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**ELDERLY INCOME AND LIVING ARRANGEMENTS:
DIFFERENCES ACROSS THE ELDERLY INCOME
DISTRIBUTION IN CANADA**

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Elderly Income and Living Arrangements: Differences across the Elderly Income Distribution in Canada

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Abstract

In this study I examine the relationship between changes in the living arrangements of the elderly and changes in elderly income across the elderly income distribution. Using Canadian data from 1977-2008, the results of unconditional quantile regressions demonstrate a negative relationship between independent living and elderly income, with the strongest effects on middle income deciles in the late 1970s. Increases in the likelihood of independent living placed downward pressure on income over the 1970s-1990s. However, simultaneous reductions in the 'penalty' associated with independently living placed upward pressure on incomes, with the strongest effects on the middle income deciles. More recent increases in the independent living penalty are placing some downward pressure on incomes in the bottom half of the elderly income distribution .

JEL Classification: J14 (Economics of the elderly), J12 (Family structure)

Keywords: Income distribution, Elderly, Canada

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1. Introduction

Income and living arrangements are two important determinants of elderly well-being. The living arrangements of the elderly have changed substantially over time as the elderly have become increasingly likely to live independently (without adult children or extended family members). Living independently may positively affect elderly well-being if a sense of independence contributes positively to mental health. Increases in elderly incomes also contribute positively to elderly well-being. There is a complex relationship between income and living arrangements. On one hand, increases in income will expand the choice set available to the elderly with respect to living arrangements and many will opt for independence. On the other hand, independent living will limit the resources available to the elderly for consumption as they forego the potential economies of scale and access to other family income that is associated with living with their extended family. Furthermore, it is not clear that the relationship between elderly living arrangements and income is the same for all individuals across the elderly income distribution.

In this study, I examine the relationship between changes in the living arrangements of the elderly and changes in the incomes of the elderly across the elderly income distribution over the 1977-2008 period. I examine deciles of elderly income in Canada using data from the Survey of Consumer Finances (SCF) and the Survey of Labour and Income Dynamics (SLID). Making use of the unconditional quantile regression methods proposed by Firpo, Fortin and Lemieux (2009), I conduct a decomposition of changes in elderly income deciles. Similar in nature to a standard Oaxaca-Blinder decomposition, the decomposition allows us to separately identify composition effects (related to the change in the likelihood of living independently) and structure effects (related to the change in the effect that living independently has on income). It is important to recognize that this study abstracts away from the

causal relationship between individual income and individual choices of living arrangements at one point in time and focuses on the broader question of how overall changes in the elderly population's choice of living arrangements relates to the elderly population's income at different points of the income distribution.

The results demonstrate that increases in the likelihood of the elderly to live independently will place downward pressure on elderly incomes and that the pressure is greatest for incomes at middle deciles of elderly income distribution. Over the 1970s and 1990s, reductions in the income penalty associated with independent living placed upward pressure on elderly incomes with the largest impact on middle income deciles. These impacts are greatest for unmarried elderly individuals. More recently, the income penalty associated with independent living has increased and this is placing downward pressure on elderly incomes in the bottom half of the income distribution.

The remainder of the paper is structured as follows. In the following section I provide some context and background for this study. I then describe the data used in this study and important trends in elderly characteristics. This is followed by a description of the econometric methods used in this paper and a discussion of results. Finally, I offer some concluding remarks.

2. Context

In most of North America and Europe it has become increasingly common for the elderly to live independently (United Nations 2005). In Canada, several cultural, social and economic factors would have contributed to this trend. We can expect that the level of income available to seniors is an important factor. Over the second half of the 20th Century, Canada's public pension system was considerably expanded to provide more generous benefits to Canadians over the age of 65 (see Appendix Figure A.1). Often credited with a remarkable reduction in elderly poverty over the 1970s and early 1980s (Milligan 2008, for example), the availability of these

benefits would have raised the elderly's financial ability to live independent of other family members. Greater employer-provided pension coverage for elderly retirees also increased income security. Between 1980 and 2003, the proportion of Canadian men aged 65 or older receiving private pension income increased from 39.8 percent to 69.8 percent (Statistics Canada 2006) and the majority of private pensions in Canada are defined benefit pension plans (Milligan and Schirle 2010).

In previous literature, the effect of changes in income on elderly living arrangements has been well-established. Engelhardt et al. (2005) found that an increase in Social Security benefits in the United States will significantly reduce the likelihood of elderly households to live with others.¹ For all elderly households, they obtain an elasticity of living with others with respect to Social Security benefits of -0.4. The likelihood of living with others among widows, divorcees and the less educated appears to be much more sensitive to income. Engelhardt et al. (2005) suggest that a 10 percent cut in Social Security benefits would lead more than 600,000 independent elderly households to move into shared living arrangements. Earlier studies (including Michael, Fuchs and Scott 1976, Borsch-Supan et al. 1992, Costa 1999) have had mixed results regarding the effect of income on living arrangements, but have generally found a positive relationship between income and living independently.

It is difficult to identify the effect of living arrangements on the resources (income or wealth) available to seniors for their own consumption. Veall (2008) has found that Canadian seniors with dependent children are significantly less likely to have family income above relative poverty lines (low income measure). This type of shared living arrangement, however, is relatively uncommon. Assuming the elderly value independent living, we should expect that, all else equal, an elderly person that lives

¹ Using data from the Current Population Survey 1980-99, they rely on the large changes in Social Security benefits that affected birth cohorts from 1910-21 to identify the effect. The elimination of the double indexing of benefits for all those born 1917-1921 resulted in serious reductions in benefits relative to the earlier cohort.

apart from adult children and other family members would have a slightly lower income than an elderly person with shared living arrangements.

3. Data Sources and Measurement

In this study I make use of the confidential microdata files of the Canadian Survey of Consumer Finances (SCF, 1977-1997) and the Survey of Labour and Income Dynamics (SLID, 1993-2008). The SCF was discontinued after 1997. The analysis presented here focuses on the years 1977-79, 1994-96, and 2006-2008.² Both surveys collect income, labour market and demographic information from all members of a household. The confidential files allow researchers to identify whether members belong to the same household and their relationships within the household.

Elderly income is measured as the equivalent after tax and transfer income of the elderly person's economic family. After tax and transfer income includes most forms of income, but will not include capital gains or lump-sum withdrawals from pension plans or registered retirement savings plans.³ The economic family includes all individuals related to each other and residing within the same household. Following the convention adopted by Statistics Canada (2010), I divide the economic family income by the square root of the number of economic family members to obtain equivalent family income. Throughout this study, incomes are stated in 2002 Canadian dollars.⁴

² Three years of data are pooled for regressions to improve the precision of estimates. The analysis begins in 1977 because this is the first year that individual and family files are reliably linked together in the available microdata files. 1994-96 was chosen as a mid-point in the analysis because it is a period during which we can use both surveys and as seen in the next section it is a period during which trends in elderly incomes appear to change slightly.

³ See Skuterud et al. (2004) for a discussion of what is included in Statistics Canada's definition of after tax income.

⁴ The all-items consumer price index is used to convert nominal income (Statistics Canada Cansim Table 326-0021).

The sample used here represents all individuals age 65 and over with observable income and demographic information. When separately examining married (and common-law) couples, only those couples with both members age 65 and over are included in the sample.

An individual is defined as living independently if they are an unattached (single, widowed, or divorced) individual that lives in an economic family of size one or they are a married couple that lives in an economic family of size two. Those living in shared arrangements are then seniors living with their adult children or members of their extended family, potentially including their parents, grandchildren, or siblings.

In the econometric analysis of income deciles, I control for various demographic variables we expect to influence incomes. I include indicator variables for the highest level of education a person has completed, whether the individual is Canadian born, male, or married, and indicators for each year of age (with all individuals age 75 and older grouped together) and each province. I also account for whether English is the person's mother tongue and their urban-rural status.

4. Trends in income and elderly characteristics

The equivalent after tax incomes of the elderly rose substantially over the 1977-2008 period. From 1977 to 1996, the 10th percentile of log equivalent income increased by more than 80 percent. At the middle of the income distribution, gains were more modest with the 50th percentile increasing by more than 30 percent from 1977 to 1996. Gains at the 90th percentile were much smaller, rising by less than 10 percent over this period. Incomes continued to rise after 1996, with more uniformity across the income distribution. From 1996 to 2008, incomes at the 10th, 50th and 90th percentiles rose by 11 percent, 25 percent, and 23 percent, respectively.

The portion of the elderly living independently also rose over the 1977-96 period. In 1977-79, 72 percent of all individuals age 65 and over lived independently. By 1994-96, more than 78 percent of the elderly lived independently. After the mid-1990s, the portion of individuals living independently appears to remain fairly stable.

Other characteristics of the elderly also changed over time. The educational attainment of the elderly increased substantially over time. In 1977-79, 56 percent of the elderly had not completed any high school; this fell to only 28 percent by 2006-08. Similarly, the portion gaining a university degree increased from 3 percent in 1977-79 to 11 percent in 2006-08. Schirle (2009) has shown that such changes in education drive large increases in income for Canadian seniors, particularly at higher percentiles of income. The elderly population is noticeably aging by the 1990s with increases in longevity, as the portion of those age 65 and over that are over age 75 increases from 35 percent in 1977-79 to 2006-08. The portion male has remained relatively stable over this period as the life expectancy of both men and women increased and women continue to live longer than men.

5. Decomposing changes in elderly income

In this study we are primarily interested in the extent to which changes in living arrangements and changes in their effect on elderly income have driven the large increases in elderly income observed over the 1977-79 to 1994-96 and 1994-96 to 2006-08 periods. To do this, we take the standard approach associated with the Oaxaca-Blinder decomposition methods. Linear regression methods are used to estimate the effect of a given characteristic on the outcome of interest. Those estimates are then used to derive the extent to which changes in the outcome of interest can be attributed to changes in the estimated coefficients. This is referred to the structure effect associated with that factor. The estimates are also used to find the extent to which changes in the outcome of interest can be attributed to

changes in mean characteristics. This component is referred to as composition effects.

5.a. Methodology

The Oaxaca-Blinder decomposition relies on the linearity of the underlying model used to predict incomes. I make use of the unconditional quantile regressions developed by Firpo et al. (2009) and apply them using the decomposition methods discussed in Fortin et al. (2011) and Firpo et al. (2007). One of the benefits of unconditional quantile regressions is that the estimated coefficients can be interpreted as the effect of increasing the mean value of a covariate on the unconditional quantile. This differs from conditional quantile regressions, whereby coefficients can only be given a conditional interpretation.⁵

In an unconditional quantile regression, an estimate of the influence function for a specified decile is found and then rescaled (recentered). This recentered influence function has an expected value equal to the distributional statistic of interest and is used as the dependent variable in a regression. Here, we assume the conditional expectation of the RIF can be modeled as a linear function of the explanatory variables. Following the notation in Fortin et al. (2011),

$$E[\text{RIF}(Y_t; \nu) | X_t] = X_t \gamma_{t, \nu} \quad (1)$$

Where Y_t is after tax equivalent income, ν represents the decile of interest, and X_t represents the characteristics that determine income including whether the individual lives independently, age, education, province of residence, gender, marital status, urban-rural status, immigrant status and whether English is their

⁵ This explained clearly in Fortin et al. (2011). OLS coefficients have two distinct interpretations. First, the conditional mean interpretation indicates the effect of a covariate on the conditional mean of the dependent variable. Second, an unconditional mean interpretation can be derived whereby the coefficient can be interpreted as the effect of increasing the mean value of a covariate on the unconditional mean value of the dependent variable.

mother tongue. The parameters γ_t are estimated using OLS and the estimates can be written as

$$\hat{\gamma}_{t,\nu} = (\sum_{i=1}^{Nt} X_{it} X_{it}^T)^{-1} \sum_{i=1}^{Nt} \widehat{RIF}(Y_{it}; \nu) \cdot X_{it}, (t = 1, 2). \quad (2)$$

Programs made publicly available have been used to estimate these coefficients.⁶ We can then present the Oaxaca-Blinder decomposition for any unconditional quantile (decile) as

$$\widehat{\Delta}_0^\nu = \sum_{k=1}^K (\overline{X}_2^k - \overline{X}_1^k) \hat{\gamma}_{2,\nu}^k + \sum_{k=1}^K \overline{X}_1^k (\hat{\gamma}_{2,\nu}^k - \hat{\gamma}_{1,\nu}^k) \quad (3)$$

The first term represent composition effects of changes in the mean of each of the K characteristics and the second term represents the structure effects based on changes in the estimated coefficients over time. Note that, as with the standard Oaxaca-Blinder decomposition, the structure effects remain difficult to interpret given their interpretation relies on which groups (from each categorical variable) are omitted.⁷

5.b. Results

The estimated unconditional quantile partial effects of living independently on select log equivalent income percentiles (from equation 2) are presented in Table 2.⁸ It is important to keep in mind that the estimates do not represent causal effects; rather they represent correlations.

⁶ The Stata ado files are made available by Nicole Fortin at <http://faculty.arts.ubc.ca/nfortin/datahead.html>, accessed October 2010.

⁷ See section 3.2 of Fortin et al. (2011) for a discussion of issues related to the choice of the omitted group. In this analysis, the omitted group represents 65 year old unmarried non-English immigrant female living in Ontario.

⁸ Note that the coefficients presented in Table 2 are from 36 different regressions (9 deciles and 4 samples). Complete regression results are available from the author upon request.

The living arrangements of the elderly clearly have a significant impact on their income. This effect was strongest in late 1970s. In 1977-79, the partial effect of increasing the portion of individuals living independently was -0.246 at the 10th percentile. The partial effects are much larger in the middle of the elderly income distribution. At the median log income, the partial effect in 1977-79 was -0.732. The effect is only slightly smaller at higher percentiles, with the partial effect of living independently at -0.447 at the 90th percentile.

A similar pattern in the negative effect of living independently across income percentiles is observed in 1994-96 and 2006-08. At lower percentiles, the partial effect is relatively small and then larger at percentiles representing the middle of the elderly income distribution. There are more modest effects at the top of the elderly income distribution.

There are important changes, however, in the partial effects at each percentile over time. From 1977-79 to 1994-96, the partial effect of increases in the portion of the elderly living independently decreased substantially. At several deciles (particularly in the lower 2/3 of the log income distribution) the negative partial effect is nearly halved. From 1994-96 to 2006-08, the negative effect of living independently appears to become larger again at percentiles in the lower half of the elderly income distribution. The effects are not as large as they were in the 1970s.

The decomposition exercise demonstrates that this large change in estimated partial effects is an important factor for explaining changes in log elderly incomes over the 1977-79 to 1994-96 period. As a starting point, consider the change in log income at the 10th percentile over the 1977-79 to 1994-96 period. The decomposition results are presented in Figure 2a.

The total increase in log incomes at the 10th percentile was 0.484. The composition effect of independent living, which represents the increase in the portion of the

elderly living independently over the 1977-79 period, drove a 0.015 decrease in log income at the 10th percentile. This downward pressure on income, however, was outweighed by other changes in elderly characteristics such as the large increases in educational attainment. As a result, changes in the total composition of the sample (representing changes in all characteristics) accounts for almost none of the large increase in elderly incomes at the 10th percentile.

Total structure effects (representing changes in the coefficients reported in Table 2) were much more important for explaining changes in the 10th percentile of log income over the 1977-79 to 1994-96 period. (To note, the largest coefficient change over the period is in the constant term of the unconditional quantile regression for the 10th percentile.⁹) Reductions in the penalty associated with living independently appear to drive a substantial portion of the total structure effects, with the estimates indicating that the structure effect of independent living accounts for 20 percent of the total increase in log income at the 10th percentile.

The composition and structure effects of independent living are much more important for explaining changes in income percentiles around the middle of the income distribution. At the 60th percentile, there was a total increase in log incomes of 0.171 over the 1977-79 to 1994-96 period. The increase in the portion of the elderly living independently placed downward pressure on incomes at the 60th percentile, with the composition effect representing -29 percent of the total increase in the 60th percentile. Structure effects associated with independent living more than offset the composition effects, driving a 0.27 increase in log incomes at the 60th percentile (representing 160 percent of the total change)

Considering higher points of the income distribution, the composition and structure effects are smaller in magnitude than for the bottom 2/3 of the distribution. Considering, however, the smaller overall change in incomes at upper percentiles,

⁹ Complete regression results are available from the author upon request.

the composition and structure effects of independent living remain relatively important. Structure effects associated with independent living put upward pressure on incomes at the 90th percentile, representing 255 percent of the 0.035 increase in log income. Composition effects offset this, with increases in the portion of the elderly living independently associated with a 0.027 reduction in log income. Note that large reductions in the constant term from the unconditional quantile regression was large enough to offset any gains associated with increased educational attainment or living arrangement structure effects at the 90th percentile.

The results are slightly different for the decomposition of the increase in income over the 1994-96 to 2006-08 period (Figure 2b). As there was little to no change in the portion of the elderly living independently, the composition effect of independent living is virtually zero for all percentiles. Structure effects, however, differed across the distribution. The ‘penalty’ associated with living independently had actually increased for the bottom half of the distribution, placing downward pressure on incomes at the lower end of the income distribution. For example, while the 10th percentile of log income increased by 0.108 over the 1994-96 to 2006-08 period, the structure effect of independent living was -0.055. This suggests the 10th percentile of income could have been 50 percent higher had the penalty to independent living not changed after 1994-96.

The decompositions for 1977-79 to 1994-96 were repeated for subsamples of observations by marital status and gender. The results are presented in Figures 3a-3c. As we might expect, it appears the structure effect of independent living is much more pronounced for unmarried individuals than married couples. At the 50th percentile of income, the positive structure effect of independent living represents 131 percent of the total increase in log income for unmarried men age 65 and over. For unmarried women, whose total increase in log income is more modest, the structure effect at the 50th percentile represent 331 percent of the total increase. For married couples, on the other hand, the structure effect of independent living at the 50th percentile represents only 77 percent of the total increase in log income.

Increases in the portion of the elderly that live independently also had a relatively larger negative effect on incomes among unmarried men and women. At the 50th percentile, the composition effect's downward pressure placed on income among unmarried men and unmarried women represented 38 and 56 percent of the total change in log income, respectively. For married couples, the downward pressure associated with the increase in independent living represented less than 10 percent of the total change in log income at the 50th percentile.

Concluding Remarks

Previous studies have found a causal link between changes in income and the elderly's choice to live independently. This study has demonstrated that the relationship between income and living arrangements is relatively complex and that the nature of this relationship will depend on which point of the elderly income distribution we are examining.

From the 1970s-1990s in Canada, there was a large increase in the portion of elderly individuals that lived independently. The higher likelihood of living independently had the largest negative impact on incomes at the middle of the elderly income distribution. Substantial reductions in the 'penalty' associated with independent living over this period (likely associated with substantial increases in public pension benefits in the late 1970s and early 1980s) placed upward pressure on elderly incomes, with the strongest effect on the middle of the elderly income distribution. That upward pressure was enough to outweigh the downward pressure associated with the increase in independent living.

These substantial reductions in the independence 'penalty' were most important for the elderly considered most vulnerable – unmarried men and women. Policy makers and those interested in improving elderly well-being need to be aware of any changes to this independence penalty at all points of the income distribution.

Since the mid-1990s this penalty has increased in Canada, seriously affecting the elderly in the bottom half of the elderly income distribution.

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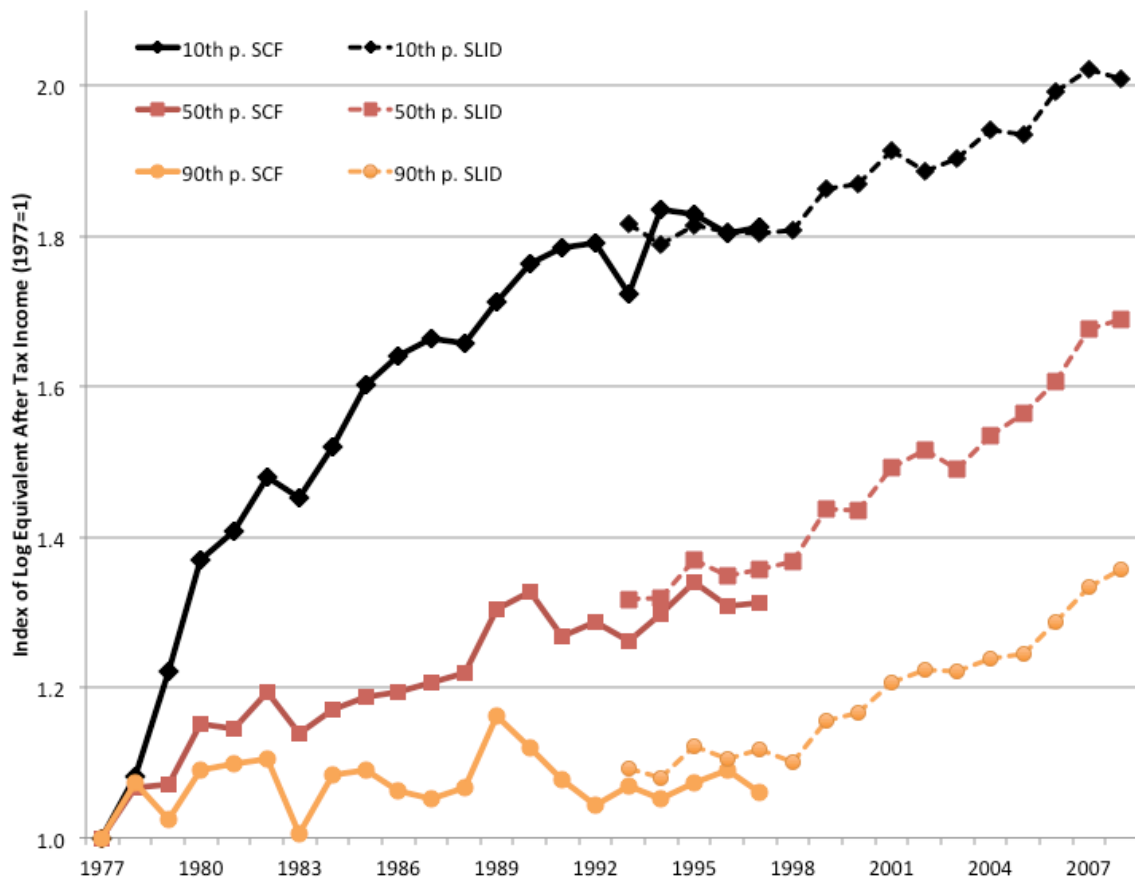


Figure 1. Equivalent economic family after tax income of elderly individuals (relative to 1977 in 2002 prices), select deciles, 1977-2008.

Source: Author's tabulations based on the Survey of Consumer Finances and the Survey of Labour and Income Dynamics. Sample includes individuals age 65 and older.

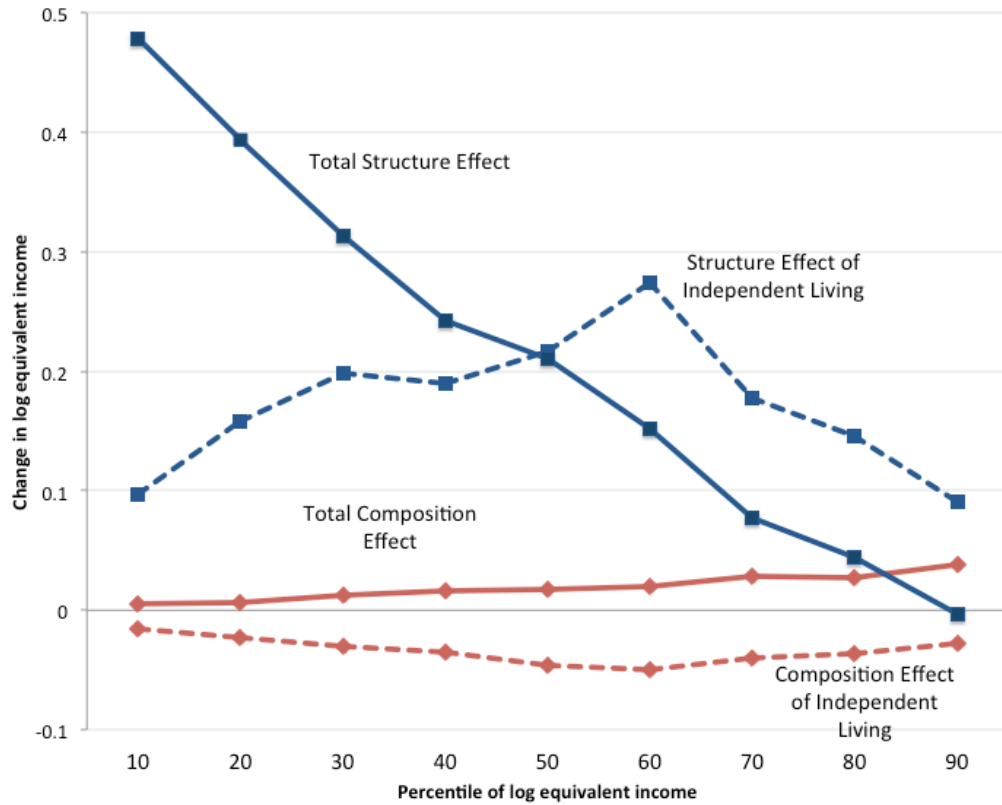


Figure 2a. Decomposition Results - 1977-79 to 1994-96 changes in log equivalent income of individuals age 65 and over at select percentiles
 Source: Author's tabulations based on the Survey of Consumer Finances and the Survey of Labour and Income Dynamics. Sample includes individuals age 65 and older.

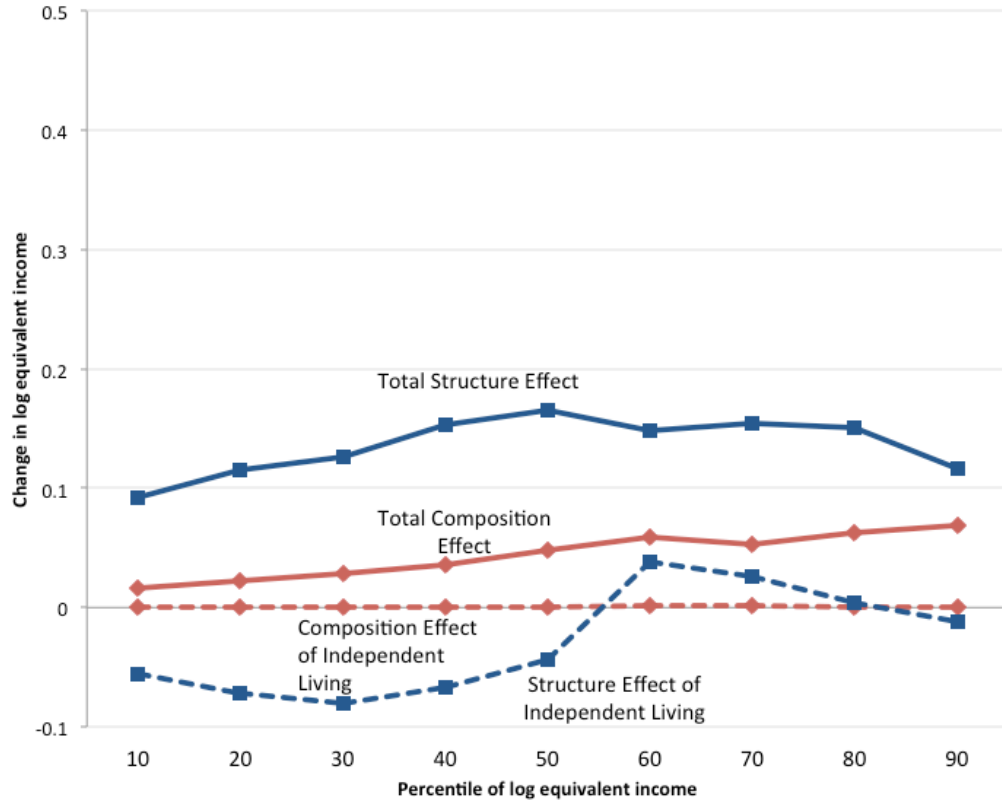


Figure 2b. Decomposition Results -1994-96 to 2006-08 changes in log equivalent income of individuals age 65 and over at select percentiles
 Source: Author's tabulations based on the Survey of Consumer Finances and the Survey of Labour and Income Dynamics. Sample includes individuals age 65 and older.

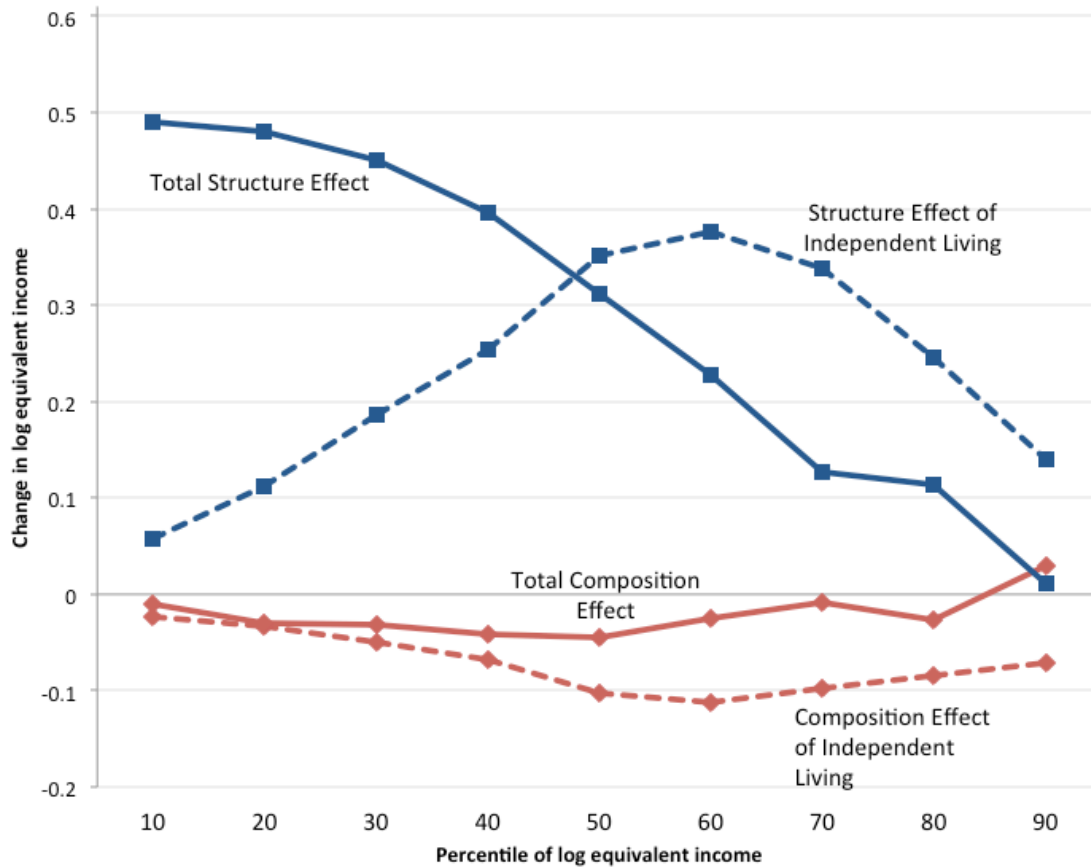


Figure 3a. Decomposition Results – 1977-79 to 1994-96 changes in log equivalent income of unmarried men age 65 and over at select percentiles
 Source: Author's tabulations based on the Survey of Consumer Finances and the Survey of Labour and Income Dynamics. Sample includes individuals age 65 and older.

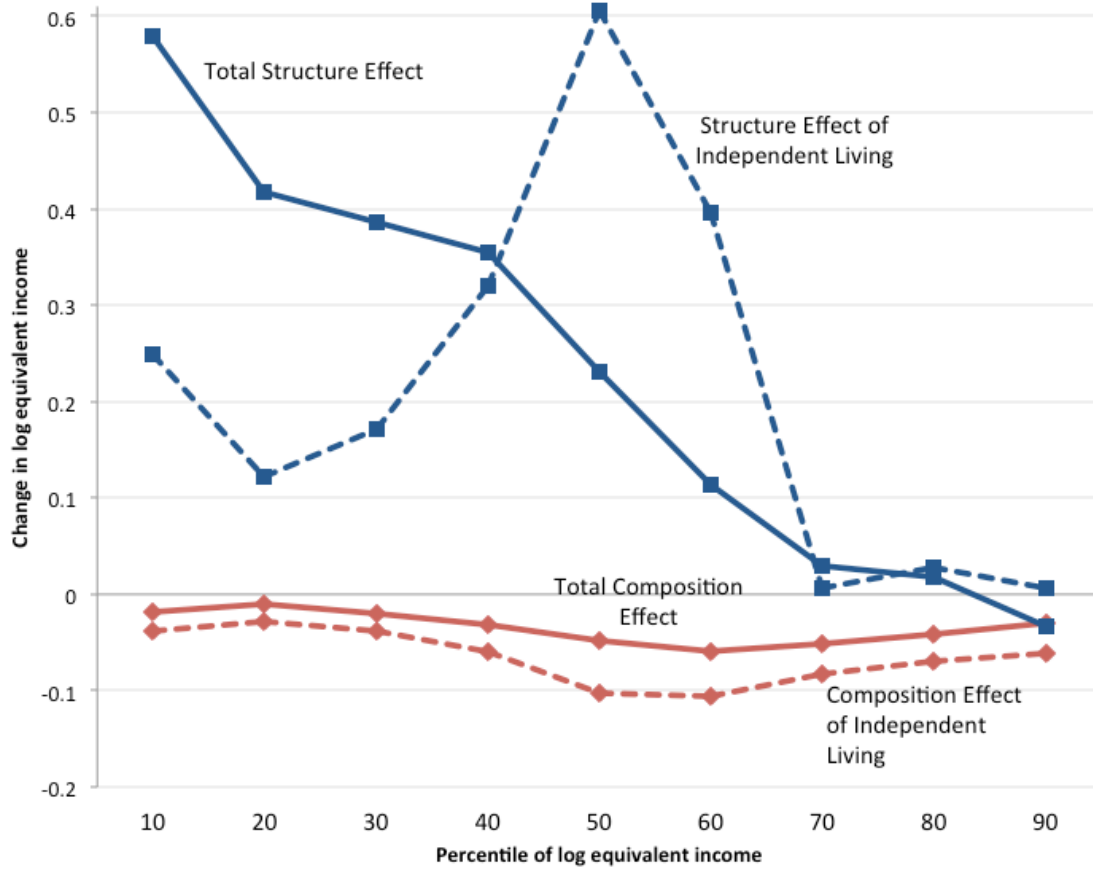


Figure 3b. Decomposition Results – 1977-79 to 1994-96 changes in log equivalent income of unmarried women age 65 and over at select percentiles
 Source: Author’s tabulations based on the Survey of Consumer Finances and the Survey of Labour and Income Dynamics. Sample includes individuals age 65 and older.

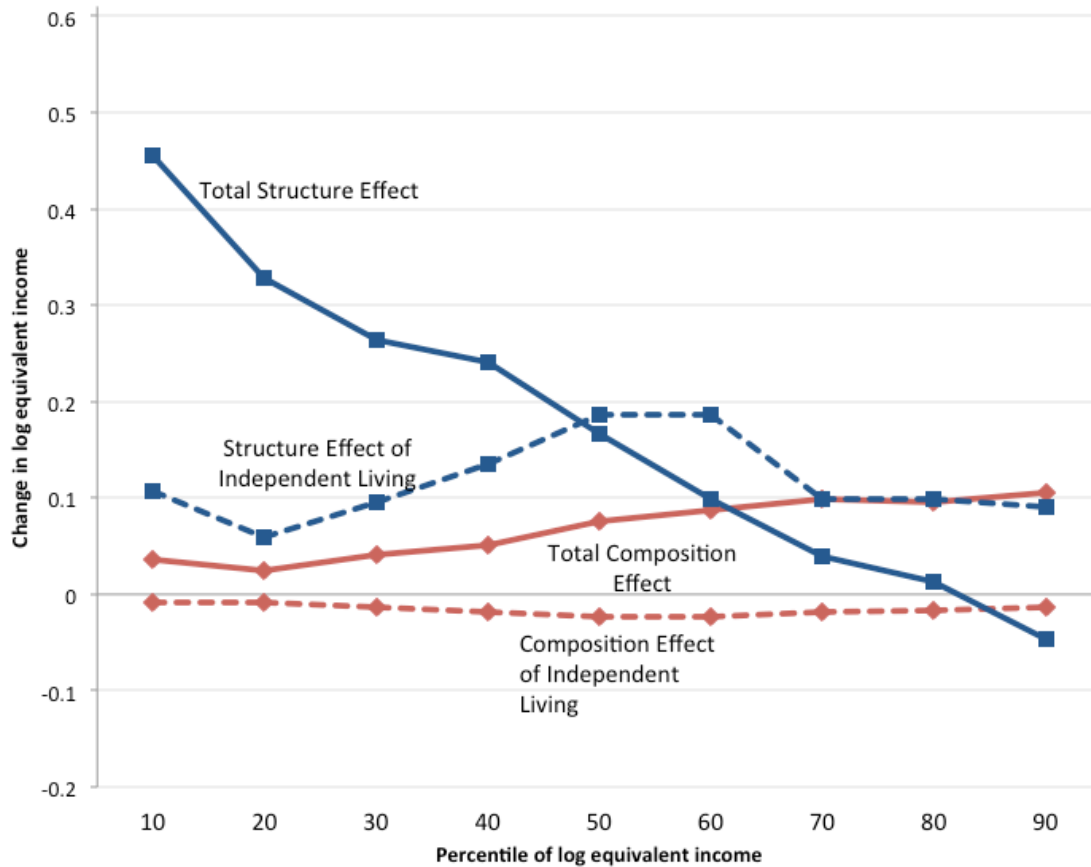


Figure 3c. Decomposition Results – 1977-79 to 1994-96 changes in log equivalent income of married couples age 65 and over at select percentiles
 Source: Author's tabulations based on the Survey of Consumer Finances and the Survey of Labour and Income Dynamics. Sample includes individuals age 65 and older.

Table 1. Income deciles and mean characteristics of elderly individuals

	SCF		SLID	
	1977- 1979	1994- 1996	1994- 1996	2006- 2008
Equivalent income (2002 prices)				
10th percentile	8690	14104	13961	15555
50th percentile	16874	21201	21591	26711
90th percentile	39890	41336	42457	51101
Live Independently	0.723	0.785	0.801	0.799
Age				
65	0.091	0.075	0.070	0.072
66	0.075	0.064	0.064	0.070
67	0.076	0.067	0.065	0.066
68	0.071	0.062	0.059	0.062
69	0.070	0.059	0.062	0.060
70	0.067	0.069	0.068	0.055
71	0.052	0.056	0.063	0.053
72	0.057	0.060	0.058	0.051
73	0.048	0.056	0.055	0.049
74	0.047	0.051	0.053	0.045
75+	0.347	0.381	0.383	0.418
Education				
Junior High and Less	0.561	0.385	0.385	0.275
High School	0.312	0.359	0.322	0.329
Some Post Sec.	0.034	0.034	0.054	0.065
Post Secondary	0.059	0.159	0.180	0.222
University	0.034	0.063	0.059	0.109
Male	0.442	0.432	0.426	0.448
Married	0.561	0.582	0.588	0.619
Number of Observations	23181	32434	17498	27812

Source: Author's tabulations based on the Survey of Consumer Finances and the Survey of Labour and Income Dynamics. Sample includes individuals age 65 and older.

Table 2. Unconditional Quantile Regression Results - Estimated partial effect of independent living on select income percentiles

Percentile	SCF		SLID	
	1977-79	1994-96	1994-96	2006-08
10th	-0.246 (0.016)	-0.123 (0.007)	-0.113 (0.012)	-0.183 (0.010)
20th	-0.362 (0.012)	-0.161 (0.006)	-0.177 (0.012)	-0.267 (0.009)
30th	-0.475 (0.012)	-0.223 (0.006)	-0.236 (0.012)	-0.336 (0.012)
40th	-0.563 (0.012)	-0.321 (0.007)	-0.293 (0.014)	-0.377 (0.012)
50th	-0.732 (0.015)	-0.456 (0.010)	-0.362 (0.017)	-0.417 (0.014)
60th	-0.798 (0.019)	-0.448 (0.012)	-0.434 (0.020)	-0.386 (0.014)
70th	-0.638 (0.018)	-0.413 (0.013)	-0.388 (0.020)	-0.355 (0.016)
80th	-0.585 (0.021)	-0.400 (0.015)	-0.334 (0.024)	-0.329 (0.017)
90th	-0.447 (0.026)	-0.331 (0.019)	-0.296 (0.034)	-0.310 (0.023)

Note: Robust standard errors are in parentheses.

Source: Author's tabulations based on the Survey of Consumer Finances and the Survey of Labour and Income Dynamics. Sample includes individuals age 65 and older.

Appendix

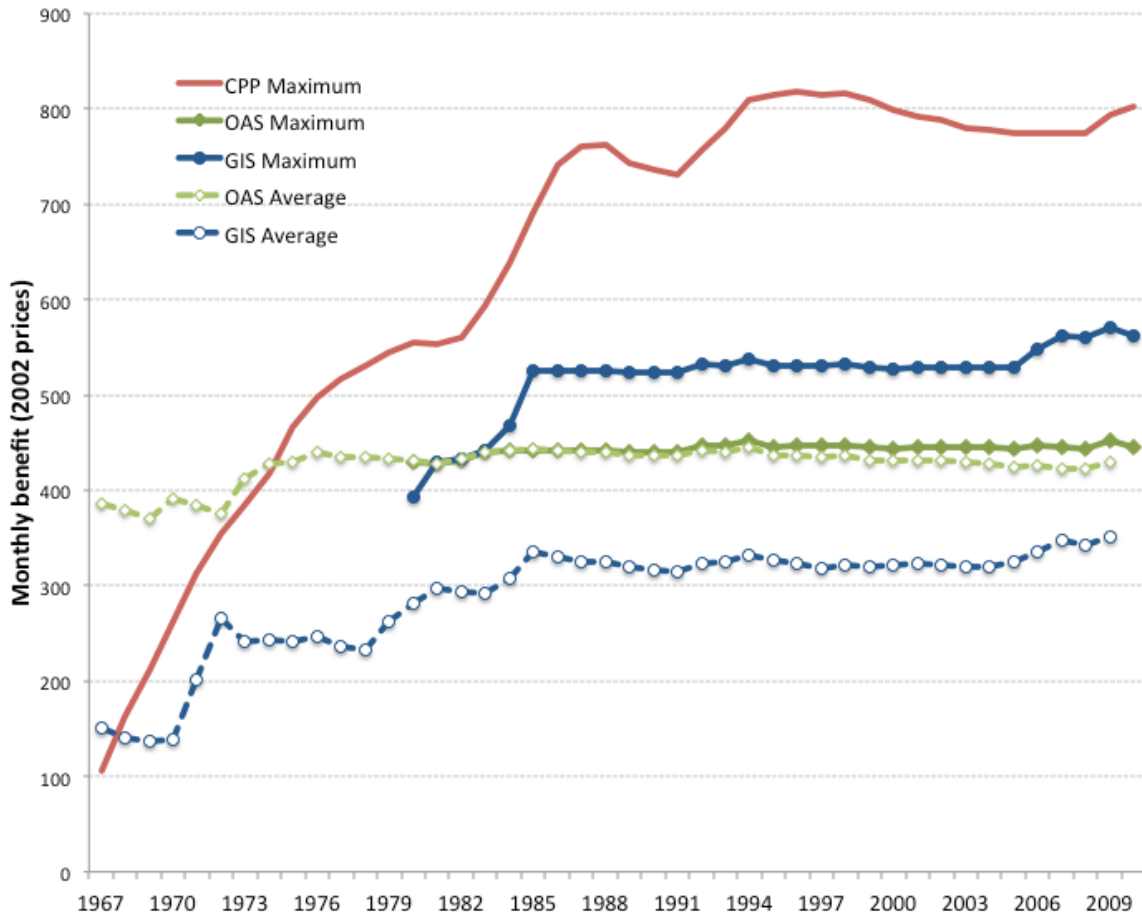


Figure A.1. Canada Pension Plan, Old Age Security, and Guaranteed Income Supplement Monthly Benefits, 1967-2010.

Source: HRSDC (2010), HRSDC (2011) and OSFI (2006)

Note: The Canada Pension Plan provides retirement pensions with benefit amounts linked to the individual's earnings history. Old Age Security is a demogrant provided to all individuals age 65 and over, with clawbacks applied to high income individuals. The Guaranteed Income Supplement is a family income-tested benefit available to low income seniors over age 65 or with a spouse over age 65.

More information on each of these public pension benefits is available at <http://www.servicecanada.gc.ca/eng/lifeevents/retirement.shtml#programs>