Age, Wealth, and Portfolio Composition: A Quantile Approach

By

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Abstract

Quantile regression analysis is used to estimate wealth-age profiles from late nineteenth and early twentieth century Ontario in an effort to examine the sensitivity of the wealth-age profile across wealth levels and the differential effect of other socio-economic variables. The distinctive hump-shaped wealth-age profile indicative of life-cycle saving is more prevalent at lower wealth quantiles suggesting that the tendency towards bequest type behaviour rises with wealth. However, the magnitude of the wealth declines after peak wealth on average left all individuals with substantial terminal wealth more indicative of a bequest motive. In addition, characteristics such as birthplace and religion were more important at higher wealth quantiles. These results suggest that the predominant motive for saving was a bequest motive and that a life-cycle transition was not yet fully underway.

Introduction

Wealth-age profiles of probated decedents from late nineteenth and early twentieth century Ontario are examined using quantile regression analysis in an effort to examine the sensitivity of the wealth-age profile across wealth levels as well as the differential effect across wealth levels of other socio-economic variables. This approach addresses the question of whether savings motives differed across wealth levels as well as if the benefits of nineteenth century economic growth were concentrated at higher socio-economic levels. Were the poor more likely to be characterized by life-cycle saving than the rich suggesting that bequest saving is a "wealth elastic" activity? Were growth rates for wealth higher at the upper end of the wealth distribution?

Whether saving is the result of precautionary, bequest or life cycle motives has consequences for long-term capital accumulation, economic development and income and wealth distribution.[1] The conventional test for life-cycle saving behaviour is the existence of a hump-shaped wealth-age profile while the presence of terminal wealth and an upward-sloping wealth-age profile is traditionally interpreted as evidence of bequest saving behaviour. However, the presence of terminal wealth on its own does not necessarily imply the existence of a bequest motive for if lifetime is uncertain, even life cycle savers can die with positive wealth levels.

There is a substantial literature on historical wealth determinants and inequality in North America, with the key determinant variables focused on occupation, ethnic origin, birthplace, urbanization and age. In addition, there is a literature that makes the case that in the United States, the nineteenth century saw a transition from target-bequest to life-cycle saving that coincided with a drop in fertility and a rise in aggregate saving as financial assets were substituted for children.[2] This transition helped fund the development of financial intermediaries and capital accumulation that helped foster the industrialization of the United States. The presence of data from 1892 and 1902 allows the opportunity to see whether or not such a transition might also mark Canadian data.

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[1] Keynes conveniently summarized the motives for saving as "Precaution, Foresight, Calculation, Improvement, Independence, Enterprise, Pride and Avarice," (Keynes, 1936/1973, 108).

[2] See Easterlin (1976), Sundstrom and David (1988) for the bequest literature. See Ransom and Sutch (1986a, 1986b, 1986c), Sutch (1991) and Carter, Ransom and Sutch (2004) for the life-cycle transition.

Empirical specifications employing an age and age-squared specification as a test for the presence of life-cycle saving have commonly used the specification on aggregate sets of data and have not adjusted for differential behaviour in the wealth-age profile across wealth levels. Moreover, by using standard linear regression estimation techniques, the results may be affected by the presence of extreme wealth observations. One solution is to perform quantile regressions as the technique helps deal with outliers as well as allows for the analysis of differences in relationships across the distribution of a variable.

Literature

The economic literature on saving and wealth addresses the importance of life cycle and other saving motives such as precautionary or bequest motives.[3] Life cycle saving is the accumulation of assets during working years to finance consumption during a period of non-working activity while the bequest motive is the accumulation of assets during productive years in order to provide an inheritance usually to offspring but sometimes to other beneficiaries. Precautionary savings are the accumulation of assets to deal with short-term unforeseen economic events.

Aside from precautionary savings, which is generally viewed as a short term saving motive, these motives can all be viewed as having provision of old age security as their goal. However, the bequest motive emphasizes familial obligations in meeting old age consumption whereas the life cycle motive stresses more impersonal market relationships. Whether saving is precautionary, bequest or life cycle driven can have consequences for long-term capital accumulation and economic development along with the distribution of income and wealth.[4] The life-cycle model predicts that without a

[3] For an overview of the life-cycle model of consumption and saving see Browning and Crossley (2001).
[4] The modern literature emphasizes lifecycle and bequest motives. See Shorrocks (1975), Davies (1981), Kotlikoff and summers (1981), King (1985), Modigliani (1988), Kotlikoff (1988), Kessler and Masson (1989), Hurd (1987, 1989, 1990, 1997), Bernheim (1991), Arrondel, Perelman and Pestieu (1994), Burbidge and Davies (1994), Menchik (1980), Menchik and David (1983), David and Menchik (1988), Gokale et al (2001).

bequest motive, wealth should begin declining at some age while a bequest motive should mean that more wealth is held at any age.[5]

In addition, models of bequest behaviour are also classified into 'voluntary' or 'accidental' categories.[6] Accidental bequests are an extension of the life-cycle framework with imperfect information regarding life span. Voluntary bequests, on the other hand are further subdivided into altruistic, egoistic and exchange motives.[7] Under altruistic motives, a household cares about its consumption and the consumption of descendants while under egoistic motives, parents derive utility from the amount bequeathed rather than the amount descendents can actually consume. Finally, under exchange motives, parents value attention or services from children and engage in strategic behaviour as larger bequests can yield more attention.[8]

Another option is to see bequests and life-cycle saving as part of more intertwined rather than compartmentalized patterns of behaviour. For example, Davies (1981) sees bequests as accidental due to life-cycle behaviour under an uncertain lifetime making it difficult to separate out bequest from life-cycle behaviour. Dynan, Skinner and Zeldes (2002) argue bequests are simply the result of a precautionary savings/life-cycle model where agents save to safeguard future consumption against unforeseen contingencies with bequests occurring if things turn out not to be as bad as they could have been. Under this approach, if the poor are more characterized by life-cycle saving it could simply be because things turn out badly for them more often than the rich and they are therefore more likely to eat into their meager assets and not leave a bequest.

There is a substantial historical literature on wealth determinants and inequality in North America, with the key determinant variables focused on occupation, ethnic origin, birthplace, urbanization and age.[9] Specifications commonly employ an age and age-

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[5] Hurd (1997: 926).

[6] For other recent historical studies of bequests that also provide discussions of bequest motivation, see McGranahan (2000, 2009) and Combs (2004, 2005).

[7] Laitner and Ohlsson (2001). See also Jousten (2001).

[8] For the classic paper on the exchange motive and strategic bequests, see Berheim, Schleifer and Summers (1985). See also Bernhein (1991).

[9] See for example Atack and Bateman (1981), Kearl and Pope (1983), Pope (1989), Steckel (1990), Galenson (1991), Haines and Goodman (1991), Herscovici (1993, 1998), Ferrie (1994, 1995, 1999), Gregson (1996) and Di Matteo (1996, 1997, 1998), Conley and Galenson (1998), Walker (2000), Steckel and Moehling (2001), Di Matteo and Emery (2002), Stewart (2006), Di Matteo (2008).

squared specification as a test for the presence of life-cycle saving and evidence has been found supporting the presence of such behaviour. However, these approaches have commonly used the specification on an aggregate set of data and have not always adjusted for differential behaviour in the wealth-age profile across wealth levels. Moreover, these results commonly use OLS as the estimation technique and the results may be affected by the presence of extreme wealth observations.

An alternative approach is to perform quantile regressions as the technique helps deal with outliers as well as allows one to compare results across wealth levels.[10] As linear regression often gives an incomplete picture of the relationships in a set of data, quantile regression can be seen as part of a comprehensive strategy for completing the regression picture.[11] In economic history, Conley and Galenson (1994, 1998) suggest using quantile regression techniques because they can avoid the problems of bias and inconsistency in the presence of censoring, they are robust to any misspecification of the known censoring point and can also be used to trace out the impact of the dependent variable at different points in the distribution.

The differences in savings motives across wealth levels and by extension socio-economic status have been explored by modern economic literature and to a lesser extent by historical literature. For example, Burbidge and Robb (1985) using cross-sectional Canadian data from the 1977 Survey of Consumer Finances show significant differences in accumulation behaviour across major household types with "blue-collar" workers decumulating after retirement but not "white-collar" workers. Fan (2006) argues that the rich in general have high savings rates because they are more concerned that their children are likely to receive lower incomes than theirs and thus would leave a larger bequest. Steckel (1990) in a longitudinal study of wealth accumulation using U.S. census data from 1850 and 1860 finds more mobility at the higher end of the wealth distribution

[10] A quantile is a value below which a given part of a data set must fall. The x-th quantile means that a fraction x of the observations lie below this nmber. For example, the 0.2 quantile means that 20 percent of observations lie below this number. The 0.5 quantile is the median. With quantile regression, each quantile in essence gets its own parameter vector and therefore one can estimate the effects of changing distributions – the quantile regression can therefore estimate the effect of an independent variable at a number of different points of the conditional distribution of the dependent variable.

[11] See Koenker and Hallock (2001).

as opposed to the lower end. However, while the rich had large increases in absolute levels of wealth, the middle classes had higher rates of wealth accumulation.

Data Construction

The micro-data consists of 7,156 census-linked probated decedents from the counties and districts of Ontario, Canada for the years 1892 (3,515) and 1902 (3,641) constructed from the probate records of the county surrogate courts and the 1891 and 1901 Census of Canada.[12] As an institutional process, probate transferred property from the dead to the living making the inventory and valuation of property of key importance. The executor of the estate (or administrator in intestate cases) conducted the inventory[13] that legally was conducted in response to a request by a legatee or creditor but in practice was done voluntarily (Howell 1880: 325-326).[14] The inventory provided wealth estimates grouped into sixteen categories[15] allowing for separate estimates of real estate, financial assets and personal property.

Potential limitations of probate records as a source of wealth data should be noted.[16] First, probated decedents are of higher socio-economic status and may not represent the general population but the problem of selection bias is limited since this paper focuses on the probated decedents themselves.[17] A related issue is that probate wealth data may be affected by whether individuals died unexpectedly or had been ill a

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[12] Sources for the data set were: (1) Public Archives of Ontario, Surrogate Court Wills, 1892, 1902 and (2) Public Archives of Canada, Census of Canada, 1891,1901 Manuscripts.

[13] Intestates are decedents without a will.

[14] According to Howell's (1880: 325-326) *Probate, Administration and Guardianship* "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." Real estate was usually recorded net of any mortgages outstanding so that the wealth figure used in this paper is a measure of net wealth.

[15] 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, (16) Other personal property. Items (7) to (13) constitute financial assets.

[16] Discussions of Ontario probate records as historical sources of data are contained in Elliott (1985: 125-32) and Osborne (1980: 235-47). See also Siddiq and Gwyn (1991: 103-117).

[17] See Siddiq and Gwyn (1991: 103-17) and Di Matteo and George (1992: 453-483) for attempts to adjust the data for potential biases using the estate multiplier technique.

long time and run down their assets. Unfortunately, information on the cause of death was not available in the probate records and other sources were not as reliable.[18]

Second, the presence of estate taxes can provide the incentive for an executor or administrator to underestimate inventoried wealth but in Ontario the presence of estate taxes seemed to provide little reason to underestimate the value of the estate for almost all decedents. There were no succession duties in Ontario until July 1, 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.[19]

Finally, *inter vivos* transfers - meaning that an unknown portion of wealth may have been transferred during life and is unaccounted for by the probate records- is also a potential concern. Generally, the property liable to duty was quite comprehensive. After 1896, it included property vested jointly with interest to survivor. 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..."[20] if they were made in the 12 months preceding death. Moreover, after 1896, *donatio mortis causa*, that is, goods and possessions delivered in apprehension of death, were also clearly defined as property liable to duty.[21] Such transfers are considered a problem if estate taxes present an

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[18] A noted scholar of Ontario's civil registration of vital events statistics writes that: "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. See Emery (1993: 32-34).

[19] 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; nor (2) To property given, devised or bequeathed for religious, charitable or educational purposes; nor (3) To property passing under a 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. Revisions to the Act in 1897 (Revised Statutes of Ontario (1897), Cap. 24) kept the $100,000 exemption value but it was later reduced to $50,000 in 1907 (5 Edw.VII, c.6, s.6) which is well after the period of these two cross-sections.

[20] A report on the Succession Duty Act in the Welland Tribune (April 1, 1892: 2) asserted that: "The act provides for evasion by transfers before death, although the fear of revival makes such attempts very rare."

[21] There is a drop in average other personal property in Ontario between 1892 and 1902 that is quite large but can be attributed to outliers. For example, in the four Niagara region counties in 1892, Wentworth County reports the two largest amounts of other personal property $66,500 by Thomas Myles, a coal merchant, and $23,522 by Jacob Zingsheim, a furniture manufacturer. These two individuals represent almost half the average value of other personal property in 1892. The maximum amount in 1902 in these four counties is $15,000 reported by one Thomas Bates, a brewer.

obstacle to terminal wealth transmission but the evidence for Ontario suggests that they should not be given the exemptions.[22]

Construction of the data set commenced by recording onto data collection forms those estates probated in the years 1892 or 1902. Individuals were then linked back to census returns in order to obtain additional information.[23] The census 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. 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.[24]

For 1892, a total of 4,925 estates were taken down of which 4,236 were traceable and 3,515 successfully traced for a success rate of 83 percent. For 1902, a total of 4,969 estates were taken down of which 4,233 were traceable and 3,646[25] successfully traced for a success rate of 86 percent. There are some differences between those individuals who could be located in the census and those who could not. In general, those not located in the census were more likely to be female, had lower average wealth and were less likely to own real estate.[26]

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[22] Another view is that an *intervivos* transfer is in principle no different than choosing to consume one's wealth in some other way in the period prior to death.

[23] For a fuller description of the data collection process, see Di Matteo (1997).

[24] Some omitted probated decedents were residents of other Canadian provinces or the United States and Britain but with Ontario property. Others were Ontario residents who died before the taking of the census (in April) and therefore were not recorded in the Census schedule of the living. There often was a lag between the date of death and the probating of the estate. Also, 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 die during administration of the estate leaving the administration incomplete. If there were no surviving children or none resident nearby, it could take many months to settle the estate.

[25] Five of these individuals did not have age recorded and therefore for analysis, the final number for 1902 is 3,641.

[26] For example, for Wentworth County, Ontario in 1892, of the final set of census linked probated decedents, 72.7 percent were male, 76.0 percent were testate, 78.6 percent reported owning real estate and average wealth was $9,716. For those who could not be traced successfully, 62.8 percent were male, 74.4 percent were testate, 60.5 percent reported owning real estate and average wealth was $6,852.

Analysis and Results

Aggregate statistics for the data are provided in Table 1 (with definitions of the variables provided in Table 2). Average wealth declined between 1892 and 1902 but this was driven by a decline in real estate as average financial asset[27] wealth rose during the same period. The data set as a whole was predominately male but the proportion male declined from 77 to 70 percent over the two years. The proportion that was urban grew over time, as did the proportion that was literate and the proportion Canadian born. In terms of occupational status, the largest single occupational group was farmers but their share of decedents also declined between 1892 and 1902. The average number of children also declined between the two years.

The next step was to construct a simple set of wealth-age profiles by quantile using a data smoothing technique to examine the shape of the profile. Figures 1-3 plot wealth versus age for the 0.10, 0.50 and 0.90 wealth quantiles using LOWESS. LOWESS is a non-parametric bi-variate regression technique that estimates a line of best fit without assuming a specific functional form and is not as sensitive to the presence of outliers. 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. Larger bandwidths provide greater degrees of smoothing while smaller bandwidths provide more variation in the final smoothed curve.[28]

The results in Figures 1-3 reveal a slightly hump-shaped wealth age profile for the 0.10 wealth quantile and upward sloping profiles for the 0.5 and 0.90 quantiles. For the 0.10 quantile, wealth rises from 209 dollars at age 20 and peaks at 243 dollars at age 64 and then begins to decline though the decline is gradual reaching 237 dollars by age 80. For the 0.50 quantile, wealth by age 20 is 3,314 dollars and rises to 3,364 dollars by age 64 and then continues to rise reaching 3,376 by age 80. For the 0.90 quantile, wealth at

[27] Financial assets are defined as the sum of items (7) to (13) on the probate inventories: book debts and promissory notes, money secured by mortgage, money secured by life insurance, bank shares and other stocks, securities for money, cash on hand and cash in bank.
[28] For references on LOWESS see Cleveland (1979, 1985 and 1993).

age 20 is 34,541 dollars and it reaches 37,944 by age 64 and then continues to rise reaching 40,039 by age 80. From age 20 to age 64, the percentage increase in smoothed wealth is 16 percent for the 0.10 quantile, 1.5 percent for the 0.50 quantile and 10 percent for the 0.90 quantile.

The great inequality in wealth is quite apparent from these LOWESS smoothed quantiles. The wealth of the 0.50 quantile is more than 10 times that of the 0.10 quantile at all ages while that of the 0.90 quantile is in turn about 10 times greater than the 0.50 quantile. In terms of evidence on saving motives, it would appear based on these profiles that life-cycle saving behaviour is most likely to characterize the lower end of the wealth distribution while higher wealth levels are more characterized by bequest type behaviour. However, it would be premature to conclude that life-cycle saving is less likely to characterize the behaviour of the wealthy. The dis-saving that occurs at the lower end of the wealth distrubtion could simply be due to the greater likelihood of those with fewer resources eating into their savings at the end of their life span and reducing the amount available for a bequest. This is in keeping with the view of Dynan, Skinner and Zeldes (2002) that the poor could be marked by more life-cycle saving simply because they are more likely to dip into their assets when older and not leave a bequest.

The next step was formal quantile regressions. The natural log of nominal wealth[29] was regressed on a broad set of socio-economic variables with the regression taking the form:

$$(1)\ LnW_i = a_o + a_1A + a_2A^2 + a_3Z_1 + \ldots.a_nZ_n + E_i$$

Where W_i is wealth, A is age, A^2 is age-squared and Z_1 to Z_n represent a vector of socio-economic variables that include gender, birthplace, occupational status, religion, literacy, marital status, number of children, region of residence, urbanization and time with the variables defined in Table 2. The multiple characteristics of the decedents are taken into account. For example, the presence of occupational status variables means that

[29] Nominal wealth was used because GDP implicit price index data for the period suggests that prices in 1902 were approximately the same as 1892. See Green and Urquhart (1987), Urquhart (1986).

differences in lifetime income apart from age can be further accounted for.[30] The regressions are bequest augmented life cycle specifications as they include age variables in order to capture wealth changes associated with life cycle behaviour and child variables to capture the target bequest motive. The regressions are run using simultaneous regression quantiles (STATA 10) for the 0.1, 0.2, 0.5, 0.75, 0.90 and 0.95 quantiles to allow for coefficient comparisons as wealth levels vary and the results presented in Table 3.

After controlling for a range of socio-economic characteristics, these results show a statistically significant wealth-age profile for all quantiles with rates of accumulation and decumulation that are larger at the lower wealth quantiles. For example, at age 20, the rate of accumulation for 0.10 quantile is 6.1 percent while for the 0.90 quantile it was 5.1 percent. At age 80, the decumulation rate is -2.3 percent for the 0.10 quantile while it is -0.9 percent for the 0.90 quantile. However, this decline is not of great magnitude. Figure 4 plots the wealth-age profiles for the 0.10, 0.50 and 0.90 quantiles and shows that while there is a hump-shaped profile for each quantile, the rate of decline is such that by age 100 there is still a substantial amount of terminal wealth. This result is consistent either with a bequest motive or a life-cycle motive with imperfect information and uncertainty.

As well, the impact of socio-economic variables is also differentiated across quantiles. For example, birthplace is a significant negative determinant of wealth relative to the Canadian born only at middle and higher wealth quantiles for the Irish and English born. Being of the highest occupational status (OCC1) has a positive and growing effect on wealth as you move up the wealth distribution with the coefficient growing from 1.68 at the 0.10 quantile to 2.31 at the 0.95 quantile. The number of children also had a positive and significant effect on wealth but the effect diminished as the level of wealth rose. At the 0.10 quantile, each child added 5.2 percent to the level of wealth while by the 0.95 quantile it was only 4.3 percent for each child. The result for children suggests that the "rich" may not necessarily be as concerned about the welfare of their children as those at lower wealth levels. On the other hand, it could also mean that children were

[30] This specification does not explicitly account for cohort and differential mortality effects. For a discussion, see Jiankoplos, Menchik and Irvine (1989) and Kitagawa and Hauser (1973).

more important inputs into family economic welfare and wealth generation at lower wealth levels.[31] Finally, religious affiliation only mattered as a wealth determinant at high wealth levels. Relative to Anglicans, those who were Roman Catholics, Presbyterians and Methodists generally had less wealth. At low wealth levels, religious affiliation had no impact on relative wealth levels.

Of course, it may be that using total wealth does not account for differential behaviour across portfolios and asset classes. Further analysis is conducted by running quantile regressions for financial assets and wealth for the 0.30, 0.50 and 0.90 quantiles. Regressions are started at the 0.30 quantiles as only 73 percent of decedents reported financial assets and while 72 percent of decedents reported real estate. The results are shown in Table 4.

For financial assets, accumulation rates with respect to age are highest at the 0.90 quantile. At age 20, the rates of accumulation were 4.4 percent for the 0.30 quantile, 3.5 percent for the 0.50 quantile and 7.0 percent for the 0.90 quantile. This of course illustrates that high rates of financial asset wealth accumulation was a definite hallmark of the wealthy. Relative to the Canadian born, the Irish-born had significantly lower financial asset wealth while being Roman Catholic was associated with significantly less financial asset wealth - at all three quantiles. Being married or having a deceased spouse also resulted in significantly less financial asset wealth but the effect was largest at the 0.30 and 0.50 wealth quantiles and lowest at the 0.90 quantile. Being an urban dweller was positively associated with financial asset wealth but the effect was largest at the 0.30 quantile and smallest at the 0.90 quantile. Being literate was significantly associated with greater financial asset wealth with the effect being largest at the 0.50 quantile and smallest at the 0.90 quantile.

With respect to real estate, accumulation rates with respect to age are highest at the 0.50 quantile and lowest at the 0.90 quantile. At age 20, the accumulation rate was 9.6 percent for the 0.30 quantile, 19.4 percent for the 0.50 quantile and only 5.0 percent for the 0.90 quantile. Being English-born, Other Birthplace or U.S.A. born resulted in significantly lower real estate wealth relative to the Canadian born only for lower wealth

[31] Children in colonial North America were an economic resource in the farm production function. See Henretta (1978).

quantiles. Religion only mattered in real estate accumulation at the 0.90 quantile with Roman Catholics, Presbyterians and Methodists having significantly less real estate relative than Anglicans. The regional variables were also fairly important in determining the level of real estate wealth with most regions reporting less real estate wealth than the Golden Horseshoe particularly at the 0.50 and 0.90 quantiles. Finally, being married resulted in significantly more real estate at all three quantiles suggesting that its ownership was an important input into family formation.

The number of children was also a significant determinant of real estate wealth (but not for financial asset wealth) at all three quantiles but the effect was largest at the 0.30 quantile and lowest at the 0.90 quantile. While the presence of a positive relationship between children and wealth in general provides support for a bequest motive, the absence of a statistically significant negative relationship between financial assets and children in particular weakens support for a life-cycle transition among these probated decedents. However, it should be noted that the negative relationship between financial assets and number of children was significant at the 10 percent level (t-statistic of -1.93) at the 0.30 quantile again suggesting that life-cycle type behaviour was more pronounced at the lower end of the wealth distribution.

Figures 5 and 6 plot the wealth age profiles for the 0.30, 0.50 and 0.90 quantiles for financial asset wealth and real estate wealth. For financial assets, the wealth age profile does become more upward sloping as wealth rises with a hump-shaped profile most noticeable at the 0.30 wealth quantile. None the less, even at the 0.30 quantile, the rate of wealth decumulation by age 80 is less than one-half of one percent. Meanwhile, for the 0.90 quantile, financial asset wealth continues to rise at age 80 with an accumulaton rate of just over one-half of one percent. As for real estate, there are hump-shaped wealth-age profiles for all three quantiles but they are most pronounced at the 0.50 and 0.30 quantiles.

However, the wealth-age profile for the 0.30 profile shows negative real estate wealth at both the start and end of the life cycle. Given this is occurring in the lower third of the wealth distribution, this is more likely a reflection of poor economic circumstances rather than life-cycle behaviour. The 0.50 wealth-age profile also shows negative real estate wealth early on in the life-cycle but it is followed by rapid

accumulation rates and large non-zero amounts of real estate late in the life cycle. The 0.90 profile starts out with significant positive amounts of real estate early on in the life-cycle – perhaps a reflection of inheritances for those high up in the wealth distribution – and then low rates of accumulation and decumulation over the life-cycle resulting in the level of real estate wealth being largely intact by the end of the life-cycle.

Conclusion

The use of quantile regression techniques to estimate the determinants of wealth to examine whether saving is life-cycle or bequest driven has yielded results that show differences in the effect of socio-economic determinants across wealth levels. Overall, assuming that the relationship between wealth and key determinants is stable across the wealth distribution is not a reasonable assumption. Indeed, amongst these late nineteenth and early twentieth century probated decedents, the distinctive hump-shaped wealth-age profile indicative of life-cycle saving was more prevalent at lower wealth quantiles than higher ones for total wealth as well as separate asset categories suggesting that the tendency towards bequest type behaviour rose with wealth. However, the magnitude of the wealth declines after peak wealth left all individuals on average with substantial terminal wealth more indicative of a bequest motive irrespective of their position in the wealth distribution.

While there are statistically significant wealth-age profiles that show greater rates of accumulation and decumulation at lower wealth quantiles, wealth-age profiles are largely upward sloping suggesting that the primary saving motivation was driven by bequest behaviour. As well, a negative relationship between the number of children and financial assets was not statistically significant while that between real estate and children was positive and statistically significant again reinforcing that saving behaviour at all quantiles was largely driven by bequest behaviour and that a life-cycle transition was not yet fully underway. At the same time, the rapid accumulation rates for financial assets is an indicator of a shift in patterns of asset holding indicative of a life-cycle transition.

Moreover, an upward sloping wealth profile could still be indicative of life-cycle saving in the presence of highly uncertain life spans.[32]

Additional results of interest suggest that at lower wealth levels, characteristics such as birthplace and religion were generally not important or significant determinants of total wealth. It is only as wealth levels rose – at higher wealth quantiles – that one's place of birth or one's religion mattered. For example, being English or Irish born relative to the Canadian born was associated with less wealth at middle and lower wealth quantiles. As for religion, it mattered at higher wealth levels with Roman Catholics, Presbyterians and Methodists generally holding less wealth relative to Anglicans. However, the negative effect on financial assets of being Irish or Roman Catholic was consistent across all wealth levels suggesting that these characteristics were particularly relevant to financial asset accumulation.

[32] While life-spans did increase during the course of the late 19th and early 20th centuries, in Canada the overall growth in life span was marginal once adult-hood was reached. In 1871, at age 20, women in Canada could expect to live 47.3 more years and men 47.9 years. By 1931, at age 20, men would expect to live 49.1 more years and women 49.8 more years. See Historical Statistics of Canada, Series B65-74.

FIGURE 1

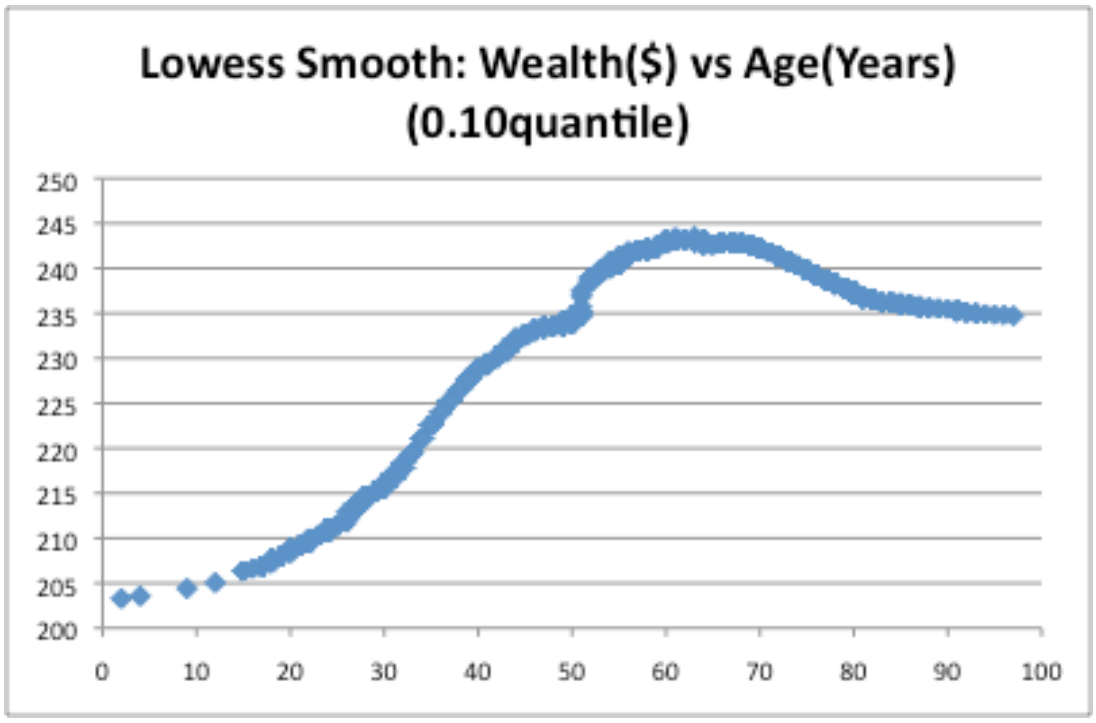


FIGURE 2

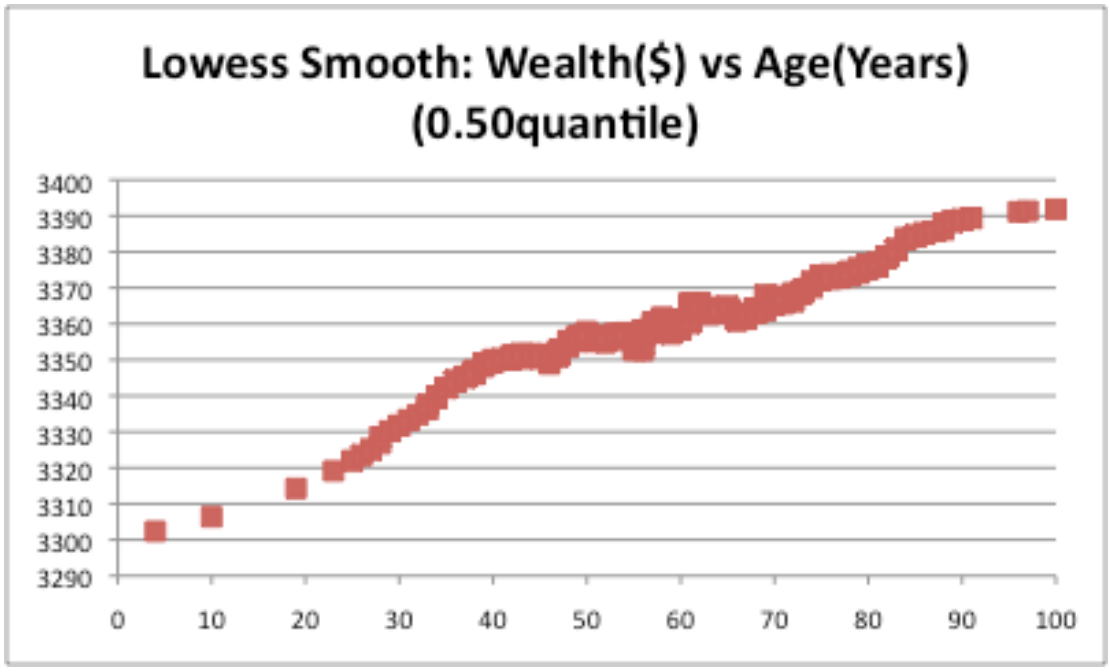


FIGURE 3

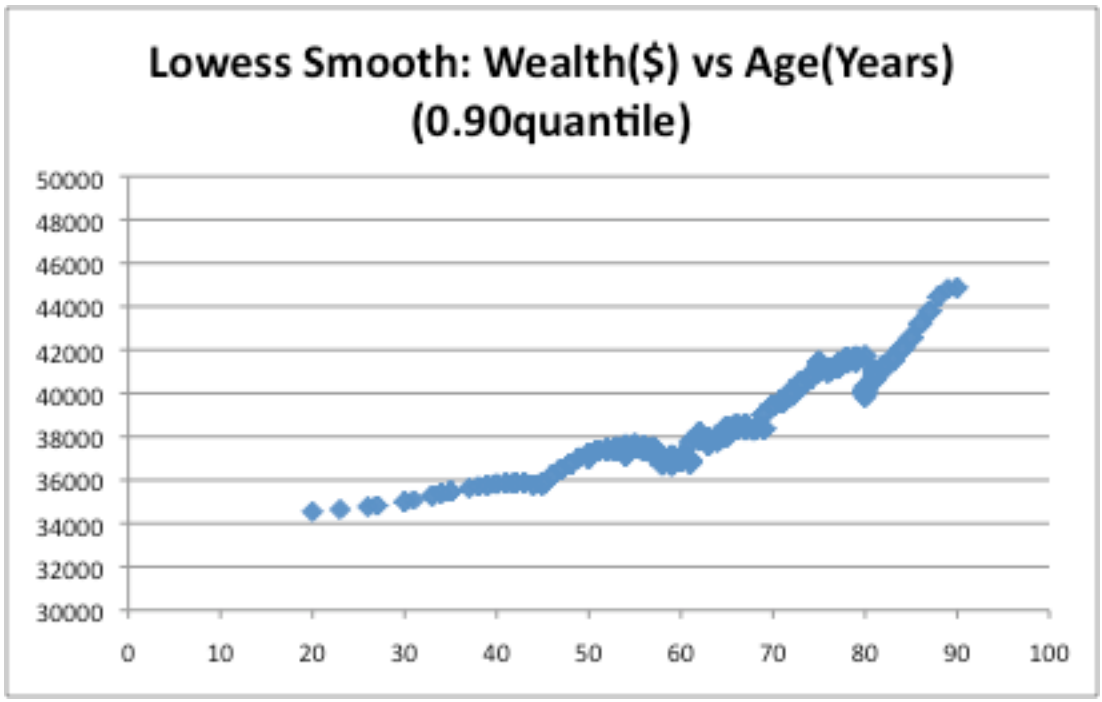

Lowess Smooth: Wealth($) vs Age(Years)
(0.90quantile)
50000
48000
46000
44000
42000
40000
38000
36000
34000
32000
30000
0
10
20
30
40
50
60
70
80
90
100

TABLE 1

AGGREGATE STATISTICS

	ALL	1892	1902
Age	61.45	61.17	61.72
Wealth($)	6871.32	7427.42	6334.46
Real Estate($)	3001.71	3468.31	2551.25
Financial Assets($)	3042.09	2988.80	3093.53
Male	0.73	0.77	0.70
Urban	0.44	0.42	0.46
Literate	0.92	0.90	0.93
Children	3.08	3.34	2.83
English	0.17	0.19	0.15
Irish	0.18	0.21	0.15
Scottish	0.13	0.14	0.11
USA	0.03	0.03	0.03
Other Birthplace	0.04	0.04	0.04
Canadian born	0.45	0.38	0.51
occ1	0.11	0.11	0.11
occ2f	0.41	0.44	0.38
occ2nf	0.08	0.08	0.08
occ3	0.08	0.09	0.08
occ4	0.02	0.02	0.02
occ5	0.02	0.02	0.02
occ6	0.27	0.24	0.30
Anglican	0.19	0.20	0.18
Roman Catholic	0.11	0.11	0.12
Presbyterian	0.27	0.27	0.27
Baptist	0.05	0.05	0.05
Methodist	0.29	0.29	0.29
Other Religion	0.08	0.08	0.08
Married	0.60	0.61	0.58
Widow	0.14	0.13	0.15
Widower	0.14	0.15	0.13
Single	0.12	0.11	0.13
Northern	0.03	0.02	0.03
Western	0.25	0.26	0.25
Huronia	0.24	0.24	0.24
Eastern	0.26	0.26	0.26
Golden Horseshoe	0.22	0.22	0.21

TABLE 2

DATA SET VARIABLES

VARIABLE	DEFINITION
WEALTH VARIABLES	
WEALTH	Wealth ($)
FIN	Financial assets ($)
REALEST	Real estate ($)
PERSONAL CHARACTERISTICS	
AGE	Age at death in years.
MALE	1 if male, 0 otherwise.
URBAN[a]	1 if urban resident, 0 otherwise.
LITERATE	1 if decedent could read and write, 0 otherwise
CHILDREN	Number of children
PLACE OF BIRTH	
ENGLISH	1 if born in England or Wales, 0 otherwise.
IRISH	1 if born in Ireland, 0 otherwise.
SCOTTISH	1 if born in Scotland, 0 otherwise.
USA	1 if born in United States, 0 otherwise.
CANADIAN	1 if born in Canada (Ont, Que or Maritimes), 0 otherwise.
OTHER BIRTHPLACE	1 if born in any other place, 0 otherwise.
YEAR1902	1 if year probated 1902, 0 otherwise.
KATZ OCCUPATIONAL CATEGORIES	
OCC1[b]	1 if Katz Category I, 0 otherwise
OCC2F	1 if Katz Category II and a farmer, 0 otherwise
OCC2NF	1 if Katz Category II and a non-farmer, 0 otherwise
OCC3	1 if Katz Category III, 0 otherwise
OCC4	1 if Katz Category IV, 0 otherwise
OCC5	1 if Katz Category V, 0 otherwise
OCC6	1 if Katz Category VI, 0 otherwise
MARITAL STATUS VARIABLES	
MARRIED	1 if ever married, 0 otherwise
WIDOW	1 if a widow, 0 otherwise
WIDOWER	1 if a widower, 0 otherwise
SINGLE	1 if single, 0 otherwise
MARRIED BUT SPOUSE DECEASED	1 if spouse deceased, 0 otherwise.
RELIGIOUS AFFILIATION VARIABLES	
PRESBYTERIAN	1 if Presbyterian, 0 otherwise
ROMAN CATHOLIC	1 if Roman Catholic, 0 otherwise
BAPTIST	1 if Baptist, 0 otherwise
METHODIST	1 if Methodist, 0 otherwise
ANGLICAN	1 if Church of England, 0 otherwise
OTHER RELIGION	1 if any other religion, 0 otherwise
REGIONAL VARIABLES	
NORTHERN[c]	1 if resident of Northern Ontario, 0 otherwise
GOLDEN HORSESHOE	1 if resident of Golden Horseshoe, 0 otherwise
WESTERN	1 if resident of Western Ontario, 0 otherwise
EASTERN	1 if resident of Eastern Ontario, 0 otherwise
HURONIA	1 if resident of Huronia, 0 otherwise

NOTES

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

b These are socio-economic occupational status categories with OCC1 as the highest, OCC5 as the lowest and OCC6 as an unclassifiable (See Katz, 1975, 343-348). 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 labour while OCC6 is unclassifiable containing mainly women.

C The counties in each regional dummy 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, York; WESTERN- Haldimand, Norfolk, Elgin, Kent, Essex, Lambton, Middlesex, Oxford, Brant; HURONIA-Waterloo, Perth, Huron, Wellington, Bruce, Grey, Simcoe, Dufferin; EASTERN-Ontario, Victoria and Haliburton, Durham and Northumberland, Peterborough, Hastings, Prince Edward Lennox and Addington, Frontenac, Leeds-Grenville, Dundas-Glengarry-Stormont, Prescott and Russell, Carleton, Lanark.

TABLE 3

QUANTILE WEALTH REGRESSION
LN(WEALTH) DEPENDENT VARIABLE*

	q10	q20	q50	q75	q90	q95
Age	***0.0893***	***0.0824***	***0.0788***	***0.0740***	***0.0750***	***0.0709***
Age Squared	***-0.0007***	***-0.0006***	***-0.0006***	***-0.0006***	***-0.0005***	***-0.0005***
Male	-0.0648	-0.0157	0.0013	0.2320	0.7701	1.2232
English	-0.1206	-0.0718	***-0.0924***	***-0.1061***	-0.0959	0.0285
Irish	0.0107	-0.0072	***-0.1530***	***-0.1839***	***-0.1501***	-0.0570
Scottish	0.1352	-0.0019	-0.0264	-0.0707	-0.0427	0.0507
USA	-0.3036	***-0.2961***	-0.2380	-0.0018	-0.0114	0.2243
Other Birthplace	-0.2512	***-0.3389***	***-0.3352***	***-0.2992***	-0.1820	-0.1841
occ1	***1.6806***	***1.6401***	***1.7294***	***2.0090***	***2.5374***	***2.3104***
occ2f	***1.7545***	***1.5601***	***1.5276***	***1.4608***	***1.5139***	***1.1880***
occ2nf	***1.2382***	***1.1360***	***1.2753***	***1.5084***	***1.7503***	***1.6645***
occ3	***0.6966***	***0.5767***	***0.6660***	***0.6702***	***0.8032***	***0.7039***
occ4	0.2293	0.1151	***0.3613***	***0.4381***	***0.6608***	0.2386
occ6	0.4623	0.2698	0.4464	***0.7957***	***1.5571***	***1.7321***
Roman Catholic	-0.0069	-0.0748	-0.1069	***-0.2211***	***-0.2603***	-0.1653
Baptist	0.0930	0.0342	-0.1531	***-0.2353***	-0.1111	-0.1264
Presbyterian	0.1390	0.0944	0.0134	-0.0315	***-0.1649***	-0.1733
Methodist	0.0529	0.0031	-0.0550	***-0.1949***	***-0.2306***	***-0.2181***
Other Religion	-0.0405	-0.1151	-0.1173	-0.0975	-0.1880	-0.0317
Literate	***0.3114***	***0.3847***	***0.3598***	***0.2943***	***0.2476***	***0.4036***
Number of Children	***0.0517***	***0.0682***	***0.0590***	***0.0525***	***0.0499***	***0.0430***
Married	0.2174	0.0431	-0.0432	-0.0538	-0.0740	-0.0492
Married but Spouse Deceased	0.0951	-0.0602	***-0.1185***	-0.0400	-0.1073	-0.0579
Northern	-0.3562	***-0.3249***	***-0.4312***	***-0.5201***	***-0.7224***	***-0.7594***
Western	-0.0952	-0.0878	***-0.1473***	***-0.1433***	***-0.3694***	***-0.4614***
Huronia	-0.0104	-0.0526	***-0.2150***	***-0.2853***	***-0.5170***	***-0.5467***
Eastern	-0.1682	-0.0979	***-0.1787***	***-0.1477***	***-0.3336***	***-0.3918***
Urban	0.0335	***0.1169***	***0.2321***	***0.3698***	***0.4316***	***0.5138***
Year1902	-0.1071	-0.0683	-0.0320	-0.0344	-0.0554	-0.0753
Constant	***2.0161***	***2.9661***	***4.1582***	***4.7361***	***4.8264***	***4.8984***
R squared	0.134	0.146	0.150	0.138	0.161	0.195

***Bolded type indicates significant at 5% level.**

FIGURE 4

WEALTH (LN Wealth) -AGE PROFILES BY WEALTH QUANTILE
Source: Table 3

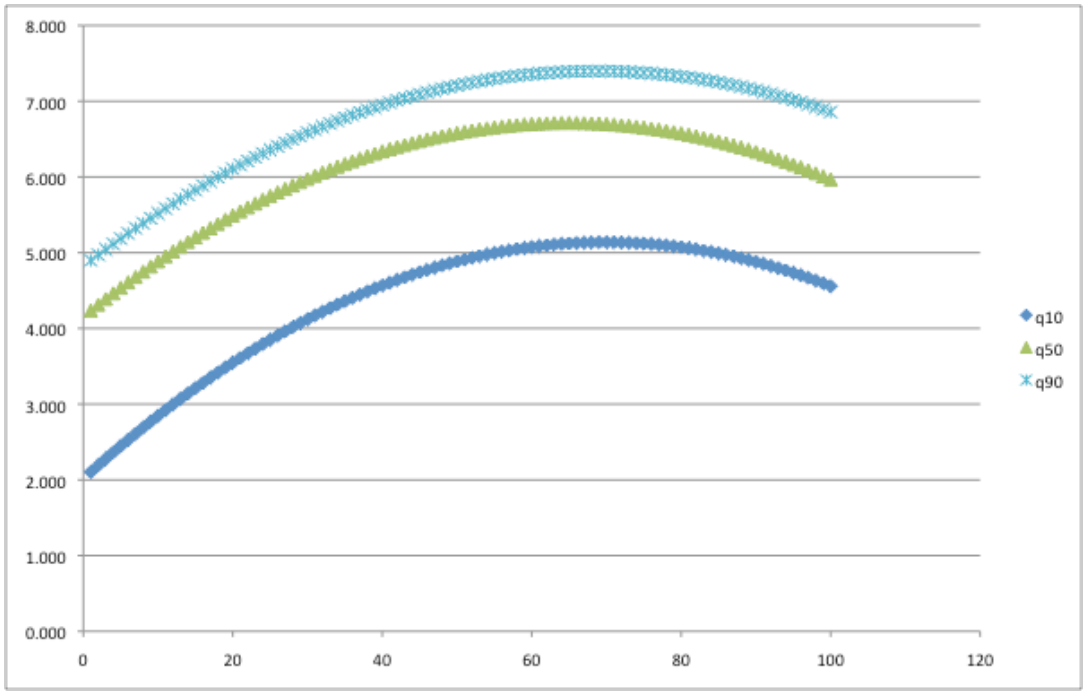


TABLE 4

QUANTILE WEALTH REGRESSION
LN(REAL ESTATE) AND LN(FINANCIAL ASSETS) DEPENDENT VARIABLES*

	Financial Assets			**Real Estate**		
	q30	q50	q90	q30	q50	q90
Age	***0.0599***	***0.0468***	***0.0709***	***0.1362***	***0.2782***	**0.0743**
Age Squared	***-0.0004***	***-0.0003***	***-0.0004***	***-0.0010***	***-0.0021***	**-0.0006**
Male	-0.1214	-0.2996	0.4651	1.1971	0.4282	0.2019
English	0.0301	0.1283	-0.1454	***-0.3171***	***-0.2171***	-0.0719
Irish	***-0.3843***	***-0.2283***	***-0.3792***	0.0539	-0.0809	-0.0596
Scottish	0.1468	0.1555	-0.1029	-0.1095	***-0.2392***	-0.0981
USA	-0.1562	-0.3832	-0.0067	***-0.5094***	-0.4781	-0.0068
Other Birthplace	0.3127	***0.4850***	-0.0601	***-0.8987***	***-0.9288***	-0.2342
occ1	***4.9667***	***2.3434***	***1.9212***	***3.9879***	***1.5429***	***2.2306***
occ2f	0.5013	0.4291	***0.6299***	***5.3195***	***2.1341***	***2.0175***
occ2nf	***4.1262***	***1.9038***	***1.2147***	0.1166	***0.9925***	***1.8861***
occ3	***2.2418***	0.7942	***0.3933***	***2.8317***	***0.8716***	***1.0488***
occ4	1.2997	0.6724	0.2890	0.9042	-0.0195	***0.4663***
occ6	***2.5885***	0.5050	0.7790	0.2269	0.1485	***1.2811***
Roman Catholic	***-0.3960***	***-0.4513***	***-0.3816***	0.0486	0.1101	***-0.1461***
Baptist	-0.3685	-0.1013	***-0.5201***	0.0548	-0.0443	-0.0696
Presbyterian	0.2387	0.2082	-0.0678	-0.0723	-0.0192	***-0.1549***
Methodist	-0.0169	-0.0179	-0.1583	-0.1960	-0.1586	***-0.1838***
Other Religion	0.4020	0.0454	0.0135	-0.0616	***-0.2310***	-0.2285
Literate	***0.4466***	***0.8930***	***0.3999***	0.2457	***0.3595***	***0.3056***
Number of Children	-0.0484	-0.0173	0.0152	***0.1004***	***0.0854***	***0.0577***
Married	***-1.3479***	***-0.7530***	***-0.3680***	***0.6942***	***1.1571***	***0.1607***
Married but Spouse Deceased	***-0.7946***	***-0.4360***	***-0.2261***	0.0791	***1.0327***	0.0951
Northern	-0.1525	0.0013	-0.1944	***-0.7806***	***-1.0040***	***-0.7896***
Western	-0.1874	***-0.2116***	***-0.3086***	-0.0043	***-0.2278***	***-0.2599***
Huronia	-0.2358	-0.0387	***-0.2521***	***-0.2499***	***-0.4846***	***-0.4416***
Eastern	0.1172	0.1441	-0.1399	***-0.3133***	***-0.4336***	***-0.2783***
Urban	***1.3236***	***0.7490***	***0.6419***	-0.0423	***0.2431***	***0.3009***
Year1902	***0.6539***	***0.3272***	0.0270	-0.1640	***-0.1776***	-0.1086
Constant	-0.9475	***2.7937***	4.7141	***-4.4291***	***-4.4892***	***4.2151***
R squared	0.12	0.06	0.08	0.24	0.12	0.09

*** Bolded type indicates significant at 5% level.**

FIGURE 5

FINANCIAL ASSET (LN Financial Assets + 1) AGE PROFILES BY QUANTILE
Source: Table 4

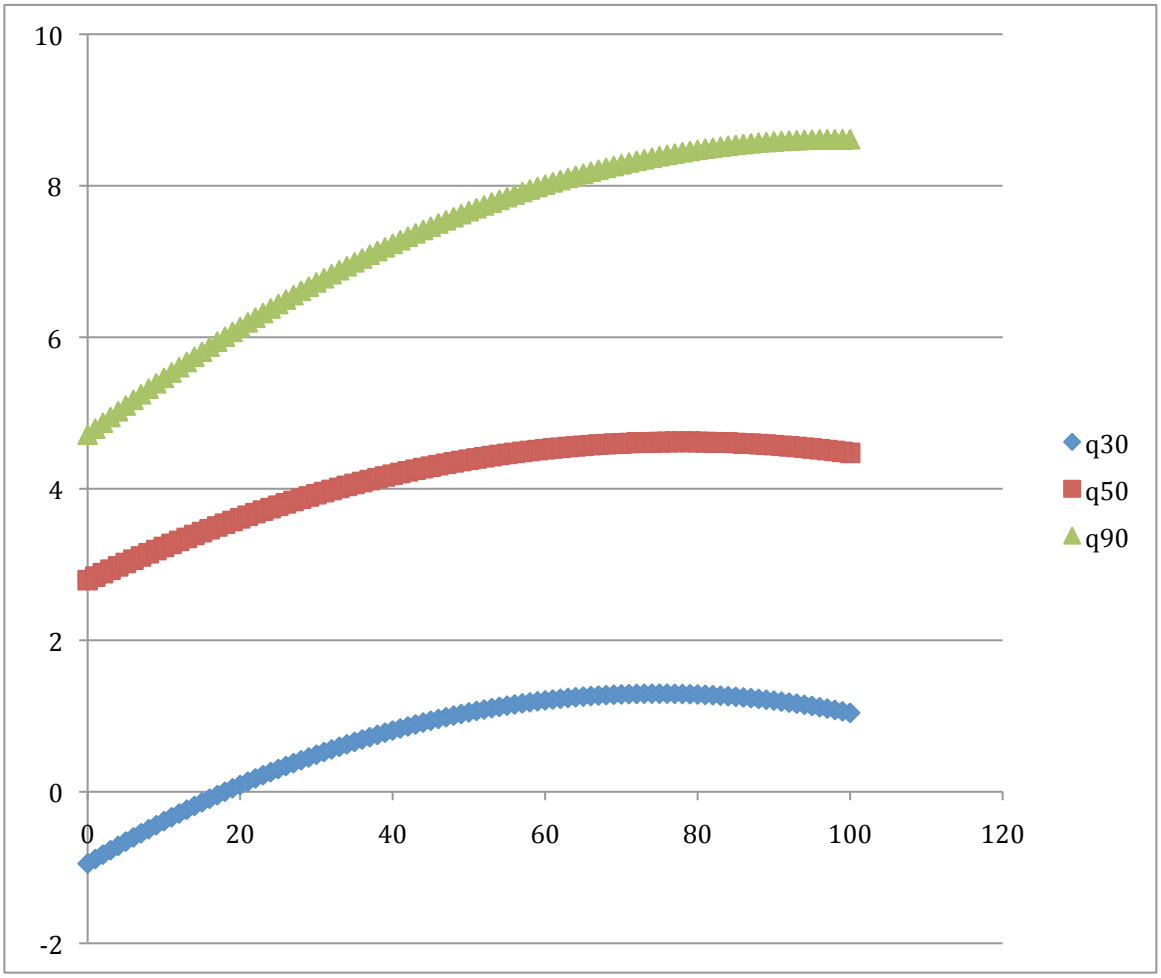
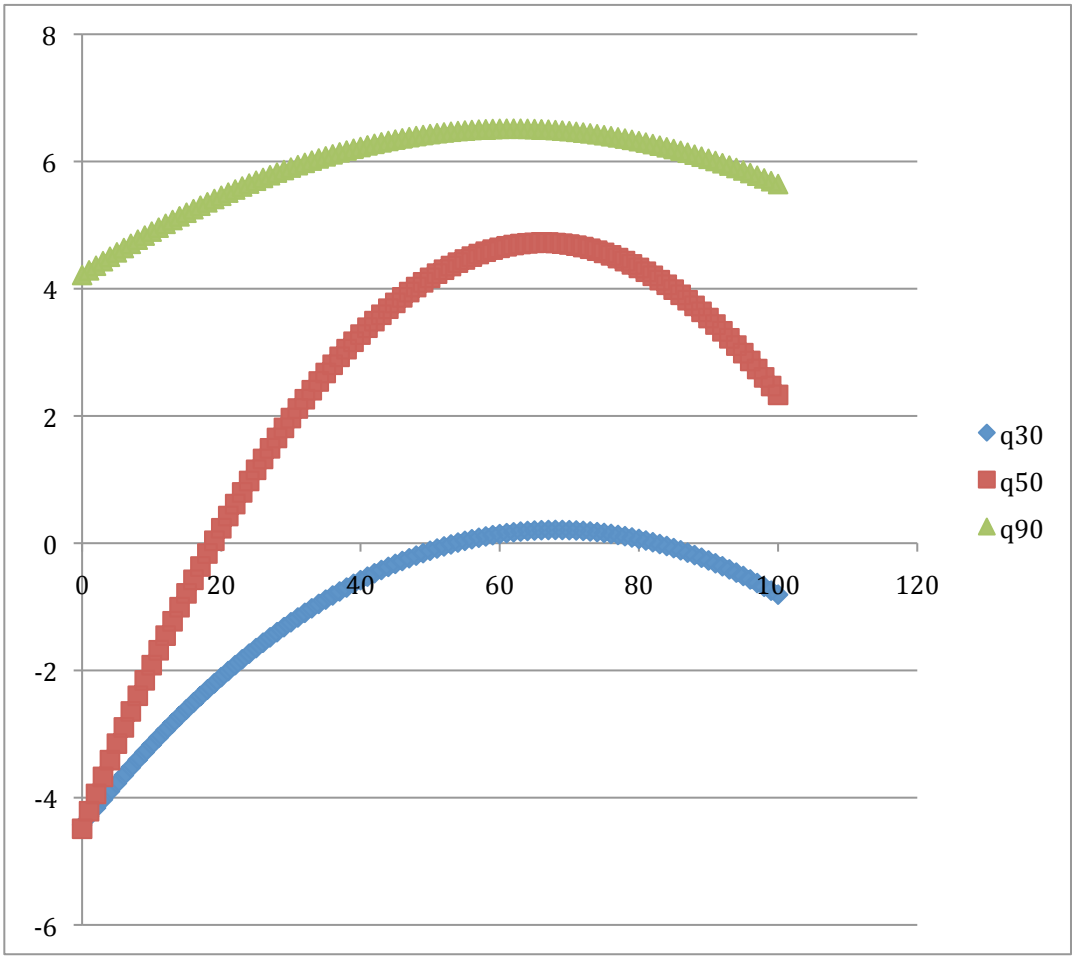


FIGURE 6

REAL ESTATE (LN Real Estate+ 1) AGE PROFILES BY QUANTILE
Source: Table 4



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