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The geography of economic mobility in 19th Century Canada[1]

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Abstract

This paper uses linked Census records from 1871 to 1901 to compute intergenerational mobility for Canadian regions and census districts. The results reveal sharp differences in mobility over space: Ontario featured high relative and absolute mobility, Quebec low relative and absolute mobility, and the Maritimes low absolute mobility. Local differences in human capital endowments and labour market inequality are correlated with district mobility patterns but do not account for regional differences, where migration and structural change toward industry and services appear important. Comparing spatial patterns of Canadian mobility in the 19th century to today shows substantial changes for Quebec districts.

Introduction

The prospect of intergenerational economic mobility has fuelled human capital investments, shaped migration patterns, and influenced the career decisions of individuals in North America for over a century. An important moderator of this economic mobility are the opportunities inherent to one's location. While recent estimates show that Canada has higher rates of intergenerational economic mobility than the United States, both countries feature significant spatial differences (Chetty 2014; Chetty, Hendren, Kline and Saez 2014; Connolly and Corak 2019; Corak 2020; Corak and Heisz 1999). For the United States,

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comparisons of present-day mobility with the early 20th century speak to long-run regional development trajectories (Connor and Storper 2020; Tan 2022). Both gross mobility rates and the direction of mobility are important considerations. Persistent low mobility is a feature of the US South, where racial inequality is a dominant feature limiting local labour market opportunities. In the Northeast, opportunities for upward mobility were greater in the early 20th century before the decline of manufacturing.

Spatial patterns of economic mobility in early 20th century Canada are unknown, and potential explanations for any such mobility patterns are also an open question. While Canada may have had a less overt racial divide between regional labour markets than the US, labour market segmentation by language limited economic mobility in this period (Antonie, Inwood, Minns, and Summerfield 2022) and the early 20th century saw notable differences in immigrant outcomes depending on origin country (Inwood, Minns and Summerfield, 2016). As in the United States, deindustrialisation has been a key feature of the Canadian economy in recent decades, with the declining share of manufacturing connected to unfavourable changes in employment opportunities for men (Morisette 2020). More generally, research on intergenerational mobility and inequality has found compelling evidence for the presence of what is now known as the Great Gatsby Curve, with high inequality locations also featuring lower economic mobility (Corak 2013; Durlauf, Kourtellos, and Tan 2022). Connor and Storper (2020) observe an inequality-mobility relationship in for the early 20th Century United States; in Canada, Porter (1965) argued strongly that low mobility in 20th century Canada was connected to class-based inequality, but no estimates of the relationship between mobility and inequality are available for earlier decades.

In this paper we use linked complete count Census data spanning 1871 to 1901 to provide the first portrait of local intergenerational mobility in eastern Canada circa 1900. We construct multiple measures of economic mobility by region and by census division, with which we document disparities in intergenerational mobility and their correlates at a local level. Our mobility measures include

broad occupation-based measures of mobility as well intergenerational earnings elasticities and measures of relative and absolute rank earnings mobility that draw on more fine-grained evidence of earnings patterns by occupation, age, and region (Connor and Storper 2020; Chetty, Hendren, Kline, and Saez 2014). In order to draw the most direct comparisons possible to contemporary outcomes, we match data from 1871 Census sub-districts to 1986 Census divisions used in recent research.[2]

Our evidence reveals the contours of intergenerational mobility across late 19th century Canada and the extent of change to recent experience. We find distinct mobility groupings in the late 19th century. Residents of Ontario experienced the greatest mobility; most Ontario divisions belonged to a high mobility cluster that included only a few divisions from Quebec or the Maritimes (New Brunswick and Nova Scotia). The character of mobility patterns also differed by region: Ontario provided clear opportunities for escape from the lower end of the national earnings distribution while Quebec was more rigid with fewer opportunities of any kind. The Maritime region is a different case, characterized by considerable mobility across occupations without improvement in earnings position. Within province, Census division mobility patterns demonstrate broad agreement with mobility seen today (Corak 2020): key population centres, including much of southern Ontario, Montreal. Moncton and Halifax were, and remain, locations of opportunity.

Further analysis shows that human capital across divisions was positively correlated with relative earnings mobility while inequality was negatively correlated with absolute mobility. These findings accord with research on present day Canada (Corak 2020) and the US (Chetty et al. 2014). We also find evidence of a correlation between cross-regional mobility patterns and both division-level migration propensities and concentrations by mother tongue. As

[2] We use new 1871 Census subdistrict shapefiles at https://hgiscanada.usask.ca/download produced by The Canadian Peoples project (https://thecanadianpeoples.com). We collapse some polygons to overlap with the 1986 Census boundaries (Statistics Canada, 2009).

division characteristics do not fully account for mobility differences between Ontario and the rest, we explore the role of migration and changing economic structures in providing opportunities for Ontario sons in 1901. We conclude with comparisons to division mobility patterns in late 20th century Canada from Corak (2020)

Linked Canadian Census Data 1871-1901

Our analysis draws on newly linked Canadian Census data for the period 1871-1901. A full overview of the approach to linkage and the characteristics of the data are available in Antonie, Inwood, Lizotte and Ross (2014) and Antonie, Inwood, Minns, and Summerfield (2021; 2022).[3] Linkage draws on complete count census data from 1871, 1881, 1891, and 1901. This paper focuses on outcomes among men due to the difficulties in successfully using nominal linkage techniques for women over the life course period where many are changing their names upon marriage. We take the records of boys aged 0 to 18 and co-resident fathers aged 18 to 80 in the 1871 Census Sample.[4] We then link the records of the boys in 1871 to each of the 1881, 1891, and 1901 complete count census files. Linkage is based on a machine learning approach, using a set of high-confidence links for training. Names, year of birth range, and province of birth are used as time-invariant characteristics on which linkage is based. We retain the records of the 1871 boys that we identify uniquely in every subsequent Census to 1901 and then double the size of the sample by using co-resident household members, where available, to disambiguate among candidate records

[3] The on-line appendix to Antonie, Inwood, Minns, and Summerfield (2022) provides a detailed overview of the approach taken to record linkage in this work. The sample used in the paper is somewhat larger as we allow a larger range of ages in 1871. Details at https://www.cambridge.org/core/journals/journal-of-economic-history/article/intergenerational-mobility-in-a-midatlantic-economy-canada18711901/68C1CFDC0AD6187B2F6F1FD33CCEAFC9#supplementary-materials.

[4] We identify the probable father by selecting a male aged 18-80 with the same family identifier. Our algorithm assesses up to 3 candidate males for surname match and age differential of 13-65 years, choosing, in order of preference, the first enumerated individual in the household, the oldest male in the household and the second-oldest male in the household. In practice, fathers are typically the first adult male named in each household, who is also often the oldest male, see Antonie, Inwood, Minns, and Summerfield (2022); Collins and Zimran (2019)

for linkage. Our 30-year linkage ensures that both father and son are observed mid-career at which point age-earnings profiles are expected to be flat.[5] There are significant changes in the geographical coverage of the Census of Canada between 1871 and 1901. In 1871, the complete count files cover Nova Scotia and New Brunswick (which we combine as a Maritime region), Quebec, and Ontario. By 1901 Census coverage expands to Prince Edward Island, more of Northern Quebec and Western Ontario, as well as the Western provinces of Manitoba, Saskatchewan, Alberta, British Columbia, Yukon, and the Northwest Territories. Our linkage traces sons that migrate into the newly surveyed parts of the country in subsequent decades.

Repeated linkage across four consecutive Censuses is a different approach to that used in much of the research on the United States, where direct linkage between the two surveys of interest is more commonly used (Long and Ferrie 2007; Feigenbaum 2018). Our approach is designed to minimize false positives, which would lead to significant upward bias to estimates of intergenerational mobility. Repeated linkage on a sub-sample of the same records has been shown to substantially reduce likely false links for researchers working with Canadian Census data (Antonie, Inwood, Minns, and Summerfield 2022), while still yielding a sizeable sample of over 50,000 linked records.

The 1871 (and 1901) Census collected a range of personal and household information, including birthplace, place of residence, household structure, religion and occupation. The 1901 Census of Canada enquired about earnings, but evidence is often missing for farmers and incomplete for occupations where individuals were not receiving a wage or salary from an employer. The 1871 Census did not ask individuals to report earnings. Both 1871 and 1901 include detailed information about occupations, which provides an avenue to assess

[5] Relative to comparable work with more recent data (Corak 2020), our sons and fathers are slightly younger and our intergenerational period slightly longer. The average age of linked sons in 1901 in our sample is 38 while Corak (2020) averages children's earnings over the age range 38-45 years. Our fathers (with average age of 43) are captured when sons are aged 0-18 while Corak (2020) captures parental income when children are aged 15-19 years.

intergenerational mobility. We can use information on occupations directly to measure mobility across major occupational categories (M), where we calculate the share of sons who were in a different occupational class to their father.[6] We adopt four occupational categories common in the study of North America: white-collar work (professionals, clerical workers, and proprietors), skilled and semi-skilled work (trades and craft work, factory operatives, and lower status service work), unskilled work (labourers and farm labour) and farmers (farm owner/operators) (Long and Ferrie 2007, 2013; Perez 2019). To place all occupied men into these categories, we assign occupational strings a 4-digit OCCHISCO code (as prepared by IPUMS for US data) and subsequently convert these into 12 HISCLASS categories (van Leeuwen and Maas 2011).[7] We then follow Perez (2019) in assigning these 12 categories into the four categories.[8] In total, 36,479 linked observations have a valid category for both father and son and can be used to estimate intergenerational mobility.

An alternative approach to measuring economic mobility is to estimate the extent of intergenerational persistence in earnings. Given the absence of income information for fathers in 1871 and many sons in 1901, an earnings-based approach requires assigning an income based on occupation to individuals in the linked sample. A large literature reviewed by Inwood, Minns, Summerfield (2019) uses occupational income scores as a measure of economic status. The approach has limitations. Limited granularity (particularly in widely held occupations) and changes in pay structure may bias estimates of

[6] An alternative approach often seen in the literature is to calculate Altham statistics (Altham 1970; Altham and Ferrie 2007) that summarize mobility in sub-groupings of the population. We do not present the results of such an approach here, but figures are available on request.
[7] Our first step in this process involves transforming OCCHISCO codes into their HISCO equivalent. We thank Evan Roberts for supplying a crosswalk that covers most Canadian occupations. See Roberts, Wollard, Ronnander, Dillon, and Thorvalsen (2003) on the development of a universal North Atlantic occupational scheme.
[8] We assign HISCLASS groups 1 to 5 (higher managers, higher professionals, lower managers, lower professionals, clerical, sales) to white-collar, groups 6, 7, and 9 (foremen, skilled workers, lower skilled workers) as skilled/semiskilled, groups 10 to 12 (lower-skilled farm workers, unskilled, unskilled farm workers) as unskilled, and group 8 (farmers and fishermen) as farming.

intergenerational mobility.[9] And yet, occupational income scores may be advantageous for evaluating intergenerational mobility if they provide a better measure of permanent status than the income observed in a particular Census year (see Solon 1992; Nybom and Stuhler 2017). Previous studies suggest that income scores are less problematic in this context (Feigenbaum 2019, Saavedra and Twiman 2019; Inwood, Minns, and Summerfield 2019).

We use complete count data from the 1901 Census to construct occupational income scores that can be applied to sample individuals in 1901 and 1871. We have experimented with different levels of aggregation in this exercise: occupational income scores are created for 633 5-digit OCCHISCO codes. We allow scores to vary by region and age group. We compute a score for average male earnings in each of 7,688 unique combinations of occupation, region and age cohort.[10] Merging these scores into our linked records provides a measure of income for almost all observations that can be assigned to the four major groups, 36,090 in total.

[9] Solutions that reintroduce plausible variation across individuals (Saavedra and Twiman 2019) struggle with occupations like farming where reported incomes are scarce even in benchmark years.

[10] Regions are Ontario, Quebec and the Maritimes. Cohorts are 10-year age groups, starting from age 16-25, with the final group including individuals aged 76-85. Earnings data are the sum of two 1901 census fields with missing treated as zero: "Earnings from occupation or trade", and "Extra earnings (From other than chief occupation or trade)." We drop earnings information for any cases where no measure of time in employment is provided (presumed to mean zero). We replace any occupation scores imputed from fewer than 20 observations by unique combination of 5-digit OCCHISCO-region-age cohort with a more aggregated average by stepping up, in successive order, to cells by 2-digit OCCHISCO-region-age cohort, then cells by 1-digit OCCHISCO-region-age cohort, and finally to scores that are imputed by 1-digit OCCHISCO-age cohort and subsequently adjusted for regional differences in average earnings by age.

Table 1: Sample and Population Characteristics, 1871

	(1)	(2)	(3)	(4)	(5)
	Full Count	Linked Sample	Unique Links	Estimation sample weighted	Estimation sample unweighted
age (1871)	8.51 (5.35)	8.24 (5.49)	8.64 (5.40)	8.61 (5.35)	8.2 (5.31)
N kids in family	4.67 (2.18)	4.54 (2.16)	4.67 (2.15)	4.70 (2.14)	4.62 (2.11)
N women in family	1.19 (0.62)	1.19 (0.60)	1.20 (0.60)	1.20 (0.58)	1.19 (0.57)
Family size	7.61 (2.63)	7.47 (2.59)	7.70 (2.59)	7.73 (2.51)	7.62 (2.49)
Born Maritimes	0.18 (0.38)	0.21 (0.41)	0.24 (0.43)	0.18 (0.39)	0.22 (0.42)
born Quebec	0.34 (0.47)	0.27 (0.44)	0.26 (0.44)	0.33 (0.47)	0.25 (0.43)
Born Ontario	0.43 (0.50)	0.48 (0.50)	0.45 (0.50)	0.44 (0.50)	0.49 (0.50)
Born UK/Ireland	0.03 (0.17)	0.03 (0.17)	0.03 (0.18)	0.03 (0.17)	0.03 (0.16)
Born other	0.02 (0.13)	0.01 (0.08)	0.01 (0.10)	0.02 (0.13)	0.01 (0.08)
Reside Maritimes	0.18 (0.39)	0.22 (0.41)	0.25 (0.43)	0.19 (0.39)	0.22 (0.42)
Reside Quebec	0.34 (0.47)	0.27 (0.44)	0.26 (0.44)	0.33 (0.47)	0.25 (0.43)
Reside Ontario	0.47 (0.50)	0.52 (0.50)	0.49 (0.50)	0.48 (0.50)	0.52 (0.50)
French ethnicity	0.32 (0.46)	0.23 (0.42)	0.23 (0.42)	0.31 (0.46)	0.22 (0.41)
Anglo ethnicity	0.40 (0.49)	0.41 (0.49)	0.33 (0.47)	0.40 (0.49)	0.41 (0.49)
Other ethnicity	0.28 (0.45)	0.36 (0.48)	0.45 (0.50)	0.29 (0.45)	0.38 (0.48)
Catholic	0.43 (0.5)	0.32 (0.47)	0.29 (0.46)	0.30 (0.46)	0.42 (0.49)
Other religion	0.56 (0.5)	0.67 (0.47)	0.70 (0.46)	0.70 (0.46)	0.58 (0.49)
Father no occupation	0.05 (0.21)	0.04 (0.18)	0.04 (0.19)		
Father white collar	0.07 (0.25)	0.07 (0.25)	0.07 (0.26)	0.07 (0.26)	0.08 (0.26)
Father skilled/semi skilled	0.14 (0.35)	0.13 (0.34)	0.14 (0.34)	0.15 (0.35)	0.15 (0.36)
Father unskilled	0.13 (0.34)	0.11 (0.31)	0.11 (0.31)	0.13 (0.33)	0.12 (0.33)
Father farmer	0.48 (0.50)	0.56 (0.50)	0.55 (0.50)	0.65 (0.48)	0.65 (0.48)
no father found	0.13 (0.34)	0.10 (0.30)	0.09 (0.29)		
N	886,854	50,999	26213	36,479	36,479

Sources: 1871 complete count Canadian Census and linked 1871-1901 Canadian Census records.
Notes: Mean covariate values with standard deviations in parentheses. See text for sample descriptions. Full count sample limited to males aged 0 to 14 in 1871. Unique links refers to all three linkages: 71-81, 81-91 and 91-01. Children defined as individuals enumerated with the same household id age 0-17, inclusive. Women defined as females aged 22+ Anglophone includes ethnicities reported as English, Welsh, Scottish, Irish and North American. Standard deviations for age in parentheses. Omitted birthplace and religion categories are "unknown", each with <0.00 share of the respective sample.

Table 1 presents summary characteristics of the linked sample and the complete count 1871 population of boys aged 0 to 18. Columns 1 and 2 compare the full count data with the full set of over 50,000 linked individuals. The linked samples overrepresent younger, anglophone individuals, born Ontario or the

Maritimes from smaller families. Disambiguation of multiple candidate links does not notably worsen any bias in linkage – unique links (Column 3) are only modestly closer on age and family size, while birthplaces are more mixed. Column 4 limits the sample to the one used in our mobility estimates, with complete information (including occupation) for the generation of sons and the generation of fathers. This retains the moderate differences in characteristics relative to the complete count data we saw in contrasting columns (1) and (2). One approach to the presence of unrepresentative lined samples is to weight observations using inverse propensity score linkage weights following Bailey, Cole, Henderson, and Massey (2020).[11] Column 5 shows that the resulting weighted sample is a closer match to initial population characteristics, and we use these adjustment for all the mobility computations that follow.[12] Using a weighted estimation sample rather than the unweighted estimation sample has little impact on the mobility estimates we compute in this paper.

Estimating Intergenerational Mobility

We use four approaches to intergenerational mobility in 19th century Canada. The first approach, as described in the previous section, is to estimate gross occupational mobility (M) as the share of sons in a different occupational category to their fathers.[13] We then estimate three models of intergenerational earnings mobility using assigned income scores. The first approach is the classic formulation of the intergenerational earnings elasticity (IGE) following

[11] Linkage weights are generated as the inverse of fitted values from Probit estimates of the probability of being a linked individual among all males aged 0-18 with family size <26 in the 1871 full count data. Our probit regressions condition on age, family size, and a suite of dichotomous variables for marital status, birth country (and province), ethnicity (Francophone, anglophone or other) and religion (Catholic, Protestant Christian or other). To ensure we generate weights for individuals with a missing covariate our sets of dichotomous variables include missing as a category. The resulting weights. Appendix figure C illustrates the overlap in the propensity scores between linked and unlinked observations.

[12] Using the unweighted estimation sample has relatively little impact on our mobility estimates – results of these are presented in Appendix Table A.1

[13] We focus on compare shares across the four classes (white-collar; skilled and semi-skilled; unskilled; farm operator) described earlier, but have also experimented with more fine-grained occupational divisions. These results are available on request.

Becker and Tomes (1979, 1986) associated with a regression of the following type:

$$lny_{i,01} = \alpha + \beta lny_{i,71} + \varepsilon_i \quad (1).$$

In equation (1), the coefficient β captures the elasticity of son earnings in 1901 y01 with respect to father earnings in 1871 yi,71. Larger values of β indicate intergenerational persistence, or lower mobility. Our second measure of intergenerational earnings mobility is the correlation in income ranks between sons in 1901 and fathers in 1871 following the formulation used by Chetty, Hendren, Kline and Saez (2014):

$$R_{S,i} = \omega + \gamma R_{F,i} + \varepsilon_i \quad (2),$$

where g is estimated correlation between rank of sons (RS) and their fathers (RF).[14] We refer to γ as relative rank mobility. Our third income-based measure is an estimate of absolute rank mobility generated by calculating the estimated income ranks of sons of fathers at the a given point in the 1871 national occupational income distribution. We follow Corak (2020) and Chetty, Hendren, Kline and Saez (2014) in estimating absolute mobility from equation (2) by computing the estimated rank of sons of fathers at the 25th percentile of the income distribution ($\hat{R}_{S,i} = \omega + \gamma * 25 + \varepsilon_i$).[15]

These three measures of intergenerational income mobility are widely used in the current literature and allow for comparisons with existing research on

[14] We compute percentile ranks separately for sons using the 1901 census and for fathers using the 1871 census. Percentiles are found in the relevant full count after merging in our occupation, so that the percentiles reflect the national occupation distribution of males during the time. In cases where the occupation distribution density is high enough to span multiple percentiles, we use the average percentile. We then merge percentiles back into our linked sample by 5-digit OCCHISCO-region-age cohort. Percentile ranks in our linked sample are therefore representative of the sample individuals' placement in the national distributions not the sample distribution.

[15] To provide inference for regression predictions at $R_{F,i} = 25$ we redefine this variable as $R_{F,i} - 25$, at which point the constant term provides the value $\hat{\gamma}$ and its 95% confidence interval.

mobility in Canada and the United States.[16] While we present results from all three approaches, we will follow much of the recent literature in placing greater emphasis on rank measures. While Solon (1992) and others argue that intergenerational elasticities based on an occupational income score may be less sensitive to measurement error than those drawn from a single income figure, Ward (2023) and Zhu (forthcoming) find substantial downward bias in intergenerational elasticities based on income or status scores. Rank-based estimates may be less vulnerable to measurement error than conventional elasticities (Nybom and Stuhler 2017). This is particularly relevant to our analysis of intergenerational mobility for individual census districts.

Regional patterns of occupational mobility, 1871-1901

We begin our analysis by calculating measures of economic mobility by province, region, and demographic group. Results in Table 2 suggest that Canada provided fairly equal opportunities for occupational mobility. The nuances of Canada's regional labour markets during this period are better described by regional differences in *relative* mobility across the distribution of average occupational earnings. Estimates of M in panel (a) differ little by region (or mother tongue), with more mobility among English speakers (0.52) and in Ontario and the Maritimes (0.50) and less mobility in among French speakers (0.48) and in Quebec (0.49). In contrast, both intergenerational elasticity (IGE) estimates and rank correlation estimates suggest striking differences across regions. Quebec exhibits low relative mobility ($\hat{\beta}$=0.43, $\hat{\gamma}$=0.42), compared to Ontario ($\hat{\beta}$=0.21, $\hat{\gamma}$=0.11) and the Maritimes ($\hat{\beta}$=0.22, $\hat{\gamma}$=0.18).[17]

[16] A further approach is directional mobility, often measures as "rags to riches" (the share of sons in the top quintile from fathers in the bottom quintile), "cycles of poverty" (the share of bottom quintile sons from bottom quintile fathers), and "cycles of privilege" (the share of top quintile sons from top quintile fathers (Corak 2020). Unfortunately, these measures are sparse across districts in our data and so we do not present them here. Results using an alternative measure that captures big moves of +/- 30 percentile points are available on request.

[17] We remind the reader that larger values of M suggest more mobility while larger values of βor γ are indicative of persistence across generations.

Table 2: Regional Intergenerational Mobility in Canada, 1871-1901

	Francophone	Anglophone	Maritimes	Quebec	Ontario
Occupational Mobility					
occupational mobility $\widehat{M}$	.48 (.01)	.52 (.00)	.50 (.01)	.49 (.01)	.50(.00)
N	7,923	14,878	8,177	9.218	19,091
Relative Income Mobility					
IGE slope ($\hat{\beta}$)	.41 (.01)	.39(.01)	.22(.01)	.43 (.01)	.21(.01)
Rank-rank slope ($\hat{\gamma}$)	.40 (.01)	.35(.01)	.18(.01)	.42 (.01)	.11 (.01)
Absolute Income Mobility					
Son mean rank, P25 father ($\hat{R}_{S,i}\|R_{F,i} = 25$)	41.7 (.36)	48.1(.42)	43.6 (.39)	41.7 (.34)	62.8 (.45)
N	7,898	14,708	7,908	9,162	19,022

Notes: Estimates are weighted using inverse probability weights. Robust standard errors in parentheses. See text for description of the mobility metrics used.

A more differentiated east-west mobility gradient emerges in panel (c) among estimates of *absolute* income mobility, the predicted rank of sons of 25th percentile fathers ($\hat{R}_{S,i}|\hat{R}_{F,i} = 25$). Ontario offered superior prospects for upward mobility: the predicted rank for sons from low-income households was the 63rd percentile, while in Quebec and the Maritime regions a similar son could expect to rank in the 42nd and 44th percentile, respectively. The regional gradient overlaps with a fairly notable difference in absolute mobility between Anglophones and Francophones (predicted rank 42nd and 48th percentile).

The comparisons in Table 2 suggest that high occupational mobility did not necessarily translate into high intergenerational elasticities when more fine-grained measures of status are used. We also see a contrast between relative income mobility and absolute income mobility across regions. In the Maritimes, economic mobility might best be described as a churning pattern where son outcomes were not strongly tied to fathers, but there were relatively few opportunities to move up the earnings ladder as compared to central Canada. Instead, mobility patterns in Ontario were less about moving sideways across occupations offering similar earnings and more about moving up the occupational (income) ladder. More dismal results for Quebec partly the result of

outcomes for farmers, a large group with considerably lower occupational earnings in this province.[18]

Comparisons of occupational mobility between Canada and the US indicate moderately more occupational change in the United States (Long and Ferrie 2007; 2013). Our IGE estimates ($\hat{\beta}$) for Francophones and Anglophones are higher than comparator estimates in both the historical and more recent settings for both countries. Ward (2023) reports historic estimates for white Americans of 0.3 before correcting for measurement error; Chetty, Hendren, Kilne and Saez have similar findings (0.30 to 0.35), while Corak (2020) suggests much higher mobility in Canada (0.20). Our results also suggest lower rank mobility in late 19th Century Canada than in the present-day. Corak (2020) reports Canadian rank-rank elasticities of 0.24. For the contemporary US, Chetty, Hendren, Kline, and Saez's (2014) figure is about 0.34. Both sets of relative mobility figures indicate that Ontario and the Maritimes lay somewhere between present day Canada and US averages, while intergenerational structures in Quebec were much more rigid. These comparisons merit some caution: linked historical Census data comes with advantages but also significant limitations relative to contemporary tax-based evidence used by Corak (2020) and Chetty et al (2014). Different approaches to linkage between Canada and the United States may also explain some of the differences across historical estimates (Antonie, Inwood, Minns, and Summerfield 2022).

Turning to absolute mobility, Corak (2020) reports an equivalent mean rank for sons ($\hat{R}_{S,i}|\hat{R}_{F,i} = 25$) of the 44th percentile for all of Canada, with quite large differences for Ontario (47-48th percentile), Quebec (46th percentile), and New Brunswick and Nova Scotia (both at 38th percentile). Our historical estimates

[18] An examination of the intergenerational rank-rank mobility across the percentile of fathers suggests that Quebec was a relatively divided society with considerable mass in the lower 20 percentiles and the upper 80 percentiles of the national income distribution, while Ontario males were scarce in this section of the distribution. Quebec farmers earn less than other farmers (fathers and sons), yet a carpenter son is able to out-earn comparators in Ontario and the Maritimes. We present regional occupational earnings distributions in Figure 13 later in the text.

place Ontario in a considerably more favourable position, the Maritimes with somewhat similar absolute mobility, and Quebec with much less absolute mobility in the late 19th century. While some caution is necessary in comparing census occupational scores to earnings from modern administrative tax records, Quebec's changing rank both in terms of absolute and relative mobility is notable and invites questions as to when over the 20th century this change occurred. Estimates of the propensity to remain in poverty across generations from Connolly and Haeck (2023) suggest decreases in mobility for all Canadian provinces since the mid-1960s, but the reasons for Quebec's unique trajectory remains an open question. Historical estimates for the US in Connor and Storper (2020) suggest a similarly wide range of regional mobility estimates, with sons of 25th percentile fathers predicted to lay below the 40th percentile in the South, but above the 50th percentile in the West and Midwest.

Patterns of Intergenerational Mobility by Census Divisions, 1871-1901

The patterns in Table 2 suggest important differences in 19th century intergenerational mobility between Canadian regions, but analysing mobility at this level does not tell us (i) whether provincial/regional boundaries coincide with true mobility clusters, (ii) the extent of local variation in mobility patterns (iii) what the correlates of local intergenerational mobility were, and (iv) how pattens of mobility across Canadian locations changed from the late 19th century to the early 21st century. To answer these questions, we examine 19th century Canadian mobility across Census divisions. To our knowledge these are the first estimates of local economic mobility for Canada prior to the 1960s (Connolly and Haeck, 2023). We compute mobility measures using the 1986 Canadian Census divisions. Sample size forces us to aggregate a few divisions.[19] As a result we

[19] Mapping 1871 Census sub-district to 1986 Census divisions is imperfect due to changes in the geographical allocation of some Census units especially in Northern Ontario and Quebec. In the Appendix we list how 1871 sub-districts were mapped into 1986 divisions, Full details on how census districts were merged are available on request. A total of 142 divisions are comparable over time. However, our links are sparse in some of the less populous divisions. After restricting to N>30 in there are 134 divisions are available for the measure of M, which does not rely on sample sizes for earnings by occupation, age cohort and region, and 132 divisions available for the other measures.

compute mobility measures that are geographically comparable to the recent findings of Corak (2020) for 130 divisions. For each division we compute four measures of mobility using our inverse propensity score weights (occupational mobility M, intergenerational elasticities, relative rank mobility, absolute rank mobility) used in the previous analysis.

Figure 1 maps occupational mobility M across Canadian Census divisions that were part of Canada in 1871, and for locations with at least 50 observations per division.[20] Pockets of high occupational mobility are evident in Cape Breton/northern Nova Scotia, southern New Brunswick, and western Ontario, while much of Quebec saw low intergenerational occupational mobility.

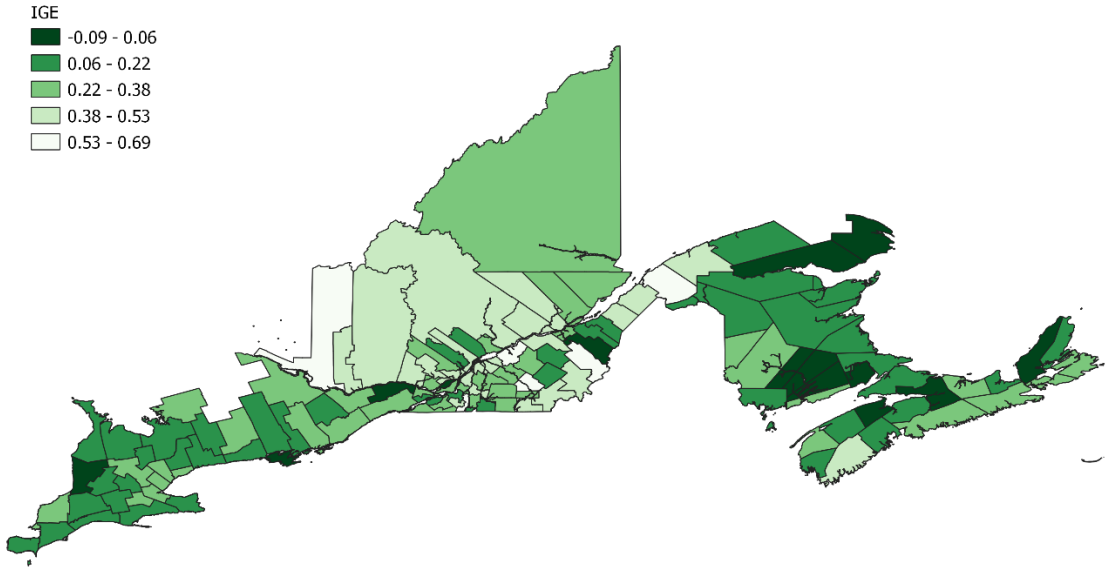
Figure 1: Occupational Mobility (M) by Census division
Darker shading = more intergenerational mobility

Notes: Intergenerational mobility calculated as the share of sons in 1901 in a different occupational category to their fathers in 1871. See text for source details.

[20] Division level mobility figures are available in the accompanying on-line Appendix.

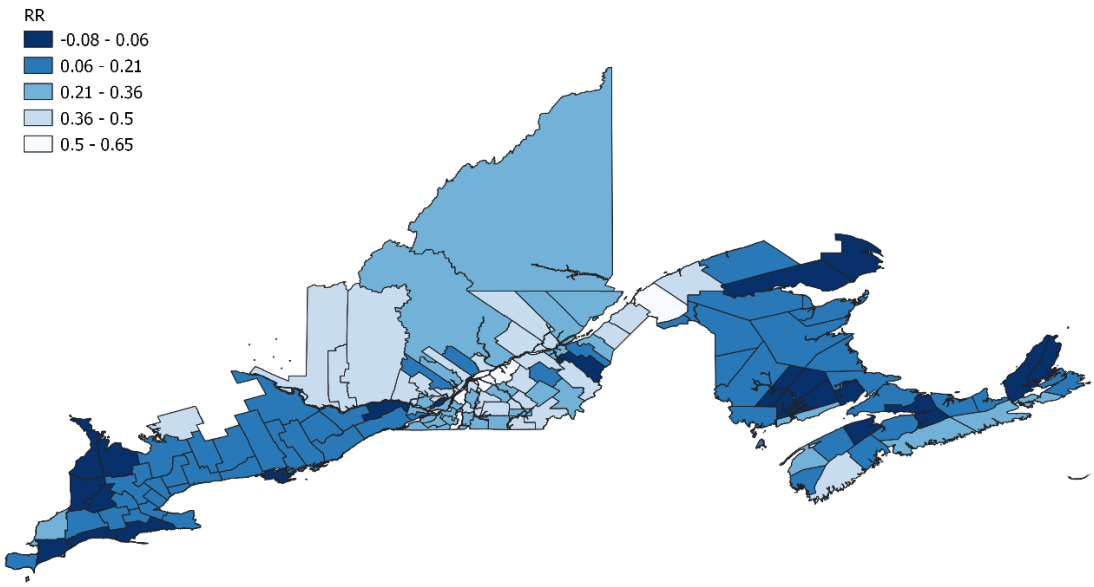
Figures 2 and 3 repeat the previous exercise with IGE and rank-rank measures. Both suggest a broadly similar spatial pattern, with high relative mobility in much of Ontario, low relative mobility in most of Quebec, and a checkerboard pattern of higher and lower mobility divisions in the maritime provinces of New Brunswick and Nova Scotia. Divisions with the highest levels of relative income mobility are spread across regions. Under the relative rank measure, the 20 most mobile divisions see 8 from the Maritimes, 6 in Quebec, and 6 from Ontario. For low relative rank mobility, 19 of the 20 bottom ranked divisions were in Quebec.

Figure 2: Intergenerational elasticity estimates (IGE) by Census Division
Darker shading = more intergenerational mobility



Notes: Intergenerational mobility calculated as the elasticity on son earnings in 1901 with respect to father earnings in 1871. See text for source details.

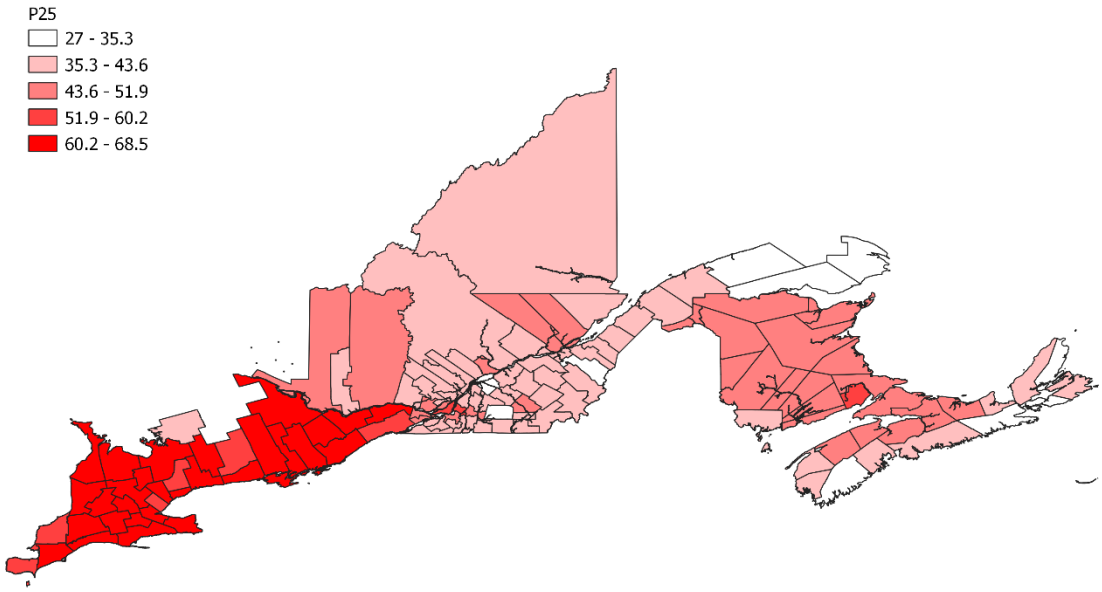
Figure 3: Rank-rank correlations by Census division
Darker shading = more intergenerational mobility



Notes: Intergenerational mobility calculated as the correlation in income rank of sons in 1901 with fathers in 1871. See text for source details.

Visualisations for absolute income mobility in Figure 4 illustrate the mean predicted rank of sons of father at the 25th percentile of the 1871 national occupational income distribution. There was variation across division within regions, particularly in Quebec and Nova Scotia, but the dominant feature in absolute rank mobility is the strong divide between Ontario and the rest of the country. All of the top 20 divisions for absolute rank mobility were in Ontario; of the bottom 20, 14 were in Quebec and 6 in the Maritimes.

Figure 4: Absolute Rank Mobility by Census division
Darker shading = more intergenerational mobility

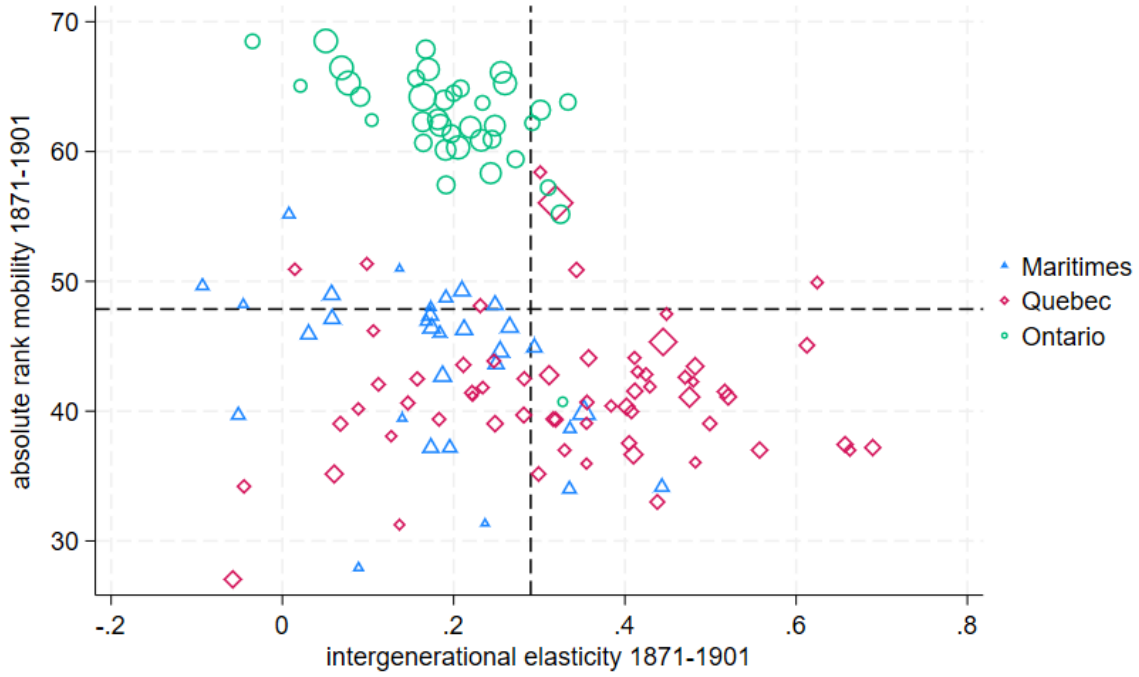


Notes: Intergenerational mobility calculated as the predicted rank of sons in 1901 from fathers of the 25th percentile of the income distribution in 1871. See text for source details.

The patterns of relative and absolute income mobility at the district level confirm the existence of distinct 19th century mobility regimes, in particular when comparing Ontario and the rest of 1871 Canada. Figure 5 plots 19th century relative and absolute rank mobility for all divisions. [21] Almost all Ontario divisions are in the top left quadrant, with above average absolute and relative rank mobility, while Quebec divisions are predominantly in the bottom right quadrant with low measures on both mobility metrics. Outcomes in the Maritimes are more variable on both metrics, as seen in Figure 4 and 5, but clearly the region has predominantly below average absolute rank mobility.

[21] Plotting absolute rank mobility against the IGE yields a similar picture to Figure 5.

Figure 5: Absolute and relative rank mobility compared



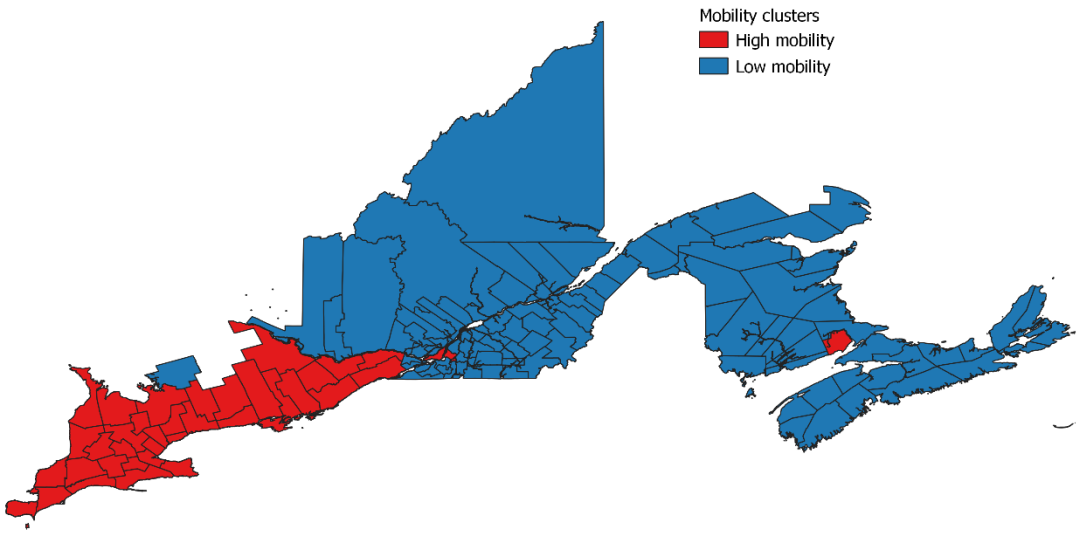
Notes: Absolute and rank mobility figures are calculated by Census division and are mapped in Figures 3 and 4. See text for source details.

The visualization in Figure 5 suggests the existence of distinctive mobility clusters in Canada that largely conform to provincial and regional boundaries. A possible three cluster model would see Ontario (high absolute and relative mobility), Quebec (low absolute and relative mobility) and the Maritimes (low absolute mobility, variable relative mobility) and being part of distinct mobility groupings. An alternative approach to identifying mobility clusters is to employ hierarchical clustering analysis (Corak 2020). This method draws on machine learning to classify units into subsets of the greatest similarity across a set of characteristics. In this case, the units are Canadian Census divisions, and the characteristics are the four mobility metrics of occupational mobility, intergenerational elasticities, relative rank mobility, and absolute rank mobility.[22] We apply agglomerative hierarchical algorithms, measuring dissimilarity using Euclidean distance and complete linkage. Figure 6 presents

[22] Note that the clustering exercise yields extremely similar results if we omit some of these characteristics or include additional ones not included in this paper, such as the share of sons moving up or done more than 30 percentile points from their father's position in the national occupational income distribution.

the results of the exercise if divisions are allocated into two clusters. While most of Ontario is in cluster 1, a small number of Quebec and Marmite divisions also appear in this cluster. The Quebec divisions include Montreal and the adjacent district of Chambly. Cluster 2 (low mobility) is almost entirely Quebec and the Maritimes. Splitting divisions over 3 to 6 clusters reveals subdivisions within the two headline clusters, but does not yield clear separation between Quebec and the Maritimes. The patterns seen in Figures 5 and 6 indicate that Ontario was clearly in a different mobility regime from the rest of the country prior to 1901, with only the most urbanized parts of Quebec and a few other exceptional divisions offering similar intergenerational opportunities for men.

Figure 6: Mobility clusters under hierarchical clustering analysis
Red shading = high mobility cluster
Blue shading = low mobility cluster



Notes: Mobility clusters are determined using all four division-level mobility measures calculated in this paper. See text for source details.

Reliability of local mobility estimates

How reliable are our local intergenerational mobility estimates? Once concern is how sensitive these estimates may be to the procedure used to assign occupational incomes to fathers and sons. While we are reasonably confident in our 1901 province-age cohort estimates for individuals who were employees paid a salary or wage, relative incomes (and their rank in the distribution) may have changed between 1871 and 1901. Our results should be seen as what would hold if the structure of occupational returns were the same in 1871 as in 1901, even though we have little sense from other Canadian sources if the distribution of earnings might have changed. More problematic for us is the lack of reliable information on farmer earnings, which is the largest occupation in all regions. The data suggest relatively high farm earnings (and therefore, better rank in the national income distribution) in Ontario, while in the Maritimes many farmers are assigned an income in the bottom quartile of the national distribution - among the lowest earning in the country. If Census-reported income poorly represents actual income for farmers, we could under or overestimate rank and absolute mobility with transition off and to the farm. To ascertain whether patterns of Census-reported farm earnings are a reliable guide of the economic position of farmers, we compare the estimated Census farm earnings across provinces with figures for net farm income from the Agricultural Census of 1901 following the accounting approach in Urquhart (1991). These figures should not be read as directly comparable to Census income. Farm income is not equivalent to the income of farmers because multiple family members worked on a family farm, and farmers could engage in secondary activities for additional income. Under the assumption that these features were roughly similar across provinces, the accounting approach provides a rough check on our results using the Census-based income of farmers.

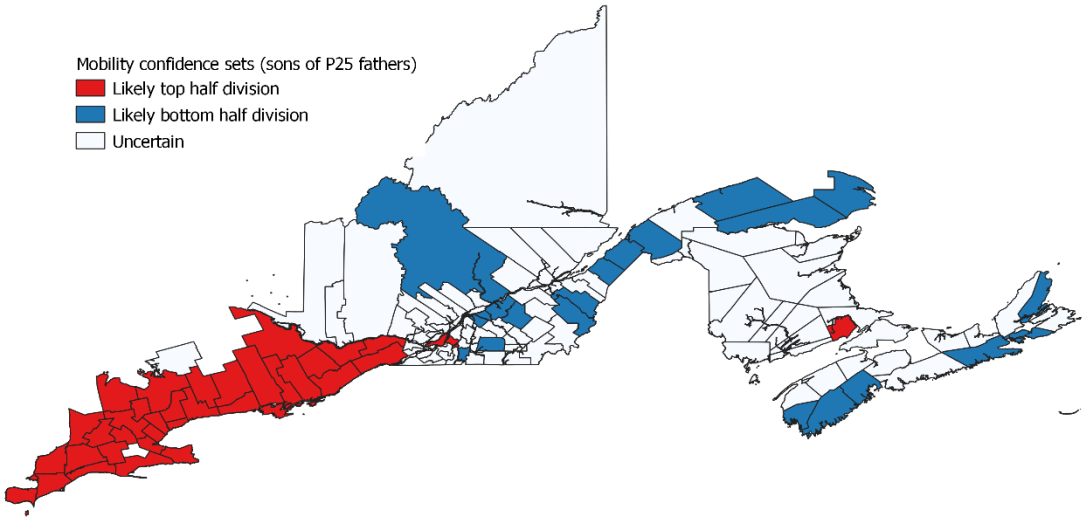
In our first check, we calculate net income per occupier and hired workers and, using Ontario as a base, adjust the ratio of occupation scores for farmers to align with the ratio of net farm income. Our second check repeats the exercise using the Maritimes as a base. We then recreate our estimates of relative and absolute

mobility from Table 2, finding only modest differences in aggregate mobility measures; slightly more rank persistence and less absolute mobility driven mainly by correction in the maritime provinces. These results and a full explanation of net farm income calculations are available in the Appendix and Table A.2. An alternative approach is to exclude father-son links where the father was a farm operator, as done by Feigenbaum (2018) and Tan (2022). Results in Appendix Table A.3 show that excluding 1871 farm operators does not undo the key mobility patterns we observe in the main results.

A second concern relates to the reliability of mobility ranking exercises. Mogstad, Romano, Shaikh, and Wilhelm (2024) find significant uncertainty in mobility rankings based on estimates of the underlying level of local intergenerational mobility. To test whether our division-level mobility differences are a statistical artifact of noisy estimates, we apply the Mostad, Romano, Shaikh, and Wilhelm (2024) inference procedure to our division point estimates and standard errors of absolute mobility. This generates a confidence set that contains the possible ranking of each division with 95 percent probability[23]. We then follow Tan (2022) in classifying divisions into two groups: those with confidence sets entirely in the top half of the rankings, and those with confidence sets entirely in the bottom half of the rankings. Figure 7 presents the results of the exercise. Ontario divisions are mostly in the likely top half group (as well as Montreal), while the likely bottom half group is a mix of divisions from Quebec and Nova Scotia in the Maritimes. On this evidence the absolute mobility advantage separating much of Ontario from the rest does not appear to be a spurious difference due to statistical noise.

[23] Results of the Mogstad et al (2024) procedure are plotted in Appendix Figure Z.

Figure 7: Likely top half and bottom half Census divisions, absolute rank mobility
Red shading = likely top half divisions
Blue shading = likely bottom half divisions
No shading: indeterminate



Notes: Division assignments are based on the rank confidence sets for division-level absolute mobility. See text for source details.

Explaining Division-level Mobility

Our results document considerable differences in mobility between regions and also across Census divisions within regions. While the former may match a broad understanding of well-known regional differences in culture, agricultural potential, and industrialization patterns, it is less obvious what factors might account for why prospects in the 19th century differed between sons born to similar fathers in neighbouring divisions within a region, and whether patterns of division economic characteristics can account for mobility differences between regions. To explore possible explanations for local differences in intergenerational mobility we estimate the correlation of division-level mobility

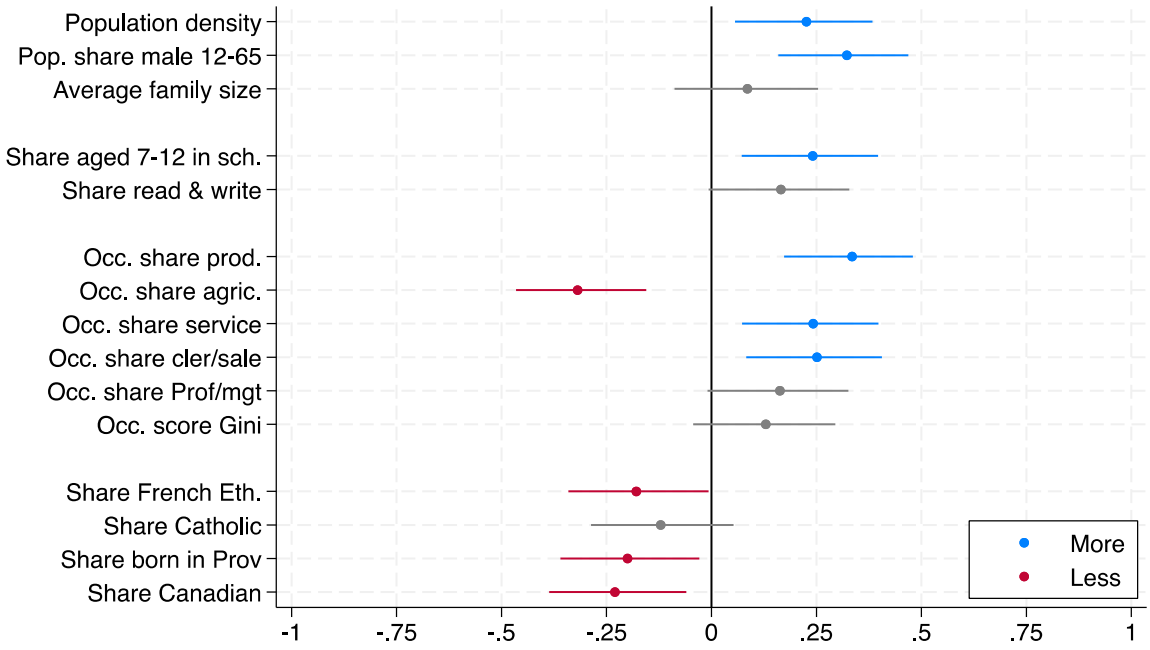
with local characteristics constructed from corresponding divisions in the 1871 full count census data. Our local characteristics correspond as closely as possible to features that have been identified as potentially important for intergenerational mobility in the current literature (Chetty et al 2014, Corak 2020, Connor and Storper 2020). Population density, the share of population comprised of working age males (12-65), and average family size capture urbanization and population dynamics.[24] To capture human capital stock and human capital formation we include the share literate (able to both read and write), and the share of children age 7 to 12 enrolled in school.[25] Local labour market characteristics are occupational shares for several occupational classifications (professional, sales and clerical, service, production and agriculture), and a Gini coefficient measuring inequality in occupational earnings scores within each division.[26] Finally, we also have four characteristics related to migration and ethnicity: the share of population in each division born in province; the share Canadian born, the share Catholic, and the share French speaking.[27]

Figures 8, 9, 10, and 11 summarize bivariate correlation coefficients and their significance between division characteristics and our four mobility measures.[28]

[24] Family size is the number of individuals assigned a common family ID after restricting to family sizes of less than 26 to avoid capturing group quarters. We calculate population density using district area from 1871 shapefiles and population counts from the 1871 full count.
[25] The Census transcriptions include two columns to allow for a flag in cases of inability to read and inability to write, separately, for those over age 20. We treat any captured response as indicative of the inability and treat blanks as indicative of ability. We then subtract each from unity and take their product to generate an indicator for joint ability in reading and writing for respondents aged 21-121. Attendance as school is also recorded as a flag with missing values assumed to represent non-attendance. Using Nova Scotia as a test case, we find comparable counts of individuals registered in school in our census generated variable and in the Superintendent of Education report for Nova Scotia 1871: Winter and Summer registration totals for the province are 74,759 and 77,232 respectively while the count from our census variable is 74,377.
[26] We calculate the relative (scale-invariant) Gini coefficient.
[27] Birthplaces for the Maritimes include NS and NB while Quebec birth includes Canada East and Ontario birth includes Canada West. Catholic religion includes "Catholic", "Irish Catholic" and "Roman Catholic" but not "Catholic Apostolic". Francophones are identified from the "Origin" variable and are considered to be those reporting: "French", "French Swiss", "French Irish", "French Canadian", "Quebecker", or "Belgian French".
[28] The underlying correlation coefficients and standard errors are available in Appendix Table A.5X.

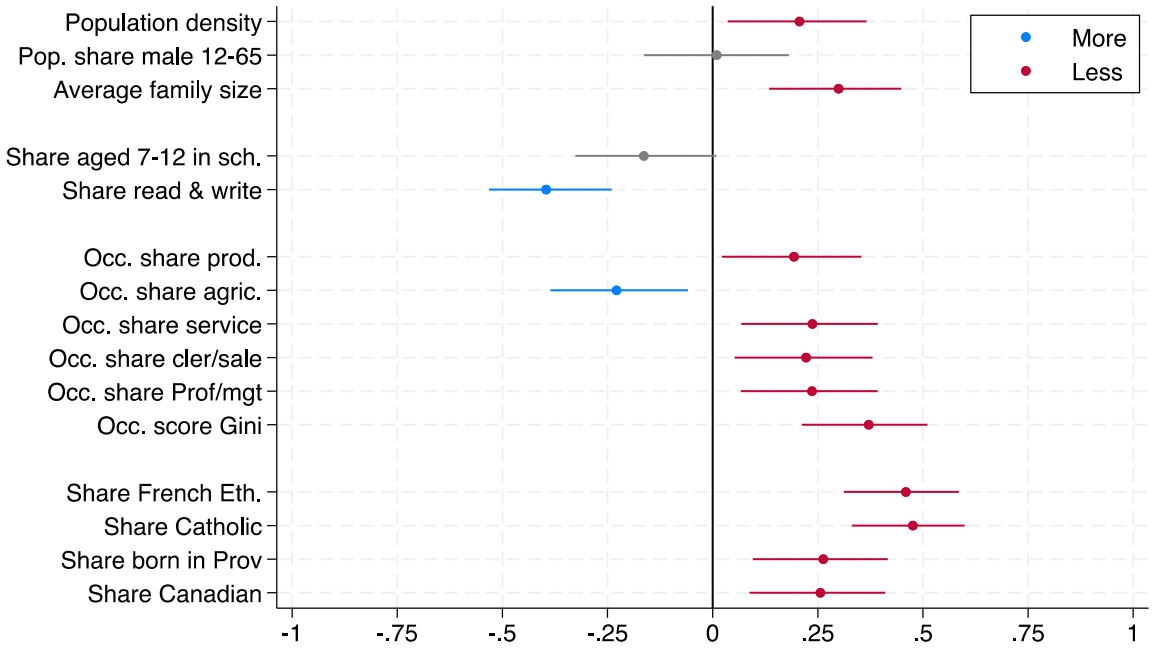
One immediately evident result is that all four mobility measures have a consistent relationship with demographic covariates. Lower mobility divisions are generally those with more Francophones, more Catholics and few interprovincial or international migrants and larger families. Measures of human capital are predictive of high mobility. The share of youth aged 7-12 in school correlates positively with all mobility measures (though insignificant at the 5% level for the IGE estimate) and our measure of share literate correlates positively with relative and absolute income mobility measures (and is positive but insignificant at the 5% level for occupational mobility).

Figure 8 Correlates of Occupational Mobility (M)



Notes: Correlations coefficient and 95% confidence interval between gross occupational mobility estimates $\widehat{M}$ and covariates in division-level data. Sample restricted to 132 divisions with at least 50 linked microdata observations available to calculate M with inverse propensity score weights. Division covariates are estimates from the 1871 full count Census data. See text for variable definitions and source details.

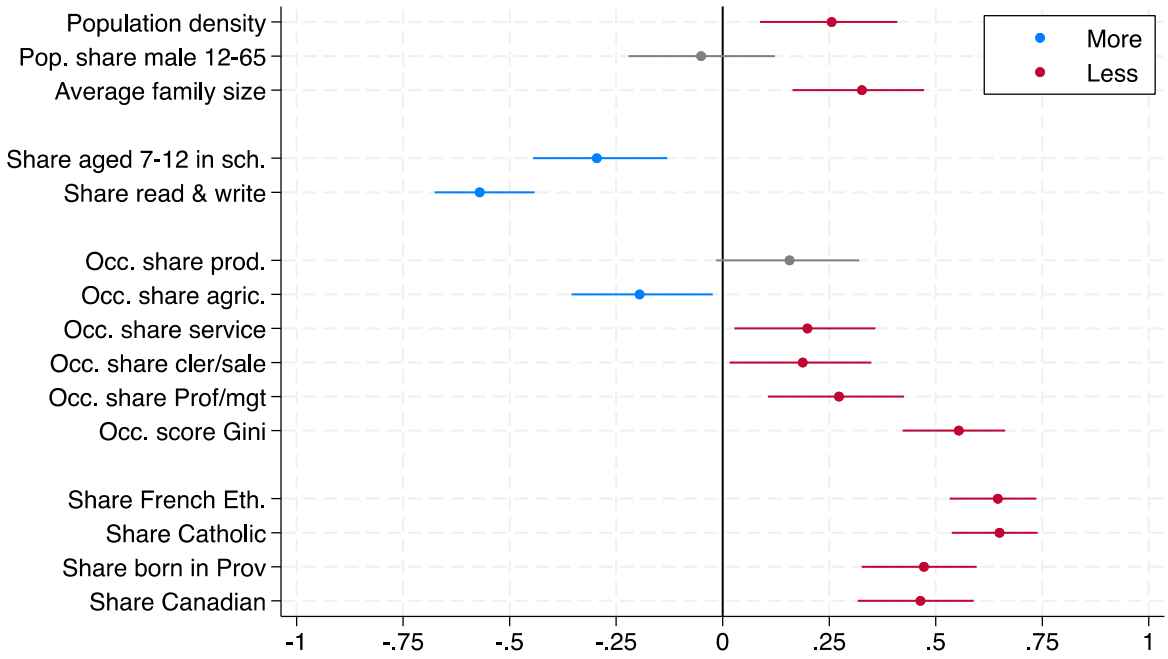
Figure 9: Correlates of Intergenerational Earnings Elasticities (IGE)



Notes: Correlations coefficient and 95% confidence interval between IGE estimates $\hat{\beta}$and covariates in division-level data. Sample restricted to 132 divisions with at least 50 observations available to calculate $\hat{\beta}$ with inverse propensity score weights. Division covariates are estimates from the 1871 full count Census data. See text for variable definitions and source details.

There is more nuance in the relationship between labour market structures and intergenerational mobility: agriculture is associated with higher relative mobility (IGE and RR) but less occupational mobility. This partly reflects the propensity of farmers sons to follow their fathers in farming, even if they were partly mobile across the income distribution because of age differences from their fathers or geographical mobility. In general, all other categories are associated with less relative mobility. Our occupational income Gini coefficient reveals a negative relationship between inequality and all measures of mobility, though it is insignificant as a correlate of occupational mobility. This finding is congruent with Porter (1965) and suggests that, at a division level, opportunities for mobility were not forthcoming from generation to generation in localities with stark class differences. One interpretation of this finding is that the inequalities present in 1871 were at least partly transmitted to the next generation as a function of their childhood location.

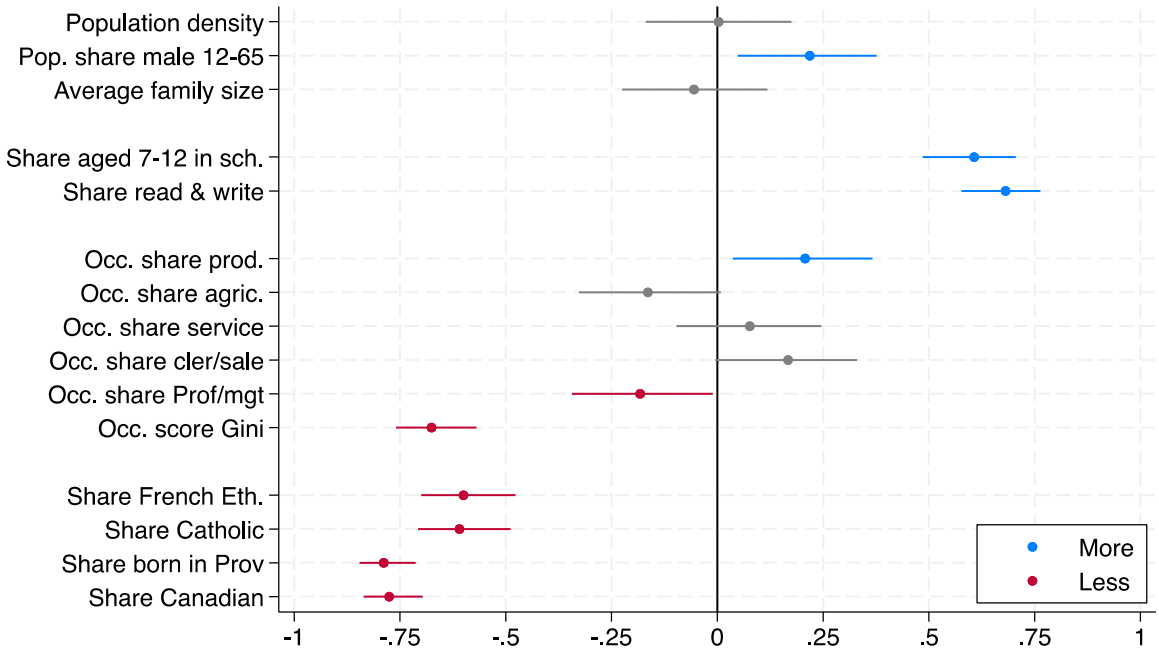
Figure 10: Correlates of relative rank mobility (RR)



Notes: Correlations coefficient and 95% confidence interval between rank-rank correlation estimates $\hat{\gamma}$and covariates in division-level data. Sample restricted to 132 divisions with at least 50 observations available to calculate $\hat{\gamma}$ with inverse propensity score weights. Division covariates are estimates from the 1871 full count Census data. See text for variable definitions and source details.

Labour force size is positively associated with occupational mobility and absolute income mobility while population density is negatively correlated with relative income mobility but positively correlated with occupational mobility. These results suggest that more urbanized areas held more opportunities to move out of the lower end of the distribution via occupational change.

Figure 11: Correlates of Absolute Rank Mobility (P25)



Notes: Correlations coefficient and 95% confidence interval between predicted percentile rank of sons from 25th percentile fathers ($\hat{R}_{S,i}|R_{F,i} = 25$) and covariates in division-level data. Sample restricted to 132 divisions with at least 50 observations available to calculate $\hat{R}_{S,i}$ with inverse propensity score weights. Division covariates are estimates from the 1871 full count Census data. See text for variable definitions and source details.

Many of our division characteristics are potentially collinear, and the bivariate correlations do not reveal the extent to which division-level features might account for the notable regional difference between Ontario and the rest of 1871 Canada documents earlier. We estimate Weighted Least Squares regressions with and without region indicators to yield the partial correlations between division characteristics and the four mobility measures overall and within region.[29] These results suggest the importance of a small number of key characteristics. Population density is positively correlated with all four mobility measures. We also find evidence of a partial correlation between income score inequality and mobility, with more occupational mobility (column 1) and lower absolute mobility (column (7)) in more unequal divisions, though this result is sensitive to the inclusion of region dummy variables in column 8. Human capital

[29] OLS versions of these regressions are similar and available on request.

variables are also positive and important contributors to both occupational mobility and absolute income mobility, though they are not statistically significant predictors of relative income mobility at the division level. The importance of inequality for absolute mobility is consistent with findings for contemporary Canada and notions of a Great Gatsby Curve that appear to apply in many contemporary economic settings.

Compared to unconditional correlations, there are some important changes in terms of the occupational structure and demographics. We find little evidence of occupational structure being important aside from decreased occupational and absolute income mobility for regions with higher clerical shares.[30] Contrasting this result with the bivariate correlations and the greater importance of population density in the WLS models, it is likely that differences in occupational structure are partially captured by urbanization (population density) here. Further, though mobility penalties for divisions with more francophones remain, there are mobility gains for Catholics after conditioning on language and province. This suggests that Catholic enclaves in Quebec may have been important refuges allowing for relatively more mobility.[31] Finally, we note that the inclusion of regional dummies for Quebec and Ontario explain away most of the migrant share covariates. That fact that the regional dummies are largely significant (columns 4, 6 and 8) confirms that mobility patterns between regional labour markets differed in ways that transcend division-level characteristics. Conditional on region, Inequality literacy and above all population density, continue to explain important differences within regions.

[30] Alternative results available upon request exclude all categories but agriculture. In these estimates, farming share predicts more relative mobility only but is significant only conditional on provincial indicators.

[31] Occupational group dummies remain largely insignificant if we exclude the income score Gini coefficient, and the pattern of size and significance of that variable is not sensitive to the inclusion of occupational structure variables.

Table 3: Regression estimates of division mobility characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	M	M	IGE	IGE	Rank-rank	Rank-rank	Absolute Rank	Absolute Rank
Population	1.293***	1.475***	-2.750***	-4.063**	-2.558***	-3.663***	157.4***	254.9***
density /1000	(0.398)	(0.487)	(0.903)	(1.037)	(0.775)	(0.830)	(492)	(31.67)
Mean family	-0.004	-0.004	0.002	-0.002	0.008	0.005	-0.477	-0.099
size	(0.004)	(0.004)	(0.007)	(0.007)	(0.006)	(0.006)	(0.340)	(0.276)
% working	0.478	0.577	0.530	0.361	0.585	0.499	-14.28	-37.56
age male	(0.407)	(0.407)	(0.742)	(0.689)	(0.807)	(0.793)	(43.20)	(35.98)
% clerical/	-1.585**	-1.511**	1.094	1005	1.457	1.428	-59.80	-82.23*
sales	(0.654)	(0.664)	(1.523)	(1.572)	(1.163)	(1.155)	(72.83)	(46.77)
% service	-0.42	-0.328	-0.576	-0.822	-0.622	-0.786	56.05	46.60
	(0.552)	(0.537)	(1.254)	(1.278)	(0.992)	(0.988	(58.69)	(34.80)
% agriculture	-0.44	-0.27	-0.248	-0.799	0.2229	-0.175	15.92	14.23
	(0.423)	(0.413)	(0.984)	(1.027	(0.723)	(0.742)	(47.19)	(27.97)
% production	-0.298	-0.152	-0.042	-0.423	0.464	0.213	30.12	14.91
	(0.432)	(0.418	(1.033)	(1.087	(0.779)	(0.799	(48.25)	(29.49)
occupational	0.691**	0.795**	0.076	-1.513	0.747	-0.677	-148.4***	23.85
income Gini coef	(0.253)	(0.321)	(0.675)	(0.924)	(0.525)	(0.703)	(24.01)	(23.16)
% literate	-0.098	-0.066	-0.083	-0.200	-0.08	-0.170	38.41**	39.50***
	(0.095)	(0.097)	(0.215)	(0.204)	(0.185)	(0.182)	(8.258)	(7.435)
% youth in	0.090*	0.125**	-0.059	-0.092	-0.074	-0.079	10.31*	-1.450
school	(0.048)	(0.058)	(0.088)	(0.106)	(0.088)	(0.099)	(5.098)	(4.040)
% francophone	-0.141*	-0.068	0.198	-0.016	0.271**	0.123	8.293	4.317
	(0.060)	(0.072)	(0.143)	(0.167	(0.132)	(0.157)	(5.415)	(6.332)
% catholic	0.109	0.118	0.020	-0.054	-0.036	-0.099	8.907	14.76**
	(0.074)	(0.071)	(0.186)	(0.164)	(0.156)	(0.145	(6.591)	(5.988)
% Canadian	-0.200*	-0.314**	-0.519	-0.081	-0.506*	-0.178	12.02	4.631
	(0.116)	(0.139)	(0.373)	(0.417)	(0.262	(0.313)	(11.80)	(11.29)
% born in	-0.046	-0.027	0.357	-0.012	0.427*	0.093	-48.53***	-6.410

Province	(0.097)	(0.121)	(0.371)	(0.390)	(0.234)	(0.267)	(10.62)	(8.123)
Quebec		-0.053		0.224***		0.172**		-6.101**
		(0.037)		(0.079)		(0.061		(2.430)
Ontario		-0.021		-0.061		-0.073		18.386***
		(0.032)		(0.074)		(0.065)		(2.083)
Constant	0.736	0.539	0.212	1.175	-0.523	0.239	59.31	18.03
	(0.510	(0.478)	(1.108)	(1.137)	(0.874)	(0.882)	(56.55)	(35.02)
R-squared	0.294	0.312	0.330	0.392	0.542	0.581	0.818	0.893
N	130	130	130	130	130	130	130	130

Notes: Weighted least squares estimates on division-level data, using as weights the number of microdata observations available per division for the dependent variable. Sample restricted to divisions with at least 50 linked microdata observations available. Standard errors in parentheses robust to heteroskedasticity. Covariates estimated from 1871 full count census data. Omitted region is the Maritimes, omitted occupational classification is professional/managers. Coefficients marked *, **, and *** are significant at the 1, 5, and 10 percent level. See text for further source details and data construction.

Sources of regional mobility differences: migration and structural change

What accounts for the substantial intergenerational mobility advantage of Ontario over the rest of 1871 Canada? Here we explore two potential channels beyond the observable characteristics of the early-life locations of our linked sons with a focus on differences in absolute mobility, the measure by which regional (and division) differences are most pronounced and the implications for long-term economic development most important.

The first channel we consider is the migration of sons toward opportunity between 1871 and 1901. Migration dynamics may account for some of the regional patterns we see if there were large differences in migration propensities or the mobility returns to migration. Our first piece of evidence is a calculation of differences in migration propensities among 1871 sons by region. Table 4 reports the share of sons who moved division between 1871 and 1901. In Ontario, migration propensities are close to 50 percent and for Quebec, just over 40 percent. In the Maritime provinces, less than a quarter of sons had moved by 1901. This pattern suggests that if inter-division migration was associated with upward mobility, the large differences between the Maritimes and the rest of the country could account for some of the limited absolute mobility seen in that region.[32]

Table 4: Migration of sons 1871-1901

	Ontario	Quebec	Maritimes
% moved division 1871-1901	47.7	41.8	22.4
N population (weighted)	419,600	305,157	163,521
N observations	21,106	10,639	8,789

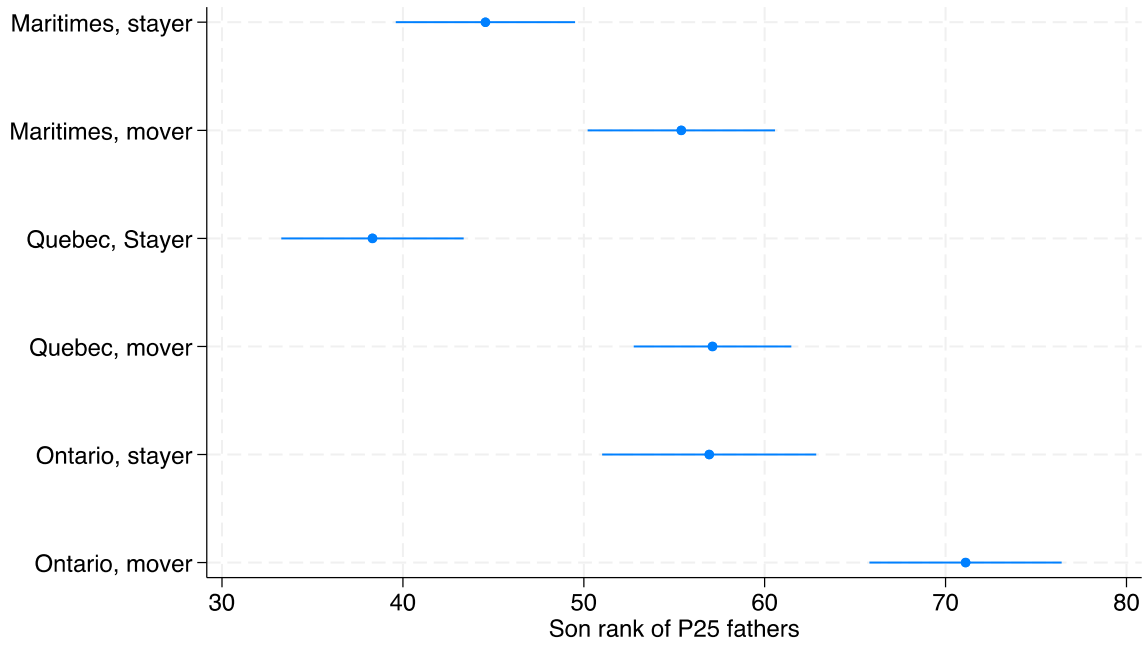
Notes: Table reports the share of sons in each region in 1871 who were living in a different Census division in 1901. Source is the linked sample used throughout this paper. Estimates with sample weights.

[32] Emigration from Canada to the United States was relatively frequent between 1871 and 1901. This could account for some of the variation in emigration propensity although it is difficult from existing sources to ascertain the extent of emigration to the US relative to destinations in other parts of Canada for any region.

We then assess whether migration was associated with high levels of absolute mobility using a subsample of brothers identified in the linked sample where at least one remained in the same division in 1901 and 1871 and at least one sibling moved divisions. Comparing outcomes between movers and stayers within sibling groups provides a test of the strength of the association between migration and mobility that conditions strongly on family background. Figure 12 summarizes the key results from this exercise.[33] Within each region, sons who moved enjoyed significantly more upward mobility with a predicted rank 15 to 20 percentage points above those who stayed. It is also clear from the results, however, that migration alone does not account for interregional mobility gaps. Movers from Quebec and the Maritimes enjoyed a rank position similar to non-migrants from Ontario; Ontario migrants were particularly advantaged. The implication of this finding is that while migration was an important channel for upward mobility, the structural advantages of origin divisions in Ontario were so large that most Ontario sons enjoyed significant upward mobility without migration. In Quebec we document a close connection between geographical and intergenerational immobility. The sons of fathers at the 25th percentile of the occupational income distribution who remained in their origin division experienced strikingly little intergenerational improvement, with a predicted rank at the 36th percentile.

[33] The calculations underlying Figure 12 are included in Appendix Table A.7.

Figure 12: Absolute rank mobility among sibling groups with mixed mobility



Notes: Figures report the predicted rank of sons of fathers at the 25th percentile and the confidence interval on this estimate. Sample includes only partly mobile sibling groups (brothers) from linked father-son census data where siblings are identified as having the same father and where at least one brother moves division between 1871 and 1901 and at least one brother does not move division over this period. Sample weights used in calculation.

The notable intergenerational progress in Ontario among non-migrants suggests the emergence of significant structural differences in the Canadian economy by 1901. One structural factor was the expansion of the Canadian West, which saw both the expansion of opportunities in agriculture and high demand for non-agricultural labour in response to urban rapid development in Vancouver, Winnipeg, and other towns and cities. These opportunities were mostly seized by migrants, with Ontarians moderately overrepresented in Western migration.[34] Within Eastern Canada, and especially Ontario (Drummond 1987), the main structural forces were the beginnings of the transition out of local agriculture, the rise of industry which brought high-wage jobs in production work, and

[34] By 1901, the share of Canadian-born residents of British Columbia, Manitoba or Northern Territories was skewed in favour of the Ontario born. Among males aged 28-50 in the 1901 full count living in British Columbia, Manitoba, or the Northwest Territories, 13% report a birthplace of Ontario, versus 3% and 4% reporting birthplaces in Quebec and the Maritimes.

urbanization which created opportunities in services and white-collar occupations.

How did structural forces in Eastern Canada relate to patterns of absolute mobility? Table 5 summarizes regional differences in the transition out of agriculture between 1871 and 1901. These figures focus on the sons of farmers in 1871 and the extent to which there were regional differences in remaining in agriculture. The first row shows that Ontario sons were least likely to still be farming in the same division as their father. However, conditional on remaining in the same division, Ontario sons were the most likely to be engaged primarily in agriculture. Among migrants, Ontario sons were also the most likely to be farming, which reflects better access to new agricultural land in Western Canada.

Table 5: Persistence in farming, 1871-1901

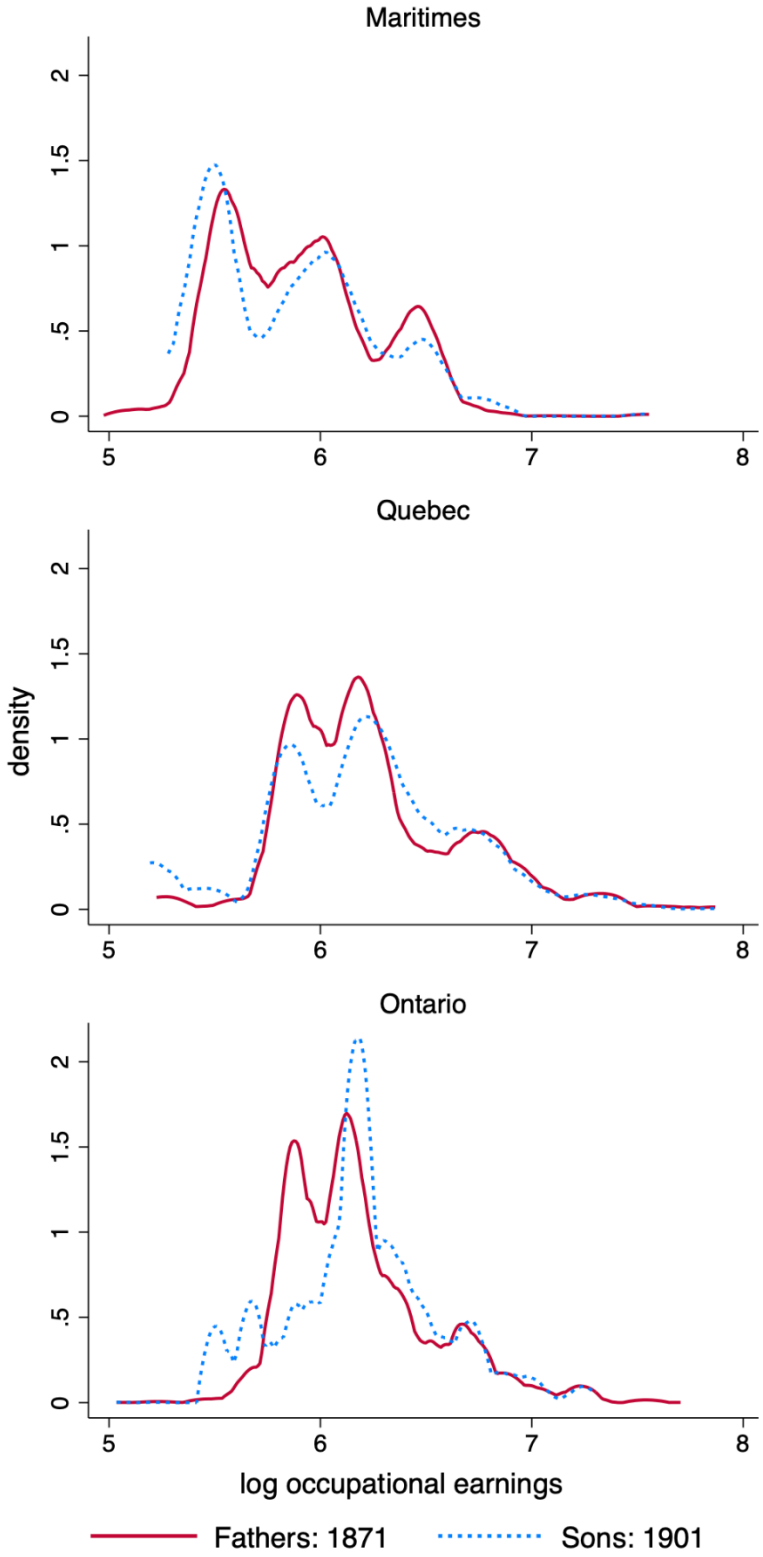
	Ontario	Quebec	Maritimes
% farming same division	35.2	37.5	42.5
% stayers farming	60.2	59.2	52.5
% migrants farming	40.3	35.6	29.5
N (farmer sons) weighted	267,447	189,159	96,084
N observations	13,597	6,579	5,154

Notes: Stayers and migrants defined as those residing (or not) in the same Census division in 1871 and 1901. Calculations using sample weights.

Table 5 shows that Ontario divisions did not have a more local transitions off the farm among non-migrant sons, but the quality of those transitions may have been different. Figure 13 presents kernel density estimates of the occupational income distribution in 1871 (fathers) and 1901 (sons) in non-farm activities for Ontario, Quebec, and the Maritimes. These figures are based on region and age-group specific occupational income scores drawn from the 1901 complete count census; the implication is that changes in the distribution within regions are a function of demographic differences between fathers and sons but also changes in the distribution of occupations towards activities with different mean earning/s. The figures show notable generational differences in non-farm income

distributions between the three regions. In the Maritimes and Quebec, 1871 and 1901 distributions have a broadly similar shape, with a notable leftward shift (lower occupational income) in the Maritimes between the two census years. Ontario presents a different picture, with a shift right in mode and median occupational income. The patterns in Figure 13 provide strong support for structural change towards high productivity, high income occupations within Ontario that provided opportunities for mobility without migration that were largely absent further east.

Figure 13: Non-farm regional log earnings distributions



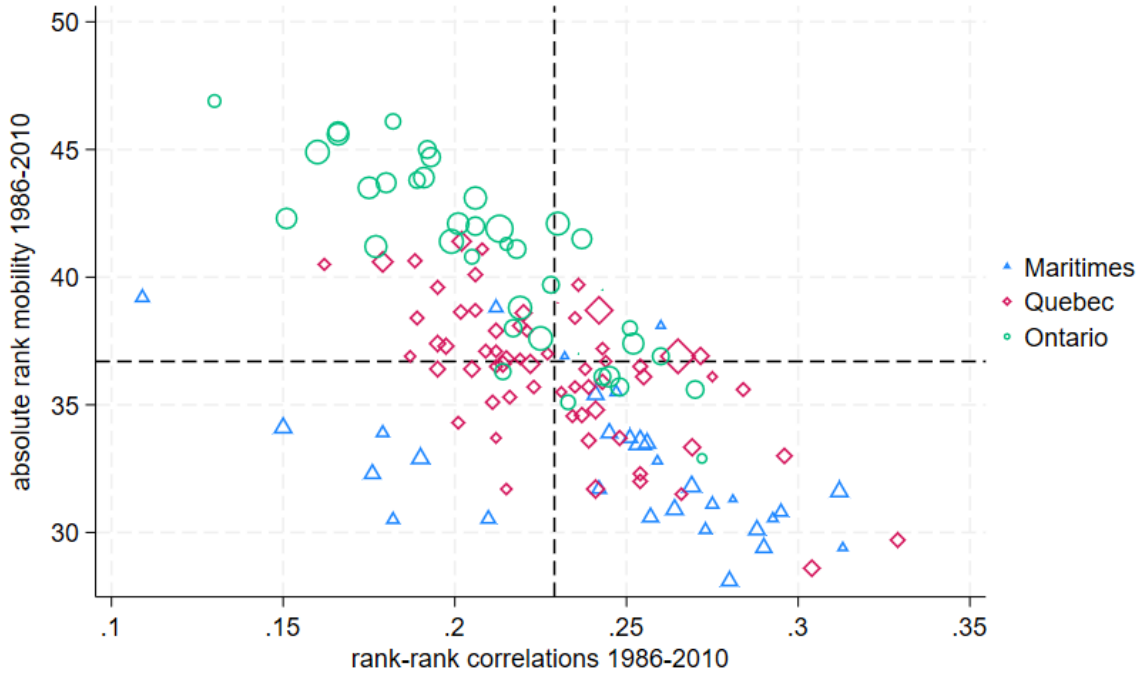
Notes: Figures report kernel density estimates of the non-farm occupational income distribution for linked sample fathers in 1871 and linked sample sons in 1901.

Then and now: Canadian intergenerational mobility 1871 – 2010

Distinct regional mobility regions emerged 1871-1901. Did they persist over time, or did they continue to evolve, perhaps even reverse during the 20th century? The use of 1986 division geographies throughout our analysis allows us to describe the landscape of Canadian intergenerational mobility changed between the end of the 19th and the beginning of the 20th century. We compare our 1871-1901 estimates to those of Corak (2020) for Canada 1986-2010. We focus on rank mobility measures to describe patterns of intergenerational mobility then and now.[35] In Figure 14 we plot the relationship between absolute and relative rank mobility 1986-2010 for Canadian divisions that were part of Canada in 1871. This figure is the contemporary analogue to Figure 5, and their comparison shows one very important change over time: the rise of intergenerational mobility in Quebec. For the 1871-1901 period, only a single Quebec division is in the top left quadrant (high absolute and relative mobility); in 1986-2010, over a third of Quebec divisions are in this quadrant. The number of Quebec divisions with absolute rank mobility above the mean has increased from less than 15 percent of all divisions to close to 50 percent from the late nineteenth to the late twentieth centuries. Ontario remains largely high mobility and the Maritimes largely low mobility in both periods.

[35] The Corak (2020) measures are comparable but not identical to ours; they use family income from administrative tax records, have larger samples per division and, like other longitudinal data not hampered by female surname change, they include women.

Figure 14: Contemporary absolute and relative rank mobility



Notes: Absolute and rank mobility figures are drawn from supplementary material related to Corak (2020) and presented for divisions matched to 1871 census geography as described in the text.

By the end of the twentieth century, 1986-2010, Quebec is towards the middle of intergenerational mobility rankings 1986-2010 in Canada. The convergence with Ontario relative to the beginning of the 20th century is notable given the large-scale social and economic changes that took place in the province over this period. We cannot pin down the causes nor the timeline of the change with the data currently to hand, though comparable progress across provinces documented by Connolly and Haeck (2023) suggests that much of this progress was made among cohorts born before the mid-1960s. A plausible explanation for the convergence with Ontario is that social changes in Quebec during the 1960s substantially improved opportunities for earlier Francophone cohorts who were then in the labour market. These changes would include greater quality and quantity of schooling, a large decline in fertility, and convergence in inter-provincial mobility rates, all of which are division-level features that we document as important correlates of mobility in Table 3. Delayed opportunities to move off the farm for Quebec born sons may also have been particularly

important in explaining Quebec's catch-up. Farmers were particularly poorly compensated in Quebec relative to other regions, and the data point to fewer opportunities for economic escape: we observe higher rates of intergenerational persistence among farmers in Quebec (56%) relative to the Maritimes (50%) and far less geographical mobility to western Canada relative to Ontario farmers.

Conclusions

Our study of historical intergenerational mobility in Canada yields several new and important stylized facts about long-run economic development in Canada. First, we find evidence of different mobility regimes across late 19th Century Canada, with a clear divide between high-mobility Ontario and low mobility Maritimes and Quebec. This finding confirms the importance of examining multiple aspects of mobility in parallel – examining only occupational mobility or intergenerational elasticities would not reveal the patterns we document here. Estimates of mobility across Census divisions reveal substantial differences within provinces and regions, but a broad separation of Ontario from the rest remains the overarching feature when we consider local variation. Estimates of the conditional and unconditional correlates of mobility across divisions shows a mixed pattern of results. Estimates of bivariate and multivariate correlations show that inequality has a strong association with absolute mobility, as found in contemporary Canada (Corak 2020). We also find some evidence of local human capital being correlated with district mobility, as well as population density (our proxy for urbanization) which is closely associated with occupational structure. As division characteristics correlate with mobility measures but do not account for the regional differences observed, we consider two further channels for regional gaps in absolute mobility. We document large differences in the propensity to move Census divisions between 1871 and 1901 across regions. While this indicates there was potentially greater movement to opportunities out of Ontario, particularly towards Western areas of new settlement, we also find that the rank position of migrants from Quebec and the Maritimes was no better than Ontario stayers. That Ontario stayers had the same extent of upward

mobility as migrants from the Eastern provinces indicates favourable structural changes in Ontario labour markets that is corroborated by examining patterns of regional occupational income distributions in 1871 and 1901.

Finally, a comparison between mobility in the late 19th century and recent decades shows evidence of substantial change in mobility relationships in Quebec, which now looks much more like Ontario in terms of absolute and relative rank mobility. Understanding the timing and causes of the mobility changes in Quebec relative to the rest of Canada is an important avenue for future research.[36]

Our results appear robust to concerns regarding the representativeness of historical linked data, the outsized role of farmers in the occupational distribution, and critiques regarding the uncertainty of ranking census district on mobility measures. One remaining challenge is the limited information on differences in the cost of living over time and, in particular, between rural and urban areas. Future research might adopt more localized price indexes, where available, to say more about whether the substantial benefits to Ontario birth were partly absorbed through higher cost of living.

[36] Geloso and Reilly (forthcoming) find no evidence that 1960 was a pivotal break point for Quebec relative to the rest of Canada. We are currently developing a 1901-1931 linked panel that will provide additional evidence.

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Appendix

1. Farm income adjustments

To estimate alternative rankings of farm incomes across Canadian regions that what was recorded in Census responses, we follow the procedure used by Urquhart to estimate net farm income (1999, pp. 43-50, table 1.9 and 1.10).

We disaggregate Urquhart (1991) farm revenue and expenses for 1900 to districts using the available census from 1901 (Volume I, Table VIII for agriculture and Tables LIII-LIV for farm-based forestry). We then mimic, to the extent possible, the income construction method of Urquhart to arrive at average income per occupier (the occupier being owner and/or tenant). Expenses that cannot easily be attributed to the local level are distributed in proportion to gross farm revenue. For each district we obtain average net farm income per farmer (the occupier being owner and/or tenant). To the denominator we also add reported weeks of hired labour (annualized at 52 wks/yr since a majority of farm operators had to work close to the entire year).

We then use the results of this exercise to adjust the occupation score for farmers only in each province (O_p) by adding some amount Z_p to each.

$$\frac{O_p + Z_p}{O_O} = \frac{NFI_p}{NFI_O}$$

In our first adjustment we calculate Z_p so that the ratio relative of corrected occupation scores to Ontario equates to the net income ratio (NFI_p) relative to Ontario found in the exercise described above. Our second adjustment rescales farm occupational incomes to match the net income ratios of each region with the Maritimes. The results of this exercise are presented in Appendix Table A2X below.

2. Mapping 1871 Census sub-district (CSDs) into 1986 Census divisions

Canadian census boundaries changed over time, particularly in Central and Western Canada where new settlement and population growth made initial divisions impractical. To match data from 1871 to 1986 as closely as possible, we assign 1871 Census sub-districts (CSDs) to 1986 Census divisions. In some parts of the country, the correspondence is straightforward, with 1871 Census districts matching in their entirety onto 1986 divisions. In other cases, we can allocate 1871 sub-districts to 1986 divisions by comparing historical census maps. There are some instances where 1871 subdistricts do not have a unique 1986 division. This is most of then the case in more northern settled areas of Quebec in 1871 and similar northern and western Ontario sub-districts where subsequent census matching did not respect earlier geographic boundaries. In such cases we have tried as best we can to allocate sub-districts to maximize the correct placement of known population settlements or in the absence of that information, to maximize the extent of territorial overlap. We did not allocate 1871 CSDs west of Ontario (as constituted them) or CSDs with no individual records in the linked dataset.

A CSV file connecting each 1871 Census subdistrict to a 1986 Census Division is available at:

https://www.dropbox.com/scl/fi/v2k1dwef57e7f67b5c67l/1871_CSD_to_1986_CD.xlsx?rlkey=up6k4yqz2wcbe18jfgaptqt6u&st=7xn3z7qv&dl=0

Table A.1: Regional Mobility in Canada 1871-1901, unweighted data

	Francophone	Anglophone	Maritimes	Quebec	Ontario
Occupational Mobility					
occupational mobility $\widehat{M}$	.49 (.01)	.52 (.00)	.50 (.01)	.49 (.01)	.50(.00)
N	7,923	14,878	8,177	9.218	19,091
Relative Income Mobility					
IGE slope ($\hat{\beta}$)	.41 (.01)	.39 (.01)	.23(.01)	.44 (.01)	.21(.01)
Rank-rank slope ($\hat{\gamma}$)	.40 (.01)	.34 (.01)	.18(.01)	.42 (.01)	.11 (.01)
Absolute Income Mobility					
Son mean rank, P25 father ($\hat{R}_{S,i}\|R_{F,i} = 25$)	41.6 (.35)	47.9 (.39)	43.5 (.35)	41.5 (.33)	62.7 (.42)
N	7,898	14,708	7,908	9,162	19,022

Notes: Robust standard errors in parentheses. See text for description of the mobility metrics used.

Table A.2: Regional Mobility in Canada 1871-1901, mean and median occupational incomes, farm income adjustments

score basis	(1) unweight	(2) weight	(3) Franco	(4) Anglo	(5) Mar	(6) Que	(7) Ont
Panel A: IGE slope estimates							
mean (original)	0.433***	0.437***	0.411***	0.393***	0.220***	0.431***	0.207***
	(0.006)	(0.007)	(0.015)	(0.011)	(0.014)	(0.014)	(0.012)
median	0.535***	0.528***	0.466***	0.554***	0.439***	0.479***	0.512***
	(0.006)	(0.007)	(0.013)	(0.010)	(0.014)	(0.012)	(0.010)
farm adjust. 1	0.415***	0.416***	0.408***	0.400***	0.224***	0.421***	0.207***
	(0.005)	(0.006)	(0.015)	(0.008)	(0.010)	(0.016)	(0.012)
farm adjust. 2	0.419***	0.422***	0.411***	0.399***	0.222***	0.431***	0.207***
	(0.005)	(0.005)	(0.013)	(0.008)	(0.009)	(0.014)	(0.012)
Panel B: RR slope estimates							
mean (original)	0.400***	0.409***	0.401***	0.347***	0.178***	0.417***	0.109***
	(0.005)	(0.005)	(0.011)	(0.009)	(0.012)	(0.010)	(0.009)
Median	0.484***	0.477***	0.422***	0.504***	0.398***	0.430***	0.488***
	(0.005)	(0.006)	(0.010)	(0.009)	(0.012)	(0.009)	(0.008)
farm adjust. 1	0.471***	0.462***	0.414***	0.463***	0.332***	0.401***	0.106***
	(0.004)	(0.005)	(0.011)	(0.007)	(0.013)	(0.011)	(0.009)
farm adjust. 2	0.491***	0.483***	0.430***	0.482***	0.342***	0.424***	0.111***
	(0.004)	(0.005)	(0.011)	(0.007)	(0.013)	(0.011)	(0.009)
Panel C: P25 estimates							
mean (original)	45.076***	44.625***	41.718***	48.069***	43.608***	41.661***	62.807***
	(0.ust219)	(0.238)	(0.358)	(0.424)	(0.385)	(0.335)	(0.447)
Median	40.296***	40.658***	40.715***	39.857***	35.853***	41.332***	42.290***
	(0.191)	(0.217)	(0.370)	(0.359)	(0.379)	(0.351)	(0.329)
farm adjust. 1	42.129***	42.668***	43.039***	42.782***	33.796***	44.199***	62.912***
	(0.194)	(0.207)	(0.348)	(0.350)	(0.322)	(0.332)	(0.467)

farm adjust. 2	41.177***	41.539***	41.051***	42.066***	33.870***	41.775***	63.057***
	(0.198)	(0.216)	(0.355)	(0.354)	(0.322)	(0.338)	(0.470)
N	36,092	36,092	7,898	14,708	7,908	9,162	19,022

Notes: Estimates weighted using inverse probability weights. Robust standard errors in parentheses. See text for description of the mobility metrics used. Farm income scores adjusted upward relative to Ontario (adjust. 1) or downward relative to the Maritimes (adjust. 2) to match ratio of net farm income calculated following Urquart (1991) using data from the 1901 Agricultural Census of Canada.

Table A.3: Regional Mobility in Canada 1871-1901, excluding sons of farmers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
score basis	unweight	weight	Franco	Anglo	Mar	Que	Ont
Panel A: IGE slope estimates							
mean (original)	0.373***	0.357***	0.326***	0.338***	0.365***	0.336***	0.235***
	(0.010)	(0.011)	(0.025)	(0.016)	(0.019)	(0.023)	(0.013)
median	0.478***	0.468***	0.446***	0.441***	0.361***	0.456***	0.345***
	(0.012)	(0.013)	(0.029)	(0.020)	(0.025)	(0.026)	(0.017)
Panel B: RR slope estimates							
mean (original)	0.377***	0.362***	0.356***	0.323***	0.334***	0.362***	0.203***
	(0.009)	(0.010)	(0.022)	(0.015)	(0.017)	(0.023)	(0.011)
median	0.476***	0.473***	0.480***	0.434***	0.318***	0.485***	0.341***
	(0.011)	(0.013)	(0.027)	(0.022)	(0.021)	(0.027)	(0.018)
Panel C: P25 estimates							
mean (original)	48.617***	49.162***	44.860***	53.408***	40.712***	45.086***	63.145***
	(0.419)	(0.452)	(1.049)	(0.734)	(0.624)	(1.162)	(0.568)
median	40.315***	40.636***	37.523***	44.189***	40.000***	38.291***	52.503***
	(0.624)	(0.711)	(1.454)	(1.280)	(0.964)	(1.508)	(1.085)
N	12,503	12,503	2,716	4,694	3,074	3,212	6,217

Notes: Estimates weighted using inverse probability weights. Robust standard errors in parentheses. See text for description of the mobility metrics used.

Table A.4: Summary statistics of district correlates

	Mean	Std. dev.
M	0.498	0.058
IGE	0.231	0.133
Rank-rank	0.176	0.139
Absolute Rank	53.6	11.0
Population density /1000	0.010	0.016
Mean Family size	7.308	1.488
% working age male	0.623	0.019
% clerical/ sakes	0.053	0.035
% service	0.057	0.028
% agriculture	0.534	0.166
% production	0.313	0.105
occupational income Gini coefficient	0.180	0.034
% literate	0.770	0.181
% youth in school	0.745	0.136
% francophone	0.244	0.348
% catholic	0.359	0.333
% Canadian	0.809	0.114
% born in province	0.788	0.122
MAR	0.214	0.412
QC	0.262	0.442
ON	0.523	0.501
N	130	

Notes: Calculations from the 1871 Census of Canada. See text for further details

Table A.5: Correlation coefficients and 95% confidence intervals

	IGE			RR			P25			M		
	corr.	95% c.i.		corr.	95% c.i.		corr.	95% c.i.		corr.	95% c.i.	
Share Canadian	0.26	0.09	0.41	0.46	0.32	0.59	-0.78	-0.84	-0.70	-0.23	-0.39	-0.06
Share born in prov.	0.26	0.10	0.42	0.47	0.33	0.60	-0.79	-0.85	-0.71	-0.20	-0.36	-0.03
Share Catholic	0.48	0.33	0.60	0.65	0.54	0.74	-0.61	-0.71	-0.49	-0.12	-0.29	0.05
Share French	0.46	0.31	0.59	0.65	0.53	0.74	-0.60	-0.70	-0.48	-0.18	-0.34	-0.01
Occ score Gini coef.	0.37	0.21	0.51	0.55	0.42	0.66	-0.68	-0.76	-0.57	0.13	-0.04	0.30
Share prof/mgmt.	0.24	0.07	0.39	0.27	0.11	0.43	-0.18	-0.34	-0.01	0.16	-0.01	0.33
Share cler/sales	0.22	0.05	0.38	0.19	0.02	0.35	0.17	-0.01	0.33	0.25	0.08	0.41
Share service	0.24	0.07	0.39	0.20	0.03	0.36	0.08	-0.10	0.25	0.24	0.07	0.40
Share agriculture	-0.23	-0.39	-0.06	-0.19	-0.36	-0.02	-0.16	-0.33	0.01	-0.32	-0.47	-0.16
Share production	0.19	0.02	0.35	0.16	-0.02	0.32	0.21	0.04	0.37	0.33	0.17	0.48
Share read & write	-0.40	-0.53	-0.24	-0.57	-0.68	-0.44	0.68	0.58	0.76	0.17	-0.01	0.33
Share aged 7-12 in sch	-0.16	-0.33	0.01	-0.30	-0.44	-0.13	0.61	0.49	0.71	0.24	0.07	0.40
Average family size	0.30	0.13	0.45	0.33	0.16	0.47	-0.06	-0.23	0.12	0.09	-0.09	0.25
Pop share wk age male	0.01	-0.16	0.18	-0.05	-0.22	0.12	0.22	0.05	0.38	0.32	0.16	0.47
Population density	0.21	0.04	0.37	0.26	0.09	0.41	0.00	-0.17	0.18	0.23	0.06	0.38

Notes: Estimated bivariate correlation coefficients and 95% confidence intervals for figures 8-10

Table A.6: District Intergenerational Mobility 1871-1901

	Occupational income mobility							Occupational mobility		
	IGE		Rank-Rank		Absolute Mobility			Major group		
Harmonized Division	coef	SE	coef	SE	coef	SE	N	coef	Se	N
Albert	0.008	0.098	0.014	0.080	55.166	2.729	175	0.429	0.041	186
Annapolis	0.173	0.075	0.078	0.051	47.386	1.620	309	0.485	0.029	330
Antigonish	0.140	0.144	0.090	0.125	39.443	3.285	93	0.626	0.051	106
Cape Breton	0.250	0.061	0.181	0.061	43.626	1.777	306	0.607	0.028	343
Carleton NB	0.248	0.071	0.194	0.059	48.187	1.649	295	0.379	0.045	319
Charlotte	0.187	0.067	0.163	0.058	42.694	1.716	368	0.486	0.026	419
Colchester	0.058	0.073	0.032	0.062	47.115	2.329	312	0.537	0.034	340
Cumberland	0.212	0.056	0.194	0.052	46.277	1.757	349	0.498	0.027	373
Digby	0.336	0.079	0.306	0.073	38.630	2.293	180	0.586	0.038	195
Gloucester	0.168	0.083	0.140	0.071	46.898	2.172	168	0.421	0.038	192
Guysborough	0.335	0.063	0.310	0.062	33.993	1.644	215	0.453	0.033	248
Halifax	0.352	0.042	0.314	0.039	39.871	1.224	598	0.448	0.020	701
Hants	0.174	0.069	0.113	0.058	46.414	1.804	352	0.558	0.027	370
Inverness	-0.051	0.088	-0.063	0.077	39.688	2.214	219	0.655	0.032	239
Kent NB	0.184	0.087	0.200	0.075	46.006	2.114	193	0.367	0.043	210
Kings NB	0.057	0.066	0.053	0.059	48.975	1.687	325	0.496	0.028	363
Kings NS	0.031	0.071	0.008	0.060	45.922	2.001	304	0.526	0.029	325
Lunenburg	0.173	0.065	0.145	0.059	37.179	1.504	299	0.438	0.028	321
Northumberland NB	0.191	0.077	0.127	0.067	48.726	2.365	221	0.543	0.035	255
Pictou	0.254	0.066	0.188	0.057	44.577	1.757	378	0.598	0.028	408
Queens & Shelburne	0.443	0.075	0.392	0.065	34.155	1.675	241	0.422	0.032	263
Queens NB	-0.093	0.077	-0.084	0.071	49.643	2.256	185	0.555	0.037	196
Restigouche	0.137	0.157	0.086	0.132	50.975	2.782	67	0.413	0.061	71

Richmond NS	0.237	0.128	0.220	0.128	31.345	2.840	72	0.397	0.058	80
Saint John	0.294	0.067	0.258	0.058	44.897	2.374	271	0.554	0.031	358
Sunbury	-0.046	0.118	-0.037	0.094	48.215	3.013	112	0.501	0.048	123
Victoria NB	0.173	0.084	0.167	0.076	47.992	2.776	127	0.342	0.043	144
Victoria NS	0.089	0.158	0.003	0.121	27.925	2.782	101	0.573	0.051	109
Westmorland	0.210	0.077	0.157	0.059	49.260	2.074	327	0.496	0.029	358
Yarmouth	0.195	0.066	0.177	0.061	37.172	1.936	243	0.526	0.033	261
York NB	0.266	0.097	0.193	0.081	46.471	2.869	359	0.544	0.053	406
Argenteuil	0.408	0.108	0.412	0.095	39.959	3.081	121	0.555	0.046	138
Arthabaska	0.330	0.174	0.404	0.152	36.991	2.839	96	0.396	0.051	107
Bagot	0.282	0.096	0.361	0.099	42.496	2.668	120	0.540	0.046	136
Beauce	0.690	0.218	0.436	0.147	37.198	2.141	164	0.423	0.039	176
Beauharnois	0.158	0.103	0.282	0.110	42.484	2.606	125	0.579	0.045	132
Bellechasse	0.112	0.139	0.095	0.126	42.063	2.975	110	0.581	0.048	122
Berthier	0.517	0.176	0.460	0.124	41.500	2.505	139	0.492	0.043	155
Bonaventure	-0.058	0.107	-0.028	0.086	27.042	2.576	189	0.450	0.045	209
Brome	0.319	0.147	0.239	0.120	39.350	2.740	133	0.508	0.045	138
Chambly	0.301	0.114	0.329	0.096	58.406	4.197	93	0.648	0.049	108
Champlain	0.410	0.134	0.317	0.092	36.657	1.735	238	0.487	0.033	259
Charlevoix	0.282	0.089	0.297	0.093	39.696	2.294	161	0.502	0.040	180
Chateauguay	0.317	0.078	0.336	0.090	39.384	2.635	139	0.482	0.044	161
Chicoutimi	0.356	0.163	0.326	0.127	40.680	2.572	126	0.411	0.044	152
Compton	0.499	0.152	0.495	0.118	39.042	2.519	124	0.324	0.044	139
Deux Montagnes	0.358	0.127	0.313	0.099	44.094	2.369	173	0.537	0.038	187
Dorchester	-0.045	0.191	0.027	0.202	34.202	3.033	106	0.426	0.049	118
Drummond	0.355	0.300	0.322	0.217	39.061	3.365	84	0.433	0.056	92
Frontenac QC	0.480	0.276	0.236	0.290	42.265	4.230	59	0.559	0.066	77
Gaspe E	0.061	0.073	0.050	0.067	35.160	2.003	211	0.553	0.035	229

Gatineau	0.402	0.090	0.395	0.069	40.343	2.456	193	0.480	0.037	215
Huntingdon	0.248	0.154	0.230	0.120	39.034	2.431	172	0.355	0.038	202
Iberville	0.355	0.236	0.321	0.170	35.957	3.687	68	0.494	0.061	83
Ile Jesus	0.015	0.179	-0.024	0.139	50.926	3.724	87	0.631	0.052	103
Ile de Montreal	0.319	0.042	0.289	0.039	56.038	2.222	887	0.564	0.017	1077
Joliette	0.211	0.135	0.218	0.108	43.559	2.696	141	0.558	0.042	164
Kamouraska	0.405	0.096	0.406	0.097	37.532	2.450	142	0.483	0.042	157
L'Assomption	0.384	0.148	0.447	0.125	40.402	3.562	82	0.567	0.055	102
L'Islet	0.482	0.139	0.470	0.117	36.050	3.417	72	0.459	0.059	88
Labelle & Papineau	0.411	0.189	0.364	0.139	44.104	3.022	98	0.491	0.052	133
Laprairie	0.099	0.090	0.222	0.114	51.349	3.390	96	0.597	0.051	109
Levis	0.312	0.078	0.342	0.061	42.770	2.185	246	0.542	0.032	289
Lotbiniere	0.412	0.108	0.413	0.094	41.545	2.233	166	0.472	0.039	187
Maskinonge	0.089	0.227	0.091	0.154	40.170	3.363	87	0.526	0.054	106
Matane	0.137	0.177	0.149	0.188	31.250	2.986	64	0.367	0.061	77
Megantic	0.068	0.123	0.101	0.132	39.023	2.697	140	0.440	0.043	174
Missisquoi	0.183	0.110	0.235	0.126	39.377	3.305	111	0.524	0.049	120
Montcalm	0.234	0.176	0.205	0.139	41.812	3.355	90	0.583	0.053	104
Montmagny	0.147	0.132	0.212	0.110	40.624	2.814	115	0.515	0.047	150
Montmorency	0.231	0.109	0.277	0.097	48.122	2.714	120	0.516	0.046	143
Napierville	0.429	0.117	0.349	0.124	41.881	3.249	89	0.436	0.053	113
Nicolet	0.557	0.121	0.651	0.089	36.997	2.061	168	0.352	0.037	192
Pontiac	0.613	0.186	0.388	0.106	45.071	2.522	152	0.505	0.041	181
Portneuf	0.475	0.077	0.412	0.063	41.089	1.685	285	0.419	0.029	336
Quebec	0.445	0.055	0.462	0.041	45.331	2.127	536	0.482	0.022	652
Richelieu	0.521	0.080	0.446	0.064	41.105	2.271	178	0.466	0.038	194
Richmond QC	0.625	0.191	0.461	0.134	49.902	3.752	87	0.481	0.056	105
Rimouski	0.415	0.127	0.454	0.142	43.028	3.133	90	0.421	0.052	109

Riviere du Loup & Temiscouata	0.657	0.113	0.545	0.091	37.426	2.126	165	0.313	0.036	186
Rouville	0.449	0.089	0.474	0.120	47.479	3.319	86	0.514	0.054	102
Shefford	0.299	0.137	0.386	0.114	35.161	2.425	127	0.397	0.045	146
Sherbrooke	0.222	0.178	0.329	0.134	41.148	4.755	53	0.573	0.071	62
Soulanges	0.106	0.127	0.186	0.119	46.193	3.786	82	0.514	0.056	99
St Hyacinthe	0.222	0.098	0.236	0.116	41.415	2.685	136	0.490	0.043	152
St Jean	0.663	0.138	0.548	0.100	36.982	3.867	78	0.409	0.057	87
St Maurice	0.344	0.104	0.359	0.077	50.876	3.076	147	0.500	0.041	177
Stanstead	0.425	0.106	0.444	0.082	42.830	2.995	112	0.537	0.050	122
Terrebonne	0.482	0.102	0.420	0.071	43.450	2.127	202	0.501	0.036	238
Vaudreuil	0.247	0.132	0.327	0.097	43.861	3.023	111	0.472	0.048	133
Vercheres	0.470	0.138	0.511	0.100	42.610	2.861	109	0.415	0.048	113
Wolfe	0.127	0.188	0.220	0.197	38.071	3.710	72	0.409	0.059	90
Yamaska	0.438	0.120	0.505	0.109	33.001	2.163	135	0.352	0.041	156
Brant	0.234	0.085	0.117	0.059	63.749	2.937	280	0.554	0.031	409
Bruce	0.091	0.061	0.053	0.053	64.226	2.693	509	0.523	0.023	543
Dufferin	0.104	0.090	0.065	0.093	62.420	4.653	201	0.619	0.035	204
Durham	0.220	0.062	0.101	0.049	61.869	2.392	657	0.534	0.020	721
Elgin	0.167	0.075	-0.033	0.054	67.878	2.501	474	0.477	0.023	506
Essex	0.191	0.092	0.166	0.081	57.427	4.215	426	0.441	0.026	463
Frontenac ON	0.245	0.053	0.169	0.050	60.951	2.644	420	0.563	0.025	456
Grey	0.077	0.055	0.008	0.048	65.274	2.437	810	0.488	0.018	876
Haldimand	0.069	0.058	0.035	0.044	66.451	2.175	786	0.472	0.018	849
Halton	0.310	0.084	0.192	0.072	57.220	3.602	307	0.542	0.029	344
Hastings	0.197	0.087	0.137	0.063	61.370	3.193	440	0.458	0.025	534
Huron	0.051	0.057	-0.023	0.044	68.521	2.168	782	0.451	0.019	863
Kent ON	0.208	0.096	0.062	0.064	64.860	3.041	377	0.436	0.027	560
Lambton	0.325	0.094	0.257	0.075	55.168	3.825	466	0.416	0.024	503

Lanark	0.156	0.109	0.069	0.076	65.636	3.762	373	0.456	0.026	406
Leeds & Grenville	0.248	0.054	0.148	0.049	61.997	2.440	600	0.476	0.021	645
Lennox & Addington	0.200	0.082	0.085	0.059	64.495	2.882	342	0.476	0.028	377
Middlesex	0.164	0.048	0.064	0.041	64.195	2.001	1057	0.512	0.016	1138
Muskoka	0.327	0.234	0.502	0.145	40.718	7.983	102	0.615	0.050	112
Niagra	0.184	0.047	0.147	0.042	62.023	2.075	681	0.460	0.020	764
Northumberland ON	0.182	0.064	0.119	0.046	62.479	2.278	578	0.492	0.021	656
Ottawa-Carleton	0.302	0.056	0.158	0.049	63.195	2.481	540	0.511	0.022	582
Oxford	0.164	0.050	0.091	0.051	62.296	2.519	546	0.511	0.022	601
Peel	0.334	0.074	0.141	0.059	63.813	2.993	351	0.547	0.027	394
Perth	0.189	0.075	0.062	0.051	63.966	2.478	540	0.541	0.022	592
Peterborough	0.272	0.080	0.192	0.057	59.409	2.873	381	0.455	0.026	434
Prescott & Russell	0.021	0.073	0.020	0.080	65.059	3.968	203	0.465	0.037	227
Prince Edward	-0.035	0.105	-0.044	0.069	68.489	3.259	277	0.496	0.031	305
Renfrew	0.292	0.137	0.096	0.090	62.198	4.472	290	0.497	0.031	307
Simcoe	0.205	0.060	0.172	0.044	60.312	2.275	767	0.505	0.019	844
Stormont	0.243	0.091	0.165	0.059	58.333	3.002	618	0.485	0.021	662
Toronto	0.260	0.039	0.177	0.035	65.257	1.797	749	0.548	0.019	859
Victoria ON	0.165	0.069	0.114	0.061	60.668	3.083	404	0.445	0.025	448
Waterloo	0.170	0.059	0.079	0.040	66.327	1.938	706	0.507	0.019	759
Wellington	0.232	0.060	0.143	0.047	60.868	2.387	669	0.559	0.020	737
Wentworth	0.255	0.054	0.099	0.039	66.104	1.840	650	0.588	0.020	727
York ON	0.191	0.067	0.143	0.049	60.122	2.388	589	0.529	0.021	616

Notes: N represents the number of linked father-son pairs used to generate measures within harmonized division.
Differences between occupational category and occupational income mobility arise when an occupation score cannot be generated for either father or son but both individuals are still classifiable by major occupation group.

Table A.7: Mover and stayer brothers by region: absolute mobility

		Mean predicted rank	Standard error	95% Confidence Interval		N
Maritimes	staying brothers	43.754	(2.208)	39.397	48.111	181
	moving brothers	55.647	(2.763)	50.191	61.103	167
Quebec	staying brothers	36.316	(1.797)	32.776	39.855	238
	moving brothers	57.771	(2.167)	53.500	62.042	231
Ontario	staying brothers	56.998	(2.966)	51.171	62.825	549
	moving brothers	70.679	(2.745)	65.287	76.071	523

Notes: The figures are the predicted rank of sons of fathers from the 25th percentile of the earnings distribution from each region. Figure 12 is a visual representation of these results.

Table A.8: Analysis of son outcomes for two father occupations

	Farmer father			Labourer father		
	Mar	Que	Ont	Mar	Que	Ont
$lny_{i,01}$	5.885***	5.802***	6.142***	5.883***	6.102***	6.141***
	(0.005)	(0.006)	(0.002)	(0.019)	(0.034)	(0.008)
$R_{S,i}$	46.12***	37.40***	65.92***	46.20***	59.47***	65.936***
	(0.409)	(0.395)	(0.165)	(1.489)	(2.063)	(0.541)
N	4,831	5,951	12,808	332	201	1,327
$lne_{i,01}$	5.736***	5.727***	5.892***	5.720***	5.894***	5.982***
	(0.036)	(0.033)	(0.018)	(0.055)	(0.104)	(0.032)
N	422	732	1,527	65	57	369

Notes: Mean outcomes of sons in 1901 by occupation of the father, estimated with inverse propensity score weighting. $lny_{i,01}$ is the log occupational income score used to estimate β. The measure $R_{S,i}$is the resulting national rank used to estimate γ and $lne_{i,01}$is the actual 1901 log earnings among those who report.