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**Nature vs. Nurture:  
Systems of Property Rights in First Peoples**

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Preliminary Draft: Comments Welcome

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"Along the mainland streams, which are called rivers, though not of sufficient size for such dignity, many coconut and other trees are planted. There are no visible boundaries separating holdings. A dozen or more families may be owners of trees on one stream. I asked Old Sobaca, of Ticantique, 'Don't Indians ever make mistakes about which one owns a tree?'

'No - yes, sometimes.'

'What happens then?'

'Indian talks to friend about it; go see tree; everything all right.'

'But if one man is not satisfied?'

'Talk to chief,' he says, 'This is your tree; this is your friend's tree. Everything all right.'

(McKim-Cuna)

It is difficult to imagine the Cuna Indian's system of delineating and enforcing property rights working in North American culture:

"Along the mainland roads, which are called transitways, though not of sufficient size for such dignity, many parking spots are located. There are no visible markings identifying the holdings. I asked Old Sobaca, of the department of transportation, 'Don't drivers ever make mistakes about which one owns a parking space?'

'No - yes, sometimes.'

'What happens then?'

'Driver talks to friend about it; go see space; everything all right.'

'But if one man is not satisfied?'

'Talk to parking lot attendant,' he says, 'This is your space; this is your friend's space. Everything all right.'

Why is the first scenario interesting, and the second incredible? Is it because the Cuna are a nicer society, predisposed to harmony-less possessive of their property? Is it because coconut trees are less valuable than parking spaces? Is it because the Cuna were never told like Duddy Kravitz, "A man without land is nobody?"

Perhaps all of these suggestions have merit, but the first two are difficult to measure, and the third has been refuted by poorly read friends who nonetheless fight for parking spaces. I propose another explanation, following directly from Demsetz (1967), but dating back at least to Smith. It is simply that both the Cuna and today's drivers seek to maximize their well-being subject to a variety of constraints. Different systems of property rights emerge reflecting the value of resources, and particular constraints faced by each group. Part I of the paper motivates the thesis further, while Part II presents more explicit statements of the costs associated with different types of ownership. Part III is dedicated to supporting the thesis with evidence from an extensive cultural database. Suggestions for further research follow in Part IV.

### I. You say tomay'to, I say tomah'to

Most scientists seek explanations for differences, or changes, in behaviour rather than accepting events as random. Such explanations for differences between Indian tribes have been put forth from various disciplines including anthropology, biology, psychology, sociology, and political science. To put some order into the debate, it is worthwhile briefly discussing alternative theses to the one presented here. Explanations vary concerning: 1. the source of the differences between groups (nature versus nurture); 2. what motivates behaviour (group or individual welfare); and 3. if the same behavioural assertions apply to groups over time. The economic perspective taken here postulates that all individuals, past and present, maximize their well-being subject to various constraints. Differences in these constraints (or changes over time), rather than innate characteristics, explain differences (or changes) in behaviour.

The first theoretical distinction stems from whether innate differences are assumed, or if the differences are asserted to emerge in response to external factors.<sup>1</sup> Any argument premised on different innate traits suffers from being unable to explain what led to the initial differences. This does not mean that preferences cannot vary, but to claim that differences in behaviour are innate, rather than learned, leaves the difficult task of explaining the origin of these genetic differences. For example, while customs of the Yurok Indians of California have been described as arising from excess suspicion, no explanation has been offered for why the first Yurok ancestors might have suffered paranoia (Farb, pg.11). More practically, since tastes are unobservable, explanations based on differences in measurable constraints have the advantage of being testable.

Divisions next occur according to what common behavioural postulate is assumed—individual or group maximization. Debates over the assertion of rational self-

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<sup>1</sup>For example, Ruth Benedict (1934) suggested innate psychological traits determined tribal similarities or differences, while Peter Farb (1978) argued social organizations were the common denominator.

interest have produced a rich literature in economic anthropology.<sup>2</sup> Posner's (1980) "Theory of Primitive Society" provides strong theoretical support to an economic analysis of early institutions, and complements the collection of detailed cases studies and field work.<sup>3</sup> He writes,

Economists (and Weberian sociologists) will not need to be reassured, but some anthropologists and lawyers may, that the purpose of such a model is not to deny the variety and complexity of primitive societies or to provide a realistic description of a particular society, but to explain those fundamental institutions and values that are common to most societies, (pg. 8).<sup>4</sup>

The behavioural postulate of individual maximization, however, is not unique to economic analysis. For example, the rational-actor theories in political science, or rational choice theories in sociology assert individual maximization. The difference is that it is the central tenet of economic analysis, while in other disciplines it is one of a number of competing assertions.<sup>5</sup>

The third debate concerns whether or not the common behavioural postulate holds across time, or is believed to have changed from early to modern civilization. Sigmund Freud wrote that "It is impossible to overlook the extent to which

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<sup>2</sup> For an interesting discussion on competing behavioural postulates and the role of neoclassical economic analysis in anthropology, see Cohen (1967). It is also worth stressing that social cooperation and charity are not incompatible with rational self-interest. One extreme argument suggests self-interest stems simply from the evolutionary outcome in organisms competing for limited resources—the selfish gene survives. This rests on a belief of Darwin's survival of the fittest. In nature, at least, this is difficult to refute. Hirshleifer (1978) discusses the evolution argument and how social cooperation is reasonable given self-interest. Although criticized for becoming almost tautological, the alternative thesis, group maximization by individuals, would lead to a different set of outcomes.

<sup>3</sup>For an account and listing of some relevant case studies, see Firth (1967) and Posner (1980).

<sup>4</sup>Posner (1980) posits rational economic behaviour and argues that distinctive primitive institutions (such as the size of kinship groups and polygamy) are adaptations to uncertainty and high information costs. This work is related to the extent that information costs are a major (transaction) cost influencing the choice of property rights.

<sup>5</sup>Hechter (1990) writes, "Since the mid 1960's, however, research based on rational choice theory has proliferated in political science, philosophy, law, and nearly every other social science discipline (including, of course, economics, where this theoretical tradition has a status that is canonical,)" pg. 143.

civilization is built upon a renunciation of instinct, how much it presupposes precisely the nonsatisfaction...of powerful instincts."<sup>6</sup> While it is true that societies establish property (and other) laws that restrict individual rights for the benefit of the group, this is not restricted to modern cultures. I am arguing that individual self-interest motivates behaviour in all these groups, past and present. The degree to which the innate self is, or must be suppressed, is not what distinguishes the complexity of the civilization, but rather the rules of the game—the acceptable bounds to selfish behaviour, including the system of property rights.

Rather than suggesting group welfare was a later phenomenon, a popular thesis proposes the opposite view: that while self-interest explains behaviour in industrialized societies, early civilizations were motivated by a "primitive communism". Cohen (1967) points out that these arguments rely on either assuming a quantum leap from pre-industrial to industrial economies (with no evidence of where that clear break occurs, or why) or a continuum of development. But he writes,

For that would be to assume the truth of the conventional wisdom that there is such an evolutionary process and that it occurs 'on all fronts' of the social system and culture. This however, is pure assumption, and some of the evidence would seem to refute it. (pg. 114).

As anecdotal evidence of at least one case where maximizing the well-being of the community as whole was not the objective, Driver and Massey (1957, pg. 388) in their account of North American Indians report,

"The Algonquins of the eastern Sub-Arctic recognized ownership of hunting and trapping territories...Trespass might be punished with death or witchcraft, the latter being more common. Not only was each family territory carefully guarded from without, but game was consistently preserved from within. Pregnant females or those with young were spared and quantities of other animals were regulated so as to prevent depletion."

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<sup>6</sup>Stephen Jay Gould writes, "We are by nature selfish and aggressive, yet any successful civilization demands that we suppress our biological inclinations and act altruistically for the common good and harmony." Gould points out that in Civilization and its Discontents, Freud takes the argument further to suggest that as civilizations become increasingly complex and "modern" we must renounce more and more of our innate selves. (Gould, pg.)

While these competing theses can offer insights into some types of behaviour, I would argue that implications arising from economic principles are useful in a broader domain than normally considered. In particular, the economic perspective is valuable when considering systems of property rights. Private property rights maximize the gross value of the rights, but the costs associated with establishing and enforcing private rights may result in a lower net value of those rights than under a common property system. Demsetz (1967) argued that private rights emerge when the benefits, due to changing relative prices, outweigh the costs of establishing and enforcing private property. Following this, Baden et. al (1981) challenge the notion that Indians' resource management reflected a greater cultural value of the land. Evidence is offered from four case studies of resource management that changed over time as increasing scarcity led to the formation of rights.

This paper continues along that line, contributing to this literature in two ways: first, it expands the database to observations on over 40 North and Central American tribes; and second, it recognizes that common property systems are not costless, and examines how private or common property rights emerge as a function of the relative costs under these two systems. Previous time series studies focussed on how increasing scarcity led to the formation of rights, largely ignoring the costs associated with common property. This cross-sectional study allows a systematic study of property rights as emerging from relative resource values and the different constraints (costs) of establishing and enforcing private versus common rights.<sup>7</sup>

## **II. A Model of Ownership**

Consider the simplest case of a tribe that trades amongst itself, but not with

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<sup>7</sup>Looking across groups rather than across time for a single group can require a stronger statement concerning preferences unless tastes are uncorrelated with other factors. Otherwise, it requires asserting that group tastes for different forms of organization are similar, or at least are not sufficiently different to explain differences in the group characteristics under study. A time series necessitates simply assuming tastes remain constant.

outsiders.<sup>8</sup> Of interest is the cost of different systems of property rights. Costs under different forms of ownership refer to resources spent by the group for establishing and maintaining the system of rights including the right to sell or transfer ownership of the property, and the right to exclude others from your property.<sup>9</sup> These costs vary with consumption, monitoring, exchange, and sanctioning.

## **A. PROPERTY RIGHTS**

### **1. The Dependent Variable in Theory**

Using Feder and Feeny's (1991, pg.137) taxonomy, there are four categories of rights: none, communal, private, and state. None indicates open access, with no rights assigned (often termed common property rights). Communal refers to a group of individuals owning rights over the property, with access restricted. Private implies an individual owner of all rights, while under state ownership some representative body in the community manages the property.

The distinction between these four categories is somewhat arbitrary, for two reasons: First, goods are composed of a number of attributes, so that types of ownership (for example, private and state) may apply to different attributes of a single good. For example, hunting territories for the Hidatsa and Mandan were controlled by the tribal village, although individual ownership was allowed over eagle pits. (pg. 277 Driver). In many cases although individuals privately owned their catch, it was assumed they would share certain parts, such as the meat, while retaining other parts, such as the skin, for themselves. Further, some

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<sup>8</sup>Although this assumption is made simply to put a bound on the size of the group (to which common property applies), it is not an unreasonable assumption. Posner (1980) writes, "In fact the costs of transportation, plus (other) transaction costs created by language differences, lack of currency and lack of contract-enforcement mechanisms, make foreign trade generally a small, though often an important, part of the primitive economy" (pg. 9).

<sup>9</sup> Although the right to derive income appears occasionally, (the Yurok allowed private ownership over fishing stations which included the right to sell or rent), it was excluded to make the analysis easier. No cases were found where the right to derive income was granted without the right to sell. Besides, selling and renting are the same right except for the time dimension.

attributes privately held may not contain all the rights of ownership. Songs were often privately owned in the sense that others were not allowed to sing them. The song owner, however, did not have the right to sell the song.

Second, private ownership is normally considered to be a single individual with exclusive rights, able to realize the profit (or bear the loss) from the property. Small groups able to limit access, however, can also be considered to have private ownership, sharing in the profit. As the number of individuals in the group holding exclusive rights increases, it approaches communal ownership. Likewise, communal ownership approaches open access as the proportion of the population in the group increases, (although everyone owning the property is equivalent to no one owning the property), or state ownership if the group is defined as the public sector.

Solving for the optimal discrete form of ownership—private, communal, or state—simply in terms of the size of the group holding rights, is therefore, somewhat arbitrary. The optimum should be considered as lying along a continuum of ownership, from an individual holding all rights, to open access.

## **2. The Dependent Variable in Practice**

Although the system of property rights is best considered a continuous variable, information comes in categories of discrete choices: individual, family, clan, etc. These choices must be ordinally ranked to locate them along the continuum. Two related issues must be addressed: 1. what index to use for ranking; and 2. how to deal with different social groupings between communities.

The index used for ranking, called  $N$ , is a measure of the comprehensiveness of property rights, capturing the right to exclude others and the right to sell or transfer ownership. Let  $E$  be defined as the fraction of individuals without



access to the property.<sup>10</sup> Considering a group of 10, for example, individual ownership puts a value on E as 9/10—only one person has access (9 of 10 lack access), while common property implies E equals 0/10—open access (no one is excluded). Now let another measure, T, take on some positive value, say .5 if ownership includes the right to sell or transfer ownership of the property, and 0 otherwise. If N is the sum of E and T, it becomes an index from 0 to 1.4 reflecting increasing completeness of private property rights.<sup>11</sup>

Preserving the ordinal ranking of N requires that different social groups be classified in a manner consistent with this index. The various units include: the individual; the nuclear family; the extended family; kin groups of lineages, sibs, moieties, phratries; clans or gens, and demes; villages or tribes; and bands or nations. Kin group classifications are based on blood rather than the residential basis of families, and are therefore less useful for considering property. A moiety is two kinship groups, a sib three or more kinship groups, and a phratry two or more sibs.<sup>12</sup> Clans or gens are composed of two or more extended families that are also related by lineage, hence the classification is based on blood and dwelling, and often cuts across other groupings. Villages are strictly territorial units, tribe generally refers to a political classification, and bands or nations a grouping of tribes or villages.

The type of social grouping favoured varies across communities, across seasons, and according to whether the grouping refers to the entire dwelling, or a subset

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<sup>10</sup> Another way to define N is as the fraction of the group with rights of exclusivity. By definition, therefore, the upper bound on that group is N-1, where N is all group members. The contentious issue is how to rank common property—does everyone have exclusive rights, or no one? Is N, the fraction of the group holding exclusive rights, 0 or 1? The notion of exclusivity implies the answer should be 0. But maintaining an ordinal ranking for the estimation would require using 1.

<sup>11</sup>The absolute value chosen is irrelevant, only the ordinal ranking matters.

<sup>12</sup>Anthropologists disagree on the exact classifications of some of these groups, whether it be determined by lineage, language, marriage, gender, or some other traditional bond. These subtleties do not change the analysis here.

of residents. For example, in the winter the South Alaskan Eskimos lived alone in small families, while in the summer families joined to form larger communities. The Iroquois lived year round in groups composed of the extended family. So single family ownership in the South Alaskan case implies the entire group, or open access in the winter, while in the summer and for the Iroquois, it implies restricted ownership. Therefore rather than classify by absolute numbers, or type of social group,  $N$  will be determined by the proportion of the current residential group possessing rights.

## **B. COSTS**

For clarity the arguments following are stated in terms of two extremes: private property will imply an individual with the right to exclude and the right to transfer ownership; and common property or open access will imply no one has exclusive or selling rights. Four costs to the community associated with different systems of property rights are examined: consumption costs, the resource cost of non-efficient consumption; and three contract enforcement costs, monitoring, exchange, and sanctioning costs.

### **1. Consumption Costs**

Consumption costs are the costs of non-optimal consumption or resource use. Property is characterised as either rival in consumption, or nonrival in consumption. Consumption costs are determined only by the possibility of mutually noninterfering simultaneous consumption, not nonexcludability or other public good criteria. A swimming hole, for example, is considered a rival good if there is congestion, and nonrival otherwise.

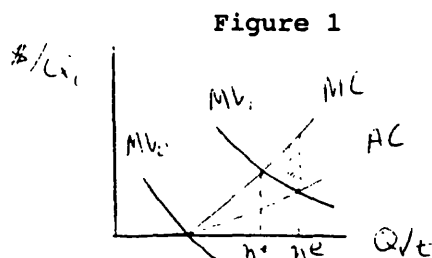
The benefit from private property is that it minimizes the damage from overuse. With private property, the owner would equate marginal cost to demand, such that the incremental cost of the last unit consumed equalled the marginal value of consumption. With communal rights, individuals equate their marginal valuation of consumption with their average cost of consumption, neglecting the additional

cost their consumption imposes on others. (At the input level, this is analogous to workers equating their average product of labour to their best alternative wage, rather than their marginal product as a private owner would.) To simplify, no distinction will be made concerning the durability of the goods, and how many periods consumption beyond the efficient level occurs.

Consumption costs for property  $i$ , are given by:

$$C_i = \int_{n^*}^{n_i(M)} [MC(Q_i) - MV_i(Q_i)] dQ_i.$$

This is the familiar area shaded in Figure 1.



The demand curve labelled  $MV_0$  reflects a good with nonrival consumption. In this case there is no damage from overuse and there are no benefits to private rights. With demand curve  $MV_1$ , the cost from common rights damage is positive. As evident from Figure 1, the damage from overuse is a function of the demand for the good and the marginal and average cost of supplying it. As usual, demand for the good depends on the number of users or the population, the price of related goods, and income. Income in this sense, however, is a function of whether there is a market for any surplus to be traded in. This market can be a regular trading market for goods through barter, with some form of currency, or a market for intertemporal trade—where surplus goods today are given away in exchange for receiving excess in the future (for example, the potlatch). Costs depend on the usual considerations of relative input prices and technology. Damage increases as the elasticity of demand increases, and the elasticity of supply decreases.

For some type of property  $i$ , consumption costs are described more generally as,

$$C_i = c(N_i, \text{Pop}_i, \text{Prel}_i, I_i, \text{Pinp}_i, \text{Tech}_i, \text{Cx}_i) .$$

Where:  $N_i$  = the degree of rights over property  $i$ ;

$\text{Pop}_i$  = the number of users of property  $i$ ;

$\text{Prel}_i$  - the price of goods related to property  $i$ ;

$I_i$  = income, or market opportunities for property  $i$ ;

$\text{Pinp}_i$  = the price of inputs in the production of  $i$ ;

$\text{Tech}_i$  = the technology used in the production of  $i$ ;

$\text{Cx}_i$  = a vector of other variables influencing consumption costs.

## 2. Monitoring Costs

On the consumption side, monitoring costs arise from efforts to minimize the non-optimal resource or output use outlined above. From a production perspective, monitoring costs stem from problems of shirking during production under different systems of property rights.<sup>13</sup> (The physical costs of producing the good given by input costs are reflected in the MC and AC curves above.) Monitoring costs will generally be higher under a system of common rights.<sup>14</sup>

Monitoring costs, as with other contract enforcement costs discussed later, vary with the type of property under consideration. Characteristics of property that affect the cost of establishing rights include how easily divisible, measurable, and contained the property is. As property becomes more difficult to delineate, monitoring (consumption and production) and exchange costs rise. Shirking costs in particular increase when output due to individual effort is not easily measurable. This is most often a factor with team production of joint goods,

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<sup>13</sup>It has been suggested that monitoring costs include the cost of actually getting individuals to commit their labour to the production process. Commitment costs are zero under private rights as individual property owners will engage in production themselves, or compensate others for their labour. Under common rights, however, there is little incentive for any individual to engage in production when they have no claim on the output. This distinction of commitment and shirking, however, seems to be mostly a matter of degree and unnecessarily clutters the discussion.

<sup>14</sup>Lueck (1991) derives results showing the decrease in effort when output is owned and shared by a closed group, compared to results under private property and fixed payment contracts.

goods that cannot efficiently be produced or captured by an individual. In general, shirking costs increase as the size of the team increases.

Hechter's (1990) discussion of shirking costs threatening group solidarity provides a useful framework for considering other factors. He argues that shirking costs are economized on by increasing visibility and sharing the monitoring burden.<sup>15</sup> Visibility is a function of the natural physical environment, whether the architecture of the group limits privacy, and public rituals (what Coleman (1990) refers to respectively as the constructed physical and social environment). Likewise, sharing the monitoring burden is facilitated by greater visibility, rewards to informants, and gossip.<sup>16</sup> The constructed environment is under the control of the group, and therefore can reflect the system of property rights. For example, the South Alaskan Eskimo shared all food in common in the summer when they cooked outdoors. In the winter, when indoor cooking was the rule and choice cuts of food could be concealed, food was private property (Jennes, 421). Likewise, if the community engages in the production of a lot of joint goods or incorporeal property, they may favour open dwellings where it is easier to monitor each other's activity. Errors in interpretation are minimized with cultural homogeneity.

Shirking costs arise under either system of rights, but are arguably somewhat higher under common rights. Suppose the objective is catching a whale, the optimal number of hunters is 10, and there are 100 members in the community to potentially share the meat. An individual is more likely to shirk knowing they

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<sup>15</sup>Hechter also argues that minimizing errors of interpretation with cultural homogeneity reduces shirking costs. While this factor probably becomes quite relevant as communities mixed and encountered European settlers, it has less applicability for the period under study.

<sup>16</sup>Visibility translates into lower shirking costs through shared monitoring, it will not be included as a separate variable.

have claim over 1/100 of the whale than if they have claim over 1/10 of it.<sup>17</sup> For this reason, methods to economize on shirking costs will be more likely with common rights and joint goods. A vivid example of this occurs with the Chugach Eskimo's rules for division of whales. While all meat was common property, there were special rules for the baleen and skins:

The whaler who first struck a whale with his lance had the right to the greater part of the baleen. The skin of a sea otter belonged to the man who hit it, and if several hunters struck the same animal, the skin went to the person whose arrow was nearest the tail. (Birket-Smith, 1953)

Monitoring costs for property  $i$  can be written as:  $M_i = m\{N_i, Typ_i, Sh[Senv(N_i)], V[Envo, Penv(N_i)], Mx_i\}$ .

Where:  $N_i$  = the degree of rights over property  $i$ ;

$Typ_i$  = the type of property;

$Sh$  = ability to share the monitoring burden;

$Senv$  = social environment including the frequency of public rituals, rewards to informants, and gossip;

$V$  = visibility;

$Envo$  = the openness of the natural physical environment;

$Penv$  = the openness of the constructed physical environment including architecture and limits on privacy;

$Mx_i$  = a vector of other factors influencing monitoring costs.

### 3. Exchange Costs

Exchange Costs include the costs of delineating, transferring, and enforcing rights. With no outside market for trading goods, common rights imply zero exchange costs.<sup>18</sup> If everyone "owns" the property, there are no buyers, hence

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<sup>17</sup>If the property is incorporeal and the productive effort is almost impossible to measure, the individual has even less incentive to devote their mental energies to the task.

<sup>18</sup>With outside market opportunities, the possibility of theft from the group arises. In that case, enforcement costs are high since everyone is a potential thief, but no one has enough of an individual incentive to spend resources protecting the communal property. Under private property, everyone except the owner(s) is a potential thief, but resources will be spent protecting the

no exchange. These costs, however, are positive for private rights, and increase with the amount of effort taken to establish or enforce these rights.<sup>19</sup>

Property type is again important for determining the cost of trying to exclude others and establish private rights. Difficult to measure, contain, and divide property, such as incorporeal property and joint goods, is more difficult to transfer, and hence increases exchange costs.

Exchange costs are expected to be higher for nomadic communities. It is harder to delineate and enforce rights on land only inhabited seasonally, hence nomadic behaviour discourages the formation of rights. Nomadic behaviour is largely determined by the communities ability (given the environment and technology) to practice agriculture.<sup>20</sup> Also, since ranching was almost nonexistent at this time, movement was also governed by the pursuit of game, such as with the buffalo hunt. It is assumed that agriculture and hunting only influenced the choice of property rights through their affect on nomadic behaviour.<sup>21</sup> Since no independent effect is assumed, they will be left out of the cost expression for simplicity.

Exchange costs are expressed as:  $E_1 = e\{N_1, Typ_1, Nom, Ex_i\}$ .

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property.

<sup>19</sup>Again, this presumes that individuals act in their own self-interest and that first Peoples, on average, have the same 'taste or distaste' for theft as white settlers. Some would dispute this of course, including Heckewelder's (1819) account of a 1771 encounter with an Indian trader. The trader was describing his "indian lock" , which consisted of a large hominy pounding block and a few sticks of wood to keep the door closed: "See my friend, this is an Indian lock that I am putting to my door." I answered, "Well enough; but I see you leave much property in the house, are you not afraid that those articles will be stolen while you are gone?" "Stolen! by whom?"—"Why, by Indians to be sure." "No, no," replied he, "no Indian would do such a thing, and unless a white man or white people should happen to come this way, I shall find all safe on my return."

<sup>20</sup>Nomadic behaviour and property rights could be simultaneously determined, but for this paper nomadic behaviour is assumed exogenous.

<sup>21</sup>Arguably they also affected the group's dependency on joint goods, which will be reflected in the type variable.

Where:  $N_i$  = the degree of rights over property  $i$ ;  
 $Typ_i$  = the type of property;  
 Nom = if the tribe was nomadic;  
 $Ex_i$  = a vector of other factors influencing exchange costs.

#### 4. Sanctioning Costs

Sanctioning costs refer to the costs of punishment for noncompliance with the property rules, so they increase with  $N$ , the comprehensiveness of rights. Punishment can take the form of stripping the individual of their reputation, status, or other human capital through symbolic sanctioning or public sanctioning; physical punishment; expulsion from the group; or appropriation of non-human wealth. (Hechter, 1990: pg. 138). Symbolic and public sanctioning is most effective when some group hierarchy exists.

Sanctioning costs to the community through expulsion are lowest when the group is geographically isolated, environmental conditions make survival difficult, and the neighbours are hostile.<sup>22</sup> One objective of war may have been to economize on these sanctioning costs by making the threat of expulsion a greater deterrent to unacceptable behaviour. This is particularly true in cases where warfare was not undertaken for economic gain. For example, many Plains Indians described warfare as a game, and gained great prestige through "counting coup" (touching their enemy without killing them). Practices of torturing captives further raised levels of hostility between enemy tribes (Driver, pg. 324/328). War was also a means of bestowing prestige, or other forms of human capital.

Although the necessity of sanctioning increases as rights increase,  $S'(N) > 0$ , the cost of sanctioning declines with the availability of punishments. For example, wealth appropriation is less costly as rights increase because there is more property to take away from the individual, so  $S'(Nh_k) < 0$ . Nonproperty

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<sup>22</sup>Other factors also play a role, such as when membership in the group involved a non-refundable investment.



punishments such as expulsion, or taking away human wealth in the form of a reputation or good name, also lower the costs of sanctioning when survival alone is difficult or a human capital has been created through ceremony or by moving up some social hierarchy,  $S'(Hk) < 0$ . There is an asymmetry between these forms of punishment, however. Physical property increases with rights,  $Nhk'(N) > 0$ . But given that human and nonproperty methods of sanctioning are substitutes for wealth appropriation, the opposite holds true with  $Hk'(N) < 0$ . As rights decrease, there must be a substitution to appropriating physical wealth.<sup>23</sup>

Sanctioning costs for property  $i$  are expressed as:  $S_i = s\{Hk[N_i, Hier, War], Nhk[N_i], Pk[Exp, War], Sx_i\}$ .

Where:  $N_i$  = the degree of rights over property  $i$ ;  
 $Hk$  = the frequency of public or symbolic sanctioning that appropriates human capital including reputation and status;  
 $Hier$  = emphasis on social classes or ranking;  
 $War$  = frequency and severity of war with neighbours;  
 $Nhk$  = non-human capital or wealth;  
 $Pk$  = all forms of physical punishment including death;  
 $Exp$  = expulsion from the group;  
 $Sx_i$  = a vector of other factors influencing sanctioning costs.

### C. EQUILIBRIUM

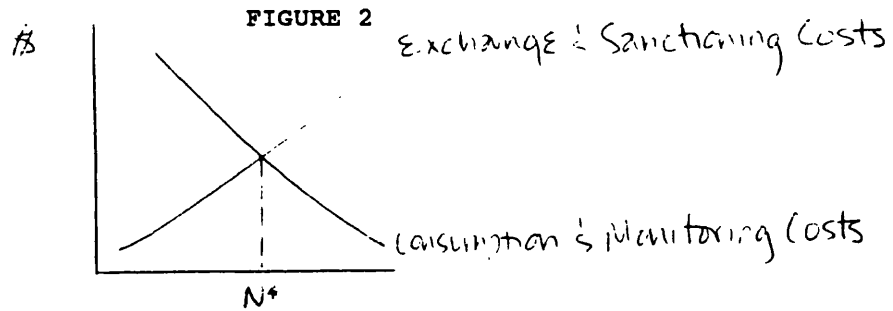
Since consumption and monitoring costs are decreasing in  $N$ , and exchange and sanctioning costs are increasing in  $N$ , the equilibrium can be solved as a simple cost-benefit problem. The objective is to choose  $N$  to maximize the net benefits from private property,<sup>24</sup> written as: Net Benefits = (Consumption + Monitoring)

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"Sanctioning costs also depend on the type of property involved, but may be independent of property rights. For example, costs are higher for incorporeal property—you can't take a song out of someone's memory.

<sup>24</sup>Obviously, given the dichotomy of private and common property this problem could equally be constructed to maximize the net value of common property.

Costs - (Sanctioning + Exchange) Costs. Summing  $i$  types of property over  $j$  communities, and letting  $X = Cx_{ij}, Mx_{ij}, Ex_{ij}, Sx_{ij}$ , for all  $i$  and  $j$ , the optimal degree of exclusive rights can be solved for as the reduced form equation:  $N_{ij}^* = n\{\text{Pop}_{ij}, \text{Prel}_{ij}, I_{ij}, \text{Pinp}_{ij}, \text{Tech}_{ij}, \text{Typ}_{ij}, \text{Senv}_j, \text{Envo}_j, \text{Penv}_j, \text{Nom}_j, \text{Hk}_j, \text{Pk}_j, \text{Nhk}_j, \text{Exp}_j, \text{War}_j, X\}$ . With the usual assumptions about smooth, differentiable, well-behaved functions the equilibrium for some property  $i$  can be represented as in Figure 2:



Of interest are the comparative static results for an increase in each variable. The predicted directions are given in Table 1:

TABLE 1

COSTS	VARIABLE	N	\$
CONSUMPTION	Pop	↑	↑
	Prel	?	?
	I	↑	↑
	Pinp	↑	↑
	Tech	↓	↓
MONITORING	Typ	?	?
	Senv	↓	↓
	Envo	↓	↓
	Penv	↓	↓

EXCHANGE	Typ	?	?
	Nom	↓	↑
SANCTIONING	Hk	↑	↓
	Nhk	↑	↓
	Pk	↑	↓
	Hier	↑	↓
	Exp	↑	↓
	War	↑	↓

### III. Empirical Results

The data set consisted of observations on up to 11 different types of property for 38 North and Central American Indian communities. The primary source was the Human Research Area Files (HRAF); an amalgamation of references and information on First Peoples' worldwide. Sources include books, journal articles, unpublished papers, archive documents, and diary entries.<sup>25</sup>

The dependent variable N was ordinaly ranked according to the exclusivity of property rights: 0 for open access; 1 for some communal ownership where the group was greater than the extended family but less than all the residents; 2 for the extended family; 3 for nuclear family ownership; and 4 for private (individual) ownership.<sup>26</sup> To accomodate a polychotomous dependent variable, an ordered probit model was used. Assuming simple linear relationships, the estimated

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<sup>25</sup>While a rich source, these anthropological collections require careful reading and cross-checks on interpretations before they begin to even classify as dirty data.

<sup>26</sup>Given the fine distinctions in some cases between these middle categories, the model was run with only three ordinal values for the dependent variable: 0 for open access, 2 for private ownership, and 1 for anything in between. The results do not differ significantly from the regression with 5 categories.

equation was:

$$\sum_i \sum_j N_{ij} - B_0 + \sum_j (B_1 \sum_i POP_{ij} + B_2 Nom_j + B_3 Nhk_j + B_4 Exp_j + B_5 War_j + B_6 \sum_i Typ_{ij}) + e_{ij}$$

The Chi-squared value for the regression,  $139.01_{(16)}$ , was significant at the .01% level. All the explanatory variables were binary, with their bases given in the second column of Table 2. Estimated coefficients and t-statistics are also given with significance levels at 1% (\*), 5% (\*\*) and 10% (\*\*\*) for a two-tailed test.

TABLE 2

VARIABLE	BASE	Est. Coef.	T-Stat
Constant		.876	3.831*
Pop	0 = sparse	.382	.873
Nom	0 = stationary	-.253	-1.092
Nhk	0 = no fine	.091	.509
Exp	0 = no expulsion	.676	2.082**
War	0 = non aggressive	-.468	-2.447**
Typ: Unimprvd Land	0 = otherwise	-.547	-2.339**
Fish	0 = otherwise	.321	.868
Agrc. output	0 = otherwise	.769	1.571
Other food	0 = otherwise	.629	2.054**
Joint food	0 = otherwise	-1.083	-3.060*
Shelter	0 = otherwise	.847	2.109**
Personals	0 = otherwise	1.789	4.339*
Tools	0 = otherwise	1.238	3.262*

Weapons	0 = otherwise	1.386	2.282**
Slaves	0 = otherwise	.637	.774
Incorporeal	0 = otherwise	.470	1.470

The first three variables representing population, nomadic, and human capital have the predicted signs, but are not significantly different from zero. Possibly the population variable, which measured density, was never a significant enough factor in the times when population was still relatively sparse. Communities with densities over 150 per hundred square kilometres (category 5 of 6) were coded with a one, however this is still a relatively sparse settlement. Also, some individual explanatory power may have been muted as population and fishing were highly correlated; the most densely populated areas were those along the coasts.

The mobility of a tribe was largely determined by food sources: where agriculture was practiced, there was less of a need to move for vegetation. Agriculture as a property type, therefore, may have taken some explanatory power from the nomadic variable. Also, the extent of mobility varied making clear divisions into categories difficult: some tribes moved regularly in search of food and were coded with a 1, others moved occasionally, or seasonally, but sufficiently more sporadically that they were given a 0.

Perhaps most surprising was the weak result for the non-human capital variable. The proxy used was whether the tribe sanctioned property crimes with a fine. It was believed that this variable would be positively correlated with the degree of property rights. While the estimated coefficient was positive, it was not significantly different from zero. This could be because fines presuppose private rights, and are not a good explanatory variable. Also, many tribes with private property simply sanctioned through other means: the Ojibwa used the fear of disease; and the Iroquois the severist punishment for the most despicable of crimes—public indignation. Since all fines were coded with a one, no

distinction was made reflecting graduated penalties. In some cases, such as with the Iroquois, the severity of the fine may have led to absolute compliance so no relationship would have been revealed.

Results for sanctioning costs were mixed. Expulsion was significant and with the predicted sign. War had the opposite sign to that predicted, refuting the notion that it may have served to lower sanctioning costs through increasing the threat of expulsion. In fact, the more comprehensive property rights, the lower the incidence of aggressive warfare. Two explanations come to mind: First, some of the most aggressive tribes were also nomadic, such as the Comanche, Crow, and Arapaho of the Plains. Second, while warfare may have decreased sanctioning costs, the threat of property loss through warfare may have been a larger factor. That is, for an aggressive tribe the cost of establishing private rights may have been too high given the possibility of theft or destruction from outside the group. Also, the threat of war may have minimized shirking problems under common property, making this a preferred system of rights.

The strongest results supporting the thesis came with property types against a base of hunting territories. Property rights were less comprehensive on unimproved land. Given the relative abundance and lack of value of this type of property, this result is not surprising. Striking results appear for food compared to joint food (food requiring a team effort to catch or consume). Food that is easily delineated and protected as private property had significantly more comprehensive rights than hunting territories, while joint food had significantly less. For personal items, tools, and weapons as well, property rights were significantly more comprehensive across tribes. This is also true for shelters, but with a smaller estimated coefficient. This may reflect the variance in shelter types based on necessities driven by the climate and need to transport them for nomadic tribes.

A lack of observations may have hurt the results for the remaining categories.

Fish and agricultural output had the predicted signs, but with less significance. Slavery was quite common, however, the nature of rights varied widely. Some groups in the Pacific Northwest, for example, considered slaves property over which all rights (including the right to kill) could be exercised. In other cases, slaves were simply war captives that were often eventually integrated into the community.

A surprising result arises with incorporeal property, expected to be negative. In fact, there are many cases of private property. The Western Basin Tubatulabal and Californian Porno tribes both had private property over songs, although they could not be sold, only inherited. For the Tewa of the Southwest, this was also true for songs, but individual curing techniques could be sold.

#### **IV. FUTURE RESEARCH**

Estimating a model with the system of property rights on the right-hand side is not traditional. Standard neoclassical analysis tends to take the system of rights as a given, upon which the business of exchange takes place. There is some ambiguity, however, determining what variables were truly exogenous. Ultimately, I would argue only the environment is exogenous. Next in line is the food and shelter dictated (with some choice available) by that environment. If trade was considered, I would include the neighbours in this list. There is some argument that many of the variables in the model have joint effects, or could be determined simultaneously. For example, the tribes location (environment) forces a nomadic lifestyle, dictating small transportable shelters, easily designated private property. A more sophisticated model could be estimated to capture this simultaneity, or perhaps a simple one with tests for joint significance.

Ambiguities in the data meant the actual estimation had to be conducted on a substantially narrower set of variables. Since, for each tribe, characteristics were common across all 11 property types, if one of the tribe variables was missing it meant throwing out all 11 observations for that tribe. In cases where

information on a single property type was missing, the cost, of excluding that from the estimate was simply the loss of one observation on property type.

One possibility for future work is to recode the data, with 1 on a variable indicating the behaviour was observed (such as aggressive warfare), and a 0 implying the behaviour was not observed, or not mentioned. The bias introduced would imply any results supporting the hypothesis were even stronger. That is, the recoding would bias the results towards estimates not significantly different from zero. Any positive results would therefore be stronger. This would also allow the database to be expanded to more communities.

The alternative chosen here was to restrict the dataset, and estimate the model excluding some variables that a reasonable interpretation from HRAF was not available. Recognizing that missing variables can bias the results and make the estimator inconsistent, attempts were made to find reasonable proxies for some missing variables. For example, the missing variables from monitoring costs were: Senv, the social environment; Penv, the constructed physical environment; and Envo, the openness of the natural physical environment. To capture the social environment, the importance of public rituals was examined. Every community, however, had some public ceremony, and while some, such as the Aztecs in Meso-America had highly organized rituals, it does not necessarily follow that compared to the lower-key practices of the Mescalero Apache that the rituals were any more effective at monitoring behaviour.

The construction of dwellings was researched as a proxy for Penv. Again, in almost every case more than one family occupied a single dwelling. While monitoring may have been easier with the rectangular plankhouse of the Nootka housing several families compared to the Hopi Pueblos of the Southwest with a single family per room but up to 200 rooms per dwelling, it seemed an arbitrary judgement. No information was available on the internal configuration of these



dwelling.<sup>27</sup>

The same argument holds true for attempting to rank the openness of the natural environment. While the Mandan Indians on the Plains seemed to have a more open environment than the woodlands of the Montagnais tribes, it seems unlikely this sort of constraint would be a determinant in the choice of property rights. I believe these variables belong in general in the model, but a more accurate measure of how they varied across communities is required.

The more difficult decision was made on the proxy for Hier, from the expression for sanctioning costs. Information was available on social status from the HRAF files. The variable, however, is intended to represent the removal of social status as a possible type of sanctioning. But public sanctioning that stripped individuals of prestige was only valid when some emphasis was placed on rank or social class. Unfortunately, how status was obtained, whether through war feats, other merit, wealth acquisition, or heredity, therefore no way of determining which could be taken away. The Pawnee acquired status with wealth or through heredity. For sanctioning, it is more relevant to discuss nonhuman capital sanctions, such as fines, as a punishment in the first case, while no stripping of prestige is possible in the second. Furthermore, while crimes of murder were often punished with elaborate public humiliations, little information was available on whether this type of sanctioning was applied to property crimes. Often elaborate spiritual guidelines were in effect warning offenders that while their crimes may go unpunished in this lifetime, they would suffer in another. Perhaps the threat of future penance was a sufficient deterrent for minor crimes. To include a variable measuring the presence of a social hierarchy, therefore, does not capture its relevance as a method of minimizing sanctioning costs with

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<sup>27</sup>Another problem was that information was mostly available by region, not community. In general, the "more sedentary peoples tend to have multi-family houses, the more nomadic tribes to live in single family structures." (Driver and Massey, pg. 312).

private rights.<sup>28</sup>

Ideally, better proxies can be found with continued culling of the HRAF files. Particular ceremonies, such as the potlatch, played a significant role in some communities. I believe they belong in the model, perhaps related to the income term, as a factor determining (or response to) the system of property rights. In its present form, the magnitude of the estimated coefficients have no significance—only their sign and that they are significantly different than zero.

#### V. Summary

*The President in Washington sends word that he wishes to buy our land. But how can you buy or sell the sky, the land? The idea is strange to us. If we do not own the presence of the air and the sparkle of the water, how you buy them?*

Such words from Chief Seattle in 1855 provide insights into the nature of people, but are also, the source of myths. To move from interpreting these words as indicating a particular view of nature, to a belief that First People's had no system of property rights is taking great literary leaps. This essay has not tried to argue that these communities did not have a unique relationship to the land, sky and sea, but rather that they behaved consistently with a model of economic man—maximizing the value of resources subject to certain constraints.

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<sup>28</sup>This variable was tried in the regression with the predicted result that it was insignificant.

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