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Methodology Changes: Census Family Low Income Measure Based on the T1 Family File

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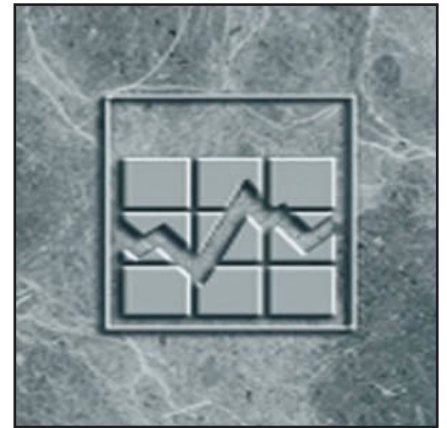
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Methodology Changes: Census Family Low Income Measure Based on the T1 Family File

Abstract

This report summarizes the methodological changes to the calculation of the Census Family Low Income Measure (CFLIM) using the T1 Family File (T1FF). These changes were introduced in 2018 (income reference year 2015). The changes make available new after-tax CFLIM (CFLIM-AT) estimates from reference year 2004 onward.

- The changes to the methodology involve the way adjusted census family income and median income are calculated to arrive at the CFLIM threshold.

- These changes improve the comparability of the Low Income Measures (LIMs) computed using different data sources. These sources include the Census of Population and the Canadian Income Survey (CIS). Nevertheless, differences remain that continue to affect the comparability of LIM thresholds and rates among these sources.

- To account for changes in the CFLIM methodology, new T1FF CANSIM tables are being introduced. They contain a detailed selection of relevant low-income statistics.

Introduction

The economic well-being of Canadians garners considerable attention and generates many questions. To provide an overall picture of this wellbeing, Statistics Canada produces several indicators, including low-income indicators.

Over the years, Statistics Canada has released a number of low-income indicators, including the Low Income Cut-Offs (LICOs), the Market Basket Measure (MBM) and the Low Income Measures (LIMs) (Income Statistics Division [ISD] 2016; Murphy, Zhang and Dionne 2010).

Several Statistics Canada programs release LIM statistics. One such program is the T1 Family File (T1FF), which, since 1995, has yielded the Census Family Low Income Measure (CFLIM). The approach used to calculate LIMs for other data sources at Statistics Canada was updated several years ago. As a result, it is appropriate to update the T1FF CFLIM methodology to maximize the comparability between the various LIM estimates available from Statistics Canada.

This paper discusses the modifications made to the CFLIM calculation based on T1FF and to the related publicly available products. The paper also elaborates on the impacts of these modifications to the CFLIM through a closer look at various dimensions of the CFLIM methodology.

1. Sources and definitions

Internationally, LIMs are the most widely used low-income indicator. They are relative measures of low income based on the national income distribution. LIM values vary depending on the unit of analysis available in the data source from which the LIM is calculated. Such units include census families,[1] economic families[2] and households.[3] When a LIM approach is used, the low-income status of an individual is relative to the income of other members of society. Simply stated, the LIM is a fixed percentage (i.e., 50%) of the "adjusted" median income of the unit of analysis, where the adjustment accounts for the needs of the unit relative to its size. This size-based adjustment reflects the fact that the economic needs of a unit grow with its size, although they grow at a slower pace than the number of members in that unit.

1.1 Details behind the calculation of the Low Income Measure

In determining the LIM, the economies of scale that people achieve by living together are taken into account. This is usually accomplished by adjusting the income of the unit of analysis. The income is divided by an adjustment factor. Different methods can be used to calculate the adjustment factor.[4]

The "square root of the size of the unit of analysis" (√FSize) method of income adjustment is often used internationally to account for the economies of scale achieved by people living together. Most Statistics Canada programs that release LIM indicators, including the current versions of the Canadian Income Survey (CIS) and the Census of Population, use √FSize to adjust the income of the unit of analysis.

Once it is adjusted, income is assigned to each member of the unit of analysis. Then, the national median[5] of the adjusted income of the unit of analysis is established. The LIM threshold corresponds to a certain percentage of this median. Statistics Canada programs typically use 50%. A person is considered to be in a low-income situation if the adjusted income of his or her unit of analysis is below the LIM threshold.

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1. A **census family** is a married or common-law couple with or without children, or a lone parent family. All members of a census family live in the same dwelling. People who are not part of a census family are included in the CFLIM calculation as a family of one.
2. An **economic family** is a group of two or more people who live in the same dwelling and are related to each other by blood, marriage, common law, adoption or a foster relationship.
3. A **household** is a person or group of people who occupy the same dwelling.
4. The T1FF previously used a factor based on census family composition and size and on the age of census family members. Going forward, the square root of census family size will serve as the adjustment factor. See Section 2 for a brief discussion of the changes to the T1FF methodology.
5. The median corresponds to the amount that divides the population into two equal groups (50%).

1.2 Units of analysis and income source selection in the context of the T1Family File

The T1FF produces income-related data based on data from the Canada Revenue Agency and on other administrative files. It contains income data for all taxfilers and their dependents. The T1FF establishes a time series that, for certain data, dates back to 1982. It also has the advantage of providing data for very detailed geographic areas. Through T1FF, before-tax CFLIM (CFLIM-BT) data are available from 1995 onward, and after-tax CFLIM (CFLIM-AT) data are available from 1997 onward.

1.2.1 Units of analysis

The formation of units of analysis in the T1FF relies on the relationship information available in the tax data. These units of analysis are census families, including persons not in a census family, as well as individuals. Census family income variables are derived using T1FF information about census family composition for taxfilers and dependents. Because of data limitations, T1FF does not provide data on economic families or households.

The unit of analysis plays an important role in establishing adjusted family income and has a considerable impact on the results. Since the census family is the basis for its calculation, the T1FF-based CFLIM does not account for certain elements of economic sharing that occur within a household (other than collective dwellings), such as unrelated individuals sharing rent or grandparents living with the family. For more information on the importance of the unit of analysis, please see "*Low Income Measure: Comparison of two data sources, T1 Family File and 2016 Census of Population*", which compares LIMs in T1FF and the 2016 Census of Population.

1.2.2 Income source selection

Different types of income can be used to calculate the LIM: before-tax income, market income and after-tax income.[6] The specific income type selected for the LIM will differ according to research objectives and the topics being analyzed.

Under the former methodology, T1FF produced CFLIM statistics on income before tax (CFLIM-BT) or after tax (CFLIM-AT). In general, using after-tax income suits the majority of analytical needs regarding the topic of low income, because this accounts for redistribution resulting from government taxation systems.

Under the revised CFLIM methodology, only the CFLIM calculated using after-tax income is included in T1FF standard tables. However, custom tabulations of CFLIM statistics based on other income types can be requested from Statistics Canada's Income Statistics Division (ISD).

1.3 Methodological changes

Until March 2018 (2015 income reference year), T1FF used a family size adjustment factor—adjusted family size—that was based on family composition and age of family members. Furthermore, family median income was established using the distribution of adjusted family income by family, not by individual.

The calculation of adjusted family size assigned a factor of 1 to the first adult in the family. A factor of 0.4 was assigned to a second adult and the firstborn child (regardless of age) in a lone parent family or any child older than 15. Each child younger than 16 (other than the first-born child in a lone parent family) was assigned a factor of 0.3 (Income Statistics Division [ISD] 2017).

For the CFLIM from T1FF to be more comparable with the LIM from other data sources, the calculation of the adjustment factor has been revised. Going forward, family income is adjusted using the square root of the family size ($\sqrt{FSize}$).

Additionally, the way median income is calculated to establish the CFLIM from T1FF has been revised in order to ensure that the individual economic well being of each member within a unit of analysis is taken into account. In the old methodology, each family was considered only once in the income distribution to establish the median. In the new methodology, the median is calculated using the adjusted family income assigned to each individual. For instance, the adjustment factor for a family of four with an income of $50,000 would be 2 (that is, the square root of 4). The adjusted income would therefore be $25,000. Consequently, four entries with an adjusted family income

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6. Market income is calculated by subtracting, from the before-tax income, government transfers. After-tax income is calculated by subtracting, from the before-tax income, net taxes on federal and provincial income and adding the appropriate provincial abatement, as applicable.

of $25,000 would be included to calculate the median. Under the old method, a single entry would be included and the adjustment factor would vary between 2.0 and 2.2, depending on the structure of the family.

The percentage of the median national income that serves to determine the low-income status of individuals is unchanged in the new methodology—50%.

1.4 Changes to the content of T1 Family File standard tables

To reflect the methodological changes to the CFLIM calculation method, the standard tables that focus on T1FF low-income data have been restructured. The CFLIM estimates calculated using the new methodology will be available only for after-tax income. In the T1FF standard tables based on the new CFLIM-AT methodology, data will be available as far back as 2004. If needed, users can obtain additional data by requesting a custom tabulation.

The new statistics available in the published tables will include the percentage of people below the CFLIM-AT and the average income gap ratio for these people. These statistics provide additional perspective on the situation of people living in low income.

The percentage of people in low income provides an idea of the size of the low-income population and of the evolution of the low-income situation over time. It corresponds to the ratio of the number of individuals with an adjusted family income below the CFLIM threshold to the total number of individuals in the population.

The gap ratio of individuals is the difference between the CFLIM threshold and the adjusted family income expressed as a percentage of the CFLIM threshold. It gives an idea of the depth of the low-income situation of individuals.

These new statistics complement those already available in the T1FF standard tables. The old CANSIM table 111-0015, "Characteristics of families, before-tax and after-tax low-income status (based on census family Low Income Measures, LIMs) by family type and family composition, annual (number unless otherwise noted)," covers the period from 2000 to 2015. It will be replaced by three CANSIM tables, two of which focus on CFLIM-AT. Table 111-0045 focusses on median family income and tables 111-0046 and 111-0047 focus on individuals and families in situation of low income.

To help users analyze CFLIM trends based on the new methodology, these tables will provide data on the CFLIM-AT going back to 2004. These data will be updated annually at the same time as other T1FF final data are released, i.e., in late spring or early summer. CFLIM-BT and CFLIM-AT data will remain available through custom tabulations when the indicators cannot be accessed through released products.

2. Comparison of results from the old and new methodologies

2.1 Comparison of after-tax Census Family Low Income Measure (CFLIM-AT) thresholds

The changes to the CFLIM methodology affect all T1FF-based LIM indicators. This is evident in the differences in the LIM thresholds generated using the old and new methodologies.

When both changes in the methodology are applied—that is, when the new method ($\sqrt{FSize}$) is used and the median is calculated for individuals rather than families—the threshold for the CFLIM-AT for 2015 is $20,137. The threshold is $18,213 when the old method is used. The proportion of people with low income is higher when income is adjusted using the $\sqrt{FSize}$ factor rather than the adjusted family size; the change in the calculation of the median explains most of the difference.

Table 2.1
CFLIM-AT thresholds ($) for 2015 under old (adjusted family size) and new (√FSize) methodologies

| Number of children aged 15 and older	Former methodology				New methodology			
	number of adults[1]				number of adults[1]			
	1	2	3	4	1	2	3	4
0	$18 213	$25 498	$32 783	$40 069	$20 137	$28 478	$34 878	$40 274
1	$25 498	$30 962	$38 247	$45 533	$28 478	$34 878	$40 274	$45 028
2	$30 962	$36 426	$43 711	$50 996	$34 878	$40 274	$45 028	$49 325
3	$36 426	$41 890	$49 175	$56 460	$40 274	$45 028	$49 325	$53 277
4	$41 890	$47 354	$54 639	$61 924	$45 028	$49 325	$53 277	$56 956
5	$47 354	$52 818	$60 103	$67 388	$49 325	$53 277	$56 956	$60 411
6	$52 818	$58 282	$65 567	$72 852	$53 277	$56 956	$60 411	$63 679
7	$58 282	$63 746	$71 031	$78 316	$56 956	$60 411	$63 679	$66 787
8	$63 746	$69 209	$76 495	$83 780	$60 411	$63 679	$66 787	$69 757
9	$69 209	$74 673	$81 959	$89 244	$63 679	$66 787	$69 757	$72 605
10	$74 673	$80 137	$87 422	$94 708	$66 787	$69 757	$72 605	$75 346

1. Includes parents/spouses, children 16 years of age and over and the first child in lone-parent families regardless of age.

2.2 Comparison of after-tax Census Family Low Income Measure (CFLIM-AT) rates

Because the CFLIM-AT thresholds calculated using the new methodology are higher in most families, the overall low-income rate generated by the new method is also higher. For the 2015 income reference year, the rate is 13.9% under the old method and 17.3% under the new method.

The gap between the two versions of the CFLIM-AT widens over time, reaching 3.4 percentage points for the 2015 income reference year. The trend in the proportion of individuals below the CFLIM-AT stabilizes over time when the CFLIM-AT is calculated using the √FSize method. The old method shows a slightly more pronounced decrease. The difference in the trends is largely attributable to family composition: the number of people who are not in a census family has increased at a much faster rate than the number of families headed by a couple. In general, the trend observed under the new methodology is more comparable with trends observed in other data sources available at Statistics Canada.

Chart 2.1
Percentage of people in situation of low income (after tax), by former and new methodologies, Canada, 2004 to 2015

percent
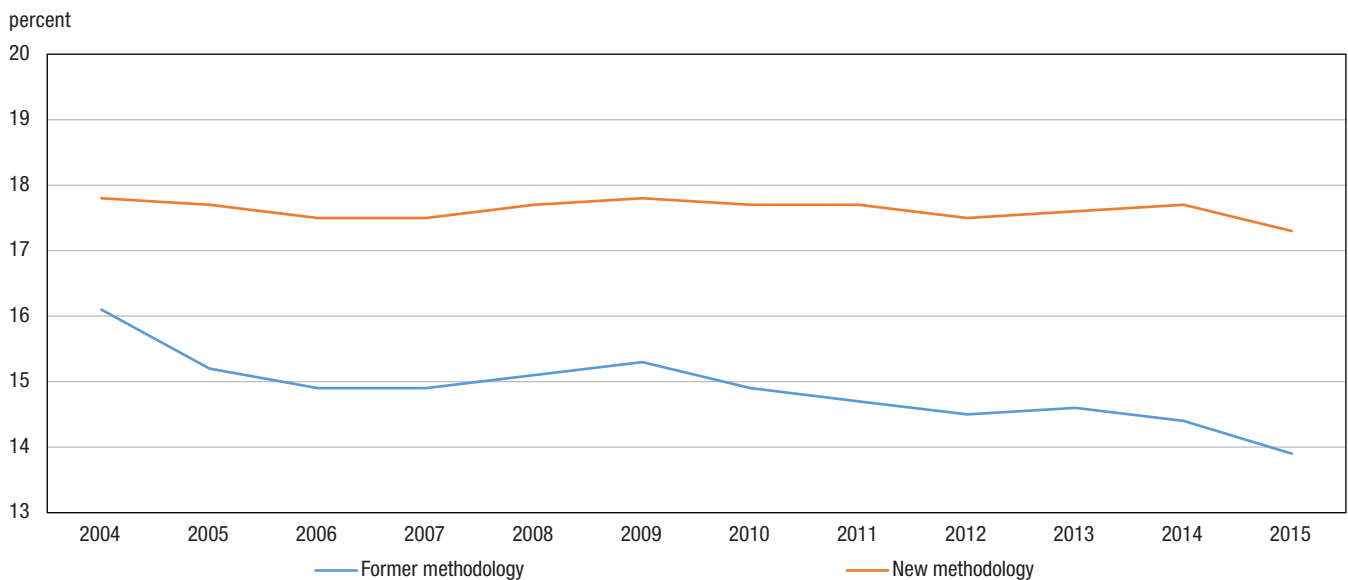
Source: Statistics Canada, Income Statistics Division, Annual Income Estimates for Census Families and Individuals (T1 Family File).

3. Remaining key differences based on data sources

Changing the methodology for calculating the T1FF CFLIM makes this LIM concept more comparable with those from other Statistics Canada sources and from international sources. The main comparable Statistics Canada sources are the CIS and the 2016 Census of Population.[7] However, although the data sources are more conceptually comparable, some major differences remain. The selected unit of analysis and the population coverage (inclusions and exclusions) remain important sources of difference, especially for low-income counts and rates. Since CIS and the 2016 Census of Population provide information on households, this unit of analysis is used for their LIM calculation. T1FF is limited to census family in its CFLIM calculations because of its data sources. Moreover, income data for people living on reserves, in collective dwellings (e.g., nursing homes, prisons and religious establishments) and in the territories are included in the T1FF CFLIM but are presently excluded from CIS and the 2016 Census.

Conclusion

This paper describes updates to the CFLIM methodology to be used in T1FF starting in 2018. The method used for this calculation in T1FF has been updated to improve conceptual comparability with other Statistics Canada and international programs. The updated data are available for the 2004 reference year onward.

The methodological change with the greatest impact is the change in the way income distribution is assessed to calculate the median used for the purposes of the CFLIM. Specifically, rather than considering families as a single entry, the assessment now includes each individual separately. The calculation of the adjusted income has also been changed so that it better aligns with Statistics Canada practices. Specifically, the old adjustment factor has been replaced by one based on the square root of family size.

These methodological changes increase the percentage of people whom T1FF reports as being below the CFLIM-AT. They also bring the CFLIM-AT trends more in line with Statistics Canada's other data sources.

To further ensure the relevance of published statistics, the content of published T1FF standard tables has been adjusted. Statistics that look at the depth of low income and the proportion of people below the CFLIM-AT have been added.

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7. A short research paper comparing the T1FF LIM with the 2016 Census of Population LIM is available. Please refer to "*Low Income Measure: Comparison of two data sources, T1 Family file and 2016 Census of Population.*"