

WHEN ARE COMMON PROPERTY INSTITUTIONS EFFICIENT?

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I. Introduction

Common property is commonly viewed as the vestigial remains of a primitive, non-market economy. The regimes themselves are viewed as quaint, inefficient and unimportant to a modern economy. Prescriptive economists, for this reason, consistently urge the replacement of common property regimes with private property arrangements. From an institutionalist's perspective, whether this prescriptive view is correct or not depends upon the relative efficiency of common property regimes - efficiency in terms of the allocation and coordination of resource use. Put differently and in the form of a question, in a heterogeneous environment in which individuals and groups are free to choose among alternative institutions for the conduct of transactions, will common property institutions become extinct? In this paper I'd like to argue that the answer to this question is no and, if one admits that information and knowledge of even the most mundane varieties are valuable economic resources, that common property arrangements are much more common and important than is commonly realized.

The argument begins by examining the conditions that appear to be necessary for the viability, or efficiency, of common property regimes relative to the alternatives of markets and hierarchies. The conclusion of this first part of the paper is that, given the conventional definitions of property and resources, the circumstances appropriate for the viability of common property regimes are likely to be limited in scope and gradually eroded with the development of new technology, better communications and associated markets. The second part of the argument reviews the first, but under the assumption that knowledge and information are valuable resources. The revised conclusion given this new assumption is that the circumstances appropriate for the existence of efficient common property regimes are likely to be much more extensive in both developed and less developed economies than is commonly supposed.

II. A broad classification of transactions costs

A comparative approach to the question of institutional efficiency requires an assessment of the factors determining the transactional costs of common property institutions relative to those of alternative institutional structures or regimes¹ - markets and hierarchies. For the purposes of this paper I define

a market regime as one in which the resource is exploited by (many) independent producers each owning a part of the resource and in which the allocation of productive inputs, the terms and valuation of items of exchange and the distribution of returns is determined (primarily) by prices.

¹ By institutional structure or regime I mean the rules governing a set of transactions (including decision making processes) that determine the allocation and coordination of resources and the distribution of returns. Since "everything hangs together" the boundaries determining an institutional structure are at best fuzzy.

A hierarchical regime as one in which a large producer owns all (or a large part) of the resource and in which the allocation of productive inputs, the terms and valuation of items of exchange and the distribution of returns is determined by an authoritative decision structure.

A common property regime as one in which rights to all (or a large part) of the resource are limited to a well defined group and in which the allocation of productive inputs, the terms and valuation of items of exchange and the distribution of returns is determined by a fairly constant and collectively defined or negotiated set of rules².

[Each of these organizational forms is capable of bringing under its purview (i.e., within the scope of its rule structure) transactions and other activities which, if not subject to governance, would lead to Hardin's 'tragedy of the commons'.³ That is, even rudimentary exchange would quickly degenerate into violence in the absence of rules governing property, theft and reciprocation. The rule structure or organizational form most appropriate (i.e., able to avoid the tragedy outcome at the lowest cost) in different circumstances is the basic question of institutional choice.] The conditions determining the relative cost of transactions under different institutional settings are often complex and always dependent upon the particulars of time and place relevant to each transaction or set of transactions. Generalization,

² A common property regime should not be confused with an open access regime. In the latter, economic activity takes place in the absence of resource rights and rules governing exchange and production. See Ciriacy-Wantrup and Bishop ...

³ Hardin's use of the term commons refers to a situation lacking any rules and does not, for that reason correspond to what is called here a 'common property regime.' Bishop and Ciriacy-Wantrup Q.

consequently, is dangerous but, if approached with tolerance, can provide an initial analytical framework. I've approached the problem by listing the major factors affecting transactions costs and institutional efficiency (Runge and Williamson).

These factors are divided into two major groups:

- (1) Factors intrinsic to the resource production problem around which the transactional set or institution is organized:
 - a. jointness/divisibility,
 - b. excludability,
 - c. enforceability, and
 - d. predictability and control.
- (2) Factors in the broader environment that influence the nature and costs of transactions associated with exploitation of the resource:
 - e. the tradability of the resource product(s) and/or inputs,
 - f. exchange asset specificity in the market for the resource product(s) and/or inputs,
 - g. the characteristics of associated markets, and
 - h. the social-legal environment.

Depending on the particulars of each instance, each of these factors will affect the magnitude and nature of the costs faced in any transaction or set of transactions. Some transactional problems may be difficult to solve and raise large costs under any institutional structure; nevertheless, given the particularistic details of the transactions, one institutional structure will be able to solve the problems at a lower transactional cost than the alternatives and this - the particulars - is what is determinative from the relative efficiency point of view. Put differently, various institutional forms cope with some kinds of transactional problems better than with

others. Consequently, the particular nature of a transactional problem creates a climate that is most favorable to the viability of one and unfavorable to other institutional forms. Since the factors that play an important role in any transaction are rarely singular, it is the net effect of all these factors that determines the institutional choice /viability question, [need a section that addresses mixed institutional structures; e.g. market trading within hierarchical organizational structure such as ITQ's]

In Figure 1 I have set out a schematic that generalizes about the relative importance of these transactional factors in market, hierarchical and common property exchange regimes. In the paragraphs that follow I expand upon the arguments summarized in the figure. I don't attempt to make an exhaustive argument about the many ways these factors might affect institutional choice; the major point of the argument is to indicate that the circumstances in which the relative efficiency or viability of common property regimes might be expected follows a consistent pattern related to conditions in the market and the kind of product traded.

Transactions cost factors intrinsic to the resource

(a) Jointness is defined as the ability to separate the effects of one person's use of the resource from another's. For example, jointness is a property of many fisheries in which one person's catch lowers the probability of another person catching fish. When jointness problems are present to only a small degree, as may be the case for example with dust bowl effects in wet climates, it is possible to safely ignore the jointness problem. In such cases individual costs closely reflect the true costs of production and, as the large literature on externalities argues, markets work well. When jointness is substantial, as in a fishery or an oil pool, individuals have strong incentives to extract resources before others, since their individual costs are below

true or social costs. As a result markets do not perform well socially but institutions such as a sole owner hierarchy or a common property regime that are capable of restraining production over the relevant range (e.g., a stock in the case of fisheries), tend to perform relatively better. In terms of transactions costs, the benefits of social efficiency in the presence of jointness can only be obtained by bearing the on-going costs associated with, principally, the suppression of the incentives to race against other users in the harvest or use of the resource. Viewed affirmatively, when jointness is present the correlation of restraint and self-interest⁴ is only made possible by the maintenance of a costly rule structure.

In terms of the relative efficiency of institutional types, market structures are clearly ill-adapted to deal with jointness problem. Hierarchical and common property regimes, on the other hand, appear well suited to handling problems of jointness provided the scope of the hierarchical or common property rule structure is able to encompass the full extent of the resource. Beyond a certain size one might expect both to encounter rising organizational costs and/or the inability to successfully govern.

There are, of course, many examples of common property and hierarchical regimes which successfully address the jointness problem - private (sole) ownership of a salmon stream or beaver range, for example (Gordon). Quota or share markets, such as ITQ's in fisheries and transferable pollution rights (Tietenberg, for example), and a variety of other attempts to ameliorate the problems of open access resources are attempts to resolve the jointness problem using market or market-like

⁴ The problem of being unable to divide the resource successfully raises exactly the same transactions cost plus the initial and sometimes substantial costs of division.

mechanisms within a basically hierarchical framework⁵. In short, jointness is an aspect of economic activity that can be resolved relatively successfully by common property regimes because of their ability to encompass within their rule and enforcement structure the entire scope of the relevant resource. Hierarchical regimes share this capability, but market regimes are generally ill-equipped to deal well with problems of jointness.

(b) Excludability, or the characteristics of the resource (and the technical/physical environment) that determine the feasibility or cost of excluding competing users. Barbed wire, for example, reduces the costs of excluding non-rights holders from grazing lands. When exclusion costs are low, market regimes tend to be relatively efficient ways to organize the production from a resource. But hierarchical and common property regimes also require the ability to exclude non-rights holders. However, unlike markets, hierarchical and common property regimes are able to extend the scope of their operations and so have open to them a wider range of possible boundaries from which they might choose the one most easily defended.

(c) Enforceability problems extend beyond the problems of maintaining exclusion. There are also the problems of assuring compliance with the rules governing transactions within the governing institution. In any regime that requires individual restraint, successful non-compliance can bring substantial benefits to the individual, the various kinds of opportunism...[the size problem, verification, monitoring]

⁵ Although all these attempts lack the crucial characteristic of self-governance because they require an central authority to set quotas or other quantitative restrictions.

(d) ~~Predictability and control~~, or the ability to understand and manipulate the forces that determine the yield from the resource is a fundamental, and usually ignored, attribute of any governance system. It is almost always assumed that the sole owner of a renewable resource *knows* how to obtain the optimum yield from the resource. Yet it is entirely possible that this knowledge may not be available to the sole owner or whomever is making decisions about resource use. Hall (), for example argues that there is not a single fishery for which published evidence validates (what ~~biologists call the recruitment function and what economists would call) the biological production function.~~ It is also possible that the characteristics of the resource may not generate the predictable behavior necessary for control. Resources that are part of complex ecosystems, for example, may exhibit chaotic behavior that removes the ability to control the changes in their abundance and yield. (Wilson, et al.) And it is also possible that the frequency of intervening events (weather, for example) may reduce the probability of a successful outcome to any single attempt at resource control to the point where the activity is no longer economically viable. For example, rainfall in the Sahel is highly variable in amount and patchily distributed. Attempts to manage a particular (restricted) piece of *grazing* land would likely encounter short, infrequent periods of rainfall that would produce grazing opportunities and long periods of drought with little chance of survival. () Brush () reports a similar case in which climatic variability in the Andes makes any individual plot of land an unreliable source of livelihood⁶.

In many cases, these problems can be overcome by common property institutions which can encompass a range large enough to minimize the production and

⁶also ethiopia

distributional problems caused by unpredictable patchiness (e.g., common property grazing on the Sahel). In some cases, as in the Andes, a land holding system that provides households a number of small plots each at a different altitude accomplishes a significant reduction in environmental uncertainty due to unpredictable patchiness associated with altitude and restores the incentive to cultivate.

Absent the ability to predict or control the outcome from, say, investing in planting, individuals have little incentive to engage in cultivation. Problems of control are often present even when predictability may be present to a limited degree. The problem arises with regard to interventions in complex systems. We may, for example, do fairly well at predicting the weather in the short term and at the same time be unable to exercise any control over the weather. In fisheries, reasonable predictions of the short term changes in the size of already established year classes are possible. However, prediction of the longer term phenomenon of recruitment (the successful occurrence of a new generation or age class) has proven very difficult (Hall eco modeling 88) and, of course, in the absence of predictability, control is not possible (Wilson, et al., 1991). In agriculture, for example, the analogous control problem would arise if a farmer were unsure about, not only how much, but also what kinds of plants might grow as a result of his cultivation efforts. In this kind of world, erstwhile farmers might find gathering the product of wild plants and hunting wild game much more efficient than cultivation.

Clearly situations in which control is not possible strongly influence the conditions under which exploitation of the resource take place. Basically, in these circumstances a great part of the economic advantage that is normally cited for private property - i.e., the ability to manipulate natural processes for economic

advantage - dissolves. The emphasis of the production problem shifts away from the amelioration of jointness problems and towards the need to coordinate search for the unpredictable but valuable results of resource change, to disseminate (or allocate) the results of that search and to provide an on-going incentive for continuing search. Under these circumstances, production is best thought of as the process of generating new (but usually mundane and ephemeral) knowledge. The valuation and trading of this knowledge creates special and costly transactions problems that are particularly favorable to [solution by] common property regimes. Fisheries provide a large number of examples of common property institutions that address the problem of coordinating production under these circumstances. (Wilson, 1990)

Environmental factors affecting transactions costs

The wider economic environment in which the products of the resource are traded can be expected to strongly influence the viability of institutional forms for two reasons: (1) because of its effects upon the costs and nature of transactions external to the regime and (2) because it determines the production opportunities with regard to the resource itself. Among the environmental factors that can be expected to influence institutional choice are:

(e) Resource product tradability, or the transactions costs characteristics of the resource product and its immediate product market. For example, home grown produce tends to be of highly variable quality and perishable. These attributes of the product raise the cost of inspection and prior knowledge (and/or confer a transactional advantage on persons engaged in frequent exchange) for the buyer at both the wholesale and retail level of the market. The relatively high transactions costs (per unit) that result tend to favor relatively small entrepreneurial exchange

and the establishment of client type relationships (McNeil) or may lead to a choice (or development) of a product that reduces those costs. The uniform (if terrible) quality and long shelf life of modern 'cardboard' tomatoes, for example, dramatically reduce unit transactions costs and make it possible for large hierarchical organizations to engage in the trade of these items (at times and over distances not otherwise possible). The exchange of fresh fish, like home grown produce, has problems of variable quality and short shelf life and is serviced by a market with many small buyers and sellers (Wilson, 1980). Frozen fish, on the other hand, has relatively constant (if not high) quality and long shelf life and, consequently, can be traded in large volume with relatively low transactions costs. For this reason frozen fish provides an environment very favorable to and dominated by hierarchical firms. [COMMON PROPERTY PRODUCT?]

But large firms are not always excluded from the exchange of products with high transactions costs. Products with unique characteristics and products that are traded only infrequently are regularly dealt with by large firms, in spite of thin or non-existent markets. For example, the highly specialized and often unique components of a nuclear facility are usually produced and purchased by large hierarchical firms. Such products tend to give rise to high transactions cost because they are not the subject of regular exchange and, consequently, have no market price nor a tangible history upon which to base expectations of performance. As a result their exchange entails considerable uncertainty and the costs of resolving or averting potentially expensive exchange related conflicts. Generally, these problems or costs are minimized by reversion to what McNeil calls relational contracting.

What is interesting about the exchange of products with potentially high transactions costs is not necessarily that firms of all kinds are capable of dealing with

these situations. Rather what is noteworthy is that as transactions costs rise, especially the costs associated with the future performance of the parties or the products, the conditions of exchange increasingly shift away from the classical arms length transaction to one in which the parties establish long term relationships in which allocation and distribution processes are governed by rules and norms similar to those found in common property institutions. These are generally characterized as exchanges governed by private contract but because of the inability to fully specify all the contingencies that might arise over the life of the contract, such exchange relies heavily upon informal rules or conventions to govern a long term bilateral sequence of exchanges.

(e) Exchange asset specificity: Many transactions require investment in assets that are unique to that particular transaction. (Williamson) For example, a new agricultural crop may require investments by farmers in equipment peculiar to that crop. These costs "lock-in" farmers and raise a host of transactional problems most of which have to do with the relationship of buyer and seller over a period of time. For example, A PIECE OF PLANTING EQUIPMENT WHOSE CAPACITY EXCEEDED THE SIZE OF A TYPICAL FARM MIGHT BE EFFICIENTLY UTILIZED UNDER A VARIETY OF EXCHANGE RELATIONSHIPS. ONE FARMER MIGHT OWN AND RENT THE EQUIPMENT, SEVERAL FARMERS MIGHT OPERATE THE EQUIPMENT UNDER SOME SORT OF COMMON OWNERSHIP ARRANGEMENT THAT GOVERNED THE TIMING AND OTHER CONDITIONS OF USE OR THE FARMERS MIGHT SIMPLY MERGE THEIR FARMS TO ACHIEVE A SIZE COMMENSURATE WITH THE CAPACITY OF THE EQUIPMENT, the specificity of the exchange assets might be expected to place either the buyer or seller in an extremely advantageous bargaining position once the assets are acquired. TWO SOLUTIONS - VERTICAL INTEGRATION OR AN EXCHANGE

AGREEMENT (MARKET) Generally, however, the parties to this kind of transaction can anticipate the nature of the problem before entering into the exchange and can negotiate the terms of a workable relationship or avoid an unworkable situation. But this cause of potentially high transactions cost also can not be completely resolved with a fully specified contingent contract and, consequently, there is a tendency, for this reason also, to rely heavily the establishment of a long term business relationship.

(f) Associated markets: When associated markets are well developed and active the opportunity for specialization in production and gains through trading is greatly enhanced. For example, a thoroughly isolated area may be forced to rely upon relatively unspecialized subsistence production. When opened to trade, the advantages of specialization arise and, concurrently, the possibility that one or another institutional regime might be better suited to the organization of specialized production. McKean cites a common property regime in Japan in which the opening up to trade appears to have favored a shift to hierarchical or market regimes because of the advantages those regimes offered in specialization. When such markets do not exist or are highly impaired, transactions costs can be prohibitively high and the relative efficiency of non-specialization in production and/or common property allocation and distribution mechanisms may be dominant.

(g) Social/legal aspects of the environment: If contracts and property rights are easily enforced through commercial law or custom transactions costs are much lower than otherwise and the choice of the preferred mode of transaction is similarly affected. Here also, the importance of the environmental factor relates to the ability to specialize and trade. The greater that ability, the lower the preference

for common property institutions. Situations characterized by no or difficult to enforce formal law, on the other hand, force reliance upon personal long term relational contracting and/or common property regimes.

In summary, when one considers 'tangible' resources, of the sort we commonly think of when discussing common property resources, there is one generality that appears applicable: Common property resources tend to be relatively efficient under conditions of high transactions costs as do hierarchical arrangements. The one common element driving a preference for hierarchical or common property regimes is the presence of significant time dependent uncertainty in the transaction. That uncertainty can only be resolved, or reduced, by the establishment of private or common rules that govern the exchange relationship over time. The point of these rules, in John R. Commons language, is to create "secure expectations" (Commons). Both hierarchies and common property regimes create an atmosphere of secure expectations through their internal organization. But H and CP are not equally viable in all situations as the discussion above indicates. CP appears most favored when predictability and control are low, when there are few or impaired associated markets and when tradability is difficult.

Finally, abiding by the conventional definition of resources as tangible, if one considers improvements in communications, the extension of markets, the refinements of commercial law and any number of other changes associated with social and economic development, the range of circumstances under which common property institutions are likely to be relatively efficient and viable can be expected to erode with time. They might, with this narrow definition of resources, logically be considered vestigial.

HL. If new information/knowledge is considered a valuable resource

Now consider a world in which new information/knowledge of both the high faluting scientific and the everyday corner store mundane varieties (Hayek, 1945; Rosenberg,) is considered a valuable resource, then one's sense of the occurrence and importance of common property institutions is changed dramatically. The economic or commodity characteristics of new information /knowledge have long been recognized as posing special kinds of economic problems.

NIK often has the properties of a quasi-public good (*jointness both positive and negative*)

NIK poses difficult problems of excludability.

NIK is unpredictable (or it wouldn't be NIK) and not subject to control.

NIK is very difficult to value and trade.

NIK often involves exchange specific (knowledge) assets

NIK does have many associated markets (and one would expect specialization to be profitable - hence small common property groups?)

NIK exchange does not benefit from well defined property and contract law.

In short, the economic circumstances of NIK and the environment which is important to NIK all contribute to difficult and high transactions costs. One would not expect markets to function well in these circumstances and, especially because of the excludability and predictability/control aspects of NIK one would not expect hierarchies to be especially well adapted to the allocation and distribution decisions required for the production of NIK. Common property rule structures, on the other hand, would appear to be favorably adapted to NIK production.

In the form of a hypothesis this can be restated as:

Common property regimes (i.e., regimes in which the valuation, allocation and distribution of resources and rewards is based on a fairly constant rule structure, customs or norms) tend to be relatively efficient when the conduct of transactions is difficult and costly. The production and exchange of new information and knowledge is characterized by similar transactional problems. Therefore, one would expect common property-like regimes to be efficient, viable and widespread in economic activities associated with the production of new information and knowledge.

Some examples consistent with this hypothesis:

First, the behavior of academic and scientific groups in general conforms with a common property regime. Take, for example, the group to whom this paper is addressed, researchers concerned with common property institutions. New knowledge about common property resources is the resource around which our institutions and transactions are centered. The peculiar attributes of this resource have led us to favor a particular non-market, non-hierarchical, common property-like method of conducting our transactions. Reviewing the attributes listed in the first section of the paper:

Resource characteristics

There are large problems of jointness. What each of us produces is very dependent on others' production in both a positive and negative way; if some other researcher publishes the same idea before another there is less status, respect (or whatever it is of value that we obtain from this endeavor) for the

other. But it is also true that what each one of us can learn and know is very dependent upon what the collective of researchers generates.

It is difficult to exclude outsiders and, in general, we tend not to do so. There is a strong preference, instead, to be inclusive, to place the boundaries of the transactional set in a location where the cost of defense is minimal. And given the positive side of our jointness problem, there is additional incentive to be inclusive so long as all those included within the boundaries have access to the product of others.

The resource we exploit is (we all hope) unpredictable and difficult to manage or control. If we could plan the outcome of our work and never faced surprises we could not call what we are doing research. It would fall, instead, into the category of production akin to that of a factory - boring but probably lucrative.

Environmental characteristics

We produce a product that is difficult to trade in a market; we all feel there is value in the knowledge we produce but would be at a loss to assign a dollar value or even a way of getting at a dollar value that we could call the price of our product. Nevertheless, we trade our product amongst ourselves, students, clients, employers and probably numerous other individuals and groups. We may not be able to assign a particular increment of our income to a particular piece of research, but we are all fairly certain that our research has generated tangible income and intangible, but valuable opportunity, mobility, security and so on.

Exchange requires a large investment in specific intellectual assets by both 'seller' and 'buyer'; not just any old dodo will be able to understand what I'm writing here and I have spent a great deal of time and energy acquiring language, theory and facts that make it difficult for old dodo's to understand me.

Because of the many associated markets, specialization does pay off; and the establishment of individual property rights and the enforcement of exchange contracts is very difficult.

In short, our corner of the academic/scientific industry is characterized by almost exactly the kinds of transactional problems typical of the conditions when common property resources are found to be efficient. The question is whether we solve our transactional problems with common property-like rule structures.

We do not conduct exchange through markets nor do hierarchies arise for the allocation of productive resources or distribution of rewards. But we do have rather strict rules governing: the conditions of exchange of new knowledge (or perhaps the timing of exchange is more appropriate); exclusion or inclusion of people within the production system; the distribution of rewards, and the allocation of resources for continuing production. A large part of the evidence for this common property structure is found in the sociology of science literature. (Kuhn is perhaps the most well known example.)

Business people engage in all sorts of activities and organizations whose primary purpose is to engage in the production and exchange of new knowledge helpful in

the exploitation of the market. Kiwanis, Rotary, industry associations, and so on. A large part of 'networking' seems to be nothing more than the establishment of common property-like groups for the production and exchange of valuable information and knowledge.

And finally, as cited much earlier when businesses encounter difficult exchange problems, especially those associated with specific assets, they tend to evolve 'relationships' governed by non-market rules for allocation and distribution. These non-market, non-hierarchical regimes for the governance of exchange can be expected to become increasingly more important as economic development, specialization and diversification proceed. (Williamson)

I suspect if I had the time or space, I could fill volumes with the common property-like arrangements that fill the economic space of modern economies. In closing, however, I might make one suggestion and that is (provided one accepts my hypothesis) that the study of these common property-like arrangements in developed economies should be studied not just for what they might illuminate about developed economies, but also because such studies might better help us understand what we conventionally call common property regimes.