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# Property Rights, Standards of Living, and Economic Growth: Western Canadian Cree

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Property Rights, Standards of Living, and Economic Growth:  
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## Abstract

The Great Divergence in standards of living for populations around the world occurred in the late 18th century. Prior to that date evidence suggests that real wages of most Europeans, many living in China and India were similar. Some a little higher and some a little lower but with a low dispersion. By the middle of the 19th century, a divergence had occurred with western Europe pulling away from other groups. Little is known about the standards of living of the aboriginal peoples of North America many of whom were primarily hunter/gatherer's at the end of the 18th century. Based on comparisons of expenditure, we show that the standard of living of aboriginal people in 1740 was similar to that of wage workers in London. However, within the next century, there would be a great divergence. This paper explores the ways in which hunter-gatherer lifeways and the concomitant property rights structures reduced the likelihood that native economy could experience modern rates of economic growth. Native society and property rights structures which provided a relatively high standard of living in the mid eighteenth century and for part of the nineteenth was unable to provide avenues for further development.

### *Introduction*

By the end of the twentieth century, aboriginal peoples through out the Americas were at the bottom of the income, education and mortality ladders. For example, infant mortality rates in Canada are 5/1000 but for those living in the Northwest Territories and in the new province of Nunavut, the respective statistics are 10.2/100 and 13.4/1000, considerably higher than the national average. The data for income and education attainment are similar. This paper does not suggest ways to ameliorate the current situation, rather it explores the position of Canada's First Nations in the eighteenth century when aboriginal people were independent nations but after contact with Europeans.

The focus here is on those aboriginal peoples living in a region extending essentially from the western edge of Hudson's Bay to the Great Plains. These groups, as all other Canadian first nations, were hunter/gatherer societies; a lifestyle they maintained even after the advent of a commercial fur trade and interaction with Europeans. Here we explore the institutions and property rights inherent in these societies and analyze their standard of living relative to wage workers living in England in 1740. We find that the standard of living of aboriginal people in 1740 was similar to that of wage workers in London who were the most highly paid in Europe (Allen, 2009). However in the next century, there would be a great divergence, with the living standards of wage workers in Europe pulling away from those of Native peoples. We explore how the structure of native institutions and property rights which provided a relatively high standard of living in the mid eighteenth century and for part of the nineteenth were unable to provide avenues for further development.

### *The Cree in the Western Woodlands*

Throughout the historical period, the area of central and southern Manitoba and Saskatchewan was inhabited by the Algonquian-speaking Western Woodland Cree and the Siouan-speaking Assiniboine. These were hunter-gatherers who migrated across the region with the seasons. Tribes whom we know now as the Western Woodland Cree occupied the full boreal forest west of Hudson and James Bays, including the northern portions of Ontario, Manitoba, Saskatchewan, and Alberta (Helm 1981, p. 256). The full boreal forest is densely forested with

white and black spruce, but also broad-leaved trees such as white birch and trembling aspen. To the north the boreal forest transitions into tundra and to the southwest into parkland and plains. Starting in 1670, the English Hudson's Bay company set up three fur trading factories on the coast of Hudson Bay: Fort Albany, York Factory and Fort Churchill, and the Cree traveled up river in birchbark canoes to trade at the Bayside posts. Despite an English presence along the Bay, throughout most of the eighteenth century, there was only occasional penetration of this region by Europeans.

In the forest, the main food animals are woodland caribou, moose, elk, wood bison and white-tailed deer. Of these, moose and woodland caribou were the more important. Smaller mammals that could be a source of food included beaver, hare, muskrat, woodchuck, porcupine and squirrel.<sup>1</sup> The main fur-bearing animals were beaver, mink, marten, otter, lynx, fox and muskrat.<sup>2</sup> Also traded, but of much less importance, were squirrel, wolverine, grey wolf and fisher (Helm 1981, p. 257). While caribou and moose were the primary food sources, Native Americans also consumed fish, waterfowl and berries when available. For the Plains Cree, the grasslands were well-stocked with game; pronghorn antelope, mule deer, red deer and bison. Of these, the bison was the most important, with bison hunts taking place during the summer. In the autumn, for protection from the elements, plains groups moved into the parkland, which was rich in a variety of resources with the exception of big game animals.

Although information on the socio-territorial organization of the Cree at this time is only fragmentary, it appears consistent with what is known from the late contact-traditional period. The smallest unit was the nuclear or polygynous family. Local bands consisted of several families headed by a leader. In summer, local hunting bands would come together as a regional band and camp in the summer grounds. At the same time, families were free to leave one group and move to another on the basis of kinship (Helm 1981, p. 259). The biggest gathering occurred in the summer when food sources allowed for larger congregations of people. In the late summer, the bands broke up as each family group traveled to its wintering territory. Autumn was the season for hunting moose, elk and caribou. The main time for hunting beaver and other small mammals for trade was late November and December, after the animals had grown winter pelts, and again in March when temperatures rose. In the sub-arctic environment, activities were

limited in January and February.

These were societies in which people moved to those resources at the time of year when they were most plentiful. Resources were cultivated and harvested but they were not planted or domesticated. Hunting for subsistence always carried with it an uncertain outcome, and as a result for all sub-arctic aboriginal populations, starvation was always a possibility. A winter with a lot of snow or one with too little snow would make hunting very difficult and could result in little meat. Institutional arrangements were such that they not only had to provide insurance against starvation, but also had to conserve the resource base.

*Native Peoples: Institutions and Property Rights*

There now exists a well defined literature linking security of property rights, lack of corruption, strong social capital, and good institutional structures to economic development. In his many books over the last thirty years, Douglass North (1970, 1981, 1990, 2005) had argued that good institutions matter. Good institutions are those that commit to the rule of law and the sanctity of property rights, allowing for investment and growth of markets. In his latest book, North, Weingast and Wallis (2009) posit that what is at issue is the extent to which non-elites had open or closed access to power, where open access to power structures promotes growth. In a series of now highly cited articles, Hall and Jones (1997, 1999), and Acemoglu (2002, 2007, 2008) and coauthors argue for a strong correlation between institutions and economic development. Indeed, Acemoglu, Johnson and Robinson (2002) propose that current performance relates to past choice of institutions. For those countries with a colonial past, whether a region faced extractive institutions or 'neo-European' institutions determined whether a country today is developed or not. Yet as Sokoloff and Engerman (2000) point out, these explanations have a tendency to take the current situation and read it back into the past. Many lower income countries of today were, in fact, high income areas in the 18<sup>th</sup> century. In their analysis Sokoloff and Engerman focus on the role factor endowments played in the construction of society and in the organization of labor.

Discussions of property rights are often starkly posed between open access-common property which is said to lead to over-exploitation, sometimes referred to as the "tragedy of the commons", and private property rights which are said to lead to optimal management and hence

growth. This dichotomy over-simplifies the usual choices. Property rights often lie between these two extremes, and this was true of the principles governing native behaviour. Native peoples in Canada developed rules that limited outside access to resources, but fell short of conferring private ownership. In fact, native groups did not 'own' their resources in the sense of having full and exclusive control. Rather, they abided by communal rules that governed extraction and access. Of fundamental concern to hunter-gatherers, including those who occupied the Hudson Bay hinterland, was the viability of the food supply; and so given the severity of the subarctic climate, a sufficient number of large game was vital. In response to this need, rules were developed to increase harvesting capacity over both the short and longer run. The institutional structure of aboriginal communities was communal and egalitarian.

It is not that these societies did not have abstract concepts such as private property. Aboriginal peoples in Canada had, in fact, well developed concepts of territoriality and trespass. In a wonderful description taken from the Jesuit Relations of an attempt by some Abenaki to reach Trois-Rivières in 1637, Bishop illustrates the rules governing trespass. The Abenaki wished to proceed down-river through land occupied by the Montagnais:

These barbarians have a very remarkable custom. When other nations arrive in their country, they would not dare pass beyond without permission from the Captain of the place; if they did, their canoes would be broken to pieces. This permission to pass on is asked for with presents in hand; if these presents are not accepted by the Chief, not being minded to let them pass, he tells them has stopped the way, and that they can go no further. At these words they have to turn back, or run the risks of war.<sup>3</sup>

Contemporaries, moreover, recognized the existence of group territories. They make reference to the land of the Montagnais, the land of the Cree, of the Huron, of the Iroquois, and of sub-groups among these. In fact, there were twenty to twenty-five identifiable groups exploiting the resources on or near the main water route between Québec and Sault Ste. Marie.<sup>4</sup>

Tying the concept of trespass to ownership, Bishop, citing Le Clerq, provides a seventeenth century example of hunting territories among the Attikamek, who were boreal Algonquians:

It is the right of the head of the nation ... to distribute the places of hunting to each



individual. It is not permitted to any Indian to overstep the bounds and limits of the region which shall have been assigned to him in the assemblies of the elders. These are held in autumn and in spring expressly to make this assignment.<sup>5</sup>

Yet rules of trespass and territoriality took second place to principles that enhanced the chances of survival in any given winter. One such rule is what has been referred to by John McManus as the “good Samaritan” principle.<sup>6</sup> This principle allowed an outsider to kill any potential food-source animal, including beaver, for personal use, but they were not permitted to sell the pelt.<sup>7</sup> As McManus points out, the good Samaritan rule limited the range of privilege of any native group to their land and ultimately affected, not just the ownership of the animal resources, but also the degree to which they were exploited. Another feature of aboriginal society was an “ethic of generosity.” Like the good Samaritan rule, the basis for this ethic was the unpredictable natural environment. Under this social norm, any visitor to someone’s encampment was to be supplied with food and shelter. Such actions were reciprocal and, in the subarctic world, were an insurance mechanism against the elements.

Although rights to small non-migratory fur bearing animals were quasi-private, ultimately access to large game animals was open access and common property. In Carlos and Lewis (2006), we show that open access to large game helped protect the total number of game animals relative to any environment with a delineation of territories among groups. In a case where each family or tribe had its own territory, there would have been an incentive to increase the numbers killed before the animals left their property. In the situation facing sub-arctic aboriginal hunter-gatherer communities, rules that promoted open access in fact promoted conservation over a more tightly defined set of property rights. Clearly the rules put in place by the Cree and Assiniboine enhanced survival of the group. These communal rules and open access to large game in turn generated some standard of living for aboriginal peoples. At issue is how their standard of living compares to that of lower wage English workers on the eve of the great divergence into modern economic growth.

### *Standards of Living*

There are several approaches one might take to measuring the relative standards of living

of natives and Europeans.<sup>8</sup> A common method when comparing countries is to express wages in terms of the local currency and use the rates of exchange between currencies (or prices expressed in units of silver), possibly adjusted for commodity prices, to arrive at a real wage comparison. Of course, this is not possible when dealing with a hunter/gatherer economy. The standard of living in a hunter/gatherer society can still be estimated; but it must be measured not by what individuals in the society had available to spend, but rather by what they consumed. This is the approach we take.

Specifically, we compare consumption by Cree and English workers in the bottom half of the income distribution over four commodity groupings: food, clothing, shelter, and luxuries. For natives, our estimates of food, clothing and shelter, namely those goods that provided for subsistence, are drawn from descriptions of traditional native life by anthropologists and historians.<sup>9</sup> The consumption of luxury goods is based on actual purchases at the York Factory trading post. English workers' consumption is drawn mainly from the work of Charles Feinstein (1998), Philip Hoffman et al (2002), Peter Lindert and Jeffrey Williamson (1983), and Carole Shammas (1990). English working-class families and Native Americans consumed very different amounts and types of goods, and faced very different prices. We adopt a method that allows for these differences in that it produces a range of real income measures some biased in favor of Native Americans, others favoring Europeans. Our preliminary results indicate that because of their far superior diet, a diet much more heavily weighted to meat, as well as the high quality of their clothing, Native Americans living in the hinterland of Hudson Bay likely had a standard of living that was comparable to that of contemporary low-wage English workers, despite their much lower consumption of luxury goods and poorer housing.

### *Food*

Adult males needed 4,500 to 5,000 calories per day in winter to meet the nutritional demands of the low temperatures and their level of physical activity.<sup>10</sup> Fewer calories were required in the summer, but, still, consumption of meat flesh over the course of a year would have averaged at least four pounds per adult male per day, an extraordinary level of expenditure. At English prices, the annual cost of consuming four pounds of meat per day was £20. Assuming women consumed 25 percent less than men and children 50 percent less, the annual cost to a family of

five would have been £65. To appreciate the size of this expenditure, consider that in 1755 the total annual earnings for non-farm English common labour was £21 (Lindert and Williamson 1983, p.4). In other words, the native diet would have cost a low-wage English worker more than three times his annual income. Indeed valuing food this way would place the cost of the native diet well above the food expenditure of the highest paid workers in England, who at the time were solicitors and barristers.<sup>11</sup> Natives in the region of Hudson Bay would hardly have had the living standards of solicitors and barristers, nevertheless, the comparison does point to the importance of food in assessing the relative incomes of Europeans and Native Americans.

Shammas (1990, p. 135) estimates that in the 1790 the caloric intake of adult male workers in England averaged between 2,500 and 2,700, with consumption somewhat lower in the South than the North. Feinstein (1998) has also estimated expenditure shares. By combining these estimates, we can obtain at least a rough picture of the caloric composition of the English diet. In 1790 English working-class families were allocating 13 percent of their food budget to beef, mutton and pork; but because the price per calorie was much greater for meat than other goods, just 5 percent of total calories were meat-based. Meanwhile close to 90 percent of calories were obtained from grains and potatoes. But as Allen (2009:28) writes: “Meat was an important preferred food.” Natives, meanwhile, would have received at least 70 percent of their calories from the meat of large game; and consumption of all meat flesh, including small game, waterfowl, and fish, would have accounted for more than 90 percent of total calories. The relative quality of the two diets is suggested by two measures: the protein content per calorie and the average cost per calorie, based on English prices. By either of these measures, not only did natives in the Hudson Bay region consume perhaps 50 percent more calories than English workers, they consumed those calories in a form that was of much higher quality as reflected by their protein content and price in England.

### *Clothing*

From the most contemporary description of the Cree living in the Hudson Bay region, it appears that an adult allocated five moose skins annually, or their equivalent, to garments, and three deerskins, or their equivalent, to moccasins. These materials could be valued using the market

prices of such skins in England or at the prices paid for such skins at the Bay-side posts. Using the most conservative pricing rule, we estimate that the material in Native clothing was £2.6. Yet regardless of whichever conversion rate is assumed, spending by English workers on clothing was much less. Feinstein estimates that in the late eighteenth century working-class families allocated spent about £1.2 annually on clothing (Feinstein 1998, p.635; Lindert and Williamson 1983, p. 4). If the material in native clothing is valued at English prices, the expenditure on clothing by low-income households was less than one-tenth the £13 value of Native American clothing. Even if the lower York Factory prices are used, low-wage English households were spending no more than half that of Native Americans. Middle and upper income households in England, of course, spent more. Workers in what Lindert and Williamson describe as the “labor aristocracy,” allocated about 25 percent of their budgets to clothing (Lindert and Williamson 1983, pp. 3, 7). Thus, the value of their clothing would have been similar to that of native families, assuming the valuation is at English prices. Assigning British prices to animal skins may overstate the relative quality of native garments; but even if Hudson’s Bay company prices are used, the cost of native dress was still more than double that of the low-income English family. Thus, Native Americans must be regarded as having been very well clothed by English standards.

### *Housing*

Although Indians in the Hudson Bay hinterlands were semi-nomadic spending much of their time out-of-doors, shelter was an important determinant of their living standards. Still, native housing in the Hudson Bay hinterland served a much more limited purpose than did European dwellings. The Cree used different forms of habitation depending on the time of year. In the winter they lived in units of three to four families, totaling about fifteen people, and occupied dome- or conically-shaped, *wigwams*, which could be constructed within two hours of setting up camp. These dwellings had a diameter of twelve feet and a floor area of 113 square feet, which allowed for 7.5 square feet per person. Eight to twelve large skins, usually of inferior grade, were needed and these had to be replaced regularly due to the harsh winter conditions.<sup>12</sup> Assuming that hides were replaced once each winter and ten caribou or moose

skins were needed for a *wigwam*, again using the Bay-side prices, the material cost can be put at £5, or £0.33 per person.

During the summer, natives congregated in long houses which accommodated much larger groups. These log structures ranged in size depending on the number of families. Long houses of 100 feet by 20 feet were typically occupied by twelve families with sixty members.<sup>13</sup> The living area was therefore 33 square feet per person. A basis of comparison for valuation purposes is provided by the houses of early nineteenth-century settlers to Upper Canada (Ontario), a province with a climate more similar, if somewhat milder, than the Hudson Bay hinterland. The basic timber one-story house was perhaps closest in value to the long house. Based on the property assessment of the time, it had a value of about \$120 which converts to £25 sterling in the mid-eighteenth century.<sup>14</sup> Assigning this value to a long house, which was larger but of lower quality, implies housing per native of £0.4.

The quality of shelter in England was heavily dependent on income. Lower income households in the late-eighteenth century were allocating about 10 percent of their income to rent; and since the lowest wage non-farm workers received just over £21 per year, annual rent would have been just over £2 (Feinstein 1998, p.635; Lindert and Williamson 1983, p. 4). Capitalizing this amount over 20 years at 6 percent gives a dwelling value of roughly £20, or £4 per person for a family of five.<sup>15</sup> Thus, the per-capita value of Native American housing, at £0.33 to £0.4, was perhaps one-tenth that of the lowest-wage non-farm households in England. The main reason English dwellings were of much higher quality was their relative permanence. Of course, to a much greater extent than was true of Europeans, Cree living conditions were affected by the outside environment especially during the summer months and the very low population density for aboriginal groups of roughly one person per 100 square kilometers not only affected the quality of life directly but also could have contributed, like their diet, to improved health. In England, by contrast, the high urban density with its associated problems of waste and unclean water, made cities unhealthy places in which to live. We are not factoring these differences into our estimates relative housing values. Accounting for them would certainly improve the relative position of Native Americans.

*Luxuries*

Food, clothing, and shelter satisfied the basic needs of Native Americans and Europeans, but especially after the advent of the commercial trade, luxury goods comprised a greater part of the native consumption bundle. The data that follow come from York Factory and the trade conducted there in 1740. The York Factory records show that, in 1740, luxury items comprised 47.5 percent of total expenditure by native traders, with alcohol and tobacco accounting for roughly half the value of luxuries. Using the same pricing structure as for clothing, the value of the total consumption of luxury goods by natives in 1740 converts to between £850 and £1,275.<sup>16</sup> It is not clear how much alcohol made its way back into the hinterland in that much of it would have been consumed at the post.<sup>17</sup> If alcohol is not included, native families in the York Factory hinterland were receiving £725 to £1,090 in luxury goods in 1740.<sup>18</sup> The best estimates of pre-contact native population for the region about 7,500 people.<sup>19</sup> This converts the total expenditure on luxury items to between 2.3 and 3.4 shillings per capita, or 11 to 17 shillings for a family of five. If we exclude alcohol, the value of these luxuries per family was about 2 shillings less.

Feinstein studied English household budgets, and although his work does not include a category for luxury items per se, he does estimate that tea, coffee, sugar and treacle accounted for 6.9 percent of workers' expenditures (Feinstein 1998, p.635). In addition, 10 percent of the budget went to "drink." Omitting alcohol, and assuming that the remaining items accounted for nearly all luxury expenditure, the family of a low wage worker, that is, one earning £21, would have been spending 28 shillings on luxury items. This is between two to three times the expenditure of the native household. Relative to Europeans, natives consumed even less alcohol, indeed much less. Native consumption averaged just 2 shillings per family as compared to 40 shillings for the English.<sup>20</sup>

### ***Relative Living Standards: Natives in the Sub-Arctic and English Workers***

Aboriginal peoples living in the hinterland of Hudson Bay and English workers faced very different prices and consumed very different bundles of goods. We approach their relative living standards by introducing expenditure functions, where tastes in addition to prices are allowed to differ. Utility is represented by:  $u^i(\mathbf{x}^i)$ , where  $\mathbf{x}^i$  is a vector of consumption,  $i = N$

(native), E (English workers). For price vector,  $\mathbf{p}^j$ , where  $j = N$  (York Factory region), E (England), the expenditure function can be expressed as:  $e^i[\mathbf{p}^j, u^i(\mathbf{x}^i)]$ . Relative income from the perspective of natives is derived as the ratio of their actual expenditure to the expenditure that would be

required to achieve the utility they would receive from the English consumption bundle:

$$\frac{e^N[p^N, u^N(x^N)]}{e^N[p^E, u^N(x^E)]}. \text{ From the perspective of English workers relative income is derived}$$

similarly as the ratio of the expenditure that would provide the utility of the native consumption

$$\text{bundle to actual expenditure: } \frac{e^E[p^E, u^E(x^E)]}{e^E[p^N, u^E(x^N)]}. \text{ Both are measures of the incomes of natives}$$

relative to English workers, but the first will tend to overstate and the second understate natives' relative living standard.

The utility function specification is an important feature of the analysis. Because food made up by far the largest share of the budgets of both English workers and natives, how food is treated is important to the issue of overall real incomes. We see food as playing two roles in regard to utility. First it provides the energy and other inputs needed for survival, in that regardless of the mix of food types, individuals must meet a nutritional constraint.<sup>21</sup> Second, although those with the same nutritional demands in terms of work effort and climate are assumed to consume the same number of calories, they may do so in forms that can provide different levels of utility. In particular, individuals are assumed to be better off if they reach their calorie constraint with a diet that is preferred.

The quality of diet can have many aspects, but here we assume there are two types of foods,  $m$  (meat) and  $g$  (grain), both expressed in (kilo)calories. Normalizing the calorie constraint to one, the utility function includes the constraint:

$$(1) \quad 1 = g + m,$$

where  $g$  is consumption of grain, and  $m$  is consumption of meat, both in terms of normalized calories.<sup>22</sup> Otherwise, the utility function is assumed to be Cobb-Douglas in food and other goods, where the food component allows for a diminishing marginal rate of substitution between

meat and grain:

$$(2) \quad u = (g + am^\alpha) \prod_{i=1}^n c_i^{\beta_i} ,$$

where  $c_i$  is consumption of (non-food) good,  $i$ , and  $a$ ,  $\alpha$ , and  $\beta_i$  are utility parameters. Given the calorie constraint, it follows that the utility from food is maximized where  $m = a\alpha^{\frac{1}{1-\alpha}}$ .<sup>23</sup>

Substituting the calorie constraint, the utility function becomes:

$$(3) \quad u = (1 - m + am^\alpha) \prod_{i=1}^n c_i^{\beta_i} .$$

Treating grain as the numeraire, the income constraint is:

$$(4) \quad Y = 1 + (p_m - 1)m + \sum_{i=1}^n p_i c_i ,$$

where  $p_m$  is the price of meat and  $p_i$  is the price of non-food good,  $i$ . The optimization problem is:

$$(5) \quad \max_{m, c_i} U = (1 - m + am^\alpha) \prod_{i=1}^n c_i^{\beta_i} + \lambda [Y - 1 - (p_m - 1)m - \sum_{i=1}^n p_i c_i] .$$

The first order conditions imply the following relation between meat consumption and the consumption of non-food goods:

$$(6) \quad \frac{a\alpha m^{\alpha-1} - 1}{1 - m + am^\alpha} = \frac{\beta_k (p_m - 1)}{p_k c_k} , \quad p^m \geq 1, \quad k = 1, \dots, n.$$

Given relative prices of meat and grain, natives would have been consuming close to their

optimal diet, setting  $m$  equal to  $(a\alpha)^{\frac{1}{1-\alpha}}$ . Note that the RHS of equation (6) is increasing in  $p^m$

and the LHS is decreasing in  $m$ ; so higher meat prices lead to less meat consumption and for  $p^m > 1$ , meat consumption will be rising with income.<sup>24</sup> Low-wage English workers, who faced high meat prices, consumed much less meat than would have been optimal. We allow for differences in native and English tastes as reflected in the parameters of utility functions, but in both cases the exponent,  $\alpha$ , is set at 0.5.<sup>25</sup> The remaining parameters are inferred from the



consumption baskets of each of the groups and are given in Table 1.

Combining relative consumption of the four categories of goods we can compare the relative utility levels of the two groups, and from the expenditure function derive estimates of relative real income.<sup>26</sup> Not surprisingly the results depend importantly on whether the comparison is based on native or English utility weights and prices. Where native weights are assumed, the question being asked is: what is the minimum income level that would allow natives the same utility as the utility they would derive from the English consumption basket. Applying the weights in Table 1, we compute a utility level for natives 7 percent to 34 percent above the utility they would have received from the English basket, which converts to a real income level that was 6 percent to 21 percent greater given in Table 2. The range is due mainly to different assumptions about native clothing.

The comparison based on English weights asks how large a change in English household income would be equivalent to their adopting the native consumption bundle. Note that in the case of food, the native consumption level is treated as the optimal combination of “meat” and “grain” for Europeans. That is, the English are assumed to obtain half their calories from meat rather than 13.9 percent. Because English households placed less weight on meat and clothing, and considered housing and luxuries to be relatively more important, the native budget would have been considered inferior, as is reflected in our real income measures. Based on English weights, the “high” estimate implies a the loss to English households equivalent to a 17 percent decline in their income; the “low” estimate implies a loss of 26 percent. The implication is that moving to the Native American diet and having higher quality clothing would not have compensated low-wage English families for their better housing and greater consumption of luxuries.<sup>27</sup> On the other hand, as just noted, Native Americans would not have chosen the higher levels of consumption of housing and luxury goods enjoyed by Europeans, if they were forced to reduce their consumption of food and clothing to European levels. This result, although possibly not surprising, does point to the potential importance of tastes in determining which society people will choose. More importantly, we find that whatever assumptions and weights are used, the real incomes of Native Americans and low-income English families were not very different. The estimates fall in a range of plus or minus 25 percent.

Aboriginal communities certainly lived frugally by later standards. But they had a standard of living that was in many respects the equal of most Europeans. Moreover, their “biological” standard of living, as defined by John Komlos (1995), was especially high because of the high level of meat consumption and the generally healthy environment. Our findings accord with the work of Steckel and Prince (2001, 2003) who, based on the anthropological work of Franz Boas, concluded that the American Plains Indians were considerably taller than Europeans and in fact “the tallest in the world.”<sup>28</sup>

### *Golden Age*

The eighteenth century might very well have been a Golden Age for the Aboriginal populations in western Canada. Their hunter/gatherer lifestyle combined with European metal goods and luxury items accessed through the commercial fur trade provided them with a standard of living on a par with English wage workers. Unfortunately that Golden Age was short-lived. A continued dependence on a renewable natural resource base comprised of large game animals and fur-bearers ruled out the long-term economic growth characteristic of modern economies. Native Americans were able to adopt European technology as it became available, and the new methods allowed them to hunt and trap more effectively; but ultimately both the trade in beaver and other furs, and the harvest of large game, was constrained by the rate at which these resources could be replenished. In addition, the fur trade, by its nature, placed a ceiling on incomes. The size of the animal population was limited and, even the best management could provide only a modest income by nineteenth century standards. Moreover, once the beaver became depleted, even the returns of the mid-eighteenth century could not be sustained.

By contrast, technological change in English husbandry and arable farming increased not only labor productivity it also meant more agricultural output could be produced on a given amount of land, and more land could be brought into production. The increased farm output allowed for population growth, not readily available to Native populations. And the dramatic improvements in manufacturing productivity associated with the Industrial Revolution first in England and then in Continental Europe further increased the gap between Europeans and Native Americans.<sup>29</sup>

The experience of Native Americans was also very different from those Europeans who were colonizing the North American continent. The activities of two New Englanders, John May and Samuel Lane, highlight the contrasting paths. May, who was born in Massachusetts in 1696, had progressed by the early 1730s from day laborer to “prosperous farmer-artisan,” owning a tannery in addition to his farm.<sup>30</sup> In the 1740s, Lane, of Stratham, New Hampshire, also developed a tannery as well as a shoemaking business.<sup>31</sup> Thus, both May and Lane, notably with help of capital from their fathers, were able to start small businesses, each finding a niche in their local communities. Were there such niches in native society? Native trappers prepared the skins and pelts before they were traded to the Hudson’s Bay Company or the French, and the next step would have been combing these pelts to separate out the beaver wool, an activity that might have been undertaken in North America. Although possible, the Hudson’s Bay company chose to process the furs in England rather than at the Bay.<sup>32</sup> So although the natives had direct access to the resource, they did not progress beyond the primary stage of the production process.

In colonial New England, providing goods and services to a local market was an important means of promoting economic growth. The scale of production may have been small, but the specialized nature of their businesses allowed colonial entrepreneurs to cater to the specific demands of the local consumers and thus compete with the more standardized imports. Native society, with its limited range of largely subsistence goods, could not support such activity. To the extent that there was retailing it was conducted by the Europeans. There was, however, one native group that did occupy an important niche in the fur trade. Groups that became known as the Home Guard Cree remained at the Bay throughout the summer and acquired European goods not primarily by trading furs, but rather by provisioning the Hudson’s Bay Company posts, mainly with large game and waterfowl. Although these were the groups who may have benefitted most from the fur trade, they also developed the greatest dependency on the Europeans.

Natives had long developed a society with supporting institutional structures and property right regimes that allowed them to meet their subsistence needs, and with the fur trade to supplement their traditional activities, they achieved by the mid-eighteenth century a standard of living that was likely comparable to that of most Europeans. Unfortunately, the natives’ reliance

on hunting meant that their economy was incapable of much further development. In that sense Aboriginal peoples were destined to a largely unchanging way of life. The markets that were so important to the rising income levels in colonial New England and the technological changes of the agricultural and industrial revolutions in Europe could not take hold. In their society there was little demand for the sorts of the goods that would have led to a local production sector, such as the chairs, tables, and leather goods produced by John Lane and Samuel May. And so, from a mid-eighteenth century base, when native communities and the lower tier of European society were roughly on a par, there grew a widening gap in both per capita income and population.

Adam Smith's insight that the degree of specialization is limited by the extent of the market is at the crux of the dramatically different experiences. In Europe and in colonial America, as local markets grew and foreign markets became more accessible, individuals specialized to an increasing extent in those commodities where they had an advantage, and the specialization itself promoted higher productivity. Not only was there an advantage in terms of agricultural output, specialization promoted a change in the nature of consumption, whereby the output of clothing and other household goods shifted from home to commercial manufacture. As each group started to do what each did best, small businesses arose furthering the growth of a market economy. Native American lifeways provided no such avenues for growth. That a continuation of Native American society was incompatible with the type growth experienced by European and North American societies is a tragedy whose consequences have persisted to the present day.

Table 1  
Parameters of the Utility Function  
( $\alpha = 0.5$ )

	English parameters	Native American parameters
$a^a$	1.41	1.79
$\beta_1^b$	0.135	0.077
$\beta_2^b$	0.054	0.125
$\beta_3^b$	0.152	0.04

<sup>a</sup> Based on the utility function, where optimal consumption of calories in the form of meat ( $m$ ) is assumed to be .8 for Native Americans and .5 Europeans. This is the solution to  $m = (\alpha \alpha)^{\frac{1}{1-\alpha}}$ . Excluding sugar and alcohol,  $m = .5$  was roughly the consumption of the top 5% of English households in 1688. See Hoffman et al. (2002, p.326).

<sup>b</sup> English workers: Treating coffee, tea, sugar, and alcohol as luxuries rather than food, the percentage consumption shares derived by Feinstein (1998, p.635) for English workers in 1788 are: food - 62.1, of which 72 percent is grain-based; housing - 15; clothing - 6; and luxuries - 16.9. For purposes of estimation, “meat” is assumed to include beef, mutton, pork, milk, butter, and cheese; “grain” includes bread, flour, oatmeal and potatoes. The 13.9 percent of calories were from meat and 86.1 from grain, and the price per of meat of meat was 2.38 times the price per calorie of grain (see Table 1). Substituting  $m = .139$  and  $p_m = 2.38$  into equation (6), we solve for  $\beta_k/p_k c_k$  to be 0.468. It follows that  $\beta_k = .468 \times p_k c_k = .468 \times s_k \times Y$ , where  $s_k$  is the share of income spent on good  $k$ . Total expenditure on food, in terms of the normalization, was  $g + p_m m = .861 + 2.38 \times .139 = 1.192$ . Since 62.1% of the budget was allocated to food, it follows that  $Y = 1.920$ , and  $\beta_k = .899 \times s_k$ .

Native Americans: For  $p_m = 1$ , which is the case for natives, the elasticity parameters,  $\beta_k$ , correspond simply to the factor shares of each of the goods. In computing factor shares we use the *made beaver* values rather than sterling prices, involve a choice of the appropriate conversion rate. We put the value of housing at £2 per family or  $8mb$  at the conversion rate of 5 shillings per made beaver. Adding the cost of fuel would likely double this estimate (for the English worker the cost of fuel was 40 percent of the total housing costs). We also estimated clothing at  $16mb$  for an adult male and  $52mb$  for a family. This value almost certainly overstates the relative value of clothing since part of the price at the trading post reflected the cost to native traders of transporting moose and deer skins, which were had a relatively low value-to-weight ratio. We take  $26mb$  as a better reflection of the cost to those who used the skins directly. Finally, the  $17,000mb$  in luxury goods received by natives in the region converts to  $10mb$  per family. Assuming that 25 percent of the budget went to goods other than food, the implied expenditure shares are: housing - .077, clothing - .125, luxuries - .048.

Table 2  
Household Consumption, Utility, and Real Income  
Native Americans/English Workers

	<b>Food</b>	<b>Clothing</b>	<b>Shelter</b>	<b>Luxuries</b>	<b>Utility</b>	<b>Real Income</b>
<i>High Estimate</i>						
Native Weights	1.18	10	.33	.21	1.34	1.21
English Weights	1.08	10	.33	.21	0.83	0.83
<i>Low Estimates</i>						
Native Weights	1.18	2.2	.33	.14	1.07	1.06
English Weights	1.08	2.2	.33	.14	0.72	0.74

Source: See Text

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1. A sub-species of hare, the varying hare, also known as the snowshoe hare, was the most important of these smaller mammals. They ranged over much of the northern half of North America.
  2. Beaver was by far the most important pelt traded by number and value.
  3. Bishop, "Territoriality," p. 47.
  4. Bishop, "Territoriality," p. 46.
  5. Ibid. p. 57. Chrétien Le Clercq was a Jesuit who spent a twelve year ministry (1675-1687) among the Micmac of the Gaspé region of New France. His journals form part of the Jesuit Relations: a set of documents on the travels and explorations of the Jesuit missionaries in New France, 1610-1791.
  6. McManus, "An Economic Analysis," pp. 48-51.
  7. Beaver had long been a source of food and clothing for natives; but it was only with the arrival of the Europeans that they became a trade good as well.
  8. Subsequent material comes from chapter 8 of our forthcoming book, *Commerce by a Frozen Sea* (2010)
  9. A detailed summary of much of this evidence is contained in Helm (1981). Other important work includes: Francis and Morantz (1983), Jenness (1963), Rogers (1963), Steegmann (1983), Turner (2001), and Winterhalder and Smith (1981).
  10. Rogers and Smith (1981, p. 135). These estimates are for the shield of the McKenzie

borderlands, which is a region west of the Hudson's Bay hinterland and includes a more northerly portion. Caloric requirement in the fur-trading area of Hudson Bay may have therefore been somewhat less.

11. The annual earnings of solicitors and barristers was £231 and they would have allocated less than 30 percent to food. Lindert and Williamson (1983, p. 4), and Hoffman et al. (2002, p. 326).

12. Turner (2001, p.299) put Nenenot lodges at 10-18 feet in diameter and 10-15 feet high, while Jenness (1963, p. 89) reports diameters of 10-12 feet. and heights of 8-10 feet.

13. Francis and Morantz (1983) note the varied sizes of pre-contact Cree dwellings based on archaeological evidence. Their lodges were comparable to the Huron long houses, described by Jenness (1963, p. 88), as being 50 to 60 yards by 12 yards and housing 24 families.

14. In 1826 only one-third of residences were assessed. The one-story timber houses were of higher quality than the log houses that were occupied by most of the population. In addition to a planked floor and other amenities, the feature that may have contributed most to the higher quality of colonial homes was a chimney (Lewis and Urquhart 1999, pp. 164-65).

15. Shamma (1990, p.160) reports that an eighteenth century "mud and stud cottage" could be built for £20 to £30.

16. This is an underestimate of the total value because we have no information on native-produced luxury goods.

17. In some years native traders received a substantial share of their alcohol as "gifts" in the ceremonies that proceeded the actual trading. This alcohol would certainly have been consumed at the post. Some of the alcohol obtained through direct trade may have been transported inland.

18. This is the value of luxury goods received at York Factory increased by 20 percent to allow for trade with the French.

19. Ubelaker's (1992, p.172). population estimate for the whole subarctic region at contact is 103,330 which implies a density of 2 persons per 100km<sup>2</sup>.
20. Those who came to the post would have consumed much more than the overall native average.
21. The calorie constraint varied of course with climate and lifestyle. Sub-arctic Native Americans had to meet a much higher constraint than did most western Europeans. Shammass (1990, p. 135) puts the eighteenth-century calorie requirement in England at 2,500 to 2,700 in adult male equivalents. This compares to a (sub-arctic) Native American requirement of perhaps 3,500 to 4,000. Treating calorie consumption as independent of income and prices must be regarded as an approximation. Logan (2004b) finds a positive relation between income and calories in late-nineteenth-century Britain and the U.S., with the elasticity declining with income. Logan (2004a) finds much smaller income elasticities of demand for calories in developing countries. Even in the late nineteenth-century, despite the 20% lower price of calories in the U.S. than in Britain, the higher income, and the possibly more active life style, per capita calorie consumption was just 13% greater.
22. We are assuming the calorie constraint is binding both from above and below.
23. This is derived by maximizing  $1 - m - am^\alpha$  with respect to  $m$ .
24. Note that  $p_k c_k$  increases with income.
25. The results are not sensitive to parameter,  $\alpha$ .
26. Where the comparison is based on English weights and prices, relative expenditure is based on the solutions to equations (4) and (6). Where native weights and prices are assumed, the model simplifies to choice over only non-food goods, because at all income levels natives continue to consume the optimal mix of "meat" and "grain."

27. In the case of luxuries most of the difference was due to much greater consumption of alcohol by the English.
28. On Ireland see Mokyr and O Grada (1994), and Steckel and Nicholas (1997); on Medieval heights see Steckel (2004); on U.S. heights see Komlos (1995, XIII), Steckel (1994), and Steckel and Haurin (1994) - but for an alternate view see Sokoloff (1995). On the heights of American Plains Indians see Steckel and Prince (2001, 2003).
29. There is debate about the timing of the increase especially of working class wages, but there is no question that the real incomes of all workers ultimately grew. See Feinstein, "Pessimism Perpetuated," and Lindert and Williamson, "English Workers' Living Standards."
30. Main, *Peoples of a Spacious Land*, pp. 203-08.
31. *Ibid.*, pp. 211-15.
32. The nature of the workshops needed for combing pelts must also be taken into account.