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Low Income Measurement in Canada: What Do Different Lines and Indexes Tell Us?

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Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.

Abstract

While Canada has never had an official poverty line, there are a number of low income lines widely employed to inform public debates and program initiatives. These lines are designed to identify low income individuals from different angles. Together with several aggregate indexes, they may be used to obtain a sensible picture of low income in Canada. But in practice, researches often rely on a single line and a single index. Would we observe the same trend by using multiple lines and indexes? What would be the best practices when different indexes contradict to each other?

This study assesses the existing LICO, LIM, and MBM lines, together with a fixed LIM, by using several distribution sensitive indexes. We found that the low income lines tracked each other well in the long-run. But, in the short-run, they often behaved differently. The same was observed when examining different indexes under the same line. In the long-run, the low income rate, gap, and severity indexes all moved in the same direction. However in the short-run, they sometimes varied in opposite directions, or in the same direction with different magnitudes, suggesting that a single line or index can be misleading in some circumstances.

Examining different low income lines across several disadvantaged groups of individuals, we found that fixed LIM was not as inclusive as MBM, or as capable as MBM in capturing individuals from families headed by recent immigrants, although the groups as a whole contributed more to low income incidence under fixed LIM than under MBM. The result suggests that future development of the LIM lines needs to take regional variations in costs of living into consideration, and that the fixed LIM needs to be re-based periodically.

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I like to thank Indranil Dutta, Kuan Xu, Willa Rea, Brian Murphy, Karen Mihorean and participants at the 2009 Canadian Economic Association Conference for their comments and suggestions.

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Executive summary

In Canada, although there has never had an official poverty line, there are several regularly published low income lines in use, including LICO and LIM of Statistics Canada and MBM of Human Resources and Skill Development Canada, to support public debates and policy developments. These lines were designed to identify low income individuals from different angles. But in practice, researchers tend to rely on a single line. This leads to some critical questions: what happens if we apply different lines to the same population? Would we observe a different low income trend? Who falls into low income under one line but not under the others? What happens to groups of disadvantaged individuals if a different line is employed?

On the other hand, although leading poverty researchers have proposed numerous aggregate indexes by which we may answer questions such as how many individuals are in low income, what their income shortfalls are, and how the income shortfalls are distributed, in practice, poverty debates often focus on a single index, namely the "headcount" and tend to compare aggregate indexes over time or across individuals without noticing whether a change of, say, half a percentage point in low income rate is statistically significant. Can these practices be misleading?

To answer these questions on a broad base of low income lines, we also included a fixed or anchored LIM. It is a modification of the existing LIM – which we shall refer to as the variable or floating LIM line hereafter. To classify individuals as low income the MBM uses the cost of a predetermined basket of goods and services, the LICO uses a fixed spending pattern, while the variable LIM uses the median of the contemporary income distribution, and the fixed LIM uses the median of an income distribution in a pre-determined year. By design, fixed LIM and variable LIM complement each other, with variable LIM being a "relative" low income line and the fixed LIM the "real" version of the variable LIM line.

We first assessed the sensitivities of these low income lines by examining a number of distribution sensitive indexes from the Foster-Greer-Thorbecke family. We also compared how different indexes moved under the same line and how different lines interacted with each other. Particular attention was paid to decomposing the aggregate low income incidence into contributions by several disadvantaged groups of individuals who are often referred to as groups at high-risk of social exclusion.

We found that, in the long-run, low income movements under different lines were similar and they were sensitive to business cycle indicators such as unemployment rate. In particular, the fixed LIM tracked LICO and MBM well, suggesting that it can be used as a credible measure to monitor low income trend in Canada. However, in the short-run, the variable LIM line behaved differently. For example, low income rate under variable LIM was flat in certain periods while low income rate under other lines changed significantly. This does not mean that the variable LIM line is misleading. On the contrary, it provides useful information that is not available under other lines. In particular, the flat low income rate under variable LIM in certain periods in Canada suggested that individuals from the lower tail of the distribution did not equally share the benefits of economic growth.

We also examined various low income indexes using one line at a time. Our results indicate that different indexes moved in the same direction in the long-run, and even in the short-run, they changed in the same direction most of the time. However, sometimes they did move in opposite directions or in the same direction with different magnitudes. Thus, although it may not be harmful to focus on a simple index such as the headcount for public debate, it is necessary to look at various indexes together for policy development, and given that various indexes can be produced with little cost, the best practice would be to use multiple indexes.

Examining the capability of different lines in capturing low income individuals, we found that for individuals being captured by MBM, there was a fair chance that other low income lines failed to identify them as being in low income; while for those who were above MBM, there was little chance they would be counted as low income persons by other lines. However, among individuals who were above the fixed LIM line, there was still a non-trivial chance for them to be captured by other lines. Thus, it appeared that the MBM line would capture more individuals than the fixed LIM line, suggesting that a fixed LIM line needs to be re-based periodically to maintain its relevance.

Our decomposition result suggests that disadvantaged individuals as a whole contributed more under the fixed LIM line than under MBM, and fixed LIM was stronger than other lines in terms of its capability to capture individuals exposed to multiple risks of social exclusion. However, the fixed and variable LIM lines were relatively weak in capturing individuals from families headed by recent immigrants, mostly likely due to the fact that recent immigrants overwhelmingly chose to reside in large cities where costs of living were high, indicating that future development of the LIM line should take regional differences in costs of living into consideration.

Finally, while comparisons of low income statistics under different lines with different indexes are necessary in order to obtain a more complete picture of Canadians' economic well-being, our exercises in this study suggest that a simple comparison of low income indexes over time or across regions without rigorous statistical test may not be the best practice in low income study.

1 Introduction

Several low income lines are regularly published in Canada.[1] They include the Low Income Cut-Offs (LICO) below which families are likely to live under straitened circumstance, the Low Income Measures (LIM) that represent half of the contemporary median adjusted family income, and more recently, the Market Basket Measure (MBM) which reflects the cost of a basket of goods and services that are deemed essential to maintain physical health and to moderately participate in community activities.[2]

The co-existence of several low income lines allows one to study the well-being of Canadians from different angles, but researchers and analysts often choose to focus on one line. This practice in low income benchmarking leads to some critical questions. Do we observe the same trend if a different line is employed, in the short-run as well as in the long-run? Who fall in low income under one line but not the others? Do we get the same information for disadvantaged groups of individuals under different lines?

On the other hand, although leading poverty researchers proposed numerous aggregate indexes by which one may answer questions such as how many individuals are in low income, what their income shortfalls are, and how the income shortfalls are distributed, in practice, poverty debates often focus on a single index, namely the "headcount", and tend to compare aggregate indexes over time or across individuals without noticing whether a change of, say, half a percentage point in low income rate is statistically significant. Can these practices be misleading?

This study attempts to tackle these questions. In particular, the study will assess the impact of choosing different lines with several distribution sensitive, aggregate low income indexes for the country as a whole and across disadvantaged groups of individuals. In addition to the existing LIM line, which we shall refer to as the variable or floating LIM hereafter, we introduce the fixed or anchored LIM line to broaden the comparisons. This will also make our low income measurement practice to be in line with several European countries where both variable and fixed LIM-type measures are employed.

The paper is organized as follows. In Section 2, we introduce the fixed LIM line and summarize the main characteristics of the various lines. Section 3 presents the movements of several aggregate indexes, including the low income incidence, gap, and severity for the period of 1976--2007. We examine how different lines interact with each other in Section 4. This is followed by a decomposition analysis to see how different groups of individuals contribute to low income in Canada. A summary and the conclusions are contained in Section 6.

1. Others include the low income guidelines of Canadian Council on Social Development (CCSD), the basic needs index of Professor Chris Sarlo at the Fraser Institute and poverty line of the Senate Committee. At regional level, there are the budget guidelines of Montreal Diet Dispensary, the budget guides of Social Planning Council of Metropolitan Toronto, the cost of living guidelines of the Social Planning and Research Council of British Columbia, and the acceptable living level of Social Planning Council of Winnipeg.
2. See Appendix 1 for a brief methodological review for the LICO, LIM and MBM lines.

2 A comparison of LICO, LIMs and MBM

Research at Statistics Canada led to the establishment of the LICO in the 1960s and the variable LIM in the early 1990s. The MBM line was developed in the late 1990s by Human Resource and Skill Development Canada in consultation with a Federal-Provincial-Territorial working group of officials on social development research and information. The methodologies of these low income lines are well known and a brief description is contained in the appendix.

The fixed LIM line has not been implemented in Canada. It was recommended by a popular report on social indicators for the EU (Atkinson et al. 2002). The line can be easily constructed, and practices in several European countries suggest that it is a useful measuring rod for low income and poverty (Corak, 2005). The methodology of the fixed LIM is similar to that of the variable LIM. But it has several unique characteristics: (1) in the base year selected, the thresholds of the fixed LIM line are identical to that of the variable LIM line; (2) outside of the base year, the thresholds of the fixed LIM are obtained by updating the base year thresholds with consumer price index; and (3) the base year is re-set periodically, say, every five or ten years.

The fixed LIM line can be a useful complement to the existing lines. If we view the variable LIM as a purely "relative" low income line reflecting a contemporary standard of living, then the fixed LIM represents an "anchored" standard of living. When we examine low income statistics with the fixed LIM line, we actually compare the well-being of individuals relative to the median of an anchored income distribution. This is different from the variable LIM line which is based on a "floating" income distribution. It is also different from MBM and LICO. The former represents the contemporary costs of a fixed basket of goods and services, while the later is based on a given pattern of spending on food, shelter and clothing of an average family.

Table 2 compares the characteristics of the four low income lines, largely from an operational point of view. First, the low income lines differ in terms of the complexity of the methodology which affects the transparency of the measure and its ease of communication. In this respect, MBM, variable and fixed LIMs have advantages over LICO. With MBM, one specifies the basket of goods and services that are deemed essential to maintain physical health and to reasonably participate in community activities. The costs of this basket are then calculated for different communities. With variable and fixed LIMs, one defines a family as being in low income if its adjusted income is below half of the population median income. But with LICO, one has to estimate a spending model and derive the income needed for a given level of spending on food, shelter and clothing.

Second, the low income lines also differ in terms of international comparability. LICO and MBM are designed as Canadian-specific lines and hence are not comparable with those of other countries. But variable LIM and fixed LIM are comparable with those used in other developed countries. Since the LIM lines are strictly based on income distribution and family composition, we can compare low income in Canada with that in any country in which an income survey is conducted, and for which a LIM-type line can be easily derived, if that country does not have one already.

Table 1 Fixed after-tax LIM thresholds based on 1992 income distribution

Number of adults	Number of children					
	0	1	2	3	4	5
1992			dollars			
1 adult	10,239	14,335	17,406	20,478	23,550	26,621
2 adults	14,335	17,406	20,478	23,550	26,621	29,693
3 adults	18,430	21,502	24,574	27,645	30,717	.
4 adults	22,526	25,598	28,669	.	.	.
5 adults	26,621	29,693	.	.	.	.
6 adults	30,717	.	.	.	.	.
2007						
1 adult	13,591	19,028	23,104	27,182	31,260	35,336
2 adults	19,028	23,104	27,182	31,260	35,336	39,414
3 adults	24,464	28,541	32,619	36,695	40,773	.
4 adults	29,901	33,978	38,055	.	.	.
5 adults	35,336	39,414	.	.	.	.
6 adults	40,773	.	.	.	.	.

. not available for any reference period

Third, the low income lines differ in terms of the underlying assumptions and choices. While it is necessary to make assumptions and choices in creating any low income line, there are differences in making implicit and explicit assumptions. More specifically, for MBM, variable LIM and fixed LIM, virtually all assumptions and choices are explicit, but many implicit assumptions and choices are associated with LICO such as, (a) the propensities to consume (food, shelter and clothing) are assumed to be the same between families in the bottom and those in the top of the income distribution; (b) individual's age, health, labour force status and so on, have no effect on a family's spending on food, shelter and clothing; (c) the estimated effects of family income, family size, and community size are all significantly different from 0; and they are the same across different regions.

Table 2 Some characteristics of alternative low income lines

	Low Income Cut-Offs	Variable Low Income Measures	Fixed Low Income Measure	Market Basket Measure
Conceptual transparency	Low	High	High	High
International comparability	No	Yes	Yes	No
Implicit choices	Many	Few	Few	Few
Costs of production	Low	Low	Low	High
Regional variability	Some	No	No	High
Rebasing frequency	Periodic	Annual	Periodic	Periodic

Fourth, the costs to produce and maintain these lines differ significantly. MBM is the most expensive one to produce, while LICO, variable LIM and fixed LIM can be produced and updated with little cost. To derive the MBM thresholds, extensive price data for different communities have to be collected and processed and the costs of data collection as well as the

periodical basket re-design can be quite high. But to produce the LICO thresholds, one uses data from a household spending survey to fit the spending model and calculate the thresholds using the estimates, no separate data collection is necessary.[3] Similarly, the variable LIM thresholds can be easily obtained from any regular income survey. The fixed LIM thresholds are based on the variable LIM thresholds of a chosen year in combination with the CPI.

For example, to construct the fixed LIM thresholds based on the 1992 income distribution for 2007, we need the 1992 variable LIM thresholds, which can be obtained through the *Income Research Paper Series* of Statistics Canada (top panel of Table 1).[4] These are then adjusted by the CPI indexes of 1992 and 2007 to obtain the 1992-based fixed LIM thresholds for the year 2007 (bottom panel of Table 1).

Fifth, the lines differ in the degree to which they reflect regional variations in the cost of living. By design, MBM reflects different regional costs of living through the use of regional or community specific thresholds. While LICO reflects different regional costs of living between rural and urban areas and between urban areas of different sizes, it does not take into consideration the provincial difference in costs of living. In contrast, variable and fixed LIM thresholds only capture the difference in costs of living between families of different sizes. They do not account any differences in the costs of living in different communities.

Finally, the rebasing frequencies are different. By definition, there is a clear updating rule for the variable LIM: it is rebased every year. But for the other low income lines, there are no agreed-upon rules and updating has occurred sporadically in the past. The first set of LICO thresholds was based on 1959 spending. They were rebased subsequently with data from 1969, 1978 and 1986. The current LICO thresholds are based on 1992 data. The MBM thresholds are based on a 1997 basket, and are currently under revision with a new basket.

In this study, we investigated the behaviour of the 1992 fixed LIM together with those of LICO, variable LIM and MBM. We chose 1992 to anchor the LIM thresholds in order to have the same base year with the current LICO thresholds.[5]

3 Low income indexes under alternative lines

A low income line per se does not tell us how many individuals are in low income, how much their income shortfalls are, and how these shortfalls are distributed. To answer these questions, we examine a number of aggregate low income indexes.

3. However, from 2010 on, SHS will become a monthly survey, implying that to produce a new set of LICO thresholds using the same methodology, a special annual spending survey is needed.
4 . Statistics Canada (2004).
5. We also tested the 1982 and 2002 fixed LIM lines and found that the choice of base year does not affect low income trend. Results based on the 1982 and 2002 fixed LIM thresholds are available from the author upon request.

3.1 Headcounts under alternative low income lines

The most often used low income index is the "headcount", also referred to as the low income rate or low income incidence. The index simply tells us what proportion of individuals whose incomes are below a given threshold. Although a comparison of the headcounts under alternative low income lines is problematic due to the fact that different lines are subject to different assumptions and arbitrary choices, tracing their movements over time is meaningful.

The low income rate is a special case of the so-called FGT (Foster, Greer and Thorbeck, 1984) index. It can be written as,

$$P_\alpha(y;z) = \frac{1}{N}\sum_{i=1}^{q} g_i^\alpha \qquad (1)$$

where y is a vector of income, z is the low income thresholds, N is the total number of individuals, q is the number of individuals whose incomes are below the low income threshold, and $g_i = (z - y_i)/z$ is a measure of income shortfall for person i. The low income rate is obtained by setting $\alpha = 0$,

$$P_0(y;z) = \frac{q}{N}.$$

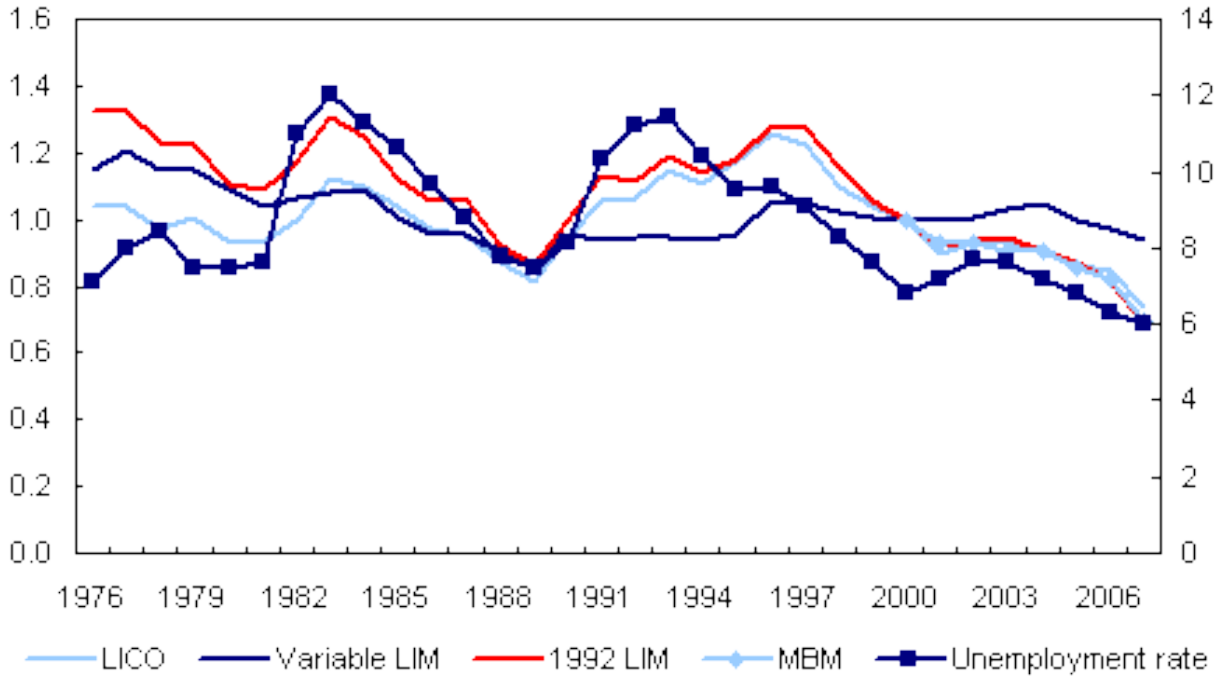
Figure 1 presents low income rates under alternative low income-lines for the 1976-2007 period. The after-tax low income lines and family after-tax income were employed to calculate the low income rates under LICO, variable and fixed LIMs, while family disposable income was used to obtain the low income rate under the MBM line.[6] To help visualize the historical variations, the estimated incidences were standardized to 1 using their corresponding values in the year 2000.[7] The unemployment rates for individuals 15 and older were also plotted in the figure (right axis scale).

Several observations can be made from Figure 1. Overall, low income incidences under different lines appeared to track each other well and they all tracked business cycles. From 1976 to 1981, the incidences declined under LICO, variable and fixed LIMs. They then increased briefly during the recession in the early 1980s, followed by six years of continuing decline until 1989. Thereafter, they followed an upward trend during the next seven years to the 1996 peak and continued to decline up to 2007, the latest year in which income data were available.

Secondly, low income incidences under LICO, fixed LIM and MBM lines fluctuated over time and behaved in essentially the same way, while the incidence under the variable LIM line varied much less, particularly during relatively short periods. This means that LICO, fixed LIM and MBM may produce the same trend, although they measure low income from different angles. However, the variable LIM line seems to be able to generate its independent information, and thus it probably cannot be replaced by the other lines. This is not surprising, as we mentioned before, the variable LIM line is based on a contemporary income standard, while the other three lines are all based on some fixed standard and the year-over-year changes in their thresholds depends on changes in price.

6. See the methodology appendix for the definition of disposable income.
7. The estimated low income rates under different low income lines can be found in Appendix Table A4.

Figure 1 Trend in low income incidence under alternative lines

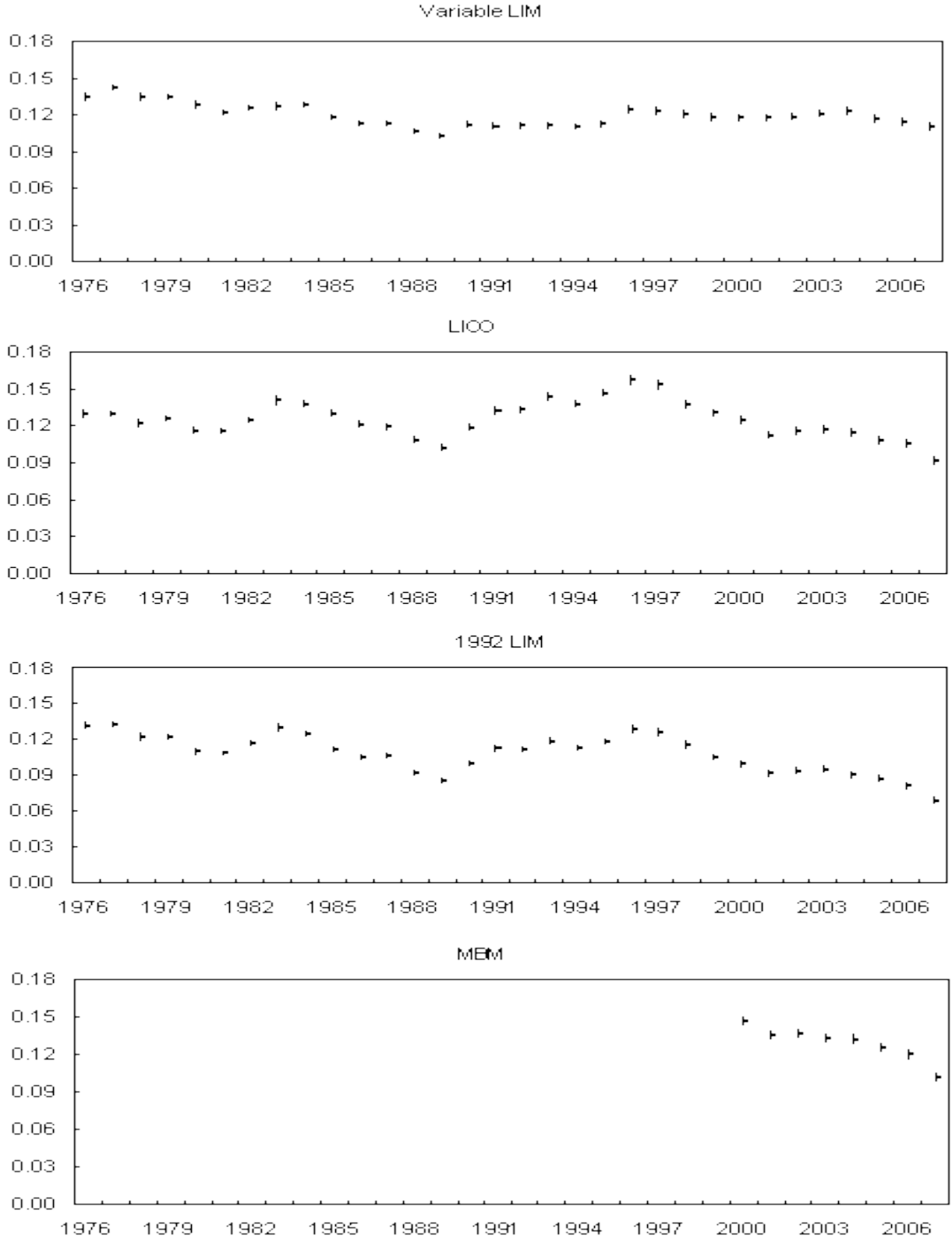


Source: Survey of Consumer Finance (1976 to 1995), Survey of Labour and Income Dynamics (1996 to 2007) and CANSIM table 282 - 0002.

Thirdly, in year-over-year comparisons, the direction of the changes in low income incidence can be different if different lines are employed. There were numerous occasions in which year-over-year comparisons on the change of low income incidence led to different conclusions when different lines were employed. For example, from 1976 to 1977, the variable LIM line indicated that low income incidence increased while the LICO and fixed LIM lines suggested that the incidence did not change. From 1990 to 1991, while LICO and fixed LIM indicated that the incidence increased, the incidence decreased under the variable LIM line. The differences can also be found over multi-year periods. From 1990 to 1993, the LICO and the fixed LIM line suggested that low income incidence increased, but according to the variable LIM line, the incidence did not change much. Similarly, from 2000 to 2004, the incidence increased slightly under variable LIM, while under the fixed LIM, LICO and MBM lines, the incidence decreased.

Finally, even when the changes in the incidence are in the same direction, the magnitudes of the changes can be different under different low income lines. For example, from 1996 to 2000, low income incidence declined under LICO, fixed LIM and variable LIM. But the decline under the LICO and fixed LIM lines seemed to be much larger than that under the variable LIM line. Indeed, Appendix table 1 shows that, from 1996 to 2000, low income incidence under LICO and fixed LIM dropped by about three percentage points (from 15.7% to 12.5% under LICO, and from 12.7% to 9.9% under fixed LIM). But during the same period, the incidence under variable LIM declined by less than one percentage point (from 11.4% to 11.7%).

Figure 2 Confidence interval (95%) estimates: low income rates (1976 to 2007)



Source: Survey of Consumer Finance (1976 to 1995) and Survey of Labour and Income Dynamics (1996 to 2007), author's calculation.

The last two observations drive to the point that, when examining low income under different lines, some inconsistencies do occur. With potential controversy between different low income lines, one thing is probably clear: it is not the best practice to pick one line and disregard the others. More careful investigations are necessary. A first such step would be to test if the changes and the differences are statistically significant. After all, the estimated low income incidences are often based on a survey sample. A change in low income can reflect a fundamental change of the underlying poverty trend or it can be just due to a sampling error. Appendix 1 contains the standard error estimates for various low income indexes.[8] They can be used to infer if a change in a low income index is significant or not.

As an example, Figure 2 presents the 95% confidence interval estimates for low income incidences under various lines. Using these estimates, some of the inconsistencies can be assessed. For example, the observed inconsistency in the declines of the incidence between 1996 and 2000 under different lines are likely due to sampling errors because the confidence interval estimates for the incidence for these two years under LICO and fixed LIM were not overlapping, and those under the variable LIM line overlapped only marginally.

Statistical analyses appeared to confirm our observation regarding the trend in low income incidence. In the long-run, the incidence moved in the same direction no matter which low income line was employed. But in the short-run, they could move in different directions or in the same direction with different magnitudes, depending on which measuring rod was employed. In particular, the low income incidences under the LICO, fixed LIM and the MBM lines mostly moved in close tandem, both in the long-run and in the short-run, while the incidence under variable LIM sometimes changed independently from the other lines in the short-run. Given the inconsistency, a sensible question to ask is, how do other low income statistics such as the gap ratio and severity indexes behave under different lines.[9]

3.2 Other aggregate indexes under different low income lines

The simplicity of the headcount ratio made it virtually the only low income statistic used in public debates for a long time. This has changed, at least in the academic world, since Sen's seminal work (Sen, 1976) that inspired a large literature on the axiomatic approach in measuring economic well-being. The FGT index (Equation 1) is one of the influential measures that satisfy a number of desirable axioms.[10]

When we set $\alpha = 1$ in Equation (1), the FGT index becomes,

$$P_1(y;z) = \frac{1}{N}\sum_{i=1}^{q} g_i = \frac{q}{N} \times \frac{1}{q}\sum_{i=1}^{q} g_i = P_0 \times \bar{g}.$$

8. For the period from 1976 to 1995, the standard errors for the incidence, gap ratio and severity indexes are based on analytical method based on linearized Taylor series approximation. For the period from 1996 to 2007 in which 1000 bootstrap weights are available, the standard errors are based on the bootstrap weights which take sampling design (clustering and stratification) into consideration.
9. In addition, stochastic dominance test, which is out of the scope of the current study, may also be pursued. For a recent example, see Chen (2008).
10. See Hagenaars (1987) for a summary of relevant axioms.

This can be referred to as the *low income gap ratio* or *low income depth* of a population. It shows on average, how far the incomes of low income individuals are away from the low income line. Foster, Greer and Thorbecke (1984) demonstrated that P_1 satisfies the monotonicity axiom, which states that, other things be equal, a reduction in income of a low income person must increase the overall low income gap ratio. Notice that P_1 is defined over the whole population, not the low income population alone.

When α is set to 2 in Equation (1), we obtain,

$$P_2(y;z) = \frac{1}{N}\sum_{i=1}^{q} g_i^2.$$

This statistic can be referred to as the *low income severity index* of a population. In addition to the monotonicity axiom, this index satisfies the transfer axiom which states that, other things being equal, a pure transfer of income from a low income person to anybody who has higher income must increase the severity index. With this index, individuals with large income shortfalls contribute more than individuals with small income shortfalls to low income severity, and hence inequality among low income persons is accounted for.

Several other low income indexes have also been developed. One is the average gap ratio among the low income population, $\bar{g}$, which is known as *Sen's gap* ratio. Another, as demonstrated by Osberg and Xu (2000), is the Sen-Shorrocks-Thon (SST) index,

$$SST = P_0 \times \bar{g} \times [1 + G(g)] = P_1 \times [1 + G(g)] \qquad (2)$$

where *G(g)* is the Gini inequality index of the low income gap ratio $g_i = (z - y_i)/z$ in the population. The SST index is also referred to as a *low income intensity* measure. One advantage of the SST index is that it summarizes low income incidence, gap, and severity in a single statistic. Heisz (2001) and Picot, Morissette and Myles (2003), among others, have employed the SST index to study low income intensity in Canada.

Figures 3-5 illustrate the trends in P_1, P_2, SST and $\bar{g}$ under alternative low income lines. The results again suggest that LICO, fixed LIM, and MBM tracked each other well in the long-run. Like the incidence, P_1, P_2 and SST essentially followed a declining trend from the mid 1970s to 1989, increased from 1989 to 1997and decreased from 1997 to 2007. But in the short-run, different lines lead to different observations. In particular, the aggregate indexes under variable LIM moved differently in short time spans from those under the other lines. For example, between 1996 and 2000, low income depth, intensity and severity under LICO and fixed LIM declined markedly, while those under variable LIM changed little.

Figure 3 Trend in low income gap ratio (P_1) under different lines

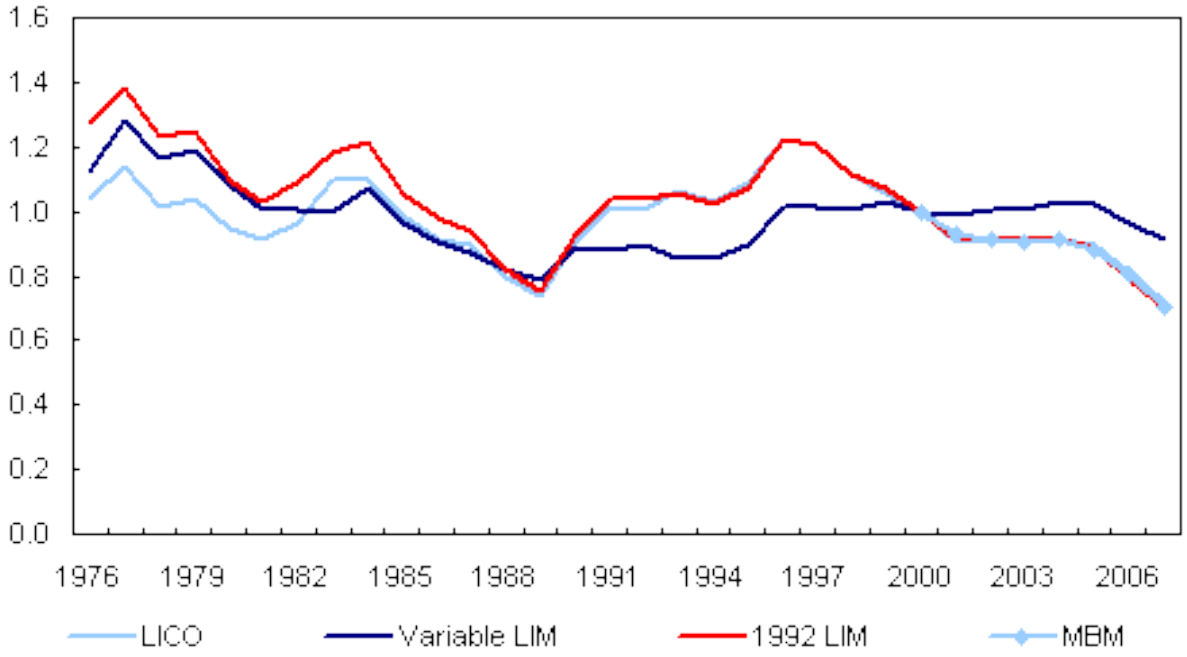


Figure 4 Trend in low income severity (P_2) under different lines

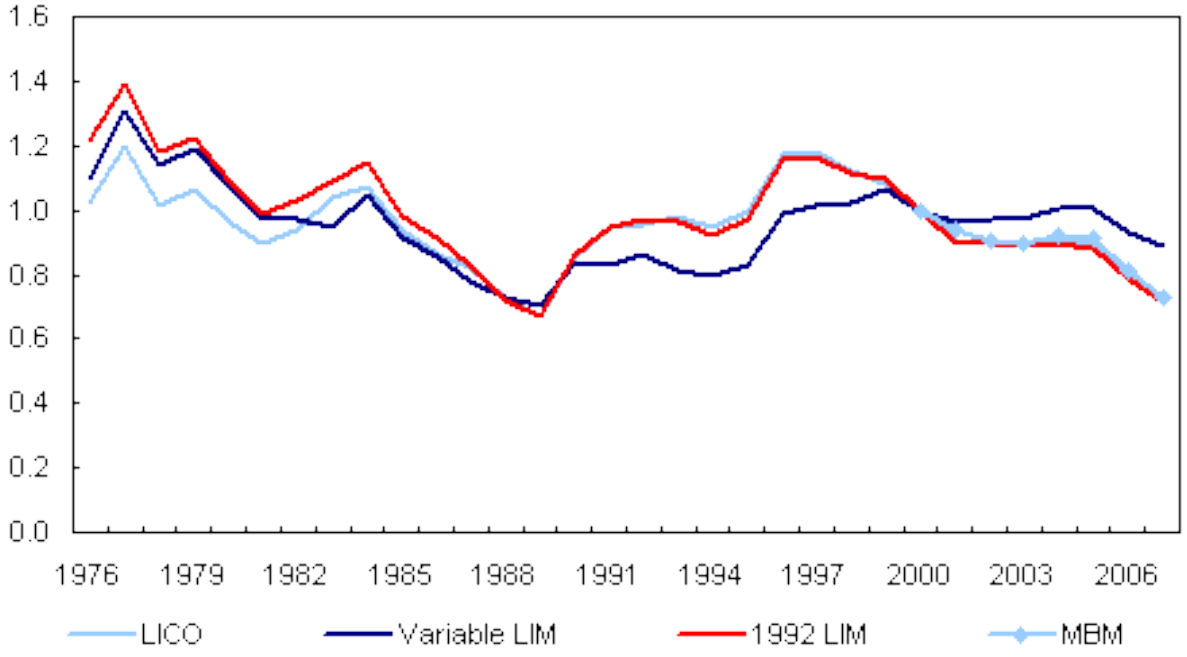
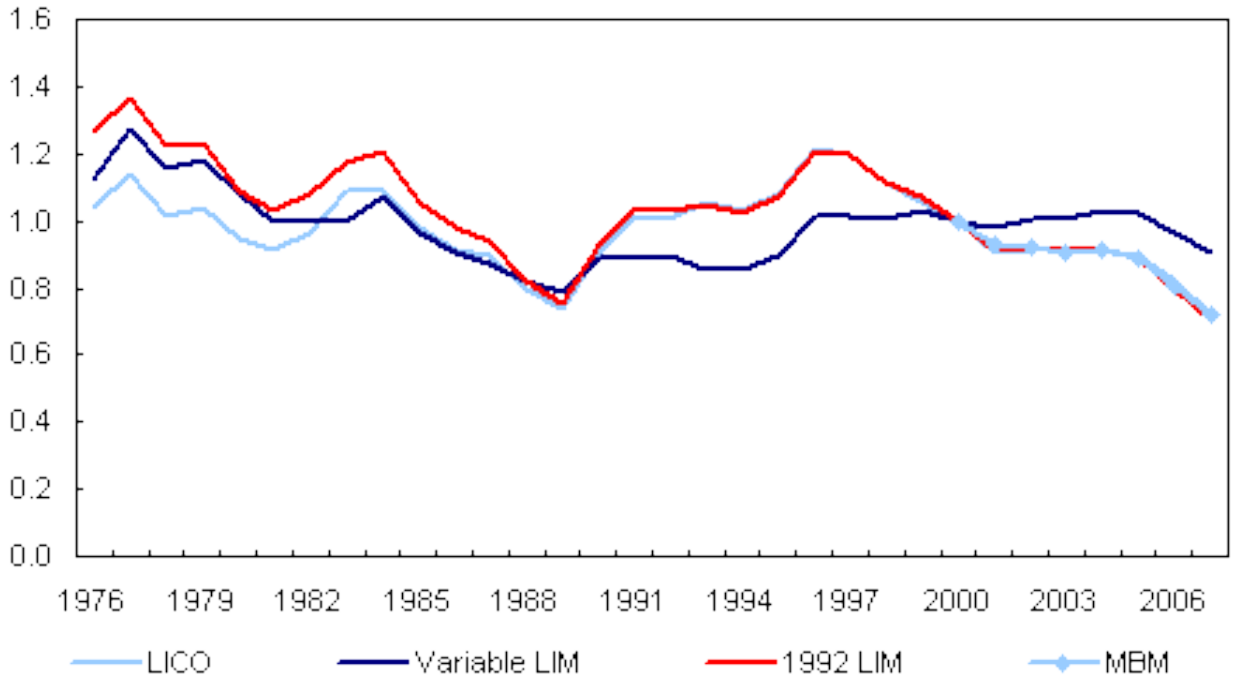


Figure 5 Trend in low income intensity under different lines



Source for Figures 3 to 5: Survey of Consumer Finance (1976 to 1995) and Survey of Labour and Income Dynamics (1996 to 2007), author's calculation.

Again, to make rigorous comparisons, we need to calculate the sampling standard errors for the indexes. As an example, Table 3 contains the testing result with statistics developed by Xu (1998). The table shows that the SST indexes based on all of the four low income lines dropped significantly between 1996 and 2007 and between 2000 and 2007. For example, the z-test statistics were -7.9, -2.4, -7.5 and -8.8 for testing the equality of the SST indexes between 2000 and 2007 under LICO, variable LIM, fixed LIM and MBM, respectively, led to the rejections of the null hypotheses at 1% of significance.

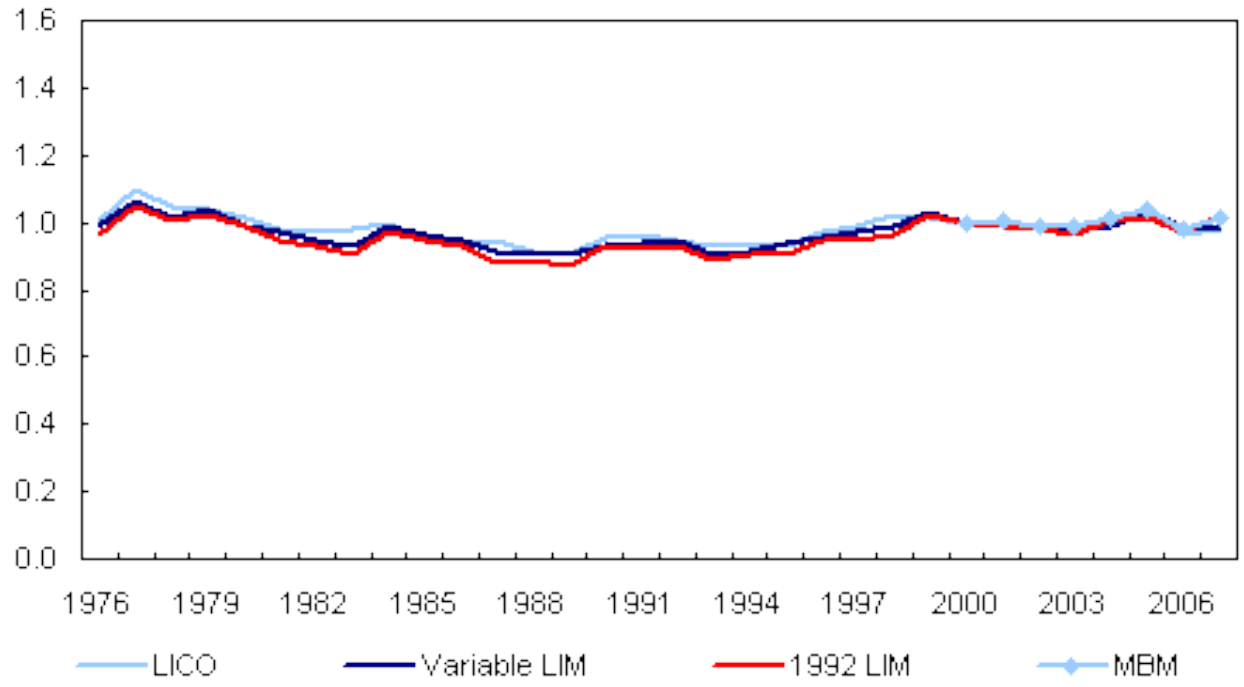
Table 3 Test statistics for changes in low income intensity

Low income lines	1996 to 2007	2000 to 2007
	index	
Low income cut-offs	-0.04	-0.02
	[-20.78]	[-7.93]
Variable low income measures	-0.01	-0.01
	[-2.58]	[-2.44]
1992 low income measures	-0.03	-0.02
	[-11.50]	[-7.48]
Market basket measure		-0.03
		[-8.78]

Source: Survey of Labour and Income Dynamics, 1996 to 2007. Asymptotic z-statistics are in parentheses.

Notice that the finding that different lines might lead to different observations in the short-run was for the general population. If we examine $\bar{g}$, that is, if we focus on the income gap among low income individuals, it can be seen (Figure 6) that, different low income lines pointed in the same direction in both the long- and short-run, and no matter which low income line was employed, we would draw the same conclusion: the income shortfalls among low income individuals were relatively low from the mid 1980s to the late 1990s, and in the past 30 years, they changed little.

Figure 6 Trend in Sen's gap ratio under alternative low income lines



Source: Survey of Consumer Finance (1976 to 1995) and Survey of Labour and Income Dynamics (1996 to 2007).

3.3 Different indexes under the same line

In order to characterize the four low income lines, we examined several aggregate indexes, one at a time, under these lines. The similarities in low income trend under different lines appeared to overshadow the differences between various aggregate indexes. To answer questions such as whether a single index contains all information on low income, this subsection compares different indexes under the same line.

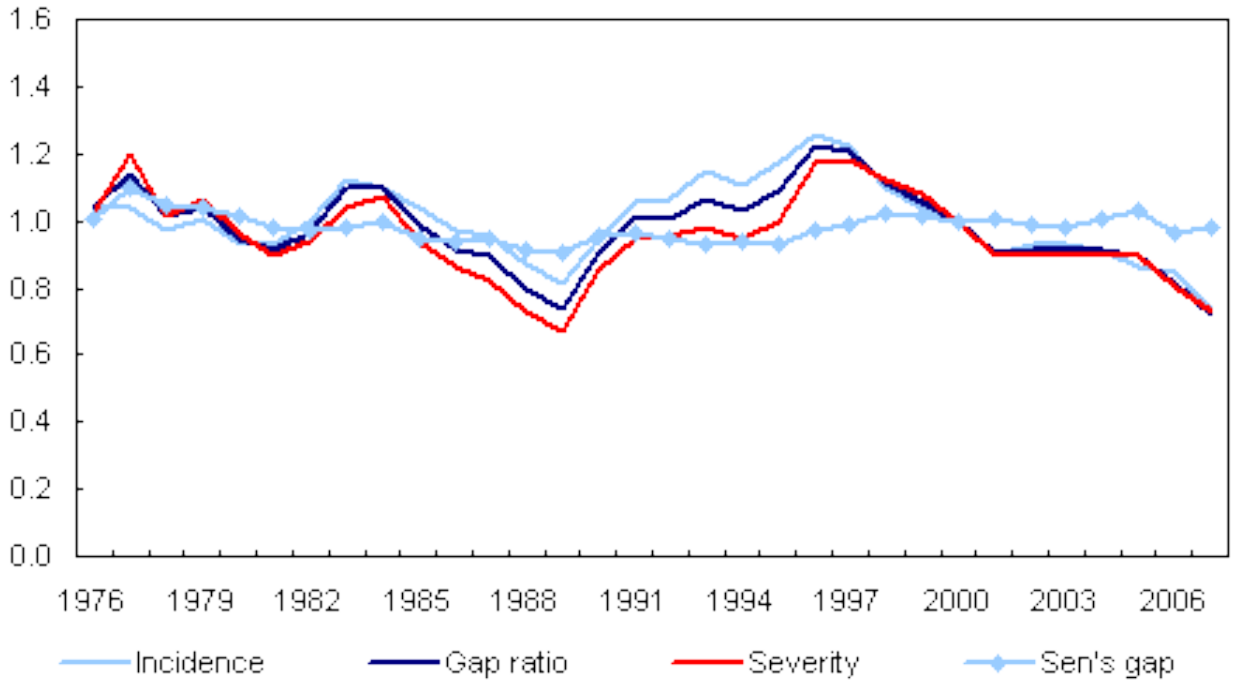
The analyses can be conducted by examining the relevant plots of various indexes across Figures 1 to 6. As an example, we extracted the plots of the LICO-based headcount, gap ratio, severity indexes and Sen's gap and put them together to obtain a new graph (Figure 7).[11] An immediate

11. The SST index behaved much like the gap ratio and the severity index, it is thus ignored in Figure 7.

observation was that higher order indexes generally varied more than lower order index: the severity index varied more than the gap ratio, which in turn varied more than the headcount. This reflects the conceptual differences between the indexes: the severity index is equal to the square of the gap ratio, and hence, any change in the gap ratio would be amplified in the severity index.

Secondly, different indexes generally moved in the same direction in the long-run, although year over year or in multiple-year periods, they might vary in opposite directions or in the same direction with different magnitudes. From Figure 7, we can easily see that, overall, different indexes from the FGT family tracked each other well. And during the last ten 10 years, the trend under these indexes was virtually identical. But in short time spans, different results might be obtained. For instance, from 1976 to 1977, while the incidence did not change, the low income depth and the severity indexes both increased. On the other hand, from 1992 to 1994, the severity index dropped slightly while the incidence and gap ratio increased.

Figure 7 Comparing different indexes under the same line (after-tax LICO)



Source: Survey of Consumer Finance (1976 to 1995) and Survey of Labour and Income Dynamics (1996 to 2007), author's calculation.

But the trend in Sen's gap, the income shortfalls among low income individuals seemed to be different than those implied by the other indexes. Overall, there was not much change in Sen's gap over time: it decreased from the mid 1970s to the end of 1980s, and increased slowly up to 2007. Over periods of several years, Sen's gap also behaved differently than the FGT family of indexes. For example, from1996 to 2007, all of the three FGT indexes dropped significantly. But in the same period, Sen's gap followed a slightly upward trend.

The same exercise was conducted for the variable LIM, fixed LIM and MBM based indexes. The observations were essentially same as those for the LICO based indexes. For instance, under the

fixed LIM line (not shown here but can be seen by combining the relevant indexes from Figures 1-6), the incidence declined by about 5% between 1983 and 1984, but the corresponding low income gap and severity indexes increased by 3% and 6%, respectively, suggesting that even though considerable number of individuals escaped low income between 1983 and 1984, the well-being of those who remained under the fixed LIM line deteriorated.

The result that various low income indexes moved in the same direction in the long-run, and they even moved in the same direction most of the time in the short-run implies that using a single, simple index such as the headcount may not necessarily be harmful in public discourse. But the finding that they might move in opposite directions or in the same direction with different magnitudes means that it is necessary to look at various indexes at the same time for policy development, and given that various indexes can be produced with little cost, the best practice would be to use multiple indexes, in addition to multiple lines.

4 Who fall between the lines?

Since aggregated indexes under different lines may behave differently in the short-run, it is interesting to see how these lines compare to each other in terms of their capabilities to identify low income individuals. For example, to what extent is an individual identified as low income by one line also identified by other lines and to what extent an individual who is above one line is also above the other lines?[12] We shall focus on the 2000 – 2007 period in this and the next sections as these are the years for which the MBM line is also available.

The result is contained in Table 4. The left side of the table shows that if, according to one line, an individual is above low income, what is the probability he or she would also be above low income under other lines. The right side of the table indicates, on the other hand, if an individual is identified as in low income by one line, what is the probably he or she is also identified as in low income by other lines. The top portion of Table 4 (left and right sides) shows the interaction of LICO with variable LIM, fixed LIM and MBM. It indicates that if an individual was above LICO, he or she was much likely to be above the other lines in the 2000 – 2007 period. If an individual was not captured by LICO, the probabilities this individual would be captured by the two LIM lines varied between 1 and 2%, while the probability he or she would be captured by MBM was from 2 to 4%. On the other hand, if an individual was captured by LICO, he or she still had a relatively high probability of being above the other lines. For example, an individual being identified by LICO as in low income in 2007 had a 29% chance to be above fixed LIM.

The situation for variable LIM is similar. An individual who was identified as being above the variable LIM line was very likely to be above the LICO and MBM lines, and was essentially certain to be above fixed LIM. But if an individual was captured by the variable LIM line, he or she still had a strong probability of not being captured by other lines. For example, for those who had been captured by variable LIM, there was a 12%-27% chance they would be not captured by LICO between 2000 and 2007.

12. The equivalent questions are: to what extend an individual who is captured by one line is not captured by the other lines and, to what extent an individual who is above one line would fall under the others. But due to sample size restriction, these two questions cannot be examined over several disadvantaged groups of individuals.

The third portion of the table shows that, when an individual was identified as above low income under fixed LIM, his or her chance to fall in low income under the other three lines varied from 4 to 5% under MBM, 2 to 4% under variable LIM, and 3 to 4% under LICO. On the other hand, if an individual was identified as being in low income by fixed LIM, the individual was essentially certain to be captured by variable LIM and MBM, although there was still a chance (6 to 8%) for him or her to fall under the LICO line.

Finally, with MBM, when an individual was identified as being above low income, it was almost certain that he or she would also be above the other lines, while if the individual was captured under MBM, there was a strong possibility for the other lines to fail to capture this individual. For example, an individual who was identified by MBM as in low income in 2000 had a 68% chance to be in low income under fixed LIM, and hence, his or her chance to be above the fixed LIM line would be 32%.

Overall, Table 4 suggests the use of multiple low income lines can be helpful in identifying individuals who would have been miss-captured by a single line. The 1992 LIM line is an exception: in the absence of this line, all of the would-be low income individuals could have been captured by variable LIM or MBM. This is because the 1992 LIM had been fixed for eight years by 2000. When it was re-based to 2002, the re-based LIM was able to capture at least 5% of individuals who could have been missed by the MBM line (see the percentages in the parentheses in Table 4). Likewise, at least 12% of individuals would be miss-captured by LICO in the absence of the 2002 fixed LIM. This seems to suggest that, a fixed LIM line needs to be re-based periodically. Otherwise, its usefulness can be compromised.

Table 4 Percentages captured and not captured by low income cut-offs - 2000 to 2007

Year	Above low income cut-offs and above			Under low income cut-offs and under		
	Variable low income measures	1992 low income measures	Market basket measure	Variable low income measures	1992 low income measures	Market basket measure
			%			
2000	98	99	96	82	74	89
2001	98	99	96	88	75	90
2002	98	99	97	87	75	91
2003	98	99	97	89	76	89
2004	98	99	97	90	74	90
2005	98	99	97	90	74	89
2006	98	99	98	91	71	89
2007	97	99	98	92	69	87

Year	Above variable low income measures and above			Under variable low income measures and under		
	Low income cut-offs	1992 low income measures	Market basket measure	Low income cut-offs	1992 low income measures	Market basket measure
			%			
2000	98	100	96	88	85	97
2001	98	100	97	84	78	96
2002	98	100	97	85	79	95
2003	99	100	98	86	78	92
2004	99	100	98	83	73	93
2005	99	100	98	83	74	92
2006	99	100	98	84	71	91
2007	99	100	99	77	62	84

Year	Above 1992 low income measures and above			Under low income measures and under					
	Low income cut-offs	Variable low income measures	Market basket measure	Low income cut-offs		Variable low income measures		Market basket measure	
				1992	2002	1992	2002	1992	2002
			%						
2000	96	98	95	93	84	100	98	100	94
2001	97	97	95	92	84	100	98	100	95
2002	97	97	95	93	85	100	100	100	95
2003	97	97	96	94	85	100	100	100	92
2004	97	96	95	93	84	100	100	100	94
2005	97	97	96	93	86	100	100	100	94
2006	97	96	96	94	88	100	100	100	95
2007	97	96	96	93	85	100	100	100	93

Table 4 Percentages captured and not captured by low income cut-offs - 2000 to 2007 (continued)

Year	Above market basket measure and above			Under market basket measure and under		
	Low income cut-offs	Variable low income measures	1992 low income measures	Low income cut-offs	Variable low income measures	1992 low income measures
	%					
2000	98	100	100	76	78	68
2001	99	99	100	75	83	67
2002	99	99	100	78	82	68
2003	98	99	100	78	84	71
2004	99	99	100	78	86	68
2005	99	99	100	77	86	69
2006	99	99	100	79	87	67
2007	99	98	100	78	90	67

Source: Survey of Labour and Income Dynamics (2000 to 2007), author's calculation.

5 Who contributes more to overall low income? A decomposition analysis

Different low income lines can also be assessed across groups of individuals, for example, by quantifying the contribution of each group of individuals to the aggregate index. In this regard, a decomposition analysis is useful. The decomposition analysis estimates the contribution to low income by each group of individuals. A low income line cannot be considered plausible if the analysis shows that individuals whose resources are severely constrained contribute little to the overall low income statistics. With this premise, we examined several groups of individuals who have been independently identified as being at high-risk of social exclusion. In the Canadian context, they include unattached individuals aged 45 to 59, lone parents and their children, individuals from families in which the major income earners are off-reserve aboriginals, new immigrants or those with work limitations.[13, 14]

For simplicity, we chose to decompose the low income incidence only.[15] To do that, we first classified individuals into mutually exclusive groups. If we classify N individuals of a population into k mutually exclusive groups, each group with n_j individuals, then the low income incidence index, P_0, can be decomposed additively as the following,

$$P_0 = \sum_{j=1}^{k} \frac{n_j}{N} P_{0j} \qquad (3)$$

13. See, for example, Buirstein (2005).
14. New immigrants are defined as those who have lived in Canada between two and ten years. Those who lived in Canada for a year or less might not have complete income information and were thus excluded.
15. The other FGT Indexes can be similarly decomposed. See Foster et al. (1984).

where P_{0j} is the low income incidence of the j^{th} group of individuals. In this study, we classified the Canadian population into seven mutually exclusive groups: those who belong to one and only one of the five high-risk groups mentioned above, a multi-risk group that consists of individuals who are members of at least two of the five groups, and the rest of the population. Thus, for example, a lone mother who is not a recent immigrant, not an off-reserve aboriginal, does not have work limitation would belong to the lone parent group, while a lone mother who is also a recent immigrant would be classified as belong to the multi-risk group.[16] The decomposition result under various low income lines is contained in Table 5.

The table shows that, no matter which low income line is employed, individuals from groups at-risk of social exclusion contributed to low income a share disproportionately large than their share in the population. Between 2000 and 2007, the at-risk groups of individuals accounted for 30% to 35% of the whole population, but they contributed much more to the overall low income incidence. Under LICO, they contributed 54% to 60%, under variable LIM, 53% to 58%, under fixed LIM, 53% to 60%, and under MBM, they accounted for 50% to 55%.

Overall, the result shows that, no low income line had substantial or systematic advantage over the others in counting the contributions by individuals from the high-risk groups. Nevertheless, there were some noticeable differences between the lines. For individuals from families headed by persons with work limitations, the LICO and the two LIM lines were somewhat stronger than the MBM line. Under LICO and the two LIMs, this group of individuals contributed 16% to 20% to low income incidence, while under MBM, they contributed between 15% and 18%. But MBM and the two LIM lines were slightly stronger than LICO in capturing individuals from lone parent families. Under LICO, they contributed 8% to 11%, while under the other three lines, they contributed between 9% and 13% to the incidence.

16. Not all groups have interactions with others: an aboriginal cannot be a recent immigrant, although she can be a lone parent, and an unattached individual can be a recent immigrant, but cannot be a lone parent.

Table 5 Decomposition of low income incidence under alternative lines

Year/Group	Population	Contribution to low income incidence			
		Low income cut-offs	Low income measures	1992 low income measures	Market basket measures
			%		
2000					
Work limitations	14.2	15.9	16.0	15.0	15.1
Lone parent	4.8	10.5	11.0	12.0	11.0
Unattached 45 to 59	1.7	4.0	3.7	3.9	3.1
Recent immigrants	3.7	8.8	7.7	6.5	7.4
Off reserve aboriginal	1.6	1.7	1.8	2.0	2.0
Multi-risks	3.5	12.7	13.2	13.7	12.0
None of the above	70.5	46.5	46.7	47.0	49.3
2001					
Work limitations	15.4	16.9	16.9	16.0	15.8
Lone parent	4.7	11.1	12.0	12.5	11.7
Unattached 45 to 59	1.7	3.9	3.4	3.7	3.1
Recent immigrants	3.2	7.3	6.4	7.2	7.1
Off reserve aboriginal	1.7	1.5	2.0	2.2	2.2
Multi-risks	3.4	14.0	13.6	14.3	12.4
None of the above	70.0	45.3	45.6	44.0	47.8
2002					
Work limitations	17.1	17.1	17.1	15.0	16.4
Lone parent	4.3	10.4	11.3	11.5	11.0
Unattached 45 to 59	1.7	3.3	3.0	3.3	2.7
Recent immigrants	3.8	7.8	7.7	8.5	7.7
Off reserve aboriginal	1.7	1.4	1.7	1.8	1.8
Multi-risks	4.4	16.8	17.3	19.1	15.7
None of the above	67.0	43.2	41.9	40.9	44.8
2003					
Work limitations	17.0	17.4	17.0	15.6	16.0
Lone parent	4.4	11.0	12.0	12.8	11.7
Unattached 45 to 59	1.8	3.5	3.3	3.8	3.0
Recent immigrants	4.1	6.8	5.9	6.5	8.1
Off reserve aboriginal	1.9	2.2	2.5	2.7	2.4
Multi-risks	4.0	15.0	15.0	16.2	13.3
None of the above	66.8	44.0	44.4	42.5	45.4

Table 5 Decomposition of low income incidence under alternative lines (continued)

Year/Group	Population	Contribution to low income incidence			
		Low income cut-offs	Low income measures	1992 low income measures	Market basket measures
2004			%		
Work limitations	16.7	17.0	16.8	16.1	15.5
Lone parent	4.5	11.4	11.9	12.7	11.9
Unattached 45 to 59	1.8	3.5	3.1	3.9	3.0
Recent immigrants	3.8	6.3	5.4	4.5	7.3
Off reserve aboriginal	1.8	2.1	2.5	2.8	2.3
Multi-risks	4.1	14.4	14.6	16.3	13.8
None of the above	67.3	45.3	45.8	43.6	46.1
2005					
Work limitations	17.5	18.7	18.7	17.1	17.4
Lone parent	4.3	8.1	9.1	9.7	9.4
Unattached 45 to 59	1.7	3.4	3.2	3.5	3.0
Recent immigrants	4.0	6.2	5.2	4.3	6.8
Off reserve aboriginal	2.1	2.3	2.4	2.2	2.3
Multi-risks	4.9	16.5	16.9	19.0	15.8
None of the above	65.6	44.8	44.6	44.1	45.4
2006					
Work limitations	17.6	17.9	18.3	17.3	17.4
Lone parent	4.3	8.0	9.1	9.2	9.3
Unattached 45 to 59	1.8	3.8	3.5	4.0	3.2
Recent immigrants	4.0	7.5	6.6	4.9	7.6
Off reserve aboriginal	2.1	2.7	3.0	2.9	2.8
Multi-risks	4.7	15.7	16.0	18.5	15.0
None of the above	65.5	44.4	43.6	43.2	44.7
2007					
Work limitations	17.4	20.3	20.0	20.3	18.4
Lone parent	4.3	8.2	8.5	9.7	9.2
Unattached 45 to 59	1.9	5.0	4.3	5.4	4.2
Recent immigrants	4.0	8.1	5.7	4.7	7.6
Off reserve aboriginal	2.1	1.9	2.4	2.3	1.8
Multi-risks	4.7	16.7	17.0	18.3	16.1
None of the above	65.6	39.8	42.1	39.3	42.7

Source: SLID 2000 to 2007

Furthermore, individuals who were subject to multiple risks tended to contribute more under fixed LIM than under the other lines. Under fixed LIM, these individuals contributed between 14% and 19% to low income incidence, while under the other three lines, they contributed between 12% and 17%. But the two LIM lines appeared to be weaker than LICO and MBM in capturing individuals from families whose major income earners were recent immigrants. With

the LIM lines, these individuals contributed as low as 4% to the incidence, while under LICO and MBM, the minimum contribution of these individuals was 6%.

The observation that individuals from families headed by new immigrants contributed more under LICO and MBM than under the two LIM lines is likely due to two facts. (1) The two LIM lines do not take the variations of costs of living between different localities into consideration, while MBM, and to a less extent, LICO do, and (2) new immigrants in Canada overwhelmingly chose to settle in large cities.[17] The MBM and LICO thresholds were high in large cities while the LIM thresholds were independent of city size, and given that the income of new immigrants were usually low, it was not surprising that more new immigrants lived in large cities were captured by LICO and MBM than by the two LIM lines.[18]

6 Summary and Conclusions

A number of low income lines are regularly published in Canada. Together with several aggregate indexes such as the incidence and the gap ratio, they can be used to highlight changes in the low income in Canada from different perspectives. However, public discourse, policy debates and even poverty researches often focus on a single line and a single index. It is unclear if these practices are misleading. A simple question to ask is, do we arrive at the same conclusion by using multiple lines and indexes instead of a single line and index?

In this study, we examined low income trends in Canada for the period of 1976 – 2007 under different lines using a number of distribution sensitive indexes from the Foster-Greer-Thorbecke family. We also investigated how these lines interact with each other by looking at individuals who are captured by one line but not by others. Attention was also paid to assess how well different lines capture the contribution of individuals subject to high-risk of social exclusion to low income incidence.

The results indicate that, no matter which line was employed, low income indexes moved in the same direction in the long-run and they were sensitive to the movements of economic indicators such as the unemployment rate. We found aggregate low income indexes based on a fixed LIM tracked those of LICO and MBM very well. In the short-run, however, aggregate indexes based on variable LIM behaved differently than indexes based on the other three lines, suggesting that variable LIM was able to provide additional information on the well-being of individuals from the lower tail of the income distribution.

Similarly, it was found that, under the same line, different aggregate indexes moved in the same direction in the long-run, while in the short-run, they sometimes moved in opposite directions or in the same direction with different magnitudes. For purposes of policy monitoring and development, it may be necessary to look at various indexes simultaneously. Between the lines, we found that, for individuals being captured by MBM, there was a fair chance that other low

17. For example, more than 60% of immigrants who arrived in Canada between 1996 and 2001 settled in Toronto and Vancouver. See Citizenship and Immigration Canada (2005) or Bernard (2008).
18. This can be easily seen from Appendix tables A1 – A3 which show that the low income thresholds for large cities are higher than those for small cities or rural area. Indeed, the MBM thresholds for Toronto and Vancouver were the highest in the country.

income lines failed to identify them as being in low income; while for those who were above MBM, there was little chance they would be counted as low income persons by other lines. But there was some non-trivial chance for individuals who were above the fixed LIM line to be captured by other lines. It appeared that the current MBM line would capture more individuals than the 1992 fixed LIM, suggesting that a fixed LIM line needs to be re-based periodically to maintain its relevance.

Our decomposition result suggests that disadvantaged individuals as a whole contributed more under the fixed LIM than under MBM, and the fixed LIM line was also stronger than other lines in terms of its capability to capture individuals exposed to multiple risks of social exclusion. But, the fixed as well as the variable LIM lines were relatively less able to capture individuals from families headed by recent immigrants, most likely because new immigrants tended to settle in large cities where costs of living were high. This indicates that regional differences in costs of living should be taken into consideration in future development of the LIM lines.

Finally, since all aggregate low income indexes are based on survey samples, one of the best practices is to estimate sampling standard errors for low income statistics to determine when the movements in these indicators are statistically significant.

Methodology appendix

A. The Methodology of LICO

LICOs are estimated thresholds below which a family is likely to spend significantly more of its income on food, shelter and clothing than the average family. The rationale behind LICO is the Engel's law which states that a family's relative expenditure on food tends to fall as its income rises. If a family spends a substantial proportion of its income on necessities such as food, shelter and clothing, then it would have little "discretionary income" left to spend on other items and thus would probably live under straitened circumstance.

The first set of LICOs was released in 1967 by Statistics Canada. It was estimated using data from the 1959 FAMEX. There were 5 cut-offs in that release, corresponding to families of sizes 1, 2, 3, 4 and 5 or more. A new set of LICOs was produced using data from the 1969 FAMEX several years later with the same methodology. The only difference was that the number of cut-offs was extended to 35 this time, allowing family size to increase to 7 and over, with each family size being crossed by 5 community sizes: rural area, urban areas with less than 30,000, 30,000 to 99,999, 100,000 to 499,999, and 500,000 or more residents. Following the 1969 practice, the LICO thresholds were re-based in 1978, 1986 and 1992, respectively.[19]

Currently, the LICO thresholds are based on data from the 1992 FAMEX. The estimation starts from the following spending model,

$$\log_{10}\mathrm{FSC}_i = \alpha + \beta \log_{10}\mathrm{INC}_i + \theta\ \mathrm{REGION} + \delta\ \mathrm{AREA} + \lambda\ \mathrm{FMSZ} + \varepsilon_i \qquad (1a)$$

19. The 1967 and 1969 LICOs were based on income before-tax only. From 1978, both before- and after-income tax thresholds were released.

where FSC_i is total spending on food, shelter, and clothing by family *i*, *INC* is the income of the family (either before- or after-tax), ***REGION*** is a vector contains 5 region dummies (Atlantic provinces, Quebec, Ontario, Prairies provinces and BC), ***AREA*** contains the dummy variables for community size, and ***FMSZ*** contains dummies for different economic family size.[20]

Using ordinary least squares estimates for α, β, θ, δ, and λ, the low income cut-off for a family is defined as the income level at which the family spends 20 percentage points higher than the ratio of average spending on food, shelter and clothing and average family income. In particular, the LICO for a family of size *k* lives in area *j* is obtained by the following equation,

$$LICO_{jk} = 10^{\frac{\hat{\alpha}+\hat{\boldsymbol{\theta}}\overline{\mathrm{REGION}}-\log_{10}(\bar{p}+0.2)+\hat{\delta}_j+\hat{\lambda}_k}{1-\hat{\beta}}} \qquad (1b)$$

where $\bar{p} = \overline{FSC} / \overline{INC}$ and where $\overline{FSC}$ is the average spending on food, shelter and clothing, and $\overline{INC}$ is average family income. When after-tax income is used, one obtains the after-tax cut-offs and when before-tax income is used, one obtains the before-tax cut-offs. The estimates for the 1992 after-tax LICOs are contained in the upper portion of Table A1.[21]

20. Economic family consists of persons living in the same dwelling and related by blood, marriage, common-law relationship or adoption.
21. Due to small number of observations, the cut-offs for families of size 7 and over are interpolated with the cut-offs for families of sizes 5 and 6. For example, for rural families of size 7 and over, the 1992 cut-off is obtained as 2 x $21,127 - $19,050 = $23,204.

Table A1 After-tax low income cut-offs - 1992 and 2007

Family size	Rural area	Urban areas by number of residents			
		Less than 30,000	30,000 to 99,999	100,000 to 499,999	500,000 and over
	dollars				
1992					
1 person	8,848	10,126	11,296	11,439	13,526
2 persons	10,769	12,325	13,749	13,922	16,462
3 persons	13,410	15,346	17,120	17,336	20,499
4 persons	16,730	19,146	21,359	21,628	25,574
5 persons	19,050	21,802	24,322	24,628	29,121
6 persons	21,127	24,179	26,974	27,313	32,296
7 persons and over	23,204	26,556	29,626	29,998	35,471
2007					
1 person	11,745	13,441	14,994	15,184	17,954
2 persons	14,295	16,360	18,250	18,480	21,851
3 persons	17,800	20,370	22,725	23,011	27,210
4 persons	22,207	25,414	28,352	28,709	33,946
5 persons	25,287	28,940	32,285	32,691	38,655
6 persons	28,044	32,095	35,805	36,255	42,869
7 persons and over	30,801	35,250	39,325	39,819	47,084

Source. 1992 FAMEX and Consumer Price Index (2005 basket), author's calculations.

The LICO thresholds after 1992 are obtained by adjusting the 1992 estimates with the Consumer Price Index (CPI). For example, for a family of size 3 living in rural area, the 1992 cut-off was $13,410. Multiply it by the 2007 CPI (111.5) and divide it by the 1992 CPI (84.0), we obtain $13,410 x 111.5/84.0 = $17,800 as the cut-off for the same family in 2007. The lower portion of Table 1 provides the cut-offs for the year 2007.

In the late 1990s, there were discussions and attempts within Statistics Canada to re-base the LICOs to the 1997 spending patterns. There were also attempts to construct annual LICOs as well as LICOs for the largest cities. Eventually it was decided to keep the 1992 LICOs and update them annually by CPI only.[22]

B. Variable LIM

Following a critical review and extensive user consultations, Statistics Canada introduced the Low Income Measure (LIM) as an alternative line in the early 1990s.[23] LIM measures low income from a distributional perspective. It is simply defined as half of the median adjusted economic family income, where "adjusted" indicates that different needs of families of different sizes and compositions are taken into consideration. For example, the shelter costs for two

22. See Cotton, Webber and Saint-Pierre (1999), Cotton and Webber (2000), and Cotton (2001) for details.
23. Wolfson and Evans (1989).

persons living together may be higher than that for one person living alone, but not necessarily twice as high due to economies of scale in consumption.

The first step in calculating the LIM thresholds is to use an "equivalence scale" to adjust family income to account for the scale economies. The equivalence scale is a set of numerical factors assigned to different members of a family such that the first person is counted as 1.0, the second person, regardless of age, is counted as 0.4. After the first two persons, if any, each additional adult is counted as 0.4 and each additional child (under 16) is counted as 0.3. For example, a family of two adults and two children would end up with an adjusted family size of 2 (= 1 + 0.4 + 0.3 + 0.3). When we sum up the factors for each member of a family, we obtain the "adjusted size" for the family.[24]

Secondly, we divide total family income by the adjusted family size to arrive at the "adjusted family income". The median of the adjusted family incomes is then calculated. The Low Income Measure for families with a single person is defined as half of that median -- we may refer this as the "LIM threshold of a single person" -- while the LIM thresholds for other types of families are obtained by multiplying the "LIM threshold of a single person" by the adjusted family size.

Table A2 Variable after-tax low income measures - 2006

Number of adults	Number of children					
	0	1	2	3	4	5
	dollars					
1 adult	15,179	21,251	25,804	30,358	34,912	39,465
2 adults	21,251	25,804	30,358	34,912	39,465	44,019
3 adults	27,322	31,876	36,430	40,983	45,537	50,091
4 adults	33,394	37,948	42,501	47,055	51,609	56,162
5 adults	39,465	44,019	48,573	53,127	57,680	62,234

Source: Survey of Labour and Income Dynamics 2006, author's calculation.

For example, using the 2006 Survey of Labour and Income Dynamics (SLID), the estimated median of adjusted family after-tax income was $30,358. Thus the after-tax LIM threshold for a single person was 0.5 x $30,358 = $15,179 in 2006. For a family of size 2, since the adjusted family size is 1.4, the threshold was $21,251 (=$15,179 x 1.4). The 2006 after-tax LIM thresholds are contained in Table A2.
Notice that Statistics Canada produces new LIM thresholds every year using data from its income survey (Survey of Consumer Finance before 1996 and Survey of Labour and Income Dynamics thereafter) and in this sense, LIM are re-based or updated every year. We refer to the published LIM thresholds as variable LIM thresholds hereafter.

C. The methodology of MBM

In order to assess the effectiveness of the Child Tax Benefit program, Human Resources and Social Development Canada (HRSDC), in consultation with a Federal-Provincial-Territorial

24. This equivalence scale is similar to the square root of family size scale used in several OECD countries.

Working Group of officials on Social Development Research and Information, started to develop the Market Basket Measure (MBM) in 1997, with the first set of MBM thresholds (for the year 2000) being released in May 2003.

The MBM measures the cost of a basket of goods and services that are deemed essential to maintain physical health and to moderately participate in community activities. A distinctive feature of MBM is that, while the basket of goods and services is identical, the thresholds are community and community size specific, reflecting differences in costs of living across communities. The community size categories are based on those currently used by LICOs (urban 500,000 and over, urban 100,000-499,999, urban 30,000-99,999, urban under 30,000 and rural). Since there is practically a one-one correspondence between a very large community and a specific city in each province, MBM replaces these large communities by the corresponding cities. As a result, a total of 48 thresholds are created, allowing each province to have its own rural threshold and a few thresholds for its cities of different sizes.

The first step in establishing the MBM thresholds is to specify the basket of goods and services. The basket contains five components: the food component, based on Health Canada's *National Nutritious Food Basket 1998*; the clothing and footwear component, based on the Acceptable Level of Living (ALL) measure developed by Winnipeg Harvest and the Winnipeg Social Planning Council; shelter component, transportation component and expenditures on other goods and services. The last component includes personal care, household needs, furniture, basic telephone service, postage stamps, religious and charitable donations, school supplies and modest levels of reading material, recreation and entertainment.

The next step is to estimate the costs of the components in the basket for a reference family of two adults and two children in each community. For this family, the cost of the food component was determined using data on food prices across 40 urban centers.[25] The cost of the clothing and footwear component was derived with Statistics Canada's relative spatial price index together with the cost for the reference family living in Winnipeg. The later was determined by Winnipeg Harvest and the Winnipeg Social Planning Council.

The shelter cost was the average of median rents for the two- and three-bedroom rental units for each community and community size, based on data from the Census, Labour Force Survey and Survey of Household Spending, while the cost of the transportation component follows the recommendations of the National Council of Welfare.[26] The cost of other goods and services was calculated as a proportion of average spending on food, clothing and footwear by the second deciles of the reference family. The proportion (or multiplier) was estimated with data from Survey of household spending.

25. For rural areas in each province, it is assumed the cost is the same as in the smallest urban centre in the province.
26. National Council of Welfare (1998, 1999), *A New Poverty Line: Yes, No or Maybe?*

Table A3 Market basket measures thresholds for reference family – 2007

Community	Market basket measures thresholds	Community	Market basket measures thresholds
Newfoundland and Labrador		**Prince Edward Island**	
rural	29,308	rural	28,603
city with population less than 30,000	29,820	city with population less than 30,000	29,465
St. John's	28,544	Charlottetown	30,527
Nova Scotia		**New Brunswick**	
rural	29,967	rural	28,893
city with population less than 30,000	30,245	city with population less than 30,000	29,364
city with population 30,000 to 100,000	28,012	Fredericton	29,681
Halifax	29,761	Saint John	27,202
Cape Breton	27,037	Moncton	27,946
Québec		**Ontario**	
rural	25,861	rural	28,440
city with population less than 30,000	25,964	city with population less than 30,000	28,428
city with population 30,000 to 100,000	24,283	city with population 30,000 to 100,000	26,478
city with population 100,000 to 500,000	24,492	city with population 100,000 to 500,000	27,856
Québec City	25,810	Ottawa	30,032
Montréal	26,560	Hamilton/Burlington	27,538
		Toronto	31,729
Manitoba		**Saskatchewan**	
rural	27,192	rural	27,018
city with population less than 30,000	28,400	city with population less than 30,000	28,047
Brandon	26,156	city with population 30,000 to 100,000	25,596
Winnipeg	27,256	Saskatoon	27,292
		Regina	26,835
Alberta		**British Columbia**	
rural	29,200	rural	29,219
city with population less than 30,000	30,729	city with population less than 30,000	29,395
city with population 30,000 to 100,000	29,355	city with population 30,000 to 100,000	27,575
Edmonton	29,215	city with population 100,000 to 500,000	30,956
Calgary	30,951	Vancouver	31,768

Source: Statistics Canada.

Finally, with the cost of the basket for the reference family at hand, the costs for other families within each community are obtained by applying the equivalence scales of LIM. This implies that, for example, the cost for a single adult would be half of the cost for the reference family, since the LIM equivalence scale for the reference family is 2 and the equivalence scale for a single adult is 1. The 2007 MBM thresholds are contained in Table A3.

Notice that the basic concept of low income underlying the MBM is being unable to purchase the goods and services contained in the basket, the income to be compared to the thresholds would be disposable income available to purchase these goods and services. Thus, under MBM, the disposable income is equal to total income (income from employment, investment, retirement pensions and all government transfers) subtracted by income taxes, CPP/QPP contribution, EI contribution, RPP contribution, union dues, child/spousal support payment, work-related child care expenses and out of pocket medical expenses prescribed by medical professionals.

Table A4.1 Some low income indexes and their standard errors[1] - After-tax low income cut-offs

Year	FGT-0	FGT-1	FGT-2	Sen's gap	SST
1976	0.1296	0.0434	0.0230	0.3346	0.0835
Standard errors	0.0019	0.0009	0.0006		
1977	0.1297	0.0477	0.0269	0.3680	0.0918
Standard errors	0.0013	0.0006	0.0004		
1978	0.1217	0.0425	0.0229	0.3491	0.0819
Standard errors	0.0018	0.0008	0.0006		
1979	0.1256	0.0435	0.0240	0.3465	0.0839
Standard errors	0.0014	0.0006	0.0005		
1980	0.1159	0.0394	0.0217	0.3395	0.0761
Standard errors	0.0019	0.0008	0.0006		
1981	0.1159	0.0380	0.0203	0.3279	0.0735
Standard errors	0.0013	0.0006	0.0004		
1982	0.1239	0.0403	0.0211	0.3253	0.0778
Standard errors	0.0013	0.0006	0.0004		
1983	0.1402	0.0458	0.0235	0.3268	0.0878
Standard errors	0.0020	0.0008	0.0006		
1984	0.1374	0.0459	0.0242	0.3338	0.0880
Standard errors	0.0015	0.0006	0.0005		
1985	0.1297	0.0412	0.0211	0.3172	0.0792
Standard errors	0.0014	0.0006	0.0004		
1986	0.1209	0.0380	0.0195	0.3138	0.0733
Standard errors	0.0016	0.0007	0.0005		
1987	0.1188	0.0374	0.0186	0.3153	0.0723
Standard errors	0.0014	0.0006	0.0004		
1988	0.1083	0.0331	0.0164	0.3056	0.0642
Standard errors	0.0015	0.0006	0.0004		
1989	0.1018	0.0307	0.0151	0.3017	0.0596
Standard errors	0.0015	0.0006	0.0004		
1990	0.1182	0.0377	0.0193	0.3187	0.0728
Standard errors	0.0016	0.0007	0.0005		
1991	0.1318	0.0423	0.0214	0.3212	0.0814
Standard errors	0.0017	0.0007	0.0005		
1992	0.1327	0.0420	0.0216	0.3167	0.0809
Standard errors	0.0018	0.0008	0.0006		
1993	0.1431	0.0444	0.0221	0.3100	0.0850
Standard errors	0.0019	0.0008	0.0006		
1994	0.1375	0.0431	0.0214	0.3134	0.0828
Standard errors	0.0014	0.0006	0.0004		
1995	0.1463	0.0456	0.0226	0.3113	0.0873
Standard errors	0.0017	0.0008	0.0005		
1996	0.1569	0.0511	0.0265	0.3254	0.0975
Standard errors	0.0022	0.0010	0.0007		
Bootstrap standard errors	*0.0030*	*0.0013*	*0.0010*	*0.0067*	*0.0025*

Table A4.1 Some low income indexes and their standard errors[1] - After-tax low income cut-offs (continued)

Year	FGT-0	FGT-1	FGT-2	Sen's gap	SST
1997	0.1531	0.0504	0.0266	0.3293	0.0964
Standard errors	0.0023	0.0011	0.0008		
Bootstrap standard errors	*0.0034*	*0.0013*	*0.0011*	*0.0068*	*0.0025*
1998	0.1369	0.0467	0.0253	0.3408	0.0897
Standard errors	0.0022	0.0011	0.0008		
Bootstrap standard errors	*0.0033*	*0.0014*	*0.0011*	*0.0073*	*0.0026*
1999	0.1300	0.0440	0.0244	0.3384	0.0848
Standard errors	0.0018	0.0009	0.0007		
Bootstrap standard errors	*0.0026*	*0.0012*	*0.0009*	*0.0068*	*0.0022*
2000	0.1248	0.0418	0.0226	0.3344	0.0806
Standard errors	0.0018	0.0008	0.0006		
Bootstrap standard errors	*0.0028*	*0.0011*	*0.0008*	*0.0061*	*0.0021*
2001	0.1120	0.0377	0.0202	0.3361	0.0729
Standard errors	0.0018	0.0009	0.0007		
Bootstrap standard errors	*0.0027*	*0.0011*	*0.0008*	*0.0065*	*0.0021*
2002	0.1156	0.0382	0.0203	0.3298	0.0738
Standard errors	0.0019	0.0008	0.0006		
Bootstrap standard errors	*0.0028*	*0.0011*	*0.0008*	*0.0068*	*0.0021*
2003	0.1163	0.0382	0.0202	0.3280	0.0738
Standard errors	0.0019	0.0008	0.0001		
Bootstrap standard errors	*0.0029*	*0.0011*	*0.0008*	*0.0065*	*0.0021*
2004	0.1137	0.0382	0.0204	0.3356	0.0738
Standard errors	0.0019	0.0008	0.0006		
Bootstrap standard errors	*0.0029*	*0.0012*	*0.0008*	*0.0074*	*0.0022*
2005	0.1082	0.0374	0.0203	0.3455	0.0725
Standard errors	0.0019	0.0009	0.0007		
Bootstrap standard errors	*0.0025*	*0.0011*	*0.0008*	*0.0079*	*0.0021*
2006	0.1053	0.0340	0.0181	0.3231	0.0661
Standard errors	0.0020	0.0008	0.0006		
Bootstrap standard errors	*0.0028*	*0.0009*	*0.0007*	*0.0072*	*0.0019*
2007	0.0917	0.0301	0.0164	0.3289	0.0588
Standard errors	0.0019	0.0008	0.0006		
Bootstrap standard errors	*0.0028*	*0.0010*	*0.0007*	*0.0082*	*0.0019*

Table A4.2 Some low income indexes and their standard errors[1] - After-tax low income mesures

Year	FGT-0	FGT-1	FGT-2	Sen's gap	SST
1976	0.1340	0.0432	0.0227	0.3225	0.0831
Standard errors	0.0019	0.0008	0.0006		
1977	0.1415	0.0492	0.0271	0.3477	0.0943
Standard errors	0.0013	0.0006	0.0004		
1978	0.1340	0.0446	0.0235	0.3330	0.0857
Standard errors	0.0019	0.0008	0.0006		
1979	0.1342	0.0457	0.0246	0.3402	0.0877
Standard errors	0.0013	0.0006	0.0005		
1980	0.1276	0.0415	0.0223	0.3251	0.0800
Standard errors	0.0019	0.0008	0.0006		
1981	0.1213	0.0385	0.0201	0.3174	0.0743
Standard errors	0.0012	0.0005	0.0004		
1982	0.1248	0.0387	0.0201	0.3104	0.0748
Standard errors	0.0013	0.0005	0.0004		
1983	0.1262	0.0383	0.0196	0.3034	0.0739
Standard errors	0.0019	0.0008	0.0006		
1984	0.1274	0.0412	0.0217	0.3236	0.0795
Standard errors	0.0013	0.0006	0.0004		
1985	0.1178	0.0370	0.0189	0.3145	0.0716
Standard errors	0.0013	0.0005	0.0004		
1986	0.1122	0.0347	0.0177	0.3092	0.0672
Standard errors	0.0016	0.0006	0.0004		
1987	0.1117	0.0334	0.0162	0.2985	0.0646
Standard errors	0.0013	0.0005	0.0004		
1988	0.1059	0.0314	0.0152	0.2964	0.0609
Standard errors	0.0013	0.0005	0.0004		
1989	0.1018	0.0302	0.0146	0.2968	0.0587
Standard errors	0.0013	0.0005	0.0004		
1990	0.1117	0.0341	0.0173	0.3050	0.0660
Standard errors	0.0015	0.0006	0.0004		
1991	0.1103	0.0339	0.0172	0.3075	0.0657
Standard errors	0.0014	0.0006	0.0004		
1992	0.1107	0.0343	0.0179	0.3095	0.0664
Standard errors	0.0015	0.0007	0.0005		
1993	0.1106	0.0328	0.0168	0.2966	0.0636
Standard errors	0.0016	0.0006	0.0005		
1994	0.1095	0.0329	0.0165	0.3003	0.0638
Standard errors	0.0012	0.0005	0.0004		
1995	0.1118	0.0343	0.0172	0.3065	0.0664
Standard errors	0.0014	0.0006	0.0004		
1996	0.1239	0.0389	0.0206	0.3137	0.0751
Standard errors	0.0020	0.0009	0.0006		
Bootstrap standard errors	*0.0028*	*0.0012*	*0.0009*	*0.0073*	*0.0022*
1997	0.1229	0.0390	0.0209	0.3173	0.0754
Standard errors	0.0020	0.0009	0.0007		
Bootstrap standard errors	*0.0028*	*0.0012*	*0.0010*	*0.0079*	*0.0024*

Table A4.2 Some low income indexes and their standard errors[1] - After-tax low income mesures (continued)

Year	FGT-0	FGT-1	FGT-2	Sen's gap	SST
1998	0.1195	0.0386	0.0212	0.3229	0.0747
Standard errors	0.0022	0.0010	0.0008		
Bootstrap standard errors	*0.0029*	*0.0013*	*0.0010*	*0.0080*	*0.0024*
1999	0.1175	0.0396	0.0220	0.3366	0.0766
Standard errors	0.0017	0.0008	0.0007		
Bootstrap standard errors	*0.0024*	*0.0011*	*0.0009*	*0.0069*	*0.0021*
2000	0.1171	0.0384	0.0207	0.3278	0.0743
Standard errors	0.0017	0.0008	0.0006		
Bootstrap standard errors	*0.0025*	*0.0010*	*0.0008*	*0.0063*	*0.0020*
2001	0.1167	0.0378	0.0199	0.3237	0.0731
Standard errors	0.0018	0.0008	0.0006		
Bootstrap standard errors	*0.0026*	*0.0011*	*0.0008*	*0.0065*	*0.0020*
2002	0.1180	0.0386	0.0202	0.3275	0.0746
Standard errors	0.0018	0.0008	0.0006		
Bootstrap standard errors	*0.0027*	*0.0011*	*0.0008*	*0.0067*	*0.0021*
2003	0.1203	0.0387	0.0201	0.3214	0.0747
Standard errors	0.0018	0.0008	0.0006		
Bootstrap standard errors	*0.0029*	*0.0011*	*0.0007*	*0.0058*	*0.0020*
2004	0.1224	0.0396	0.0208	0.3231	0.0764
Standard errors	0.0019	0.0008	0.0006		
Bootstrap standard errors	*0.0029*	*0.0011*	*0.0008*	*0.0067*	*0.0022*
2005	0.1164	0.0392	0.0208	0.3368	0.0758
Standard errors	0.0019	0.0009	0.0006		
Bootstrap standard errors	*0.0026*	*0.0011*	*0.0008*	*0.0069*	*0.0021*
2006	0.1137	0.0370	0.0193	0.3252	0.0715
Standard errors	0.0019	0.0008	0.0006		
Bootstrap standard errors	*0.0028*	*0.0010*	*0.0007*	*0.0063*	*0.0018*
2007	0.1097	0.0351	0.0184	0.3202	0.0681
Standard errors	0.0019	0.0008	0.0006		
Bootstrap standard errors	*0.00281*	*0.001*	*0.00069*	*0.0067*	*0.002*

Table A4.3 Some low income indexes and their standard errors[1] - After-tax low income mesures fixed at 1992

Year	FGT-0	FGT-1	FGT-2	Sen's gap	SST
1976	0.1309	0.0422	0.0223	0.3225	0.0813
Standard errors	0.0019	0.0008	0.0006		
1977	0.1313	0.0458	0.0255	0.3486	0.0881
Standard errors	0.0018	0.0008	0.0006		
1978	0.1215	0.0407	0.0217	0.3350	0.0785
Standard errors	0.0018	0.0008	0.0006		
1979	0.1209	0.0412	0.0225	0.3404	0.0795
Standard errors	0.0013	0.0006	0.0005		
1980	0.1093	0.0362	0.0200	0.3310	0.0701
Standard errors	0.0018	0.0008	0.0006		
1981	0.1077	0.0341	0.0182	0.3165	0.0661
Standard errors	0.0012	0.0005	0.0004		
1982	0.1157	0.0361	0.0189	0.3116	0.0698
Standard errors	0.0012	0.0005	0.0004		
1983	0.1295	0.0391	0.0200	0.3020	0.0754
Standard errors	0.0019	0.0008	0.0006		
1984	0.1236	0.0401	0.0211	0.3244	0.0774
Standard errors	0.0013	0.0006	0.0004		
1985	0.1108	0.0349	0.0179	0.3151	0.0676
Standard errors	0.0012	0.0005	0.0004		
1986	0.1045	0.0324	0.0168	0.3106	0.0630
Standard errors	0.0014	0.0006	0.0004		
1987	0.1055	0.0310	0.0152	0.2937	0.0601
Standard errors	0.0013	0.0005	0.0004		
1988	0.0911	0.0270	0.0133	0.2967	0.0526
Standard errors	0.0013	0.0005	0.0003		
1989	0.0851	0.0248	0.0124	0.2917	0.0485
Standard errors	0.0012	0.0005	0.0004		
1990	0.0991	0.0307	0.0158	0.3098	0.0597
Standard errors	0.0015	0.0006	0.0004		
1991	0.1117	0.0344	0.0174	0.3079	0.0666
Standard errors	0.0014	0.0006	0.0004		
1992	0.1107	0.0343	0.0179	0.3095	0.0664
Standard errors	0.0015	0.0007	0.0005		
1993	0.1175	0.0349	0.0177	0.2974	0.0676
Standard errors	0.0017	0.0007	0.0005		
1994	0.1125	0.0339	0.0169	0.3014	0.0657
Standard errors	0.0013	0.0005	0.0004		
1995	0.1172	0.0355	0.0178	0.3032	0.0687
Standard errors	0.0015	0.0006	0.0004		
1996	0.1272	0.0403	0.0212	0.3169	0.0778
Standard errors	0.0020	0.0009	0.0007		
Bootstrap standard errors	*0.0028*	*0.0012*	*0.0009*	*0.0071*	*0.0023*
1997	0.1257	0.0399	0.0213	0.3170	0.0769
Standard errors	0.0020	0.0009	0.0007		
Bootstrap standard errors	*0.0028*	*0.0012*	*0.0010*	*0.0079*	*0.0024*

Table A4.3 Some low income indexes and their standard errors[1] - After-tax low income mesures fixed at 1992 (continued)

Year	FGT-0	FGT-1	FGT-2	Sen's gap	SST
1998	0.1143	0.0369	0.0205	0.3228	0.0715
Standard errors	0.0020	0.0010	0.0008		
Bootstrap standard errors	*0.0029*	*0.0013*	*0.0010*	*0.0082*	*0.0024*
1999	0.1044	0.0355	0.0202	0.3399	0.0690
Standard errors	0.0016	0.0008	0.0007		
Bootstrap standard errors	*0.0022*	*0.0011*	*0.0009*	*0.0077*	*0.0021*
2000	0.0990	0.0331	0.0184	0.3339	0.0643
Standard errors	0.0016	0.0007	0.0006		
Bootstrap standard errors	*0.0024*	*0.0010*	*0.0008*	*0.0072*	*0.0019*
2001	0.0909	0.0301	0.0165	0.3315	0.0588
Standard errors	0.0016	0.0008	0.0006		
Bootstrap standard errors	*0.0023*	*0.0010*	*0.0008*	*0.0075*	*0.0019*
2002	0.0928	0.0303	0.0164	0.3263	0.0590
Standard errors	0.0017	0.0007	0.0006		
Bootstrap standard errors	*0.0025*	*0.0010*	*0.0008*	*0.0080*	*0.0019*
2003	0.0939	0.0303	0.0164	0.3228	0.0591
Standard errors	0.0017	0.0007	0.0006		
Bootstrap standard errors	*0.0027*	*0.0009*	*0.0007*	*0.0071*	*0.0018*
2004	0.0897	0.0302	0.0165	0.3370	0.0589
Standard errors	0.0017	0.0007	0.0006		
Bootstrap standard errors	*0.0025*	*0.0010*	*0.0007*	*0.0078*	*0.0020*
2005	0.0864	0.0293	0.0162	0.3395	0.0573
Standard errors	0.0017	0.0008	0.0006		
Bootstrap standard errors	*0.0023*	*0.0010*	*0.0007*	*0.0082*	*0.0019*
2006	0.0806	0.0260	0.0145	0.3233	0.0510
Standard errors	0.0017	0.0007	0.0006		
Bootstrap standard errors	*0.0023*	*0.0008*	*0.0006*	*0.0083*	*0.0016*
2007	0.0684	0.0233	0.0131	0.3415	0.0459
Standard errors	0.0016	0.0007	0.0005		
Bootstrap standard errors	*0.0023*	*0.0009*	*0.0006*	*0.0092*	*0.0017*

Table A4.4 Some low income indexes and their standard errors[1] - market basket measures

Year	FGT-0	FGT-1	FGT-2	Sen's gap	SST
2000	0.1459	0.0469	0.0249	0.3218	0.0901
Standard errors	0.0019	0.0008	0.0006		
Bootstrap standard errors	*0.0029*	*0.0011*	*0.0009*	*0.0059*	*0.0021*
2001	0.1351	0.0436	0.0234	0.3228	0.0840
Standard errors	0.0019	0.0009	0.0007		
Bootstrap standard errors	*0.0027*	*0.0012*	*0.0009*	*0.0062*	*0.0022*
2002	0.1359	0.0430	0.0226	0.3168	0.0829
Standard errors	0.0020	0.0009	0.0006		
Bootstrap standard errors	*0.0028*	*0.0012*	*0.0009*	*0.0061*	*[0.0023*
2003	0.1324	0.0423	0.0223	0.3194	0.0815
Standard errors	0.0019	0.0008	0.0006		
Bootstrap standard errors	*0.0031*	*0.0011*	*0.0008*	*0.0061*	*0.0021*
2004	0.1317	0.0429	0.0229	0.3254	0.0826
Standard errors	0.0020	0.0009	0.0006		
Bootstrap standard errors	*0.0033*	*0.0012*	*0.0009*	*0.0069*	*0.0023*
2005	0.1245	0.0415	0.0226	0.3331	0.0802
Standard errors	0.0020	0.0009	0.0007		
Bootstrap standard errors	*0.0026*	*0.0012*	*0.0009*	*0.0074*	*0.0023*
2006	0.1194	0.0376	0.0201	0.3149	0.0728
Standard errors	0.0020	0.0009	0.0007		
Bootstrap standard errors	*0.0030*	*0.0010*	*0.0008*	*0.0071*	*0.0020*
2007	0.1008	0.0332	0.0180	0.3265	0.0646
Standard errors	0.0019	0.0008	0.0006		
Bootstrap standard errors	*0.0028*	*0.0011*	*0.0007*	*0.0077*	*0.0020*

1. From1996 to 2007, bootstrap weights are also used to calculate the bootstrap standard errors.
Source: Survey of Consumer Finance (1976 to 1995), Survey of Labour and Income Dynamics (1996 to 2006).

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