

Trade, Consumption and the Native Economy:
Lessons from York Factory, Hudson Bay

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Like European and colonial consumers, eighteenth-century Native Americans were purchasing a greatly expanded variety of goods. Here the focus is on those Indians who traded furs, mainly beaver pelts, to the Hudson's Bay Company at its York Factory post. From 1716-1770, a period when fur prices rose, there was a shift in Indian expenditures from producer and household goods to tobacco, alcohol and other luxuries. We show, in the context of a model of consumer behavior, that the evidence on consumption patterns suggests strongly that Indians were increasing their purchases of European goods in response to the higher fur prices, and perhaps more importantly were increasing their effort in the fur trade. These findings are contrary to much that has been written about Indians as producers and consumers.

Eighteenth-century families from the Friesenland to the Tidewater of the Chesapeake were accumulating goods. Personal and household diaries, firm and probate records, document the increased variety and range of commodities held by households; among them oak chests, pottery, fine curtains and mirrors, along with new groceries items, such as sugar, tobacco, and rum.¹ Concomitant with this widening in the range of consumer goods was an increase in British and European overseas trade. Indeed, it was long-distance exchange that allowed Europeans and colonists alike to enjoy the new products that became important components of the eighteenth-century consumption basket. To date research on consumers has focused on households in Europe and colonial America, but other groups participated in the consumer revolution, enjoying the greater variety that was made possible by the long-distance trade.

A reflection of the fur trade that supplied the hatting and felting industries in England and France with beaver pelts, Indians were increasing their purchases of European goods. Although

beaver were harvested in many parts of North America, the highest quality pelts came from the drainage basin of Hudson Bay. Here, as in other regions, only Native Americans hunted and trapped the fur-bearing animals and thus were the primary agents in a market where furs were bartered for European commodities. By this process, Indians gained access to goods, both producer and consumer, that previously had been unknown. Our objective is to examine the responses of Native traders to the opportunities that were made available to them in terms of what they purchased and how these choices, in turn, reflected on their allocation of time between the fur trade and other activities.

The detailed and, in many ways, unique data set that is part the Hudson's Bay Company records provides a window on the cultural life of many of these groups. Arthur Ray and Edward Rogers have made particular use of the records, but other researchers, among them geographers, anthropologists, archaeologists and historians, have turned to the Hudson's Bay Company accounts to help them explore Indian cultural life both before and after European contact.² In fact Ray and Rogers have described not just the cultural interactions and how they were affected by trade; they have reviewed as well the impact of European goods on Native means of production and discussed how the new production methods and new consumption goods may have altered Indian treatment of their environment. Nevertheless, within this extensive literature, nowhere is there a fully systematic account of the trade goods Indians were receiving and how the composition of these goods changed over time.

Our focus is on those Indians who traded furs to the Hudson's Bay Company, and although we have collected data from several of its trading posts, we report here only on the trade at York Factory, focussing on the years 1716-1770. By analysing the consumption of those Indians who participated in the trade over this period, we hope to shed light both on some historical issues relating to the patterns of Indian consumption, and on the behavior of Native Americans in the presence of what was an improving market for their output.

The trade accounts from York Factory suggest that Indians did indeed respond to the

opportunities created by higher fur prices. There was, for example, a large reduction in the share of furs traded for producer goods in favor of consumer goods, as Native Americans adjusted the composition of their consumption basket toward cloth, ornamental goods, alcohol, and other luxury items. To better understand these and other changes and their implications, the York Factory trade data has been analysed in the context of a model of Indian consumption behavior. The model and data suggest that, in terms of their consumption choices, Natives were responding to price much as do modern consumers. And, perhaps more importantly given the contrary view in much of the literature, it appears that higher fur prices were inducing greater effort in the trade. More generally, what we hope to capture through this analysis is the nature of the Indian participation and the extent to which changing fur prices at the post played through to the choices made by independent households far removed from direct contact with the Europeans who benefitted from their output.

INDUSTRIOUS HOUSEHOLDS IN EUROPE AND BRITISH NORTH AMERICA

Historians have marked the eighteenth century as a turning point in consumption patterns. Apparently it was not tastes per se that changed, but rather opportunities. There is considerable evidence that by the end of the century households had many more possessions, which they acquired through purchase rather than by inheritance. The work of Gloria and Jackson Main, Lois Green Carr and Lorna S. Walsh, Lorna Weatherill, Jan de Vries, and Carole Shammas among others documents the acquisition by households, throughout the social strata, of a wide range of goods.³ During the eighteenth century, saucepans were being used in addition to cooking pots; earthenware and china in addition to the more durable pewter dishes; table linen and curtains. Knives, forks and utensils for hot drinks were other innovations. Also capturing these changes in consumption patterns was the increased use of goods that were ornamental rather than necessary - books, clocks, pictures, and looking glasses, to name a few. Yet as Shammas notes: "Probably the most striking development in consumer buying during the early

modern period was the mass adoption by the English and the colonials of certain non-European groceries."⁴ By the mid-eighteenth century, tea, sugar, rum, and molasses had become staples of the consumer diet.

The probate records and trade statistics suggest that the increased consumption was not simply a trickle down effect nor a mere emulation of those regarded as social superiors. There was a more fundamental change in consumer behavior which de Vries and others have tried to capture in the term "industrious society."⁵ At the heart of the industrious society is the view that households responded to the increased variety of goods by shifting their preferences between income and leisure. Rather than exhibiting backward-bending supply curves of labor, as had peasants in earlier times, the industrious household had an upward-sloping, even elastic supply of labor. Households altered the allocation of work and leisure within the family so that they could acquire more of the new goods. De Vries has argued that the emergence of this consumer society was not sudden, nor was it limited geographically to Britain. Rather, these changes in consumer behavior also occurred in Dutch and French peasant households, as well as in colonial America; and we argue here that this same model of behavior might equally be applied to Native Americans.

At the center of our study is the consumption of those Indians who traded with the Hudson's Bay Company, but at issue are many of the same questions that have arisen in the debate within the European literature on the traditional versus the industrious peasant. Our preliminary findings of how Natives responded to rising fur prices at the trading posts suggest that they were acting much like their "industrious" counterparts in colonial America and Europe. Moreover, the results take on added importance in that they are in opposition to the consensus view of Indian behavior among historians. According to the consensus, the objective of Native Americans, who participated in the trade, was a given quantity of European goods. They, therefore, harvested just enough furs to meet that objective. Conrad Heindenreich and Arthur Ray give what is perhaps the most succinct statement of the generally accepted view: "The

Indians brought only enough furs to the fort to obtain these [European] goods. By giving him increasingly favorable terms of trade, the trader often obtained fewer furs because the Indians could bring fewer pelts to obtain the same goods."⁶ Citing Ray, Shepard Krech makes a similar point in *The Ecological Indian*: "even when traders signaled a greater demand for furs in the prices (in goods) they were willing to pay, Indians did not respond by increasing the supply. Instead they brought the same number or sometimes less..."⁷ Similar comments can be found in the older European descriptions of peasant behavior in the face of rising wages: "The labor of the poor is ... scarce to be had at all (so licentious are they who labor only to eat, or rather to drink)" or "The poor in the manufacturing counties will never work any more time than is necessary to live and support their weekly debauches."⁸

Statements concerning Indian responses to rising fur prices appear to have originated from the writings of contemporaries, many of whom saw Native Americans as indolent and having little concern for other than their immediate needs. Joseph Robson's description of the Indians, at a time when prices for furs were high, is typical: "[an] improvident and lazy people, having no concern but the subsistence of the present day."⁹ But elsewhere, Robson condemned low fur prices as "big with inequity;" and he continued, " [low prices] is no less inconsistent with the Company's true interest than it is injurious to the natives, who become more and more alienated from us, and *are either discouraged from hunting at all*, or inclined to carry all their furs to the French (emphasis added)."¹⁰ Here Robson appears to imply that lower prices reduced Native effort.¹¹ Thus the contemporary reports, which seem to underpin much of the historical view of Indians as non-industrious, are at a minimum ambiguous about how Native trapping effort and consumption were affected by pricing policy at Hudson's Bay Company trading posts.

Formalizing how Native households reacted to changes in the price of furs at the posts may also shed some light on the larger question of how the trade affected these households. As Krech has noted, there is a distinction between those researchers, who see the fur trade as having had little effect on Native peoples, with the result that their cultural patterns remained little

changed throughout the nineteenth century;¹² and those who see the trade as having had a major impact, especially on their social arrangements.¹³ Our formal model suggests that the importance of the trade to Native Americans was related to how substitutable European goods were for Native-produced items. Moreover by examining the shifts that took place in the share of Native expenditure on different classes of goods, we can better understand the nature of the choices that were made. Indeed the message that we hope will emerge is that Indian households faced options and made decisions similar in nature to those of European and colonial households.

THE TRADE AT YORK FACTORY IN CONSUMER AND PRODUCER GOODS:

1716 -1770

York Factory, located on Hudson Bay at the mouth of the Nelson River, was the largest of the Hudson's Bay Company's main trading posts; the others were Fort Churchill to the northwest and Fort Albany and Moose Factory to the southeast, on James Bay (see Figure 1). York Factory was founded in 1684, fourteen years after the Hudson's Bay Company received its charter, but it was only with the signing of the Treaty of Utrecht in 1713 that British control of the region was defined. During the eighteenth century, York Factory served a hinterland of nearly one million square kilometers, and although the land in the immediate vicinity of the Bay was quite barren tundra, much of the area was ideal habitat for beaver and other fur-bearing animals.¹⁴

In 1720, the northern hinterlands of the Hudson's Bay Company, from James Bay to the headwaters of the Churchill River, were controlled by Algonquian-speaking Cree bands. The lands along the southwestern boundaries were controlled by Cree allies: the Sioan-speaking Assiniboine and the Algonquian-speaking Ojibwa. To the north of the Churchill River, which roughly marked the boundary between the York Factory and Fort Churchill hinterlands, lived the rival Athapaskan-speaking Chipewyan, for whom Fort Churchill was established in 1689. During the time period considered here, the Ojibwa moved north and west around Lake Superior

and up towards Lake Winnipeg, where they became active participants in the York Factory trade. As the Ojibwa expanded their territory, the Assiniboine moved into the parkland and grassland areas further to the south and west.¹⁵

Hudson's Bay Company traders remained at their posts around Hudson Bay. After the spring thaw and before the winter freeze, groups of Indian traders would travel from the hinterland down the Nelson River to the Factory where they would exchange beaver, marten and other furs for a wide variety of European goods.¹⁶ The size of the trading groups could vary from a few traders to larger groups. Decisions concerning who would come down to trade were made at the local level with the Company as the more passive partner.

The Hudson's Bay Company was a relative latecomer to the North American fur trade. There already had existed an organized French presence along the St. Lawrence and an English trade through Albany and the Hudson River valley.¹⁷ Over the course of the decades examined here, French traders moved across the Great Lakes to the regions west and south of Lake Winnipeg. From 1717 to 1738, York Factory faced little competition, but beginning in the mid-1730s, French traders were intercepting Indian groups on their journey to the post.¹⁸ As a result, some groups traded with the French and others proceeded down to York Factory. Indian traders were astute, and the English-French competition contributed to an increase in the price they received for their furs. This competition continued through the French and Indian Wars, which ended in 1763; but within a decade another well-organized trade had developed, this time directed from Montreal.¹⁹

A listing of goods received by Native traders at York Factory is given in Table 1 for five-year intervals from 1716 to 1770.²⁰ The Company's method of accounting and its trading practises have been described elsewhere, but they are worth summarizing.²¹ The unit of account used by the Company at all its posts was the Made Beaver and all values were expressed in that unit. One Made Beaver was the price of a prime beaver skin, either parchment or coat.²² The *Official Standard* or the list price gave the official rate of exchange between trade goods and furs

expressed in Made Beaver. The use of the *Official Standard* and the fact that it was changed only infrequently may have led Karl Polanyi and Abraham Rotstein to suggest that the Canadian trade was tightly administered from London.²³ In fact, the *Official Standard* was used more for purposes of accounting and as a guide to Company factors, than as a rigid price list. Post factors were permitted, indeed encouraged, to trade at more favorable rates both to cover the expenses required by the ceremonial nature of the trade and to generate additional income for the Company. As a result, the actual trading of furs for goods took place at a rate which has been referred to as the post factor's *Comparative Standard*, which typically exchanged European goods at prices higher than the official list price.²⁴

To illustrate, in 1730 Natives received, in trade, 4,410*MB* worth of guns (see Table 1). Since the official price of a gun was 14*MB*, the number of guns was 315. The total (*Official*) value of all goods received in trade was 31,834*MB*. Each type of fur was also assigned an *Official* price, and in 1730 the value of pelts Natives provided in exchange at these prices was 47,656*MB*.²⁵ The difference of 15,822*MB* was reported in the Company accounts as an *Overplus*, representing a markup that averaged 50 percent. York Factory's *Comparative Standard* in 1730 thus exceeded the *Official Standard* on many of the goods traded.²⁶ Offsetting the *Overplus*, however, were *Expenses* incurred in the form of gifts presented to Native traders during ceremonies that preceded the actual trading. A listing of these gifts is also included in the accounts and is reported in Table 2 for a selection of years. In 1730, for example, Indians received 28*MB* in guns (2 guns) and the total value of all gifts given during these ceremonies came to 1,900*MB*. Overall, Indian traders received 33,734*MB* (31,834+1,900) worth of European trade goods in exchange for 47,656*MB* worth of furs. Taking 100 to represent the *Official* price of furs, it follows that in 1730 the price of furs at York Factory was 70.8.²⁷

Indian traders purchased a wide variety of goods, which we have grouped into a few broad categories: producer goods, household goods, alcohol and tobacco, and other luxuries. In our formal model, Natives are assumed to allocate their time across three activities: the

production of subsistence goods, the production of non-subsistence goods and leisure, and the trapping and trading of furs. Here we see producer and household goods as belonging to the subsistence category. These goods helped Native households in hunting as well as domestic activities, and could be substituted for exclusively Native technologies. As Kathryn Braund has noted in the context of a more southerly trade: "The improved tools meant that traditional tasks were completed faster and better" as "metal replaced stone, bone, and shell."²⁸

Production goods were mainly for hunting game; and, with the exception of the ice chisels, knives and twine, played little part in the harvesting and preparing of beaver pelts. The category was dominated by guns and related supplies which, in terms of value, accounted for 70 to 80 percent.²⁹ Household goods were used mainly in food preparation, but blankets have been included in this category. In value, kettles and blankets dominated this class, with awls and fire steels being minor items. The share of producer goods changed markedly over the period (see Figure 2).³⁰ Prior to 1720, more than 60 percent of Native income from the fur trade was spent on producer goods; during the 1720s and through to the 1730s, the share fell to between 40 and 50 percent; and starting in the early 1740s and continuing to 1770, the producer goods share declined to about 30 percent. Over the same period, the household goods share declined from about 10 percent to just over 5 percent (see Figure 3). These are large changes suggesting a major shift in how Indians allocated their income from the trade.

The decline in the producer and household goods shares of Native expenditure was offset by an equal increase in the share of expenditure on what we term luxury items. To further indicate the nature of expenditure on these items we have combined these goods into three broad categories: alcohol and related items, tobacco and related items, and other luxuries. The final category includes beads, cloth, jewelry, and vermillion among a long list of goods (see Tables 1 and 2). Within the broad groupings some significant patterns emerge (see Figure 4). For much of the period, the most important luxury good purchased by Indians was tobacco. There were a few large year-to-year fluctuations, but for the most part, consumption as a share of total

expenditure remained in the 15-20 percent range. At the same time there was a steady increase in the share of expenditure on alcohol, albeit from a very low level.³¹ In the early period no alcohol was received in trade, and until 1730 alcohol remained a relatively minor item, with a share of about 5 percent.³² But with rising fur prices, especially after 1738, the share of expenditures on alcohol increased markedly, equalling or surpassing tobacco from 1750 to the end of the period.³³ But alcohol was not the only good whose share increased. Many items among the wide variety of luxury goods also gained, the most important of these by far being cloth. Overall, the share of expenditure on "other luxuries," increased from about 15 percent in the early years, to almost 30 percent by the end of the period.³⁴

The issue of alcohol consumption has been presented in the literature as a negative aspect, it being argued that alcohol created a dependency among the Indians, and may have reduced their ability to bargain. Although brandy was consumed, it was by no means the only commodity consumed, and for much of the period brandy was dwarfed by other goods that have received much less prominence.³⁵ Certainly alcohol was a major component of the gift-giving ceremonies, accounting for 20 to 30 percent of these costs (see Table 2); but Indian traders seem clearly to have adjusted their purchases of brandy in the trading stage.³⁶ Until the late 1740s, alcohol amounted to less than 10 percent of the total value of goods received, and was in most years less than half the trade in tobacco, a good that has received far less attention. Purchases of cloth also exceeded alcohol through much of the period, and until the later years as much was spent on kettles.

In the absence of more extensive trade data, it is difficult to compare the role of alcohol in the Hudson's Bay hinterland with its role in other areas. The literature on the American trade intimates that vast quantities were traded and that some Native groups would trade furs only for alcohol. Daniel Usner writes, for example, that the "English government in Pensacola attempted to restrict Indian traders to fifteen gallons every three months, which was considered a necessary amount for their purchase of food from Indian villagers;" while in 1772 several Choctaw chiefs

complained that rum "pours in upon our nation like a great Sea from Mobbille and from all the Plantations and Settlements round about."³⁷ Braund also comments on the harmful effects of alcohol.³⁸

In 1740, before there was much French trade in the area, Indian traders received from the Hudson's Bay Company a total of 494 gallons of alcohol. This amount, notwithstanding the comments of some contemporaries and later historians, would have been hardly sufficient for five two-ounce drinks per person per year for all Indians living in the York Factory hinterland.³⁹ At its peak, and allowing for alcohol received from the French, consumption per person was perhaps double this estimate. Even allowing that only 5 percent of the Indian population was involved in the brandy trade, the number of drinks per person among this restricted group may have risen at most from 100 to 200 over the period.⁴⁰ By comparison, in 1925, the Canadian population 20 and older consumed, in the form of spirits, 60 two-ounce drinks; but including beer and wine increases the total ethanol equivalent to 160 drinks.⁴¹ In 1998, the corresponding values were 120 drinks for spirits alone and the equivalent of 435 drinks with beer and wine added. The total amount of alcohol purchased by Indians could therefore have sustained, by today's standard, no more than light drinking over the course of a year, four two-ounce drinks per week at most.⁴²

The commodity, that has perhaps not received the attention it deserves, is the fine Brazil tobacco that made up between 15 and 20 percent of Native expenditure throughout the period.⁴³ In terms of value the consumption of tobacco was more than double that of alcohol until the 1740s, in part because the type of tobacco being sold to the Indians was the most expensive available. It was shipped from Brazil to Lisbon, and was then sent on to London to be reexported to the Bay. Some indication of the importance tobacco can be found in the instructions to the post factors. An annual letter from the Company's head office to Governor Knight of York Factory included a price list at which he could sell commodities to the British employees at the post and continued with instructions not to sell Brazil tobacco to these workers

unless "any is damaged that the Indians wont buy."⁴⁴

A further indication that Native groups were taking part in the consumer revolution of the eighteenth century was the growing consumption of a remarkable variety of products that we have combined in the all-purpose category, "other luxuries." Cloth, including baize, duffel, flannel, and gartering was by far the largest class of items in this group, but luxuries included beads, combs, looking glasses, rings, shirts, and vermillion among a much longer list. These goods made up a substantial and increasing fraction of the total trade, from about 15 percent in the early years to nearly 30 percent by the end of the period, by which time expenditure roughly equalled that on producer goods. Because these items were important and heterogeneous in nature, the Hudson's Bay Company's head office went to great lengths to satisfy the specific tastes of the Natives. As well attempts were made, not always successful, to introduce new products that would attract more furs to its posts.

One of the more important items among "other luxuries" was beads. Here the challenge faced by the Company was to provide the color and variety most valued by the Indians; and in the early years especially there were often problems with supply, this from a 1718 letter: "as to ye large purple and small white beads there are none to be had in England, but hope another year to furnish you with both."⁴⁵ Two years later, the Company was able to send some large white beads, but only enough for Fort Churchill and not York Factory. By 1740, Head Office was writing that beads were being inspected before they were sent so that no wrong ones got mixed in, but it could not get any number 30 long large red. The 1752 letter from Head Office to York Factory gives some indication of the range of beads sent over. Three new types of beads were included: white barley corn, red flower black barley corn, and round white with double flowers in red and green "which from their scarcity are at an excessive high price."⁴⁶ The Company was also attentive even in dealing with such a minor good as buttons. In 1720 Head Office requested: "let us know ... ye coat and waistcoat buttons, whether solid or hollow, pewter or other metal, and be as particular in such things as you can be."⁴⁷ Clearly the Hudson's Bay

Company regarded Indians as exacting, if not sophisticated, consumers; but how Indians reacted to the actions of the Company, both in terms of what they consumed and the time they devoted to the trade, remains to be explored.

A MODEL OF NATIVE-AMERICAN CONSUMPTION PATTERNS IN THE HUDSON BAY REGION

We propose a simple optimizing framework in which Native utility depends on three components: European luxury goods (e), food and other subsistence goods (f), and Native-produced luxury goods and leisure (t_l), hereafter referred to simply as leisure.⁴⁸ Consumers must attain a minimum level of subsistence, f^* , but do not raise their utility by increasing consumption beyond this point. The utility function can therefore be written as:

$$v(e, f, t_l) = \begin{cases} u(e, t_l), & f \geq f^* \\ -\infty, & f < f^* \end{cases} \quad (1)$$

where $v(\cdot)$ is utility, and $u(\cdot)$ is utility conditional on achieving subsistence.⁴⁹ Subsistence goods were produced mainly with Native labor; but as the fur trade developed European products became increasingly important. Guns and related items⁵⁰ were used to hunt mainly large game and waterfowl; kettles contributed to food preparation; and blankets served an important function. The role of these European trade goods in producing subsistence is formalized with production function:

$$f = f(g, t_f), \quad (2)$$

where t_f is time spent directly producing subsistence goods, and g represents the input of European producer and household goods. In this section, the combined input of producer and household categories will be referred to as *producer* goods.

European trade goods were purchased with beaver pelts and other furs. Indian trappers

used ice chisels to penetrate the beaver lodges, and knives were used to skin the animals; otherwise, the harvesting of furs was based on the direct input of Native labor. This was in contrast to the hunting of big game and waterfowl, and to food preparation and other household production, where the European component was more significant. As an approximation, furs are assumed to be produced with labor alone, subject to constant returns.⁵¹

$$B = t_B, \quad (3)$$

where B is the output of furs, and t_B is time devoted to the trade.⁵² The furs are used to purchase European luxury goods (e) and *producer* goods (g), whose prices are both normalized to one.

Thus:

$$pB = e + g, \quad (4)$$

where p is the price of furs. The time constraint closes the model.

$$T = t_B + t_f + t_l, \quad (5)$$

where T is total time available. Combining equations (1) to (5), an Indian's optimization problem can be written as:

$$\max_{e, g, t_B, t_f, t_l} \quad \langle = u(e, t_l) + \mathcal{L}_1[f(g, t_f) - f^*] + \mathcal{L}_2(pt_B - e - g) + \mathcal{L}_3(T - t_B - t_f - l). \quad (6)$$

The first-order conditions, describing the relationships that will be satisfied if Indians are allocating their time and income from the trade, optimally, give rise to the following equations:⁵³

$$\frac{u_2}{u_1} = p, \text{ and} \quad (7)$$

$$\frac{f_2}{f_1} = p. \quad (8)$$

Equations (7) and (8) speak directly to the issue of how fur prices affected the volume of trade

goods purchased by the Indians. According to equation (7) the price of furs at the optimum equals the ratio of the marginal utilities of leisure and European luxury goods. A higher price of furs, which can be regarded as equivalent to a decline in the price of European luxury goods, thus leads Indians to substitute these goods for leisure. In fact, income effects aside, the view that Natives demanded a given quantity of European goods and so applied the benefit of any price rise to increased leisure requires a zero elasticity of substitution in consumption between European luxury goods and leisure. Given the wide variation in the quantities and types of trade goods received by Indians over the period 1716-1770 and the fact that these items were regarded as luxuries, by Europeans as well as Indians, such an elasticity is simply not plausible.⁵⁴ Equation (8), which says that the price of furs at the optimum equals the ratio of the marginal products of labor and *producer* goods in subsistence production, also seems unambiguous in terms of how fur prices affected Native purchases. Higher fur prices implied a lowering of the cost of *producer* goods relative to labor, and for all but a zero elasticity of substitution in production, would have led to increased use of European goods in meeting subsistence requirements. A zero elasticity of substitution is hardly plausible given that the blankets, kettles, guns and other *producer* goods were in fact alternatives to the animal pelts, wood, bone and stone items that they were supplanting. Thus, even if subsistence consumption is treated as constant, purchases of *producer* goods necessarily increase. In sum, under the mildest of assumptions about technology and consumer behavior, higher fur prices must have induced greater purchases of both *producer* and luxury goods.

Of particular relevance to the issue of beaver depletion is the effect of fur prices on the labor input, t_B , to the fur trade. Clearly the interpretation of Ray and others is that the supply curve of labor to the trade was strongly backward-bending. But Carlos and Lewis argue for an upward-sloping supply curve of labor, assuming elasticities of 1 and 2 in their simulations.⁵⁵ Here we apply the model and evidence on the mix of purchases by Natives at York Factory to suggest values of this elasticity.

The model is based on a given consumption of subsistence goods, f^* , which are produced with a combination of time and goods purchased from the Hudson's Bay Company. Applying the optimality condition [equation (8)], it follows that the elasticity of demand for *producer* goods with respect to the price of furs, p , can be expressed as:

$$\epsilon_{g,p} = 2F, \quad (9)$$

where 2 is the direct Native input of time, t_b , to subsistence production expressed as a proportion of the total time required to achieve subsistence, and F is the elasticity of substitution in the production of subsistence goods between *producer* goods, g , and time, t_f .⁵⁶ The elasticity of the time, t_g , spent acquiring *producer* goods with respect to the price of furs is therefore:

$$\epsilon_{t_g,p} = 2F - 1. \quad (10)$$

The value of share, 2 , must remain a matter of speculation, but it could hardly have been much below 1. Our results are based on 0.8, a value that is likely biased downward.⁵⁸ The value of the elasticity of substitution, F , is also a matter of conjecture, but given that the guns, knives and kettles that made up the bulk of *producer* goods were in fact replacing Native-produced items, clearly there was adjustment taking place. We derive results for F 's of 0.5, 1.0, and 1.5. The two lower values imply that an increase in the price of furs would have reduced the time Indians would spend acquiring guns, shot, kettles, and other *producer* goods [see equation (10)]. It seems then that if Indians had been purchasing only goods to help them meet their subsistence requirements and nothing else, the Native supply curve of labor to the trade might have been backward-bending as much the literature argues. But at an elasticity of 1.5, time spent acquiring *producer* goods would have increased.

Producer goods, however, were just one component, and indeed a declining component of the fur trade. Based only on those items received in trade (Table 1), *producer* goods accounted for 73 percent of the trade in 1715. This share dropped to 57 percent in 1720 and

continued to decline over the next 50 years. In 1770, 41 percent of the trade was in these items, and in some years the share was lower than this. Moreover, goods obtained in trade understates the decline because it omits Expenses, representing the gifts received by Natives in advance of the actual trading. Expenses became increasingly important and were heavily weighted toward luxury items, especially tobacco and alcohol (see Table 2). With these gifts included the share of *producer* goods in the total was 58.2 percent in 1720, 47.7 percent in 1750, and 36.2 percent in 1770.

By comparing the decline in shares with the change in the price of furs over this period we can make inferences about the overall elasticity of supply of labor to the trade. There were wide fluctuations in the price of furs in the very early years, but beginning in 1723, the price settled down at a value of about 70, where the *Official Standard* is indexed at 100.⁵⁹ In the late 1730s, higher fur prices in Europe and competition from the French began to drive up prices at the York Factory post until by the 1750s Indian traders were receiving roughly the *Official Standard* (100) for their furs, representing an increase in price of about 40 percent. According to equation (9) this price increase should have led to a decline in the time spent acquiring *producer* goods, the extent depending on α , the proportion of time, t_f , spent directly in subsistence production and F , the elasticity of substitution between European *producer* goods, g , and time, t_f . For α equal to 0.8 and F equal to 1, the decline in the time spent acquiring producer goods, t_g , for a fur price increase of 40 percent is 6.5 percent.⁶⁰ Since the share of expenditure on *producer* goods declined from 58.2 percent in 1720 to 36.2 percent in 1770, or by 38 percent, it follows that total time in the trade must have gone up.⁶¹

The relationship between the various elasticities with respect to the price of furs is given formally by:

$$\epsilon_{tB} = \epsilon_{t_g} - \epsilon_{sg}, \quad (11)$$

where ϵ_{tB} is the elasticity of supply of labor to the trade, and ϵ_{sg} is the elasticity of the share of

producer goods.⁶² The elasticity, ϵ_{tB} , was almost certainly positive, but its magnitude is sensitive to the choice of parameter values and time period. From roughly the beginning to the end of the period, the *producer* goods share declined 38 percent, while fur prices increased by 40 percent, giving an elasticity, ϵ_{sg} , of -1.4.⁶³ Assuming as above, an elasticity, F , of 1 and a time share in subsistence production, Z , of .8 implies a positive labor supply elasticity to the fur trade, ϵ_{tB} , of 1.2. But even this elasticity may understate the response of Natives to fur prices. Over the period from the 1730s to the 1750s there was, according to Carlos and Lewis, a decline in beaver stocks brought on by the greater harvesting effort.⁶⁴ Their simulated decline in the beaver population was from the maximum sustained yield population of 230,000 to a level in the 1750s of about 150,000. Assuming a harvest elasticity with respect to population of .25, the net increase in return to Native time in the trade can be treated as roughly 25 percent rather than 40 percent.⁶⁵ The adjusted labor supply elasticity to the fur trade is 1.9.⁶⁶

The above elasticities are based on initial and terminal values of the trade shares and fur prices. To better capture the relationship, annual series of fur prices and the *producer* goods trade share have been derived (see Figure 5). The two series exhibit a strong negative relation, with the price of furs increasingly sharply starting in the late 1730s, roughly the same time when the *producer* goods share begins to decline. The estimated elasticity of the *producer* goods share with respect to the price of furs, ϵ_{sg} , is -0.88 or -0.94, depending on whether the first few years of the period are included.⁶⁷ During the period 1716-1722, when the post was being established, prices were unusually high and variable.⁶⁸ The elasticity of -0.94 may, therefore, better reflect Natives' response to price. Combining this estimate with equation (11) and the value of ϵ_{tg} assumed above (ie. -0.2) gives a labor supply elasticity of 0.74. But if, as we suggest above, part of the effect of the increase in fur prices was offset by a declining beaver population (the offset assumed is about 40 percent), the implied labor elasticity increases to 1.3.⁶⁹

The sensitivity of the labor elasticity to the elasticity of substitution, F , is shown in Table 3. Even for elasticities of substitution as low as 0.5, the labor elasticity is positive; and for

elasticities that perhaps better reflect the substitutability of European *producer* goods for Native time, the labor supply is quite elastic, especially once the effect of changes in the beaver population are taken into account. With an adjustment for the beaver population, the elasticity estimates, 1.2 to 1.7, fall within the range assumed by Carlos and Lewis for all but the lowest values of F .⁷⁰

This evidence, which as argued above strongly suggests a positive labor supply elasticity with respect to fur prices, is contrary to much that has been written about the market behavior of Native Americans. It seems unlikely, however, that plausible parameter values could reverse the conclusion that rising fur prices gave rise to greater trapping and trading effort. Indeed some of the model specifications tend to work against this result. Subsistence consumption, for example, is assumed fixed. If we were to allow this consumption to rise with income, the decline in t_g would be less and the implied labor supply elasticity would be greater. Parameter values aside, the intuition for the upward-sloping supply curve of labor seems compelling. An increase in fur prices almost certainly led Indians to substitute European goods, such as guns and kettles, for Native-produced goods in subsistence production. If the demand for subsistence was perfectly inelastic, the net effect on the time spent acquiring producer goods depended not only on how substitutable these goods were for Native time, but also on their factor share. Since far more time would have been spent producing subsistence than harvesting the furs used to purchase the European producer goods, increases in fur prices could have caused at most a modest reduction in the time spent acquiring producer goods, and may have increased it. Over the first half of the eighteenth century, as fur prices rose, Indians were spending a much smaller share of their fur income on producer goods. It follows then that the total time spent in the fur trade must have increased. Reasonable parameter values, possibly including an allowance for a declining beaver population, suggest that the labor supply response was unit elastic or greater. This result seems entirely consistent with the nature of many of the goods being purchased by Natives, which at the time would have been regarded by them and indeed by Europeans and colonists as luxuries.

The suggested elasticities also help account for the pricing policies of the Hudson's Bay Company at its various trading posts as outlined in Carlos and Lewis.⁷¹

CONCLUDING REMARKS

The commercial fur trade of the eighteenth century provided Native Americans with a broad array of alternatives. Indians were now acquiring, through exchange, a wide selection of European goods, and they responded to the new options in much the same manner as colonials and many Europeans of the time. Not only were they shifting their consumption toward luxury items; our finding that their supply of labor to the trade was upward-sloping places Native families squarely among the "industrious" households identified by de Vries and others as important contributors to the Industrial Revolution. The increased market orientation of Native Americans was not without its costs; but, according to Carlos and Lewis, these costs were due mainly to a failure among Native groups to delineate property rights, especially to fur-bearing animals.⁷² Beginning in the 1730s, rising fur prices in Europe and competition from the French led to increased fur prices at Hudson's Bay Company trading posts. Higher prices led to a positive labor supply response, not only because of the nature of the trade goods but, in part, because of the inability of Natives to fully limit access to the beaver resource. The result was depletion of the animal population, at least in some hinterlands. Our findings may raise other issues as well. We have shown that there was a significant rise in the share of expenditure on luxury items: alcohol, tobacco, cloth, beads, lace and many other goods. Among them were products of a somewhat gendered nature, and this was despite the fact that those coming to the post to trade were overwhelmingly male. The types of goods being purchased in conjunction with the shifting Native allocation of time leads to several questions for further research, among them: what was happening to the division of labor within the Native household?

Appendix: Beaver as a Joint Product

In the model, the beaver benefits Indians only to the extent that they are exchanged for European goods. Yet there are references to beaver as having been a source of food, and in the case of coat beaver pelts, also clothing.⁷³ Because this joint-product aspect has not been included, we provide some calculations intended to provide an indication of the place of beaver in the consumption of those Indians who participated in the fur trade.

There is ample evidence that beaver provided meat. In fact it is said that meat from the tail was a delicacy; and at some special feasts, beaver figured prominently. On the other hand, most references to meat in the contemporary accounts seem related more to large game and waterfowl. The following report drawn from Andrew Graham's observations for the latter part of the eighteenth century also carries the implication that the beaver was not highly prized for direct consumption. According to an observer, Indians regarded the white men as: "fools, who leave their homes in small parties, risk their lives on the great waters, among strange natives who will take them for enemies, *all for the sake of a small animal whose pelt made poor clothing and was too small to be used for tipi covers or other practical purposes* (italics added).⁷⁴ The reference here is to the pelt rather than the flesh; nevertheless the view expressed here seems to be that, prior to its use in the fur trade, the beaver was not an important resource.

We infer the contribution of beaver to the Indian diet by assuming that all the beaver traded to the Hudson's Bay Company also provided meat. The calculation is limited to the early years of York Factory, prior to the introduction of a significant French presence, whose share of the trade is uncertain. Over the years 1732 to 1738, the number of pelts received at the post each year did not fluctuate much. The average was about 30,000. Adult beaver weigh about 40 lbs., and according to Adrian Tanner can provide about 10 lbs. of edible meat.⁷⁵ The half-parchment beaver included in the trade may have produced less, but assuming all beaver were adult gives an implied level of 300,000 lbs. available to the Natives of the York Factory hinterland. Native population estimates for this period are, of course, rough, but can suggest orders of magnitude.

Estimates, likely downward biased, for the three main tribal groups that occupied the York Factory trading hinterland are: Western Cree - 4,500, Northern Ojibwa - 1,400, and Plains Assiniboine - 2,700, giving a total population for the region of 8,600.⁷⁶ Thus, per capita beaver meat consumption would have been, at most, 35 lbs.

Total meat consumption has been derived from nutritional requirements; and we also apply a contemporary consumption estimate. Rogers and Smith report that in the cold climate of the Hudson's Bay lowlands, 4,500-5,000 calories per adult per day were required, implying a 4lb. daily intake of flesh food.⁷⁷ This estimate seems consistent with Tanner, who reports that adults, among a group of Eastern Cree in 1970/71, consumed roughly 1000 lbs. of meat and fish per year and this was in addition to the 25 percent of their diet that was purchased from local stores.⁷⁸ Taking 1000 lbs. as a conservative estimate of the consumption of eighteenth-century Natives, who would have obtained no food from the Europeans, it follows that beaver could have made up no more than a small fraction of their diet, perhaps 5 percent. And if the reference from Graham reflects Native views of the beaver, their pelts also contributed little to Native well-being.

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Footnotes

¹ Shammas, "Changes in Consumption."

² Ray, *Indians*; and Ray and Freeman, *Give Us Good Measure*. Along with a bibliography, some of Roger's research is summarized in Helm, *Handbook*, pp. 19-29, 130-57, 231-43, and 789-90.

³ Main, "Economic Growth;" Carr and Walsh, "Standard of Living;" Weatherill, *Consumer Behaviour* and "Meaning of Consumer Behaviour;" de Vries, "Peasant Demand;" and Shammas, *Preindustrial Consumer*.

⁴ Shammas, "Changes in Consumption," p.178.

⁵ de Vries, "Between Purchasing Power."

⁶ Heindenreich and Ray, *Early Fur Trades*, p. 48.

⁷ Krech, *Ecological Indian*, p. 184. In *Indians*, Ray had argued that: "One of the inherent weaknesses in the fur-trading system ... related to the fact that ... they [Indian traders] did not react in the same manner as did the Europeans. ... With demand levels relatively fixed, a drop in the effective price for goods meant that the Indians could bring in fewer furs to obtain what they wanted. Their potential free time was thereby increased and they could spend it at the posts drinking and smoking ..."Ray, *Indians*, p. 68.

⁸ Quoted in de Vries, "Between Purchasing Power," p. 112.

⁹ Robson, *Account*, p.29.

¹⁰ *Ibid.*, p. 39.

¹¹ The sensitivity of Natives to price differences between French and English traders, mentioned by Robson, has long been recognized by Ray and others. See Ray, *Indians*; Ray and Freeman, *Give Us Good Measure*; and Wien, "Selling Beaver Skins." On the whole, the Hudson's Bay Company offered better terms than the French traders; but, unlike the French, forced Native traders to make the long journey to the Bay to do their trading. Although concerned with a very different region and with deer rather than beaver, Braund's study of Creek Indians in the southern U.S. includes an extensive discussion of Native reactions to price, in this case the deerskin price, and to deviations between their price and the price received by other groups such as the Cherokee. Braund, *Deerskins*, pp. 81-102.

¹² Krech, "Trade of the Slavey," p. 100; Asch, "Some Effects;" Janes, "Cultural Contact," and "More on Cultural Contact;" and Helm, "On Responsible Scholarship."

¹³ Krech, "Trade of the Slavey;" Sloan, "Native Response;" and Yerbury, "Social Organization."

¹⁴ As well, there was the twice yearly seasonal migration of geese and other birds. These migrations provided a major source of food both for Indians and the men at the posts. In fact, the Company would hire Indians to hunt geese so as to give the posts a supply of food for the winter.

¹⁵ Ray, "Bayside Trade."

¹⁶ Beaver comprised over 80% of the trade, and marten roughly 15%. Common trade routes were along the North and South Saskatchewan Rivers, Lake Winnipeg, and the Nelson River which flowed into Hudson's Bay at York Factory. Rich and others have argued that this century can be characterized as "the sleep by the frozen sea." This is a picture of inactivity focusing on the Europeans, and contrasted by the decision of Native traders to come down to the Bay. See Rich, "Trade Habits."

¹⁷ It should be recognized that an aboriginal exchange of goods pre-dated the introduction of a commercial fur trade. Thus, to Native Americans, trading was not a foreign concept.

¹⁸ Carlos and Lewis, "Indians," pp. 480-82.

¹⁹ In the 1770s, individual Montreal traders began to form partnerships. Over time, these partnerships developed into what became the Northwest Company, which was to compete with the Hudson's Bay Company until their eventual merger in 1821. See, for example, Carlos and Hoffman, "North American Fur Trade."

²⁰ An annual series is available from the authors.

²¹ Ray and Freeman, *Give Us Good Measure*, were perhaps the first to provide a clear description of Hudson's Bay Company accounting practices.

²² Parchment beaver were pelts from freshly-caught animals; coat beaver were pelts that had been worn for some time by the Indians. See Carlos and Lewis, "Indians."

²³ Polanyi, "Economy;" and Rotstein, "Trade."

²⁴ As noted above, Ray and Freeman give an good account of method by which furs were priced relative to European goods. Ray and Freeman, *Give Us Good Measure*, chs. 6 and 7.

²⁵ The *Official* price of prime beaver pelts (coat or parchment) was $1MB$, smaller or inferior beaver pelts were $1/2MB$, marten were $1/3MB$, and all other furs were assigned prices based on the size of the pelt and their desirability.

²⁶ The *Comparative Standard* by item was not generally recorded. Goods amenable to division such as gun powder or cloth may have been more affected, but there appears to have been no systematic relation between the type of good (producer, household, luxury good - as described in Table 1), and the size of the markup. It seems, then, and Ray and Freeman have also made this point, that although the markups varied by year, the relative prices of European goods stayed much the same. See Ray and Freeman, *Give Us Good Measure*, pp. 268-70.

²⁷ This price index, used in our earlier papers, is applied in the analysis below. See Carlos and Lewis, "Indians," and "Property Rights."

²⁸ Braund, *Deerskins*, p. 130.

²⁹ Certainly guns were not used to hunt beaver. Shot would have severely damaged the pelt.

³⁰ The share values in Figure 2 and the subsequent figures include expenses. Expenses, by item, have been collected for 5-year intervals, excepting 1755 and 1765. We do, however, know aggregate expenses by year. In deriving Figure 2 and the later figures, the shares of the various categories are assumed to have changed at a constant (absolute) rate between benchmark years.

³¹ An increase in alcohol consumption is also identified by Ray and Freeman, *Give Us Good Measure*."

³² For the years before 1720, Figure 4 assumes a small volume of brandy was received as gifts.

³³ Shammass describes a similar increase in alcohol consumption in mid-eighteenth-century England. Note that it was after 1738 that the French became a significant presence in the York Factory hinterland. Shammass, "Changes."

³⁴ How important was alcohol and the other European goods relative to *total* Native consumption is necessarily a matter of speculation, but we can suggest orders of magnitude. In western Europe, prior to 1700, typical households allocated about 80% of their income to food; and in late eighteenth-century Philadelphia the minimal maintenance of indentured servants was roughly 80% of their total compensation. See Cipolla, *Before the Industrial Revolution*, p. 30; Grubb, "Auction," p. 588. Assuming that at least this share of Native income went to supplying subsistence, the European luxury goods could have accounted for no more than 20%, likely less since Natives produced some luxuries directly. Since at its peak, alcohol was about 25% of European luxury good consumption, alcohol could have comprised no more than 5% the total Native consumption basket, and was generally much less than this.

Tobacco's share might have been 5% throughout the period, while estimates for other luxury goods are: cloth and gartering - 2-3%, beads - 0.2%, vermillion -0.2%, other items less.

³⁵ The brandy sold at the Bay would have been grain-based and produced in Britain.

³⁶ An important insight of consumer theory is that rational consumers will base decisions on the relative prices of goods *at the margin*. According to this principle, Native consumption of brandy depended solely on the cost of brandy in trade (4MB per gallon at the official rate) and was unaffected by the quantity received as gifts. Inspection of the Company accounts suggests Native behavior in fact conformed to this notion of rationality. Note, for example, that from 1720 to 1725 alcohol received as gifts fell 50%, from 518MB to 254MB; whereas total alcohol consumption increased slightly from 1,017MB to 1,041MB (Tables 1 and 2; alcohol includes brandy and strong water). Thus Native compensated for the smaller volume in gifts by exchanging more furs for brandy in the trading stage.

³⁷ Usner, "Frontier Exchange," p. 178. See also Mancall, *Deadly Medicine*.

³⁸ Braund, *Deerskins*, ch. 7.

³⁹ We put the population of the York Factory hinterland at about 8,600 (see appendix), implying consumption per person of 0.06 gallons. There are 160 fluidounces in one Imperial gallon.

⁴⁰ For a more extended discussion of alcohol consumption in this region see Paludetto, "Native Alcoholism."

⁴¹ Segal, "Analysis," pp. 28-29.

⁴² It seems likely that most drinking was concentrated over the summer months, which would have allowed perhaps 20 drinks per week over a 10-week interval. There are also reports of very short periods of binge drinking.

⁴³ But see Wimmer, "To Encourage a Trade," who fully recognizes the importance of this product.

⁴⁴ This and the following references to the Head Office letters are from the Hudson's Bay Company's, "London Correspondence." Note: to the extent that tobacco was made available to the servants it was English (Virginia) roll tobacco.

⁴⁵ Hudson's Bay Company, "London Correspondence."

⁴⁶ *Ibid.*

⁴⁷ *Ibid.*

⁴⁸ Consumption of Native-produced luxury goods and leisure is identified with the time, t_l , allocated to those

activities. Implicitly, then, the production of luxury goods is assumed to exhibit constant returns.

⁴⁹ The utility function, $u(\mathcal{Q})$ is assumed quasi-concave. This will ensure the second-order conditions of the optimization problem are satisfied.

⁵⁰ These included gunpowder, shot, and minor items such as powder horns.

⁵¹ Constant returns to labor is also assumed in Carlos and Lewis, "Property Rights," although Carlos and Lewis, "Indians," uses a somewhat lower elasticity, 0.67. The elasticity, 0.67, was based only on the harvesting of beaver and does include the transporting and trading aspects, which were more likely subject to constant or even increasing returns. Changes in the beaver population, of course, affected the relation between trapping time and fur output. The likely impact on the results of the decline in beaver stocks simulated in Carlos and Lewis, "Indians," is explored below.

⁵² Input, t_B , includes all time devoted to the fur trade, which would involve not just the harvesting of the animals, but also the preparing, transporting and trading of the skins.

⁵³ It is sufficient that $u(e, t_l)$ and $f(g, t_f)$ are each quasi-concave to satisfy the second-order conditions, ensuring an optimum.

⁵⁴ In fact, even if one were to assume a zero substitution elasticity, constant consumption would require a zero income elasticity as well, since higher fur prices increased Native real income. Thus Indians would have had to exhibit preferences such that an increase in leisure, however small, was preferred to an increase in the consumption of European luxury goods, however large. In consumer theory, this is a lexicographic preference ordering, used mainly for the purpose of illustration and rarely seen in practice.

⁵⁵ Carlos and Lewis, "Indians," p. 486, and "Property Rights," p. 722.

⁵⁶ See, for example, Takayama, *Mathematical Economics*, p. 144.

⁵⁷ The time acquiring *producer* goods, t_g , can also be expressed as g/p . See equation (4). Thus, $t_g = (dt_g/dp)(p/t_g)$ can be derived as equation (10).

⁵⁸ The minimum value of labor share, \bar{z} , is suggested by the following. It seems safe to assume that Natives were spending at least 80% of their income (or working time) acquiring subsistence goods (see fn. 34). The remaining 20% of their income, spent on luxury goods, would have been divided between European goods and those luxury goods they produced directly. Even if 80% of luxury goods were supplied from Europe, the income spent on these goods would

account for just 16% of their total income. During the earlier years, Native expenditures on European luxuries was somewhat below expenditures on *producer* goods, but this was not true of much of the period to 1770 (see Figures 2 and 3). During the latter years, the luxury goods share had increased to more than 60%. On average, about half the value of Native purchases were in the *producer* goods category. Attributing the same income (working time) to these goods as luxury goods, ie. 16% of the total, implies the time to acquire the *producer* goods was no more than 20% (16/80) of the total time to achieve subsistence. It follows that, expressed as a share, the remaining time, \mathbf{Z} , was at least 0.8.

⁵⁹ Carlos and Lewis, "Indians," p.474.

⁶⁰ From equation (10), $\epsilon_{tg} = -0.2$; therefore we have $.065 = 1 - 1.4^{-.2}$.

⁶¹ Alternatively, since t_g is estimated to decline by 6.5 percent, and t_g/t_B declined by 33.3 percent, t_B must have increased. The result is much the same if \mathbf{F} is assumed to be 0.5. In this case, $\epsilon_{tg} = -.6$, and the estimated decline in t_g is 18.3 percent, still less than the one-third decline in the *producer* goods share that was observed.

⁶² The share of *producer* goods in Native expenditure is $s_g = t_g/t_B$. Differentiating with respect to the price of furs, p , and expressing in elasticity form gives the result.

⁶³ Note that $(1-.38) = 1.4^{-1.4}$.

⁶⁴ Carlos and Lewis, "Indians."

⁶⁵ The return to Native effort, r , can be expressed as $r = pX^\epsilon$, where X is the beaver population and ϵ is the elasticity of fur output with respect to population. In "Property Rights," Carlos and Lewis assume a harvest elasticity with respect to the beaver population of 0.5, but if we treat the trading costs per fur as independent of population and assume they were one-half total Native costs, then an elasticity of 0.25 is more appropriate. The increase in the return to Native effort is thus $1.25 = 1.4 \times (150/230)^{.25}$. See Carlos and Lewis, "Property Rights," pp. 714-15, 720.

⁶⁶ Following fn. 62, $(1-.38) = 1.25^{-2.1}$, and $\epsilon_{tg} = -.2$. A different elasticity of substitution, \mathbf{F} , of course gives rise to a different labor supply response. If \mathbf{F} is assumed to be 0.5, the implied elasticity, ϵ_{tB} , is 1.5; and if \mathbf{F} is set at 1.5, the elasticity is 2.3.

⁶⁷ The estimating equation is: $\ln s_i = \epsilon + \beta \ln p_i + \gamma_i$, where s_i is the *producer* goods, p is the price of furs, and i is the year. The results, with t -statistics in parentheses, are:

1716-1770: $(\ln s) = -0.873 - 0.877(\ln p)$, adjusted $R^2 = 0.40$, $DW = 1.87$,
(-24.78) (-6.03)

1723-1770: $(\ln s) = -0.935 - 0.945(\ln p)$, adjusted $R^2 = 0.66$, $DW = 1.97$.
(-38.36) (-9.70)

⁶⁸ As well there was a change in the *Official Standard* in 1720, which makes comparison with the earlier years problematic.

⁶⁹ The price adjustment assumed above was from 40% to 25%. The effect on the elasticity, ϵ_{sg} , is to increase it from .94 to 1.5, giving a labor supply elasticity of 1.3 (1.5 - 0.2).

⁷⁰ Carlos and Lewis, "Indians," and "Property Rights."

⁷¹ Ibid.

⁷² Carlos and Lewis, "Property Rights."

⁷³ See, for example, Ray, *Indians*, and "Indians as Consumers;" and Rogers, "Cultural Adaptations."

⁷⁴ Williams, *Andrew Graham's Observations*, p. 97.

⁷⁵ Tanner, *Bringing Home Animals*, p.53.

⁷⁶ These estimates, inferred from Ray, *Indians*, pp. 105, 111, are drawn from reports mainly for the latter part of the eighteenth century and, in the case of the Ojibwa, the early nineteenth century. Although smallpox was apparently not as severe a problem as it was further south, Ray suggests that the Indian population may have been somewhat higher during the period of our study.

⁷⁷ Roger and Smith, "Environment," p. 135.

⁷⁸ Tanner, *Bringing Home Animals*, p.57.

TABLE 1
GOODS RECEIVED AT YORK FACTORY, 1716 - 1770
(MADE BEAVER)

MB/UNIT	1716	1720	1725	1730	1735	1740	1745	1750	1755	1760	1765	1770
PRODUCER GOODS												
files	1	190	240	329	214	308	484	166	243	360	261	327
fishhooks	0.071			11				30		26	9	
flints	0.083	150	304	460	256	185	192	276	294	92	208	66
guns	14	3,770	1,820	3,906	4,410	1,876	3,500	2,730	1,106	1,638	2,380	1,288
gun worms	0.25	38	56	60	70	22	85	61	23	38	23	31
hatchets	1	712	1,500	763	854	657	762	853	341	508	897	732
ice chizzles	1	547	224	813	846	407	472	549	396	196	253	242
knives	0.25	688	622	1,121	843	684	828	649	275	356	586	532
mocotaggans	0.5	46	68	22	4					4		
net lines	1	23	49	185	245	200	218	221	80	158	169	174
powder horns	1	138	126	229	440	59	181	178	71	17	66	79
powder (lb.)	1	3,048	2,057	4,050	4,796	2,661	3,360	3,282	1,703	1,689	4,080	1,326
scrapers	0.5	89	90	113	150	108	108	144	26	26	18	8
shot (lb.)	0.25	1,423	840	1,812	2,356	1,284	1,847	1,281	605	761	578	782
twine (skein)	1	51	22	57	139	57	114	90	45	62	66	18
GUNS ^b		8,566	5,204	10,517	12,327	6,086	9,165	7,808	3,801	4,234	7,334	3,572
OTHER		2,155	2,765	3,314	3,421	2,327	2,810	2,990	1,359	1,549	2,378	1,976
TOTAL		10,721	7,968	13,831	15,748	8,413	11,974	10,798	5,160	5,783	9,712	5,548
HOUSEHOLD GOODS												
awls	0.125	126	115	169	167	120	105	67	25	58	53	32
blankets	7	280	581	791	1,659	749	1,323	1,729	791	938	1,064	259
fire steels	0.25	124	160	94	164	106	94	150	31	39	26	26
kettles	1.5	808	214	1,360	1,482	1,162	1,018	910	853	343	876	581
TOTAL		1,338	1,069	2,414	3,472	2,137	2,540	2,856	1,700	1,378	1,993	898
TOBACCO AND ALCOHOL												
brandy (gal)	4		499	727	1,568	1,248	1,514	2,391	1,554	2,190	2,296	1,461
rundlets	1			44	216	267	350	554	337	493	445	451
tobacco (lb)	2	2,369	2,704	4,077	4,679	3,944	4,543	5,991	2,625	3,674	4,234	3,408
tobacco boxes	1	41	1	167	156	177	162	193	54	194	92	42
tobacco tongs	0.5	8	19	36	75	2						1
water, strong (gal)	4			60	94	132	167	102	300	196	40	99
ALCOHOL ^c		0	499	831	1,784	1,609	1,996	3,112	1,993	2,983	2,937	1,952
TOBACCO ^d		2,418	2,724	4,280	4,910	4,123	4,705	6,184	2,679	3,868	4,326	3,451
TOTAL		2,418	3,223	5,111	6,694	5,732	6,701	9,296	4,672	6,851	7,262	5,403
OTHER LUXURIES												
baize (yd.)	1.5	33	42	3		11			14	16		
bayonets	1	173		121	303	214	150	190	106	188	452	500
beads (lb.)	2	629	513	514	337	386	318	196	134	322	565	272
buttons	0.25		2	15	9	7	10	23	2	9	13	1
cloth (yd.)	3.5	593	1,869	2,856	2,984	1,677	3,454	3,053	1,510	2,507	2,572	1,845
combs	1	135	157	390	445	269	346	328	150	158	213	190
duffel (yd.)	2	6	184	38	155	32	14	70	80	67	104	114
egg boxes	0.333		82	8	32	36	47	43	28	29	17	21
flannel (yd.)	1.5	24	24		9	29	28	76	31	50	27	212
gartering (yd.)	0.667	24	36	95	264	238	244	104	58	167		117
glasses burning	0.5			4	3	4	16			13	12	4
handkerchiefs	1.5			56	18	18	18	9	26			
hats	4			136	40	152	140	296	64	52		80
hawkbells (pair)	0.083	99	39	75	78	40	42	17	5	10	28	38
lace (yd.)	0.667						123	27				133
looking glasses	1	88	87	126	132	141	108	168	59	61	82	98
needles	0.083	8	46	41	40	42	34	33	2	20	85	25
pistols	7-			7	98	147	182	77		28	21	49
rings (three kinds)	.12-.33		22	37	67	91	106	108	29	121	73	54
sashes	1.5			66	48	72	48	5	23	2		16
scissors	0.5	26	7	23	3	25	28	6	18	16	18	10
shirts	2.5	4	21	72	142	244	226	156	82	76	30	66

TABLE 1 (cont.)

	MB/UNIT ^a	1716	1720	1725	1730	1735	1740	1745	1750	1755	1760	1765	1770
OTHER LUXURIES (cont.)													
shoes (pair)	3					3			4				12
spoons	0.5			1	2		12			2	12	2	
stockings	2.5	8	15	36	60	80	64	28	4	26	11	24	26
sword blades	1	2	5	4	4		5	6		1	15	10	8
thimbles, thread			48	3	2	10	53	65	11	22	2	1	3
trunks	4					46	148	68	152	20	160	56	88
vermillion (lb.)	16	196	400	447	571	338	296	232	118	124	50	280	288
worsted (yd.) ^e	.5-.67					24	59	140		2	2	138	
miscellaneous ^f				28	26		64	50	32	10	40	12	20
TOTAL		2,048	3,599	5,079	5,919	4,321	6,418	5,577	2,737	4,142	4,641	4,164	5,654
Producer Goods		10,721	7,968	13,831	15,748	8,413	11,974	10,798	5,160	5,783	9,712	5,548	7,096
Household Goods		1,338	1,069	2,414	3,472	2,137	2,540	2,856	1,700	1,378	1,993	898	1,384
Alcohol&Tobacco		2,418	3,223	5,111	6,694	5,732	6,701	9,296	4,672	6,851	7,262	5,403	6,772
Other Luxuries		2,048	3,599	5,079	5,919	4,321	6,418	5,577	2,737	4,142	4,641	4,164	5,654
GRAND TOTAL		16,524	15,858	26,435	31,834	20,603	27,633	28,527	14,269	18,153	23,609	16,013	20,905
SHARES (%)													
Producer Goods		64.9	50.2	52.3	49.5	40.8	43.3	37.9	36.2	31.9	41.1	34.6	33.9
Household Goods		8.1	6.7	9.1	10.9	10.4	9.2	10.0	11.9	7.6	8.4	5.6	6.6
Alcohol & Tobacco		14.6	20.3	19.3	21.0	27.8	24.2	32.6	32.7	37.7	30.8	33.7	32.4
Other Luxuries		12.4	22.7	19.2	18.6	21.0	23.2	19.5	19.2	22.8	19.7	26.0	27.0

^a Made Beaver per unit.

^b GUNS - flints, guns, gun worms, powder horns, powder, shot.

^c ALCOHOL - brandy, rundlets (barrels), strong water.

^d TOBACCO - tobacco, tobacco boxes, tobacco tongs.

^e Worsted binding and worsted knit.

^f Brass collars, earrings, feathers, medals, pumps, and razors.

Source: Hudson's Bay Company, "London Correspondence."

TABLE 2
GOODS RECEIVED AS EXPENSES AT YORK FACTORY, 1720 - 1770
(MADE BEAVER)

	1720	1725	1730	1735	1740	1745	1750	1760	1770
PRODUCER GOODS (selected items)									
flints	115	30	55	31	51	80	64	66	115
guns	126	28	28		70	140		462	560
hatchets	40	29	15	11	11	27	15	5	28
knives	25	9	16	20	28	56	45	37	100
powder	783	300	464	319	439	730	724	940	840
shot	842	318	443	246	379	592	532	678	519
TOTAL	1,985	743	1,072	675	1,036	1,705	1,504	2,289	2,377
HOUSEHOLD GOODS									
ALCOHOL	518	254	290	296	328	812	680	1,918	2,884
TOBACCO	409	120	111	108	198	475	304	514	1,128
OTHER LUXURIES (selected items)									
baize		20	14	14	12	30	18	225	398
beads	31	8	16	12	24	71	8	71	24
cloth	189	81	98	93	123	485	227	948	1,067
duffel								27	164
gartering		53	4	18	20	27	133	77	108
hats		8	24	20	28	32	48	136	320
lace			60	87	100	80	270	558	605
rings			3	5	8	4		67	72
sashes			6	5	12	12	6	45	68
shirts				4	8			60	108
stockings			4				24	60	126
trunks				4	16	20			104
vermillion		17	21	14	32	109	46	64	32
worsted binding			133	24				64	
TOTAL	1,953	1,937	2,131	2,055	2,189	2,731	2,596	4,456	5,369
Producer Goods	1,985	743	1,072	675	1,037	1,705	1,505	2,289	2,377
Household Goods	94	21	27	7	11	187	57	240	495
Alcohol & Tobacco	927	374	401	404	526	1,287	984	2,432	4,012
Other Luxuries	233	212	401	320	449	986	846	2,696	3,599
GRAND TOTAL	3,238	1,350	1,900	1,406	2,024	4,165	3,392	7,657	10,483
SHARES (%)									
Producer Goods	61.3	55.0	56.4	48.0	51.3	40.9	44.4	29.9	22.7
Household Goods	2.9	1.6	1.4	0.5	0.6	4.5	1.7	3.1	4.7
Alcohol & Tobacco	28.6	27.7	21.1	28.8	26.0	30.9	29.0	31.8	38.3
Other Luxuries	7.2	15.7	21.1	22.8	22.2	23.7	24.9	35.2	34.3

Source: Hudson's Bay Company, "London Correspondence."

TABLE 3
ELASTICITY OF SUPPLY OF NATIVE LABOR TO THE FUR TRADE

σ^a	0.5		1.0		1.5	
	A ^b	B ^b	A ^b	B ^b	A ^b	B ^b
1716 - 1770	.27	0.8	.67	1.2	1.07	1.6
1723 - 1770	.34	0.9	.74	1.3	1.14	1.7

^a σ is the elasticity of substitution between *producer* goods and labor in the production of subsistence output.

^b A - no adjustment for changes in the beaver population; B - 37.5% of the change in fur price is assumed offset by a change in the beaver population.

Source: see the text.

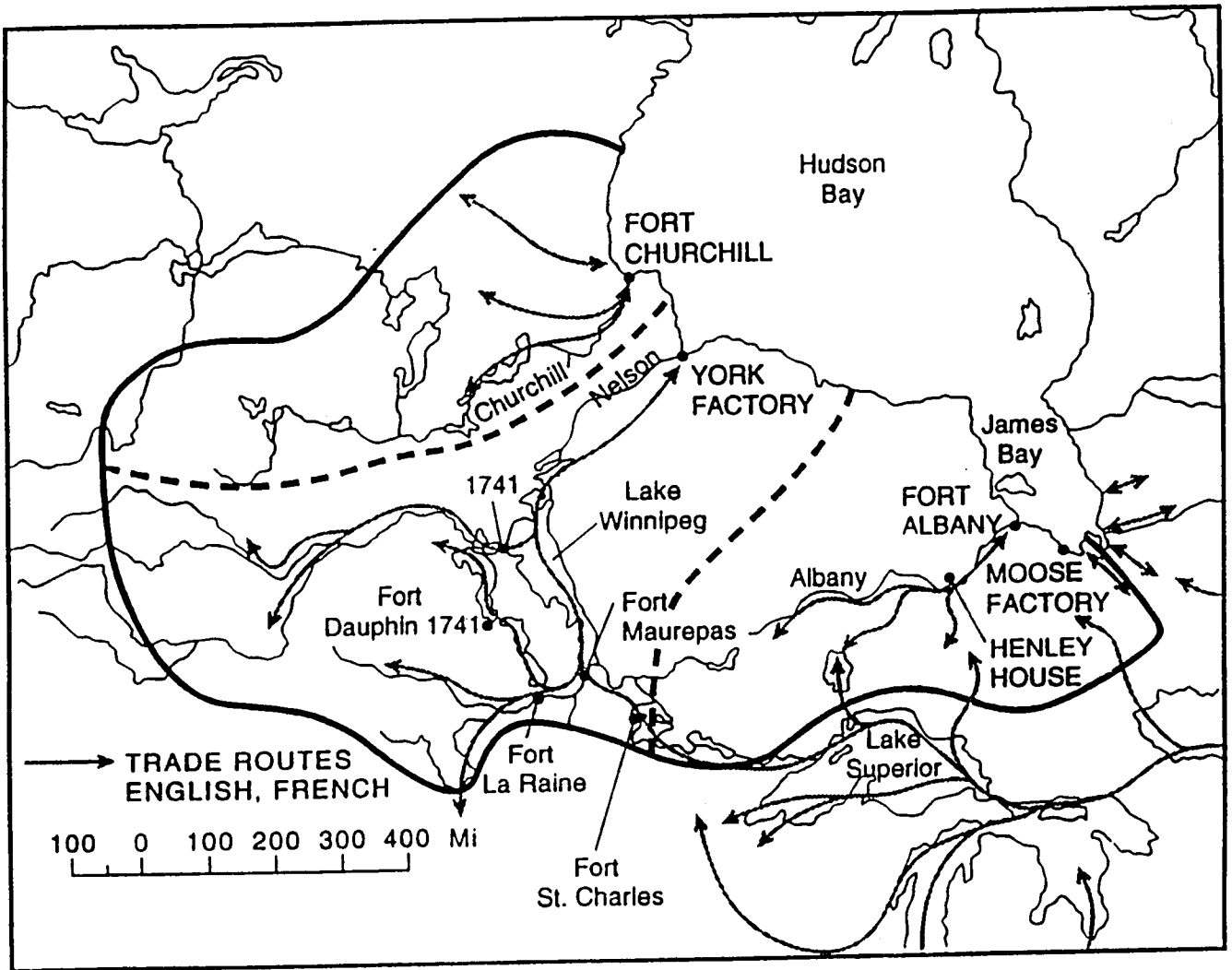
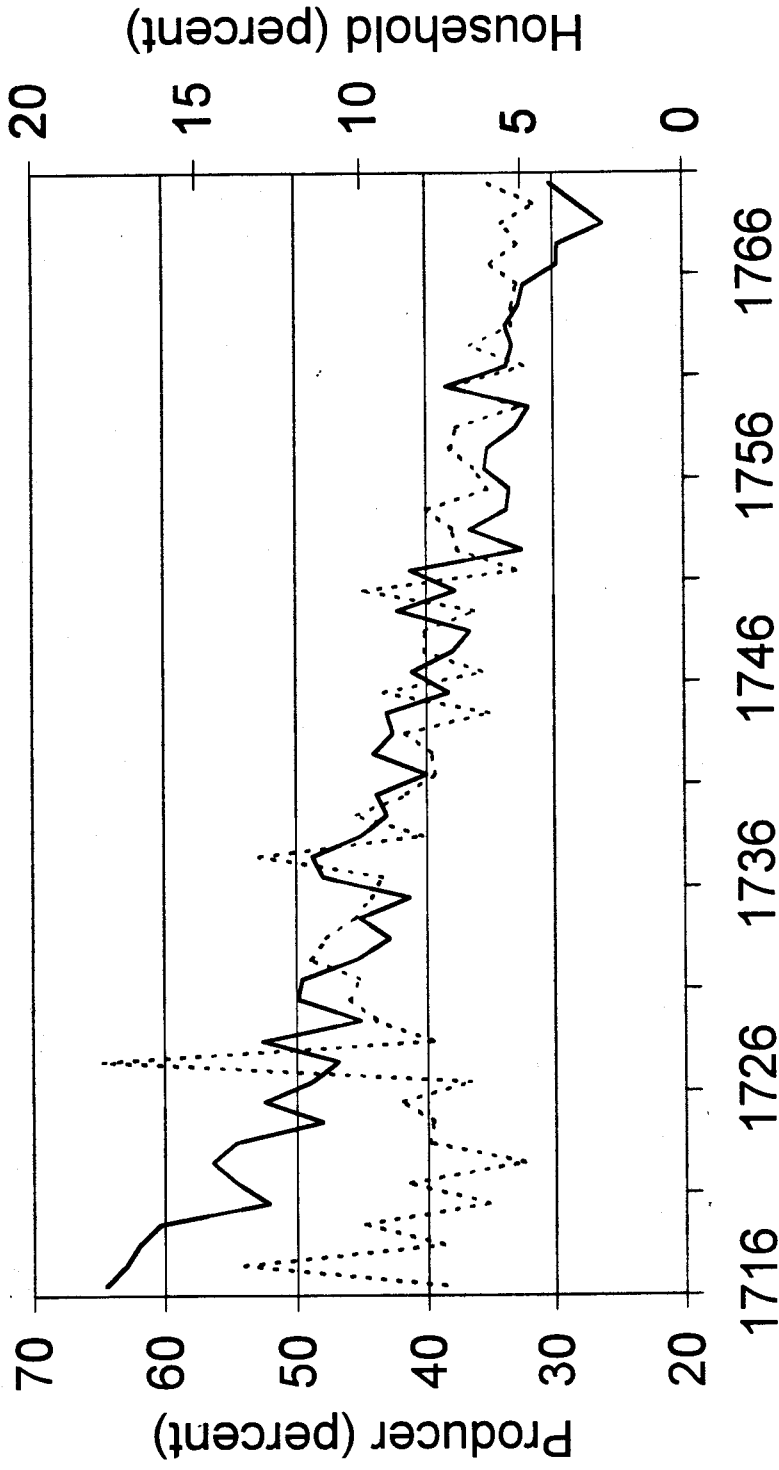


FIGURE 1
HUDSON'S BAY COMPANY HINTERLANDS

Source: Ray, "Bayside Trade."



— Producer Goods Household Goods

FIGURE 2
PRODUCER AND HOUSEHOLD GOOD SHARES

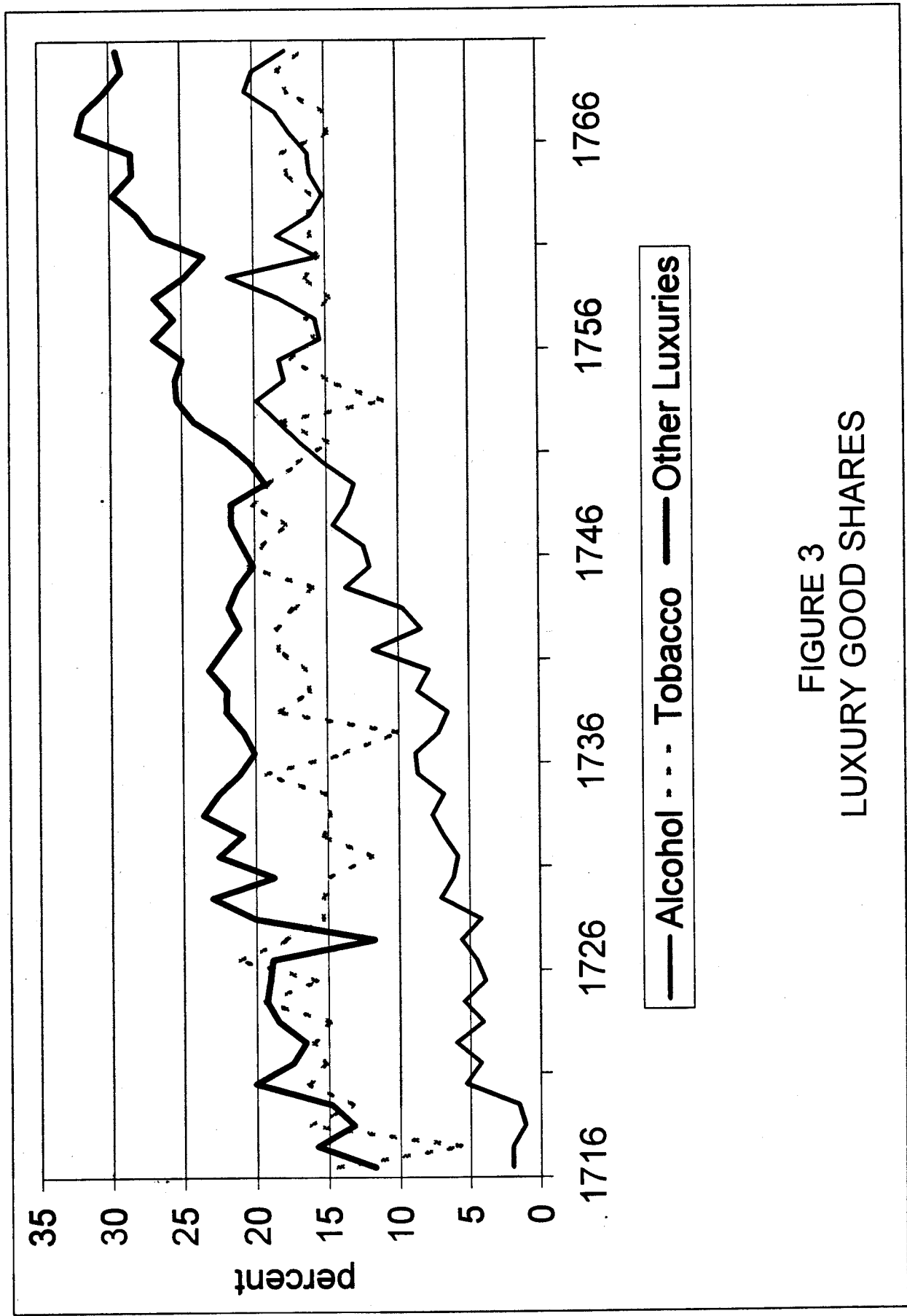


FIGURE 3
LUXURY GOOD SHARES

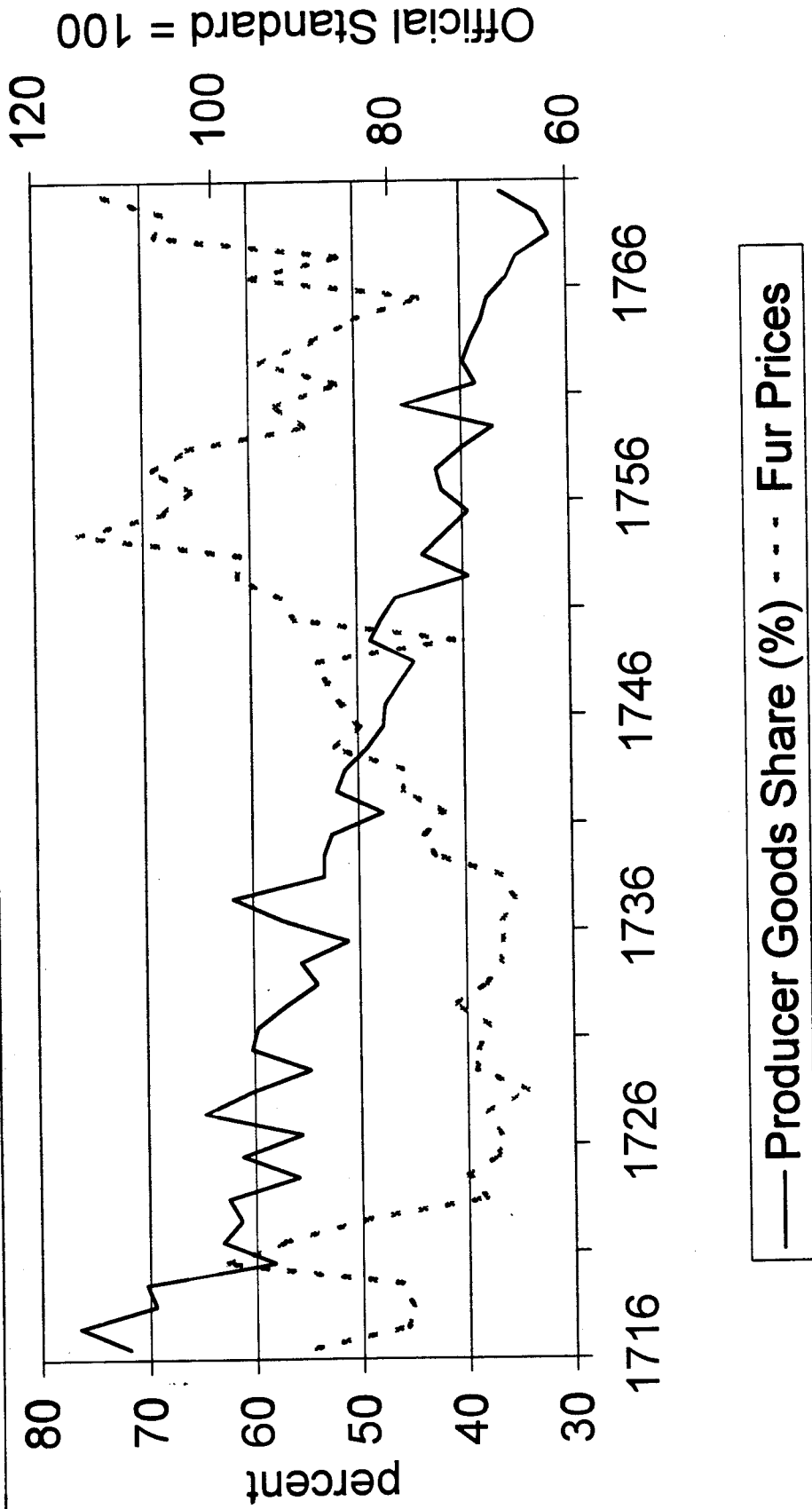


FIGURE 4
 FUR PRICES AND THE PRODUCER GOODS SHARE