

**Theoretical Considerations and Implications of
Low Income Threshold Choices to Low Income
Dynamics: A Case Study for Canada from 1999 to
2007**

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Working Paper No. 2012-3

August 2012



DEPARTMENT OF ECONOMICS

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Theoretical Considerations and Implications of Low Income Threshold
Choices to Low Income Dynamics: A Case Study for Canada from 1999 to
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¹ The authors wish to thank Statistics Canada for research support and awarding Tom Symons Research Fellowship to Kuan Xu; the analysts at Atlantic Regional Data Centre, Dalhousie University and SSHRC for data access support, as well as conference and seminar participants at the Canadian Economics Association Meetings in Québec and members of the Department of Economics, Dalhousie University for constructive comments.

Abstract

In the traditional low income or poverty studies, we often use given low income thresholds or poverty lines. However, there is a perennial debate on how to select a low income threshold or a poverty line among several choices. This debate is relevant to a statistical agency and public policy makers. In this paper, we argue that to select a suitable low income threshold or a poverty line, we need a sound theoretical foundation for selection and we shall clearly understand the consequences of selecting one versus other thresholds. Using this Canadian case study of low income dynamics, we explain the theoretical consideration and demonstrate the consequences of selecting a low income threshold or a poverty line versus other thresholds.

JEL Codes: I3, J1, C1

Keywords: Low income, poverty, threshold, measure, choice

Section 1. Introduction

There are several established low income thresholds in Canada: the Low Income Cut-offs (LICO), the Low Income Measure (LIM) developed by Statistics Canada, and the Market Basket Measure (MBM) introduced by Human Resources and Skills Development Canada (HRSDC).² The use of these different thresholds leads to different low income subpopulations identified in a society. An analysis of low income dynamics is critically dependent on the choice of an established low income threshold. All of these are relevant to a statistical agency and public policy makers.

However, in the literature, and in public policy making as well, there is a perennial debate on what is the most preferred low income threshold. Galbraith (1998) advocates the idea that low income thresholds must be established with reference to specific communities. Hence, he implicitly suggests the relative approach. In the empirical research, some authors (e.g., Osberg and Xu (1999, 2000), Myles and Picot (2000), Morissette and Zhang (2001), Finnie and Sweetman (2003), Giles (2004), and World Bank Institute (2005)) adopt the relative approach to low income³ and favor the use of LICO and LIM. Recently Osberg and Xu (2008) and Ravallion (2010) provide some evidence to support the low income relativism. Some authors (Sarlo (1996) and Pendakur (2001)) adopt the absolute approach to low income⁴ and favor the use of MBM. Whether or not one threshold is more generous than the other, is an empirical question. For example, it is still unclear if LICO and LIM are indeed more generous than MBM. On the relevancy 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.” Therefore, it is highly likely that the two approaches may complement each other.

² LICO, LIM and MBM will be discussed in detail in the later part of this paper.

³ Please note that the terminology “low income” is adopted 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. The justifications for doing so are (i) that we do use LICO, LIM, and MBM in our analysis and (ii) that from the conceptual point of view, low income defined by Statistics Canada nests poverty but not the other way around.

⁴ This absolute approach emphasizes that the essential costs of living (such as basic food, clothing, and shelter are absolute essentials) are used to construct a low income threshold.

In this paper, we discuss theoretical consideration of low income dynamics and threshold choices. Then we empirically study low income dynamics under different low income thresholds for the Canadian adult population based on the SLID data from 1999 to 2007.⁵ We further evaluate the impact of threshold choices on some high risk groups of the society.

The remainder of the paper is organized as follows. Section 2 discusses the theoretical considerations of low income dynamics and threshold choices. Section 3 is an empirical analysis on the low income dynamics and low income threshold choices. In Section 4, we offer concluding remarks.

Section 2. Theoretical Considerations

2.1 Target Population and Variables

We study the target population (U) of N individuals over T periods. Let y_{it} be the income of individual i in period t , for $i = 1, 2, \dots, N$ and $t = 1, 2, \dots, T$. Let

$\mathbf{y}_t = [y_{1t}, y_{2t}, \dots, y_{Nt}]$ be the income vector of the total population in period t and $\mathbf{y}_i = [y_{i1}, y_{i2}, \dots, y_{iT}]$ be the income vector of individual i over T periods. Let \mathbf{w}_{it} be the vector containing socioeconomic and demographic factors for individual i in period t , such as gender, age, education activity and attainment, activity limitation, immigration status, minority status, family size and composition, and area of residence etc. The variables in \mathbf{w}_{it} can be used to identify influential socioeconomic and demographic factors for individual i in period t and to identify high risk groups whose members are more likely to be in low income.

2.2 Identification of Low Income

⁵ As a companion piece, Ren and Xu (2011) contains more relevant discussions on theoretical and empirical work.

There are three possible low income threshold configurations. One is that over the T periods, the researcher selects one inflation-adjusted low income threshold z in real dollar (see, for example, Finnie and Sweetman (2003)). Another configuration is that over the T periods, the researcher selects T time-varying but methodologically consistent thresholds, $z = [z_1, z_2, \dots, z_T]$ (see, for example, Morissette and Zhang (2001)). The third configuration is that the researcher selects and evaluates several methodologically inconsistent and time-varying low income thresholds. In this case, the time-varying low income thresholds following methodology j can be denoted by $z_j = [z_{j1}, z_{j2}, \dots, z_{jT}]$. The research using this configuration is rarely conducted. In this paper, we examine the Canadian SLID data with three methodologically different sets of low income thresholds, which are discussed below.⁶

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 (e.g. food, shelter, and clothing) than the average family of a similar size, this family is classified as a low income family. Separate LICOs are defined for seven sizes of family - from unattached individuals to families of seven or more persons - and for five community sizes - from rural areas to urban areas with a population of more than 500,000. 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 both after-tax family incomes and after-tax LICOs.⁷ If the economic family income is below the cut-off, all individuals in that family are considered to be in low income.

⁶ Zhang (2010) offers comprehensive assessment on the technical details of the existing low income measures in Canada.

⁷ 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. Due to the fact that after-tax incomes reflect the true purchasing power and after-tax LICOs (LICO-IAT, short for LICO-Income After-Tax, and hereafter) can reveal the shortfalls in the true purchasing power, both Statistics Canada and researchers prefer the use of LICO-IAT. The before-tax LICOs (LICO-IBT, short for LICO-Income Before-Tax, and hereafter) and resulting low income rates are only used to evaluate the redistributive impact of Canada's tax/transfer system. Note that for ease of demonstration, we use LICO rather than LICO-IAT hereafter, without creating confusion.

LIM is a low income threshold that is defined as a fixed percentage (50%) of the median adjusted family income.⁸ The adjusted family income refers to the family income adjusted for size using the equivalent scale, which takes account of the economies of scale. That is, the adjustment inflates the family income to account for the fact that a larger family requires less per capita income.⁹ By design, LIM is not adjusted for differences in community size but it is automatically adjusted each year for any change in the median adjusted family income. Similar to LICOs, if the income of an economic family is below the corresponding LIM, all individuals in that family are considered to be in low income. For our analysis of actual well-being, we follow the convention of Statistics Canada and the literature to use after-tax incomes and the after-tax LIMs.¹⁰

It should be noted that fixing LIM at percentage 50% of the median adjusted family income can be somewhat arbitrary at the operational level. For example, conceptually similar low income thresholds for the European Union and the OECD countries are chosen as 60% and 70% of their median household incomes, respectively. Statistics Canada proposes modifications to the LIM by replacing the economic family based income by household based income, by replacing the current LIM equivalence scale by the square root of household size, and by taking household size into consideration in determining the low income thresholds.¹¹

MBM is based on the costs of a basket of necessary goods and services including food, shelter, clothing and transportation, and a multiplier to cover other essentials. Statistics Canada, on Human Resources and Skills Development Canada (HRSDC)'s behalf,

⁸ 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.

⁹ In our discussion of the concept of individual equivalent income, for simplicity we sometimes use \sqrt{s} to represent the adjusted size of a family of size s . The scale used in LIM allocates 1.0 to the oldest person in the family, 0.4 to the second oldest person, 0.4 for each additional adult, and 0.3 for each additional child. Based on this scale, a family of two adults and two children is assigned a size equivalent to two times ($1.0 + 0.4 + 0.3 + 0.3 = 2.0$) the size of a family consisting of a single adult. Each family's income is divided by its adjusted size to produce adjusted family income. In fact, sometimes the literature refers to this adjusted family income as the individual equivalent income.

¹⁰ 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 or LIM-IAT. Note that for ease of demonstration, we use LIM rather than LIM-IAT hereafter, without creating confusion.

¹¹ Interested readers may refer to Murphy et al. (2010).

collects the data on the cost of goods and services in the basket to calculate thresholds for 19 specific communities and 29 community sizes in the ten Canadian provinces. The cost of the goods and services in MBM is calculated for a reference family of two adults aged 25-49 with two 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.

MBM is, by design, supposed to be closest to the absolute low income measure. But, the after-tax incomes compared with MBM cut-offs are narrower than the after-tax incomes compared with the after-tax LICO and/or LIM, as the after-tax incomes relevant to MBM cut-offs further exclude from total income other non-discretionary expenses such as support payments, work-related child care costs, transportation cost and employee contributions to pension plans and to Employment Insurance.^{12,13} If the economic family's after-tax income defined as such is below the corresponding MBM, all individuals in that family are considered to be in low income.

Although LICO, LIM, and MBM are defined for family incomes, it is conceptually clearer if family incomes and cut-offs are converted into individual equivalent incomes and cut-offs.¹⁴

Generally, if an individual income is lower than a suitably chosen individual low income threshold, the person with that individual income is considered a low income person. As

¹² 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.

¹³ It should be noted that the conceptual framework of MBM was developed and adopted by HRSDC and Statistics Canada in 2000. Therefore MBM is not directly available for 1999 or earlier. To enable our analysis on low income dynamics across different choices of low income thresholds, we impute MBM for 1999 by converting the MBM in 2000 (using MBM 2007 Basket) with the Consumer Price Index (CPI). Therefore, we shall use caution when interpreting the results under MBM in 1999.

¹⁴ 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 and will not increase linearly with family size 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 can 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 $y = \frac{Y(s)}{\sqrt{s}}$ and $z = \frac{Z(s)}{\sqrt{s}}$. 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 $X = z - y = \frac{Z(s)}{\sqrt{s}} - \frac{Y(s)}{\sqrt{s}}$ if $y < z$. The individual relative low income gap would be $x = \frac{z-y}{z} = \frac{\frac{Z(s)}{\sqrt{s}} - \frac{Y(s)}{\sqrt{s}}}{\frac{Z(s)}{\sqrt{s}}} = \frac{Z(s)-Y(s)}{Z(s)}$ if $y < z$.

Apparently, x is scale-free.

we face three possible low income thresholds, we may use the indicator function to simplify the discussion:¹⁵

- (1) A_{it} refers $y_{it} < z$ for all i and t ;
- (2) A_{it} refers $y_{it} < z_t$ for all i and t ; and
- (3) A_{it} refers $y_{it} < z_{jt}$ for all i, j and t .

That is, if $I(A_{it}) = 1$, individual i in period t is identified as a low income person. If $I(A_{it}) = 0$, individual i in period t is identified as a non low income person.

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: the subpopulation of individuals whose incomes are less than the low income threshold in period t , $S_t = \{i: y_{it} < z_t\}$, and the subpopulation of individuals whose incomes are greater than or equal to the low income threshold in period t , $\bar{S}_t = \{i: y_{it} \geq z_t\}$. The total target population is $U = S_t \cup \bar{S}_t$.

2.3 Transitory and Persistent Low Income

Duncan et al. (1993) and the US Bureau of the Census (1989) find that the people in persistent low income have characteristics that are significantly different from the rest of the population.

While the distinction between transitory (or transient) low income and persistent (or chronic) low income is probably well understood, there are many possible interpretations at the operational level. For example, Borrooah and Creedy (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, (1) a “chronically poor” person refers to an individual whose income is lower than the low income threshold in each of the T periods (e.g., five years) or in most (e.g., four years) of the T periods (e.g., five years), (2) a “transitorily poor” person refers to an individual whose income fluctuates around the low income threshold over time or whose

¹⁵ Here we adopt the low income criteria with the income strictly “less than” a low income threshold that are consistent with the large part of relevant literature and data processing convention. Some authors (Borrooah and Creedy (2002), for example) use “less than or equal to” rather than “less than”.

income falls below the low income threshold in one of the T periods, and (3) a “non-poor” person refers to an individual whose income is always greater than the low income threshold(s) during the study period.

Clearly, the period of an individual’s life span covered by the survey data dictates how persistent low income can be best measured. If we follow a cohort for only six years, then the maximum duration in low income would be limited to six years. Censoring and truncation will inevitably occur.¹⁶ When low income starts before the first survey year but we can only observe the low income duration as if it starts from the first survey year in our data, we call this left censoring. When low income persists beyond the last survey year in our data but we cannot observe when this low income spell will actually end, we call this right censoring.

Truncation occurs when low income is so brief within a year so that the annual surveys do not detect such low income spells. The critical difference between censoring and truncation is that the former is detectable but without full information, while the latter is not detectable at all as it is truncated. To minimize challenges from censoring, we shall use the longest panel data possible. Even if we do so, there is no guarantee that we will avoid this problem completely. Annual surveys are inherently incapable of capturing brief low income spells within a year.¹⁷ In essence, censoring and truncation are the limitations of data collection.

2.4 Choices among Different Low Income Thresholds

As we have noted earlier, although the total population U is the same over time, the subpopulations $S_t^j = \{i: y_{it} < z_{jt}\}$ and $\bar{S}_t^j = \{i: y_{it} \geq z_{jt}\}$ are indeed threshold-dependent in the sense that they are dependent on the choice of threshold j , z_{jt} , where $j = 1, 2, \dots, J$.

¹⁶ Osberg and Xu (2001) have addressed censoring and truncation in the context of monthly incomes when discussing theoretical issues in poverty measurement and poverty duration.

¹⁷ 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 the annual low income threshold.

To identify low income individuals in the population, we must select a low income threshold. We approach the issue of threshold selection from two different perspectives. We examine the issue first at the methodological level and then at the empirical level.

For the moment, let us suppress the subscript t so that we ignore the time period. Let S be the low income subpopulation which is not completely observable and \mathcal{S} the collection of all possible low income subpopulations. Apparently, $S \in \mathcal{S}$. Let S^j be the low income subpopulation defined under threshold j , where $j \in \mathcal{J}$. \mathcal{J} is the collection of all possible thresholds. Let $L(S, S^j)$ be the loss function which gives a positive value for selecting S^j which is not the same as S . The more S^j differs from S , the higher the value of the loss function $L(S, S^j)$. Therefore, threshold j is preferred to threshold k if

$$L(S, S^j) \leq L(S, S^k).$$

According to Wald (1950), there exists the optimal decision rule called the minimax rule:¹⁸

$$\sup_{S \in \mathcal{S}} L(S, S^j) = \inf_{k \in \mathcal{J}} \sup_{S \in \mathcal{S}} L(S, S^k).$$

That is, threshold j should be chosen so that the maximum loss is minimized for $S \in \mathcal{S}$. The meaningful loss function for the purpose of correctly identifying those low income individuals should be the number of low income individuals who are mistakenly identified as non low income individuals under threshold j ;¹⁹ that is,

$$L(S, S^j) = \#(S - S^j).$$

¹⁸ The supremum or *sup* of L is the smallest upper bound for L . An upper bound which actually belongs to the set is called a maximum. Similar, the infimum or *inf* of L is the greatest lower bound for L . A lower bound which actually belongs to the set is called a minimum.

¹⁹ (1) Instead of using this loss function, one can use other loss functions. For example, we can attach the highest rank weight to the lowest income (highest low income gap) individual and the lowest rank weight to the highest income (lowest low income gap) individual. Such a schedule is often called the Gini social welfare function. For simplicity of the discussion, we leave this discussion for other occasions. (2) Some may suggest that we consider both Type I and II errors here as in statistical inference. First, we argue that wrongly excluding a truly low income individual from the low income subpopulation does more harm to incorrectly including a high income individual into the low income subpopulation. Therefore, we focus on reducing Type I error. Second, because the research question here is to find out which existing low income threshold is more inclusive, the count function is a more suitable choice for the loss function.

The count function is adopted here based on the fact that individuals are equally valued. When there are two thresholds such as $i, j \in J$, we can compare the pair of relevant loss functions. The minimax rule chooses threshold j over threshold i if

$$\sup_{S \in \mathcal{S}} L(S, S^j) \leq \sup_{S \in \mathcal{S}} L(S, S^i).$$

When there are more than two thresholds, we can compare all relevant loss functions. The minimax rule chooses threshold j if

$$\sup_{S \in \mathcal{S}} L(S, S^j) \leq \inf_{i \in J} \sup_{S \in \mathcal{S}} L(S, S^i).$$

Now we explore the implication of the minimax rule further. Given that $(S, S^i) = \#(S - S^i)$, we can write the decision rule as

$$\sup_{S \in \mathcal{S}} \#(S - S^j) \leq \inf_{i \in J} \sup_{S \in \mathcal{S}} \#(S - S^i).$$

The above inequality can be further rewritten as

$$\sup_{S \in \mathcal{S}} \#(S) - \#(S^j) \leq \sup_{S \in \mathcal{S}} \#(S) - \sup_{i \in J} \#(S^i)$$

or

$$\#(S^j) \geq \sup_{i \in J} \#(S^i).$$

The final inequality implies that the minimax rule chooses threshold j because the low income subpopulation is the most inclusive one than any other low income subpopulations identified under all thresholds $j \in J$.

Note that the low income populations $(S^i, i \in J)$ are nested or these low subpopulations are not nested as shown in the Venn diagrams in Figure 1 - A/B. If $S^i, i \in J$ are nested, we can find the largest set S^j such that $S^j \supseteq \cup_{i \in J} S^i$. Therefore, the ranking of $S^i, i \in J$ can be based on $\#(S^i), i \in J$. That is, threshold j is chosen because

$$\#(S^j) \geq \sup_{i \in J} \#(S^i)$$

for $i \in J$.

If $S^i, i \in J$ are not nested, the low income subpopulations identified under thresholds i and j partially overlap each other as shown in Figure 1 - B. That is, $S^j - S^i \neq \emptyset$ and $S^i - S^j \neq \emptyset$, where \emptyset is the empty or null set. This implies $\#(S^j - S^i) \geq 0$ and $\#(S^i - S^j) \geq 0$

On the relationship between inclusion and exclusion, we assume that there are only two low income thresholds i and j . To make the case applicable, we only need to consider that threshold j is chosen over threshold i , which is the second most inclusive one among many other possible choices. We start from

$$\#(S^j) \geq \#(S^i).$$

As $\#(S^j \cup S^i)$ is the upper bound for $\#(S^j)$ and $\#(S^i)$, we have

$$\#(S^j \cup S^i) - \#(S^j) \leq \#(S^j \cup S^i) - \#(S^i),$$

which can be rewritten as

$$\#(S^i - S^j) \leq \#(S^j - S^i).$$

That is, threshold j is chosen so that the low income subpopulation under this threshold encompasses the most low income individuals that are otherwise excluded under any other thresholds $i \in J$. We call this decision rule *the minimax principle*. Alternatively, threshold j is chosen because the low income subpopulation under this threshold excludes the smallest number of low income individuals identified under threshold i . We call this alternative decision rule *the least exclusion principle*.

The above discussion and identification of the suitable choice of a low income threshold are indeed very interesting. On the philosophical level of social justice in the sense of Rawls (1971), a more inclusive low income threshold is more likely to include those who probably belong to the less well off. On the operational level of statistical analysis in the sense of Wald (1950), a more inclusive low income threshold is more conservative to capture the truly low income population.

We now turn to the discussion of the threshold choice issue at the empirical level. As noted previously, the SLID data do contain much information on gender, age, education, minority status, language, student status, disability status, and family types, and so on. Therefore the key research question is: Whether or not the individuals included in the low income subpopulation under threshold j but excluded from the low income subpopulation under threshold i are inappropriately excluded? If a significant proportion of these excluded individuals belong to the members of the high risk subgroups, such as women, lone mothers, individuals with less education attainment and/or with disability, recent immigrants and so on, we can judge that threshold i may be challenged.

Section 3. Empirical Analysis of Data

3.1 Basic Statistics of the Target Population

When this research is conducted, there are four complete panels in the SLID database available. Each panel consists of roughly 17,000 Canadian households and about 34,000 adults surveyed for a period of six consecutive years. A new panel is introduced every three years, so two panels always overlap. For studying low income dynamics after 1999, we focus on the SLID Panel 3 for 1999-2004 and the SLID Panel 4 for 2002-2007.²⁰ Since the SLID data only cover survey participants for at most six years, we are only able to analyze income mobility for that period of time.²¹ Our target population consists of the members of the population who are 16 and older over the six-year period. The Canadian population aged 16 and over are about 18 million adult people by the end of 1998 and about 19 million by the end of 2001.

²⁰ We have also analyzed the Longitudinal Administrative Database (LAD) for the corresponding periods (1999-2004, 2002-2007, and 1999-2007) with LIM but the results are not reported here.

²¹ Hulme et al. (2001) and (2003) focus on the five-year span because this is a sufficiently long period. Duncan et al. (1993) use the LAD panel for the period of 1982-1986 (five years). Finnie and Sweetman (2003) use the LAD panel for the period of 1992-1996 (five years). Morissette and Zhang (2001) use the SLID panel for the period of 1993-1998 (six years).

The unit of analysis of this study is individual, but it is the family income that is used to derive individual equivalent incomes for all family members. Our analysis for the SLID focuses on economic families²².

The two SLID panels are overlapping in time and represented by two distinct survey samples. Because we are interested in low income dynamics, we study each panel and compare the findings from both panels.

For Panel 3 (1999-2004), 51.4% of the population are women while 48.6% are men. Immigrants account for about 18% of the population and over 9% of the population belong to members of visible minorities. In the beginning year of 1999, around one quarter of the population fall under the age group of 35-44 years old, more than 10% are aged 65 years old and above, three quarters receive at least diplomas from high school, about 15% are students, and 18% of the population have some form of disability. 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 child(ren) decreases from almost 42% in 1999 to about 34% in 2004. The attached individuals without child(ren) steadily increase their share from about 23% to more than 27% during the six-year period.

For Panel 4 (2002-2007), 51.1% of the population are women while 48.9% are men. Immigrants account for almost 20% of the population and more than 12% of the population belong to members of visible minorities. In the beginning year of 2002, more than one fifth of the population fall under the age group of 35-44 years old, more than 12% are aged 65 years old and above, around 80% receive at least diplomas from high school, about 15% are students, and 23% of the population have some form of disability. In terms of family composition, families headed by lone parents represent 5% of the population. The proportion of unattached individuals and attached individuals without child(ren)

²² There are two definitions on the concept of family in the SLID, namely economic families and census families. An economic family is defined as a group of two or more persons who live in the same dwelling and are related to each other by blood, marriage, common-law, or adoption. The term “census family” corresponds to what is commonly referred to as a “nuclear family” or “immediate family”. In general, it consists of a married couple or common-law couple with or without children, or a lone-parent with a child or children. The corresponding definitions on different types of families can be found in the website of Statistics Canada: <http://www.statcan.gc.ca/concepts/definitions/fam-eng.htm>, retrieved on May 18, 2010.

steadily increase their shares from about 14% to almost 17%, and from about 24% to almost 28%, respectively. The proportion of attached individuals with child(ren) decreases from almost 41% in 2002 to almost 33% in 2007 during the 6-year period.

3.2 What Are the Patterns of Low Income Dynamics over Time?

Looking at the low income rates for both men and women given in Figure 2 - A/B, we find that LICO and LIM are quite comparable although they are based on different methods. MBM is more inclusive as to who are in low income. That is, some people whose incomes are marginally above LICO or LIM are classified as low income under MBM.

We observe that the low income situation for many Canadians is transitory (for 1-3 years) during the study period. Only a very small percentage of the population experiences persistent low income (for 4-6 years) regardless which low income threshold is used. As shown in Figure 2 – A, in Panel 3 (1999-2004), 5.2% and 5.5% of the population are in low income for four or more years from 1999 to 2004 under LICO and LIM, respectively, while it is 6.4% under MBM. In Panel 4 (2002-2007), 5.1% and 5.6% of the population are in low income for four or more years from 2002 to 2007 under LICO and LIM, respectively, while it is 5.8% under MBM.

Figure 2 – B shows that more women than men are in low income for various durations in Panels 3 and 4 (1999-2004 and 2002-2007) regardless which low income threshold is used although MBM appears to be more inclusive than LICO and LIM. Figure 2 – B also shows that from Panel 3 to Panel 4, more women experience transitory low income than men do while less women experience persistent low income than men do.

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)), Figure 2 – C shows that the gender difference in low income (more women than man in low income) still exists among those aged 65 or over. Under LICO, the low income incidence for men is about 6 % but it is about 16 % for women. Under MBM, the gap is smallest with the low income incidence for men being 8% and

that for women being 11%. This may be related to the difference in Canada public pension payments that depend on how much and how long workers contribute to the Canada public pension in life time. Because female workers tend to contribute less over shorter periods of time than their male counterparts do in life time, female retirees tend to receive less Canada public pension payments.

In Panels 3 and 4 (1999-2004 and 2002-2007), we note the remarkable patterns of life cycle transitions. While a majority (from two thirds to three quarters) of the total population are never in low income, young people, students, unattached individuals and lone parents are likely in low income for a short period of time (e.g., one year) reflecting their life cycle transitions. Next we look at the life cycle transitions in detail.

First, as shown in Figure 3, the young individuals, aged 16-24, have the highest percentage (more than 25%) of being in transitory low income (for 1-3 years) while the older individuals, aged 65 and over, have the lowest percentage (less than 10 %) of being in transitory low income. The transitory low income incidence reduces remarkably as individuals age from 25-45 (for cohorts aged 25-34, 35-44, and 45-54). In addition, the evidence of the highest transitory low income incidence for the young population 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 aged 55-64 have the second highest transitory low income incidence after those aged 16-24. But this age group also has the highest persistent low income incidence (for 4-6 years). This group of individuals can be vulnerable in the labour market as well as in health conditions and marriage situations. It appears that over time the transitory low income incidence for these groups drops below 15% in Panel 4 from a higher rate in Panel 3.

Third, as shown in Figure 3, individuals aged 65 or over have the lowest transitory low income incidence as well as the lowest persistent low income incidence. More specifically, the transitory low income incidence for this age group is lower than 10% and the persistent low income incidence is lower than 5%. This is a successful story of the social policy on senior citizens such as the Old Age Security (OAS) and Guaranteed

Income Supplement (GIS). For this group of individuals, men have an even lower low income incidence than women (Figure 2 - C).

One of the most important life cycle changes is the change of family composition. It can be complex as any change will involve more than one individual (e.g., spouse and children). As family incomes are shared among family members, the change of family composition often has direct impact on low income state under various low income thresholds.

As shown in Figure 4 – A, in Panels 3 and 4 (from 1999 to 2007), unattached individuals and those living in families headed by lone parents have higher transitory and persistent low income incidence regardless which low income threshold is used. The 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 transitory and persistent low income (above 15%). Similarly, lone parents are also likely in low income since a single breadwinner with one or multiple children as dependents tends to spread his/her earnings across many family members. They have a much higher transitory low income incidence (25% or higher) as well as a persistent low income incidence (15% or higher). It is worthwhile to examine further the lone parent family by the gender of the family head. From Figure 4 – B, we find that families headed by lone mothers have a higher persistent low income incidence compared to families headed by lone fathers while their transitory low income incidence is at least as high as that for families headed by lone fathers. Lone mothers have to spend more time taking care of their child(ren) and hence are less likely to pursue higher education and/or be active in the labour market. As a result, lone mothers and their family members possess less economic resources compared to the population in general and they represent one of the high risk groups.

In addition to low incomes related to life cycle transitions and family compositions, we also note low incomes among some high risk individuals such as those with less than

high school education, individuals with disability, members of visible minorities, and recent immigrants.²³ Our findings in this paper are consistent with the literature.²⁴

First, as shown in Figure 5 – A, in Panel 3 (1999-2004) more than 8% of the individuals with less than high school education are in persistent low income (4-6 years in low income) under all three low income thresholds. In Panel 4 (2002-2007), more than 8% of those with less than high school education are in persistent low income under both LICO and LIM, while this percentage is just below 8% under MBM during the same period. As the theory of human capital predicts:²⁵ when workers have less education, they get lower returns for their human capital and hence more likely to fall into low income.

Second, Figure 5 – B shows that in Panel 3 (1999-2004) more than 16% of those with disability are in persistent low income under all low income thresholds. This is a high percentage considering the fact that less than 4% of those without any disability are in persistent low income under all low income thresholds. In Panel 4 (2002-2007), about 14% of those with disability are in persistent low income under all low income thresholds. Again this percentage is much higher considering that only about 3% for those without disability are in persistent low income. This finding is consistent with the earlier findings in the literature.²⁶

Third, as shown in Figure 5 – C, in Panel 3 (1999-2004) more than 10% of the members of visible minorities are in persistent low income under all three low income thresholds while less than 6% of the people who do not belong to these groups are in persistent low income. In Panel 4 (2002-2007), less than 9% of the members of visible minorities are in persistent low income while only about 5% of the people who do not belong to these groups are in persistent low income under LICO and LIM. Under MBM, the percentage of people who belong to members of visible minorities are in persistent low income is

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

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

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

²⁶ See, for example, HRSDC (2006).

higher (11%), compared to about 5% for those who do not belong to members of visible minorities. The above findings are consistent with the earlier findings in the literature.²⁷

Fourth, as shown in Figure 5 – D, in Panel 3 (1999-2004) more than 11% of the recent immigrants (who moved to Canada after 1986) are in persistent low income under all three low income thresholds while only less than 6% of the native-born Canadians are in persistent low income. In Panel 4 (2002-2007), more than 9% of the recent immigrants (who moved to Canada after 1989)²⁸ are in persistent low income under all three low income thresholds while around 5% of the native-born Canadians are in persistent low income. The data again echo with the recent empirical findings on the Canadian immigrant population.²⁹

3.3 Which Low Income Threshold Is More Inclusive?

In our previous analysis, while there is a broad agreement between the findings under the three low income thresholds, we note some inconsistencies. Because of these inconsistencies, we wish to know which threshold is the most inclusive or least exclusive for the two panel periods; whether or not the ranking among the three thresholds are constant over time; and which high risk groups tend to be over-identified under these thresholds.

We address the question of inclusiveness of a low income threshold based on the minimax principle (or least exclusion) principle.

From Tables 1 – A/B, we find that MBM is more inclusive over the two panel periods because under MBM, the proportion of the population who ever had low income durations is the highest in both panels. This finding shows that it is not the case, based on the sample in hand, that LICO and LIM are more generous than MBM.

²⁷ See, for example, Statistics Canada (2001) and Samuel (2006).

²⁸ Panel 4 begins three years after Panel 3. The immigrant groupings, defined by their landing years, are therefore also postponed three years in Panel 4 for consistent comparison.

²⁹ See, for example, Picot and Hou (2003, 2007).

When we apply the minimax principle (or least exclusion principle) to the data, we note that the low income subpopulations identified under the three low income thresholds are not nested in all years in both panels, as demonstrated by the Venn diagram in Figure 1 - B. That is, within each pair, one threshold will always exclude some low income individuals identified under another threshold. Tables 1 - A/B list the total number of individuals in the population, the number of low income individuals identified by one threshold but excluded by another threshold, and the percentage of these excluded low income individuals in the total population. We do such comparison among the six pairs (LICO versus LIM, LIM versus LICO, LICO versus MBM, MBM versus LICO, LIM versus MBM, and MBM versus LIM) for both Panels 3 and 4.

We first examine the minimum and maximum of exclusions in Panel 3 (1999-2004). In Table 1 - A, we shall treat the result for 1999 with caution as MBM was not established for 1999. We used the data of MBM for 2000 and convert them for 1999 using the annual community-specific CPI. By looking at the minimum and maximum of exclusions during 2000-2004, we note that the percentages of low income individuals identified under LICO or LIM but excluded by MBM have the minimum values (0.4%-1.3%).

We then examine the minimum and maximum of exclusions in Panel 4 (2002-2007). In Table 1 - B, we note that the percentages of low income individuals identified under LICO or LIM but excluded by MBM also have the minimum values (0.5%-1.5%). But for the period 2002-2007, we also see from Table 1 - B that the percentages of low income individuals identified under LICO and MBM but excluded by LIM are close to the minimum values (0.6%-1.9%). Clearly, it appears that MBM is the most inclusive among all three low income thresholds.

We can further summarize all possible rankings of the three low income thresholds in Table 2. It shows that based on Panels 3 and 4 MBM is the most inclusive threshold among the three. We may recall the equivalency between the minimax and least exclusion principles. We use empirical evidence to rank LICO, LIM, and MBM in each year for both panels. We note that in Panel 3, according to the minimax (or least exclusion) principle, MBM is consistently ranked as the most inclusive threshold while the least inclusive threshold is LIM from 1999 to 2000 and LICO from 2001 to 2004. In

Panel 4, MBM again is consistently ranked as the most inclusive threshold from 2002 to 2006. But in 2007, LIM is ranked as the most inclusive one. For Panel 4, the least inclusive threshold switches from LIM in 2002 to LICO for the rest of the panel. In other words, the nature of inclusiveness and least exclusion of a threshold may change over time, which is likely to be determined by the methodology of a threshold construction and random sampling variation.

Having determined that MBM is the most inclusive and/or least exclusive low income threshold over time, we now study who are included under MBM but excluded under LICO or LIM. We note that individuals in some high risk groups included under MBM but excluded under LICO or LIM have roughly the same profile as the population. But individuals in other high risk groups included under MBM but excluded under LICO or LIM are indeed over-represented. If excluded high risk individuals under LICO or LIM are too high, this suggests that exclusions may not be justified and hence the threshold that causes exclusions may be questioned.

We then examine, by high risk group, the low income individuals included under MBM but excluded under LICO or LIM in Panel 3 (1999-2004) and Panel 4 (2002-2007). First, for each high risk group (say, lone parents), we calculate its percentage in the marginal low income population that is included under MBM but excluded under LICO or LIM. Then we compare this percentage of exclusions with the percentage of low income individuals in that specific high risk group (say, lone parents) in the total population. The essence of this approach is that: when the probability of making “Type-I error” (when individuals are of low income under MBM but were identified not so under LICO or LIM) is substantially higher than that of finding low income individuals in the population, it raises a flag. At the empirical level, this means that individuals who should not be excluded under MBM are possibly over-excluded under LICO or LIM.

The general findings are as follows. Among all high risk groups that are included under MBM but excluded by LICO or LIM, women, senior citizens, people with less than high school education, people with disability, and unattached individuals appear to be consistent or close to their percentages in the population. This indicates that MBM does a

reasonable job of including those who are supposed to be included in the low income subpopulation. The exclusions under LICO or LIM are not excessive.

However, the same cannot be said for other high risk groups such as members of visible minorities (Figure 6-A), immigrants who are members of visible minorities (Figure 6-B), and lone parents (Figure 6-C). It seems that members of visible minorities, immigrants who are members of visible minorities, and lone parents included as low income individuals under MBM but excluded under LICO or LIM are very much over-represented. These exclusions appear to be excessive under LICO or LIM, in particular under LIM. This further confirms that MBM can reduce such over-exclusions.

Perhaps, classification of these high risk group members under different low income thresholds is subject to a whole range of other factors that cannot be captured by the SLID data. For example, factors of family composition, region, and location are taken into account in developing LICO and MBM but not LIM while LIM and MBM use the same equivalent scale but LICO does not.

Section 4. Concluding Remarks

The existing analyses on low income dynamics in Canada generally build on the data of different sources available till the end of the 1990s and on different low income thresholds. From both theoretical and empirical points of view, this paper attempts to analyze the patterns of low income dynamics in Canada in 2000 and beyond and whether or not different low income thresholds would matter to the analysis.

In this paper, we first lay out the conceptual framework on target population, identification of low income, differentiation between transitory and persistent low income, and the principles for selecting among several low income thresholds. Then, on the basis of the conceptual framework and principles, we have analyzed Panel 3 (1999-2004) and Panel 4 (2002-2007) of the SLID data.

We have the following interesting findings.

First, low income state for many Canadians is transitory during the study period while persistent low income is often associated with high risk groups. As to transitory low income, we note the remarkable patterns of life cycle transitions: young people, students, unattached individuals, and lone parents are likely in low income for a short period of time, reflecting their life cycle transitions. The persistent low income group accounts for a very small percentage of the total population. However, people with less than high school, people with disability, members of visible minorities, and recent immigrants, or high risk groups, have high risk of falling into low income. These findings are prevalent under all three low income thresholds and are robust across Panels 3 and 4 of the SLID data.

Second, we identify that MBM is the most inclusive threshold among the three (LICO, LIM and MBM) for the two panel periods (1999-2004 and 2002-2007) by using the minimax (or least exclusion) principle. Moreover, among those who are included under MBM but excluded by LICO or LIM, the profiles of women, senior citizens, people with less education, people with disability, and unattached individuals do not differ much from

those in the total population. However, among those who are included under MBM but excluded by LICO or LIM, members of visible minorities, immigrants who are members of visible minorities, and lone parents are over-represented and excessive compared to their profiles in the total population. Therefore, when we use LICO or LIM, some high risk group members may well be unreasonably excluded but they are indeed included under MBM. This evidence indicates that less inclusive thresholds may well under-identify some high risk individuals as low income individuals.

This research also has some limitations. First, we note that some senior citizens have low income but they may have accumulated some wealth. In this research we will not be able to link the flow (income) to the stock (wealth). Second, LICO, LIM and MBM are taken as plausible choices although other thresholds may be established. Third, the observation of the inclusiveness of MBM relative to LICO and LIM is based on Panels 3 and 4 of the SLID data but not a general conclusion.

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Tables

Table 1 - A: Exclusion analysis on the marginal population at-risk under LICO, LIM, and MBM, 1999-2004

Representative Population	1999	2000	2001	2002	2003	2004	1999-2004		2000-2004	
Total Population	17,906,297	17,906,297	17,906,297	17,906,297	17,906,297	17,906,297	Min	Max	Min	Max
in low income under LICO but excluded under LIM	350,822	262,846	171,140	197,557	192,071	153,445				
Percentage	2.0%	1.5%	1.0%	1.1%	1.1%	0.9%	0.9%	2.0%	0.9%	1.5%
in low income under LIM but excluded under LICO	182,435	207,586	291,158	250,846	244,038	275,551				
Percentage	1.0%	1.2%	1.6%	1.4%	1.4%	1.5%	1.0%	1.6%	1.2%	1.6%
in low income under LICO but excluded under MBM	227,066	228,475	160,472	153,587	220,052	167,944				
Percentage	1.3%	1.3%	0.9%	0.9%	1.2%	0.9%	0.9%	1.3%	0.9%	1.3%
in low income under MBM but excluded under LICO	492,355	504,933	495,407	426,361	377,741	385,497				
Percentage	2.7%	2.8%	2.8%	2.4%	2.1%	2.2%	2.1%	2.8%	2.1%	2.8%
in low income under LIM but excluded under MBM	51,860	70,798	81,926	105,361	131,074	122,816				
Percentage	0.3%	0.4%	0.5%	0.6%	0.7%	0.7%	0.3%	0.7%	0.4%	0.7%
in low income under MBM but excluded under LIM	485,537	402,517	296,843	324,847	236,795	218,263				
Percentage	2.7%	2.2%	1.7%	1.8%	1.3%	1.2%	1.2%	2.7%	1.2%	2.2%

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

Note: The counts included in this table reflect the representative population, by applying the SLID sampling weights.

Table 1 - A presents the exclusion of the marginal population at-risk between one low income threshold and the other (LICO, LIM, and MBM).

The percentage of each marginal population at-risk out of the total population in each year is also given. The two columns on the further right of this table show the minimum and maximum percentages of these subpopulations of exclusion.

Table 1 - B: Exclusion analysis on the marginal population at-risk under LICO, LIM, and MBM, 2002-2007

Representative Population	2002	2003	2004	2005	2006	2007	2002-2007	
Total Population	19,403,068	19,403,068	19,403,068	19,403,068	19,403,068	19,403,068	Min	Max
in low income under LICO but excluded under LIM	289,081	239,065	181,892	198,816	154,168	107,520		
Percentage	1.5%	1.2%	0.9%	1.0%	0.8%	0.6%	0.6%	1.5%
in low income under LIM but excluded under LICO	283,629	250,870	329,149	355,984	272,135	358,568		
Percentage	1.5%	1.3%	1.7%	1.8%	1.4%	1.8%	1.3%	1.8%
in low income under LICO but excluded under MBM	211,738	287,768	225,459	194,543	195,953	211,918		
Percentage	1.1%	1.5%	1.2%	1.0%	1.0%	1.1%	1.0%	1.5%
in low income under MBM but excluded under LICO	468,622	438,509	438,483	497,252	391,473	314,236		
Percentage	2.4%	2.3%	2.3%	2.6%	2.0%	1.6%	1.6%	2.6%
in low income under LIM but excluded under MBM	97,909	209,814	181,544	151,812	164,459	294,771		
Percentage	0.5%	1.1%	0.9%	0.8%	0.8%	1.5%	0.5%	1.5%
in low income under MBM but excluded under LIM	360,245	348,751	247,311	297,354	242,012	146,041		
Percentage	1.9%	1.8%	1.3%	1.5%	1.2%	0.8%	0.8%	1.9%

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

Note: The counts included in this table reflect the representative population, by applying the SLID sampling weights.

Table 1 - B presents the exclusion of the marginal population at-risk between one low income threshold and the other (LICO, LIM, and MBM). The percentage of each marginal population at-risk out of the total population in each year is also given. The two columns on the further right of this table show the minimum and maximum percentages of these subpopulations of exclusion.

Table 2: Annual ranking of low income thresholds (LICO, LIM, and MBM) by the principle of minimax or least exclusion, for both SLID Panel 3 (1999-2004) and Panel 4 (2002-2007)

	Principle of Minimax	Principle of Least Exclusion	Principle of Minimax	Principle of Least Exclusion
	Panel 3		Panel 4	
1999	MBM>LICO>LIM	MBM>LICO>LIM		
2000	MBM>LICO>LIM	MBM>LICO>LIM		
2001	MBM>LIM>LICO	MBM>LIM>LICO		
2002	MBM>LIM>LICO	MBM>LIM>LICO	MBM>LICO>LIM	MBM>LICO>LIM
2003	MBM>LIM>LICO	MBM>LIM>LICO	MBM>LIM>LICO	MBM>LIM>LICO
2004	MBM>LIM>LICO	MBM>LIM>LICO	MBM>LIM>LICO	MBM>LIM>LICO
2005			MBM>LIM>LICO	MBM>LIM>LICO
2006			MBM>LIM>LICO	MBM>LIM>LICO
2007			LIM>MBM>LICO	LIM>MBM>LICO

Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Table 2 ranks the three low income thresholds (LICO, LIM, and MBM) annually by the minimax or least exclusion principle for panels 3 and 4, respectively.

Figures

Figure 1 - A: Illustration of the scenario that the low income subpopulations identified by the one threshold is nested within the other

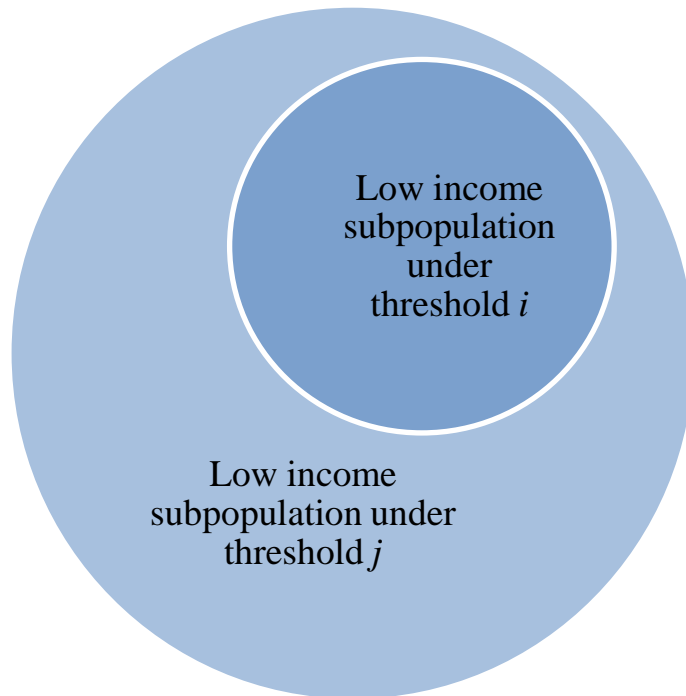


Figure 1 - A depicts the scenario where the low income subpopulation under the low income threshold i is nested within that under the threshold j . For example, the j and i threshold pair can be LICO vs. LIM, or LICO vs. MBM, or LIM vs. MBM, respectively. When the subpopulation identified by one threshold (say i) is a subset of the subpopulation identified by the reference threshold (say j), the reference low income threshold (say j) under which the subpopulation is identified is said to be more inclusive than the alternative low income threshold (say i).

Figure 1 - B: Illustration of the scenario that the low income subpopulations identified by any two thresholds overlaps with each other

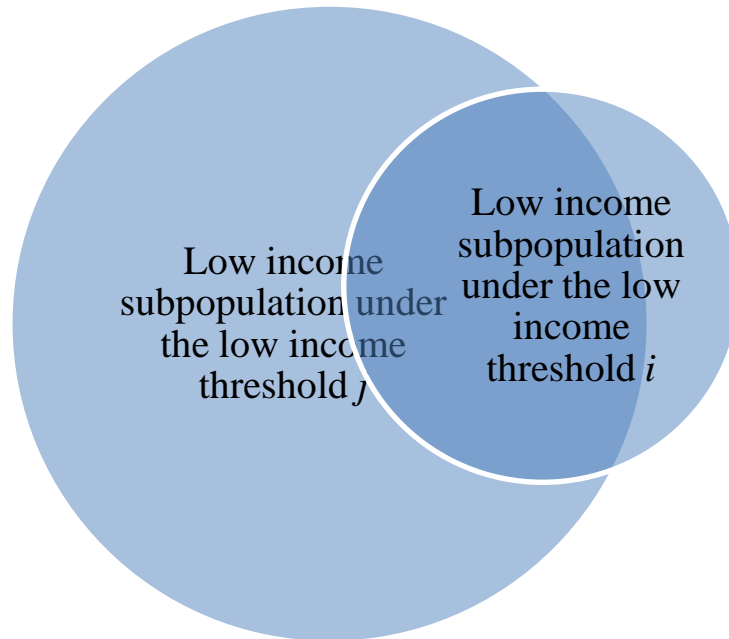
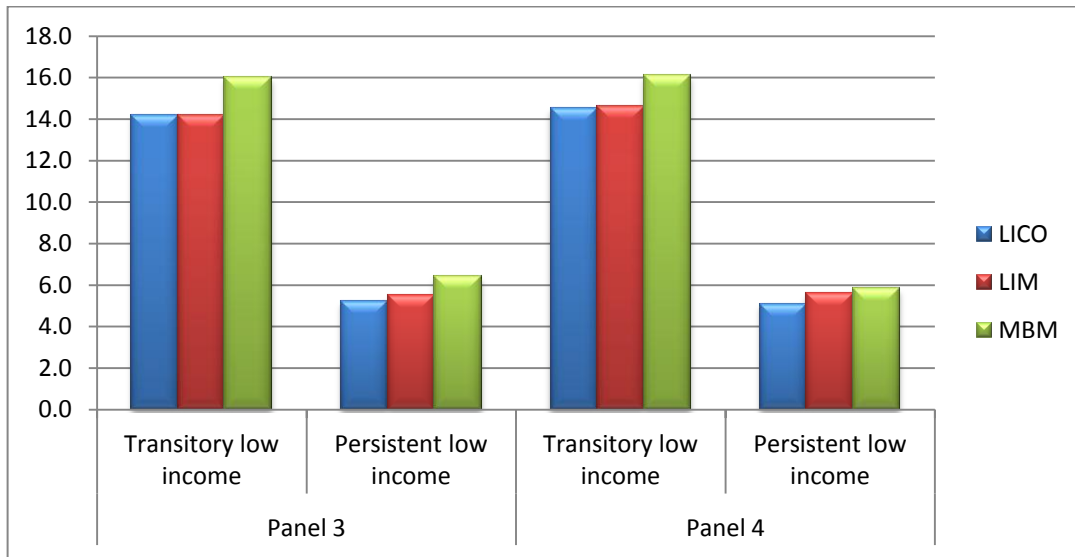


Figure 1 - B depicts the scenario where the low income subpopulation identified by the low income threshold j (or i) overlaps with that identified by an alternative low income threshold i (or j). For example, the i and j threshold pair can be LICO vs. LIM, or LICO vs. MBM, or LIM vs. MBM, respectively. The left (or right) subpopulation contains individuals who are excluded by the alternative threshold i (or j). When a subpopulation identified under one reference low income threshold (say j) excludes fewer individuals than it does vice versa, the reference low income threshold (say j) under which the subpopulation is identified is said to be more inclusive than the alternative low income threshold (say i).

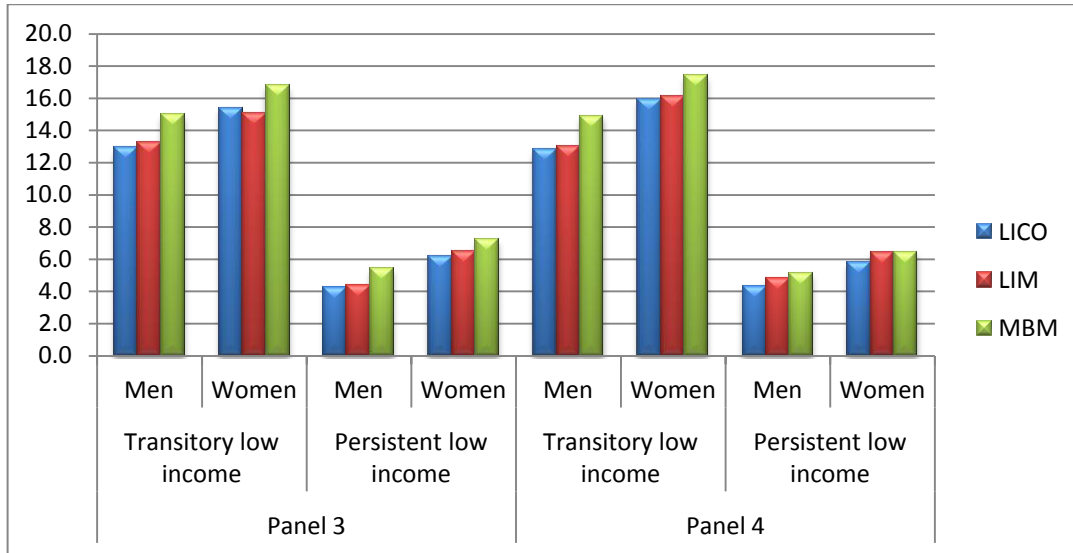
Figure 2 - A: Proportions of transitory and persistent low income (%) for total population under the three low income thresholds: 1999-2004 and 2002-2007



Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Figure 2 - A demonstrates the proportions of transitory low income (1-3 years in low income) and persistent low income (4-6 years in low income) for total population under the three low income thresholds (LICO, LIM, and MBM) for SLID panel 3 (1999-2004) and panel 4 (2002-2007), respectively.

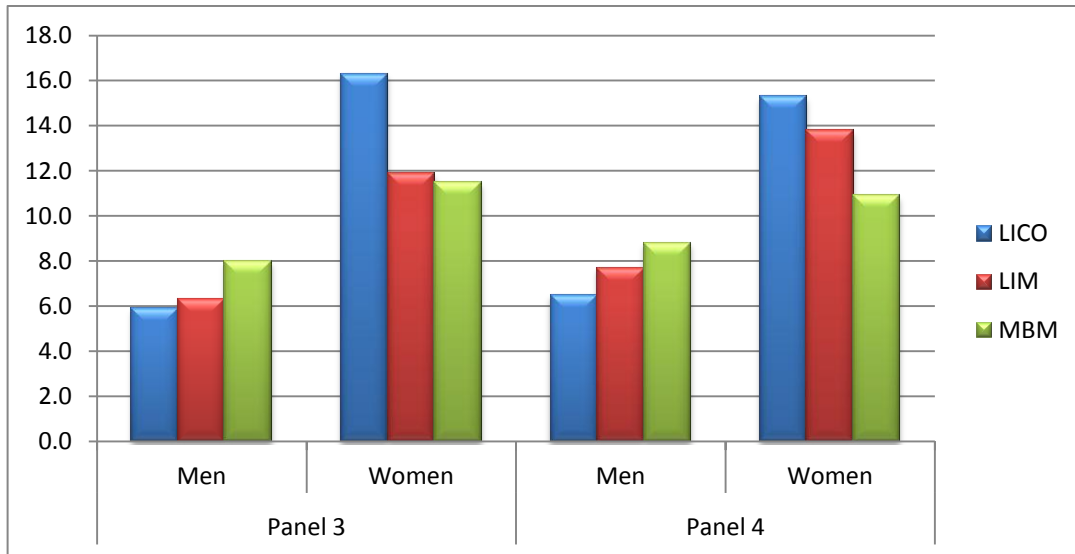
Figure 2 - B: Proportions of transitory and persistent low income for men and women (%) under the three low income thresholds: 1999-2004 and 2002-2007



Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Figure 2 - B demonstrates the proportions of transitory low income (1-3 years in low income) and persistent low income (4-6 years in low income) for men and women under the three low income thresholds (LICO, LIM, and MBM) for SLID panel 3 (1999-2004) and panel 4 (2002-2007), respectively.

Figure 2 - C: Proportions of low income (%) for seniors by gender under the three low income thresholds: 1999-2004 and 2002-2007

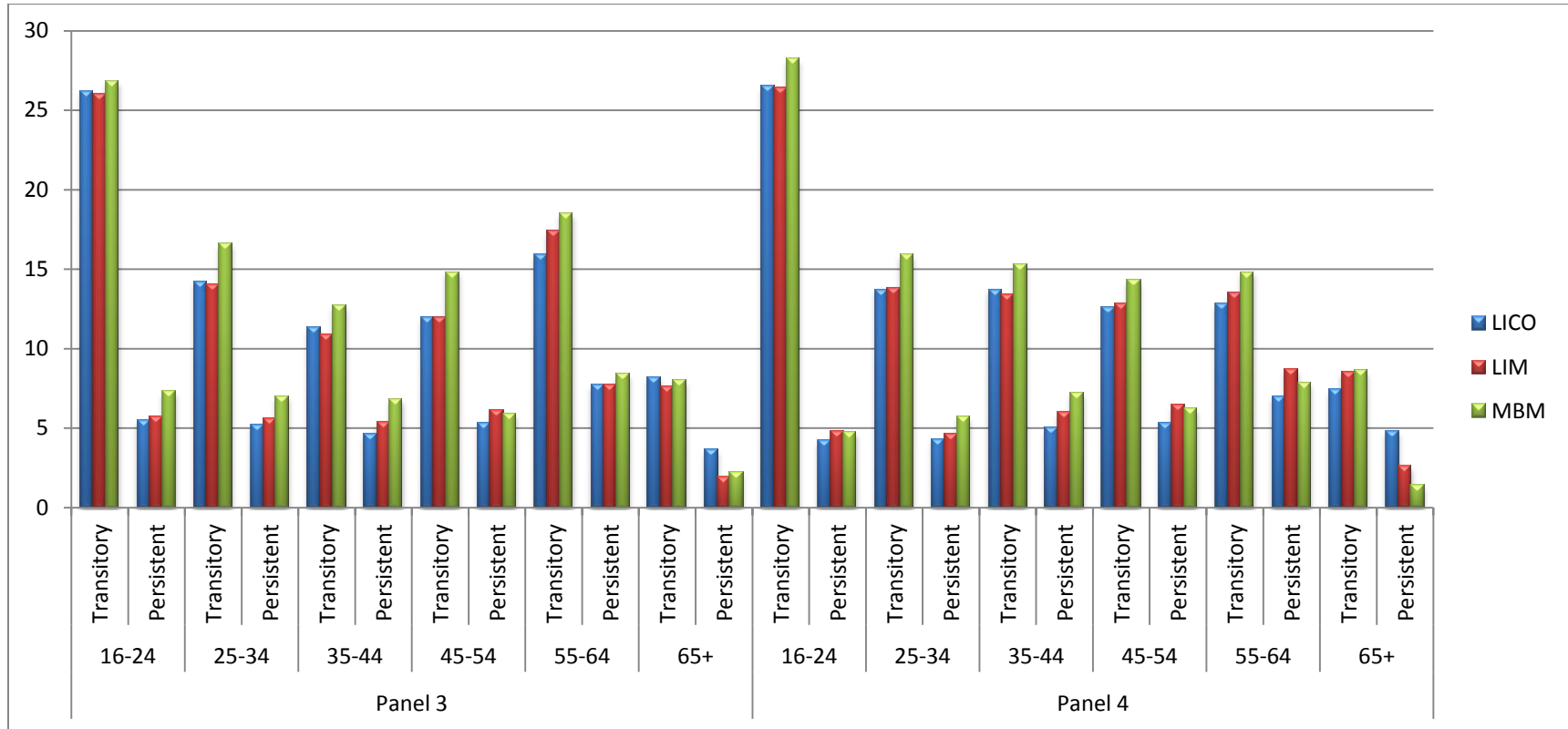


Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Note: For confidentiality concerns, it is not able to differentiate the transitory and persistent low income for the subpopulations analyzed in this diagram. Instead, the combined rates of low income (at least one year in low income out of 6-year period) are shown.

Figure 2 - C demonstrates the proportions of low income (spent at least one year in low income out of 6-year panel) for seniors by gender under the three low income thresholds (LICO, LIM, and MBM) for SLID panel 3 (1999-2004) and panel 4 (2002-2007), respectively.

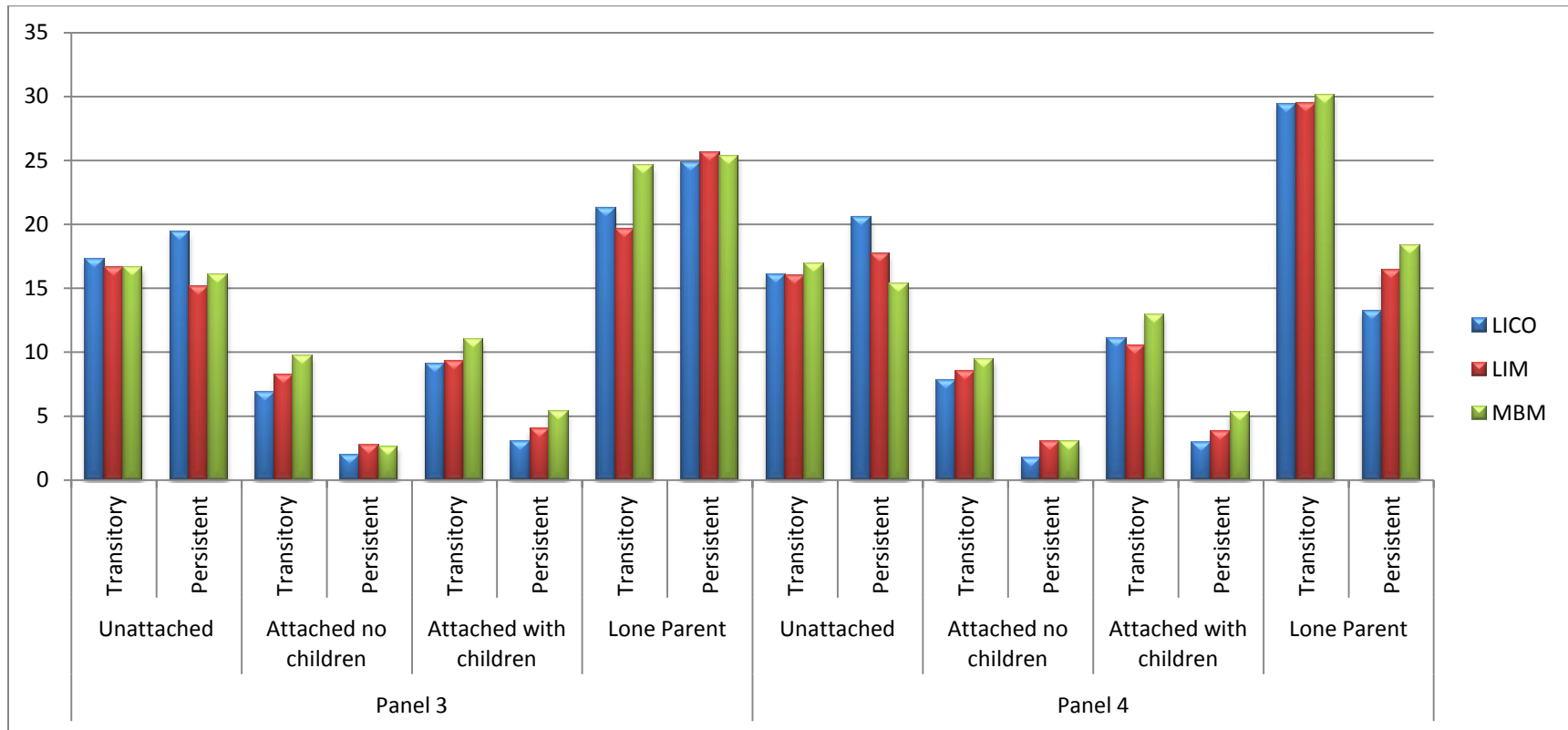
Figure 3: Proportions of transitory and persistent low income (%) by age under the three low income thresholds: 1999-2004 and 2002-2007



Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Figure 3 demonstrates the proportions of transitory low income (1-3 years in low income) and persistent low income (4-6 years in low income) by age (in the beginning year of the panel period, respectively) under the three low income thresholds (LICO, LIM, and MBM) for SLID panel 3 (1999-2004) and panel 4 (2002-2007), respectively.

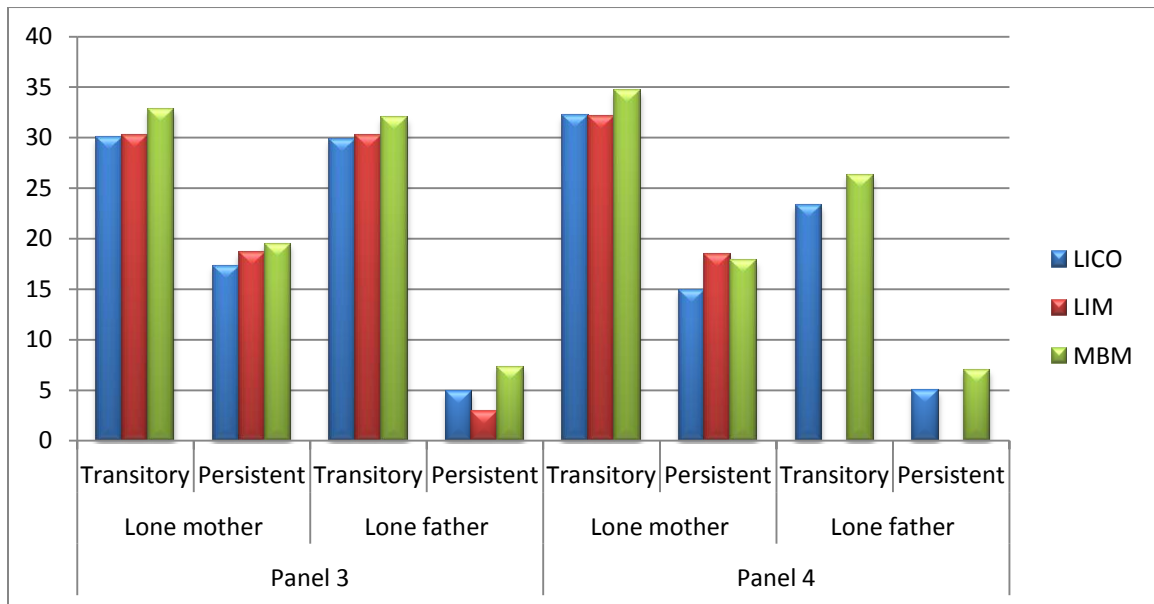
Figure 4 - A: Proportions of transitory and persistent low income (%) by family composition under the three low income thresholds: 1999-2004 and 2002-2007



Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Figure 4 - A demonstrates the proportions of transitory low income (1-3 years in low income) and persistent low income (4-6 years in low income) by family composition (throughout the panel period, respectively) under the three low income thresholds (LICO, LIM, and MBM) for SLID panel 3 (1999-2004) and panel 4 (2002-2007), respectively.

Figure 4 - B: Proportions of transitory and persistent low income (%) for family headed by lone parent (lone mother/father) under the three low income thresholds: Panel 3 (1999-2004) and Panel 4 (2002-2007)

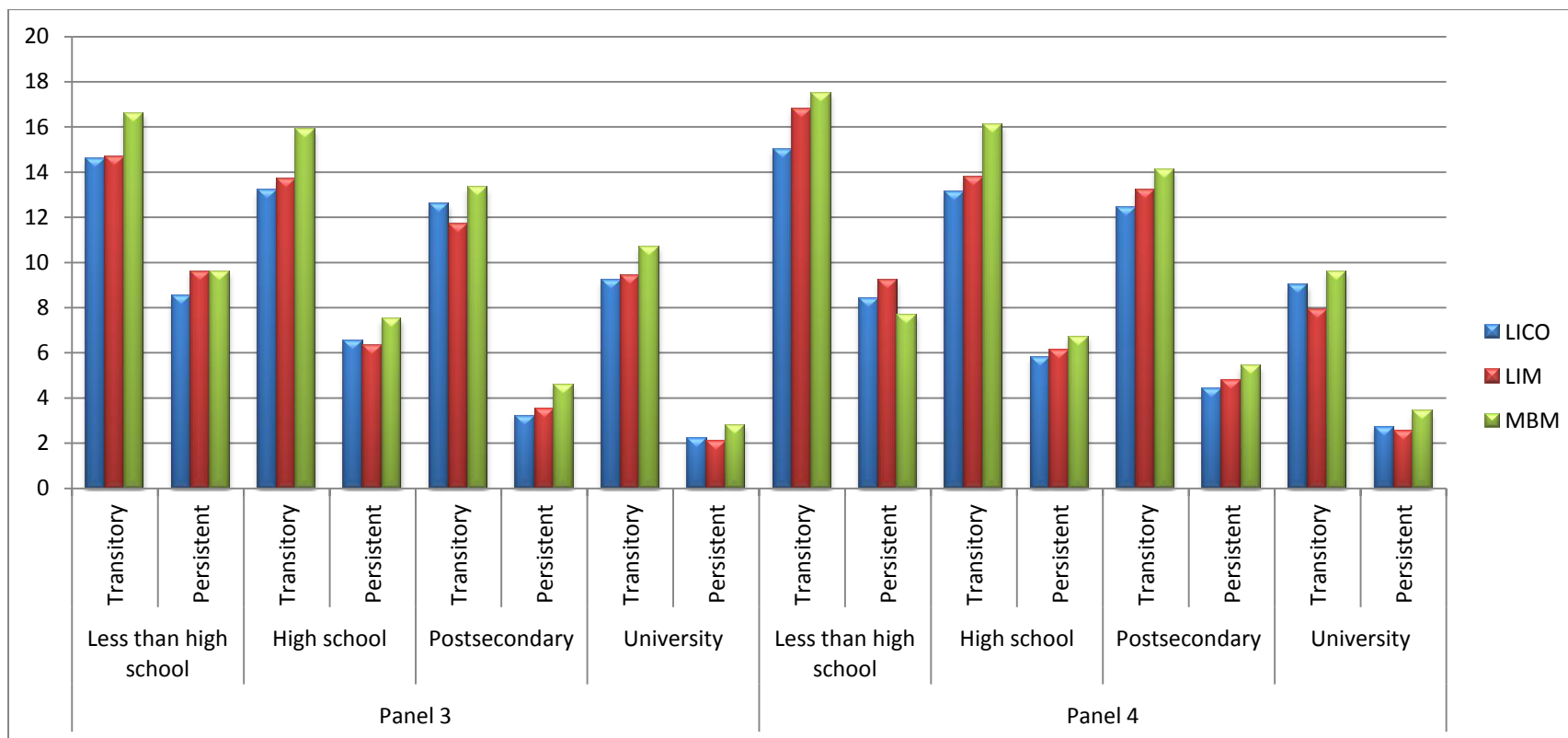


Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Note: Data for the proportions of lone fathers who had low income under LIM during the period of Panel 4 are not shown due to the data release restriction of Statistics Canada.

Figure 4 - B demonstrates the proportions of transitory low income (1-3 years in low income) and persistent low income (4-6 years in low income) for family headed by lone mother and lone father (throughout the panel period, respectively) under the three low income thresholds (LICO, LIM, and MBM) for SLID panel 3 (1999-2004) and panel 4 (2002-2007), respectively.

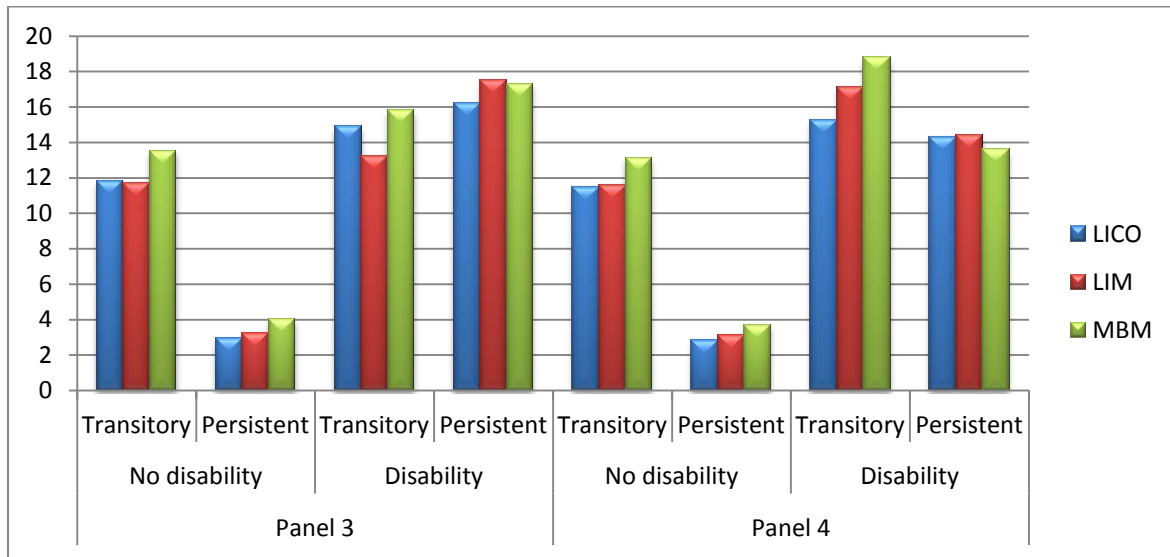
Figure 5 - A: Proportions of transitory and persistent low income (%) by educational attainment under the three low income thresholds: 1999-2004 and 2002-2007



Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Figure 5 - A demonstrates the proportions of transitory low income (1-3 years in low income) and persistent low income (4-6 years in low income) by educational attainment (throughout the panel period, respectively) under the three low income thresholds (LICO, LIM, and MBM) for SLID panel 3 (1999-2004) and panel 4 (2002-2007), respectively.

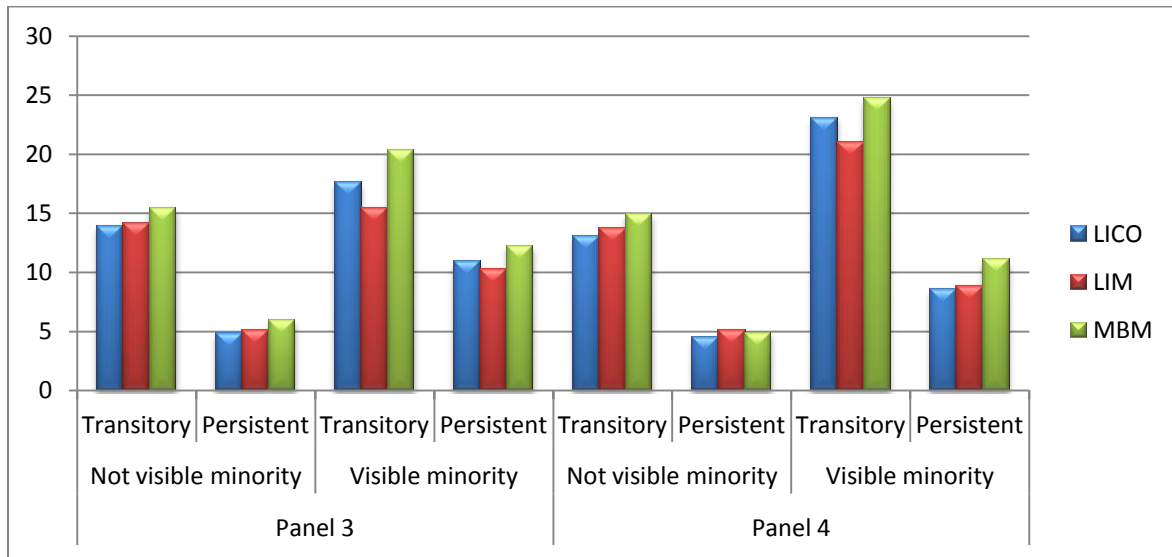
Figure 5 - B: Proportions of transitory and persistent low income (%) by disability condition under the three low income thresholds: 1999-2004 and 2002-2007



Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Figure 5 - B demonstrates the proportions of transitory low income (1-3 years in low income) and persistent low income (4-6 years in low income) by disability condition (throughout the panel period, respectively) under the three low income thresholds (LICO, LIM, and MBM) for SLID panel 3 (1999-2004) and panel 4 (2002-2007), respectively.

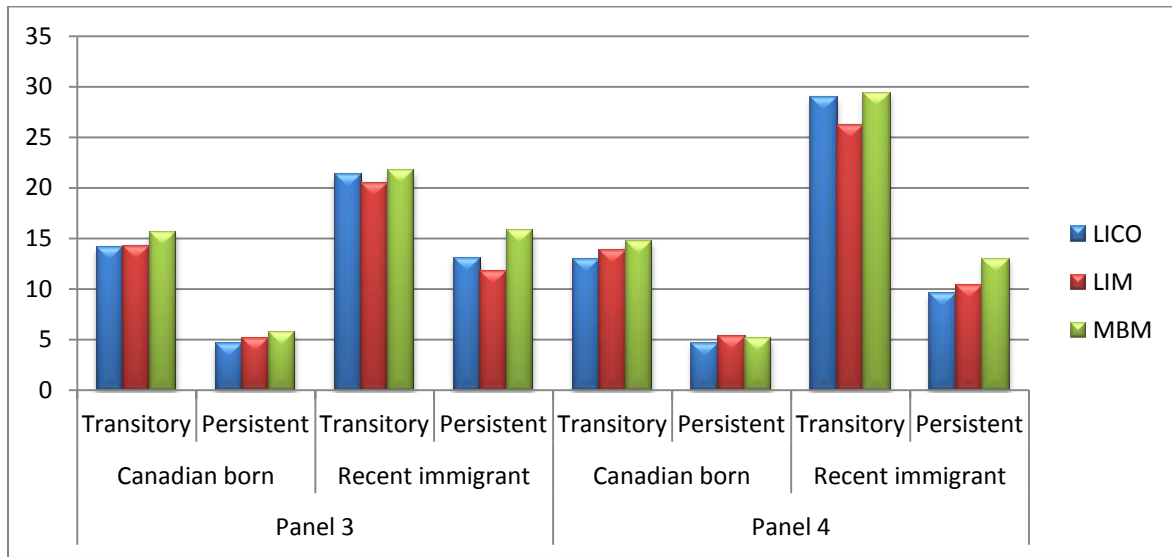
Figure 5 - C: Proportions of transitory and persistent low income (%) for visible minority under the three low income thresholds: 1999-2004 and 2002-2007



Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Figure 5 - C demonstrates the proportions of transitory low income (1-3 years in low income) and persistent low income (4-6 years in low income) for visible minority under the three low income thresholds (LICO, LIM, and MBM) for SLID panel 3 (1999-2004) and panel 4 (2002-2007), respectively.

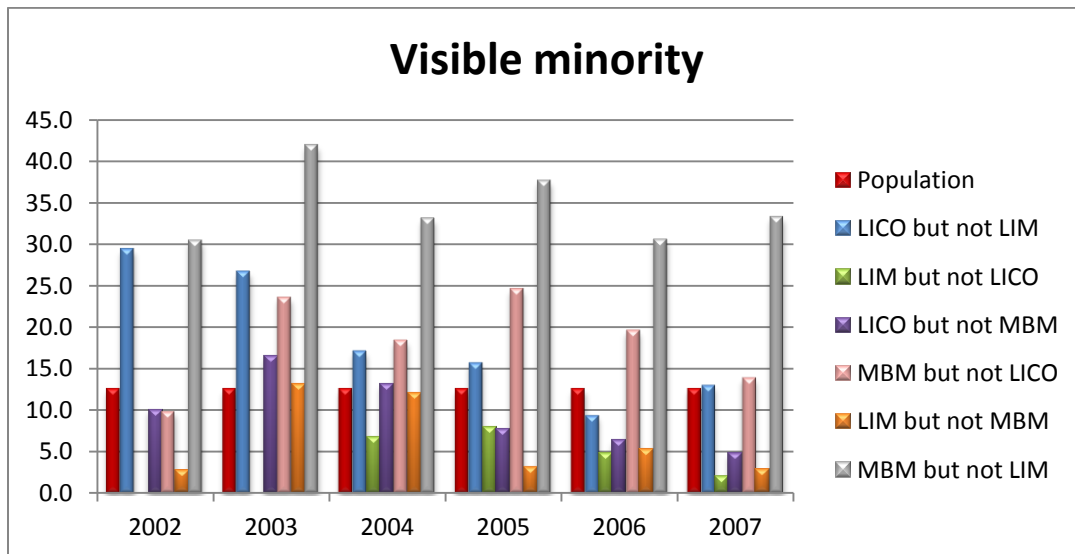
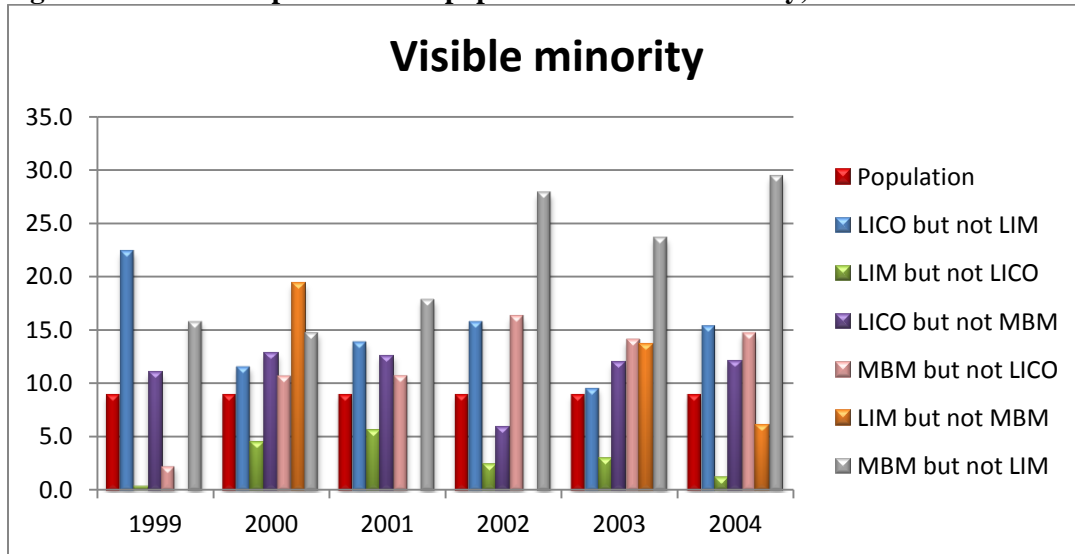
Figure 5 - D: Proportions of transitory and persistent low income (%) for recent immigrant under the three low income thresholds: 1999-2004 and 2002-2007



Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Figure 5 - D demonstrates the proportions of transitory low income (1-3 years in low income) and persistent low income (4-6 years in low income) for recent immigrant (landed in Canada after 1986/1989 for panel 3/4, respectively) under the three low income thresholds (LICO, LIM, and MBM) for SLID panel 3 (1999-2004) and panel 4 (2002-2007), respectively.

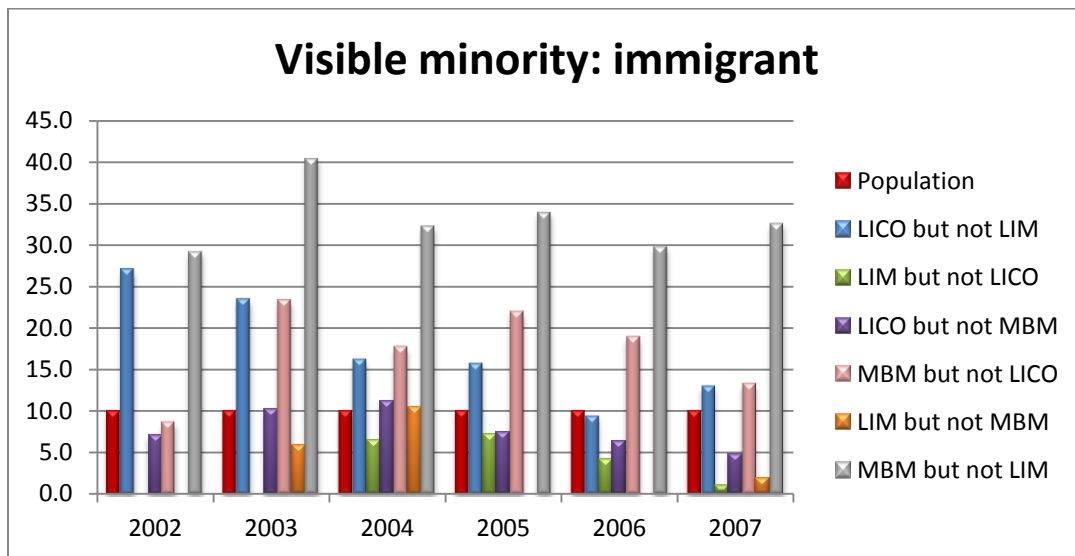
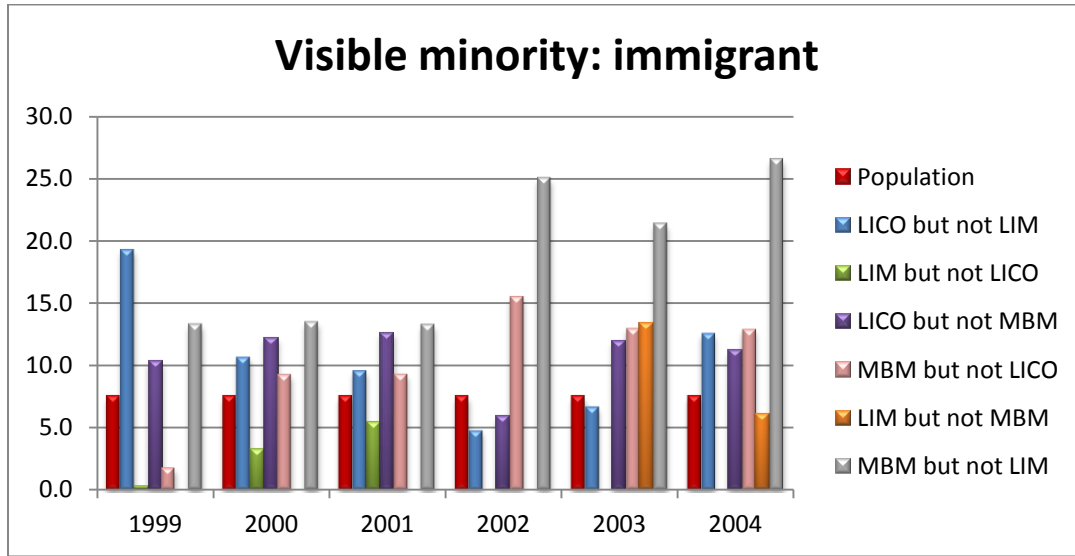
Figure 6 - A: Over-represented subpopulation: Visible minority, 1999-2004 and 2002-2007



Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Figure 6 - A demonstrates that people who belong to members of visible minority are over-represented in the marginal population that is included under one threshold but excluded by another during 1999-2004 and 2002-2007.

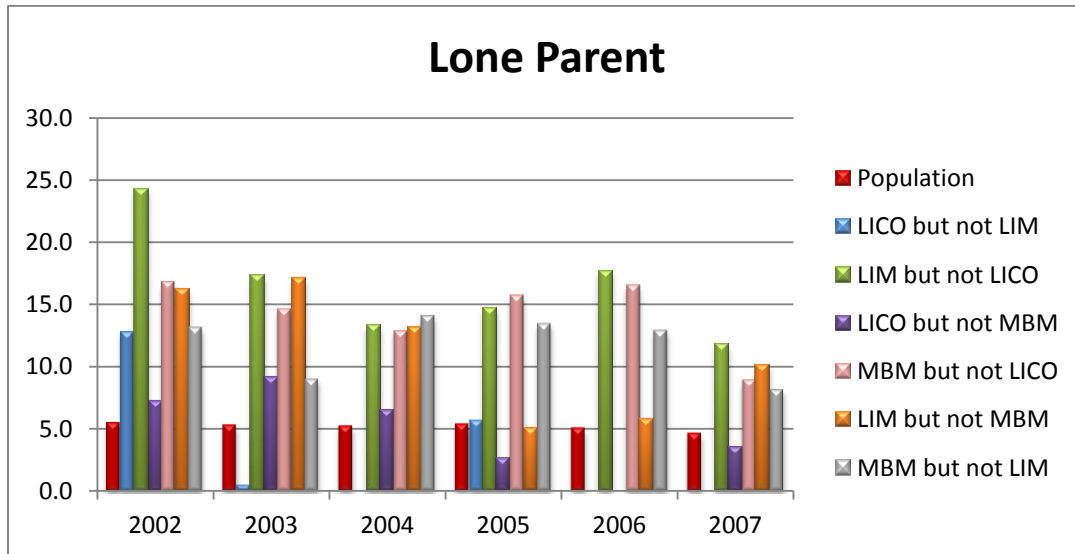
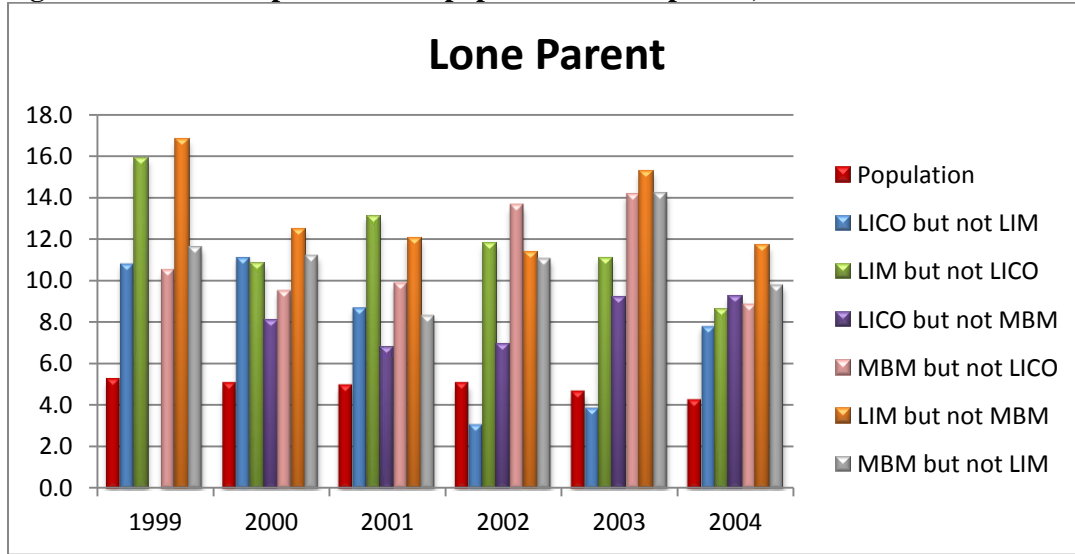
Figure 6 - B: Over-represented subpopulation: Visible minority - Immigrant, 1999-2004 and 2002-2007



Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Figure 6 - B demonstrates that immigrants who also belong to members of visible minority are over-represented in the marginal population that is included under one threshold but excluded by another during 1999-2004 and 2002-2007.

Figure 6 - C: Over-represented subpopulation: Lone parent, 1999-2004 and 2002-2007



Source: Survey of Labour and Income Dynamics, Panels 3 and 4.

Figure 6 - C demonstrates that families headed by lone parent are over-represented in the marginal population that is included under one threshold but excluded by another during 1999-2004 and 2002-2007.