of over-arching contracts as a means to achieving conservation-compatible farming and investment. Without trust between conservation agents and landowners, agency costs and shirking in an over-arching contract may be so great as to prohibit desirable trade. In such cases it would be valuable to determine if public policy has a role to play in helping to build trust.

It is in this context that I recommend that current research agendas in agriculture and conservation be expanded to include the organizational perspective. While not comprehensive, the analysis in this paper suggests particular research priorities. First, in an effort to explicate differences in the conservation effort of landowners, empirical evaluation might be used to search for differing levels of trust among conservation agents and landowners. The organizational analyses suggest that greater trust and support from agricultural conservation agents would be correlated with

higher levels of conservation effort and conservation investment. Second, a detailed examination of relationship-specific in the agricultural sector would be valuable in helping to understand the potential affect of “holdup” on public policy and conservation goals. Third, experimental economics may be useful in determining the cost-effectiveness of over-arching under-specified contracts in comparison to relatively complete contracting. If farmers themselves could be included in such experiments we might observe more interesting and reliable results. In the end, this paper aims to encourage more research in these areas with the ultimate aim of improving conservation policy for the agricultural sector.

## References

- Arrow, K.J. *Information and Economic Behavior*, Federation of Swedish Industries, Stockholm, 1973.
- Batie, S.S. "The Multifunctional Attributes of Northeastern Agriculture: A Research Agenda," *Agricultural and Resource Economics Review*, **32**, 1-8, 2003.
- Batie, S.S., and D. Ervin. "Flexible Incentives for Environmental Management in Agriculture: A Typology," in F. Casey, A. Schmitz, S. Swinton and D. Ailberman (eds.), *Flexible Incentives for the Adoption of Environmental Technologies in Agriculture*. Kluwer Academic Publishers, Norwell, Mass., 1999.
- Baylis, K., S. Peplow, G. Rausser, and L. Simon. "Agri-Environmental Policies in the EU and United States: A Comparison," *Ecological Economics*, **65**, 753-64, 2008.
- Bromley, D.W. "Environmental Benefits of Agriculture: Concepts," in, *Environmental Benefits from Agriculture: Issues and Policies (Helsinki Seminar)*. Organization for Economic Cooperation and Development, Paris, Helsinki, 1997.
- . "Environmental Regulations and the Problem of Sustainability: Moving Beyond 'Market Failure'," *Ecological Economics*, **63**, 676-83, 2007.
- Bruce, K., and J. Jordan. "Between Markets and Hierarchies: Towards a Better Taxonomy of Hybrid Organizational Forms?," *Technology Analysis and Strategic Management*, **19**, 7-16, 2007.
- Chloupkova, J., G.L.H. Svendsen, and G.T. Svendsen. "Building and Destroying Social Capital: The Case of Cooperative Movements in Denmark and Poland," *Agriculture and Human Values*, **20**, 241-52, 2003.
- Coase, R.H. "The Nature of the Firm," *Economica*, **4**, 386-405, 1937.
- de Bruin, A., and C. Moore. "Incorporating Ethical and Trust-Based Behaviour into Economics: A Transaction Cost Exploration," *Journal of Interdisciplinary Economics*, **16**, 289-306, 2005.
- Dobbs, T.L., and J.N. Pretty. "Agri-Environmental Stewardship Schemes And "Multifunctionality"," *Review of Agricultural Economics*, **26**, 220-37, 2004.
- Etzioni, A. *The Moral Dimension: Toward a New Economics*, New York: Macmillan, Free Press;, 1988.
- Ferraro, P.J. "Asymmetric Information and Contract Design for Payments for Environmental Services," *Ecological Economics*, **65**, 810-21, 2008.
- Fukuyama, F. *Trust : The Social Virtues and the Creation of Prosperity*, Free Press, New York, 1995.
- Gow, H.R., and J.F.M. Swinnen. "Up- and Downstream Restructuring, Foreign Direct Investment, and Hold-up Problems in Agricultural Transition," *European Review of Agricultural Economics*, **25**, 331-50, 1998.
- Grossman, S.J., O.D. Hart, and M. Casson. "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration," in, *The Theory of the Firm*. Elgar Reference Collection. International Library of Critical Writings in Economics, vol. 72. Cheltenham, U.K. and Lyme, N.H.: Elgar; distributed by American International Distribution Corporation, Williston, Vt., 1996.
- Hart, O. *Firms, Contracts, and Financial Structure*, Clarendon Lectures in Economics. Oxford and New York: Oxford University Press, Clarendon Press, 1995.
- Hart, O., and J. Moore. "Property Rights and the Nature of the Firm," *Journal of Political Economy*, **98**, 1119-58, 1990.
- Hart, O., J. Moore, and D.G. Baird. "Foundations of Incomplete Contracts," in, *Economics of Contract Law*. An Elgar Reference Collection. Economic Approaches to Law series, vol. 5. . Cheltenham, U.K. and Northampton, Mass.: Elgar, 2007.

- Isik, M. "Incentives for Technology Adoption under Environmental Policy Uncertainty: Implications for Green Payment Programs," *Environmental and Resource Economics*, **27**, 247-63, 2004.
- Jacoby, H.G., and G. Mansuri. "Land Tenancy and Non-Contractible Investment in Rural Pakistan," *Review of Economic Studies*, **75**, 763-88, 2008.
- Klein, B., R.G. Crawford, and A.A. Alchian. "Vertical Integration, Appropriable Rents, and the Competitive Contracting Process," *Journal of Law and Economics*, **21**, 297-326, 1978.
- Knierim, A. "Farm Management Systems and Voluntary Action: What Can Germany Learn from Canada?," *International Journal of Agricultural Resources, Governance and Ecology*, **6**, 341-59, 2007.
- Kurkalova, L., C. Kling, and J. Zhao. "Green Subsidies in Agriculture: Estimating the Adoption Costs of Conservation Tillage from Observed Behavior," *Canadian Journal of Agricultural Economics*, **54**, 247-67, 2006.
- Lambert, D. *Conservation-Compatible Practices and Programs : Who Participates?*, United States Dept. of Agriculture, Economic Research Service, [Washington, D.C.], 2006.
- Lambert, D., and P. Sullivan. "Land Retirement and Working-Land Conservation Structures: A Look at Farmers' Choices," *Amber Waves*, **4**, 2006.
- Latacz-Lohmann, U., and C. Van der Hamsvoort. "Auctioning Conservation Contracts: A Theoretical Analysis and an Application," *American Journal of Agricultural Economics*, **79**, 407-18, 1997.
- Latacz-Lohmann, U., and C.P.C.M. Van der Hamsvoort. "Auctions as a Means of Creating a Market for Public Goods from Agriculture," *Journal of Agricultural Economics*, **49**, 334-45, 1998.
- Lovejoy, S.B. "Environmental Conservation Strategies: What Works and What Might Work Better," in F. Casey, A. Schmitz, S. Swinton and D. Ailberman (eds.), *Flexible Incentives for the Adoption of Environmental Technologies in Agriculture*. Kluwer Academic Publishers, Norwell, Mass., 1999.
- MacDonald, J.M., M.C. Ahearn, and D. Banker. "Organizational Economics in Agriculture Policy Analysis," *American Journal of Agricultural Economics*, **86**, 744-49, 2004.
- Milgrom, P., and J. Roberts. *Economics, Organization and Management*, Englewood Cliffs, N.J.: Prentice Hall, 1992.
- Quddus, M., M. Goldsby, and M. Farooque. "Trust: The Social Virtues and the Creation of Prosperity--a Review Article," *Eastern Economic Journal*, **26**, 87-98, 2000.
- Robinson, G.M. "Canada's Environmental Farm Plans: Transatlantic Perspectives on Agri-Environmental Schemes," *Geographical Journal*, **172**, 206-18, 2006a.
- . "Ontario's Environmental Farm Plan: Evaluation and Research Agenda," *Geoforum*, **37**, 859-73, 2006b.
- Rousseau, S., and E. Moons. "The Potential of Auctioning Contracts for Conservation Policy," *European Journal of Forest Research*, **127**, 183-94, 2008.
- Russell, C.S., P.T. Powell, and J.C.J.M. van den Bergh. "Practical Considerations and Comparison of Instruments of Environmental Policy," in, *Handbook of Environmental and Resource Economics*. Cheltenham, U.K. and Northampton, Mass.: Elgar; distributed by American International Distribution Corporation, Williston, Vt., 1999.
- Schilizzi, S., and U. Latacz-Lohmann. "Assessing the Performance of Conservation Auctions: An Experimental Study," **83**, 497-515, 2007.
- Simon, H.A. "Organizations and Markets," *Journal of Economic Perspectives*, **5**, 25-44, 1991.
- Timothy N. Cason, L.G. "Auction Design for Voluntary Conservation Programs," *American Journal of Agricultural Economics*, **86**, 1211-17, 2004.
- Williamson, O.E. *Markets and Hierarchies*, 1975.
- . "The Theory of the Firm as Governance Structure: From Choice to Contract," *Journal of Economic Perspectives*, **16**, 171-95, 2002.

- . "Transaction Cost Economics," in C. Menard and M.M. Shirley (eds.), *Handbook of New Institutional Economics*. Springer, Dordrecht, The Netherlands, 2005.
- Wilson, P.N. "Social Capital, Trust, and the Agribusiness of Economics," *Journal of Agricultural and Resource Economics*, **25**, 1-13, 2000.
- Yiridoe, E. "Risk of Public Disclosure in Environmental Farm Plan Programs: Characteristics and Mitigating Legal and Policy Strategies," *Journal of Agricultural and Environmental Ethics*, **13**, 101-20, 2000.
- Zilberman, D. "Introduction," in F. Casey, A. Schmitz, S. Swinton and D. Ailberman (eds.), *Flexible Incentives for the Adoption of Environmental Technologies in Agriculture*. Norwell, Mass.: Kluwer Academic Publishers, 1999.