Evangelisches
Studienwerk e.V. Villigst

UNIVERSITÄT HOHENHEIM 1818

CARL VON OSSIETZKY universität OLDENBURG

Schriftenreihe des Promotionsschwerpunkts
Globalisierung und Beschäftigung

Nr. 47/2015

Infant Mortality and the Role of Seigneurial Tenure in Canada East, 1851

von

Alex Arsenault Morin, Vincent Geloso, Vadim Kufenko

Stuttgart-Hohenheim
ISSN 1618-5358

Unemployment is persistently high in many European countries. It is frequently attributed to 'functional deficiencies of labor markets', even though to a large extent caused by demand and supply shifts in goods markets and financial markets. The PhD program *Globalization and Employment* therefore focuses on the employment effects of structural change and macroeconomic developments and encourages research by granting scholarships. The dissertation projects address topics such as new technologies, processes of internationalization and system transformation, endogenous finance constraints and various strategies of fiscal and monetary policy.

Work and supervision in the PhD program follows the structures of a standard graduate school. Coordinators and *editors of the discussion paper series* are the following professors:

Prof. Dr. Harald Hagemann harald.hagemann@uni-hohenheim.de
Department of Economics (520H)
University of Hohenheim
D-70593 Stuttgart

Prof. Dr. Heinz-Peter Spahn peter.spahn@uni-hohenheim.de
Department of Economics (520A)
University of Hohenheim
D-70593 Stuttgart

Prof. Dr. Hans-Michael Trautwein michael.trautwein@uni-oldenburg.de
Department of Economics and Statistics
Carl von Ossietzky University Oldenburg
D-26111 Oldenburg

PhD projects in the program can be funded by grants of the *Evangelisches Studienwerk e.V. Villigst*. Application forms can be ordered from:

Evangelisches Studienwerk e.V.
Promotionsförderung
Iserlohner Str. 25
D-58239 Schwerte Phone: +49 (2304) 755-215, Fax: +49 (2304) 755-250

For further information about the PhD program *Globalization and Employment* as well as the PDF-files of the discussion papers see:

http://www.globalization-and-employment.de

Infant mortality and the role of seigneurial tenure in Canada East, 1851

Alex Arsenault Morin
(HEC Montréal)

Vincent Geloso
(London School of Economics and HEC Montréal)

Vadim Kufenko
(University of Hohenheim)

Abstract: This paper aims to explain differences in infant mortality across the colony of Quebec, known in the 1850s as Canada East, by institutional settings. Areas settled under French laws (known as seigneurial law) implied important transfers from peasants to landlords through private taxes and duties, restrictions on mobility, scant provision of public goods and disincentives to invest in agricultural productivity. As a result, areas under this law system tended to be poor and prone to high mortality. Upon conquering Quebec, the British maintained French land laws but, in 1791, the boundaries of its application were frozen – all newly settled lands would be under British land laws. By 1851, the two legal systems had cohabited for six decades – allowing us to compare them. Using the 1851 census, we argue that French seigneurial law – which reduced living standards through a variety of channels – translated into higher rates of infant mortality. After estimating a Zero-inflated Negative Binomial Regression we find that the effect of seigneurial tenure results in an increase in infant death rates from 43.79 to 44.89 for the age group below one and from 5.21 to 5.277 for the age group from one to five. Additionally, we conduct robustness checks by limiting the sample to large settlements and changing the age groups for the dependent variable.[1]

[1] Acknowledgements go to Livio di Matteo, Jari Eloranta, Miikka Voutilainen and Taylor Jaworski

Introduction

This paper tackles the issue of institutional factors in the determination of mortality differentials across the colony of Quebec in the 1850s, when it was known as Canada East. The first decades of the 19th century are associated with the impression of poor economic performance in Quebec and that the colony had very high mortality rates. Most of the literature has either stressed deficient foreign market demand for exports from Quebec (Ouellet 1966, 1972, 1980; McCallum 1980; Cole 2009; Courville 2008) in combination to varying explanations of overpopulation. Few scholars entertain the possibility that the problems were linked to the institution of seigneurial tenure. This system, feudal in nature, was imported by the French when they colonized Quebec and was then kept by the British when they conquered in 1760. However, after 1791, all newly settled lands would operate under British land laws. As a result, seigneurial tenure and free and common tenure would co-exist until the abolition of the former in 1854. Using the census of 1851-52, we show that there were wide variations in mortality across the colony – differences that strongly follow the institutional lines that emerged after 1791. This could have occurred through numerous channels that would increased economic vulnerability: predatory taxation, monopoly power and restrictions on mobility. The data from the census of 1851-52, all things held equal, shows that the infant mortality rate and the infant mortality rates and quotients were higher in areas under seigneurial law than those under freehold tenure.

Overall, these results suggest that populations pressures – often emphasized in literature on Quebec – have been misidentified. We argue that the signs of institutional pressures were mistaken for signs of population pressures.

1. Population pressures in Lower Canada

The generally accepted viewpoint for Lower Canada is that population pressures materialized during the course of the 19th century as a result of soil erosion, poor farming practices and a rapid growth of population while available farmland grew scarcer. This use of population pressures was meant as a tool by numerous historians to explain a prolonged economic crisis in which poverty increased dramatically (Jones 1943; Ouellet 1966, 1972, 1980; McCallum 1980). Historians of Quebec have often portrayed it as a society rife with Malthusian pressures (in honor of T.R. Malthus' work). The eminent Fernand Ouellet (1966) asserted that the colony lived through an "economic crisis" from 1802 to the late 1840s mainly because of soil erosion and overpopulation of the colony. After years of farming, land quality was deteriorating, marginal lands were being settled and population growth meant that there were an increasing number of individuals per unit of land. This meant deterioration in living standards. In turn, the deterioration in living standards increased the vulnerability of population to exogenous shocks. Supply-side shocks (or even demand-side shocks through changing conditions on foreign exports markets) would thus have disproportionate effects on mortality given the vulnerability of the population. This view is still commonly portrayed by popular historians (Bédard, 2012).

However, recent research has questioned this interpretation from two angles. On the first hand, recent measurements of living standards suggest that growth of per capita income was actually positive. Bédard and Geloso (2014) have proposed an average annual growth rate of real per capita income varying between 0.28% and 0.36% between 1790 and 1830 while Paquet and Wallot (2007) have found growth rates slightly above those for the same period (around 0.9% per annum). Marvin McInnis (1982) and Courville (2008) also questioned the claim of a prolonged crisis. However, it is relevant to point out that these rates of growth are very modest in comparisons with rates achieved in the United States (Lindert and Williamson 2013).

Secondly, Geloso and Kufenko (2015) used a VAR analysis approach to study short-run fluctuations in birth rates and death rates, concluding that there were no signs of population pressures during the 19th century. They argued that while economic growth might have been disappointing, it was not the result of population pressures. In fact, they point out that these pressures were present earlier, in the 18th century when land was abundant which stands in stark contradiction with the logic underlined by proponents of population pressures as an explanation of poor economic performance.

2. Population pressures and institutions in Lower Canada

The problem of these reinterpretations of Quebec's poor economic performance is that they merely minimize the importance of population pressures, they offer no counter-explanation. We seek to propose such a new interpretation centered on the role that institutions might have played. More precisely, we propose that pressures caused by institutions masqueraded as population pressures.

In their study of living standards in England from 1270 to 1870, Broadberry and al. (2015) show that there is a "Smithian" counter-effect to those of overpopulation. The terms "Smithian" refers to Adam Smith's (1774) claim the size of the market determines the scope for specialization. Population growth expands the size of the market, allowing for greater specialization which meant less stress on resources. To compound this effect is the return to scale from greater population which means that there are increasing returns from large projects like infrastructure (Boserup 1965; Simon 1977). As a result, Broadberry and al. (2015: 272-278) reject the idea that population pressures are a strong explanation (although they do not dismiss that it must have played a role). Their results are also echoes of earlier works by Nicolinni (2007), Crafts and Mills (2009) who suggest to various degrees that in Great Britain, the pressures were largely alleviated from the 15th century onwards. The "Smithian counter-effect" is basically refers to a debated literature in economics that concerns "scale effects" (Mokyr 1990). Scale effects arise when ideas (read: information) are non-rival inputs in the production of intermediate goods needed to generate final products and that there are important economies of scale. As population increases, more and more inputs are cheaply made available for intermediate production. The implication of scale effects is that population growth should be accompanied with economic growth and that populous economies should grow faster than smaller ones. This has led many economists to deride the concept (Lucas 1993: 263), especially since the empirical support is limited (Jones 1995). However, the idea should not be discarded as Lewis Davis (2008) points out since population is a poor proxy variable for ideas. Davis argues that, out of analytical convenience, population size was used as the proxy for non-rival information that could support expansion in trade. If transaction costs are falling while there is an increase in international trade and a stable population level, Davis argues that the "potential for exploiting non-rival ideas has grown much faster than (…) population size" (417) but scale effects materialize. Hence, as population increases, there can be scale effects as long as transaction costs do not increase so as to offset the benefits of the scale benefits. The institutional setting in place can create transaction costs sufficiently important to generate the problems of population pressures. Consequently, the problem of population pressures results from institutional problems that limit the Smithian and Scale counter-effects.

Some institutions seem to enhance these counter-effects. For example, Dribe, Olsson and Svensson (2012) found that Sweden's manorial estates acted as an institution which minimized the effects of short-run variations on mortality – albeit modestly – at a time when capital markets were imperfect (preventing the smoothing of consumption) and that stored food was not sufficient to counteract adverse shocks to supply. Kelly and Ó Gráda (2014) found that the systematic introduction of poor relief in England coincided with the disappearance of the link between variations in real wages and variations in the crude mortality rate.

But institutions can also limit these counter-effects – and we will argue here that this was the case of Quebec. As A.W. Carus and Sheilagh Ogilvie point out in the case of the institution of serfdom, it was not "that markets were missing in serf societies" but rather than "landlords intervened in markets in such a way as to redistribute to themselves part of the profits from serfs' market participation" (2014: 479). In doing so, the institution of serfdom would have lowered economic growth by reducing the ability of the "Smithian" offset to materialize. It could also transfer important resources to rent-seekers who produce very few public goods. If given a certain legal power to tax peasants and restrain their mobility, the landlord could enact redistribution of income towards himself thus pushing numerous peasants towards a poverty line. Normally, when given such powers under manorial systems, landlords had to provide public goods. However, they did not always provide them (Ogilvie 2007), and when they did, they may not have been those that maximized welfare (Moselle and Polak 2001). Thus these landlords enacted predatory taxation.

Another channel, emphasized by Mokyr (1983) is that of insecurity in landholding. This insecurity discouraged peasants from realizing investments that would have increased productivity and thus to insufficient capital formation. Olsson and Svensson (2012) show that greater security in ownership allowed Swedish food production to outpace population growth after 1780. Absent such security, the investments that could generate such outcomes would also be absent, making the population poorer.

All of these channels would have pushed populations closer to a poverty line where shocks have disproportionate effects on survival chances. In short, if the rent-seekers from institutional arrangements redistribute wealth sufficiently in their favor, they could increase the vulnerability of the population to exogenous shocks by increasing their odds of mortality.

In Lower Canada, the institution of seigneurial tenure could have acted as such. Imported from France in the 17th century, under seigniorial law a landlord would buy a landed estate from the crown and with that acquisition was associated some obligations. The landlord *(seigneur)* was required to grant (freely) land to peasants which would become *censitaire*. The *censitaire* would pay the *seigneur* a rent for the acquisition and use of the land granted which were called *cens et rentes*. These rates were established in relation to land held rather than the amount of land actually farmed (they could be legally construed as taxes on assets rather than output). However, (and this is a key point to remember), the *censitaire* could not simply abandon his land. Once settled, a peasant could only leave the estate if he sold his farm, subject to the *lods et ventes* tax (see below). This was an important restriction on mobility.

In return, the *seigneur* would have to provide grist mills to the peasants (he was obligated to do so) and he was only allowed (by royal edict) to charge one fourteenth of the grains brought to the mill to be turned into flour (this was known as the *Banalité*). The peasant was not allowed to use grist mills in neighbouring seigneuries. Other obligations would be associated like that of the *corvée* where the peasants would have to do work for the seigneur on certain days (generally three days or sixty *sols* per day if he decided not to work). The *censitaire* was also subjected to the *lods et ventes* which required he pay an 8.5% tax to the seigneur upon selling his land. The seigneur himself was obligated to pay the *Quint* which was also a tax to be paid upon selling the estate, but he would to pay this to the crown. There were other minor obligations, but they are not of relevance to our story here. To all of these were added the *dîme* – a religious tithe charged by the Church who generally also wore the hat of seigneur at the same time. The tithe represented one twenty-sixth of gross grain output. Unlike the *cens et rentes,* the *dîme* applied to output rather than assets.

Finally, the *seigneur* had monopoly right on the establishment of mills and access to water ways. Moreover, the *seigneur* had the right to tax everyone on his estate which acted as a tax on such activities. Generally, *seigneurs* would be active in numerous forms of investments from the flour mill to the saw mill. After the Conquest in 1760, the British maintained the institution. In fact, numerous *seigneurs* would actually end up serving as high-ranking officials in the colonial administration through the Legislative Council of Lower Canada. With the Constitutional Act of 1791, the British opted to allow all new settlements to occur under British freehold tenure law. Seigneurial law would remain in place where it was already established. The newly settled areas would be legally known as townships rather than parishes. In townships, none of these duties and monopolies existed.

The burden of seigniorial tenure was not insignificant. Richard Harris (1966 [1984]) estimated seigniorial dues somewhere between 5% and 10% of the average farm household income and Louise Dechêne (1974) put that figure at 14% of household income. However, both authors relied on *hypothetical* scenarios based only on gross output. This problem was solved partially in the works of Morris Altman. He used census data to estimate that seigniorial dues absorbed between 37% and 47% of net output per household (measured in wheat minus consumption needs and seed requirements) in the 1688-1714 period. By 1726-1739, it had declined to a share ranging between 26% and 37%. Alan Greer (1985:136) used that approach to estimate a proportion of 44% in St-Ours (on the south shore of Montreal) in 1765. In 1987, Altman revised his estimates downwards by half as a result of new data on seed requirements, but the costs to farm households was still considerable.

According to Altman, the transfer from peasants to seigneurs reduced disposable income. Lower incomes for the peasant population meant that the market for non-agricultural goods was smaller and hence the scope for specialization was reduced. Even if the seigneurs gained an important income, they did not represent a great pool of potential consumers for new industries. In essence, Altman's argument was a Keynesian demand-side argument whereby lower income for the vast majority led to lower demand which meant slower growth and more poverty. Altman also argues that exactions made by *seigneuries* were purely extractive and were not meant to finance the production of public goods that would enhance overall welfare.

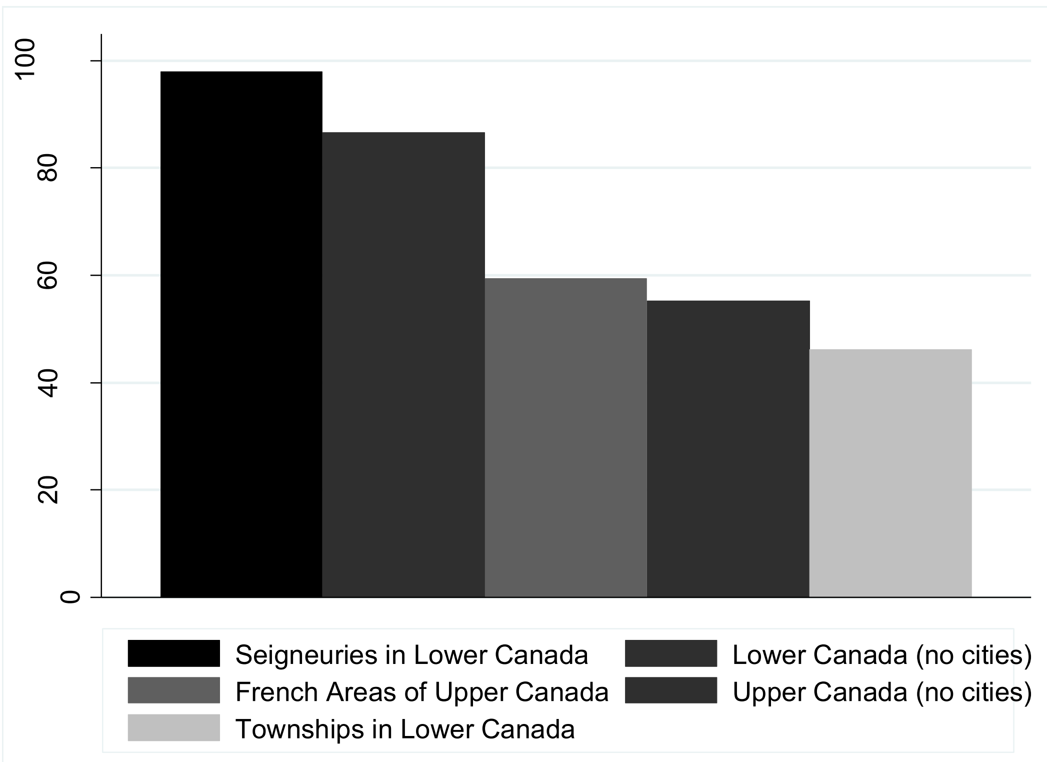
All of these effects also do not include the role that the monopoly rights of *seigneurs* could have played. Indeed, *seigneurs* were free to establish mills, plants, foundries and factories in their estates without being submitted to the *cens et rentes* and the *lods et ventes*. Any competitor to the *seigneur* would have to pay these duties, which are basically taxes on capital stock and capital transfers. The *seigneur* would not.

In addition, the system of seigneurial could have hindered agricultural growth. The best summary available is that regard is that of Percy and Szostak (1992) where they study the abolition of seigneurial tenure and state that "the negative effects of seigneurial tenure on the economy appear to have been exaggerated". To make that claim, they rely on a paper by Lewis and McInnis (1980) that showed very small differences in total factor productivities across ethnic lines with the census of 1851 of Canada East (as Quebec was then known) which Percy and Szostak assume extends along institutional lines. The problem is that the differences underlined in the Lewis and McInnis paper are by no means small, and are probably understating the reality.

First of all, there is gap ranging from a 7.6% disadvantage to a 15.7% disadvantage over all regions in terms of total factor productivity. Using different computation methods, Morris Altman (1998) rejected their results and found larger differences in total factor productivity. Finally, Lewis and McInnis had estimated output based on uniform prices for the entire economy – a problematic assumption given the lack of integration between regional markets (Armstrong 1984). Armstrong argued that Lewis and McInnis overly favored remote French areas under seigneurial by overestimating the value of their output. Overall, the differences have been downplayed and should not have been.

Comparing mortality across the colonies of Upper and Lower Canada shows a very distinctive pattern emerging along institutional lines. As figure 1 testifies, infant mortality rates on seigneurial estates in Quebec were substantially higher than those where British tenure laws were applied (at a ratio of nearly two to one). In addition, rates were also lower in the neighboring colony of Ontario (known interchangeably in 1851 as Upper Canada or Canada West). In fact, infant mortality was also lower in areas where there were large proportions of French-Canadians. The county of Bruce, which had the largest proportion of French-Canadians for all of the counties of Ontario (24.6%) also had an infant mortality rate well below the level of the entire colony excluding urban centres (28 per 1,000 against 55.2 per 1,000).

Figure 1: Infant mortality rate (per 1,000) for different regions



3. The Census of 1851 and research design

To study the effects of seigneurial tenure on mortality, we will exploit the co-existence of seigneurial and free and common tenure laws and how, controlling for other factors, they impacted infant mortality. Our reason for selecting infant mortality is that it is the most reliable. Mortality after a certain age could be related to factors unrelated to seigneurial tenure – like work accidents.

More importantly, infants are more susceptible to suffer from adverse shocks. The effects of poverty are most robustly seen in childhood. Poverty increases vulnerability to shocks which meant that there could be wide swings in nutritional intake. For pregnant mothers, nutritional deficiencies meant they would have expended more energy than was required by their bodies which would impact the developing child and his early chances of survival (Meredith and Oxley 2014: 142-144). Poor nutrition during pregnancies implied that hormone production would be affected. This would hurt the fetus and lead to adaptations that are suited for short-term survival at the expense of potentially adverse lifetime effects. These effects which materialize later in life shorten life expectancy (Godfrey and Barker 2000). Otherwise, poor or unstable nutrition after birth could also increase risks of mortality.

Secondly, the institutional feature of seigneurial tenure that limited mobility offers a strong testing ground. After 1791, all newly settled lands would have to be settled under freehold. Upon the conquest of the colony by the British, the seigneurial system was maintained but in the Constitutional Act of 1791, it was frozen to the areas where it had already been established – it could not expand. Hence, by 1851, the two legal systems had cohabited side-by-side for six decades. More importantly, the restrictions on mobility seen in the seigneurial system would have prevented a colony-wide equilibrium to be achieved. As mentioned above, seigneurial tenure imposed a *de jure* limitation on the *censitaire* in the form of a restriction to abandon their lands. This was combined to a *de facto* limitation in the form of the *lods et ventes* which was a tax on capital mutation (one eight of the sale price of the farm had to be given to the *seigneur*). This meant that most peasant were "locked-in" and that differences in living standards could subsist between different areas. This offers a strong experiment to measure the importance of seigneurial tenure on living standards (through infant mortality).

The census of 1851-52 is a suitable dataset to test this hypothesis. First, it breaks down mortality by age group which allow us to create three dependent variables. It was the first census to report tables of mortality by area so that we can measure mortality rates by areas, something which has already been done by Pelletier et al. (1997). The first variable will be all deaths below the age of one per 1,000 births. The second will be all deaths between the ages of 1 and 5 relative per 1,000 persons in that age group. The third will consider all deaths between the ages of 1 and 15 years of age per 1,000 in that age group. Variations in infant mortality below age one could be found between groups with identical socioeconomic conditions as a result of differences in breastfeeding and weaning practices (Haines 1985). There is some evidence that breastfeeding practices did differ across ethnic lines (Cranfield and Inwood 2014: 249) and as a result, it is better to err on the side of caution. The effect of breastfeeding on mortality would be limited after one year of age, thus variables of mortality for children above the age of one act as a robustness. Moreover, the age breakdown provided in the census allows us to control for the issue of birth spacing. There is a relation between the probability of survival for young infant and the spacing between each birth (Cleland and Sathar, 1984; Gentil 2009; Steckel 1980) and thanks to the breakdown in the census, we can create a control variable for birth spacing.

Secondly, the census of 1851-52 offers a great level of institutional mixity in many regions. It is necessary to point out that while there are clusters of townships (the Estrie region and the Saguenay region), there are many townships existing alongside seigneurial estates in the same counties. By the time of the census of 1851-52, the counties of Vaudreuil (west of Montreal), Two Mountains (north of Montreal), Terrebonne (northeast of Montreal), Rimouski (east of Quebec City), Ottawa, (west of Montreal), Nicolet (south of Trois-Rivières), Mississquoi (south of Montreal), l'Islet (south of Quebec City), Montmorency (east of Quebec City), Leinster (North of Montreal), Kamouraska (east of Quebec City), Gaspé (east of Quebec City, close to New Brunswick), Dorchester (south of Quebec City) , Bonaventure (east of Québec, close to New Brunswick) and Beauharnois (south of Montreal) are all institutionally mixed. In addition, the townships in the Saguenay are predominantly French-speaking and co-existing alongside French-speaking seigneurial estates. In the Eastern Townships (Estrie region), there is cultural mixity (roughly 30% of the population of the area is French-speaking – up from 15% relative to the 1844 census). This mixity offers a strong testing parameter.

Thirdly, the census of 1851-52 also offers the possibility to create a wide set of control variables notably regarding agricultural productivity. The census reports acreage under each type of crops and the total quantity of crops harvested. As a result, we can compute yields for the most important types of crops which we will combine with a measure of land quality in the form of the length of the growing season (Atlas Agroclimatique du Québec 2015). Some adjustments are necessary however. Different ethnic groups used different measuring units depending on where the censor collected the information (McInnis 1981). The vast majority of the population – the French-speaking Catholics – used a measuring system whereby surface and volume were denominated in *arpents* and *minots*. Each arpent was equivalent to 0.845 acres and each *minot* was worth 1.107 bushels. This means that one *minot* per arpent was more than 30% what a bushel per acre represented – a substantial difference. In the predominantly English-speaking Protestant townships –

mainly located in central Quebec along the border with the United States – measuring units were reported in acres and bushels. Marvin McInnis (1981) was the first to tackle this problem and proposed important corrections in the case of the 1851-52 census. Expanding on a method produced by Altman (1998) to improve upon McInnis, we proceeded to make the adjustments based on the ethnic composition of each area. The observations are available in volumes presented to the government of the Canadas (1853) and are recorded at the sub-district level. As a result, our dataset from the 1851 census is a cross-sectional dataset of more than 460 districts in the colony. Some areas were excluded like the district of Grosse-Île which had a very high mortality rate because it was a quarantine area for immigrants.

However, there are downsides to the census of 1851-52. Pelletier et al. (1997) point out that there the era is the "dark ages" for the study of mortality. It is clear from the census aggregate outcomes that there is a case of underestimation of mortality. However, in our case, what is of interest is the not *absolute* level but the *relative* levels between townships and seigneuries. As long as the problems of the 1851 census are equally distributed along institutional lines, this does not pose a problem to our current research question that cannot be handled by proper econometric tools as we will see below. To test our hypothesis, we propose the following equation:

$$IM_i = \beta_0 + \beta_1 I_i + \beta_1 B_i + \beta_2 Y_i + \beta_3 D_i + \beta_4 N_i + \beta_5 R_i + \beta_6 F_i + \beta_7 S_i + u_i \qquad (1)$$

IM_i refers to infant mortality quotient (the four independent variables described above) in region i. The term I_i refers to the institution in place in region i (with 1=seigneurial). The term B_i refers to our variable for birth spacing. That measure, which would affect infant mortality, is derived from the work of Steckel (1980) as the number of infants below age 10 relative to the female population between 15 and 50 years old. The level of that ratio would capture – partly - how much spacing there was between births. In addition, that variable would very likely control for cultural differences in behavior. The effects of culture on child mortality would appear through the impact it has on the behavior of parents. In combination with our different set of independent variables (which are meant to see the effects of culturally different breastfeeding habits), the variable for birth spacing would control for different cultural practices that could have effects on a child's health. Y_i refers to a vector of wheat yields (minots per arpent) and length of the growing season (in days) to measure the productivity of agricultural activities in the area. The term D_i refers to population density. This is important since proximity to urban centres meant that infectious diseases could spread more easily in congested regions. Turpeinen (1973) found that death rates in Finland between 1816 and 1865 fell as one considers more backwater regions. We expect to find a similar relation whereby dense areas experience more mortality thanks to the ease that contagious diseases has to spread. We include N_i to measure the number of sawmills, fulling mills, carding mills, foundries, tanneries, distilleries, woolen factories and breweries per 1,000. The goal of this latter measurement is to capture for the effect of non-farm employment which increased income. Since all the other controls variables to see the effects of I_i are related to agriculture, some variations could be created by differences in non-farm work, which justifies the inclusion of N_i.

Table 1: Descriptive statistics

Variables	Complete sample		Seigneurial Tenure		Townships	
	mean	sd	mean	sd	mean	sd
below 1	78.61	90.77	95.4	94.42	45.9	73.08
from 1 to 5	14.81	17.11	17.02	17.1	10.6	16.35
from 5 to 15	3.63	6.01	3.93	5.81	3.06	6.36
tenure	0.66	0.48				
dependents 60+	0.08	0.03	0.09	0.03	0.06	0.03
birth spacing	1280.21	248.64	1232.1	203.5	1372.17	297.3
indsutry per 1000	3.3	4.82	2.4	2.93	5.03	6.86
pupils share	38.6	28.18	40.43	21.74	35.12	37.38
growing season	197.34	12.43	198.42	12.78	195.21	11.47
wheat yield	7.8	2.74	7.62	2.51	8.16	3.11
oats yield	26.9	245.21	15.07	10.17	49.8	419.83
population density	13.21	12.18	10.67	5.18	18.06	18.6
land cleared	37.96	24.28	42.51	20.74	29.25	27.97
meat per person	132.46	168.37	127.88	54.86	141.21	277.47
population < 1	77.06	56.9	92.71	56.38	47.15	44.73
Population 1to 6	249.23	174.4	293.52	167.59	164.58	155.23
Population 5 to 16	450.89	315.93	533.26	302.26	293.45	280.47
distance > 200 km	0.12	0.33	0.08	0.27	0.22	0.41
widows per 1000	47.82	32.84	51.05	33.46	41.66	30.78
N	460		302		158	

We have also excluded the urban agglomerations of Quebec City, Trois-Rivières and Montréal. They were large urban areas with clear mortality differentials from the colonial average. In spite of their massive populations, each would count for only one observation had they been included. This would have created a biased sample. The term R_i refers to the dependency ratio. The idea is that if there were a large number of older individuals within a household, available resources would have to be divided between them and young children, hence affecting their odds of survival. The variable is computed as the ratio of individuals above 60 years of age over the population aged between 15 and 60 years old. The term S_i aims to account for the recency of a settlement by measuring the share of land that has been cleared. Term F_i denotes a vector of further controls: various variables which could contribute to the explaining the death rates which includes widows (which we expect to increase mortality), supply of meat (to capture access to proteins) and education (to capture any effects it may have on mortality).

4. Results

It is important to make a short digression about the estimation technique. As it follows from Figure A, the death rates are not normally distributed. Moreover, a Poisson distribution is unlikely: from Table 1 we can conclude that the variance of the death rates is not equal to the mean. Another feature of the death rates is the excess zeros, which can be seen on the distribution plots as well. Therefore, out of the methods for the analysis of count data, the Zero-inflated Negative Binomial regression (or ZINB) as in Long (1997, p. 244) and Lond and Freese (2006, pp. 535-538) was selected. The advantage of this model is that the excess or inflated zeros can be explained by a similar set of control variables and a logistic regression. Indeed, one could assume that the zero death rates are a consequence of good health; however, it is also plausible to assume that recent or small settlements simply had few children of this age group. Therefore, we add the total population of the related age group to each logit regression in order to explain the excess zeros. Another variable which turned out to be a good predictor for the inflated zeros is the number of widows per 1000 population, since this population group is unlikely to have newborn children in general. In the tables we report two types of effects: the marginal effects for the count of deaths and the marginal effects for the probability of obtaining zero deaths.

Tables 2, 3 and 4 present equation (1) estimated with the ZINB, which includes the part for the counts and the logit regression for the inflated zeros. The dependant variable for Table 2 is the Infant Mortality Rate below 1 year of age. Table 3 and 4 show the results for the mortality quotient for ages 1 to 5 and 5 to 15 to test the sensibility of our results to deaths under one year of age. Same set of explanatory variables is used; however, into each logit equation for the inflated zeros the total population of the related age group is added: population below age of 1 for Table 2; population aged

1 to 6 for Table 3 and population aged 5 to 16 for Table 4. The intuition behind is that in certain villages there would be few children facing the risk of dying and this could be a significant predictor for zero death rates.

Testing the robustness of the results is not limited to changing the age group of the dependent variable – we also limit the sample size to settlements with population above 200: in Table 2 these are columns 5, 6, 7 and 8; in Table 3 these are columns 13, 14, 15 and 16; in Table 4 these are 21, 22, 23 and 24.

The results show that seigneurial tenure did have an impact on infant mortality. Table 2 shows that the effect of seigneurial tenure for infant mortality below one year of age is statistically significant at the 1% level and that the impact coefficient large: the presence of seigneurial tenure increases the mortality by 43.79 per 1000 births (see Table 2, column 3). For the settlements with population above 200 the effect is 44.89 (see Table 2, column 7). For *seigneuries* the marginal probability, the slope of the probability function, of observing zero deaths is 7.91% lower (see Table 2, column 4). The same effect significant at the 5% level is observed in larger settlements: -7.79% (see Table 2, column 8).

The raw data suggested that there could have been countervailing factor since households in seigneurial estates had a greater share of its population above the age of 60 than townships. Since older individuals – who have passed their prime age for working – could have competed with children for household resources, this could have explained partly the differences across institutional lines. We use the dependency ratio, defined as ratio of individuals above 60 years of age over the population aged between 15 and 60 years old to control for that fact. However, this effect turns out to be significant only in the equation for inflated zeros.

For mortality between one and five years of age, the seigneurial tenure regime increases the mortality by 5.21 and 5.277 in larger settlements per 1000 births (see Table 3, columns 11 and 15). The tenure effect is still significant at 5% level. However, tenure is no longer a good predictor for inflated zeros. For the last age group, between five and fifteen, the tenure effect is not significant (see Table 4). Therefore across specifications for the age groups below one and between one and five years old (the most vulnerable groups), the tenure effect is robust; however, the effect vanishes when considering the last age group.

The effects of the control variables are fragile: the length of growing season; wheat and oats yield; industrial activities per 1000 population and population density are significant; however, not in all specifications. One of the most important controls is the length of the growing season –

denoting environmental condition and the quality of agricultural lands – is statistically significant in the expected direction (longer seasons are associated with lower levels of deaths).

As mentioned earlier, the results could be driven by outliers. Areas with small populations do represent most of the outliers. This is because in such small areas, the death of one child if the infant population is two registers as an infant mortality quotient of 500 per 1,000 while very few of the densely populated areas have such high figures. However, as we conclude from the tables, exclusion of small settlements with population below 200 does not considerably alter the results. After removing the outliers, the seigneurial tenure effect is still strong in Tables 2 and 3.

Finally, we should consider the test results for our specification: the test on the over-dispersion parameter alpha and the Vuong (1989) on the relevance of the equation for the inflated zeros. The alpha is significant and the test results suggest over-dispersion, which validates our choice in favor of the ZINB regression for all specifications. The Vuong (1989) test results for all specification are strong to suggest the need to explain the excess zeros.

Table 2: Death quotient below 1, regression results (ZINB, robust)

VARIABLES	(1) ZINB below 1	(2) inflated logit	(3) ME (count)	(4) ME (p)	(5) ZINB below 1	(6) inflated logit	(7) ME (count)	(8) ME (p)
tenure	0.428***	-0.681**	43.79***	-0.0791**	0.451***	-0.707*	44.89***	-0.0779**
	(0.125)	(0.332)	(10.92)	(0.0382)	(0.125)	(0.363)	(10.82)	(0.0396)
dependents 60+	0.360	-10.92**	127.8	-1.267**	1.081	-9.640*	170.6	-1.062**
	(1.768)	(4.613)	(166.7)	(0.522)	(1.756)	(4.940)	(162.4)	(0.530)
birthspacing	-0.000294	0.000166	-0.0275	1.93e-05	-0.000485*	0.000425	-0.0456*	4.69e-05
	(0.000272)	(0.000616)	(0.0259)	(7.16e-05)	(0.000259)	(0.000692)	(0.0242)	(7.65e-05)
indsutry per 1000	0.0249*	0.00898	2.116*	0.00104	0.0321**	-0.00796	2.858**	-0.000877
	(0.0144)	(0.0233)	(1.271)	(0.00270)	(0.0153)	(0.0314)	(1.343)	(0.00346)
pupils share	-0.00494**	0.00844*	-0.510***	0.000980*	-0.00481**	0.0120**	-0.514***	0.00132**
	(0.00202)	(0.00467)	(0.190)	(0.000533)	(0.00200)	(0.00522)	(0.187)	(0.000567)
growing season	-0.00305	0.0203	-0.448	0.00236	-0.00185	0.0162	-0.289	0.00178
	(0.00435)	(0.0131)	(0.403)	(0.00153)	(0.00431)	(0.0141)	(0.394)	(0.00156)
wheat yield	0.0117	0.0169	0.888	0.00196	0.00671	0.0294	0.352	0.00324
	(0.0224)	(0.0489)	(1.975)	(0.00566)	(0.0218)	(0.0484)	(1.884)	(0.00528)
oats yield	-7.69e-05**	-0.00229	0.0133	-0.000266	-8.63e-05***	-0.000906*	-0.000348	-9.98e-05
	(3.27e-05)	(0.0178)	(0.154)	(0.00207)	(3.16e-05)	(0.000549)	(0.00559)	(6.20e-05)
population density	0.0157*	0.00795	1.314	0.000922	0.0139	-0.000344	1.217	-3.79e-05
	(0.00887)	(0.0209)	(0.828)	(0.00242)	(0.00905)	(0.0256)	(0.823)	(0.00283)
land cleared	0.00177	-0.000316	0.159	-3.66e-05	0.00105	0.00831	0.0259	0.000916
	(0.00257)	(0.00768)	(0.243)	(0.000892)	(0.00248)	(0.00896)	(0.223)	(0.000991)
meat per person	-0.00104	-0.000445	-0.0877	-5.17e-05	-0.000721	-0.00466	-0.0260	-0.000513
	(0.00105)	(0.00125)	(0.0930)	(0.000145)	(0.00103)	(0.00288)	(0.0934)	(0.000317)
widows per 1000	0.000783	-0.00353	0.100	-0.000409	0.000492	-0.00722	0.100	-0.000796
	(0.00203)	(0.00530)	(0.190)	(0.000614)	(0.00202)	(0.00608)	(0.188)	(0.000667)
population < 1		-0.0315***		-0.00365***		-0.0285***		-0.00314***
		(0.00547)		(0.000495)		(0.00529)		(0.000496)
Constant	5.099***	-2.905			5.042***	-2.435		
	(0.965)	(2.735)			(0.977)	(2.942)		
ln alpha	-0.597***				-0.618***			
	(0.0798)				(0.0798)			
LR test for alpha=0	1.90E+04				1.80E+04			
p value	0				0			
Vuong test	13.32				13.06			
p value	0				0			
AIC	9.552				9.869			
Cragg & Uhler's R2	0.303				0.269			
Observations	443	443	443	443	420	420	420	420

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 3: Death quotient for ages 1 to 5, regression results (ZINB, robust)

VARIABLES	(9) ZINB from 1 to 5	(10) inflated logit	(11) ME (count)	(12) ME (p)	(13) ZINB from 1 to 5	(14) inflated logit	(15) ME (count)	(16) ME (p)
tenure	0.303**	-0.0943	5.210**	-0.0123	0.323**	0.0553	5.277**	0.00705
	(0.140)	(0.353)	(2.351)	(0.0461)	(0.146)	(0.403)	(2.421)	(0.0512)
dependents 60+	-1.144	-14.86**	19.61	-1.937**	-1.123	-19.21*	24.03	-2.448**
	(2.071)	(7.054)	(37.69)	(0.877)	(2.410)	(10.54)	(40.19)	(1.221)
birthspacing	0.000239	-0.000480	0.00516	-6.26e-05	0.000179	-0.000749	0.00467	-9.54e-05
	(0.000246)	(0.000594)	(0.00447)	(7.73e-05)	(0.000250)	(0.000674)	(0.00462)	(8.53e-05)
indsutry per 1000	0.0419***	-0.0187	0.735***	-0.00244	0.0434***	0.000120	0.726***	1.53e-05
	(0.0100)	(0.0222)	(0.167)	(0.00291)	(0.0135)	(0.0299)	(0.229)	(0.00380)
pupils share	0.000599	0.00838	-0.0118	0.00109	0.000762	0.00984	-0.00918	0.00125*
	(0.00200)	(0.00597)	(0.0343)	(0.000757)	(0.00202)	(0.00604)	(0.0345)	(0.000728)
growing season	-0.0114***	0.00143	-0.190***	0.000187	-0.0115***	0.00185	-0.197***	0.000236
	(0.00428)	(0.0124)	(0.0735)	(0.00161)	(0.00432)	(0.0129)	(0.0747)	(0.00165)
wheat yield	0.0117	0.0994**	-0.0641	0.0129**	0.0144	0.0948**	0.0299	0.0121**
	(0.0232)	(0.0465)	(0.378)	(0.00585)	(0.0235)	(0.0459)	(0.389)	(0.00563)
oats yield	2.43e-06	-0.00101	0.00265	-0.000132	-2.01e-06	-0.00109	0.00239	-0.000139
	(3.29e-05)	(0.000649)	(0.00187)	(8.63e-05)	(3.35e-05)	(0.000804)	(0.00198)	(0.000105)
population density	0.00321	0.0270	-0.0172	0.00352	0.00248	0.0123	0.0141	0.00157
	(0.00881)	(0.0191)	(0.151)	(0.00248)	(0.0100)	(0.0232)	(0.176)	(0.00296)
land cleared	0.00167	-0.00624	0.0434	-0.000813	0.00149	-0.00908	0.0452	-0.00116
	(0.00280)	(0.00742)	(0.0495)	(0.000975)	(0.00288)	(0.00768)	(0.0506)	(0.000997)
meat per person	-0.000634	0.00279	-0.0176	0.000364	-0.000604	0.00434	-0.0198	0.000553
	(0.000675)	(0.00283)	(0.0135)	(0.000368)	(0.000713)	(0.00299)	(0.0137)	(0.000371)
widows per 1000	0.00469**	-0.00976*	0.102**	-0.00127*	0.00414	-0.00590	0.0825*	-0.000752
	(0.00212)	(0.00521)	(0.0406)	(0.000681)	(0.00257)	(0.00582)	(0.0475)	(0.000754)
population 1 to 6		-0.00895***		-0.00117***		-0.00780***		-0.000995***
		(0.00151)		(0.000144)		(0.00136)		(0.000143)
Constant	4.306***	1.132			4.398***	1.166		
	(0.929)	(2.611)			(0.951)	(2.708)		
ln alpha	-0.631***				-0.624***			
	(0.0944)				(0.0979)			
LR test for alpha=0	2511.7				2491.56			
p value	0				0			
Vuong test	10.62				10.3			
p value	0				0			
AIC	6.708				7.007			
Cragg & Uhler's R2	0.312				0.244			
Observations	448	448	448	448	421	421	421	421

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 4: Death quotient for ages 5 to 15, regression results (ZINB, robust)

VARIABLES	(17) ZINB from 5 to 15	(18) inflated logit	(19) ME (count)	(20) ME (p)	(21) ZINB from 5 to 15	(22) inflated logit	(23) ME (count)	(24) ME (p)
tenure	0.167	-0.165	0.861	-0.0268	0.190	-0.166	0.929	-0.0276
	(0.194)	(0.354)	(0.765)	(0.0568)	(0.191)	(0.354)	(0.756)	(0.0582)
dependents 60+	-1.471	-7.122	3.022	-1.156	-1.558	-6.453	1.157	-1.073
	(3.271)	(4.575)	(13.61)	(0.747)	(3.327)	(4.965)	(13.61)	(0.822)
birthspacing	0.000754	-0.000399	0.00346*	-6.47e-05	0.000552	-0.000146	0.00232	-2.43e-05
	(0.000475)	(0.000673)	(0.00194)	(0.000109)	(0.000482)	(0.000747)	(0.00192)	(0.000124)
indsutry per 1000	0.0179	0.0116	0.0561	0.00189	0.0197	-0.000718	0.0777	-0.000119
	(0.0239)	(0.0236)	(0.100)	(0.00380)	(0.0237)	(0.0294)	(0.0966)	(0.00490)
pupils share	0.000198	-0.00554	0.00763	-0.000899	0.000563	-0.00398	0.00667	-0.000661
	(0.00305)	(0.00584)	(0.0121)	(0.000963)	(0.00300)	(0.00566)	(0.0119)	(0.000945)
growing season	-0.0212***	0.00124	-0.0851***	0.000202	-0.0210***	-0.00291	-0.0790***	-0.000483
	(0.00658)	(0.0146)	(0.0277)	(0.00237)	(0.00655)	(0.0150)	(0.0269)	(0.00248)
wheat yield	0.0475**	0.129**	0.0269	0.0210***	0.0481**	0.123**	0.0501	0.0204***
	(0.0207)	(0.0543)	(0.100)	(0.00764)	(0.0214)	(0.0530)	(0.0990)	(0.00756)
oats yield	-0.00136	-0.00102	-0.00409	-0.000166	-0.000866	0.000668	-0.00414	0.000111
	(0.00126)	(0.0102)	(0.0163)	(0.00165)	(0.00312)	(0.00323)	(0.00865)	(0.000536)
population density	0.0285**	-0.00372	0.117**	-0.000603	0.0225*	-0.0273	0.119**	-0.00454
	(0.0134)	(0.0221)	(0.0585)	(0.00357)	(0.0133)	(0.0311)	(0.0579)	(0.00496)
land cleared	0.00635	0.0122*	0.00986	0.00198*	0.00666*	0.0138*	0.0106	0.00229**
	(0.00386)	(0.00650)	(0.0161)	(0.00104)	(0.00381)	(0.00708)	(0.0157)	(0.00115)
meat per person	-0.00185*	0.000555	-0.00795	9.00e-05	-0.00195*	0.00127	-0.00906*	0.000212
	(0.00111)	(0.00149)	(0.00484)	(0.000240)	(0.00104)	(0.00264)	(0.00543)	(0.000429)
widows per 1000	0.00449	-0.0113**	0.0317**	-0.00184**	0.00445	-0.0154**	0.0347**	-0.00256**
	(0.00344)	(0.00533)	(0.0156)	(0.000846)	(0.00339)	(0.00711)	(0.0154)	(0.00111)
population 5 to 16		-0.00471***		-0.000765***		-0.00462***		-0.000768***
		(0.00108)		(9.79e-05)		(0.00114)		(0.000107)
Constant	4.004***	1.568			4.229***	2.298		
	(1.549)	(3.255)			(1.527)	(3.478)		
ln alpha	-0.333*				-0.356*			
	(0.178)				(0.193)			
LR test for alpha=0	502.02				460.35			
p value	0				0			
Vuong test	5.11				5			
p value	0				0			
AIC	4.249				4.402			
Cragg & Uhler's R2	0.266				0.23			
Observations	448	448	448	448	421	421	421	421

Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Conclusion

To the best of our knowledge, we are the first to highlight the existence of differences in mortality across institutional lines in Canada in the 19th century. We documented the well-known evidence concerning the weight of the burden imposed by seigneurial tenure. We proposed that this system of law had a wide array of effects from predatory taxation to increased poverty and monopoly power on local markets. As a result, seigneurial tenure rendered households more vulnerable to shocks and food intake would have varied sufficiently close to a point where there could have been important ill-effects on health – especially for children. Using data from the 1851 census in combination with a set of geographical data to provide for controls, we show that seigneurial tenure did lead to significant differences in infant mortality: under tenure the death quotient was from 43.79 to 44.89 deaths per 1000 population higher in the age group below one and from 5.21 to 5.277 deaths per 1000 population higher for the age group from one to five. There were no statistically significant effects after the age of 5. These results are important for the interpretation of early Canadian history. It has long been argued that Quebec, now the second largest province in Canada accounting for nearly a quarter of its population and close to two-fifths in 1851, suffered from population pressures in the pre-confederation era. It is argued that these population pressures materialized as less and less land remained available for more and more individuals – hence decreasing marginal returns. If that was true, newly settled lands under British land tenure laws were of poorer quality and should have had higher infant mortality (since they should have been poorer given the marginal productivity of these lands). They did not. The long-settled areas under seigneurial law exhibited higher infant mortality, even when we introduce statistical controls. As a result, it seems fair to argue that population pressures *might* have existed – but they would be explained by the institution of seigneurial tenure which increased mortality by a combination of factors (from regressive income transfers to predatory taxation to disincentive effects).

List of references

PRIMARY SOURCES:

Government of the Province of Canada (1853). *Census of the Canadas, 1851-1852, Volume I*. Quebec: John Lowell Printer.

Public Archives of Canada. 1874. *Censuses of Canada, 1665 to 1871, Vol. 4*. Ottawa: Department of Agriculture.

SECONDARY SOURCES:

Altman, Morris. 1983. "Seignorial Tenure in New France, 1688-1739: An Essay on Income Distribution and Retarded Economic Development". *Historical Reflections / Réflexions historiques,* Vol.10, No.3, pp.335-375.

Altman, Morris. 1987. "Note on the Economic Burden of the Seigniorial System in New France, 1688-1730". *Historical Reflections / Réflexions historiques,* Vol.14, No.1, pp.135-142.

Altman, Morris. 1998. "Land Tenure, Ethnicity, and the Condition of Agricultural Income and Productivity in Mid-Nineteenth-Century Quebec", *Agricultural History,* Vol.72, No.4, pp. 708-762.

Armstrong, Robert. 1984. "The Efficiency of Quebec Farmers in 1851", *Histoire sociale / Social History,* Vol.17, no.33, pp.149-163.

Bédard, Éric. 2012. *L'histoire du Québec pour les nuls.* Montréal : First Editions.

Bédard, Mathieu. and Vincent Geloso. 2014. Free banking and economic growth in Lower Canada, 1817 to 1851. *Conference paper presented at Lund University during the Free Banking Conference*.

Boserup, Esther. 1965[2008]. *The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure*. New Brunswick, NJ: Aldine Transactions.

Broadberry, Stephen, Bruce M.S. Campbell, Alexander Klein, Mark Overton and Bas van Leeuwen. 2015. *British Economic Growth, 1270-1870*. Cambridge: Cambridge University Press.

Centre de Référence en Agriculture et Agroalimentaire du Québec. 2012. *Atlas Agroclimatique du Québec*. Available online at http://www.agrometeo.org/index.php/atlas (Consulted on March 1st 2015).

Cleland John and Zeba Satha. 1984. "The effect of birth spacing on childhood mortality in Pakistan", *Population Studies,* Vol.38, no.3, pp.401-418.

Courville, Serge. 2008. *Quebec: A Historical Geography*. Vancouver: University of British Columbia Press.

Craft, Nicholas and Terrance Mills. 2009. “From Malthus to Solow: How did the Malthusian economy really evolve?”, *Journal of Macroeconomics*, Vol.31, no.1, pp.68–93.

Cranfield, John and Kris Inwood. 2014. “Genes, Class or Culture? French-English Height Differences in Canada”, in eds Peter Baskerville and Kris Inwood, *Lives in Transition: Longitudinal Analysis from Historical Sources*. Montréal and Kingston: McGill-Queen’s University Press, pp. 233-253.

Davis, Lewis. 2008. “Scale effects in growth: A role for institutions”, *Journal of Economic Behavior & Organization,* Vol.66, No. 2, 403-419.

Dechêne, Louise. 1974. *Habitants et Marchands de Montréal au XVIIe siècle*. Paris : Plon.

Dribe, Martin, Mats Olsson and Patrick Svensson. 2012. “Was the manorial system an efficient insurance institution? Economic stress and demographic response in Sweden, 1749-1859”, *European Review of Economic History,* Vol.16, no.3, pp.292-310.

Fowke, Vernon C. 1962. "The myth of the self-sufficient Canadian pioneer." *Transactions of the Royal Society of Canada*, Vol.56, no.3, pp.23-37.

Geloso, Vincent and Vadim Kufenko. 2015. “Malthusian Pressures: Empirical evidence from a frontier economy”, *Journal of Population Research,* Vol.32, no.3, pp.263-283.

Geloso, Vincent. Forthcoming. *The Seeds of Divergence: The Economic of French North America, 1688 to 1760*. PhD dissertation, Department of Economic History at the London School of Economics and Political Science.

Godfrey, Keith and David Barker. 2000. “Fetal nutrition and adult disease”, *American Journal of Clinical Nutrition,* Vol.71, no.5, pp.1344-1352.

Greer, Allan. 1985. *Peasant, Lord and Merchant: Rural Society in Three Quebec Parishes, 1740-1840*. Toronto: University of Toronto Press.

Haines, Michael. 1985. “Inequality and childhood mortality: A comparison of England and Wales, 1911, and the United States, 1900”, *Journal of Economic History,* Vol.45, no.4, pp.885-912.

Harris, Richard. 1966 [1984]. *The Seigneurial System in Early Canada*. Montréal: McGill-Queen’s University.

Harris, Cole. 2012. *Le Pays Revêche: Société, espace et environnement au Canada avant la Confédération*. Québec : Les Presses de l’Université Laval.

Jones, Charles. 1995. "Time Series Tests of Endogenous Growth Models", *Quarterly Journal of Economics,* Vol.110, No.2, pp.495-525.

Jones, Robert. 1942 "French-Canadian Agriculture in the St. Lawrence Valley, 1815-1850." *Agricultural History,* Vol.16, no. 3, pp.137-148.

Jones, Robert. 1946. "Agriculture in Lower Canada, 1792-1815", *Canadian Historical Review,* Vol.37, March, pp.33-51.

Kelly, Morgan, and Cormac O'Grada. 2014. "Living Standards and Mortality Since the Middle Ages." *The Economic History Review*, Vol.67, no.2, pp.358-381.

Lewis, Frank and Marvin McInnis. 1980. "The Efficiency of the French-Canadian Farmer in the Nineteenth Century", *Journal of Economic History,* Vol.40, No.3, pp.497-514

Lewis, Frank and Marvin McInnis. 1984. "Agricultural Output and Efficiency in Lower Canada, 1851", *Research in Economic History,* Vol.9, pp.45-87.

Lindert, Peter and Jeffrey Williamson. 2013. "American Incomes before and after the Revolution", *Journal of Economic History,* Vol.73, no.3, pp.725-765.

Long, J. Scott, & Freese, Jeremy. 2006. *Regression Models for Categorical Dependent Variables Using Stata (Second Edition)*. College Station, TX: Stata Press.

Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks, CA: Sage Publications.

Lucas, Robert. 1993. "Making a miracle", *Econometrica*. Vol.61, no.2, pp.251-272.

McCallum, John. 1980. *Unequal Beginnings: Agriculture and Economic Development in Quebec and Ontario until 1870*. Toronto: University of Toronto Press.

McInnis, Marvin. 1981. "Some Pitfalls in the 1851-1852 Census of Agriculture of Lower Canada", *Social History / Histoire Sociale,* vol.14, no.27, pp.219-231.

McInnis, Marvin. 1982. "A Reconsideration of the State of Agriculture in Lower Canada in the First Half of the Nineteenth Century", *Canadian Papers in Rural History,* Vol.3, pp.9-49.

McInnis, Marvin. 1992. *Perspectives on Ontario agriculture*. Gananoque: Langdale Press.

Meredith, David and Deborah Oxley. 2014. "Nutrition and health, 1700-1870" in eds. Roderick Floud, Jane Humphries and Paul Johnson, *The Cambridge Economic History of Modern Britain, Vol.1, 1700-1870*. Cambridge: Cambridge University Press.

Mokyr, Joel. 1990. *Twenty-Five Centuries of Technological Change*. London: Routledge Publishing.

Moselle, Boaz and Benjamin Polak, 2001. “A model of a predatory state”, *Journal of Law, Economics, and Organization,* Vol.17, no.1, pp.1-33.

Nicolini, Esteban. 2007. “Was Malthus right? A VAR analysis of economic and demographic interactions in pre-industrial England”. *European Review of Economic History*, Vol.11, no.1, pp.99–121.

Ogilvie, Sheilagh. 2007. “What is, is right? Economic institutions in pre-industrial Europe”, *Economic History Review,* Vol.60, no.4, pp.649-684.

Ogilvie, Sheilagh and A.W. Carus. 2014. “Institutions and Economic Growth in Historical Perspectives”, in eds Philippe Aghion and Steven Durlauf, *Handbook of Economic Growth, Vol 2A*. New York, NY: North Holland, pp. 403-513.

Olsson, Matts and Patrick Svensson. 2010. “Agricultural growth and institutions : Sweden, 1700-1860”, *European Review of Economic History,* Vol.14, no.2, pp.275-304.

Ouellet, Fernand. 1966. *Histoire économique et sociale du Québec, 1760 à 1850*. Ottawa: Édition Fides.

Ouellet, Fernand.1972. *Élements d'histoire sociale du Bas-Canada*. Montréal : Hurtubise HMH.

Ouellet, Fernand. 1980. *Lower Canada, 1791-1840: Social Change and Nationalism*. Toronto: McClelland and Stewart Limited.

Paquet, Gilles and Jean-Pierre Wallot. 2007. *Un Québec moderne, 1760-1840 : Essai d'histoire économique et social*. Montréal : Éditions Huburtise HMH.

Pelletier, François, Jacques Légaré and Robert Bourbeau. 1997. “Mortality in Quebec during the nineteenth century: From the state to the cities”. *Population Studies,* Vol.51, no.1, pp.93-103.

Percy, Michael and Rick Szostak. 1992. “The Political Economy of the Abolition of Seigneurial Tenure in Canada East”, *Explorations in Economic History,* Vol.29, no.1, pp.51-68.

Simon, Julian L. 1977. *The Economics of Population Growth*. Princeton, NJ: Princeton University Press.

Steckel, Richard. 1980. “Antebellum Southern White Fertility: A Demographic and Economic Analysis”, *Journal of Economic History,* Vol.40, no.2, pp.331-350.

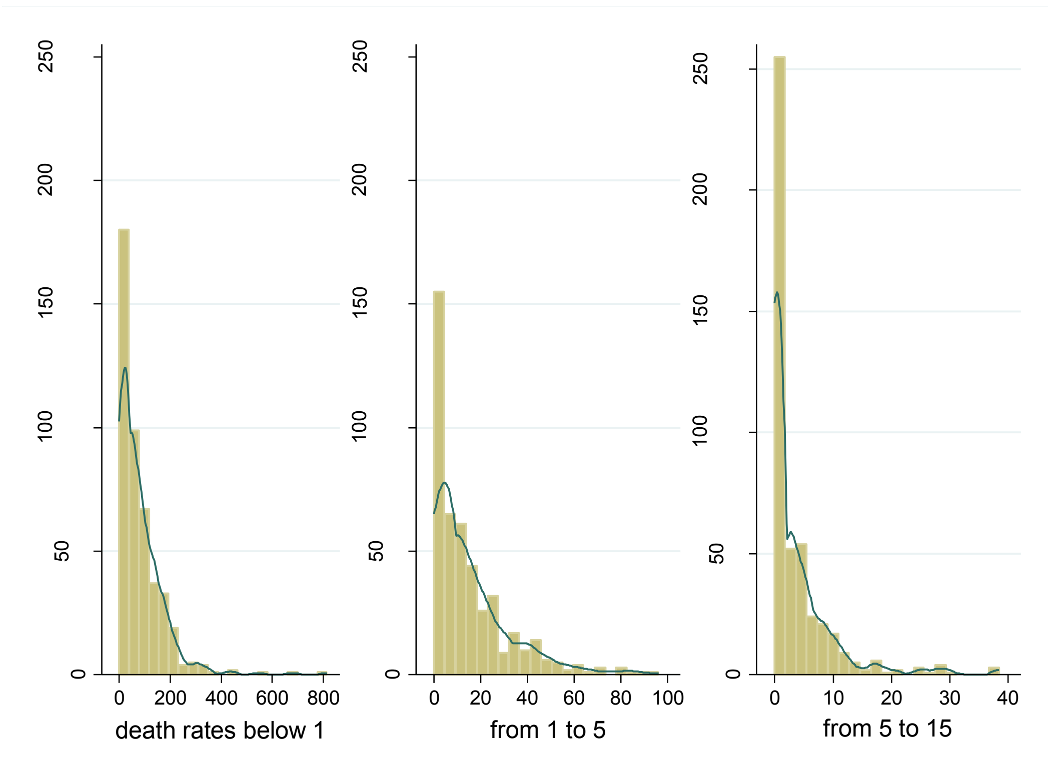
Turpeinen, Oiva. 1973. “Regional differentials in Finnish mortality rates 1816-1865”, *Scandinavian Economic History Review,* Vol. 21, no.2, pp.145-163.

Vuong, Q. 1989. *Likelihood ratio tests for model selection and non-nested hypotheses*. Econometrica 57: 307-333

Woods, Robert. 2003. “Urban-Rural Mortality Differentials: An Unresolved Debate”, *Population and Development Review*, Vol.29, no.1, pp.29-46.

Appendix

Figure A. Distribution of the death rates



Schriftenreihe des Promotionsschwerpunkts Globalisierung und Beschäftigung

Nr.	1/1998	Bernhard Holwegler und Hans-Michael Trautwein, *Beschäftigungswirkungen der Internationalisierung, eine Studie aus- und einfließender Direktinvestitionen der Metall- und Elektroindustrie im Raum Stuttgart*
Nr.	2/1998	Heinz-Peter Spahn, *Heterogeneous Labour, the Unemployment Equilibrium, and the Natural Rate*
Nr.	3/1998	Philip Arestis, Iris Biefang-Frisancho Mariscal and Harald Hagemann, *Capital Shortage Unemployment in Germany and the UK*
Nr.	4/1999	Theo Schewe, *Full Employment in the Age of Globalisation? Political-Economic Analysis of Effective Employment Policies in the Nineties. The Case of Norway.*
Nr.	5/1999	Hagen Krämer, *Dienstleistungen: Motor für Wachstum und Beschäftigung in Deutschland?*
Nr.	6/1999	Jürgen Kromphardt, *Lohnbildung und Beschäftigung*
Nr.	7/1999	Ewald Walterskirchen, *Beschäftigungspolitik in Österreich*
Nr.	8/1999	Reiner Franke, *Lohnzurückhaltung, Beschäftigung und (zu) einfache empirische Zusammenhänge*
Nr.	9/1999	Peter Kalmbach, *Implications of Integration for Wage Formation and Employment*
Nr.	10/2000	Arne Heise, *Theoretische Grundlagen einer Verhaltensabstimmung der makroökonomischen Politikträger*
Nr.	11/2000	Eckhard Hein und Carsten Ochsen, *Monetary Interest Rates, Income Shares, and Investment: Theory and Empirical Evidence for France, Germany, the UK, and the USA*
Nr.	12/2000	Guntram R. M. Hepperle, *Airbus – ein gelungenes Beispiel für beschäftigungsorientierte Industriepolitik?*
Nr.	13/2000	Bernhard Holwegler, *Implikationen der Technologiediffusion für technologische Arbeitslosigkeit*
Nr.	14/2000	Markus Schreyer, *Wachstum und Beschäftigung vor dem Hintergrund des Solowschen Produktivitätsparadoxons*
Nr.	15/2000	Mauro Boianovsky, *Some Cambridge Reactions to The General Theory: David Champernowne and Joan Robinson on Full Employment*
Nr.	16/2001	Marc-Peter Radke, *Law and Economics of Microsoft vs. U.S. Department of Justice: A New Economic Paradigm for Antitrust in Network Markets or Inefficient Lock-in of Antitrust Policy?*
Nr.	17/2001	Daniel Hartmann, *Taylor-Regel und amerikanische Geldpolitik*

Nr. 18/2002 Jutta Maute, *Stabilization via Currency Board*

Nr. 19/2002 Daniel Hartmann, *The Fed Strategy: Successful but Out-of-Date?*

Nr. 20/2004 Dirk H. Ehnts, *Spatial Decisions of Multinational Enterprises and their Effect on Local Firms*

Nr. 21/2004 Theo Schewe, *Makroökonomische Probleme des extensiven Rohstoffexports in einer entwickelten Volkswirtschaft – analysiert am Beispiel der norwegischen Erdölwirtschaft*

Nr. 22/2005 Georg Erber & Aida Sayed-Ahmed, *Offshore Outsourcing - A global shift in the present IT industry*

Nr. 23/2006 Deborah Schöller, *Service Offshoring: A Challenge for Employment? Evidence from Germany*

Nr. 24/2007 Ralf Rukwid, *Arbeitslosigkeit und Lohnspreizung - Empirische Befunde zur Arbeitsmarktsituation gering Qualifizierter in Deutschland*

Nr. 25/2007 Julian P. Christ, *Varieties of Systems of Innovation: A Survey of their Evolution in Growth Theory and Economic Geography*

Nr. 26/2008 Andreja Benković & Juan Felipe Mejía, *Tourism as a Driver of Economic Development: The Colombian Experience*

Nr. 27/2009 Julian P. Christ & André P. Slowak, *Standard-Setting and Knowledge Dynamics in Innovation Clusters*

Nr. 28/2009 Constanze Dobler, *The Impact of Institutions, Culture, and Religion on Per Capita Income*

Nr. 29/2009 Julian P. Christ & André P. Slowak, *Why Blu-ray vs. HD-DVD is not VHS vs. Betamax: The Co-evolution of Standard-setting Consortia*

Nr. 30/2009 Patricia Hofmann, *Die neue neue Außenhandelstheorie: das Melitz-Modell*

Nr. 31/2010 Julian P. Christ, *The Geography and Co-location of EuropeanTechnology-specific Co-inventorship Networks*

Nr. 32/2010 Julian P. Christ, *Geographic Concentration and Spatial Inequality: Two Decades of EPO Patenting at the Level of European Micro Regions*

Nr. 33/2011 Finn Marten Körner, *An Equilibrium Model of 'Global Imbalances' Revisited*

Nr. 34/2011 Constanze Dobler & Harald Hagemann, *Economic Growth in the Post-Socialist Russian Federation after 1991: The Role of Institutions*

Nr. 35/2011 Constanze Dobler, *Instability, Economic Stagnation and the Role of Islam in the North Caucasus*

Nr. 36/2012 Georg Erber und Harald Hagemann, *Wachstums- und Investitionsdynamik in Deutschland*

Nr. 37/2012 Ralf Rukwid, *Grenzen der Bildungsexpansion? Ausbildungsinadäquate Beschäftigung von Ausbildungs- und Hochschulabsolventen in Deutschland*

Nr. 38/2012 Vadim Kufenko, *Empirical Analysis of Regional Economic Performance in Russia: Human Capital Perspective*

Nr. 39/2013 Harald Hagemann und Vadim Kufenko, *The Political Kuznets Curve for Russia: Income Inequality, Rent Seeking Regional Elites and Empirical Determinants of Protests during 2011/2012*

Nr. 40/2014 Danila Raskov und Vadim Kufenko, *The Role of Old Believers' Enterprises: Evidence from the Nineteenth Century Moscow Textile Industry*

Nr. 41/2014 Harald Hagemann, Georg Erber, Niels Geiger, Johannes Schwarzer und Oliver Zwiessler, *Wachstums- und Investitionsdynamik in Deutschland*

Nr. 42/2015 Vincent Geloso und Vadim Kufenko, *Malthusian Pressures: Empirical Evidence from a Frontier Economy*

Nr. 43/2015 Christine Clement, *The Formal-Informal Economy Dualism in a Retrospective of Economic Thought since the 1940s*

Nr. 44/2015 Niels Geiger, *The Rise of Behavioural Economics: A Quantitative Assessment*

Nr. 45/2015 Vadim Kufenko und Niels Geiger, *Stylized Facts of the Business Cycle: Universal Phenomenon, or Institutionally Determined?*

Nr. 46/2015 Niels Geiger und Vadim Kufenko, *Business Cycles in the Economy and in Economics: An Econometric Analysis*

Nr. 47/2015 Alex Arsenault Morin, Vincent Geloso und Vadim Kufenko, *Infant Mortality and the Role of Seigneurial Tenure in Canada East, 1851*

Die Ursachen der gegenwärtig hohen Arbeitslosigkeit in einigen europäischen Ländern sind nicht allein in 'Funktionsproblemen des Arbeitsmarktes' zu suchen, sondern auch in Nachfrage- und Angebotsentwicklungen auf Güter- und Finanzmärkten. Im Promotionsschwerpunkt *Globalisierung und Beschäftigung* werden daher Dissertationsvorhaben gefördert, in denen die Beschäftigungseffekte gesamtwirtschaftlicher Entwicklungen untersucht werden - beispielsweise von neuen Technologien, von Prozessen der Internationalisierung und Systemtransformation, von marktseitigen Finanzierungsbeschränkungen oder von unterschiedlichen Strategien der Fiskal-, Geld- und Währungspolitik.

Die Betreuung und Vernetzung der Arbeiten im Promotionsschwerpunkt entspricht der Arbeitsweise eines Graduiertenkollegs. Betreuer des Schwerpunkts und *Herausgeber der Schriftenreihe* sind folgende Hochschullehrer:

Prof. Dr. Harald Hagemann harald.hagemann@uni-hohenheim.de
Institut für Volkswirtschaftslehre (520H)
Universität Hohenheim
D-70593 Stuttgart

Prof. Dr. Heinz-Peter Spahn peter.spahn@uni-hohenheim.de
Institut für Volkswirtschaftslehre (520A)
Universität Hohenheim
D-70593 Stuttgart

Prof. Dr. Hans-Michael Trautwein michael.trautwein@uni-oldenburg.de
Fakultät II – Institut für Volkswirtschaftslehre
Carl von Ossietzky Universität
D-26111 Oldenburg

Dissertationsprojekte im Schwerpunkt können durch Promotionsstipendien des *Evangelischen Studienwerks e.V. Villigst* gefördert werden. Bewerbungsunterlagen können unter folgender Adresse angefordert werden:

Evangelisches Studienwerk e.V.
Promotionsförderung
Iserlohner Str. 25
58239 Schwerte Tel.: 02304/755-215, Fax: 02304/755-250

Weitere Informationen zum Promotionsschwerpunkt sowie die Diskussionsbeiträge der Violetten Reihe im PDF-Format finden sich im Internet unter der Adresse:

http://www.globalization-and-employment.de