Patterns and Determinants of Wealth Inequality in Late-Nineteenth-Century Ontario: Evidence from Census-Linked Probate Data

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Evidence from Census-Linked Probate Data

This article shows that late-nineteenth-century wealth inequality was associated with rising wealth levels supporting the existence of a Kuznets-type curve, but this curve is not unconditional. The tendency of wealth inequality to vary with age means that wealth inequality was also a function of the changing age composition of the population and may have been the result of portfolio allocation decisions across the life cycle. Canada's population "aged" during the late nineteenth century, with the proportion of population under

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age 20 dropping from 53% in 1871 to 43% by 1911. The general aging of the population could have increased inequality in both wealth and income. These results follow recent work by Jeffrey Williamson (1998), who argues that Kuznets curves are not unconditional. In other words, as the results of this article confirm, wealth inequality is the outcome of a complex economic process, not a single determinant cause.

A literature dealing with wealth accumulation and inequality in nineteenth-century North America has emerged that quantitatively assesses the extent of wealth holding and inequality. Studies for Canada and the United States have found high degrees of wealth inequality even in frontier areas of recent settlement.[1] These studies have made use of census, assessment roll, and probate data but rarely in combination, with an exception being Di Matteo and George 1992, 1998, which links probated decedents in Wentworth County, Ontario, to census and assessment rolls for the period 1872 to 1902. Linking individuals across data sources creates data sets with more socioeconomic variables, which enhances explanatory power.

This article uses 3,515 census-linked probated decedents from Ontario in 1892 to examine some of the patterns of wealth inequality using basic inequality measures, such as Gini and Theil coefficients, as well as coefficients of variation.[2] The size of the data set and the distribution of the probated decedents both regionally and across age, gender, and religious lines allow for the examination of wealth inequality across subgroups of the data. The results show that while wealth inequality in late-nineteenth-century Ontario was high, there are variations across regions and age groups, as well as across wealth levels and socioeconomic status groups. Moreover, regression results found significant statistical relationships between inequality and wealth levels, as well as age, farm employment, portfolio composition, region of residence, and literacy.

Issues in Wealth Inequality and Growth

Wealth inequality can be defined as the differences that individuals exhibit in their control over or access to the stock of economic resources. The determinants of inequality are complex but ultimately depend on the ability to take advantage of economic opportunities and the capacity to absorb economic shocks. The study of wealth inequality using historical micro-data must

be placed into the context of Simon Kuznets's (1955, 1966) pioneering work on the inverted U-hypothesis relationship between economic growth and inequality. Most of the literature in this area has dealt with income and inequality, though the concepts and arguments are readily extended to wealth, which is highly correlated with income. Also, most studies of the Kuznets hypothesis have relied on cross-sectional country studies whereby intercountry differences are used to make inferences about intracountry differences. Such cross-sections have been criticized, first, because there are obvious deficiencies in using static cross-sections to address issues of dynamic change over time,[3] and second, because there are deficiencies in the quality of the data.[4]

Several studies of inequality in North America that have explored the Kuznets hypothesis are relevant here. Williamson (1965) found that during the economic growth of the United States, the period 1840 to 1880 was one in which regional inequality increased, 1880–1920 was a period of stabilization, and the post-1920 period witnessed a decline in regional inequality.[5] Lindert and Williamson 1985, Williamson and Lindert 1980, and Lindert 1991 examine the empirical evidence relating the international distribution of wealth and income to trends over time in income and also document a Kuznets-type curve in the relationship. More recent studies (Williamson 1996, 1998; Higgins and Williamson 1999) have begun to move beyond examining inequality as simply an unconditional Kuznets-curve relationship to a much broader study. Along with the Kuznets curve, inequality is also rooted in demographic or cohort size effects as well as effects from the pursuit of policies such as globalization.[6] One of the problems with most empirical examinations of the Kuznets curve is that they have focused on "strong" or unconditional versions of the hypothesis that have regressed an inequality measure on income without controlling for other factors associated with inequality (Higgins and Williamson 1999: 8–9).[7]

For Canada, Alan Green's (1967, 1968/69, 1971) work found evidence of a Kuznets curve and his work marked "the beginning of systematic knowledge in a national income framework about the long-term shape and interaction of Canada's regional economies" (Inwood and Irwin 1998: 1).[8] However, there was a puzzle in that regional disparities did not begin to converge before World War I, given the robust economic growth then enjoyed by the Canadian economy. On one hand, Green argues that regional inequality continued to increase because the wheat boom era stimulated an agricultural expansion

that was a low-income sector in the west while the high-income manufacturing sector expanded in central Canada. On the other hand, Kris Inwood and James Irwin (1998: 18), using pre–World War I regional income estimates for the period 1870 to 1890, observe "significant continuity in the patterns of spatial inequality, regional specialization and the relationship between income growth and structural change" and actually find a modest reduction in spatial inequality between 1870 and 1890.[9]

An important dimension of the regional growth/inequality relationship is the potential impact of demographic forces, such as population age distribution. Williamson (1998) argues that inequality can be driven by demographic factors as well as technology, globalization, and education supply. However, "it is not the overall rate of population growth that matters. Instead, it is a change in the age distribution that matters. When the child cohort is relatively big, a small share of the population is working and saving, generating slow per capita GDP growth. When the economically active cohort is relatively big, a large share of the population is working and saving, generating fast per capita GDP growth" (ibid.: 259). As a result, rapid economic growth and rising inequality may be the result of a change in the age distribution that generates supply side economic growth. Recent empirical work for Canada by Alan Green and Gordon Sparks (1999) suggests that increases in population during the wheat boom era were definitely a source of Canadian economic growth though they do not consider the effects of changes in the age distribution.

Williamson and Lindert (1980) explore the role of age in explaining trends in the distribution of wealth during the colonial period. The authors establish a potential role for demographic forces as a source of change but find that the "actual role of demographic forces is far more difficult to isolate" (ibid.: 27). Demographic data, particularly for the American colonial era, are rarely available in more than three age classes (under 16, 16–60, and over 60) and what is available suggests a stable colonywide age distribution. However, the authors acknowledge that inequality may have widened if cities attracted the young. Most recently, using international data for the period from the 1960s to the 1990s, Higgins and Williamson 1999 finds that the relative size of the "mature" population cohort between ages 40 and 59 had a negative and significant impact on inequality. The cohort size hypothesis is simply stated as "fat cohorts tend to get low rewards" (ibid.: 2) and thus when large cohorts get into middle-earning years, earnings inequality is moderated.

The demographic effect in essence relates inequality to behavior over the economic life cycle. According to the life-cycle model of consumption and saving, forward-looking consumers aim to smooth their consumption profiles over time but their income is not spread over time.[10] As a result, there are periods of wealth accumulation and decumulation as individuals save during their working years in order to finance consumption during their nonworking years, thereby generating a hump-shaped wealth-age profile. Life-cycle effects on historical income distributions have not been found to be very significant sources of income inequality, but the studies have used historical data on wage earners for the most part (Brenner et al. 1991: 21). Indeed, age effects might be more significant for wealth accumulation and inequality given the effects of compounding growth and the fact that wealth accumulation is the outcome of a long-term process.

For example, Atack and Bateman 1981 and Gallman 1978 suggest that since wealth does rise with age, the larger the proportion of young people in a society, the more wealth inequality there would be. Di Matteo 1998 finds that the rate of wealth accumulation in historical micro-data can also vary across the life cycle with the highest rates of accumulation in the 20–29 and 40–49 age categories. This finding in itself suggests that a portion of changing trends in wealth and income inequality could be ascribed to changes in the composition of the age distribution of the population and their movement through the economic life cycle. A related work, Malmburg 1994, argues that age structure is an important factor behind variations in the rate of economic growth and documents a relationship between age structure and Swedish economic growth for the period 1950 to 1989. During this time, Swedish growth rates increased when large portions of the population reached peaks in human capital accumulation and saving and then slowed down with increases in the dependent population.

Recent economic research has also found that the relationship between age and inequality is U-shaped and that the life-cycle model can explain this age-inequality profile under certain assumptions (Davies 1996). According to Davies 1996, the simple life-cycle model can generate realistic age-inequality profiles provided that the need for private retirement savings is not too great and that permanent shocks to earnings do not have a higher variance than transitory shocks. Studies for Canada and other countries using modern data sets have generally found that relative inequality falls sharply over the first 10

to 15 years of the working lifetime, levels off over the remainder of the working period, and then begins to increase during retirement. These empirical results have been documented for Canada (Magee et al. 1991), the United Kingdom (Shorrocks 1975b), and the United States (Greenwood 1987). If an upward-sloping Kuznets curve is accompanied by aging population, then the rising inequality may be partly a function of an aging population and life-cycle effects. These forces need to be considered alongside other factors associated with economic growth, such as sectoral imbalances and factor productivity, labor-force growth, and lags in skills deepening (Lindert and Williamson 1985: 368).

The Data

The set of micro-data consists of 3,515 census-linked probated decedents from Ontario in 1892.[11] The data set was constructed from the probate records of the county surrogate courts and the 1891 Census of Canada. Under the Surrogate Courts Act of 1858 (Statutes of Canada, 22 Vict., Cap. 93, 1858), a surrogate court with the power to issue grants of probate and administration valid throughout the province was established in each Ontario county, replacing the centralized Court of Probate established in 1793. Probate was an institutional arrangement that transferred property from the dead to the living and therefore the inventory and valuation of property was of key importance. The inventory was conducted by the executor of the estate (or administrator in intestate cases).[12] Legally it needed to be conducted in response to a request by a legatee or creditor, but in practice it was brought in voluntarily before receipt of the compulsory summons (Howel 1880: 325–26).[13] The inventory provided wealth estimates grouped into 16 categories, allowing for separate estimates of real estate, financial assets, and personal property.[14]

There are limitations to the use of probate records, but these should be weighed against the fact that wealth in the probate records is inventoried in detail not found in any other nineteenth-century source.[15] First, it can be argued that probated decedents are of higher socioeconomic status and therefore do not represent the general population. This bias is potentially problematic if the data set is used to draw inferences about the wealth of the general population; since this article focuses on only the probated decedents themselves, the problem of selection bias is limited.[16] However, dealing with the distribution of the dying as opposed to the living is more than simply adjusting the data

set for the relatively fewer numbers of younger individuals. The wealth data are likely to be affected by whether the individuals died unexpectedly or had been ill a long time and therefore run down their assets. One way to deal with this problem would be to have data on the cause of death for the individuals in the data set. Unfortunately, this information was not available in the probate records and other sources are not reliable for this period.[17]

Second, the presence of estate taxes may provide incentive for an executor or administrator to underestimate the wealth being inventoried. The wealth data obtained from nineteenth-century Ontario probate records does not likely suffer from such a bias because there were no succession duties in Ontario until 1 July 1892, when the Succession Duty Act (Statutes of Ontario, 55 Vict., Cap. 6, 1892) came into effect, and even then the act allowed for numerous exemptions. The Succession Duty Act did not apply: "(1) To any estate the value of which, after payment of all debts and expenses of administration, does not exceed $10,000; or (2) To property given, devised, or bequeathed for religious, charitable, or educational purposes; or (3) To property passing under will, intestacy, or otherwise, to or for the use of the father, mother, husband, wife, child, grandchild, daughter-in-law, or son-in-law of the deceased, where the aggregate value of the property of the deceased does not exceed $100,000 in value." In Ontario the presence of estate taxes provided no reason to underestimate the value of the estate for almost all decedents.[18]

A final concern is the occurrence of *inter vivos* transfers, which implies that an unknown portion of wealth may have been transferred during life and may be unaccounted for by the probate records. Generally, such transfers are considered a problem if estate taxes present an obstacle to intergenerational wealth transmission, but the evidence for Ontario suggests that they were not. Moreover, the Succession Duty Act applied even to property "voluntarily transferred by deed, grant or gift made in contemplation of the death of the grantor or bargainor, or made or intended to take effect, in possession or enjoyment after such death."[19]

The construction of the data set began by recording onto standardized data collection forms those estates that bore an application date for probate falling in 1892.[20] The year 1892 was selected so that individuals could then be linked back to the 1891 Census returns in order to obtain additional information and provide a cross-check to some of the information from probate. The census provided key socioeconomic data, such as birthplace, birthplace

of parents, ability to read and write, and religion. One of the most important pieces of information provided by the census was age, since the probate records did not contain this information. Often, the census was also more specific than the probate records in describing occupations. There were instances in which the probate records referred to a decedent as a merchant or laborer, whereas the census enumerated the individual as a hardware-store keeper or farm laborer.

Those individuals who died prior to the taking of the census or were non-Ontario residents with property in one of the counties were omitted from the census-tracing procedure.[21] An attempt was then made to link manually the remaining individuals to the corresponding census return. The tracing procedure used the name of the deceased, occupation (if provided), marital status, spouse's name (if any), and the names of children mentioned in the probate records as the variables to determine a match. This procedure had a good success rate. Of the original 4,925 estates recorded, 4,236 were suitable for tracing and 3,515 were successfully traced, resulting in a success rate of 83% of traceable decedents.[22] The success rate ranged from a low of 72% (Wellington County) to a high of 98% (Lanark County).[23]

This data set is suitable for an examination of wealth inequality because it does address some of the recent criticisms that have been made about inequality research. Martin Shanahan and Margaret Correll (1997) argue that the wealth distribution trends outlined in Williamson and Lindert 1980 as support for the existence of a Kuznets-type curve are not supported by the data sources. According to Shanahan and Correll, the Lindert/Williamson analysis combines studies built on different data sources and based on different geographic and social population coverage, as well as systematic sampling errors produced by different size samples. Many of the probate studies cited also use the estate multiplier technique to correct for "missing people." They argue that if systematic differences in the wealth distribution estimates based on minimally adjusted probate records exist when compared with estimates using fully adjusted probate records, then the observed trend in wealth distribution may only be the result of differences in the technique used.

This data set can be used to examine wealth inequality regionally because the data are available by county/district divisions and, though Ontario is a single political jurisdiction, there were differences in the pace and pattern of economic development within it, allowing for sufficient variation.

By examining the relationship between county/district inequality measures and average wealth levels, one can attempt a cross-sectional approach to the Kuznets-curve relationship. More important, the data contain a large number of variables that allow for the estimation of the Kuznets curve conditional on other factors. Finally, most empirical studies of wealth inequality that have attempted to estimate a Kuznets curve have relied on cross-sectional country studies where intercountry differences are used to make inferences about intracountry differences. The probate records were maintained according to provincial legislation and standards and therefore do not introduce potential errors rooted in comparing different data sources. In a sense, while only a single cross-section, this data set is valuable because it belongs to a common jurisdiction and therefore was collected consistently across regions.

Results and Analysis

Evidence on wealth inequality in Ontario using the 1892 data is presented in Figures 1–2 and Tables 1–3. Inequality measures and average wealth are presented in Table 1 by the county/district divisions of Ontario, and they reveal that average wealth and inequality do vary across the province. The highest average wealth figure was for York County ($18,556), which contains Toronto, the largest city in Ontario. The lowest average wealth was for the frontier region of Northern Ontario ($2,415). Generally speaking, average wealth was highest in the more developed Golden Horseshoe counties (see Tables 1–4), followed by the eastern and western counties and then by the more northerly counties and districts of Huronia and Northern Ontario.

Inequality also varied considerably across regions. The minimum Gini coefficient was 0.46 for Elgin County in Western Ontario and a maximum of 0.82 in York County in the Golden Horseshoe. When the Theil coefficient is used, the minimum is Elgin with a value 0.35 and the maximum is Norfolk County with a value of 1.77. York County is now second highest at 1.70. Generally speaking, the inequality measures all parallel one another in terms of magnitude. On average, wealth inequality was lowest in Huronia and Northern Ontario and highest in the Golden Horseshoe with the eastern and western counties generally in the middle. These results suggest a positive relationship between average wealth levels across counties and the measured degree of inequality that is confirmed by a scatterplot of these results (Figure 1).[24] The

Table 1 Average wealth and inequality by county/district

County/district	($)Wealth	CV	Range ($)	Gini	Theil
Wentworth	10,105	2.17	147,028	0.696	1.037
Lincoln	5,383	1.76	56,021	0.665	0.862
Welland	4,141	1.2	23,557	0.552	0.531
Haldimand	5,027	1.8	72,769	0.574	0.699
Norfolk	9,180	4.02	275,556	0.781	1.767
Elgin	4,386	0.9	19,627	0.459	0.353
Kent	6,227	1.62	66,602	0.578	0.673
Essex	4,847	1.04	28,096	0.498	0.421
Lambton	5,198	2.1	99,869	0.623	0.843
Middlesex	5,733	1.51	82,156	0.557	0.605
Oxford	4,917	1.15	36,622	0.528	0.489
Brant	10,043	2.78	236,135	0.724	1.24
Waterloo	5,491	1.47	66,734	0.564	0.599
Perth	7,396	2.73	194,832	0.668	1.101
Huron	4,983	1.35	54,014	0.533	0.54
Wellington	5,752	2.05	104,404	0.603	0.807
Bruce	4,189	1.72	64,239	0.534	0.625
Grey	4,175	1.47	44,105	0.527	0.564
Simcoe	5,441	1.36	50,759	0.578	0.609
Dufferin	5,341	1.06	29,522	0.482	0.414
Peel	4,729	1.31	39,846	0.549	0.562
Halton	7,067	1.48	62,620	0.573	0.629
York	18,556	3.68	913,081	0.818	1.703
Ontario	4,379	1.16	28,190	0.552	0.526
Victoria and Haliburton	4,994	0.86	16,678	0.463	0.353
Durham and Northumberland	6,400	2.16	121,809	0.668	0.959
Peterboro	11,274	2.02	131,025	0.684	0.975
Hastings	7,206	2.05	83,155	0.725	1.085
Prince Edward	5,527	1.45	37,026	0.598	0.668
Lennox and Addington	5,582	1.59	44,895	0.614	0.715
Frontenac	5,541	1.76	64,383	0.638	0.799
Leeds-Grenville	4,703	1.43	39,262	0.586	0.635
Dundas-Glengary-Stormont	6,616	1.93	76,771	0.615	0.822
Prescott-Russell	3,805	1.31	27,926	0.508	0.509
Carleton	10,483	3.36	345,341	0.755	1.445
Lanark	3,984	1.25	27,902	0.536	0.521
Renfrew	6,687	2.09	71,937	0.694	1.087
Northern Ontario	2,415	1.34	18,274	0.528	0.532

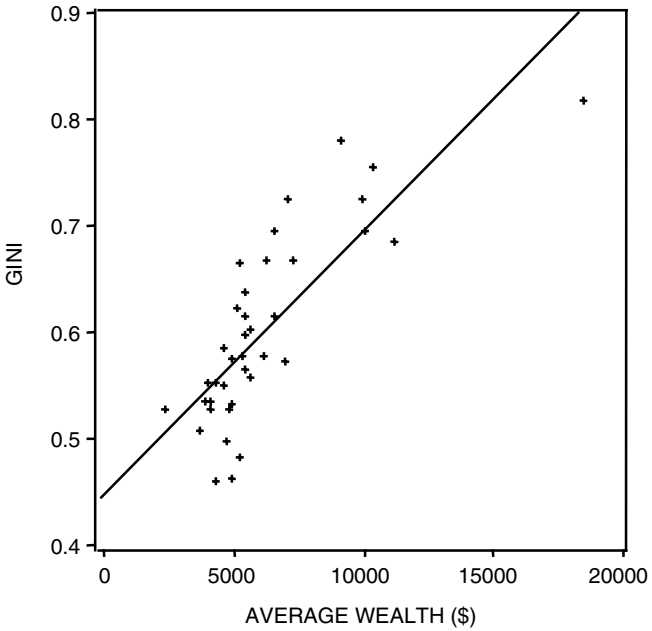

Figure 1 Gini coefficients by county plotted against average wealth (with regression line)

scatterplot does hint at a diminishing rate of growth in inequality as wealth rises, though an inverse U-shaped Kuznets-type relationship is not readily evident.

In Table 2, average wealth and the value of the Gini are provided for the micro-data by age category, and a three-age-period moving average for these data is plotted in Figure 2. The results suggest that there is indeed a U-shaped relationship between age and inequality in these data, with inequality dropping sharply from the 20s to the early 40s and then rising steeply between 40–44 and 55–69 and continuing to rise less sharply after that. The implication here is that over time, with changes in the composition of the population age structure, there could be an effect on trends in wealth inequality. All other things given, an aging population is likely to be accompanied by an increase in wealth inequality.

In Table 3, inequality and wealth figures are presented for selected subgroups in the data. The average level of wealth for the data set is $7,427 with

Table 2 Statistics by age categories

Age category	Average wealth ($)	Gini
20–24	2,607	0.76
25–29	2,405	0.61
30–34	4,206	0.69
35–39	3,310	0.53
40–44	4,906	0.61
45–49	5,467	0.61
50–54	10,518	0.74
55–59	7,147	0.63
60–64	8,118	0.65
65–69	9,591	0.70
70–74	8,009	0.66
75–79	9,139	0.72
80–84	7,558	0.62
85–89	8,669	0.74

a Gini of 0.69. This is indeed a high level of inequality and fits in well with the range of other estimates from the nineteenth century.[25] In general, the average wealth of Roman Catholics, those without children, farmers, females, and rural dwellers was lower relative to their respective comparison group. The largest differences in wealth inequality across comparison categories exist for farmers versus non-farmers and rural dwellers versus urban dwellers. Again, these results suggest that counties that are more agricultural and rural have lower wealth inequality than urban ones. Birthplace, religion, and gender, however, do not appear to be associated with large differences in wealth inequality.

Regression analysis is used to examine the determinants of wealth inequality across county/district divisions by regressing the county Gini and Theil coefficients on a variety of county characteristics to see what the important correlates or determinants of wealth inequality are. [The variables used are defined in Table 4 and the results from four separate specifications are presented in Tables 5 and 6.] Variables aside from the level of wealth were used in recognition of Williamson's view (1996, 1998; Higgins and Williamson 1999) that inequality is not driven by changes in wealth/income alone but can be a

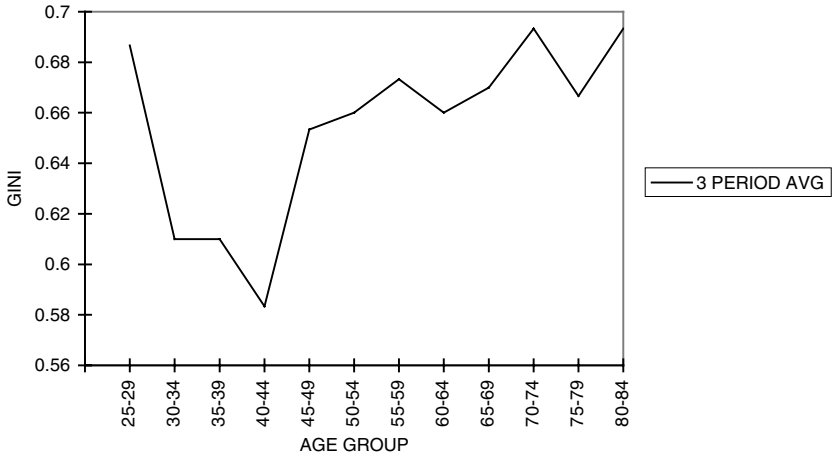

Figure 2 Inequality by age group

function of other factors such as public policy, institutions, schooling, natural resource endowments, and demography.

Specification (1) in both Tables 5 and 6 is an unconditional Kuznets curve. It regresses the Gini and Theil coefficients on wealth and wealth-squared and finds a Kuznets curve with significant coefficients at the 5% level. Specification (2) omits the wealth variable but includes other variables that could be associated with inequality, including regional dummies (the Golden Horseshoe as the omitted category), a portfolio variable (the ratio of average real estate to average wealth), a literacy variable,[26] an age-distribution variable defined as the proportion between ages 30 and 44,[27] and a skilled trades variable to capture the potential effects of skills deepening. Specification (3) combines (1) and (2) while specification (4) is a reduced version of (3) in which only those variables in (3) with a t-statistic near the absolute value of one or higher were included. Relative to (3), specification (4) provides a better fit in terms of the adjusted R-squared and its coefficients have overall greater significance.[28] The regression results for the Gini and Theil coefficients generally parallel one another.

The key determinants of wealth inequality across these counties are average wealth, the proportion of population aged 30–44, the proportion employed as farmers, the ratio of average real estate wealth to average wealth, and

Table 3 Inequality and wealth by selected subgroups

	Proportion (%)	Average wealth ($)	Gini
All	100	7,427	0.69
Canadian-born	38.4	7,356	0.70
Non–Canadian-born	61.6	7,472	0.68
Roman Catholic	10.8	5,554	0.66
Non–Roman Catholic	89.2	7,653	0.69
With children	78.6	8,001	0.67
No children	21.4	5,322	0.73
Farmers	46.5	5,899	0.50
Non-farmers	53.5	8,755	0.78
Males	76.6	8,687	0.68
Females	23.4	3,314	0.64
Urban	42.1	10,803	0.77
Rural	57.9	4,973	0.54

the proportion that is literate. Essentially, after controlling for farm employment, in counties where real estate made up a higher share of one's portfolio and with higher literacy rates, there was greater wealth equality. There is a negative and significant relationship between the proportion of the population aged 30–44 and inequality in these results.[29] Gender, proportion in skilled trades, urbanization, birthplace, religion, region of residence, and number of children are not significant determinants of wealth inequality. The insignificance of gender, in particular, seems counterintuitive given that average female wealth is significantly below male wealth. However, given that the proportion male was strongly correlated with the proportion farmer, it would suggest that the effect of gender was not significant when farm employment was controlled for.

Overall, the results in Tables 1–3 and 5–6 and Figures 1–2 provide some evidence supporting the existence of a Kuznets-type U-shaped inequality curve. However, the Kuznets curve is not unconditional and other factors are also important in determining inequality. The regression results suggest that as average wealth across counties increased, inequality did also but it would eventually decline after wealth peaked at about $18,000. Given the slow rate of decline in inequality after peaking, it can be surmised that Ontario counties in the late nineteenth century, while at various stages of the inequality-

Table 4 Variables used in regression analysis (continued on next page)

Variable	Definition
Average wealth	Total wealth of county/district probated decedents divided by number of decedents
Average age	Average age of probated decedents in county/district
Proportion aged 30–44	Proportion of probated decedents in county/district aged 30–44
Proportion male	Percentage of male probated decedents in county/district
Proportion farmer	Percentage of probated decedents in county/district who were farmers
Proportion skilled trades	Percentage of probated decedents in county/district who were in skilled trades defined as Katz Occupational Category III[a]
Proportion urban	Percentage of probated decedents in county/district who were urban dwellers[b]
Proportion Canadian-born	Percentage of probated decedents in county/district who were Canadian-born
Proportion Roman Catholic	Percentage of probated decedents in county/district who were Roman Catholic
Ratio of average real estate to average wealth	Ratio of the average value of probated real estate in the county/district to average probated wealth in that county/district
Average number of children	Average number of children per probated decedent in county/district

[a] These are socioeconomic occupational status categories with OCC1 as the highest, OCC5 as the lowest, and OCC6 as an unclassifiable (see Katz 1975: 343–48). Category OCC1, for example, contains lawyers, merchants, doctors, etc. Categories OCC2F includes farmers, while OCC2NF contains minor government officials and small businessmen. Category OCC3 includes skilled tradesmen, such as blacksmiths, while OCC4 contains barbers and restaurant workers. Category OCC5 is mainly unskilled labor, while OCC6 is unclassifiable. OCC6 contains mainly women.

[b] Urban is defined as a resident of a city, town, or village.

development relationship, were nevertheless mainly in the upward sloping portion of a conditional Kuznets curve. That is, at this stage in their economic development, economic growth was accompanied by rising inequality, though this insight should be tempered by the fact that the data are a cross-section.

When specification (1) is compared with final specification (4), the results suggest that demand side forces associated with the technological and struc-

Table 4 Continued

Variable	Definition
Eastern [c]	1 if an Eastern Ontario county/district and 0 otherwise
Western	1 if an Western Ontario county/district and 0 otherwise
Northern	1 if an Northern Ontario county/district and 0 otherwise
Huronia	1 if county/district in Huronia, 0 otherwise
Golden Horseshoe	1 if county in Golden Horseshoe, and 0 otherwise
Proportion literate	Percentage of county/district probated decedents who were literate (could read and/or write according to the census)
First settlement before 1812 [d]	1 if county/district first settled agriculturally by Europeans prior to 1812 and 0 otherwise

[c] The counties in each of the regional dummies are as follows: NORTHERN: Renfrew, Districts of Muskoka and Parry Sound, Sudbury-Nipissing, Algoma, Manitoulin, Kenora and Rainy River, and Thunder Bay; GOLDEN HORSESHOE: Wentworth, Lincoln, Welland, Peel, Halton, and York; WESTERN: Haldimand, Norfolk, Elgin, Kent, Essex, Lambton, Middlesex, Oxford, and Brant; HURONIA: Waterloo, Perth, Huron, Wellington, Bruce, Grey, Simcoe, and Dufferin; EASTERN: Ontario, Victoria and Haliburton, Durham and Northumberland, Peterborough, Hastings, Prince Edward, Lennox and Addington, Frontenac, Leeds-Grenville, Dundas-Glengarry-Stormont, Oprescott and Russell, and Carleton and Lanark.
[d] As defined by McInnis 1991: Appendix 2.

tural economic change that drive the Kuznets curve account for most of the inequality during this period. The unconditional Kuznets curve appears to explain about 65% of the variation in inequality across counties. Meanwhile, the conditional curve explains about 80%. Again, these results reinforce the conclusion that the Kuznets-curve relationship cannot be taken as unconditional.

The ratio of average real estate to average total wealth suggests that the rising importance of financial assets in wealth holding and the decline in the importance of real estate during the late nineteenth century may have made a contribution to inequality, though the exact mechanism is not obvious. The late nineteenth century saw an expansion of the financial sector and asset holding in Canada (see Neufeld 1972; Shearer et al. 1995: 405; and Di Matteo 1997: 908), as well as in other countries, and this shift in economic behavior, while associated with urbanization and the decline of agriculture, nonetheless may have been of some importance in its own right. In Wentworth County,

Table 5 Regression results: Gini coefficient

Independent variable	(1)	(2)	(3)	(4)
Constant	−0.964	0.745	0.168	0.130
	(−13.09)	(1.24)	(0.38)	(0.44)
Average wealth	0.914E-04	—	0.747E-04	0.713E-04
	(5.40)		(5.32)	(7.78)
Average wealth, squared	−2.728E-09	—	−2.384E-09	−2.229E-09
	(−3.74)		(−3.77)	(−5.59)
Proportion aged 30–44	—	−0.007	−0.006	−0.006
		(−1.03)	(−1.70)	(−2.39)
Proportion male	—	0.001	−0.000	—
		(0.230)	(−0.01)	
Proportion farmer	—	−0.004	−0.003	−0.004
		(−1.06)	(−1.06)	(−2.83)
Proportion skilled trades	—	0.001	−0.001	—
		(0.09)	(−0.16)	
Proportion urban	—	0.002	0.000	—
		(0.71)	(0.06)	
Proportion Canadian-born	—	−0.003	−0.000	—
		(−0.93)	(−0.14)	
Proportion Roman Catholic	—	0.003	0.000	—
		(1.21)	(0.02)	
Ratio of average real estate to average wealth	—	−0.010	−0.005	−0.005
		(−4.93)	(−2.46)	(−3.26)
Average number of children	—	0.042	−0.018	—
		(0.75)	(−0.501)	
Eastern	—	0.028	0.027	0.033
		(0.49)	(0.68)	(0.98)
Western	—	0.064	0.028	0.033
		(1.22)	(0.52)	(0.75)
Northern	—	−0.071	0.081	0.079
		(−0.67)	(1.07)	(1.62)
Huronia	—	−0.045	0.029	0.025
		(−0.53)	(0.38)	(0.60)
Proportion literate	—	−0.008	−0.006	−0.006
		(−1.77)	(−1.79)	(−2.27)
First settlement before 1812	—	0.020	0.003	—
		(0.47)	(0.09)	
Adjusted R^2	0.65	0.48	0.73	0.80
F-statistic	35.26	3.31	6.91	15.66

Note: Ordinary least squares // dependent variable is log of Gini coefficient; number of observations: 38// t-statistics in brackets underneath; heteroscedasticity-consistent covariance matrix.

Table 6 Regression results: Theil coefficient

Independent variable	(1)	(2)	(3)	(4)
Constant	−1.555	3.456	1.927	1.721
	(−6.65)	(2.00)	(1.46)	(2.11)
Average wealth	0.250E-04	—	0.182E-04	0.184E-04
	(4.57)		(4.72)	(7.06)
Average wealth, squared	−7.407E-09	—	−5.270E-09	−5.284E-09
	(−3.18)		(−3.09)	(−4.72)
Proportion aged 30–44	—	−0.019	−0.018	−0.017
		(−1.16)	(−1.83)	(−2.27)
Proportion male	—	0.005	0.128E-04	—
		(0.36)	(0.01)	
Proportion farmer	—	−0.014	−0.010	−0.008
		(−1.16)	(−1.07)	(−2.08)
Proportion skilled trades	—	−0.003	−0.003	—
		(−0.15)	(−0.21)	
Proportion urban	—	0.004	−0.001	—
		(0.59)	(−0.14)	
Proportion Canadian-born	—	−0.006	−0.278E-04	—
		(−0.82)	(−0.05)	
Proportion Roman Catholic	—	0.009	0.002	—
		(1.44)	(0.32)	
Ratio of average real estate to average wealth	—	−0.031	−0.02	−0.017
		(−4.97)	(−3.03)	(−3.81)
Average number of children	—	0.146	−0.013	—
		(0.93)	(−0.13)	
Eastern	—	0.055	0.070	0.093
		(0.34)	(0.708)	(1.14)
Western	—	0.243	0.154	0.155
		(1.60)	(1.10)	(1.27)
Northern	—	−0.228	0.198	0.222
		(−0.86)	(1.05)	(2.06)
Huronia	—	−0.064	0.143	0.152
		(−0.28)	(0.70)	(1.36)
Proportion literate	—	−0.025	—0.018	−0.018
		(−1.99)	(−2.04)	(−2.67)
First settlement before 1812	—	0.014	−0.028	—
		(0.113)	(−0.26)	
Adjusted R^2	0.64	0.47	0.71	0.78
F-statistic	33.21	3.20	6.31	14.22

Note: Ordinary least squares // dependent variable is log of Theil coefficient; number of observations: 38// t-statistics in brackets underneath; heteroskedasticity-consistent covariance matrix.

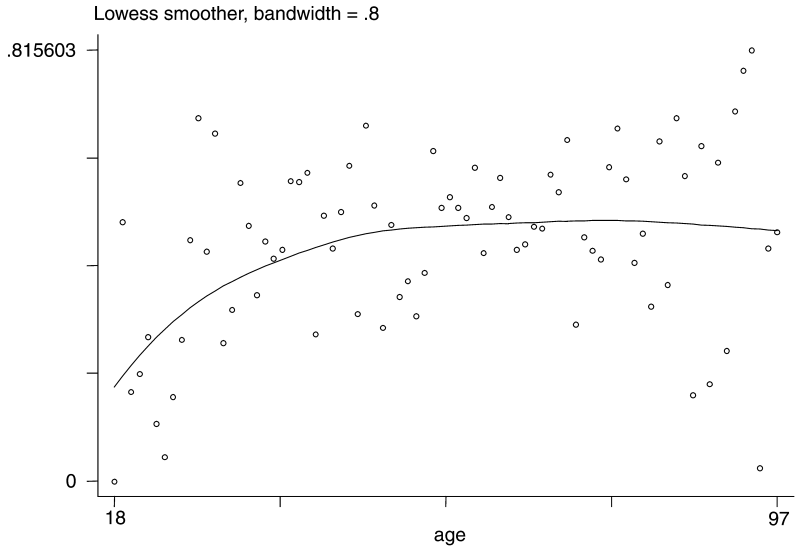

Figure 3 LOWESS profile between average real estate to average wealth ratio (realestw) and age of probated decedents

Ontario, the period 1882 to 1902 was marked by a growth in aggregate financial asset holding as well as an increase in the proportion of wealth held as financial assets (Di Matteo and George 1992: 460). Evidence on nineteenth-century wealth accumulation over the life cycle also suggests that individuals sought first to build up their real estate values and later on diversified into financial assets.

A possible explanation is that individuals engaging in the process of family formation would place many of their assets in home and real estate ownership, leaving significantly fewer resources to place toward financial assets. Also, single individuals would often use financial assets as a saving mechanism prior to family formation and then use them to buy a house. Research for the United States using a 1889 Maine survey of laborers found the incidence of home ownership rose with age, whereas bank account ownership fell, implying that young workers saved in banks until they had accumulated enough to purchase a house (Ransom and Sutch 1986). Alter et al. 1994 finds that in nineteenth-century Philadelphia, men used savings accounts to amass funds before acquiring physical property. These results suggest a definite preference for real estate ownership over renting when it came to family formation, and

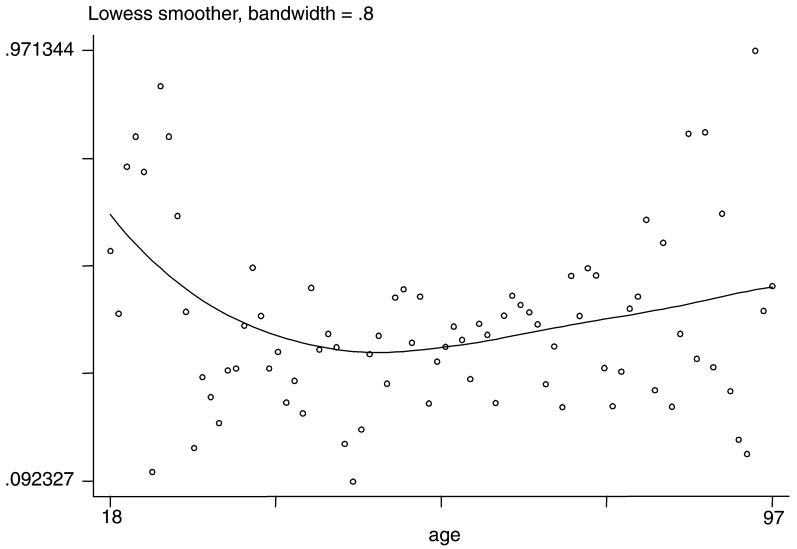

Figure 4 LOWESS profile between average financial assets to average wealth ratio (finw) and age of probated decedents

as a result, portfolio allocation is associated with the family and economic life cycle.

Figures 3 and 4 use a nonparametric curve-fitting technique known as locally weighted scatterplot smoothing (LOWESS) to examine the movement of the average real estate to average wealth and the average financial asset to average wealth ratios against age.[30] The figures show the average real estate to wealth ratio by age rising steeply to a value of approximately 0.48 by age 55 and then leveling off. The average financial asset to wealth ratio, however, is U-shaped, reaching its minimum at age 50 at a value of approximately 0.35 and then rising. These profiles are consistent with the aforementioned process of savings behavior over the life cycle. Furthermore, these maximum and minimum portfolio share values both occur after the age range (40–44) at which inequality reaches its minimum and then begins to rise.

That some expansion of financial asset holding in late-nineteenth-century Canada was due to demographic and life-cycle forces meshes well with the observation that inequality at first declined during the early working years and then increased. The decrease in inequality during the early working years may have been the result of the emphasis on real estate accumulation during the

Table 7 Asset holding proportions (%) and average values ($): Ontario, 1892

	All decedents		Top 10%		Bottom 10%	
	%	$	%	$	%	$
Household goods and furniture	71	147	87	574	43	29
Farm implements	34	49	36	79	5	3
Stock in trade	7	190	14	1,474	4	3
Horses	39	74	49	132	10	8
Cattle	37	64	38	106	7	3
Sheep and swine	27	16	25	21	4	1
Book debts and promissory notes	34	435	61	2,655	14	18
Moneys secured by mortgages	22	1,030	55	7,342	5	10
Life insurance	10	252	20	1,216	2	6
Bank stocks and other shares	8	570	29	5,151	1	1
Securities	5	141	16	1,088	3	4
Cash on hand	28	73	47	349	15	14
Cash in bank	36	522	60	3,206	34	62
Farm produce	24	52	28	107	4	1
Real estate	74	3,481	94	17,013	27	69
Other property	24	355	35	2,969	28	24
Wealth		7,449[a]		43,481		255

[a] Prince Edward Co. omitted.

initial phase of the life cycle. The increase in inequality in later years could be due to the increase in the relative value of financial assets within individual wealth portfolios. For example, the 1892 micro-data shows that the annual rate of accumulation for real estate for an individual aged 30 was 4.6%, whereas rates of accumulation for specific financial asset categories ranged from 1.0% for cash on hand to 47.3% for stocks (Di Matteo 1997: 919).

A shift in portfolio composition over the life cycle away from real estate and toward financial assets would result in more variable growth rates in wealth accumulation across individuals. Portfolio allocation choices could affect wealth accumulation rates. Table 7 presents data showing the average value and proportion holding assets across the top and bottom 10% of the wealth distribution in the 1892 data. Wealthier individuals were more likely to hold risky assets such as stocks and would do so only if on average their expected return was superior to real estate. Given that individuals with greater

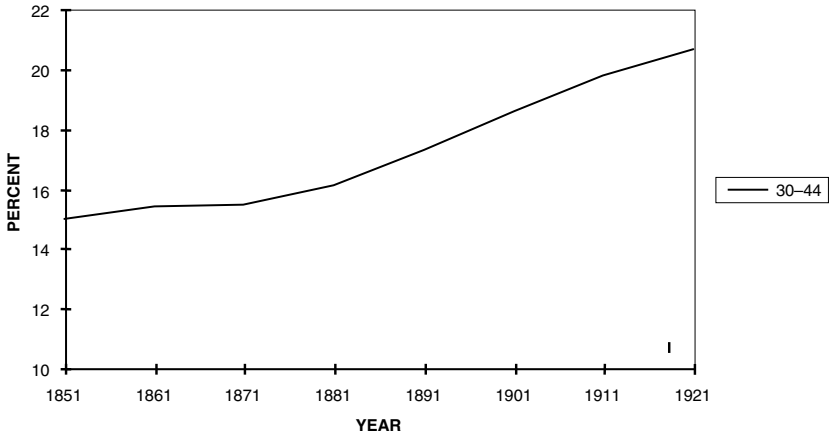

Figure 5 Percentage of Canada's population aged 30–44. Source: Mitchell 1993.

wealth tended to diversify more into higher return financial assets, this behavior would also help foster greater wealth inequality over the later stages of the life cycle. Demographic evidence for Canada, the United States, and the United Kingdom shows an aging population for all three countries during the second half of the nineteenth century.[31] Therefore, a U-shaped inequality-age curve, which may be the result of the effects of changes in portfolio composition over the life cycle, may help explain part of the increase in wealth inequality during the late nineteenth century and early twentieth century.

This evidence shows that an unconditional Kuznets-curve relationship between wealth or income levels and inequality may simply be the result of demographic forces. In the case of Canada, Alan Green's Kuznets-curve puzzle may have a demographic explanation. Although the proportion of population aged 30–44 did increase in Canada between 1851 and 1921 (see Figure 5), the increase is associated with rising rather than diminishing inequality in regional income distribution because the proportion of population aged 45 and over rose even faster. The ratio of the proportion of population over age 45 to that aged 30–44 rose steadily from 1851 to 1901 and then declined slightly through to 1921 (see Figure 6). Overall, this ratio was still higher in 1921 than in 1851, suggesting that overall, the period would be one of rising wealth and income inequality.

The settlement of the Canadian prairies between 1896 and 1929 would

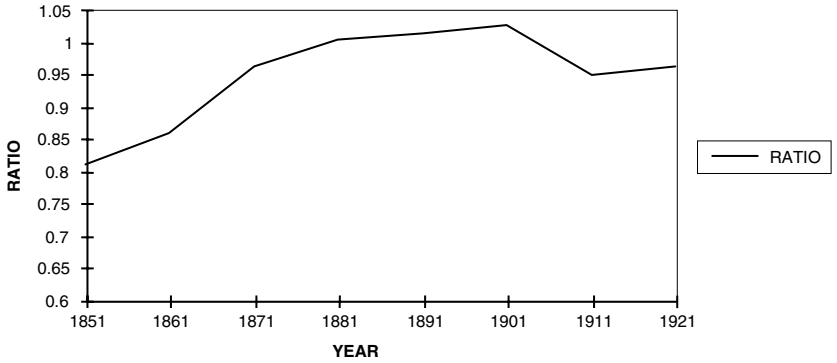

Figure 6 Canadian ratio of population proportion aged 45+ to that aged 30–44. Source: Mitchell 1993.

have exacerbated these forces because the young are generally more mobile than the old and therefore the younger age distribution for the prairies would also have had some effect on wealth and income distributions. With respect to age distribution of population, in 1921 the prairie provinces of Manitoba, Alberta, and Saskatchewan had the lowest proportions of individuals over age 50 (see Table 8). Given that wealth and income both rise with age, the possibility that age differences were a driving factor in fostering regional inequality is worth considering.

Conclusions

The data presented in this article provide insights into the patterns and determinants of late-nineteenth-century wealth inequality. Support is found for the existence of a *conditional* Kuznets-type curve using wealth inequality data from Ontario counties in 1892 while controlling for other factors. Other important determinants of regional differences in wealth inequality are the age composition of the population, the share of wealth held in real estate, the proportion employed as farmers, and the proportion who were literate. These regressions explain nearly 80% of the variation in inequality across counties. Overall, these cross-section results for late-nineteenth-century Ontario suggest that the determinants of wealth inequality are complex and the outcome of interplay among several factors.

While rising wealth levels were associated with greater inequality, lower

Table 8 Age distribution of population for Canada's provinces in 1921

Age category	PEI	NS	NB	QUE	ONT	MAN	SASK	ALTA	BC
<20	42.3	43.8	46.1	48.4	38.8	45.6	48.1	44.6	35.6
20–49	36.0	38.2	37.5	38.2	43.4	42.7	42.7	45.0	49.3
50+	21.7	18.0	16.5	13.5	17.8	11.6	9.3	10.4	15.1

Source: Dominion Bureau of Statistics (1921) Census of Canada, 4: xix.

inequality was associated with having a larger population proportion in the 30–44 age bracket (essentially the same as a decrease in the ratio of those aged 45 and over to those aged 30–44).[32] In addition, greater literacy, greater farm employment, and a higher proportion of wealth in real estate were associated with greater wealth equality. The relationship between age and inequality may be the result of changes in portfolio allocation over the life cycle away from real estate and into financial assets. Moreover, the general trend toward greater financial asset ownership in the late nineteenth century may also have had a role to play in generating an increase in inequality. Given that the greater risk of financial asset holding was accompanied by greater returns, higher financial asset accumulation rates could have led to greater inequality.

Notes

The financial assistance of the Social Sciences and Humanities Research Council and the research assistance of Rosanna Di Matteo is acknowledged. The comments of three anonymous referees and suggestions provided by Jeffrey Williamson are also gratefully acknowledged.

1 For Canada: Siddiq 1988; Osberg and Siddiq 1988, 1993; Darroch 1983; Di Matteo and George 1992; Gwyn and Siddiq 1992; and Darroch and Soltow 1994. For the United States: Burchell 1987; Bolton 1982; Soltow 1979, 1975; Atack and Bateman 1981; Newell 1980, 1986; Herscovici 1993; Pope 1989; and Gregson 1996. A notable exception to these results are those by Gerard Bouchard (1998) for the Saguenay region of Quebec. Bouchard finds that the Saguenay was far more egalitarian than the provinces of Ontario and Nova Scotia, which in turn were more egalitarian than the United States.

2 The Gini coefficient takes on a value between 0 and 1 with 0 as perfect equality and 1 as perfect inequality. The Theil coefficient uses information theory to interpret individuals as events and their wealth share as probability and then proceeds to construct

an index. It ranges from 0 to infinity with larger values being associated with greater degrees of inequality. The coefficient of variation is equal to the standard deviation of a distribution divided by its mean and is a measure of relative dispersion. Larger coefficients of variation are associated with greater inequality. For a discussion of various inequality measures, see Cowell 1977.

3 The use of cross-section micro-data to make inferences about changes over time is subject to a number of potential biases that have been illustrated in micro-data literature dealing with age and wealth in particular. Shorrocks 1975a first pointed out that the age-wealth relation observed in a cross-section can differ from the true age-wealth profile. As Jianakoplos et al. 1989 demonstrates, cross-section wealth-age profiles suffer from two sources of bias: differential mortality and cohort effects. On one hand, because of differential mortality, that is, the poor dying younger and the rich dying older, the estimated age-wealth profile is steeper than would be observed if the same individuals were followed over time. On the other hand, with the cohort effect, since younger birth cohorts have higher incomes on average because of productivity growth over time, the wealth-age profile appears flatter than would be observed over time. Attempts to deal with these issues have included adjustments to the data (Mirer 1979) and the use of panel data (Hurd 1987). Historical wealth studies have relied on cross-section data mainly because of availability. Availability has also been the determining factor in the use of cross-sectional data for international studies of inequality.

4 See Deininger and Squire 1996, 1998. The authors argue that studies using cross-section country income data should be based on nationally representative surveys, should encompass all types of income, and should cover the entire population rather than subsets. While in theory these principles are easily agreed upon, they are difficult to implement consistently across available modern data.

5 According to Jeffrey Williamson (1965: 44), "increasing regional inequality is generated during the early development stages, while mature growth has produced regional convergence or a reduction in differentials."

6 The strict Kuznets curve argues that demand side forces associated with technological and structural economic change favor the demand for capital and skills that first worsens inequality and then is moderated during a catch-up phase. Globalization and economic openness leads to trade, which leads to changes in factor demands and incomes, which then can affect inequality. Finally, the cohort effect finds that large mature earnings age cohorts (as opposed to young or old cohorts) are associated with lower inequality. See Higgins and Williamson 1999.

7 Among the studies that have fallen into this category are Chenery et al. 1974; Ahluwalia 1976; Anand and Kanbur 1993; and most recently, Deininger and Squire 1996.

8 According to Green, in Canada, the period 1890 to 1910 saw a widening of regional income inequality with the disparity widening further from 1910 to 1929 and then some narrowing between 1929 and 1956. Inwood and Irwin 1998 (23) calculates descriptive income inequality measures for 1870 and 1890. Using districts weighted by

population, the authors find that the value of the Gini coefficient in Canada was 0.14 in 1870 and 0.15 in 1890. As well, the income shares of the wealthiest and poorest fifth of the population remained about the same at 27% and 13%, respectively.

9 A related work, Beaulieu and Emery 1998, advances the hypothesis that the linkages from the prairie wheat economy were probably not very significant to Ontario relative to the importance of the Ontario economy itself. In other words, Ontario and the prairie provinces may not have been as interdependent as the staples theory requires, and as long as markets are not well integrated, one would expect continued divergence rather than convergence in regional wealth and income even in the presence of robust growth.

10 Early work in the life-cycle/permanent income hypothesis includes Friedman 1957 and Ando and Modigliani 1963. For a discussion of life-cycle saving motivation and behavior, see Shorrocks 1975a; King 1985; Modigliani 1988; Kotlikoff 1988; Kessler and Masson 1989; Hurd 1990; and Burbidge and Davies 1994. For examples of work using the life cycle in economic history, see Haines 1985; Sutch 1991; Main 1983; Jones 1980; and Kearl and Pope 1983.

11 Sources for the data set were (1) Public Archives of Ontario, Surrogate Court Wills, 1892, and (2) Public Archives of Canada, Census of Canada, 1891, Manuscripts. Prince Edward County recorded assets only as real estate and personal property and therefore detailed asset data were not available.

12 Intestates are decedents without a will. Approximately 27% of probated decedents in the final data set were intestate.

13 According to Howell 1880 (325–26), "The inventory should contain a statement of all the goods, chattels, wares and merchandize, as well moveable as not moveable, which were of the person deceased at the time of his death within the jurisdiction of the court. A proper inventory should enumerate every item of which the personal estate consisted, and should specify the value of each particular. But unless by order of court, or in obedience to a citation, an inventory does not set forth the goods and chattels in detail." The instructions for probate do not specify how the value of an asset was assigned. In the case of real estate, livestock, and personal property, the evidence suggests that market value determined value. Sometimes, property was sold and its selling price recorded in the inventory, whereas more often it was an estimate of what the property would fetch if sold. Fortunately, financial assets by their nature were precisely recorded. Mortgages held, the amount of insurance payments, and bank account balances were usually fairly precise amounts. In addition, real estate was usually recorded net of any mortgages outstanding so that the wealth figure used in this article is a measure of net wealth.

14 The inventory categories were (1) household goods and furniture, (2) farm implements, (3) stock in trade, (4) horses, (5) cattle, (6) sheep and swine, (7) book debts and promissory notes, (8) moneys secured by mortgage, (9) life insurance, (10) bank stocks and other shares, (11) securities, (12) cash on hand, (13) cash in bank, (14) farm produce, (15) real estate, and (16) other personal property.

15 Discussions of Ontario probate records as sources of historical data are contained in Elliott 1985 and Osborne 1980. See also Siddiq and Gwyn 1991.

16 When studying the wealth holding of the general population, an attempt can be made to adjust the data for potential biases using the estate multiplier technique. See Siddiq and Gwyn 1991: 103–17; Wagg 1990: 74–87; and Di Matteo and George 1992: 453–83. One can also attempt to control for these biases using weighted regression where the data are weighted by the inverse age-sex specific mortality rates thereby giving younger individuals a larger weight in the regression. See Di Matteo 1996: 220. As well, it should be noted that for Wentworth County, Ontario, over the period 1872 to 1892, based on estates probated and reported adult deaths in the census, the proportion of individuals probating estates rose from about 20% to over 30%.

17 A noted scholar of Ontario's civil registration of vital events statistics, George Emery (1993: 32–34), writes: "For years after 1869 Ontario's civil registration of vital events was unsatisfactory. Although its legislative provisions surpassed Quebec's, Ontario was less successful in obtaining registrations . . . the registrar-general estimated that registrations for 1870 captured only a fifth of the province's deaths." By 1893, reported death rates for municipalities ranged from 26 to 2 per thousand.

18 Approximately 13% of the individuals in this data set reported wealth greater than $10,000 and less than 1% reported wealth greater than $100,000. Nevertheless, in an effort to see whether the onset of the Succession Duty Act did have an impact on wealth, wealth was sorted by month of death to see whether wealth probated in the first six months of the year was significantly higher than wealth probated in the latter six months. Average wealth in the first six months was higher ($7,800 versus $6,974) but this was due to the first quarter. When broken down by quarter, average wealth was $8,409 (January–March), $6,883 (April–June), $7,221 (July–September), and $6,756 (October–December). Approximately 35% of deaths occurred in the first quarter and the average age at death was also highest in the first quarter. These results, therefore, are more reasonably ascribed to the propensity of the elderly (who, because age and wealth are correlated, would also tend to be wealthier) to die during the severe Canadian winter than to any effect of the Succession Duty Act.

19 A report on the Succession Duty Act in the *Welland Tribune* (1 April 1892: 2) asserts, "The act provides for evasion by transfers before death, although the fear of revival makes such attempts very rare." More to the point, for the purposes of studying wealth, an *inter vivos* bequest is in principle really no different than choosing to consume one's wealth in some other way in the period prior to death. It becomes a more serious issue only if one is using the data to study bequest patterns rather than terminal wealth levels.

20 There are also some concerns about the 1891 Census of Canada. The results were originally attacked by the Liberal opposition on the grounds that an overenumeration in the range of 250,000 to 300,000 had taken place, though it was difficult to fathom whether the overestimates were due to a political conspiracy or whether they followed from the practice of paying enumerators according to the number of establishments

reported (Pomfret 1993: 64). For the purposes of tracing probated decedents for this study, however, overenumeration is not a problem. Whereas underenumeration hinders researchers' opportunities to link records, overenumeration imposes no such limits.

21 Some of these omitted probated decedents were residents of other provinces of Canada, the United States, and Britain but with property in Ontario. Other omitted individuals were Ontario residents who died before the taking of the census (in April 1891) and therefore would not have been recorded in the census schedule of the living. There often was a lag between the date of death and the probating of the estate. For example, in some intestate cases, time was expended searching for a will. As well, there were sometimes complicated intestate estates with incomplete administrations. For example, an individual could die intestate and the surviving spouse apply for administration of the estate and in turn die leaving the administration incomplete. If there were no surviving children or none resident in the immediate vicinity, it could take many months to apply for probate and settle the estate.

22 About 17% of traceable decedents could not be located in the census. A regression of the success rate in tracing on the proportion of urban probated decedents in each county found a negative relationship, but it was not significant at the 5% level. Since many characteristics, such as age, birthplace, and religion were not available for these individuals, they were not entered for analysis. However, in an effort to see what some of the characteristics of these individuals might be, data for these individuals on gender, whether testate or not, and their wealth were entered for the counties of York, Wentworth, Carleton, and Essex and compared with the traced decedents for those counties. In all four counties, the traced decedents were more likely to be testate. As well, the proportion of female was higher in the untraced decedents except for Carleton. As for average wealth, it was higher for the traced decedents in York, Wentworth, and Essex and lower in Carleton.

23 For a comparison of the characteristics of the 1892 probated decedents to the 1891 Census results for Ontario, as well as a description of the variables in the data set, see Di Matteo 1996, 1997.

24 The positive relationship between inequality and wealth also offers an explanation for why the Saguenay region had low inequality. See Bouchard 1998. Average real estate wealth over the period 1879 to 1949 seems low when compared with nineteenth-century figures for both Nova Scotia and Ontario. The relatively more equal distribution of wealth in the Saguenay may have been a function of weaker economic growth and development and associated lower levels of wealth.

25 Gini coefficient estimates for the late nineteenth century for Wentworth County, Ontario; Nova Scotia; Toronto; Massachusetts; and Wisconsin range from 0.598 to 0.893. See Di Matteo and George 1992: 481; see also Bouchard 1998: 680.

26 A literacy variable can be partly interpreted as a policy variable. In the nineteenth-century economy, the extension of public education can be seen as an attempt to build human capital to cope with the needs of an industrial economy. In Ontario, the advent

of compulsory schooling in 1871 led to a high level of literacy among the population by century's end. The proportion of individuals in this data set who could read and write was 90%, whereas the 1891 Census of Canada reported that 92% of Ontario's population over age 10 could read and write.

27 This definition of "mature" differs from that used by Williamson, but it is based on the results plotted in Figure 2, which shows ages 30–44 associated with low Gini coefficients.

28 Specification (4) for both the Gini and Theil coefficients was subjected to sensitivity runs in which the top and bottom 5% of counties as ranked by average wealth were dropped. The results generally paralleled those presented in Tables 5 and 6 in terms of coefficient signs and significance.

29 The regressions were also run using average age rather than the age proportion variable. The results showed a positive relationship between age and inequality. But, as expected, it was not significant at the 5% level, since the range of average ages across these counties is quite limited. Across the 38 county/district divisions, the maximum average age was 66.2 years and the minimum, 50.7. This finding is to be expected, since the data is from probate records and therefore more likely to contain the elderly.

30 LOWESS is a nonparametric regression technique that estimates a line of best-fit without assuming a specific functional form and therefore can better capture patterns and trends in the data. A parametric approach to Figures 3 and 4 would involve regressing the respective ratios on age and age-squared. In fitting LOWESS curves, the crucial decision involves the size of the smoothing parameter or bandwidth over which the locally weighted regressions used in the estimation process are estimated. The bandwidth is the range of data over which the smoothing is done. For example, a 0.2 bandwidth uses 20% of the data, while 0.8 uses 80%. Larger bandwidths provide greater degrees of smoothing, while smaller bandwidths provide more variation in the final smoothed curve. The curves in Figures 3 and 4 are estimated with maximum bandwidths available (0.8) in Stata 4.0. Estimates were also conducted with bandwidths of 0.2 and 0.5 and yielded similar results but with more variation. For references on LOWESS, see Cleveland 1979, 1985, and 1993. For LOWESS applied to historical research as well as a more detailed explanation, see Di Matteo 1998.

31 Between 1871 and 1911, the proportion of Canada's population under age 20 dropped from 53% to 43%. Over the same period, the proportion of population aged 20 to 49 grew from 36% to 44% and that over 50 from 11% to 14%. For the United States, in 1850, 52% of the white population was under age 20 and this figure declined to 43% by 1900. The proportion aged 20 to 49 rose from 39% to 43% and that between 50 and 79 rose from 9% to 13%. The United Kingdom between 1841 and 1901 saw the proportion under age 20 decline from 46% to 42%. The proportion between ages 20 and 49 rose from 40% to 43% and between ages 50 and 69 rose from 11% to 12%. Source: Mitchell 1992, 1993.

32 With respect to the regression results in Table 5, an increase in the proportion of a

county's population aged 30–44 is generally equivalent to a decrease in the share aged 45 and over because of the absence of younger individuals due to the nature of probate data. In the 1892 probate data set, 81% of the individuals were over age 40, 14% were aged 30 to 44, and only about 5% were below age 30.

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