

Property, Power and Politics

- Some Methodological Challenges to Understanding Access and Control in Sub-Saharan African Resource Management

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How do we know what we know? Can we improve our modes of inquiry? In what follows I will examine some empirical studies of land tenure in sub-Saharan Africa from the methodological point of view of an institutional and behavioral economist. These include studies of community forestry, common pool resources, and tenure impact on conservation and other agricultural practices. I will briefly describe the questions asked by the authors of these studies as well as the methods used to answer the questions. Then both alternative questions and methods will be suggested.

Before turning to a sample of studies, I pause to examine a summary assertion of Sara Berry (1993). She says "it is difficult to say how far statutory changes in property rights have determined the structure of access to land--let alone 'redefined social relationships' or determined the course of agricultural development--in either colonial or independent Kenya (1959)." If true, this leaves little room for self congratulation among African scholars and raises serious questions about the adequacy of our methodologies. One possibility to be explored below is that our nominal categories of institutions and rules are inadequate to capture their instrumental features. Another theme will be how studies might be better made from a coevolutionary point of view rather than uni-directional determinism. Finally,

a Conceptual Appendix is included to summarize some of the principles of an institutional and behavioral approach to the study of access and control issues which underpin my methodology.

Community Forestry

Various African governments and donors have implemented woodlot projects. Such a project in Niger is the subject of research by James Thomson. The Nigerian Forest Service persuaded villagers as a group to plant a woodlot area. The government provided technical assistance and imported wire fencing. The fencing to keep animals out is critical to tree growth in the establishment phase. In Thomson's conceptual scheme (and Schmid, 1987), attributes of goods and services are important¹ Different attributes create different opportunities for one person's actions to affect another. You can't understand the effects of different institutions if you don't know where the human interdependence is coming from.

What are the essential attributes of woodlots? In general, the cost of excluding an unauthorized user is high relative to the value of the product (high exclusion cost). The Nigerian government thought it had solved this problem by subsidizing the fence (fences are quite literal exclusion costs). But the fence still has to be maintained. Woodlots are typically somewhat distant from the village and not easily monitored. What then are the institutions that interact with the characteristics of the good to affect outcomes or performance? The project document arranged by a Canadian donor stipulated that the woodlots were common property with the wood belonging to each village whose residents gave land and planted and protected it. The villagers were to initially alley crop the woodlots to prevent weed competition. The Forest Service must approve all cutting and it enforces the rules in principle, but in practice there are few inspections. Harvest by one person (or village) is incompatible with another.

¹ Thomson perceives that these goods attributes create incentives for certain behavior. But attributes only create opportunities, and other variables such as selfish calculation or caring must be added to produce a behavior.

Access, Control and Management of Natural Resources

The conceptual model in outline form is:

Goods Attribute <-> Institutions		Outcomes
High excl. cost	Common Property	Tree Survival rate
Incompatible use	Govt. approves cut Villagers obligated to maintain	Fence Maintenance

Sixty village woodlots were planted with exotic species from 1974 to 1978 following a drought. The research report is dated 1992 and the field work must have been conducted shortly before. Therefore the interviews involve recall by the respondents. It is not clear how many of the woodlots were surveyed, but the general reported outcome was that most have been abandoned. Many of the young trees were destroyed by animals and the fence not maintained. There was a variation in survival among arrondissements.

In principle, Thomson is a methodological individualist and assumes substantive rationality of the parties. In practice, the unit of analysis is vague. Some individual interviews were conducted but there was no attempt to determine why some individuals participated and others did not. So the interviews are largely to determine a representative, typical response to the rules. While arrondissements differed in their aggregate behavior, no systematic attempt was made to discover why. It was observed that the arrondissement with the best record of tree

survival was governed by a forestry official in residence for 13 years. This official was vigorous in his promotion of the project, though the degree of sanctions for violation of his orders is not clear. This is often the point where data breaks down. Nominal rules and authority are one thing, but it takes a great deal of effort to determine how they are delivered in practice. No other differences among successful and abandoned woodlot villages were noted.

Villagers reported that while they were nominally common owners, they did not regard the woodlot as belonging to them. "The woodlots were widely referred to as *dawan gwamna* ('government forests') (47)." Even villagers in the arrondissement where local harvest was permitted still don't regard the resource as theirs. Further inquiry might ascertain whether the villagers regard harvest as randomly determined with no implication for future predictability. After 15 years, the surviving lots in the other two arrondissements have not yet been allowed to be harvested. Thomson does not report whether the precedent of allowing local harvest is known in the yet-to-be-harvested villages or if there are other experiences with government officials honoring their pledges.

In practice, Thomson's unit of analysis (observation) is the whole of the 60 villages. He implicitly assumes that the rational individual who feels no ownership or more importantly can't link effort and individual reward would not maintain the fence and the trees. The general outcome is consistent with this deduction. But it is difficult to disentangle external enforcement from self-imposed rule following. Different levels of enforcement among arrondissements is noted. Thomson also notes differences in "respect for outside authority." He says, "Where the village is less structured and residents are more prone to ignore local and outside authorities, greater local investment in management might be necessary (49)." "Prone" is an interesting concept in this regard. Has a rational choice theorist a place for proneness? (See the Concept Appendix below for further discussion.) It is not clear that Thomson has any direct observations of this proneness or if it is simply a name applied after the fact of following the rules. Behavior is a complex matter influenced by mode of life, public opinion, learning and selective perception, expectations and discounting. It might also be hypothesized that people's sense of fairness has something to do with voluntarily following the rules without any calculation of individual cost and benefit.

Access, Control and Management of Natural Resources

Exclusion costs can defeat even the most determined official. While guards could be hired to restrict cutting and to force fence maintenance, at some point these cost more than the resource is worth. The villagers might hire their own guards, but in Niger there is no local authority to collect a tax for this purpose. The whole system of local government interacts with resource management institutions. Individuals who follow self-imposed rules (a kind of social capital) can be a substitute for other costly inputs to management.

Nigerian officials learned something from this project. In the second phase starting in 1982, villages who had participated in the earlier phase were selected for tree planting by families on land they usually farmed. A volunteer was recruited to learn tree nursery techniques. The extent to which others in the village helped with the nursery was mixed. The tree species were selected by the local people and were largely indigenous rather than exotic. Trees were planted at scattered sites in family fields and along paths.

The rational choice theorist would predict that these trees associated with individual families with rights to harvest them would result in their survival. The outcome provides less than a clear test. The only affordable protection against animals for the young trees was a small wicker cage. This worked fine in wet years, but the animals knocked over the cages during droughts to get the green leaves. However, there were few green leaves and most trees died anyway, so the exclusion costs were moot in their effect. The most successful village which now has some pole-sized trees constituted efforts by five or six individuals whose fields are contiguous and fairly close to the village. Is the outcome determined by the lower monitoring costs or the solidarity and follow-the-leader behavior possible in small related groups? Young trees and animals are incompatible so there must be agreement on whether the tree products are worth the cost of foregone forage or animal control.

Thomson continued his analysis of four different projects. None were outstanding successes or it is yet too early to tell. Nevertheless, he is willing to make a series of recommendations which emphasize local rather than national forestry official control. For example, he recommends "a localized approach to woodstock management in rural communities (122)." The localization is predicted to have two effects. First, it makes better use of local knowledge as illustrated by the case where the officials planted exotic species and the locals planted indigenous species-

-remember, however, that both mostly died. Second, the locals will be able to better solve the high exclusion cost problem. Thomson says, "Unless regular surveillance on a year-round basis is possible as a consequence of land use patterns--which is typically not the case, ...--it may be necessary to mount a system of organized patrols (122)." Apparently he does not hold out any hope that local people can substitute social capital for patrols, but only that local provision of patrols might be cheaper. His earlier reference to being prone to follow authority (dare we say conscience) is not followed up. Self restraint based on caring for others is a kind of social capital which can be substituted for fences and police (Schmid and Robison). Loyalty to and conflict between ethnic or occupational groups could be explored. Thompson does suggest that local decision making may be better able to match the distribution of cost to local perceptions of what is fair. Methodology affects the questions asked. See Figure 1 for a summary of Thomson questions and method and alternatives thereto.

The above is not intended as a critique of the Thomson study. There are many strengths to its methodology, particularly its conception of correlative rights and obligations and its focus on attributes of goods influencing how institutions affect performance. It has been used here only as a vehicle to demonstrate the consequences and possibilities of methodological alternatives. Let's turn now to another group of studies on common pool resources which have some similarity with forestry.

Figure 1: Methodological dimensions of tenure studies illustrated with reference to Thomson (1992)

What is the Question?	Concepts & Method Used	Alternative Variables & Method
<p>What village characteristics are associated with tree survival?</p> <p>Deterministic model</p> <p>Unit of Analysis: Nominally the individual, but typical village in practice.</p> <p>Behavioral perspective: Rational/a-rational</p>	<p>Case Study -</p> <p>Describe villages as to Ostrom categories. Pick villages which differ in respect to these categories.</p>	<p>Inquire of perceptions</p> <p>Experience with government honoring promises.</p> <p>Inquire of social capital.</p> <p>Make opportunity cost and return explicit.</p>
<u>Alternative Question</u>		
<p>How are village characteristics and tree survival mutually determined?</p> <p>Coevolution model.</p> <p>Behavior Perspective: Learned cues and patterns of behavior</p>	<p>Describe villagers as to perception of fairness which may cause individual to not make B-C calculation.</p> <p>Construct history of interactive change in variables.</p>	

Common Pool Resources

Econometricians would scoff at the type of study discussed above. The summary dismissal is contained in the label "anecdotes." Yet, as McCloskey has pointed out, the case study and the econometric study both involve a story--rhetoric, and both involve persuasion and judgments such as the acceptable level of significance of a statistical test. Case studies can be the data points for later econometric analysis. Some of the most insightful work in the social sciences is done by surveying a large number of case studies to discover the patterns they contain. If the individual case studies had not been made, there would be no material for these meta-analyses. By the way, it is curious that there is less meta-analysis to check the consistency among different econometric studies than one might imagine (Tomek).

One of the most successful surveys of the case-study literature is that made by Elinor Ostrom in her book *Governing the Commons*. Her research program is suggestive of how methods complement each other. She conducts her own case studies to increase the supply. She develops a set of categories to record the essentials of other people's cases into a manageable data base. And she is involved in some laboratory experiments which try to reproduce the environment that she wants to understand and then observes behavior within it.

Ostrom, like Thomson, utilizes a conceptualization relating attributes of goods to alternative institutions and then following through to outcomes. The goods attribute of interest in this book is what she calls common pool resources (CPR). (Note that *common pool* describes the inherent character of the good and is distinguished from the collectively chosen institution of *common property*). A common pool resource is characterized by high exclusion costs. It is also characterized by the fact that its production system is such that total production from the resource is enhanced when investments are made in the resource as a whole. For example, an investment in management of breeding area may affect yield in an ocean fishery over a wide area. (The breeding area and food system are CPR while the fish harvested are incompatible use.) Likewise, it may be more economical to herd animals over a large area rather than confine smaller herds in subdivided areas.

It has been common to predict resource destruction when common property institutions are applied to common pool resources.

Access, Control and Management of Natural Resources

The inference is that only centralized coercion can prevent what is popularly labeled "the tragedy of the commons." Ostrom's observations falsify this popular inference. She finds numerous cases where resource users have in fact followed rules of use that preserved and enhanced the resource. Consistent with Kenneth Boulding's idea that "what exists is possible," she inquires into the patterns that typify the successes as distinct from the failures. She emphasizes that her approach is a search for "design principles" rather than testing a model. "The reason for presenting this complex array of variables as a framework rather than as a model is precisely because one cannot encompass (at least with current methods) this degree of complexity within a single model (214)."

Impact analysis of a given institution or right is usefully distinguished from *institutional change analysis*. Impact analysis asks, what the outcomes would be if certain rules/rights were adopted. Ostrom asks why the rules that common pool users adopted seem to work. A different question asks about the process of institutional change, i.e. the process of devising new institutions. Ostrom asks what the existing situation was before a group attempted to change its rules. While separable, the two questions overlap if the way rules are devised affects how they work.

After examining six cases where the common property regime is robust and the resource is maintained and eight cases of failure, Ostrom compiles a list of design principles. These design factors help predict which set of rules produce an impact or outcome of success or failure. Below are just a few to illustrate their character (90):

1. Clearly defined boundaries.
2. Congruence between appropriation and provision rules and local conditions.
3. Individuals affected can participate in modifying operational rules.
4. Monitoring.

The distinction between a framework and a model can be explored with reference to the above design principles or variables. One difference is the way categories of variables are recorded. For example, with respect to the boundaries variable, in a case study the analyst creates a narrative to convince the reader that one set of villages and accompanying resources have

qualitatively better defined boundaries than another set. In an econometric study, there can be a number which measures the continuous degree of boundary clarity. If a dummy variable is used (clear or unclear), there must be a narrative rationale for placing a particular village in one category rather than the other which is similar to that of a case study.

Note that while Ostrom's theoretical language is of rational choice and individual decision making, the unit of analysis is the whole case situation such as an irrigation system, forest, or fishery. The successful cases where the resource is maintained have more of these design principles than the failures. There are no statistical tests of significance or the other trappings of econometrics. Are Ostrom-type results less persuasive than one econometric study? I do not know of any overwhelming answer. Some people are persuaded by one type of evidence and others by another type.

Econometric analysis might be conceivable when we collect enough cases to make an acceptable sample (say a number of irrigation systems). Ostrom is trying to increase our supply of cases (data points) with similar data--namely observations on the type of design variables noted above.² Without this data, most econometric analyses shift the question from situational characteristics of a resource to characteristics of particular individuals or households. For example, if there were some formal vote on a set of common property rules, analysts might formulate a model of what individual characteristics are associated with people who voted yes vs. no. More on this below.

With respect to *institutional change analysis*, Ostrom again puts the theoretical question in individual participation terms. When would individuals act to change the rules? Answer: when it pays. This may be true, but not of much help; and she does not in fact try to collect data on the benefit-cost ratio of individuals or their participation. After studying a number of cases she suggests the following internal characteristics of the situation (not observations of individuals) are associated with changes in the rules (211):

1. Most resource appropriators share a common judgment that they will be harmed if they do not adopt an alternative rule.
2. Most appropriators will be affected in similar ways.

² Ostrom, Schroeder and Wynne have made a similar analysis of rural infrastructure investments.

Access, Control and Management of Natural Resources

3. Low discount rates.
4. Appropriators face relatively low information, transformation, and enforcement costs.
5. Most appropriators share generalized norms of reciprocity and trust that can be used as initial social capital.
6. The group appropriating from the CPR is relatively small and stable.

These characteristics may help us predict when rules will change, but it is of limited use to policy advisers who would like to make suggestions for improving success. Are large heterogeneous groups simply hopeless or can we find some substitutes for these factors? What methods will give us some idea of the rate of substitution among these situational characteristics?

A note to all researchers, especially dissertation writers: we all want to be like Ostrom and do the convincing meta-analysis. But, if others had not slogged away producing the individual case studies, the meta-analysts would have no raw material to interpret.

Ostrom is well aware that the process of institutional change of CPR rules has the same attributes as the CPR problem itself. (And what is true of CPR rules is true of any public policy such as the cheap food policy which Bates observes that a majority of farmers seems unable to change in many African nations.) Both rule change and resource use require us to ask why the individual should avoid being a free-rider and to contribute/cooperate if s/he cannot be excluded from the result anyway. Thus, item five above on shared norms is key. The language is rather cold and abstract. Warmer terms might be benevolence or caring. It is hard to deny some emotional content here. People who care for each other to some degree are less likely to be tempted to be opportunistic free riders and users of high exclusion cost CPR goods. Does this concept have a place in the lexicon of a rational choice theorist? Many economists have tried to salvage the theory by conceptualizing norms of reciprocity and trust, caring, and the like as just another kind of preference which the rational person includes in their welfare maximizing calculation.

I am rather more convinced by the anthropological perspective. (See the Conceptual Appendix below.) Pauline Peters says, "It is error to suppose that an individual calculus can explain a commons system--rather one has to understand the socially and politically embedded commons to explain the indivi-

dual calculus (79)." This perspective emphasizes social learning and the evolution of meaning. Peters says, "competition among rights and claims takes place through competition in meaning (192)." Can we test whether people have a caring argument in their utility function or whether when caring is learned, calculation of certain alternatives is suspended? In any case, we have not said a great deal that helps anyone until we know how these preferences or meanings (or simply, behaviors) are learned. What are the experiences out of which people learn trust and caring? Maybe people are just "prone" to it or not, but I doubt it.

Laboratory experiment is another methodology which can produce knowledge of behavior of people under alternative rules. Ostrom and associates have begun to reduce the common pool resource problem and alternative rules to understandable interactive games which subjects can play (Walker, Gardner and Ostrom). It remains to be seen whether the laboratory setting can approximate the richness of the field. There have been a number of exciting experiments which create prisoner's dilemma type situations which are similar to common pool resource, high exclusion cost situations. A series of experiments designed by Dawes, van de Kragt and Orbell try to separate the effects of group identity, conscience and material reward. The work is entitled, "Cooperation for the Benefit of Us--Not Me, or My Conscience." Space does not permit description of the details but the authors conclude that discussion (getting to know each other) has a powerful effect on the probability of cooperation. In the absence of discussion, the cooperators said they acted in order to do the right thing (conscience). With discussion they emphasized concern for group welfare. The defectors emphasized personal material payoff. The conclusion is that group identity matters. I believe that there is some emotional dimension here that is not coldly calculated, but I realize that finding a result consistent with a certain logical deduction (story) does not prove that story is actually what was going on.

It might be useful to repeat some of these experiments in an African natural resource management setting. It might answer some question about cultural differences in cooperation. It might also be conducted as part of an effort to change the probabilities of cooperation. Can people learn to cooperate on land use matters after experiencing trust in a game simulation?

Case Studies of Tenure Impact

How does tenure affect land use? This question has occupied many scholars. Economists were sure they knew the answer deductively. Only secure private ownership as practiced in the West would achieve maximum productivity. Everything else was rights attenuation leading to poorer results. This deduction has driven a lot of policy advice which supports a lot of titling projects around the world. It has also been the subject of empirical study with mixed results (and critiques such as that of Sara Berry noted above). But my purpose here is not to evaluate the weight of the evidence, but rather to explore methodological alternatives.

Typical of the case studies is that of Elise Golan in the peanut basin of Senegal. She asked field managers the following questions:

1. How did you obtain this field?
2. How many years have you been the manager of this field?
3. Who could take this field away from you?
4. Will you manage this field next year?
5. Will your children operate this field?
6. Who determines who the heirs to this field will be?
7. Can you give this field away?

On the basis of manager response she placed 262 fields into one of three categories. "Fields with secure rights" were those where the managers stated that no one could take the field from them. "Fields with moderately secure rights" were those whose managers said the field could not be taken from them but they either did not determine crop, seed, or pesticide use or did not know if they would be working the field next year. The "insecure" classification were fields managed by individuals who said someone had the right to take the land away from them. They were not asked if they thought this was likely. The outcome of these institutional alternatives was measured in a social account called "value of land services per hectare" which was felt to reflect production innovations and land-improving technologies.

The results are presented in a cross tabulation of value of land services/hectare and the tenure security categories (50). The value varied over the categories, but the author judged it was not significant and concluded that security of tenure doesn't

much affect the amount of land-saving investments, efficiency in land allocation or prudent use of mortgage credit (53). She surmises that other constraints such as the availability of technologies, input and output markets prevent testing of the relationship between tenure and outcomes (51 and 53).

It is curious that I have found no studies where farmers were asked directly if they thought the probability of future use of the land (or its equivalent) affected their adoption of a practice they otherwise considered economical. Economists seem to have a strong preference for making up their own stories on the connection between variables rather than asking people for their own story. Some argue that you can't trust what people say. Is this justified?

Econometric Studies of Tenure Impact

Given data availability, econometric studies are better adapted to determinants of individual behavior on their own parcels of land (rather than community forestry or common pool resources). What econometric methodologies and variables have researchers employed to understand the determinants of farm-level conservation investments? Clay and Reardon utilized a nationwide survey in Rwanda with a random sample of 1,240 households and 6,464 parcels in 1991. The dependent variables in a regression model were meters per hectare of three practices--grass strips, anti-erosion ditches, and hedgerows measured at the parcel level. The tenure variable was simply whether the parcel was owned or leased. Other variables measured regional variation in the profitability of agriculture, wealth and liquidity sources of the household, and other household characteristics such as age and literacy. The authors theorized that holdings operated under lease rights had a greater risk of appropriation of any land conservation investments. The dummy variable was found to be statistically significant although its coefficient was very small. These findings contradicted another study by Blarel also in Rwanda which found no significant relationship between risk and conservation investments. Clay and Reardon implied that their results are superior since "Blarel's study was limited to just three of Rwanda's ten prefectures, and the analysis of tenure status and investments was conducted exclusively at the bivariate level."

The connection between ownership-leasing and the perception of security remains untested. People were not asked about their perception or actual experience with security.

The productivity effects of indigenous land tenure systems was the subject of a study by Place and Hazel. Farm surveys were conducted in Ghana, Kenya, and Rwanda in 1987-88. The sample size varied from 97 to over 600 in various regions of each country. The tenure variable was more complex than in the Clay and Reardon study. They conceptualized tenure as a bundle of rights describing different opportunities with respect to the land and other people. Since this potentially creates a large number of combinations, the rights are grouped into three categories. "Complete rights parcels are those which can be sold by the current operator. Parcels which cannot be sold but can be given or bequeathed, usually to members of the same family or lineage, are classified as preferential transfer parcels. The remaining parcels, which may not be permanently transferred, are placed in a limited transfer category (12)."

The model required that land rights are predetermined and not subject to farmer choice. Yet, it is possible that farmer efforts at land improvements could be the basis for improved rights. The authors did not measure land rights at acquisition time and thus cannot test directly the extent to which farmers can alter their rights. But when they examine their data they conclude that any changes in land improvements are too modest to explain any jump from one land rights category to another.

The picture is more complex than Place and Hazel discuss. Farmers may improve their security and access relative to others by efforts other than land improvement. Berry observes that people invest in social capital which improves their relationship with others. "Investment in social status as a means to strengthen property rights may help to explain a wide array of rural expenditures, from weddings to palaces (1987, 12)." These investments do not move a person's land holding from the "preferential transfer" or "limited transfer" categories to the "complete rights" category that can be sold. But such efforts may greatly increase the security of use and access (in other words, security within the category). (For more on social capital see Schmid and Robison.)

Given the way in which rights were conceptualized by Place and Hazel, they found that land rights were not a significant factor in determining whether or not farmers made land-improving investments or used yield-enhancing inputs. They offer

this conclusion, "Our study provides little support for ambitious land registration and titling programs at the current time (19)." They surmise that there are other more binding constraints on productivity.

Does their methodology support their conclusion? Does the conclusion extend to any kind of institution and therefore focus policy attention on technology rather than institutions (assuming they can be separated)? Maybe rights don't affect yield--only who gets the yield (who is rich and who is poor); though I would be surprised if distribution did not affect work and yield. Do the Place and Hazel variables get at the operative claims to rent and how people coordinate to help and enable each other?

The variables utilized in various econometric model specifications differ in concept and number. Place and Hazel use a large number of variables in their plot yield regressions: size of parcel, distance to house, soil fertility, slope of the parcel, topographical location, cropping patterns to name but a few. Some of the other studies use some but not all of the same variables. It is well known that the statistical significance of a given variable of interest such as the tenure variables is often affected by the presence or absence of other variables in the equation (Leamer). Yet none of these studies report on how the robustness of their results is affected by model specification.

The evidence of Clay and Reardon, Blarel, and Place and Hazel are contradictory and the studies hardly conceive of the institutional/rights variable in the same way. It is difficult to know what is being tested relative to any particular policy decision. Construct validity refers to the reasoned path between conceptualization of the variable and what it is supposed to measure, which derives its meaning from how the knowledge is to be applied. It is the path or linkage between a questionnaire obtaining data on owner vs. renter and the policy of titling, for example. This is inescapably a matter of rhetoric no matter how large the sample or sophistication of the econometrics. The choice of constructs (variables) backed by a rhetoric reflecting extensive and repeated in-depth interviews is more convincing than the constructs of owner vs renter backed by some rational choice theory.

There are still other econometric studies that might be reviewed such as Platteau (see also my review of Hayami). If we were to do a more extensive meta-analysis of the econometric literature, we would have something that looks a lot like what

Ostrom did with her collection of case studies. These different methods are more complements than substitutes, though there are tradeoffs.

The strength of econometrics is that it explicitly holds some variables constant while varying others. So for example, in investigating tenure impact on conservation, Clay and Reardon hold household age and liquidity constant while varying ownership (owned or leased). Clay and Reardon could argue that the context of own or lease is not important or that there is little significant variation among households in this regard. In contrast, Golan asks many questions about the choices field users can make and tries to persuade the reader that these can be combined into three levels of security. Thus the rights structure has more context. She implicitly holds other variables constant such as when she ignores age and liquidity of the field user. She could either argue that these variables are irrelevant or that there is little significant variation among fields. All methods leave something out and involve tradeoffs between the depth to which a variable is measured (i.e. given more content) and the breadth of its application (data points).

Methodological Evaluation: Coevolutionary Perspective

Can any methodological conclusions be drawn from this brief review of empirical studies? Yes, case studies, econometric studies, and meta-analyses of both case and econometric studies have a place. We can do better in conceptualizing the dimensions of institutions/rights that are instrumental in influencing access to and control of natural resources. But Sara Berry's negative assessment of our knowledge of the impacts of purposeful change in rights can't be ignored. Will we need even more fundamental recasting of our methodologies? Or, just intensify our present efforts?

To help answer this question, I want to present briefly two additional case studies: one of sharply contrasting laws of access and control of land in Kenya and Ghana and another of a cowpea farming systems experiment in Mali.

Land Access

One of the fundamental requirements in any quasi-experimental design is to look for the opportunity to contrast the outcomes of large differences in the treatment variable so

that its' effects will not be lost in the noise of other variations. One could not hope for a larger difference in institutions of land ownership than existed in the histories of Kenya and what is now Ghana between 1900 and World War II. Kenya was colonized by white settlers who took the best land and forced Africans onto reserves. In contrast, in Ghana whites were forbidden to own land. Other laws in Kenya were designed to enable whites to employ Africans at low wages. An example was master-servant ordinances that prohibited an employee from leaving a job without the employer's permission. It is not surprising that this resulted in low incomes for Africans.

What is surprising was that the average per capita income in Ghana was not much different from Kenya even where Africans owned the land . Robert Seidman argues that there were other changes in the economic system than offset land ownership by Africans. The main export crop was financed, purchased, stored, and shipped by a few European firms. The Africans had little bargaining power and the surplus went to the Europeans. From time to time the Africans tried to organize withholding strikes (1930 and 1937) but were not able to sustain any effective collective action.

The picture is far more complex than I can draw in a few paragraphs, but I venture the suggestion that the experience suggests that controlling or changing one part of a system may not have the intended effect if other parts of the system change. Factor ownership does not tell the whole story by any means. This picture is compatible with some of the authors examined above who were left wondering if there were other constraints to productivity that were more binding than the tenure differences. However, the language of constraints may itself be a restraining conception. The problem of development is more than removing constraints. It is a matter of enablement, cooperation and coordination. One problem with many of our present methodologies is that they presume a new instrument (treatment variable) is introduced into a stable environment. When this fails, as it often does, we tend to assume we choose the wrong instrument or did not give it sufficient control.

Coevolution is an alternative conception. The metaphor for this conception is biological evolution rather than mechanical determinism and equilibrium (Norgaard). Any introduction of new organisms, if successful to some degree, engenders changes in other parts of the ecosystem. This may stamp out the initial fit or possibly accelerate growth of the new organism. Species do

not just gradually evolve to better fit a niche within a fixed physical environment but evolve together with other species, often in unpredictable ways. The planner who introduces new factor ownership or titling programs often finds that other parts of the system have shifted to offset the intended outcome.

The Cows Ate the Cowpeas

I was witness to the initial results of an introduction of a new crop into a traditional farming system in southern Mali in 1990. A farming systems research team had persuaded 10 villagers to intercrop cowpeas and sorghum. The farmers were given rock phosphate fertilizer which experimental results showed to give greater yields and income than the traditional cropping system. However, it is the custom to harvest in teams moving from field to field, and after harvest, the cows (no matter whose) have free range of the village lands. So the cows followed soon after the sorgho harvest was completed and by the time the teams came back to the first field to harvest the later maturing cowpeas, the cows had enjoyed the peas so appropriately named after them. It had proved impossible for the 10 farmers participating in the experiment to protect their unfenced fields individually from the village cows.

In rights terms, the owners of cows have the right to forage on harvested fields. By the end of the sorgho harvest the cows have nothing to eat in the areas where they are herded and their owners are eager to move them to the harvested fields. Surely a different institutional system might evolve in time. But, at the time I saw the project, the new cropping system did not fit any ecological-institutional niche. And we haven't even begun to discuss how it fits into interacting systems of credit to sustain the fertilizer and other inputs, as well as other question of food use, transport and urban markets--dare we even mention global markets.

The whole conception of farming systems as a sub-discipline is to better understand interacting biological systems (eg. integrated pest management) as well as interaction of the biological with the social. But it is a tough assignment to execute.

Implications for Tenure Surveys

Future institutional studies will have to go beyond specifying the rights variable as owner vs. tenant or degree of security (right to sell or use). Questionnaires will need to obtain data on not only the state of other system components but also how these components might change as a result of introducing a new ingredient into the system, and how these changes in turn feedback on the planned institutional or technological variable. A question obtaining data on the tenure variable in the Mali cowpea project that asked only of owner-tenant or right to sell would not produce information on how the rights of livestock owners interact with other use rights. It would not obtain data on how on-going negotiations between villagers who own different numbers of cattle and different crop fields might come out.

Inquiry into the relevant "ecosystem" would need data on the credit system and input and output markets. The relevant ecosystem has become even larger as market oriented farmers are exposed to shifts in prices as a result of international commodity agreements and other trade agreements.

To understand the evolving impact of a new technology or law we would also need to understand how government works in practice. Recall the community forestry project study noted above. Some of the difference in results seemed to be a function of the presence of a long tenured, locally based forestry official. This variable can only be obtained in the field. The reaction of the farmers to this official may be influenced by some existing stock of proneness to follow authority. But at the same time, this stock is being altered by the way the official performs. The point is not just that a new treatment must take into account how it interacts with other parts of the system, but that other parts of the system evolve and feed back on the introduced change--not just affecting its impact, but affecting its very content. This is not a license, however, for a case study that tries to document everything in sight.

The preceding methodological discussion might be summarized as follows:

1. Every method contains a model of relational variables.
2. Every model is a story.
3. Every method/model includes and excludes some variables. And, the categories of variables are matters of rhetoric and not self-evident and self-defining.

Access, Control and Management of Natural Resources

4. Different variations in space, time, and institutions are necessary to test different questions.
5. Strategic questions of epistemology may be distinguished from alternative methods to explore these questions (see Figure 2 below).

In closing, I urge you to become more self conscious about metaphors. It is common to hear of institutional mechanisms. Human relationships are seldom mechanistic. Try instead, "adjustment process." I know it is clumsy, but an awkward word is better than an inappropriate metaphor. Maybe there is a word in Dansk that better captures the meaning.

Figure 2: Alternative epistemologies and methods with illustrative literature citations

Epistemology (Strategic Questions)	Method	
	Case	Econometrics
1. Uni-directional determinism	Thomson Golan	Clay & Reardon Place & Hazel
2. Coevolution	Cowpeas Norgaard	
3. Impact Analysis	Golan Seidman	Clay & Reardon Blarel
4. Change Analysis	Ostrom	

Conceptual Appendix

Given the complexity we have observed above, research requires the conceptual framework of an institutional and behavioral economics. Some of the theoretical dimensions of such an economics can now be summarized. First the unit of analysis is the transaction. Individuals make choices and exhibit other patterned behaviors interacting with other individuals. Preferences and institutions are both dependent and independent variables. In the context of problems, people sometimes reference pre-existing preferences and economize perceived alternatives in terms of perceived available resources; sometimes learn new preferences and entertain new conceptions of alternatives; and sometimes act with reference to learned cues without anything that can be called calculation.

Institutions/property rights are sets of ordered relationships among people that define their opportunities, their exposure to the rights of others, their privileges and their responsibilities. Note rights are defined as correlative among people in the context of an interaction or transaction. Or, as John R. Commons put it, "An institution is collective action in control, liberation, and expansion of individual action." The *expansion* of individual action deserves emphasis so that institutions are not seen just as constraints.

A recent critical evaluation of the political economy of Robert Bates in *World Development* provides a convenient referent to any methodological discussion applied to African agriculture and natural resources. Bates is known as a rational choice theorist who claims four essentials to his analysis: individual as basic analytic unit; individuals and politicians as rational; politics as relatively autonomous; and individual rationality does not imply social rationality. In the paragraphs above, I have already departed from Bates's position on the unit of analysis and rationality.

The rationality point needs further elaboration. Yes, observation demonstrates some purposive economizing. People sometimes respond to changes in relative scarcity and prices. They can also maintain a behavior long after it produces less income than other alternatives. They also respond to symbols such as tribe and religion. They sometimes are loyal and trustworthy even when there are no practical sanctions supporting such behavior. Sometimes selfish and sometimes altruistic. Sometimes

Access, Control and Management of Natural Resources

integrative and consistency seeking and sometimes of two minds. They sometimes ignore sunk costs as economists advise and other times throw good money (time) after bad in hopes of avoiding having to admit they were wrong. Some cues elicit an emotional response that in no way can be regarded as reasoned though it may serve a reasoned purpose or be completely destructive. What can be said of farmers can also be said of politicians.

Bates, a political scientist, sees an autonomous role for politics. He argues that politics is not an automatic recorder of preferences for rules. Change in relative prices can affect the demand for institutional change, but it is not straightforward. Politics is not just a distortion of natural economic forces. Again, I adopt an interdependent perspective. Law (politics) and economics constitute an inescapable nexus (Samuels). Law and prices are both dependent and independent variables. Price can not be the determinant of law since prices are themselves the outcome of the play of rights. Of course, in the arena of power play, negotiation, and persuasion that shapes policy, skillful manipulation of the appeal to what is asserted to be natural is part of the historical coevolution of what emerges.

What is political as distinct from economic rationality? Bates argues that African urban elites depress agricultural prices to their advantage. Shall we call this a political diversion of otherwise natural economic prices? But prices and certainly net incomes to different parties are a matter of rights which are political. If we accepted the assertion that the land is owned by everyone of a country, then urban people would have the right to collect a rent from farmers which would offset higher food prices. It would be possible to design an ownership and lease system or a cheap food price policy system that would produce the same net income for farmers. Or for that matter prices could be higher, but taxes on farmers could leave them with the same net income as with lower prices. The point is that there are many right equivalencies which can produce the same income distribution. This has important conceptual and methodological implications. Different rights are substitutes for each other and if we do not study the coevolutionary complements and substitutes, we will not understand the effect of a change in any one of them.

Does individual rationality imply social rationality? Bates says no, but the question is empty. When there are conflicting interests, to label one of the interests as socially rational is to presumptively choose sides. Aggregate value is not independent

of distribution which affects relative prices. Stein and Wilson in their evaluative review of Bates observe that rational choice theorists exclude or marginalize some terms including "exploitation" or "domination." Some of the "new institutionalists" such as Williamson go to great lengths to deny any place for power in explaining institutions. They prefer to view institutions as the outcome of trades beneficial to all parties. Bates correctly notes that this begs the question of starting places of who has what to trade. Rights determine whose preferences count. Property rights are about who can act without the consent of others. But any right rests ultimately on some threshold of collective agreement of who is owner and who is buyer (or beggar). So, antecedent to the opportunity set of one person is some collective agreement as to who is excluded. One can assert might, but it is a non sequitur to individually assert a right. Rights are public phenomena--independent and dependent variables as noted above.

Issues of power are ineluctable from the perspective of institutional economics. If interests conflict, there is necessarily the exercise and result of power--the right holder has power when he/she has an opportunity which is a cost to another. As Lund puts it, "Power is relational ... and only conceivable as a capacity in a social relation (9)." On the other side of the transaction, the non-right holder has no power and is exposed to the cost of others behavior. The fact that subsequent to this referent place the parties may voluntarily trade to make themselves better off does not mean that the parties accept the starting place. Starting places for trade is what politics is about. Trade and politics (law and custom) constitute a coevolutionary nexus.

I know only one universal law of economic development: War and terrorism are antithetical to development. But people will create cost for themselves to create cost for the objects of their malevolence. Violence is not a random exogenous event causing otherwise sound development policies to be postponed. People do evolve conceptions of fairness. It is integral to willing participation in any system. Fairness affects the productivity of labor whose output can not be inferred simply from measures of skill (human capital).

A coevolutionary perspective is essential to the study of institutional change. The elements of coevolution or overdetermination include (Samuels, Schmid and Shaffer): The economy and polity are continuously reformed in what may be called the legal-economic nexus; Explanations are multiple, two-way, cumu-

lative and curvilinear; The key legal-economic question is who is to control government for what purposes, and whose interests are to count; The driving forces of legal-economic behavior are ideology and the continuing contest over distribution of wealth; The legal economic nexus is the sphere in which resolutions of the problem of order are continually negotiated and worked out; The substance of the legal-economic nexus is a matter of the social reconstruction of reality; Power, ideology, and institutions are important dependent and independent variables; The principal characteristic of the operation of the legal-economic nexus is process; Substantive results are treated simply as results without the trappings of global productivity or efficiency; Substantive results necessarily exhibit the principle of unintended or unforeseen results; Parts are a function of wholes and wholes are a function of parts.

There is no unified single story line here. Is it sociology, law, political science, anthropology, geography, or economics? My answer is yes--so be it. That is the way the world appears to me.

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