

A Revolution Delayed? Dairy Output and Tenure Institutions in Lower Canada, 1831

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Abstract

A recent burst of research in the field of economic history emphasizes the role of dairy production in stimulating growth for small open economies like Denmark or Ireland in the 19th century. This paper attempts to link the province of Quebec in Canada, a key producer of cheese intended for export, to the literature in question. In Quebec, the emergence of large-scale dairy production was largely concentrated in areas operating under the British freehold tenure system (as opposed to the French seigneurial tenure system (Ouellet, 1988)). Using the censuses of 1831 as my primary data source, I question the role of seigneurial tenure in delaying specialization in dairy production. It is my conclusion that seigneurial tenure depressed production in 1831 relative to freehold areas. It should also be noted that the results hold different data specifications.

1 Introduction

In recent years, research has increasingly underlined the role of the dairy industry in shaping the growth and direction of select, small open economies in the late nineteenth century (Henriksen et al., 2011, 2012a,b, 2015; Lampe and Sharp, 2015, 2014; Henriques and Sharp, 2016). With increased access to foreign markets as result of technological advances, small, open economies like those of Denmark and Ireland benefited heavily from international trade,

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and their respective dairy sectors were key actors vis-a-vis economic growth. In the case of Denmark, one must recognize the important role of institutions in creating a sound legal environment that discouraged opportunism (Henriksen et al., 2012a) while promoting investments in new technologies (Henriksen et al., 2011).

Similarly, Canada proved a strong competitor in the international dairy products market throughout the 19th century (McInnis, 1982b). While the Danes produced 44% of the United Kingdom's butter imports in 1900, Canadians produced 55% of its cheese imports (Fream, 1910, pp. 758-759). Within Canada, Quebec was an important player in that industry's rise as 80% of its cheese was exported (Dupré, 1990, 1999; Lavertue, 1984; Thibeault, 1996). However, we must consider a rarely noted fact pertaining to the emergence of this sector in Quebec: the industry came into its own around 1860, but this is predated by early pockets of dairy specialization. These niches, so to speak, would eventually become the focus of production (Thibeault, 1996). Such specializations, prior to 1854, were predominantly situated in areas operating under freehold tenure as opposed to French seigneurial tenure areas; by 1861, cheese production per freehold tenure farm was 4.8 times smaller than that of farms under the French system (Ouellet, 1988, p. 326). By 1891, the areas where production of cheese was well above the provincial average (the darker areas in map 1 below showing the standard deviation from provincial average) were largely areas that had not been settled under French seigneurial tenure.

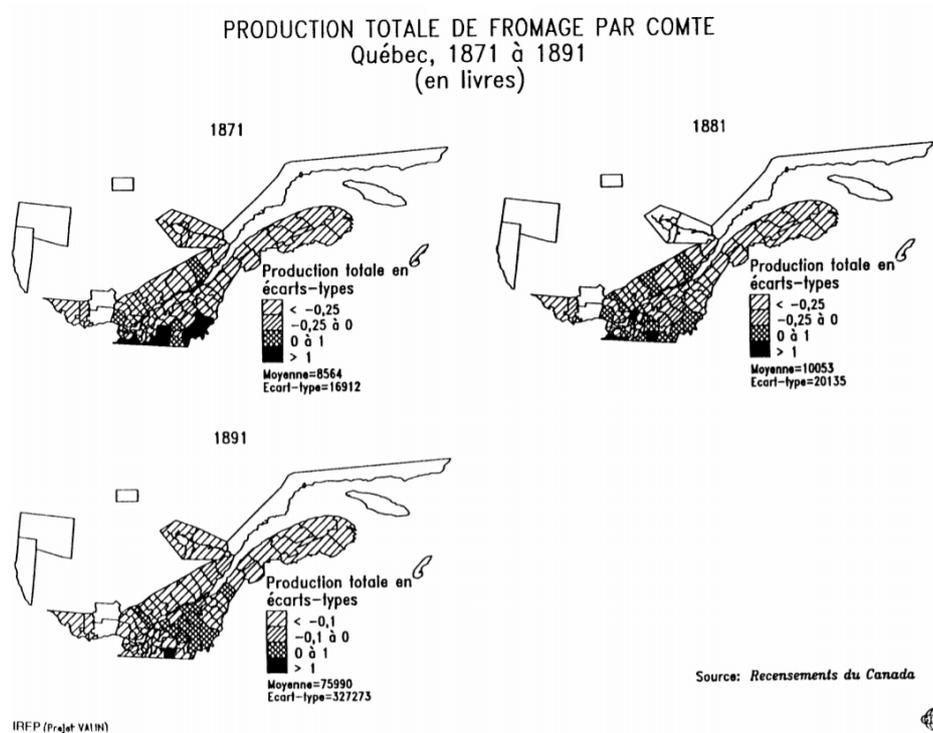
The question that this paper seeks to answer is whether or not seigneurial tenure hindered Quebec's specialization in dairy production?¹ Under seigneurial tenure, the crown grants land to a landlord (*seigneur*) who then concedes it freely to peasants so that he can tax them - a burden that represented 5% to 14% of net farm income (Dechêne, 1992; Harris, 1984).² As farmers were operating under an imperfect capital markets framework (Lewis, 2001), most investments had to be financed through savings while taxes imposed under seigneurial tenure inhibited the ability to finance new farm investments (Altman, 1983, 1987, 1998; Greer, 1985).³

¹Historians argue over the institution's perceived negative impacts. The debate hinges on the extent of damages it actually caused, with some arguing it was minimal (Desbarats, 1992; Percy and Szostak, 1992) while others cite its broad and ultimately negative effect. (Phillips, 1974; Altman, 1983, 1987).

²The *seigneur* could impose the frontage tax of the *cens*, the conceded land area tax of the *rente*, the land sale tax of the *lods et ventes* as well as a wide array of ancillary taxes decided by the features of his estate. The *seigneur* also imposed the mandatory minimum labor provision of two to three days of work per year known as the *corvée*. This could be avoided by paying a fee amounting to twice the daily wage rate for unskilled workers.

³Less frequently emphasized as detrimental, the *seigneur* also enjoyed a variety of legally-supported monopolies that fall under the rubric of seigneurial rights - the most important of which was the monopoly on flour milling. For example, the inhabitants of a given *seigneurie* were forbidden from bringing their wheat to

Figure 1: Standard Deviation of Pounds of Cheese Produced by County, 1871-1891



Source: The map is taken from Thibeault (1996, p. 150)

In this paper, I use the 1831 census of Lower Canada (the earliest census that allows us to measure herd sizes) to assess whether or not these features of seigneurial tenure hindered early specialization in dairy production. By 1831, the colony had existed under a mixed system with all areas conceded prior to 1791 operating under seigneurial tenure; those settled after that date operated under British freehold tenure, where monopolies and seigneurial taxes were non-existent. Comparing seigneurial areas with non-seigneurial areas would be problematic as the former were conceded from the first available lands while the latter from land still available by 1791. However, there are two distinct features we can use to generate viable approaches. First, we know that after 1791 there were still new settlements being opened under already conceded seigneurial estates; by using a new dataset - the dates of first settlement - (Geloso et al., 2017) we can restrict the sample to recently settled areas, thus avoiding selection problems. Second, the demarcation lines between seigneurial areas and non-seigneurial areas produce a sample of "institutional neighbors," likely settled around the same time. Using maps from *circa* 1831, I am able to identify which areas have "shared institutional borders" as a means of restricting the sample. This approach reduces selection problems; we then combine it with newly developed exogenous control variables, such as: length of growing season, how recently an area was settled, land quality, communication costs (e.g. postal offices), and distance from large urban markets. The result? Seigneurial tenure served to deter specialization in dairy production.

The remainder of this paper is divided as follows: Section 2 discusses the data and methodology used to investigate the effects of seigneurial tenure. Section 3 presents the results and a robustness check with the 1851 census. Section 4 discusses the implications.

2 Data and Methodology

In this paper, I use the 1831 census of Lower Canada. Historians tend to deride it as a means of evaluating Quebec's agricultural productivity, largely because it does not break down acreages by crop nor provide estimates of hay production. As such, it is difficult to calculate net farm output without resorting to assumptions that, in the end, would ultimately

the mill of another *seigneur*. That said, this monopoly was regulated through controls over the milling fee, fixed early on at one out of every fourteen units of wheat brought to the mill. Bread and flour prices were also heavily regulated while byproducts from flour production, like wheat middlings and bran, were not subject to price controls. As such, *seigneurs* maximized profits by increasing the prices for middlings and bran (Geloso and Lacombe, 2016). Since these two items were key feed inputs in all forms of pastoral production, this circumvention of price controls had a secondary effects that affected pastoral production disproportionately.

be less persuasive. This is why scholars instead prefer to use the 1851 census, which collected and captured more details (Altman, 1998; Armstrong, 1984; Lewis and McInnis, 1980; Little, 1986).

However, this scorn is unwarranted as the 1831 census offers several (crucial) advantages over the 1851 census, as recently underlined by Geloso et al. (2017). The first is that it provides parish-level and county-level wheat prices, thus allowing us to measure local output values with greater accuracy. This data can then be used to regionalize prices for other goods - notably animals. The second is that it includes estimates of labor inputs that are easy to compute.⁴ The 1851 census provides the number of laborers per county, but not per sub-district - a complication that previous authors found challenging (Altman, 1998; Lewis and McInnis, 1980). For its part, the 1831 census asked questions about the “number of families earning subsistence through agricultural work” as well as the number of male farm hands hired⁵ at the time of the census (therefore household labor and non-family hired labor).⁶ The third advantage is that the census of 1831 is the farthest point in time that allows us to reasonably question whether or not seigneurial tenure discouraged early specialization in dairy production.

These advantages lend themselves to the purposes of the present analysis. This is why we use the data set recently developed by Geloso et al. (2017), who uses the 1831 census to measure agricultural productivity across a colony in order to assess the existence of efficiency disparities between English and French farmers.⁷ This data includes: measures for the length

⁴There is also the problem of measuring units, which differed along ethnic lines. This problem plagued both censuses (McInnis, 1981). However, thanks to the work of Courville et al. (1995) vis-a-vis the 1831 census, we can work from a detailed list of adjustments to be made at the sub-district level in order to arrive at uniform measures.

⁵The exact heading is the “nombre de serviteurs employés comme fermiers dans chaque famille” [number of males employed as farmers in each family].

⁶There is also an occupational heading where the occupation of the household head was mentioned, thereby permitting verification.

⁷Geloso et al. collected the data in question from the actual rolls of the 1831 Census - now available online at www.familysearch.org and complemented by the compiled tables contained in appendix O.o of the *Journal of the House of Assembly of Lower Canada*, 1832 edition.

of a growing season⁸, soil quality⁹, distance from urban markets, the recency of settlement¹⁰ to which I added a variable for whether or not a sub-district was neighboring an institutionally different sub-district, as well as a measure of connection to markets, e.g. the presence of a post office in a sub-district as reported by House of Assembly of Lower Canada (1832). To proxy dairy production, I took the size of cattle herds in each sub-district and weighed them by the regional wheat price relative to the price of wheat in Montreal. The production is then divided by the number of workers as calculated by Geloso et al. (2017).¹¹ The first two columns of table 1 illustrate the values for the overall sample by institutional regime.

However, it would be inappropriate to compare the non-seigneurial and seigneurial areas when attempting to answer the question of whether or not the latter were disadvantaged insofar as dairy output specialization. Simply put, areas under seigneurial tenure were the first to be settled while those under freehold tenure were the last, thanks to the 1791 Constitutional Act. Considering this, we can clearly see that there is an obvious selection bias. In addition, immigrants to Quebec - the vast majority of whom were British - also opted to settle in non-seigneurial areas, primarily because this is where new lands were most easily available. As a result, one could end up capturing factors related to either cultural aspects (English versus French farmers) or recency of settlement as opposed to institutional effects. However, this problem can be circumvented.

First, there were still new settlements opening within seigneurial estates after 1791. This is because *seigneuries* could be conceded without being fully settled. Consequently, of the 92 areas settled after 1791, 63 were settled under freehold tenure and 29 were opened under seigneurial tenure.¹² Second, the areas along the institutional demarcation line imposed by the 1791 Constitutional Act are very similar. Institutionally different areas in close proximity

⁸Drawn from the *Atlas Agroclimatique du Québec*, which chronicles average growing seasons based on data from between 1971-2000 (Centre de Référence en Agriculture et Agroalimentaire du Québec, 2012).

⁹Based on Agriculture and Agri-Food Canada (1998), in which land is organized into seven classes. The best agricultural areas, with the least limitations, are assigned low numbers (1), with worsening limitations resulting in higher class values (7). Organic soils (i.e. significant peat bogs), non-classified areas for the purpose of agriculture (i.e. built up areas, national parks, nature preserves) and water are also assigned specific class values.

¹⁰Based on Magnan (1925), who noted the opening dates of different parishes and first settlement. The tables in appendix O.o to the 1832 edition of the *Journal of the House of Assembly of Lower Canada* provides additional details. Missing observations were completed by direct query to the Commission de Toponymie du Québec.

¹¹Geloso et al. (2017) also followed the steps undertaken by Lewis and McInnis (1980), who subtracted workers in function of cleared land as a means of reflecting agricultural labor invested in opening new land for farming.

¹²However, only 26 of these 29 areas can be used.

Table 1: Descriptive Statistics, Census of Lower Canada, 1831

| | Entire Sample | |
|--------------------------------------|----------------|-----------------|
| | Seigneurial | Non Seigneurial |
| Cattle per Worker | 7.64 (0.31) | 8.81 (0.52) |
| Distance from Urban Centre (km) | 57.31 (4.59) | 102.37 (6.46) |
| Length of Growing Season (days) | 198.43 (0.90) | 201.89 (0.96) |
| Land Quality 1 to 3 (%) | 50% (2%) | 25% (3%) |
| Years Since First Settlement (years) | 103.8 (3.51) | 27.75 (1.29) |
| Postal Office (%) | 26% (3%) | 33% (6%) |
| Shared Borders (%) | 27% (3%) | 33% (6%) |
| Observations | 186 | 64 |
| | Shared Borders | |
| | Seigneurial | Non Seigneurial |
| Cattle per Worker | 6.51 (0.27) | 8.43 (0.73) |
| Distance from Urban Centre (km) | 56.68 (5.83) | 64.24 (5.88) |
| Length of Growing Season (days) | 201.02 (1.42) | 201.31 (2.41) |
| Land Quality 1 to 3 (%) | 43% (4%) | 32% (6%) |
| Years Since First Settlement (years) | 101.18 (6.49) | 27.14 (3.36) |
| Postal Office (%) | 38% (7%) | 29% (10%) |
| Shared Borders (%) | - | - |
| Observations | 50 | 21 |

Table 2: Descriptive Statistics, Census of Canada East, 1851

| | Entire Sample | |
|---------------------------------------|----------------|-----------------|
| | Seigneurial | Non Seigneurial |
| Dairy Output per Acre in Pasture (\$) | 2.93 (0.48) | 4.35 (1.1) |
| Distance from Urban Centre (km) | 67.93 (5.64) | 146.88 (9.75) |
| Length of Growing Season (days) | 198.43 (0.74) | 195.15 (0.92) |
| Land Quality 1 to 3 (%) | 48% (2%) | 24% (2%) |
| Years Since First Settlement (years) | 105.08 (3.47) | 44.16 (2.44) |
| Shared Borders (%) | 30% (3%) | 32% (4%) |
| Observations | 298 | 153 |
| | Shared Borders | |
| | Seigneurial | Non Seigneurial |
| Dairy Output per Acre in Pasture (\$) | 1.95 (0.25) | 5.31 (2.62) |
| Distance from Urban Centre (km) | 89.19 (12.56) | 116.06 (18.83) |
| Length of Growing Season (days) | 197.74 (1.33) | 195.46 (1.76) |
| Land Quality 1 to 3 (%) | 43% (3%) | 25% (3%) |
| Years Since First Settlement (years) | 102.05 (6.2) | 43.58 (4.3) |
| Shared Borders (%) | - | - |
| Observations | 88 | 49 |

to one another would have shared similar environmental constraints, allowing property owners to observe one another and learn by way of best practices. These features can serve to limit a sample to areas with shared "institutional borders" (i.e. where selection biases are less problematic). As we see, the pattern of non-seigneurial areas specializing in cattle seems to hold regardless of the sub-specification.

I can also apply the same restrictions as a robustness check of the 1851 census. The 1851 census has the distinct disadvantage of being very close in time to when the dairy industry first came to be in the 1860s, and this negates one of the advantages of the 1831 census. Second, the 1851 census can only be applied in the context of farms rather than actual labor, as in the case of 1831. Moreover, unlike the 1831 census, it does not provide regional price estimates - meaning that all quantities must be multiplied by a colonial-level price. On the upside, the census asked questions regarding the actual production of dairy products as well as the amount of land used for pastoral purposes. I therefore followed the approach used by Altman (1998)¹³ in order to use a production volume measure in lieu of a cattle herd size measure, as is the case for 1831. In this respect, the 1851 census provides a robustness check.

¹³Method consists of converting dairy production into butter equivalents units

As with the 1831 census, table 2 below indicates that in 1851, there was a similar pattern of early specialization in dairy production in non-seigneurial areas.

The second element in this approach is to avoid using "bad controls" (Angrist and Pischke, 2008, pp.64-68), namely variables that are themselves outcomes from seigneurial tenure. The broad range of regulations, obligations and taxes imposed by seigneurial tenure would have had impacts on numerous variables reported in the censuses. For example, the taxes of *cens et rentes* applied on all land conceded to a farmer rather than the land actually farmed. This affected patterns of land clearing and the average size of farms. Consequently, any test must be constrained to variables that are truly independent from seigneurial tenure. For these reasons, I use the data compiled by Geloso et al. (2017) to calculate distance from the nearest urban centre, length of growing season, soil quality, number of years elapsed since first settlement, and the presence of a post office.¹⁴

3 Results

The results for cattle size are reported in table 3 below. The log of cattle per worker was applied]. In reading table 3, one sees that using all areas contained in the census of 1831 yields no clear results, yet non-seigneurial areas are advantaged. However, as indicated above, this is problematic because it mixes areas that were settled as far back as the 17th century with areas that were settled less than ten years before the 1831 census. This can be observed in how poor a fit it is for the entire sample.

When the sample is restricted to areas that have institutionally different neighbors (a result of the demarcation line imposed by the 1791 Constitutional Act), non-seigneurial areas are found to have 27.5% more cattle per worker than seigneurial areas (this is significant at the 97.5% level). Moreover, other control variables, like the length of the growing season and the presence of a post office, also become significant: an additional day in the day increases the amount of cattle by worker by 0.1% while a post office increases this by 19.6%. Sample alignment also improves when the sample is restricted to these areas.

The robustness check, made possible by the 1851 census, confirms this broad pattern. While readers should be aware that this census is flawed¹⁵ with limitations that make it hard to rely upon for the purposes of this paper, the results it provides are nonetheless reassuring.

¹⁴That variable is presently only available for 1831.

¹⁵See discussion above

When looking at the colony-wide sample of 450 districts, seigneurial tenure seems to have a statistically significant effect that depresses specialization in dairy production. However, the results hold when the sample is restrained to areas along the institutional demarcation line imposed by the 1791 Constitutional Act. On a per acre of pasture basis, non-seigneurial areas produced 36.7% more dairy products.

Table 3: OLS Regression on log of cattle per worker, 1831

| Restriction | Entire Sample | Shared Borders |
|---|---------------|----------------|
| Non-Seigneurial Tenure | 0.178* | 0.275*** |
| Length of Growing Season (days) | -0.001181 | 0.01**** |
| Distance from Nearest Urban Centre (km) | -0.000964 | 0.002 |
| Years since First Settlement | 0.0011212 | 0.001 |
| Shared Borders | -0.121088 | - |
| Land Quality, Classes 1 to 3 (%) | -0.082* | -0.031 |
| Postal Office (%) | 0.077161 | 0.196* |
| Constant | 2.174*** | -0.526 |
| Observations | 250 | 71 |
| R-Squared | 0.046 | 0.2526 |
| Adjusted R-Squared | 0.018 | 0.1825 |

* = 90% ** = 95% *** = 97.5% **** = 99%

Table 4: OLS Regression on log of dairy output per acre in pasture, 1851

| Restriction | Entire Sample | Shared Borders |
|---|---------------|----------------|
| Non-Seigneurial Tenure | 0.348**** | 0.367** |
| Length of Growing Season (days) | 0.009** | 0.012 |
| Distance from Nearest Urban Centre (km) | 0.0015**** | 0.002**** |
| Years since First Settlement | 0.00009 | 0.0007 |
| Shared Borders | 0.048 | - |
| Land Quality, Classes 1 to 3 (%) | 0.1182 | -0.153 |
| Constant | -1.639 | -2.101 |
| Observations | 450 | 137 |
| R-Squared | 8.14% | 15.68% |
| Adjusted R-Squared | 6.89% | 12.46% |

* = 90% ** = 95% *** = 97.5% **** = 99%

4 Discussion

The rise of Quebec's dairy industry from the 1860s onwards should be understood in the context of the first wave of globalization in the second half of the nineteenth century. Reductions in shipping costs and a growing demand in the industrializing core for dairy products provided a valuable opportunity for small open economies. However, the dairy industry produces highly processed foods whose added-value is superior to grains (even if its products do not provide large gains in calories). For this reason, it is a more capital-intensive form of agricultural production (Broadberry, 2013). Both the production of raw milk and its transformation are capital intensive.

In the case of Quebec, the industry was concentrated heavily in areas which had been settled under British freehold tenure as opposed to French seigneurial tenure. In 1871, 85% of Quebec's cheese factories in 1871 were located in such areas even if they only accounted for 12% of the province's farms (Thibeault, 1996, p.143). The location of these factories depended in part on the proximity to farms that could provide raw milk for transformation. As such, the type of farm specialization that took place before that point is relevant. However, since pastoral farming is also capital intensive it is important to consider barriers to capital formation before the 1860s and 1870s.

Farmers operating under both tenure systems prior to the 1860s would have operated in imperfect capital markets (Lewis, 2001). As such, most of their investments had to be financed through their own savings rather than through banking intermediaries. However, the duties and taxes imposed under seigneurial tenure - and which increased steadily from the late eighteenth century until the system's abolition in 1854 (Ouellet, 1972) - would have limited the ability to form the capital necessary for investing in larger animal herds. Thus, farmers in seigneurial areas were disadvantaged.¹⁶ My use of the 1831 and 1851 censuses suggests that this was indeed the case.

Some would argue that cultural factors would account for these differences. As seigneurial areas tended to be French and non-seigneurial areas tended to be English, cultural factors could be improperly revealed. However, the methodological choice of concentrating on neighboring districts should negate this argument. Areas in close proximity to one another are able to observe one another and it is doubtful that farmers would leave the proverbial dollar-bill on the sidewalk unpicked if they observed it. Another important reply to this view is that one cluster

¹⁶They were also locked-in since one of the taxes imposed by *seigneurs* was the *lods et ventes* which was a tax of 1/12th on the value of land sold to third parties.

of non-seigneurial settlements, the Saguenay region, was largely settled by French-Canadians. It is also in that region that we find heavy specialization in dairy farming (Thibeaul, 2008).

If seigneurial tenure should be given a role in discouraging early specialization in dairy farming, then this could help contribute to two separate questions in Canadian agricultural and economic history. The first relates to the smaller scale of the first cheese and butter factories of Quebec relative to those of Ontario (Dupré, 1990, 1999). By limiting the ability to specialize in pastoral production in seigneurial areas - which accounted for close than 80% of Quebec's population - this would have reduced the size of the market that factories could tap, thus limiting their optimal size. The second relates to the question of the "agricultural crisis" of the 1830s. One of the most contentious claims in Canadian economic history concerns the existence of an "agricultural crisis" in the early nineteenth century Quebec. The term is used with reference to a protracted period of poor economic performance resulting from poor international demand and numerous crop failures caused by the Hessian fly. This was marked largely by a downturn in wheat production. While the claim of a crisis has been questioned (McInnis, 1982a; Paquet and Wallot, 2007; Geloso and Bédard, *ming*), it is clear that the economy grew slowly¹⁷ and that this growth was unevenly distributed with some regions clearly experiencing important downturns (Ouellet, 1972; Harris, 2009). By constraining the formation of capital for the purposes of pastoral production, seigneurial tenure hindered the ability of local economies to adapt to changing circumstances and made them more vulnerable to shocks.

5 Conclusion

In this working paper, I argued that Quebec's seigneurial tenure affected the development of the province's dairy industry - an important exports industry - during the nineteenth century. This system, imported into Quebec when it was a French colony, imposed a series of taxes on farmers which would have limited their ability to save. In a world of imperfect capital markets, it is argued these taxes limited the ability to finance early investments in dairy production.

Using the census of 1831 and a wide array of newly developed environmental variables

¹⁷Paquet and Wallot (2007) found growth rates of per capita wealth that were between 0.4% and 0.9% per year between 1792 and 1835 depending on the region. Geloso and Bédard (*ming*) used estimates of the money supply in combination to recent estimates of price movements to arrive at plausible value of output growth (under different scenarios of monetary velocity) and found that growth between 1817 and 1850 would have stood at 0.17% per year.

(distance from urban markets, land quality, length of growing season, access to communication networks and the number of years since the first settlement), I restrained the sample to areas which were institutional neighbors so as to limit selection biases. In close proximity to one another, the farmers of these geographically similar areas had a greater ease of observing the practices of others and adopting the best practices. In this restrained sample, seigneurial tenure appears to depress early specialization in dairy farming. The results hold when the same design is used with the census of 1851.

By affecting early specialization patterns, seigneurial tenure hindered the ability of Quebec to seize the opportunity of the late nineteenth boom in international demand for dairy products. In spite of their relatively small size, non-seigneurial areas - where specialization had begun by the 1830s - provided the bulk of the production during that episode.

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