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Low-income Dynamics and Determinants under Different Thresholds: New Findings for Canada in 2000 and Beyond

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Low-income Dynamics and Determinants under Different Thresholds: New Findings for Canada in 2000 and Beyond

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1. This article is an excerpt from a full report, with the same title, prepared by the authors for Statistics Canada. The full report is available from the authors upon request.

Table of Contents

Abstract 4
1. Introduction 5
2. Theoretical considerations and empirical strategy 7
2.1 Conceptual questions and notations 7
2.2 Identifying low income 8
2.3 Transitory and persistent low income 11
2.4 Analysing low-income dynamics 12
2.5 Analysing low-income persistence 14
2.6 Analysing incidence of low income and probability of being in low income 15
2.7 Duration aversion and comprehensive measure of low-income durations 16
3. Empirical Results 18
3.1 Sample statistics 18
3.2 Patterns of low-income dynamics from year to year 19
3.3 Patterns of low-income dynamics over time 19
3.4 How are transitions to low income affected by gender, family type and other factors? 23
3.5 What determinants influence transitory and persistent low income? 26
3.6 What are the robust changes from Panel 3 to Panel 4? 27
4. Conclusion 28
Appendix 30
References 38

Abstract

The existing studies on Canadian low-income dynamics are mainly based on 1990s data from the Longitudinal Administrative Database or the Survey of Labour and Income Dynamics (SLID). These studies typically rely on a single low-income threshold. Our work extends the existing studies beyond 1999 by using SLID data from Panel 3 (1999 to 2004) and Panel 4 (2002 to 2007). We consider all three low-income thresholds established by federal departments: Statistics Canada's low-income cut-off (LICO) and low-income measure (LIM), and the market basket measure (MBM) of Human Resources and Skills Development Canada.

We find that two-thirds of low-income Canadians and 97% of non-low-income Canadians stay in their respective states from one year to the next, while about one-third of low-income Canadians move out of low income and 3% of non-low-income Canadians move into low income. Women in general are more likely to be in low income for various durations than men are. However, gender does not appear to play a significant role in determining persistent low income after we control for other confounding factors. The overall assessment of low-income dynamics changes little under each of the three low-income thresholds.

We also find that transitory low income is very much a life cycle phenomenon, with transitory low income being more prominent in certain age groups and among unattached people. Therefore, age and family composition play an important role in transitory low income. These findings are quite robust under all three low-income thresholds and across the two SLID panels.

While a small percentage of the total population experience persistent low income, we find that large percentages of high-risk groups (such as lone mothers, recent immigrants, members of visible minorities, people with less education and people with activity limitations) suffer more from persistent low income.

Finally, we find that low-income persistence improved over time for several vulnerable groups, such as women and lone parents. But the overall low-income duration worsened slightly from Panel 3 to Panel 4, no matter which threshold is used.

1. Introduction

Much of the debate on poverty and low income in Canada focuses on cross-sectional evidence.[2] While this is important, low-income dynamics from the longitudinal perspective should also be examined. How often do Canadians get in and out of low income within a given period of time? How long do they stay there and how fast do they escape from low income? Who are more likely to be in low income for a long episode? What are the factors affecting the dynamics and persistence of low income? In this paper, we will address these questions to better understand low income from the dynamic perspective.

Existing literature provides some evidence on low-income dynamics and persistence for the 1990s and earlier. Duncan et al. (1993) is probably among the earliest studies on low-income dynamics for a number of countries, including Canada. Morissette and Zhang (2001) is one of the first fully dedicated studies on Canadian low-income dynamics and persistence. Using data from the 1993-to-1998 panel of the Survey of Labour and Income Dynamics (SLID), Morissette and Zhang showed that about 8% of Canadians experienced low income for four years or more in the six-year period. Only 3% were in low income for all six years. They also highlighted the low-income experiences of various high-risk groups in the population. Finnie and Sweetman (2003) is another major Canadian study on low-income dynamics using data from the Longitudinal Administrative Database (LAD) from 1992 to 1996 (a five-year panel). They found that about 6% of Canadians were in low income for all five years from 1992 to 1996. Almost 21% experienced low income for one to four years. They showed that compared to married couples, lone parents, in particular lone mothers and unattached individuals, had greater rates of low-income entry and exit during the period. However, the above studies are based on data from the 1990s or earlier. In this paper, we wish to study what has happened to Canadian low-income dynamics and persistence since then.

2. We have adopted the term 'low income' in our analysis. Although low income is not interpreted as poverty by Statistics Canada, we use this concept to refer to both low income and poverty broadly in our analysis. We believe, from the conceptual point of view, low income defined by Statistics Canada nests poverty, but the inverse is not necessarily true.

Another feature of previous studies is their use of a single low-income threshold. Morissette and Zhang (2001) employ the Low Income Cut-Off (LICO); Finnie and Sweetman (2003) create a relative threshold similar to the Low Income Measure (LIM). LICO and LIM are two low-income thresholds established by Statistics Canada. In addition, Human Resources and Skills Development Canada (HRSDC) also introduced the Market Basket Measure (MBM) in the early 2000s. With these three low-income thresholds readily available, we wish to evaluate how robust our updated analysis on low-income dynamics and persistence would be using these low-income thresholds.

Assessing low-income thresholds touches the core of low-income measurement. In the literature, some authors advocate the relative approach; others advocate the absolute approach emphasizing the use of food, clothing, shelter and other essentials for defining the poverty threshold. Osberg and Xu (1999, 2000a), Myles and Picot (2000), Morissette and Zhang (2001), Finnie and Sweetman (2003) and the World Bank Institute (2005) have adopted the relative approach. Others such as Sarlo (1996) and Pendakur (2001) consider the LICO and LIM too generous: they advocate using the essential costs of living to construct a threshold such as MBM.

There is a tendency to focus on relative low income or poverty within developed countries. Galbraith (1998) advocates the idea that low-income thresholds must be established with reference to specific communities. He implicitly suggests the relative approach. On the relevance of relative low-income thresholds to other absolute deprivations, Sen (1992, p. 115) points out that "[r]elative deprivation in the space of incomes can yield absolute deprivation in the space of capabilities." More recently, Osberg and Xu (2008) and Ravallion (2010) provide new evidence to support low-income relativism. On the magnitude of low-income thresholds, Osberg and Xu (2008) further argue that if z_A is an 'absolute' (however defined) low-income threshold, and z_R is a 'relative' (as a fraction of median equivalent income) low-income threshold, the optimal choice of low-income thresholds, z, should be the maximum of the two—that is, $z = \text{maxi}(z_R , z_A)$.

Nevertheless, when we face several low-income thresholds—all of them could be relative or absolute—how to evaluate the impact of various threshold choices? In this study, we

will try to answer the question in the context of analysing low-income dynamics and persistence for Canada in 2000 and beyond.

Our study is unique in the following ways. First, we rely on more recent data to examine low-income dynamics and persistence in Canada. Second, unlike previous studies we employ several low-income thresholds at the same time to study low-income dynamics and persistence. Third, we pay particular attention to the development of research strategies on low-income dynamics and persistence. Finally, we attempt to shed some light on the choice of different low-income thresholds, both theoretically and empirically.[3]

The rest of the paper is organized as follows. Section 2 discusses the conceptual questions and our research strategies. Section 3 presents the empirical results. In Section 4, we conclude.

2. Theoretical considerations and empirical strategy

2.1 Conceptual questions and notations

We would like to discuss the following conceptual questions that are relevant to our empirical analysis. What are the possible time-invariant and time-varying low-income thresholds? What are the issues arising in low-income identification? How should one analyse low income over time and across the population? What are the differences between transitory and persistent low income? How should one measure transitions into and out of low income? How should one analyse low-income incidence, duration and transition in terms of key characteristics of the members of the population?

To facilitate the discussion, we use U to denote the target population, in which there are N individuals. We study these individuals over T periods. Let y_{it} be the income of

3. Theoretical discussions and empirical results on the choice of different thresholds are contained in the full version of the report, available from the authors on request.

individual i in period t, where $i = 1, 2, ...N$ and $t = 1,2,...T$. Let $y_{.t} = [y_{1t}, y_{2t}, ...,y_{Nt}]$ be the income vector of the total population in period t and $y_{i.} = [y_{i1}, y_{i2}, ...,y_{iT}]$ be the income vector of individual i over T periods. Let $\boldsymbol{w}_{it}$ be the vector containing socioeconomic and demographic information, such as gender, age, educational attainment, activity limitation, immigration status, minority status, family size, family composition and area of residence for individual i in period t.

2.2 Identifying low income

Low income is identified by comparing family income with the low-income thresholds the family faces. The three low-income thresholds are LICO, LIM and MBM, which are established and regularly updated by the Canadian government and widely employed by researchers.[4] LICO is established using data from the Family Expenditure Survey, now known as the Survey of Household Spending. When a family has to spend 20 percentage points more of its income on necessities (food, shelter and clothing) than the average family, it is classified as a low-income family. Separate thresholds are defined for seven sizes of families—from unattached individuals to families of seven or more people—and for five community sizes—from rural areas to large population centers with more than 500,000 people. To determine whether a person (or a family of which the person is a member) is in low income, an appropriate LICO (given the family size and community size) is applied to the income of the person's economic family. In this study, we use after-tax family incomes and after-tax LICOs.[5] If the economic family income is below the cut-off, all individuals in that family are considered to be in low income.

4. Zhang (2010) offers a comprehensive assessment on the technical details of the existing low income measures in Canada.

5. There are after-tax and before-tax LICOs produced by Statistics Canada. The former is the benchmark used for after-tax incomes while the latter is for before-tax incomes. We work on after-tax LICOs and after-tax income.

LIM is a low-income threshold that is defined as a fixed percentage, 50%, of the median 'adjusted family income'[6]—family income adjusted for size using the equivalent scale, which takes account of the economies of scale in consumption. By design, LIM is not adjusted for differences in community size: it is, however, automatically adjusted each year for changes in family income distribution. As with low-income identification under LICO, if the income of an economic family is below its LIM threshold, all individuals in that family are considered to be in low income under LIM. Our analysis follows the convention of Statistics Canada and the literature to use after-tax income and the after-tax LIM.[7]

Fixing LIM at 50% of the median adjusted family income can be somewhat arbitrary.[8] For example, the European Union has chosen 60% for a conceptually similar low-income threshold and the OECD, 70%. Statistics Canada proposed modifications to the LIM by replacing the economic family-based income with household-based income, by replacing the current LIM equivalence scale with the square root of household size, and by taking household size into consideration in determining the low-income thresholds.[9]

MBM is based on the costs of a basket of goods and services such as food, shelter, clothing, transportation and other essentials. Statistics Canada, on behalf of HRSDC, collects price data on the goods and services in the basket to calculate thresholds for 19 specific communities and 29 community sizes in the 10 Canadian provinces. The MBM thresholds are calculated for a reference family of two adults aged 25 to 49 with two

6. We can also discuss the matter on the basis of equivalent individual incomes. The adjusted family income is the sum of equivalent individual incomes of the family members.

7. LIMs are calculated three times—using market income, before-tax income and after-tax income. Similar to LICO, we only use the after-tax LIM.

8. However, the existence of arbitrary elements is not unique to LIM. Other low-income thresholds contain their own arbitrary elements. For example, under LICO, an arbitrary 20% factor was employed.

9. Interested readers may refer to Murphy et al. (2010). Owing to time constraint, we have not considered these modifications in the current study.

children, a boy aged 13 and a girl aged 9. The costs for all other household configurations are then calculated using the LIM equivalence scale.

The income compared with the MBM threshold is different from the after-tax income, as the income relevant to MBM further excludes from total income other non-discretionary expenses such as support payments, work-related child care costs, transportation costs and employee contributions to pension plans and to Employment Insurance.[10,11] If the economic family's disposable income defined as such is below the established MBM threshold, all individuals in that family are considered to be in low income.

Although LICO, LIM and MBM are in the context of family or household income, it would be much clearer if we convert these incomes and cut-offs into individual equivalent incomes and cut-offs.[12] Generally, if the income of individual i at time t, y_{it}, is lower than a suitably chosen low-income threshold, the individual with that income is considered a low-income individual. For any low-income threshold, z_t, we may use the

10. MBM is more sensitive than LICO or LIM to the significant geographical variations (both among and within provinces) in the cost (especially for shelter and transportation) of many typical items of expenditure.

11. The conceptual framework of MBM was developed and adopted by HRSDC in 2000: therefore, MBM is not directly available for 1999 or earlier. To enable our analysis on low-income persistence across different choices of low-income thresholds, we impute MBM for 1999 by converting the MBM in 2000 (using the MBM 2007 basket) with the Consumer Price Index. Therefore, we will use caution when interpreting 1999 results under MBM.

12. We can explain the simplest conversion here. Let $Y(s)$ be the income of a family of size s. The required family income for a family of size s due to economies of scale is increasing and concave in s. This concept is also applicable to the family low-income cut-off or threshold, $Z(s)$, which is increasing and concave in s. If we use $\sqrt{s}$ as the adjusted family size, we can convert both family income and low-income threshold into the individual (or per capita) equivalent income and low-income threshold as $y = Y(s)/\sqrt{s}$ and $z = z(s)/\sqrt{s}$. The comparison between $Y(s)$ and $Z(s)$ is identical to the comparison between y and z. The individual absolute low-income gap would be $X = z - y = z(s)/\sqrt{s} - y(s)/\sqrt{s}$ if $y < z$. The individual relative low-income gap would be $x = (z - y)/z = [Z(s) - Y(s)]/Z(s)$ if $y < z$. Apparently, the relative low-income gap x is scale-free, in the sense that it is the same for an individual and for the family of which the individual is a member.

indicator function to simplify the discussion.[13] Let A_{it} refer to the event $y_{it} < z_t$ for all i and t. If the indicator function $I(A_{it}) = 1$ holds, individual i in period t is identified as in low income. If $I(A_{it}) = 0$, then individual i in period t is identified as not in low income.

With the above low-income identification, in period t the target population U which is the same for all T periods, is classified into two subpopulations: individuals whose incomes are below the low-income threshold in period t, $S_t = \{i: y_{it} < z_t\}$, and individuals whose incomes are greater than or equal to the low-income threshold in period t, $\overline{S_t} = \{i: y_{it} \geq z_t\}$. The total target population is $U = S_t \cup \overline{S_t}$. In our study, U contains the same N individuals for all T periods within a panel.

2.3 Transitory and persistent low income

In this paper, we distinguish transitory (or transient) low income from persistent (or chronic) low income. While the distinction between the two is probably well understood, there are many possible interpretations at the operational level. For example, Borrooah and Greedy (2002) consider one year in poverty as temporary poverty and two years in poverty as permanent poverty. Hulme et al. (2001, 2003) use more refined grades of poverty duration. According to their definitions, a 'chronically poor' person is an individual whose income is lower than the low-income threshold in each of the T periods or in most of the T periods, e.g., five or four out of five years; a 'transitorily poor' person is an individual whose income fluctuates around the low-income threshold over time, or whose income falls below the low-income threshold in one of the T periods; a 'non-poor' person is an individual whose income is always greater than the low-income threshold during the study period. These definitions are consistent with the classification of the low-income individuals into transitory and persistent low-income groups in this paper.

Clearly, the period of an individual's lifespan covered by the survey dictates how persistent low income can be best measured. If we follow a cohort only for six years, then

13. Here we adopt the low-income criteria with the income strictly 'less than' the low-income threshold, consistent with most of the relevant literature and data processing conventions. Some authors—e.g., Borrooah and Creedy (2002)— use 'less than or equal to' rather than 'less than.'

the maximum duration in low income would be limited to six years. Censoring and truncation will inevitably occur.[14] There are two types of censoring. When low income starts before the first survey year, we call this 'left censoring.' When low income persists beyond the last survey year, we call this 'right censoring.' Truncation occurs when low income is so brief that the annual survey does not detect the spell of low income. The critical difference between censoring and truncation is that the former is detectable, while the latter is undetectable with annual data. Annual surveys are inherently incapable of capturing brief low-income spells within a year.[15] To minimize challenges from censoring and truncation, we will use the longest panel data possible and ignore truncation in our analysis.

2.4 Analysing low-income dynamics

To measure low-income dynamics, let the low-income indicator be $d_{it} = I(A_{it})$. $d_{it} = 1$ if individual i in period t is in the low-income state; $d_{it} = 0$ otherwise. Let $\mathbf{d}_{.t}$ be the vector of low-income indicators for the population in period t and $\mathbf{d}_{i.}$ be the vector of low-income indicators for individual i for all T periods.

When we follow a cohort in and out of low income with its probabilities (or proportions) in and out of that low-income state for all T periods, which is the maximum number of years, we call this cohort a closed Markov system.[16] Let q_t be the number of the low-income individuals in the target population. Then the proportion[17] of individuals in low income (denoted by state ***1***) in period t is $\pi_{1t} = q_t / \mathrm{N}$ and the proportion of individuals not in low income (denoted by state ***2***) in period t is $\pi_{2t} = 1 - q_t / \mathrm{N}$. By definition, $\pi_{1t} + \pi_{2t} = 1$.

14. Osberg and Xu (2000) have addressed censoring and truncation in the context of monthly incomes when discussing theoretical issues in poverty measurement and poverty duration.

15. The truncation at the annual data level will occur if an annual income is higher than a suitably chosen annual low-income threshold but some monthly incomes are actually below the monthly low-income threshold that corresponds proportionally to the annual low-income threshold.

16. See Bartholomew (1982) for more information.

17. We use 'proportion' instead of 'probability' although the latter may be more precise in discussing the stochastic process.

Let $\pi_t = [\pi_{1t}, \pi_{2t}]$. The history of proportions in low income and not in low income over T periods is therefore given by $\pi_1, \ldots, \pi_{t-1}, \pi_t, \pi_{t+1}, \ldots, \pi_T$.

We can also examine low-income dynamics by using the history of the proportions of individuals in low income and out of low income in period *t*, conditional on their previous low-income state in period *t-1* over periods $t = 2, \ldots, T$.

To make sense of the history of conditional proportions, $\{\pi_{nt} \mid \pi_{mt-1}\}$, we need the transition probabilities. The transition probability from an income (low-income or not-low-income) state *m* in period *t-1* to an income state *n* in period *t* is denoted by $p_{mn}(t)$. In our analysis, we have a transition probability matrix in period *t*

$$P(t) = \begin{bmatrix} p_{11}(t) & p_{12}(t) \\ p_{21}(t) & p_{22}(t) \end{bmatrix}.$$

for $t = 1, 2, \ldots, T$. Here, $p_{11}(t) + p_{12}(t) = 1$ and $p_{21}(t) + p_{22}(t) = 1$. We can identify interesting patterns in the mobility of the low-income states by analysing the estimated transition probabilities. With the transition probabilities, we can calculate $\pi_{nt} \mid \pi_{mt-1} = \pi_{mt-1}$ $p_{mn}(t)$ and $\pi_{nt} = \pi_{mt-1}\, p_{mn}(t) + \pi_{nt-1}\, p_{nn}(t)$ for period $t = 2, \ldots, T$ and state $m, n = 1, 2$ which can be written compactly as $\pi_t = \pi_{t-1}\, p(t)$ for all *t*.

In particular, we can use the long-run average of the diagonal elements of $P(t)$ to measure the immobility in various low-income states. More specifically,

$$M = \frac{\sum_{t=2}^{T} \sum_{m=1}^{2} p_{mm}(t)}{2(T-1)}$$

can be used to evaluate the overall immobility regardless of being in, or not in, low income. Because the state ***1*** (***2***) is the low (or non-low) income state, we can use $M_{11} = \frac{\sum_{t=2}^{T} p_{11}(t)}{T-1}$ $\left(M_{22} = \frac{\sum_{t=2}^{T} p_{22}(t)}{T-1}\right)$ to evaluate the overall immobility of being (or not being) in low income. Similarly, we can use $M_{mn} = \frac{\sum_{t=2}^{T} p_{mn}(t)}{T-1}$ to evaluate the mobility from state *m* to state *n,* where $m, n = 1, 2$.[18]

18. Here we follow the spirit of Section 2.3 in Bartholomew (1982).

2.5 Analysing low-income persistence

Given income data for N individuals over T periods, we can use the set framework to describe transitory and persistent low income.[19] In our study, individuals may maintain or change their low-income states over time. As mentioned before, in the population U, we use S_t and $\overline{S_t}$ to identify those who are in or out of low income in period t. In order to analyse low-income persistence, we can examine S_t (or $\overline{S_t}$) over time t. A range of possible configurations is available. One extreme is that the individuals are in low income in all T periods: this group is denoted by $\cap^T_{t=1} S_t$. The other extreme is that individuals are not in low income in all T periods: this group is denoted by $\cap^T_{t=1} \overline{S_t}$. Then the set $U - \cap^T_{t=1} \overline{S_t}$ represents the individuals who are in low income for at least one year; the set $U - \cap^T_{t=1} S_t$ represents those who are not in low income for at least one year. There are many intermediate configurations between these two extremes.

To make the above framework operational, let D_{iT} be the number of the years in low income for individual i over T periods, which is given by

$$D_{iT} = \sum_{t=1}^{T} d_{it}.$$

We can analyse the distribution of normalized low-income durations. The normalized low-income duration is defined as

$$\delta_{iT} = \frac{D_{iT}}{T}.$$

Here, $\delta_T = [\delta_{1T}, \delta_{2T}, \ldots, \delta_{NT}]$ describes low-income durations as fractions of T periods of the target population. Obviously, $0 \leq \delta_{iT} \leq 1$. The longer (or briefer) the low-income duration is, the higher (or lower) value δ_{iT} has. As usual, the mean and variance of δ_T provide useful information about the distribution. Sometimes, we are interested in the distribution of non-zero δ_{iT}. In this case, we can denote these normalized low-income

19. Although Borrooah and Greedy (2002) adopt a similar framework, they only consider two-year poverty status. That is, they define temporary poverty as one year in poverty and permanent poverty as two years in poverty. In our context, we call one to three years in low income transitory and four or more years in low income persistent—over a six-year period.

durations by the vector δ_p. Similarly, the mean and variance of δ_p provide important information about the distribution of δ_p.

We can analyse the proportion of the population who are in low income for *k* out of *T* periods:

$$\pi^T_{t=1}(D = k) = \pi^T_{t=1}\left(\delta = \frac{k}{T}\right) = \frac{\#(D_{iT}=k)}{N}$$

where $\#(D_{iT} = k)$ is a count function for the number of individuals whose low-income periods equal *k*, with $k = 0, 1, \ldots T$. We can also examine the proportion of the population who are in low income for at least *k* periods,

$$\pi^T_{t=1}(D \geq k) = \pi^T_{t=1}\left(\delta \geq \frac{k}{T}\right) = \sum_{t=k}^{T} \pi^T_{t=1}(D = t).$$

Clearly, the relationship between $\pi^T_{t=1}(D \geq 1)$ and $\pi^T_{t=1}(D = 0)$ is given by

$$\pi^T_{t=1}(D \geq 1) = \pi^T_{t=1}\left(\delta \geq \frac{1}{T}\right) = 1 - \pi^T_{t=1}(D = 0).$$

As to what constitutes transitory or persistent low income, researchers must make a reasonable choice. For our panel data of six years, it appears reasonable to view one to three years in low income ($1 \leq D \leq 3$) as transitory and four or more years in low income ($4 \leq D \leq 6$) as persistent, although other configurations are possible.

2.6 Analysing incidence of low income and probability of being in low income

We will now analyse incidence in low income and probability of being in low income with respect to the available panels of data. First, the incidence in low income and probability of being in low income can be captured by binary dependent variables. To learn what might increase the probability of being in low income and/or cause low income, we can study the low-income incidence and/or the probability of being in low income that are related to covariates such as gender, age, education, minority status, language, student status, activity limitation status and family composition in the regression framework of the form

$$d_i = f(w_i) + u_i,$$

where d_i represents low-income state for individual i at the six-year aggregate level, w_i represents the vector of covariates associated with individual i, and u_i represents the error term, $i = 1, 2, ..., N$. Therefore, when the inner product of the coefficient vector and w_i vector enters $f(\cdot)$, the coefficient estimate for each explanatory variable in the covariates vector w_i is the marginal effect[20] attributing to the probability of being in low income. Modeling the probability of being in low income at the panel-aggregate level has the benefit that the binary variables of the low-income state can be created by the degree of low-income persistence over the panel period, e.g., at least one year in low income, at least four years in low income, and all six years in low income. In doing so, we are able to analyse factors that may contribute to higher probabilities in transitory low income as well as those in persistent low income.

2.7 Duration aversion and comprehensive measure of low-income durations

In addition to the above discussion, following Osberg and Xu (2000b), we consider an index for low-income duration over T periods. This is particularly useful for comparing low-income persistence between the populations in two different (possibly overlapped) panels.

We can establish the following seven axioms for a low-income-duration index:

1. Focus axiom for low-income duration: The low-income-duration index should be independent of the subpopulation that does not experience any low income.
2. Weak monotonicity axiom for low-income duration: A reduction in a person's low-income duration, holding other low-income durations constant, must decrease the low-income-duration index.

20. Marginal effect is also known as partial or net effect in other contexts. It reflects the impact on the dependent variable caused only by the explanatory variable in question, with everything else held constant.

3. Impartiality axiom for low-income duration: The low-income duration index may be defined over ordered low-income durations without loss of generality.
4. Weak transfer axiom for low-income duration: The low-income-duration index should increase if an individual's shorter low-income duration is further reduced at the expense of a similar or greater increase in a long initial low-income duration of another person and the set of low-income people does not change.
5. Strong upward transfer axiom for low-income duration: The low-income duration index should increase if an individual's shorter low-income duration is further reduced at the expense of a similar or greater increase in a long initial low-income duration of another individual.
6. Continuity axiom for low-income duration: The low-income duration index varies continuously with low-income durations.
7. Replication invariance axiom for low-income duration: The low-income duration index does not change if it is computed based on a distribution of low-income durations that is generated by the k-fold replication of the original distribution of low-income durations.

Under the above axioms, we can construct the Sen-Shorrocks-Thon (SST) index of low-income duration over T periods as

$$SST(\delta_T) = \pi_{t=1}^{T}\left(\delta \geq \frac{1}{T}\right) * \bar{\delta}_p * \left(1 + G(\delta_T)\right)$$

where $G(\delta_t)$ is the Gini coefficient of the normalized low-income durations (in non-decreasing order) of the population. The SST index of low-income duration over T periods is the product of the proportion of the population that is ever in low income, average normalized low-income duration of the subpopulation who are ever in low income, and the inequality measure of normalized low-income durations. The higher (or lower) the SST index of low-income duration is, the lower (or higher) the well-being the target population has.

3. Empirical Results

3.1 Sample statistics

When this research was conducted, there were four complete panels in the SLID database. Each panel consists of roughly 17,000 households and about 34,000 adults surveyed for a period of six consecutive years. For studying low-income dynamics after 1999, we focus on the SLID Panel 3 for 1999 to 2004 and the SLID Panel 4 for 2002 to 2007.The targeted population consists of individuals aged 16 and older during the panel years.

In Panel 3 (1999 to 2004), women's population share is 51.4%; men's is 48.6%.[21] Immigrants account for about 18% of the population, and more than 9% of the population are members of visible minorities. At the beginning of 1999, around one-quarter of the population are estimated to be in the 35-to-44 age group, more than 10% are 65 and older, three-quarters have at least a high school diploma, about 15% are students, and 18% have activity limitations. In terms of family composition, families headed by lone parents represent 5% of the population. The proportion of unattached individuals remains stable at 16% over time. The proportion of attached individuals with children decreases from almost 42% in 1999 to about 34% in 2004.

For Panel 4 (2002 to 2007), 51.1% of the population are women; 48.9% are men. Immigrants account for almost 20% of the population, and more than 12% of the population are members of visible minorities. At the beginning of 2002, more than one-fifth of the population fall into the 35-to-44 age group, more than 12% are 65 and older, around 80% have at least a high school diploma, about 15% are students, and 23% have activity limitations. In terms of family composition, families headed by lone parents represent 5% of the population. The unattached individuals and attached individuals without children steadily increase their shares from about 14% to almost 17%, and from about 24% to almost 28%, respectively.

21 . To save space, we only present several key tables in this article. The rest of the empirical results (tables and figures) appear in the full version of the report.

3.2 Patterns of low-income dynamics from year to year

We analyse year to year low-income dynamics by examining the empirical low-income transition probabilities of the population for each panel over time under various low-income thresholds. Probably the simplest way to examine year-to-year low-income dynamics is to examine the proportions of the people in and out of low income as well as the empirical transition probabilities from one year to another. Table 1 shows results for the targeted population and for men and women.

The results suggest that while the year-to-year transition probabilities vary somewhat across the three different low-income thresholds over Panels 3 and 4, they are broadly consistent across the thresholds over time. That is, approximately two-thirds of the low-income individuals stay in low income year after year, and about one-third of them move out of low income over time. About 97% of the non-low-income individuals stay out of low income, and only about 3% of them fall into low income. This observation is quite robust for the total population as well as for both female and male subpopulations.[22]

3.3 Patterns of low-income dynamics over time

The low-income rates for both men and women, under both LICO and LIM, are quite comparable. Compared to LICO and LIM, MBM captures more individuals in low income. That is, some people whose incomes are marginally above LICO or LIM are classified as low-income individuals under MBM.

Transitory and persistent low income

Many Canadians experienced transitory low income (low income for 1 to 3 years) during the study period. Only a very small percentage of the population experiences persistent low income (for 4 to 6 years), regardless which low-income threshold is used. In Panel 3 (1999 to 2004), 5.2% and 5.5% of the population are in persistent low income under LICO and LIM, respectively; about 6.4% are in persistent low income under MBM. In Panel 4 (2002 to 2007), 5.1% and 5.6% of the population are in persistent low income

22. The female subpopulation has a slightly higher probability of staying in low income and a slightly lower probability of staying out of low income relative to their male counterpart under various low-income thresholds and over Panels 3 and 4.

under LICO and LIM, respectively; about 5.8% are in persistent low income under MBM.

We find that more women than men are in low income for various durations in Panels 3 and 4 (1999 to 2004 and 2002 to 2007) regardless of the low-income threshold used. We also find that compared to men, more women experience transitory low income and fewer women experience persistent low income.

Although senior citizens are much better off than members of other age groups in Canada due to the relevant social policy, such as Old Age Security (OAS) and Guaranteed Income Supplement (GIS), we find a persistent gender difference in low income among those 65 and older—more women than men were in low income. Under LICO, the low-income incidence is about 6% for elderly men but about 16% for elderly women. Under MBM, the difference between the two groups is the smallest; with low-income incidence for elderly men at 8%; for elderly women, 11%. This gender difference may be related to the difference in Canadian public pension payments depending on how much and how long workers contribute to the plan over their working lives. Because female workers tend to contribute less over shorter periods of time than their male counterparts in their working years, female retirees tend to receive lower public pension payments.

Life cycle transitions

In Panels 3 and 4, we note the remarkable patterns of life cycle transitions. While most people—two-thirds to three-quarters of the population—are never in low income, young people, students, unattached individuals and lone parents are more likely to be in transitory low income, reflecting their life cycle transitions.

First, young people aged 16 to 24 have the highest share, more than 25%, in transitory low income; seniors 65 and older have the lowest percentage, less than 10%. The transitory low-income incidence reduces remarkably as people move through the age cohorts from 25 to 54 (i.e., 25 to 34, 35 to 44 and 45 to 54). In addition, the evidence of the highest transitory low-income incidence for young people aged 16 to 24 is strong. The rate stays above 25% under all three low-income thresholds for both Panels 3 and 4.

Second, among all age groups, those 55 to 64 have the second highest transitory low-income incidence after those aged 16 to 24. This age group also has the highest persistent low-income incidence. People in this age group can be vulnerable in the labour market as well as in health and marriage situations. But, over time, the transitory low-income incidence for this group drops to about 20% in Panel 4 from about 25% in Panel 3.

Third, seniors have the lowest transitory low-income incidence and the lowest persistent low-income incidence. The transitory low-income incidence for this age group is lower than 10% and the persistent low-income incidence is lower than 5%. Furthermore, compared to women, men have an even lower low-income incidence in this age group.

One of the most important life cycle changes is the change of family composition. It can be complex: any change will involve more than one individual (e.g., spouse and children). As family incomes are shared among family members, a change of family composition often has a direct impact on the equivalent individual income of the family members and therefore whether the family members are in low income according to the established low-income thresholds.

We find that, in Panels 3 and 4, unattached individuals and those living in families headed by lone parents have higher transitory and persistent low-income incidence regardless of the low-income threshold used. Unattached individuals include those singles who are in the earlier stage of their life cycle and those who end up living alone at various stages of the life cycle. These individuals either have less income or need more to get by, or both. Hence, it is not surprising that they experience both high transitory and persistent low income (above 15%).

Similarly, lone parents are also likely to be in low income, as single breadwinners with one or multiple dependent children tend to spread their earnings across more family members. They have a much higher transitory low-income incidence (25% or higher) and a persistent low-income incidence (15% or higher).

High-risk groups

The high-risk groups we have identified are individuals with less than high school education, individuals with activity limitations, members of visible minorities, and recent immigrants.[23] Our findings in this paper are consistent with the literature.[24]

First, we find that, in Panel 3, more than 8% of the people with less than high school education are in persistent low income under all three low-income thresholds. In Panel 4, more than 8% of those with less than high school education are in persistent low income under both LICO and LIM, and just under 8% under MBM. As the theory of human capital predicts, when workers have less education, they get lower rewards for their human capital and are more likely to fall into low income.[25]

Second, in Panel 3, we find more than 16% of those with activity limitations are in persistent low income under all low-income thresholds. This is a high percentage considering that less than 4% of those without activity limitations are in persistent low income under all low-income thresholds. In Panel 4, about 14% of those with activity limitations are in persistent low income under all low-income thresholds. Again, this percentage is much higher considering that only about 3% for those without activity limitations are in persistent low income.

Third, Panel 3 shows that more than 10% of the members of visible minorities are in persistent low income under all three low-income thresholds; yet less than 6% of the people who do not belong to these groups are in persistent low income. In Panel 4, less than 9% of the members of visible minorities are in persistent low income, while only about 5% of those who do not belong to these groups are in persistent low income under LICO and LIM. Under MBM, the percentage of people who are members of visible

23. The concept of recent immigrants is dynamic in our study. That is, in the setting of Panel 3, recent immigrants refer to those who landed in Canada after 1986; in the setting of Panel 4, recent immigrants refer to those who landed in Canada after 1989. This addresses the fact that Panel 4 started three years later than Panel 3.

24. Relevant research includes Morissette and Zhang (2001), HRSDC research paper (2009) and Valletta (2005).

25. The theory of human capital can be traced back to Becker (1964) and Schultz (1971).

minorities and in persistent low income is 11%, compared with about 5% among those who are not members of visible minorities. These findings are consistent with earlier findings in the literature.[26]

Fourth, we find that, in Panel 3, more than 11% of recent immigrants (those who moved to Canada after 1986) are in persistent low income under all three low-income thresholds, compared with less than 6% of Canadian-born individuals. In Panel 4, more than 9% of recent immigrants (those who moved to Canada after 1989) are in persistent low income under all three low-income thresholds, while about 5% of native-born Canadians are in persistent low income. These results echo with the recent empirical findings on the Canadian immigrant population.[27]

3.4 How are transitions to low income affected by gender, family type and other factors?

It is possible to classify low-income transition over two adjacent years, and therefore, its probability, into four categories—getting out of low income, getting into low income, staying in low income, and staying out of low income. Because of the small sample sizes for certain groups of individuals,[28] we looked only at the joint probability of entering or staying in low income. The complement cases are the transitions of getting out of or staying away from low income, which are exactly opposite to the transitions of entering or staying in low income.

Because the patterns across genders and/or family compositions are clearly different, we will study the year-to-year transition of entering or staying in low income with respect to each subpopulation group. The goal of this analysis is to further identify the factors that

26. See, for example, Statistics Canada (2001) and Samuel (2006).

27. See, for example, Picot and Hou (2003, 2007).

28. When some specific transitions (getting into low income) are analysed in a regression framework with a large number of covariates, the number of cases for these kinds of transitions with reference to some covariates is too small to be published under Statistics Canada's release guidelines.

determine low income and their marginal effects by gender and family composition.[29] In addition to the general observation on the role of gender, we find that family composition dynamics, number of children, age and student status are important life cycle factors; important risk factors are low education, activity limitation, being a member of a visible minority and recent immigration status.

First, let us discuss the role of gender and family composition in both Panels 3 and 4 under LICO, LIM and MBM, based on our estimates from the logit models of entering or staying in low income. The result shows that, under various low-income thresholds, women, lone mothers and, in particular, unattached women, have higher probabilities of entering or staying in low income than other people. We find, other things being equal, that unattached women and lone mothers are more likely to be in low income than their male counterparts. In addition, their probabilities of entering or staying in low income under LICO are higher than those under LIM and MBM.

Second, let us examine the role of family-composition dynamics. Family-composition dynamics refers to the following year-to-year changes in family types: from unattached to other types of family composition (such as attached with no child, attached with children, lone parent, and other); from attached with no children to other types of family composition; from attached with children to other types of family composition; and from lone parent to other types of family composition.

In general, chances of being in low income are low when individuals move from unattached to attached with or without children under all three low-income thresholds in both panels. In particular, the impact of this change in family composition is more pronounced for unattached women than for unattached men. In other words, getting

29. The marginal effect (also known as partial effect or net effect) in logit regression models here refers to the marginal contribution of each covariate to the probability of entering/staying in low income, with everything else held constant. When the covariates in the models are all binary variables (0/1), we can interpret the marginal effect of each covariate of interest in the following way: the marginal contribution of an individual covariate to the probability of entering/staying in low income is triggered by 'switching on' this covariate (from 0 to 1), while keeping all other covariates 'switched off' at 0. This is done by performing the logit command and its auxiliary command mfx using Stata (Ver. 11.0).

attached appears to have more impact for single women than for single men to get out of or stay away from low income.

For families headed by lone parents, changing to unattached families would mean a greater chance of being in low income. On the other hand, lone mothers, not lone fathers, saw less chance of being in low income when they become attached. This may reflect the fact that, when getting into a relationship—either married or common-law—lone fathers may not be as well-off as lone mothers in terms of pooled family income from the income perspective. In other words, lone mothers' new life partners tend to help their families more to get out of or stay away from low income than lone fathers' new life partners do for their families.

Third, the role of the number of children: attached individuals with more children are more likely to be in low income. The attached individuals with no children clearly have more resources for fewer people within their families: but they may decide not to have children because of insufficient resources to share among more family members. Those with more children must spread their income among more family members, but they can also take advantage of economies of scale. While a causal relationship is difficult to conclude, the robust empirical evidence shows that the attached individuals with more children are more likely to be in low income.

Fourth, the role of age: Our empirical evidence shows that the existence of the OAS and GIS in Canada renders senior citizens (aged 65 and older) less likely to be in low income across different types of family composition. But the unattached young people aged 16 to 24 and the vulnerable age group from 55 to 64, particularly, are more likely to be in low income. While the former often have low income to begin with and are still accumulating human capital, the latter may end up in low income for various reasons such as job separation, marriage breakdown, activity limitation or changes in family composition (e.g., death of spouse, living with grown children).

Finally, we also observe that members of high-risk groups generally have greater probability of falling into low income and multiple risks—for example, lone parents with

less education and unattached individuals with activity limitations have particularly high probabilities of transitions to low income.

3.5 What determinants influence transitory and persistent low income?

The above analysis looks at the factors that affect the marginal probability of transition into low income year to year. Now we will use the logit models to examine the factors that lead individuals to be in low income for (a) at least one year, (b) at least four years, and (c) all six years. By doing so, we can disentangle the determinants for transitory low income from those for persistent low income. The results are contained in Tables 2-A to 2-F).

We find that the dominating factors for being in low income for at least one year include family composition (unattached individuals and lone parents), activity limitation, less education, student status and recent immigration. But the dominating factors for being in low income for all six years are family composition (unattached and lone parents), activity limitation, and less education. This suggests that student status and recent immigration are more likely to be the key determinants for transitory low income, but family composition (unattached and lone parents), activity limitation and less education are more likely the key determinants for both transitory and persistent low income. The above observations are quite robust under all three low-income thresholds and across the two panels.

Perhaps it is useful to assume that people can smooth their incomes over time. The relevant question then is, would low-income incidence over the six-year period differ significantly from that on the annual basis? To find out, we aggregated individual annual incomes and annual low-income threshold over the six-year panel and compared the aggregate individual incomes with the aggregated low-income threshold as well as the upper and lower bounds (125% and 75%) of the aggregate low-income thresholds. The result suggests that regardless of which low-income thresholds are adopted, the high-risk groups with the most pronounced low-income incidence are lone parents, unattached

individuals, people with activity limitations and recent immigrants, in particular recent immigrants who are also members of visible minorities.

3.6 What are the robust changes from Panel 3 to Panel 4?

When we compare the estimates in Panel 3 across the three thresholds with those in Panel 4, we can identify some robust changes over time.

First, the low-income transition for women improves under all three low-income thresholds over the two panels: we found both a lower immobility measure in low income and a higher immobility measure in non-low income. The low-income incidences for women, young people, people with less education and lone parents who are in persistent low income fall from Panel 3 to Panel 4. We also see the falling low-income incidence for those aged 45 to 54. However, more young people experienced transitory low income under MBM from Panel 3 to Panel 4.

We paid particular attention to the SST index of low-income duration, which is a comprehensive and decomposable measure of low-income duration. The results are shown in Table 3. The first component, $\pi^{T}_{t=1}(\delta \geq 1/T)$, the proportion of the population that had any low-income durations over a six-year period, increased under LIM but declined slightly under LICO and MBM from Panel 3 to Panel 4; the second component, the normalized average duration in low income, dropped under LIM but rose slightly under the two other lines. The third component, $1+ G(\delta_T)$, an inequality measure of low-income durations, increased under LICO and MBM but declined slightly under LIM.

Putting these components together, we see that situations of low-income duration worsened slightly from Panel 3 to Panel 4. Under LICO, the index increased from 0.2045 to 0.2065 over the two panel periods. Under MBM, the index increased from 0.2276 to 0.2300. Under LIM, it increased from 0.2062 to 0.2089. The increase under LIM is slightly stronger than those under the other two thresholds.

4. Conclusion

The existing analysis on low-income dynamics and persistence in Canada builds on the data of different sources available until the end of the 1990s and on single low-income thresholds. What are the patterns of low-income dynamics and persistence in Canada in 2000 and beyond? Would different low-income thresholds matter to the analysis of low-income dynamics and persistence? This paper attempts to address these and other questions to fill the void in the literature. Our findings are as follows:

First, the year-to-year low-income-transition probabilities are broadly consistent under all three thresholds and across the two panels. Following these people year to year by their low-income state, we found that the low-income-transition pattern is quite robust. While two-thirds of the low-income population and 97% of the non-low-income population remained in the same income state as the previous year, about one-third of the low-income population emerged from low income and about 3% of the non-low-income population fell into low income. The low-income transition for women improves under all three low-income thresholds over the two panels. A similar pattern can be found in the male or the total population under some low-income thresholds, but this pattern is not robust across all thresholds.

Second, we find that many Canadians experienced transitory low income during the study period. We saw remarkable patterns of life cycle transitions: young people, students, unattached individuals and lone parents are likely in low income for a short period, reflecting their life cycle transitions. Those who experience persistent low income typically account for a very small percentage of the total population. We found that certain groups are at high risk of falling into low income—people with less than high school education, people with activity limitations, members of visible minorities and recent immigrants. These findings are prevalent under all three low-income thresholds and are robust across Panels 3 and 4 of the SLID data.

Third, we found that the life cycle factors such as family composition dynamics, number of children, age and student status affect the probability of falling into (or staying in) low income.

Fourth, we disentangle the determinants for transitory and persistent low income. Student status and recent immigration are more likely key determinants for transitory low income; family composition (unattached and lone parents), activity limitation and less education are more likely key determinants for both transitory and persistent low income. Although we identified gender differences in low income for various durations in both panels, gender does not appear to play a significant role in determining persistent low income after we control for confounding factors. The observations are quite robust—no matter which low-income thresholds and no matter which panels of the SLID data are used.

Finally, we find that low-income persistence becomes less severe over time for several vulnerable groups—for example, women and lone parents. But the overall low-income duration worsened slightly from Panel 3 to Panel 4, under all three thresholds.

We notice that this research has some limitations. On the one hand, we note that some senior citizens have low income but may have accumulated some wealth. In this research we were not able to link the flow (income) to the stock (wealth): we could only focus on income. On the other hand, LICO, LIM and MBM are taken as given in this research. Therefore, our estimates on low-income dynamics and persistence are conditional on the appropriateness of the thresholds. Nevertheless, this research serves as a timely update on the trend in low-income dynamics and persistence in Canada.

Appendix

Table 1 Low-income transition probability matrices, Canada, 1999 to 2007

	LICO	LIM 1999-2004	MBM	LICO	LIM 2002-2007	MBM
Overall						
M_{11}	64.0	65.3	64.4	63.6	65.5	61.8
M_{22}	97.0	96.7	96.3	97.1	96.7	96.4
Men						
M_{11}	61.7	63.7	63.7	63.4	65.4	61.2
M_{22}	97.3	96.9	96.5	97.2	96.9	96.5
Women						
M_{11}	65.7	66.7	65.0	63.8	65.5	62.3
M_{22}	96.7	96.4	96.1	96.9	96.5	96.3

Note: M_{11} is low-income immobility; M_{22} is immobility of non-low income.
Source: Survey of Labour and Income Dynamics (1999 to 2004, 2002 to 2007).

Table 2-A. Probability of being in low income under LICO, 1999 to 2004

	At least 1 year	At least 4 years	All 6 years
Baseline probability	8.6	1.4	0.6
Women	2.2***	0.5**	0.2
Age 16 to 24	-0.6	-0.6***	-0.4**
Age 35 to 44	-2.0***	-0.5**	-0.3**
Age 45 to 54	-2.0***	-0.4**	-0.2**
Age 55 to 64	0.9	-0.3	-0.3**
Age 65 and older	-6.0***	-1.2***	-0.5***
Less than high school	7.3***	3.0***	1.7**
High school graduate	2.6***	1.7***	0.7**
University	-3.2***	-0.6**	-0.4**
Other	-0.7	0.3	0.0
Visible minority	0.8	0.6	1.1*
Immigrant, before 1977	-0.5	0.1	0.0
Immigrant, 1977 to 1986	-0.7	0.6	-0.1
Immigrant, after 1986	6.7***	2.1**	0.9
Student in 1 year	1.0	-0.4	-0.3*
Student in 2 years	4.8***	-0.1	-0.2
Student in 3 years	5.3***	0.3	0.0
Student in 4 years	4.4**	0.9	0.2
Student in 5 years	6.6***	1.4	N/A
Student in 6 years	6.9***	1.3	N/A
Persons with activity limitations	14.9***	7.0***	3.8***
Persons with activity limitations, status changed	5.5***	1.5***	0.9***
Unattached person	23.1***	11.7***	8.2***
Attached person, no child	-1.8**	-0.3	-0.1
Lone parents	23.7***	10.1***	3.4**
Other family types	-2.3**	-0.5	-0.3*
Family composition changed	7.0***	0.2	-0.1

* Indicates an estimate is significant at 10% level; ** indicates an estimate is significant at 5% level; *** indicates an estimate is significant at 1% level; N/A indicates that data are suppressed due to confidentiality rules.

Notes

The table uses the logit model to estimate the probabilities of a person being in low income for at least one year, at least four years and all six years. The reference person is a man, aged 25 to 34, with a postsecondary degree, who is not a member of a visible minority, is Canadian-born, is not a student, has family with children under 18, is not disabled, and lived in an Ontario city with 500,000 or more residents. Province and area of residence and language profile are also controlled.

Source: Survey of Labour and Income Dynamics, Panel 3.

Table 2-B. Probability of being in low income under LIM, 1999 to 2004

	At least 1 year	At least 4 years	All 6 years
Baseline probability	7.4	1.4	0.9
Women	1.6***	0.6***	0.2
Age 16 to 24	-0.3	-0.5**	-0.6***
Age 35 to 44	-1.7***	-0.4**	-0.4**
Age 45 to 54	-1.7***	-0.4**	-0.3**
Age 55 to 64	0.8	-0.4**	-0.4**
Age 65 and older	-5.7***	-1.3***	-0.8***
Less than high school	7.0***	3.1***	1.7***
High school graduate	2.8***	1.2***	0.5*
University	-2.1***	-0.6**	-0.6***
Other education	1.7	0.2	-0.2
Visible minority	0.6	1.1**	1.1
Immigrant, before 1977	-0.9	-0.1	0.2
Immigrant, 1977 to 1986	-1.0	0.1	N/A
Immigrant, after 1986	6.6***	1.5**	2.3*
Student in 1 year	0.4	-0.3	-0.5**
Student in 2 years	3.7***	-0.2	-0.3
Student in 3 years	4.1***	0.2	0.2
Student in 4 years	4.3**	0.1	0.9
Student in 5 years	4.9***	0.9	N/A
Student in 6 years	6.1***	0.7	N/A
Persons with activity limitations	12.6***	7.7***	5.1***
Persons with activity limitations, status changed	4.9***	1.4***	0.8***
Unattached person	15.9***	6.9***	6.1***
Attached person, no child	-0.9	-0.3	-0.2
Lone parents	18.8***	7.8***	4.9***
Other family types	-1.6**	-0.3	-0.6***
Family composition changed	5.5***	0.1	-0.3

* Indicates an estimate is significant at 10% level; ** indicates an estimate is significant at 5% level; *** indicates an estimate is significant at 1% level; N/A indicates that data are suppressed due to confidentiality rules.

Notes

The table uses the logit model to estimate the probabilities of a person being in low income for at least one year, at least four years and all six years. The reference person is a man, aged 25 to 34, with a postsecondary degree, who is not a member of a visible minority, is Canadian-born, is not a student, has family with children under 18, is not disabled, and lived in an Ontario city with 500,000 or more residents. Province and area of residence and language profile are also controlled.

Source: Survey of Labour and Income Dynamics, Panel 3.

Table 2-C. Probability of being in low income under MBM, 1999 to 2004

	At least 1 year	At least 4 years	All 6 years
Baseline probability	7.0	1.5	0.5
Women	1.2***	0.4**	0.1
Age 16 to 24	-0.9	-0.6***	-1.8
Age 35 to 44	-1.7***	-0.4**	-0.2**
Age 45 to 54	-1.8***	-0.6***	-0.1
Age 55 to 64	-0.1	-0.4**	-0.2**
Age 65 and older	-5.6***	-1.4***	-0.5***
Less than high school	6.6***	2.4***	0.7**
High school graduate	2.9***	1.0***	0.3*
University	-1.9***	-0.6**	-0.3**
Other education	2.7*	-0.2	-0.1
Visible minority	2.4**	0.5	0.8*
Immigrant, before 1977	-0.4	0.0	-0.1
Immigrant, 1977 to 1986	-0.1	0.2	0.1
Immigrant, after 1986	5.6***	2.6***	0.6
Student in 1 year	0.0	-0.3	-0.2**
Student in 2 years	2.7***	0.0	-0.2
Student in 3 years	3.7***	0.3	0.0
Student in 4 years	4.0**	1.0	-0.1
Student in 5 years	3.4**	1.8*	-0.3*
Student in 6 years	4.3**	1.0	0.0
Persons with activity limitations	11.5***	7.2***	2.6***
Persons with activity limitations, status changed	4.2***	1.6***	0.5***
Unattached person	13.4***	5.9***	2.6***
Attached person, no child	-1.2***	-0.6***	-0.2*
Lone parents	19.0***	6.4***	2.3**
Other family types	-1.5**	-0.6**	-0.3**
Family composition changed	4.6***	-0.1	-0.2**

* Indicates an estimate is significant at 10% level; ** indicates an estimate is significant at 5% level; *** indicates an estimate is significant at 1% level; N/A indicates that data are suppressed due to confidentiality rules.

Notes

The table uses the logit model to estimate the probabilities of a person being in low income for at least one year, at least four years and all six years. The reference person is a man, aged 25 to 34, with a postsecondary degree, who is not a member of a visible minority, is Canadian-born, is not a student, has family with children under 18, is not disabled, and lived in an Ontario city with 500,000 or more residents. Province and area of residence and language profile are also controlled.

Source: Survey of Labour and Income Dynamics, Panel 3.

Table 2-D. Probability of being in low income under LICO, 2002 to 2007

	At least 1 year	At least 4 years	All 6 years
Baseline probability	8.4	2.1	0.5
Women	1.6***	0.2	0.0
Age 16 to 24	1.7	-0.6	-0.2
Age 35 to 44	0.4	0.0	0.1
Age 45 to 54	-0.7	-0.2	0.2
Age 55 to 64	0.1	-0.1	0.0
Age 65 and older	-5.4***	-1.5***	-0.3*
Less than high school	5.6***	2.8***	0.7**
High school graduate	1.6**	1.1**	0.3
University	-3.7***	-0.9**	-0.3*
Other education	4.2***	0.5	0.0
Visible minority	1.5	1.4*	0.9
Immigrant, before 1980	-0.1	-0.8**	-0.2
Immigrant, 1980 to 1989	9.1***	1.0	0.8
Immigrant, after 1989	14.1***	2.7**	0.7
Student in 1 year	1.0	-0.4	0.0
Student in 2 years	3.8***	-0.3	0.1
Student in 3 years	3.2*	0.2	0.0
Student in 4 years	4.0**	0.2	0.0
Student in 5 years	3.1	-0.7	N/A
Student in 6 years	4.5**	-0.7	N/A
Persons with activity limitations	13.4***	7.2***	3.2**
Persons with activity limitations, status changed	4.5***	1.5***	0.7**
Unattached person	24.5***	17.6***	7.1***
Attached person, no child	-0.8	-0.5	-0.2
Lone parents	18.0***	6.3***	1.0*
Other family types	-1.8*	-1.0**	-0.3*
Family composition changed	5.0***	1.0*	-0.2

* Indicates an estimate is significant at 10% level; ** indicates an estimate is significant at 5% level; *** indicates an estimate is significant at 1% level; N/A indicates that data are suppressed due to confidentiality rules.

Notes

The table uses the logit model to estimate the probabilities of a person being in low income for at least one year, at least four years and all six years. The reference person is a man, aged 25 to 34, with a postsecondary degree, who is not a member of a visible minority, is Canadian-born, is not a student, has family with children under 18, is not disabled, and lived in an Ontario city with 500,000 or more residents. Province and area of residence and language profile are also controlled.

Source: Survey of Labour and Income Dynamics, Panel 4.

Table 2-E. Probability of being in low income under LIM, 2002 to 2007

	At least 1 year	At least 4 years	All 6 years
Baseline probability	6.5	1.3	0.3
Women	1.5***	0.2	0.1
Age 16 to 24	1.1	-0.2	-0.1
Age 35 to 44	0.4	0.2	0.1
Age 45 to 54	-0.4	0.1	0.1
Age 55 to 64	0.6	0.2	-0.1
Age 65 and older	-4.5***	-1.1***	-0.3**
Less than high school	4.7***	1.7***	0.5**
High school graduate	1.2**	0.6**	0.1
University	-3.2***	-0.6***	-0.1
Other education	2.9***	0.9*	0.0
Visible minority	1.9*	1.1**	0.5
Immigrant, before 1980	0.0	-0.3	-0.1
Immigrant, 1980 to 1989	6.6***	0.5	0.0
Immigrant, after 1989	11.6***	1.9**	0.6
Student in 1 year	1.1	0.1	0.0
Student in 2 years	3.1***	0.0	0.0
Student in 3 years	2.7*	0.2	0.0
Student in 4 years	3.9**	-0.1	0.0
Student in 5 years	2.5	-0.5	N/A
Student in 6 years	4.1**	-0.1	N/A
Persons with activity limitations	11.3***	4.1***	2.3**
Persons with activity limitations, status changed	3.9***	1.1***	0.7***
Unattached person	18.0***	8.2***	3.6***
Attached person, no child	-0.1	-0.2	-0.1
Lone parents	17.4***	4.3***	1.2**
Other family types	-0.5	-0.3	-0.1
Family composition changed	4.6***	0.3	-0.1

* Indicates an estimate is significant at 10% level; ** indicates an estimate is significant at 5% level; *** indicates an estimate is significant at 1% level; N/A indicates that data are suppressed due to confidentiality rules.

Notes

The table uses the logit model to estimate the probabilities of a person being in low income for at least one year, at least four years and all six years. The reference person is a man, aged 25 to 34, with a postsecondary degree, who is not a member of a visible minority, is Canadian-born, is not a student, has family with children under 18, is not disabled, and lived in an Ontario city with 500,000 or more residents. Province and area of residence and language profile are also controlled.

Source: Survey of Labour and Income Dynamics, Panel 4.

Table 2-F. Probability of being in low income under MBM, 2002 to 2007

	At least 1 year	At least 4 years	All 6 years
Baseline probability	7.4	1.6	0.2
Women	1.0**	0.2	0.0
Age 16 to 24	0.8	-0.4	-0.1
Age 35 to 44	0.1	0.1	0.0
Age 45 to 54	-1.2*	-0.2	0.0
Age 55 to 64	-0.3	-0.1	-0.1
Age 65 and older	-5.6***	-1.5***	-0.2**
Less than high school	4.6***	1.6***	0.2**
High-school graduate	1.9***	0.7**	0.1*
University	-3.2***	-0.6**	-0.1
Other education	2.7**	0.7	0.0
Visible minority	2.4**	1.7**	0.5*
Immigrant, before 1980	1.2	-0.4	-0.1*
Immigrant, 1980 to 1989	11.5***	0.9	0.3
Immigrant, after 1989	13.2***	1.9**	0.5*
Student in 1 year	0.5	-0.1	-0.1
Student in 2 years	2.4**	0.0	0.0
Student in 3 years	3.3**	-0.3	0.0
Student in 4 years	3.2**	-0.3	0.0
Student in 5 years	2.2	-0.8**	N/A
Student in 6 years	3.6*	0.0	N/A
Persons with activity limitations	12.7***	5.0***	1.3**
Persons with activity limitations, status changed	3.8***	1.0***	0.3**
Unattached person	14.6***	7.1***	2.2***
Attached person, no child	-1.0	-0.3	0.0
Lone parents	16.4***	4.6***	1.0**
Other family types	-2.2***	-0.7**	-0.1*
Family composition changed	3.2***	-0.1	-0.1

* Indicates an estimate is significant at 10% level; ** indicates an estimate is significant at 5% level; *** indicates an estimate is significant at 1% level; N/A indicates that data are suppressed due to confidentiality rules.

Notes

The table uses the logit model to estimate the probabilities of a person being in low income for at least one year, at least four years and all six years. The reference person is a man, aged 25 to 34, with a postsecondary degree, who is not a member of a visible minority, is Canadian-born, is not a student, has family with children under 18, is not disabled, and lived in an Ontario city with 500,000 or more residents. Province and area of residence and language profile are also controlled.

Source: Survey of Labour and Income Dynamics, Panel 4.

Table 3. SST index of low-income duration and its components under different lines

	LICO	LIM	MBM
Panel 3 (1999 to 2004)			
Population proportion ever in low income:	0.1948	0.1970	0.2230
Normalized average duration (year):	0.5721	0.5710	0.5625
Inequality of low-income duration:	1.8347	1.8331	1.8149
The SST index:	0.2045	0.2062	0.2276
Panel 4 (2002 to 2007)			
Population proportion ever in low income:	0.1945	0.2020	0.2190
Normalized average Duration (year):	0.5785	0.5652	0.5776
Inequality of low-income duration:	1.8353	1.8292	1.8185
The SST index:	0.2065	0.2089	0.2300

Note: The SST index is equal the product of its three components.

Source: Survey of Labour and Income Dynamics, 1999 to 2004 and 2002 to 2007.

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