

# Market Structure and Competition for Indigenous Labor

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## Abstract

This paper assembles novel data from the account books of the Hudson's Bay Company (HBC) to study the wage effects of a new entrant into a monopsonistic market for Indigenous labor. We show that in the setting of Canada's early modern fur trade, where Indigenous labor was free and mobile between firms, increased competition improved wages for Indigenous workers. This unique case study allows us to isolate market structure as the main channel of labor market power and to quantify the impact on wages. We find that a 100km decrease in distance to the nearest competitor location was associated with a 1.5% increase in wages.

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# 1 Introduction

In recent years, there has been a resurgence of interest in understanding imperfect competition in labor markets and its consequences for welfare. Empirical puzzles, including the rise of superstar firms, declining labor share of income, limited geographic and job-to-job mobility, and increasing inequality, have defied attempts at reconciliation with theories of perfectly competitive labor markets. These findings have motivated further research into models of monopsonistic labor markets, which posit that employers curb labor demand to reduce costs and maximize profits by paying wages below workers' productivity levels.

Traditionally, the term "monopsony" has referred to a single buyer dominating a market (Robinson 1933).<sup>1</sup> Recent definitions in the labor literature allow for a broader interpretation of monopsony, including the employer's wage-setting power attributed to search frictions and job differentiation (e.g. Boal and Ransom (1997), Manning (2003) or Ashenfelter et al. (2010)). However, one of the most striking findings in the recent literature reveals that, for a significant number of workers, the number of potential employers in their local labor market is relatively small, and that employment and wages are highly concentrated in a few firms (Berger et al. 2022). These findings motivate further research into the role of labor demand concentration, and broadly market structure, as a key contributor to monopsony power and wage suppression.

Historically, market structure and the concentration of employers have often granted companies significant monopsony power. For example, colonial trading companies in the early modern era (starting in the 16th century) were well-positioned to exercise market power over the labor force in their areas of operation. The extent of that power depended on the ability of rival firms to enter their markets. Many firms, such as the Dutch and English East India Companies or the Royal African Company, were given charters of monopoly and exclusive rights to trade with a region. Some firms even used force to exclude rivals (Phillips and Sharman 2020). As the main purchasers of Indigenous production, trading companies could procure their wares at below-market prices, even without direct labor coercion.

Did the entry of rival companies enable Indigenous workers to play off the Europeans against one another and improve their labor market outcomes? In this paper, we leverage newly collected archival data to estimate how the entry of a competitor affects the wages offered by a colonial company to their Indigenous labor force.

This study provides evidence from one of history's oldest and most powerful corpo-

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<sup>1</sup>As reported in Thornton (2004), Robinson argued that "is necessary to find a name for the individual buyer which will correspond to the name monopolist for the individual seller. In the following pages an individual buyer is referred to as a monopsonist".

rations, the Hudson's Bay Company (HBC). The HBC played a major role in Canadian history,<sup>2</sup> helping to pioneer the transatlantic fur trade. After the French expulsion from Canada in 1763, the HBC's monopsony was challenged by Montreal-based free traders. From 1779, many of these so-called "pedlars" combined forces as the North West Company (NWC). The NWC, which had access to British capital and goods markets, took over the preexisting French trading network and aggressively competed for Indigenous labor.

To understand how the changing market structure affected wages, we combine several historical sources. We geolocate all of the trading posts operated by the HBC and its competitors over the period 1763-1810, during which the HBC lost its dominant position and the NWC was founded. For the same period, we hand-collect and transcribe the HBC Account Books, which contain detailed information on the value of furs hunted by Indigenous people and the trading goods provided in exchange by the company at each trading post. We follow the HBC's accounting system of reference prices for goods and pelts to derive a measure of piece-rate wages paid to Indigenous workers. The piece-rate wages are calculated as the ratio between the value of the goods received by Indigenous hunters over the value of the pelts they delivered to the company.

We find that the period of heightened competition between the two companies led to a proliferation of trading posts, with the HBC and NWC progressively operating in overlapping areas. The distance between HBC and competitor posts decreased over time as the NWC encroached on the HBC's monopsony area around the Hudson Bay and as the HBC expanded inland. At the same time, the average wages paid to Indigenous trappers increased from 69.9% of the reference price of fur in 1763 to 97.3% in 1810.

By leveraging spatial variation in the change in distance to the closest competitor's post, we show that wage markdowns responded to the entry of a competitor into the local labor market. Indigenous trappers started to receive more for their output compared to the period of HBC's monopsony. Holding the HBC trading post fixed and isolating variation in distance from the entry of competing posts, we show that every 100 kilometers decrease in distance to the closest competitors' post came with a 1.5 percentage point increase in the wages paid to Indigenous hunters for their furs.

Our findings contribute to a growing empirical literature on the implications of market structure on wages. In this literature, market structure is often proxied by an index of employers' concentration akin to the Herfindahl-Hirschman index (HHI), used broadly by both academics and antitrust authorities to assess market power in product markets.

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<sup>2</sup>In this paper, "Canada" is used as a shorthand to describe the region encompassed by the modern country. The areas controlled by the British Crown—and then termed Canada—were confined to a relatively narrow band along the St. Lawrence River and the Eastern Great Lakes. Most of the setting discussed in this paper overlapped with Indigenous sovereign territory.

Following this approach, Autor et al. (2020) find an increase in national sales concentration and a fall in the labor share, while Rossi-Hansberg et al. (2021) highlight a decrease in regional employment concentration, even as national concentration continues to increase. Other papers have documented the relationship between wages and concentration, as measured in various data sources such as administrative data (Benmelech et al. (2022), Yeh et al. (2022), Rinz (2022)) or vacancies from online sources (Azar et al. (2020), Azar et al. (2022)). The closest approach to ours is exploiting changes in market structures due to mergers (Prager and Schmitt (2021), Arnold (2021)). These studies typically demonstrate a negative relationship: increased employer concentration is associated with lower wages.

Related to this literature, our contribution is two-fold. First, our setting allows us to define the market structure and the set of relevant competitors in a clean and straightforward manner. This eliminates the need for relying on a concentration index calculated using pre-defined industry categorizations like the HHI, which often don't align with workers' outside options (Nimczik 2020). While Indigenous people had the option not to participate in the fur trade with Europeans, fur trapping constituted the only way to obtain manufactured goods from Europe, which simplifies the assessment of alternative employers competing in the market. Second, the NWC's entry into labor markets that were previously locally dominated by the HBC is a unique case study of the transition from monopsony to duopsony. Our findings of increasing wages with declining distance to the closest competitor complement earlier studies that established a similar relationship leveraging different sources of variation in market structure, such as local employer concentration or mergers.

We also contribute to the literature on the effects of colonial organizations and institutions in economic development (Acemoglu et al. 2001, Dell 2010, Nunn 2008, Diaz-Cayeros and Jha 2016, Dell and Olken 2020). In particular, our work relates to studies on the role of private or semi-private actors for Indigenous welfare, akin to the studies conducted by Méndez and Van Patten (2022) and Lowes and Montero (2021). In contrast to these two papers that focus on the long-term consequences of the concessions, we use contemporary data to quantify the rate of extraction that a colonial company exerted on an Indigenous population in settings of local monopsony and duopsony. Our results are compatible with the interpretation that better outside options, as measured through the distance between competing firms, decreased the rate of extraction and improved Indigenous wages.<sup>3</sup>

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<sup>3</sup>Our study is also related to that of Diaz-Cayeros et al. (2022), who show that settlements producing hard-to-expropriate cochineal dyestuffs in New Spain were more likely to survive the Conquest of Mexico, as the Spanish could not easily replicate their skills. This parallels our argument that the irreplaceable trapping and navigation skills of Indigenous workers allowed them to exploit inter-firm competition to improve their labor market outcomes.

Furthermore, we contribute to a long-standing literature on the economic history of the Canadian fur trade. Carlos (1981, 1982) and Carlos and Hoffman (1986) studied the rivalry between the HBC and the NWC after 1810. We show the existence of intense spatial competition prior to this point, dating back to at least the 1790s. Other authors have debated the HBC’s impact on Indigenous welfare. Innis (1930) argued that the relatively benign role of the fur trade was in part responsible for Canada’s more quiescent relationship with its Indigenous peoples. More recent studies, including Carlos and Lewis (1993) and Carlos and Lewis (2010), have argued that the fur trade resulted in higher Indigenous living standards prior to 1760. Ray (1974) emphasizes increasing Indigenous dependence on trade with Europeans as their resources—beaver and buffalo—declined. We build on work by Carlos and Lewis (1993), who study the four HBC posts operating before 1763 and find greater fur prices at posts closer to Montreal at times of competition with France. Expanding the analysis to a panel of prices at all known posts operated by the HBC from 1694 to 1810 allows us to hold post-level characteristics fixed and isolate variation from the entry of competitors. Our empirical exercise quantifies the extent to which Indigenous traders were able to exploit inter-firm rivalry to improve their labor market outcomes.<sup>4</sup>

Our results support the views of economic historians who assigned Canada’s Indigenous peoples greater agency in their historical interactions with European colonialists. The sociologist Karl Polanyi (2018) argued that because Europeans organized the fur trade, Indigenous Canadians were passive players in the colonial game. Early studies of the Canadian fur trade, like those of Rich (1958) and Innis (1930), tended to focus on the operations of the trading companies and minimize the role of Indigenous customs and decisions. In particular, they posited that Indigenous people had different economic motivations than the market-oriented Europeans. Even Ray (1974), who emphasized Indigenous agency in the fur trade, suggested that they were “satisficers”—desirous only to maintain a fixed standard of living. In their seminal book *Commerce by a Frozen Sea* (and in several papers), Ann Carlos and Frank D. Lewis have presented a different view: Canada’s Indigenous peoples were sophisticated economic actors who responded to price incentives and shaped the fur trade via their customs and preferences (Carlos and Lewis 1999, 1993, 2010). Our empirical results support the conclusions of Carlos and Lewis, showing that Indigenous traders knew how to leverage the competition between colonial companies to obtain superior prices for their goods.

The remaining portion of the paper is structured as follows. The historical context of the Canadian fur trade is discussed in Section 2. Section 3 includes details of the data used

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<sup>4</sup>Our analysis does not aim to evaluate the overall impact that the HBC had on the Indigenous populations with which it interacted, and our work is neither an endorsement nor a comprehensive evaluation of European colonialism.

in our analysis. We provide graphical evidence and present our empirical results in Section 4. Section 5 concludes.

## 2 Historical Context

### 2.1 European Entry into the Canadian Fur Trade

The transatlantic fur trade, one of Canada's oldest and most historically significant industries, dates back to the arrival of European explorers in the 16th century. Initially carried out on a small scale, the impetus for the expansion of this commerce came from the rapidly expanding high-fashion felt hat industry, for which beaver wool was the ideal raw material. The near-extinction of the European beaver during the seventeenth century and the growth of the hat-making trade propelled efforts to derive a North American source of supply (Carlos and Lewis 2010).

The first European participants in the Canadian fur trade were the French "coureurs des bois", who successfully worked the regions along St. Lawrence and Ottawa Rivers. This blocked efforts by the English, based in New England, to enter the market. In 1670, King Charles II granted a charter of monopoly to the Hudson's Bay Company (HBC), establishing its monopoly over all trade through the Hudson Strait and its exclusive possession of the vast Hudson's Bay drainage basin (Easterbrook and Aitken 1988).<sup>5</sup>

While the HBC's nominal domains were nearly boundless, its actual powers were limited. For the first 150 years of the company's operations, it possessed only a small set of trading posts on the edge of the Bay, manned by a skeleton staff of traders and clerks. Though the Europeans possessed firearms, more populous Indigenous tribes—the Cree and Assiniboin—actually controlled most of the region (Carlos and Lewis 2010, Innis 1930, Ray 1974).

The HBC entered a well-established European fur market, with supplies coming from New France, the Continental colonies, northern Europe, and Russia. However, the HBC had access to top-quality pelts, mainly beaver but including marten, fox, and muskrat, that were highly prized by European furriers (Carlos and Lewis 2010, p. 16-7). As the HBC was required by a clause in its charter to sell its furs only on the English market (Carlos 1981), historians have retrieved an estimate of the total value of its commerce and its market share.

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<sup>5</sup>In this sense, the HBC might be properly characterized as a "concessionary company," having been assigned the rights to a nominal trade monopoly in a specific region and product. Carlos (1992) has compared the HBC with the Royal African Company, which also enjoyed a monopoly over the West African slave trade in name but not in practice. The HBC and RAC were both formed during the early 1670s, based in London, and run using similar organizational structures.

Already from 1738 through 1748, the company's imports to England totaled more than one million beaver pelts, valued at over £270,000, or more than \$63 million in today's currency (Pettigrew and Smith 2017). Work by Wien and Pritchard (1987) indicates that the HBC was not a monopolist in the *London* market. In 1772, the HBC accounted for less than 20% of the total value of beaver pelts exported from North America to England.

## 2.2 Indigenous Relations with European Fur Traders

The Canadian fur trade was *dependent* on Indigenous peoples.<sup>6</sup> Europeans relied on Indigenous hunters for their superior skill at trapping; their knowledge of animal behavior (e.g. migration patterns and food sources); and their winter survival techniques (i.e., construction of snowshoes and the use of dog teams; cf. Honeyman (2003)). In turn, Europeans provided trappers with a wide range of foreign goods. Initially, manufactured consumer and producer goods, including textiles, firearms, and metal tools, were predominant. With fur prices increasing from the 1730s, higher Indigenous incomes were diverted into luxury goods like tobacco, alcohol, cloth, and beads.<sup>7</sup> The exchange happened at trading posts, mostly located along waterways. The furs would be stored at the posts until they could be shipped to Europe for processing and final sale.

Indigenous traders frequently held significant leverage in dealings with Europeans. In particular, their skills (knowledge of local geography and acuity at trapping) were costly to acquire or imitate. The HBC's directors, therefore, ordered post factors to maintain friendly relations with Indigenous traders.<sup>8</sup> Traders learned local languages and sought to provide their discerning Indigenous suppliers with high-quality goods. When post factors observed that trappers preferred Brazilian roll tobacco to Virginian, the company was forced to acquire greater stocks of the superior variety (despite the longer supply chain) and banned employees from consuming it (Carlos and Lewis 2010, pp. 88-9). In 1728, James Isham, governor of York Factory, wrote to London that "never was any man so upbraided with our Powder, Kettles and Hatchets, than we have been this summer by all the Natives, Especially by those that border near the French" (Carlos and Lewis 2010, p. 100). In 1739, Isham reported (at the behest of the London director) on the "Indians dislike of particular goods" and their reasons for not purchasing them. The firm's kettles were said

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<sup>6</sup>In this setting, neither party possessed the power to coerce the other (Carlos and Lewis 2002).

<sup>7</sup>While some historians emphasize the negative consequences of the increasing share of alcohol in luxury purchases (Usner 1987, Braund 1996), Carlos and Lewis (2002) show that even under conservative assumptions, Indigenous adults likely drank no more than contemporary Europeans. In 1740, Indigenous traders received 450 gallons of alcohol, good for 0.5 gallons per capita. By contrast, English consumption per capita at the time was 1.4 gallons annually (Carlos and Lewis 2002, pp. 300-1).

<sup>8</sup>A 1727 missive, for example, asked that post factors "carefully observe our former instructions to treat the Natives very civilly" (Carlos and Lewis 2010, p. 75).



to be “small for the weight, [and] of a very bad shape”; other complained that the knives had “very bad blades and worse handles”; and that “Twine is... very weak and uneven, being as thick as packthread in some places and as thin as thread in other places” (Carlos and Lewis 2002, pp. 308-9). Thus the company assiduously adapted itself to the consumer demands of its discerning Indigenous counterparties, even when doing so likely increased operating costs (Carlos and Lewis 2010).

In these respects, the HBC’s conduct differed markedly from the settler colonialism of the nineteenth century—predicated on superior military force, large and increasing European populations, and government by a colonial administration.

## 2.3 Phases of Competition

Despite the HBC’s charter, the firm always faced some competition. The first forty years of the company’s existence were embroiled in geopolitical competition with the French. After the Treaty of Utrecht in 1713 declared the Hudson Bay basin British territory, competition with French traders continued at the fringes of the HBC’s monopsony area. The period characterized by HBC monopsony close to the Bay and competition in its periphery lasted until the end of the French and Indian War in 1763 (Easterbrook and Aitken 1988).

The French expulsion from North America resulted in an influx of free-trading “pedlars” from Montreal. The pedlars were more aggressive in penetrating the HBC’s monopsony area and, though disorganized, cut into the company’s trade (Rich 1958, pp. 246-252). In response, the HBC abandoned its policy of operating exclusively on the Bay, establishing its first inland post at Cumberland House in 1774. The combination in 1779 (and more formally in 1783-4) of several independent traders—financed by Anglo-Scottish merchants—as the North West Company (NWC) presented the HBC with a competitor of comparable strength. The NWC coupled the skills of the Montreal-based pedlars with access to credit, overseas fur markets, and the cheap British manufactures and Brazilian tobacco that made the HBC competitive (Ray 1974).

The formation of the NWC kick-started a race to expand the firms’ trading and supply networks—a race that involved deliberate encroachment on opposition hinterlands. After the HBC built a post at Portage l’Isle on the Winnipeg River in 1793, for example, the NWC erected a post of their own just two weeks later on the opposite bank. The HBC post closed in 1797 (Freeman and Dungey 1981, pp. 263-6).<sup>9</sup> This phase of intensifying competition is illustrated by Figure 1, which shows the evolution of the fur trade from 1780 to 1805 in four maps. During the 1780s, the HBC slowly responded to the westward drive of the NWC

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<sup>9</sup>There were two posts on Cat Lake and two posts on Crow’s Nest Lake. Each company also had its own Cumberland House, Swan River, and South Branch House.



and independents, moving toward Athabasca and the Great Lakes. A more dramatic shift occurred in the period 1790-1805, when the HBC and NWC (and briefly the XY Company) raced west across the prairies. Posts cluster at tight intervals along many major rivers, evidence of deliberate efforts to cut off opposition hinterlands and of the importance of waterways for transportation.<sup>10</sup>

Our analysis concludes in 1810. By this year, the Napoleonic blockade—which inhibited fur exports from England to Europe—had slashed demand for the HBC’s goods and induced a severe financial crisis. In response, the HBC moved aggressively into the NWC’s Athabasca heartlands, initiating a phase of unprecedentedly aggressive competition between the two firms (Carlos 1981, pp. 792-4). This included outbreaks of violence between the operatives, from harassment and intimidation to outright massacres and seizures of competing posts (Carlos 1982, pp. 177-8). We are leaving an investigation of this era of “predatory competition” (Carlos 1982), which ended in a merger of the two firms, for subsequent research.

## 3 Data

### 3.1 Account books

For our analysis, we leverage two particular features of the HBC organizational structure.

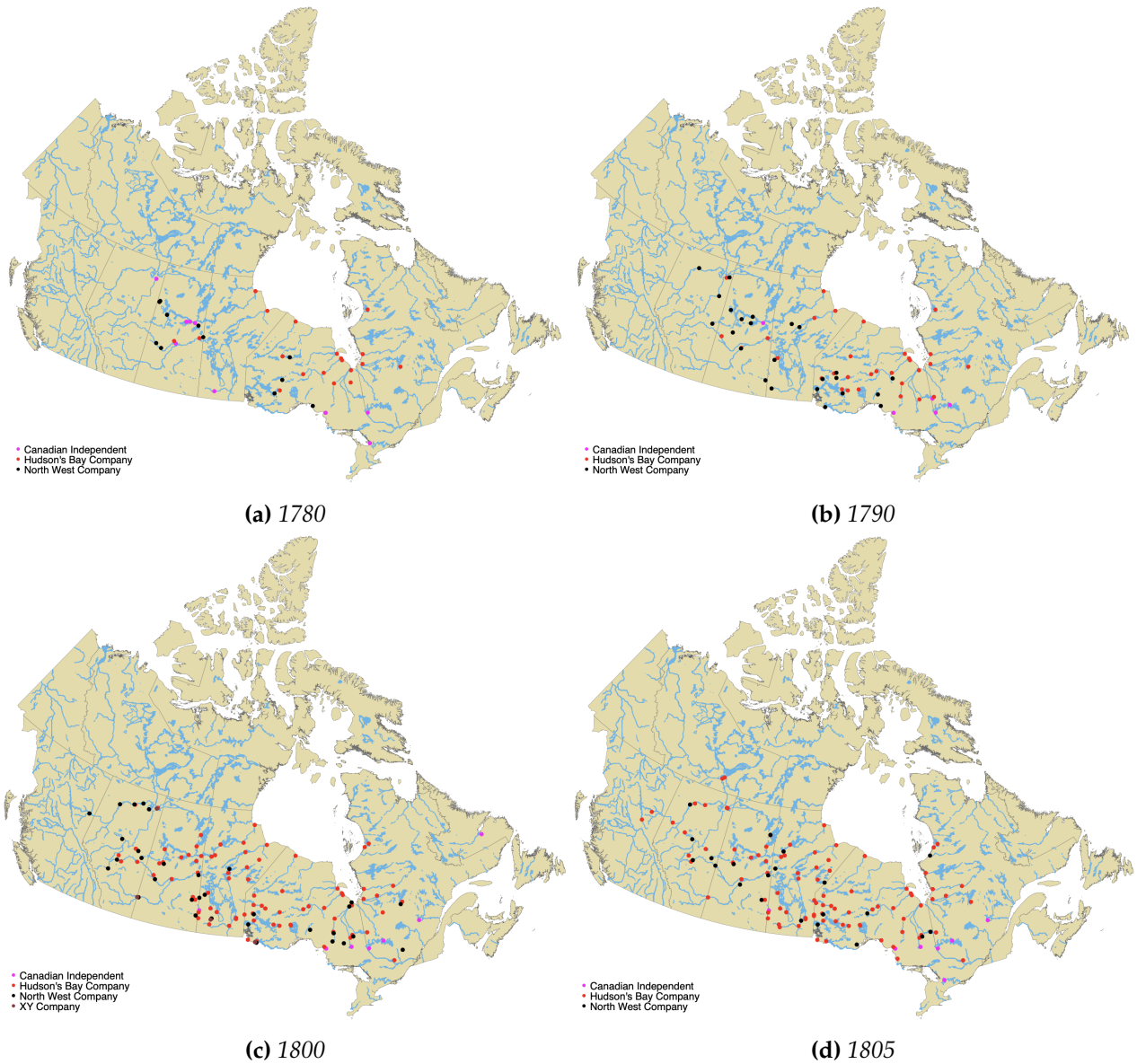
First, agency problems arising from the distance between the HBC’s headquarters in London and the post factors in Canada required the Company to devise an accountability system for the fur trade.<sup>11</sup> For this reason, the HBC’s directors mandated the posts’ factors to keep comprehensive account books detailing the post’s business operations which would then be sent to London at the end of each trading year.

The HBC Account Books constitute an invaluable source of information for several reasons. First, the books’ standardized format allows us to compare the state of the fur trade across posts (Ray 1975). Moreover, HBC accounting procedures required the traders to inventory the goods traded, furs received, and goods remaining for future use (Carlos and Nicholas 1990), distinguishing between goods shipped to posts for trade purposes and those which were intended for use by the factors.

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<sup>10</sup>As there were no roads or railways available, all transportation had to rely on rivers and lakes. The most appropriate means of transportation was the canoe, which had already been perfected by the local inhabitants (Morse 1969). The most distant posts could be reached from Montreal with fewer than half a dozen portages. The fur trade thus integrated Canada’s regions into a single economic system for the first time.

<sup>11</sup>See Carlos and Nicholas (1990) for a more detailed explanation of the HBC agency problems and operation strategies aimed at reducing opportunistic behavior.



**Figure 1:** *The evolution of the HBC and NWC rivalry*

*Note:* These maps depict the evolution of competition between the major fur-trading Companies from 1780 to 1805. Each panel shows the locations of posts extant in the specified year; 1780 in subfigure (a), 1790 in subfigure (b), 1800 in subfigure (c), and 1805 in subfigure (d). See Section 3.2 for information on the construction of these maps.

Second, the lack of a common currency between HBC factors and Indigenous traders forced the HBC to devise its own unit of account.<sup>12</sup> For this reason, the HBC valued both trade goods and furs in *made beaver* (MB), each unit equivalent in value to one prime beaver skin. Trade goods were valued according to the *Official Standard*, while furs received from Indigenous traders were evaluated according to the *Comparative Standard*. Together, the two documents constituted an 'exchange rate' between the HBC's goods and Indigenous-collected pelts.

We build on work by Ray (1974) and (Carlos and Lewis 1993) to use the standards of trade to assess Indigenous wages at each post, and thereby shed light on the labor market power of the HBC. Post factors had the incentive to minimize the value of goods traded per pelt received. When they could, factors demanded more for their goods (i.e. charged higher 'prices') than the Official Standard warranted, usually by giving short measures (less gunpowder, fewer beads, etc.) during the trading.<sup>13</sup> For this reason, the value of furs received almost always exceeded the value of goods given to the Indigenous traders according to the Official Standard valuation, and the difference between the two sums was labeled "overplus" and recorded in the account books at the close of each trading season (Ray 1974, pp. 63-5).<sup>14</sup> We use this data to quantify wage markdown for each post and year. We measure markdowns as the ratio of the value of goods exchanged with Indigenous traders over the value of furs the HBC received.<sup>15</sup>

We collected and digitized all available Account Books stored at the firm's official archives at the University of Manitoba. For the period of interest (1760-1810), we extracted and manually transcribed the relevant account lines: total furs received, goods expended in trade, and overplus.<sup>16</sup> We assembled an annual post-level panel for the available years. We are confident that our sample includes close to all of the fur collected by the HBC. Over 1799-1800, two years for which we have detailed data on the HBC's fur exports, the firm sent 51,341 skins of parchment beaver to Britain, of which we capture 46,337, or roughly

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<sup>12</sup>While Ray (1974, p. 61) argued that "the Indians lacked any concept of money," Carlos (2023, p. 333) writes that North American Indigenous tribes did use currencies, including the Chumash, who employed cupped beads.

<sup>13</sup>Indigenous people understood that this was occurring, but accepted it, within limits, as a necessary part of the barter economy. By the same token, Indigenous traders strove to extract greater quantities of goods from the HBC in exchange for each pelt.

<sup>14</sup>We are not the first to suggest that the overplus may be used for this purpose. Ray (1974, p. 65) observed that the overplus varied with "competitive conditions", while Carlos and Lewis (2010, p. 55) note that the measure indicates the "relative distribution of gains" between Indigenous traders and post factors.

<sup>15</sup>We follow (Carlos and Lewis 1993) and include both goods explicitly traded and those given as gifts in in the value of goods exchanges.

<sup>16</sup>Notice that the value of the fur received should be equal to the value of the goods exchanged plus the overplus. Hence, where one variable was unavailable, the difference between the other two can be used to fill the gap.

90 percent.<sup>17</sup>

### 3.2 Geospatial Data

To capture the changing economic geography of the fur trade, we also collected, digitized and geo-referenced two separate maps of Canadian fur trading posts.

The first map is from the Manitoba archives, covers the HBC alone, and contains 502 posts ranging from Hawaii to Labrador. The second is extracted from the 1973 *National Atlas of Canada* (Division 1974). It is restricted to Canadian posts and thus contains fewer belonging to the HBC, but it has several additional benefits: more precise coordinates, dates of establishment and (approximate) closure, and, most importantly, includes the locations of French, Canadian and British independent, XY Company, and NWC posts.

We manually linked the HBC posts in the two collections to create a full dataset of the locations and operation times of every station in the Canadian fur trade. Using this extended set, we created a post-year panel stretching from 1670 to the late twentieth century, although we focus on the period 1763-1810 in our analysis. For each post-year combination, we then calculated the distance in kilometers to the nearest competing establishment.<sup>18</sup>

Moreover, we calculated a proxy for the suitability of each area to being inhabited by beaver, the main animal that was hunted in the fur trade (Morse 1969). For this purpose, we replicated the US Geological Survey GAP model for beavers across Canada. The final iteration uses 10-meter resolution Landsat-based landcover data for North America in combination with a digital elevation model of Canada (which gives a finely-detailed description of the country's topology) and water-flow vectors to pinpoint the capacity of the country's alluvial habitats.

Suitable areas for beavers are considered to be those: a) within 250 meters or 60 meters inside of water bodies; b) located on flat terrain; and c) restricted to elevations below 3400 meters and to afforested or wetland regions. We then divide Canada into 400 polygons of roughly equal size and calculate the share of the area of the polygon covered by land suitable for beavers.

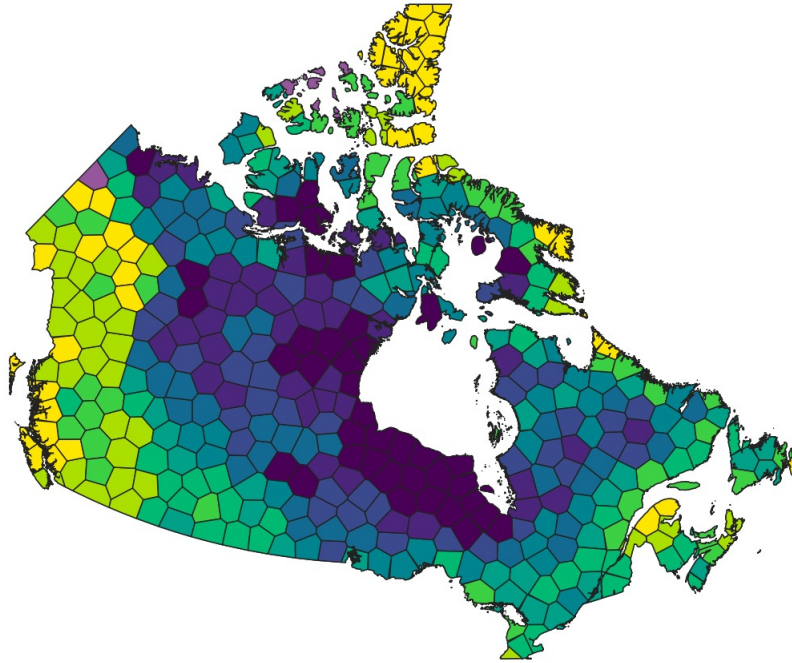
Figure 2 presents a map of Canada with the polygons colored by average beaver suitability. The map reveals that the initial region of HBC expansion on the southwestern

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<sup>17</sup>Previous work by Carlos and Lewis (1993, 1999, 2002) has focused on the account books of the four main posts (York Factory, Fort Albany, Moose Factory, and Fort Churchill) that have been transcribed over long time ranges. We collected data on over forty-five additional posts—unavailable during the period studied by Carlos and Lewis (1999)—of varying sizes. While many of these posts drop in and out, they are most densely clustered in the period of HBC-NWC rivalry. Summary statistics are reported in the Appendix.

<sup>18</sup>As a validation exercise to analyze possible cannibalization between 'friendly' posts (akin to intra-brand competition), we also computed the same measure, but to the nearest other HBC post.

shore of Hudson's Bay has the highest suitability for beaver.<sup>19</sup>



**Figure 2:** *Measure of Beaver Suitability; darker values represent more suitable area*

*Note:* The above map shows the average suitability for beaver habitation in each of 400 polygons of roughly equal size. See Section 3.2 for a description of the algorithm used to derive the suitability measure, which is based on the USGS GAP model.

## 4 Empirical Results

### 4.1 A stylized framework for spatial competition

To set up the analysis discussed below, it will be useful to keep in mind the following stylized model of spatial competition, inspired by Hotelling (1929).

In our setting, there is a labor market with two firms (the HBC and NWC) and only one occupation for Indigenous workers, namely fur trapping. This is in addition to their non-market outside option. While Indigenous Canadians were not obligated to participate in the fur trade for their subsistence, it was only by hunting and gathering pelts that they could obtain manufactured and luxury products of Europe's new and expanding industry.

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<sup>19</sup>Figure 2 describes the intrinsic suitability for beaver habitation. Suitability can differ from the actually occurring density of beaver populations, for example due to greater hunting in some locations. Table 2 presents evidence that greater hunting at older locations is not driving our results.



The two firms compete à la Hotelling for labor by choosing two variables: first, they choose the locations of their trading posts and then compete on the value of goods offered to Indigenous trappers for the pelts they hunted. The Indigenous utility is increasing in wages (or the wage markdown, defined as the share of the marginal product of labor that they receive) but decreasing in transportation costs: given the costs of traveling to posts and transporting furs, higher markdowns will expand the labor supply at a company's post. A company can also choose to move the location of its post closer to Indigenous settlements, thereby reducing Indigenous transport costs and enlarging the firm's harvest. But if the other firm chooses a more favorable price-location pair, it will capture a greater share of the season's furs. This simplified model incorporates the two key features of standard monopsony models: (1) upward-sloping firm-specific labor supply and (2) wage posting.

In each period, the two firms decide whether to open a new post, thus entering a new labor market and expanding their network. The entry choice is a strategic decision and a dynamic problem, that depends on the number and characteristics of the competitors and potential markets. At this stage, we provide only descriptive evidence on the patterns of entry and we abstract from analyzing the location choice in a structural manner. We focus on spatial differentiation and proxy for the intensity of spatial competition by using the distance from each HBC post to the nearest competitor post.<sup>20</sup> Our main interest is in understanding if markdowns respond to changes in the competitor's distance to the post.

## 4.2 Descriptive evidence on post locations

We start our descriptive analysis by providing some graphical evidence of the HBC's patterns of spatial differentiation.

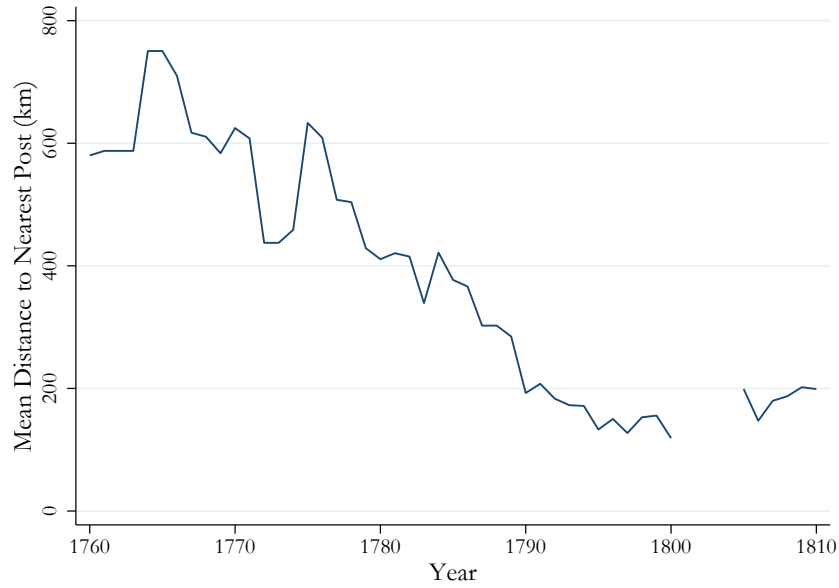
In Figure 3, we plot a yearly time-series of the average distance between each HBC post and its nearest competitor post.<sup>21</sup> Due to the combination of the NWC expanding its trading network and the HBC opening increasingly more posts over time, the average distance between HBC posts and its competitors' posts declined from 700 kilometers in the 1760s to less than 200 by 1810. The reduced distance between trading posts and the proliferation of posts in all areas of Canada suggests that Indigenous trappers might have benefited from increased competition between the two companies through decreasing transportation costs.

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<sup>20</sup>We also use the distance between each HBC post and its two closest rival posts in tables not reported here. Using two closest competitors is in the spirit of Salop (1979), in which each establishment competes directly only with its two nearest neighbors.

<sup>21</sup>We use all HBC posts in this calculation, even though some of them might have been used as points of supply depots for the inland traders.





**Figure 3:** *Average distance between HBC posts and their closest competitors*

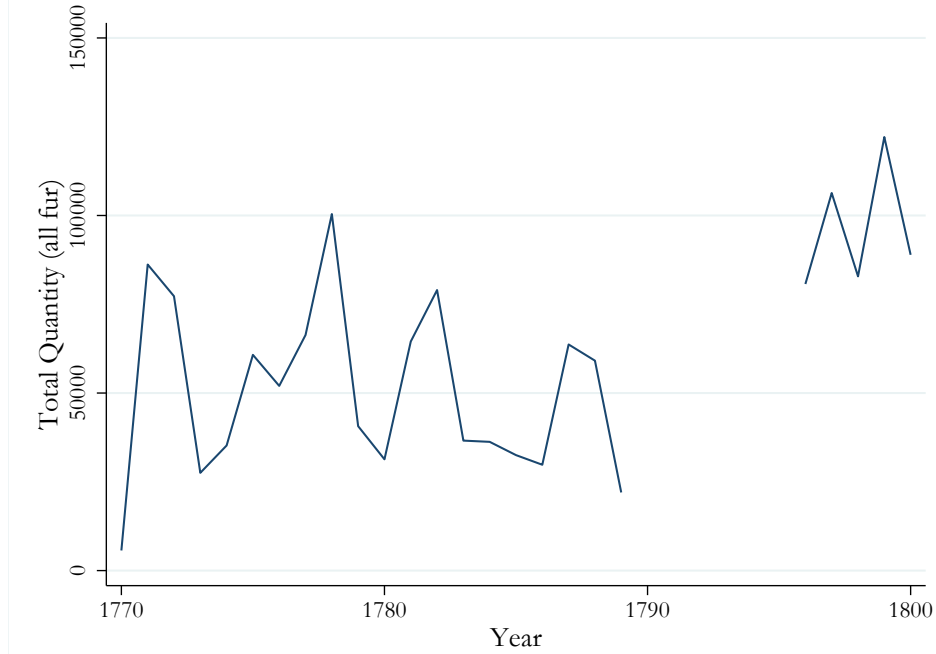
*Note:* Figure 3 shows the average distance to the nearest non-HBC post from each HBC post in the sample. We derive post locations from the University of Manitoba archives and from Division (1974).

In Figure 4, we provide graphical evidence of the quantity of fur collected by the HBC in the period of interest. Panel A 4 presents a time-series of the total amount of fur, measured in made beaver, collected across all HBC sampled posts collected by each HBC post across our sample period (1760-1810). There is substantial variation over time, with a noticeable drop around 1780, when the NWC started operating. This suggests that the reorganization of trade in Montreal and the financial means of the NWC allowed this company to compete more effectively than previous independent traders.

Panel B instead shows a time-series of the average quantity of fur, measured in made beaver, collected by each HBC post across our sample period (1760-1810). There is a significant decline from the peak achieved at the close of the Seven Years' War, falling from over 12000 MB in the late 1760s to under 5000 during the late 1770s and to fewer than 2500 in 1810. Several reasons are responsible for this change. First and foremost, the HBC experienced (as shown in Figure 3) increasing competition from independent traders, and then the NWC, which cut into their fur harvests. Second, the HBC established an array of minor posts to compete with its rivals. These establishments were smaller than the main factories on the Bay and consequently returned fewer furs per year. They also diluted the returns at the major posts, as inland Indigenous traders preferred to travel to nearer venues.

**Figure 4**

Panel A: Total quantity of fur collected by all HBC posts, in made beaver equivalent (MB)



Panel B: Average quantity of fur collected by HBC post, in made beaver equivalent (MB)



*Note:* Panel A portrays the evolution of the total quantity of fur, aggregated in made beaver (MB), across all sampled HBC posts. Panel B depicts the evolution of the average quantity of fur, aggregated in made beaver (MB), across all sampled HBC posts,

Moreover, it is important to understand where the trading companies decided to open new posts. As the expansion of the fur trade was mostly driven by the high demand for fur (mostly beaver) in Europe, we expect the decision to set up a new trading post to correlate with the degree of suitability for beaver habitat. Panel A of Figure 5 demonstrates that the HBC first built posts in locations with a high share of suitable area for trapping beavers and then later expanded into progressively less suitable areas. Similarly, Panel B describes the pattern of post selection for the NWC: while the first active posts were opened in highly suitable areas (close to the St. Lawrence rivers, taking over the previous French network), the later period witnesses active posts located in less suitable areas.

### 4.3 Descriptive evidence on markdowns

The spatial competition between the HBC and its rivals did not only involve the proliferation of posts, but it also affected the level of wage markdown. The data presented in Figure 6 indicate a significant rise in the average wage markdown (across all posts) paid by the HBC over time. In the 1760s, trappers used to receive on average not even 70% of the value produced by their labor, hunting, and gathering pelts. However, post-1780, average wages were nearly equal to the total value of the gathered fur.

We further investigate the evolution of the wage markdown over time and the degree of heterogeneity in markdowns across posts. Panel A of Figure 7 displays a scatter plot illustrating wage markdowns for each individual post from the establishment of the HBC up until 1810. In the initial period of operations, the HBC opened only a few posts and paid the Indigenous workers less than the full value of the furs they gathered.<sup>22</sup> For instance, in the years between 1730 and 1750, post factors were paying trappers between 60% and 90% of the value of the furs received. However, after 1760, the number of HBC posts started to increase, with an exponential growth following the reorganization of trade in Montreal around 1775. Moreover, the wage markdown paid to natives started to increase considerably around 1770, approaching the full value of pelts by the beginning of the 1780s. Note that the increasing trend in wage markdown leads to decreased volatility in this variable, as all posts started to pay workers close to their full value when competition intensified in the 1780s.

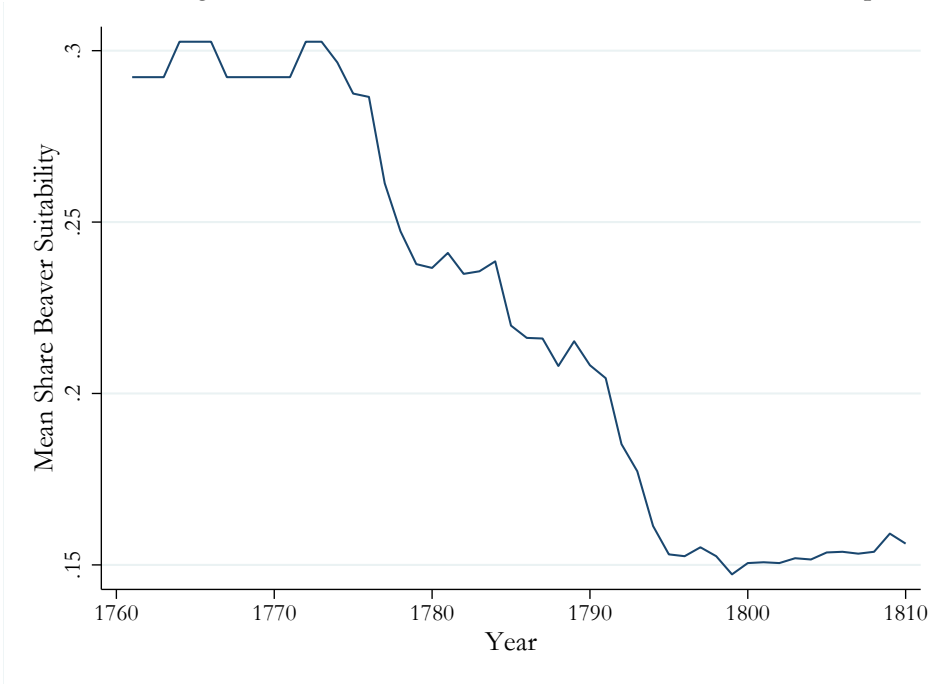
In Panel B of Figure 7, we narrow our focus to the period of interest, allowing for a more immediate visualization of wage markdown patterns within and across trading posts between 1760 and 1810. In the immediate years following the cessation of the rivalry with

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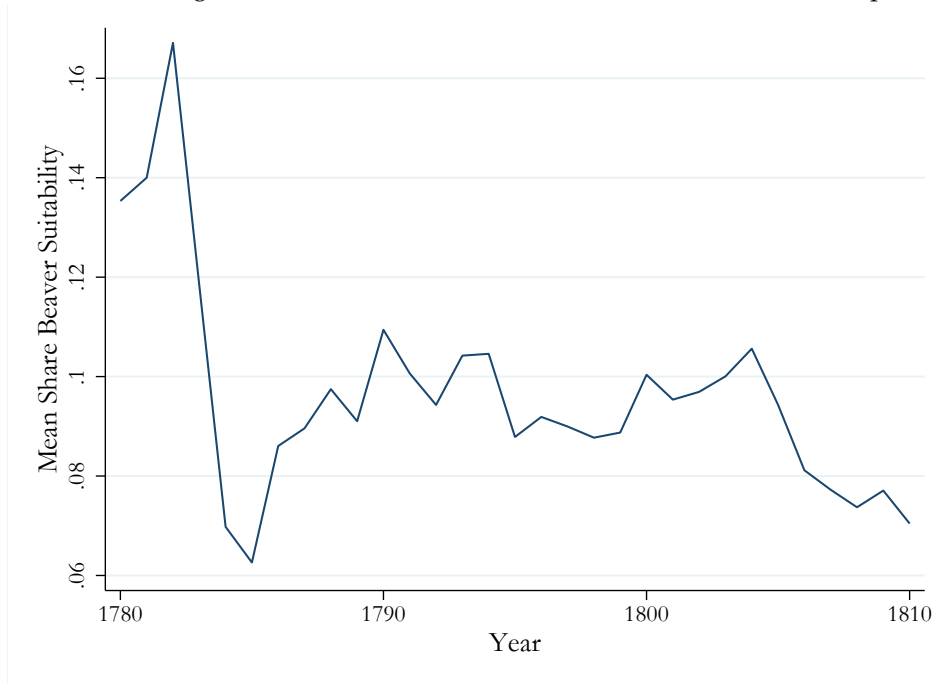
<sup>22</sup>While the HBC had a limited presence on the territory between 1700 and 1763, its posts were exposed to different degrees of competition by the French. This is documented in Carlos and Lewis (1993), which show that fur prices were different in levels and growth depending on the proximity with the French competitors.

**Figure 5**

Panel A: Average share of suitable land for beaver across all HBC active posts

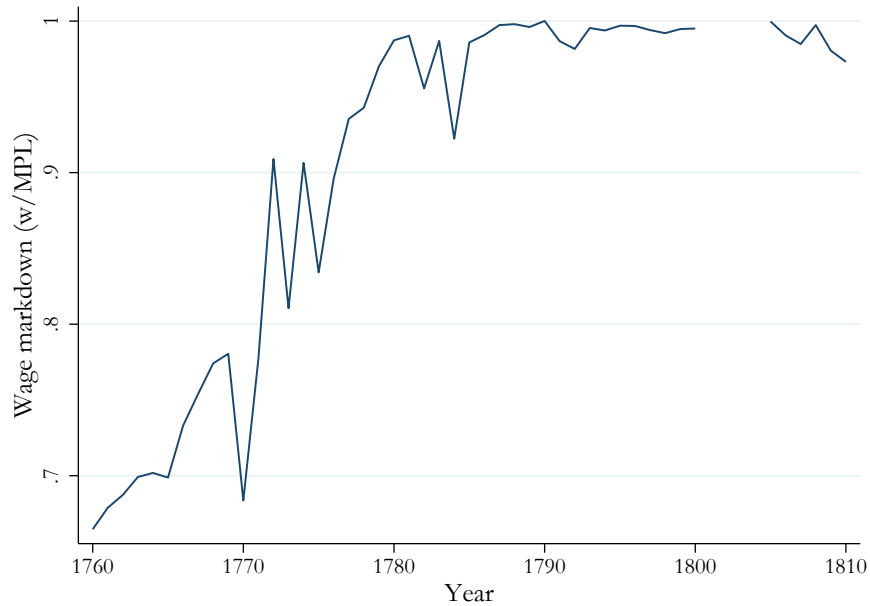


Panel B: Average share of suitable land for beaver across all NWC active posts



*Note:* Panel A shows the declining suitability for beaver at the post level for HBC posts, demonstrating the occupation of marginal trapping areas with the intensification of competition. Similarly, Panel B shows the average share of suitable area for all active NWC posts. See Section 3.2 for details on the construction of our geospatial data.

the French, the few open posts offered wage markdowns ranging from 50% to 80% of the value of the gathered furs. However, by 1780, the compensation received by Indigenous individuals approached parity with the value of the pelts they collected. The Figure allows to visualize both the within-post variation over time, with post increasing the wage markdowns by 30 percentage points over 10 years, and the across-posts variation, even in the later period of enhanced competition. We exploit these two sources of variation in the empirical analysis. We report in the Appendix a similar figure for the period spanning from 1790 to 1810.

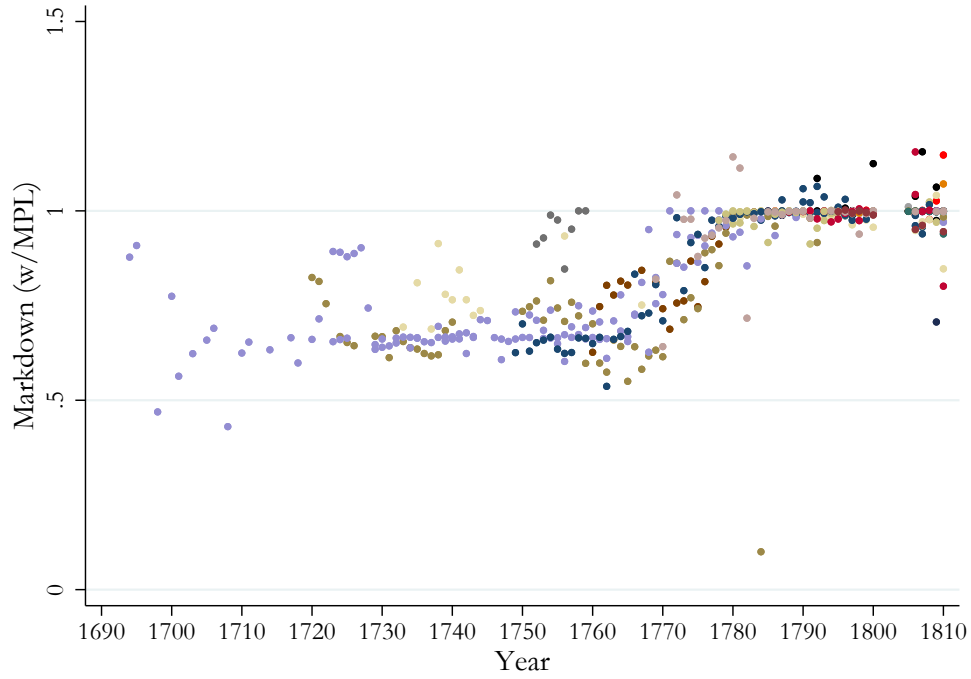


**Figure 6:** *Average wage markdown at HBC posts in a given year*

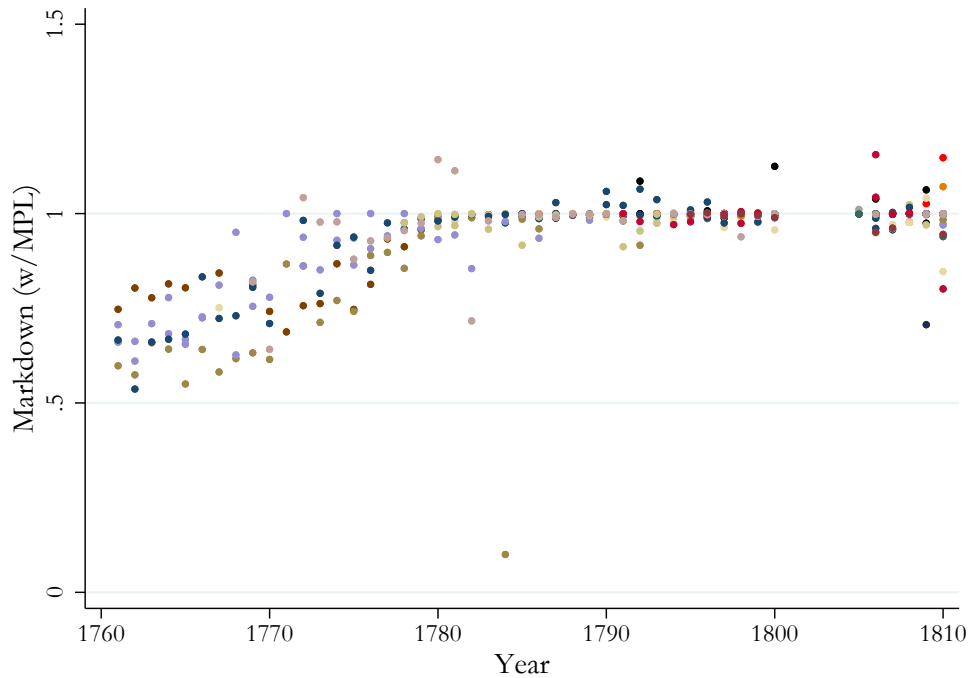
*Note:* Figure 6 shows the average wage markdown across HBC posts in the sample. Note that this measure can be greater than one; this indicates that the HBC is paying *above* the standard of trade. See Section 3 for the logic underlying the markdown measure.

**Figure 7:** *Scatter Plots on Wage Markdowns Over Time*

Panel A: Post-level wage markdown in a given year, period 1690-1810



Panel B: Post-level wage markdown in a given year, period 1760-1810



*Note:* Panel A shows a scatter plot of the post-level wage markdown over time between 1690 and 1810. Each dot represents a post-year observation, with individual posts coded by color. Panel B zooms in on the period of our analysis (1760 to 1810), showing that on top of the increasing trend in markdowns, Indigenous workers are paid close to the value of the fur they provide after 1780.



#### 4.4 Panel specification: spatial competition and markdowns

We investigate how the markdowns offered by the HBC to Indigenous traders correlate with the distance to the closer competitor. Given the greater ability of Indigenous trappers to switch their business between firms in more contested regions, the Hotelling model of competition would predict that wages offered as a share of workers' productivity would decrease with the distance to the nearest competitor.

With this in mind, we estimate the following equation:

$$Y_{it} = \beta_0 + \beta_1 MINDIST_{it} + \alpha_i + \alpha_t + \epsilon_{it} \quad (4.1)$$

where  $i$  denotes the post,  $t$  the year,  $Y$  the outcome of interest, and  $MINDIST$  the distance in kilometers to the nearest opposition post. We also estimate specifications where we focus on the within-location comparison by including province<sup>23</sup> or post ( $\alpha_i$ ) fixed effect, and we alleviate concerns of time-varying confounds by adding decade fixed ( $\alpha_t$ ) effects. Across all specifications, standard errors are clustered at the post level.

Table 1 presents the results of estimating equation 4.1. Column 1 shows the basic OLS result without controls. The relationship between distance and wage markdown is negative and highly significant. An increase of 100 kilometers in minimum distance lowers the markdown paid out to Indigenous traders by 2.8 percentage points. The coefficient is of the same sign, significance, and magnitude when adding province fixed effects (column 2) or post fixed effects (column 3). In columns 4 and 5, we add decade fixed effects to 2 and 3 respectively, the relationship weakens somewhat but remains negative and significant at the 1% level.

We inspect the relationship graphically in Figure 8. Panel 8a shows the strong linear relationship in a binscatters of the baseline specification in column 1 of Table 1. The relationship is similar to our preferred specification in column 5 of Table 1, as seen in Panel 8b.

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<sup>23</sup>We use provinces as more aggregate geographical units, even though they have been established later than our period of interest.

**Table 1: Regression Estimates of Spatial Competition on Wage Markdown**

	(1)	(2)	(3)	(4)	(5)
	w/MPL	w/MPL	w/MPL	w/MPL	w/MPL
MinDistance (100km)	-0.028*** (0.004)	-0.029*** (0.003)	-0.033*** (0.008)	-0.013*** (0.005)	-0.015*** (0.005)
Province FE	No	Yes	No	Yes	No
Post FE	No	No	Yes	No	Yes
Decade FE	No	No	No	Yes	Yes
Observations	405	405	405	405	405
Posts	38	38	38	38	38

*Note:* Table 1 shows the relationship between the distance to the nearest opposition post at the post level and the wage markdown. Column 1 reports the effect of the markdown without controls. Columns 2 and 3 add province and post fixed effects alternately. Columns 4 and 5 add decade fixed effects to Columns 2 and 3 respectively.

**Table 2: Regression Estimates, Controlling for Years of Operation**

	(1)	(2)	(3)	(4)	(5)
	Price	Price	Price	Price	Price
MinDistance (100km)	-0.028*** (0.005)	-0.030*** (0.005)	-0.016*** (0.005)	-0.010* (0.005)	-0.012*** (0.004)
Years since post opening	0.000 (0.000)	0.000 (0.000)	0.003** (0.001)	-0.000 (0.000)	0.004** (0.001)
Province FE	No	Yes	No	Yes	No
Post FE	No	No	Yes	No	Yes
Decade FE	No	No	No	Yes	Yes
Observations	408	408	408	408	408
Posts	38	38	38	38	38

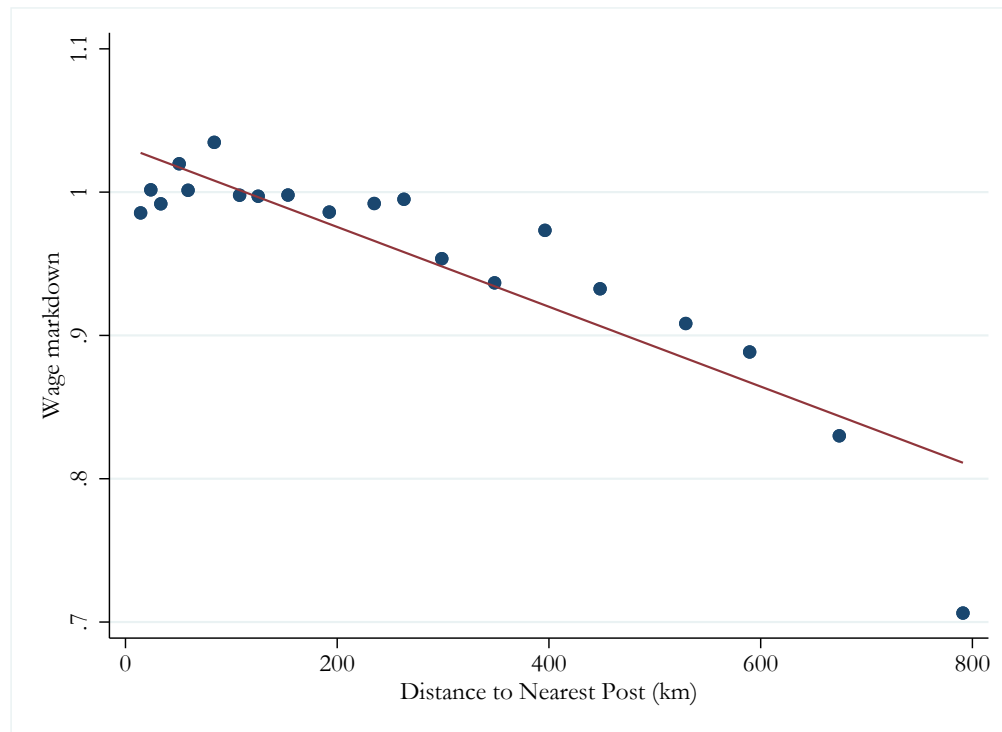
Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

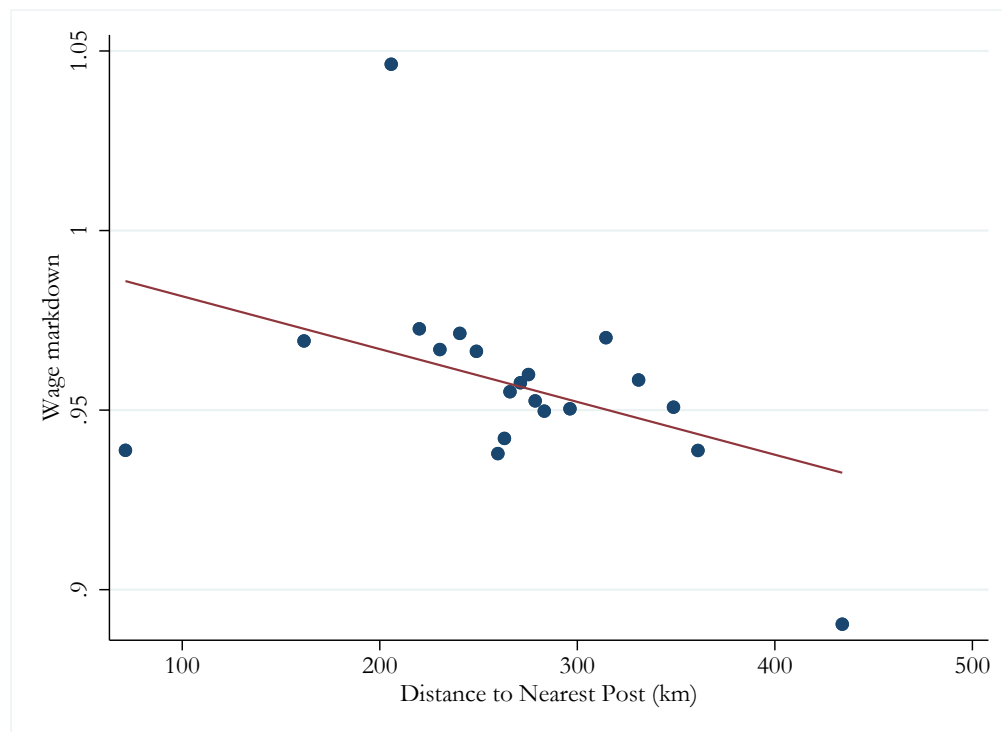
*Note:* Table 2 shows the relationship between the distance to the nearest opposition post at the post level and the wage markdown, controlling for the age of the post. Column 1 reports the effect of the markdown without controls. Columns 2 and 3 add province and post fixed effects alternately. Columns 4 and 5 add decade fixed effects to Columns 2 and 3 respectively.

**Figure 8:** *Binscatters of Markdowns vs. Minimum Distances*

**(a)** *No Controls*



**(b)** *Post and Decade Fixed Effects*



*Note:* Figure 8 presents binscatters of the relationship between distance to the nearest post and wage markdown at the post level with (Figure 8b) and without (Figure 8a) the full battery of controls.

## 4.5 Robustness: spatial competition and markdown

To interpret the relationship between minimum distance and markdowns as a causal effect of competition on wages, we would have to assume that there are no confounding characteristics correlated with both variables. One leading example of such a threat to identification could be a depletion of local beaver populations caused by the heightened competition between the two companies. Some historians have argued that depletion weakened the bargaining positions of Canada's Indigenous peoples with the Europeans.

Ideally, we would directly control for a time-varying measure of local beaver populations. Unfortunately, such data does not exist. Instead, we can control for how many years a post has already operated in a location as a proxy for the local history of resource exploitation. It is likely that posts that have operated for a longer period, even in suitable areas, might have caused over-harvesting of pelts and animal depletion. In Table 2 we repeat the exercise of Table 1 but explicitly control for the number of years a post has already been active. The relationship between spatial competition and wage markdowns remains virtually unchanged. The results also confirm that wages for Indigenous traders decrease over time as a post operates longer in the same location.

Finally, one might worry that the HBC posts were not only responding to the NWC's competitive pressure, but were also suffering from some intra-brand competition. The proliferation of HBC posts might have indeed led the HBC post factors to compete with each other for Indigenous labor and to offer higher markdowns. We test for this hypothesis by running the same regression as in equation 4.1, but our main regressor is now the minimum distance to another HBC post, rather than a competitor's post. Results are reported in Table 3. Across all specifications, we find no evidence of intra-brand competition, as wage markdowns are not impacted in a statistically significant way when another HBC post moves closer.

**Table 3:** *Regression Estimates of Cannibalization on Wage Markdown*

	(1)	(2)	(3)	(4)	(5)
	Price	Price	Price	Price	Price
MinDistance (100km) to HBC	-0.031 (0.021)	-0.031* (0.018)	-0.035 (0.041)	-0.004 (0.004)	0.005 (0.016)
Province FE	No	Yes	No	Yes	No
Post FE	No	No	Yes	No	Yes
Decade FE	No	No	No	Yes	Yes
Observations	404	404	404	404	404
Posts	38	38	38	38	38

*Note:* Table 3 shows the relationship between the distance to the nearest HBC post at the post level and the wage markdown. Column 1 reports the effect on the markdown without controls. Columns 2 and 3 add province and post fixed effects alternately. Columns 4 and 5 add decade fixed effects to Columns 2 and 3 respectively.

## 4.6 Discussion and Next Steps

The results are in line with the predictions of a simple model of spatial competition as outlined in section 4.1. Increasing encroachment on HBC posts by its competitor forced the HBC to pay higher wages and decreased the distance between trading posts and Indigenous settlements. The timing of wage increases and the expansion of the HBC post network coincides with the rise of the NWC. Markdowns rose steeply with the advent of free trade and the NWC's challenge to the HBC monopsony position.

A few remaining challenges prevent us from interpreting the panel estimate of equation 4.1 as the causal effect of spatial competition on Indigenous wages. The current design is unable to account fully for strategic decisions on post locations made by the NWC. In particular, the decision to open a new trading post in an area could depend on latent characteristics of that area, which in turn are correlated with the wages of Indigenous trappers. Such confounders would bias our estimates of spatial competition on wage markdowns. Our preferred specification already controls for time-invariant characteristics of an area by including post fixed effects. This means that we should not be worried if wages and NWC locations are affected by such factors as the beaver suitability of an area or by the distance of a post to the headquarters of the two companies.

There could also be time-varying characteristics of areas that make them more or less attractive locations for a new trading post. Those would bias our estimates if they are correlated with wage markdowns. An example for such a potential confounder could be local

trends in the supply and hunting of beaver or other animals. The exercise in the previous section suggests that our results are unlikely to be biased by this factor in particular. But other phenomena of a similar flavor like local productivity shocks or price shocks to the furs of particular regions could still pose threats.

To overcome these threats to causal identification, we plan to use a control function approach to directly handle endogeneity in the choice of post location. In our model, the change in the wage markdown depends on whether competitor's entry occurred (the NWC opened a post in an area where the HBC had already established a presence), the change in observable covariates, as well as the change in unobservable idiosyncratic shocks. The control function approach assumes there exists a set of covariates that, once we condition on a function of them, make the decision to enter uncorrelated with the change in the idiosyncratic component.

We believe the control function approach is particularly suitable in our setting, as geography and historical evidence provide us with rich information on the drivers of post selection. The NWC expanded from the previous French network based at Lake Superior following pre-established trading routes, that were reported on early European explorers' maps thanks to the collaboration between the latter and Indigenous people. Besides, European traders exploited portages to connect the waterways involved in the fur trade. These portages were locations where canoes and goods were transported overland to avoid obstacles such as rapids, rocks, and treacherous currents, or to reach the next navigable body of water. Indigenous communities had constructed and maintained these portages for many years before the arrival of European settlers.

Hence, in the next iteration of the paper, our control function approach would combine information on established trading routes, geographical features (portages and rivers, share of suitable land for beaver), and flexible time-trend to control for the selection of NWC posts. Explicitly addressing the selection issue will allow us to identify the causal effect of spatial competition on wage markdowns.

## 5 Conclusion

We study the effects of a competitor's entry on the wage markdown imposed by a near-monopsonist. We exploit the unique case study of the fur trade in Canada, where the Hudson's Bay Company's dominance during the late eighteenth and early nineteenth centuries gave it significant influence over the geographical distribution and material welfare of Indigenous peoples, for whom the Company was in many places the sole provider of the European goods.



We compiled new data from the HBC's archives on the post-level quantities, the value of fur gathered by Indigenous trappers, and the value of manufactured and luxury goods they received in exchange for their labor. Preliminary analysis of the data suggests that a decrease of 100 kilometers in the minimum distance to the nearest competitor was associated with a decrease of 1.5 percentage points in the markdowns paid to Indigenous trappers.

These results indicate that competitive pressure improved the outside options available to Indigenous traders, allowing them to threaten to move to rival establishments to obtain higher piece rates. This evidence from the Canadian fur trade demonstrates that differential outcomes for Indigenous populations in colonized regions depend crucially on the extent of the colonizing power's control over production. When Indigenous people can withhold their output or shift allegiances to other groups, colonial regimes may be forced to negotiate with them for a share of the gains from trade.

This project focuses on labor market outcomes and how these depend on the monopoly power of colonial companies. Our measure of wage markdowns does not purport to measure the totality of colonial extraction or Indigenous welfare. We therefore cannot make a definitive statement in the controversy over the effects of colonialism on Indigenous populations generally or the specific case of the HBC's role in either promoting or hindering the prosperity of Canada's First Nations.

For example, we do not capture the indirect effects of colonial competition on Indigenous populations or the effects of deadly diseases brought by Europeans (though it should be noted that the HBC made strenuous efforts to vaccinate their trading partners when possible (Ray 1974)).

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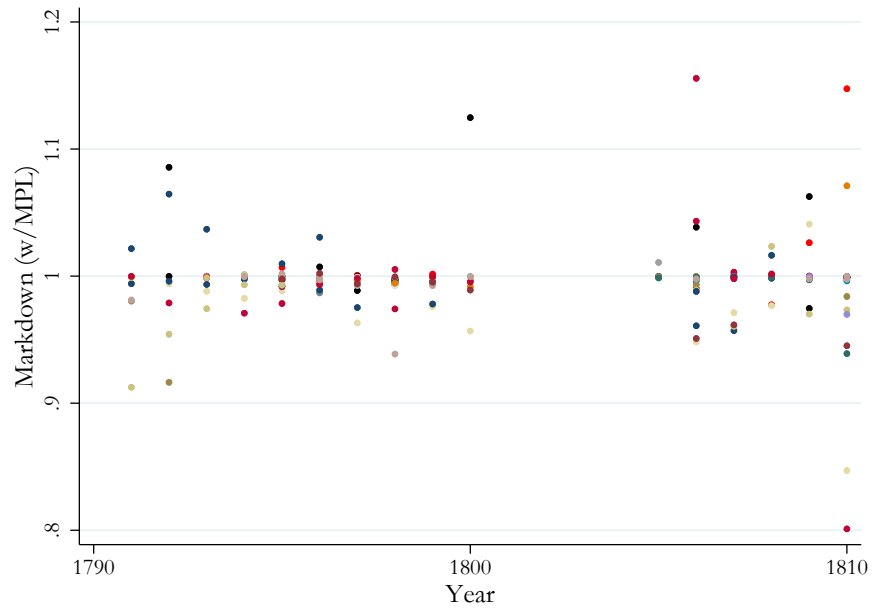


## A Appendix

**Table 4:** *Summary Statistics*

	(1)
Annual Fur Harvest	4457.135 (5341.8)
Annual Value of Goods Traded	3699.473 (3823.5)
Overplus	514.162 (2063.1)
Wage Markdown	0.957 (0.120)
Beaver Suitability	0.252 (0.168)
<i>N</i>	549
Mean coefficients; sd in parentheses	
* $p < 0.05$ , ** $p < 0.01$ , *** $p < 0.001$	

*Note:* Table 4 summarizes the major variables used in the above analysis, showing the average of annual fur collected, goods bartered, overplus (fur collected minus goods traded), wage markdown, and beaver suitability. Standard deviations are shown in parentheses. For information on the computation of the suitability measure, see Section 3.2.



**Figure 9**

*Note:* Figure 9 shows a scatter plot of the post-level wage markdown over time between 1790 and 1810. Each dot represents a post-year observation, with individual posts coded by color.