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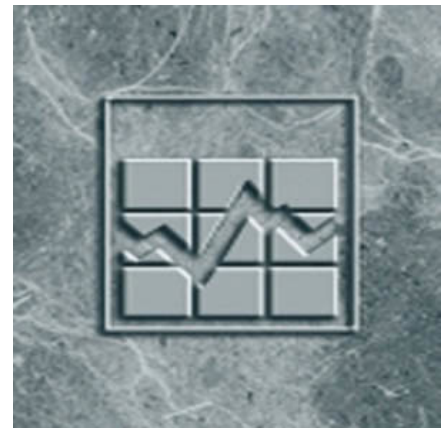
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Market Basket Measure research paper: An analysis of the equivalization method

by **Prince Kevin Danieles, Andrew Heisz** and **Keith Lam**

On August 21, 2018, the Government of Canada released Opportunity for All: Canada's First Poverty Reduction Strategy, which outlined long-term commitments to guide current and future government actions and investments to reduce poverty. The Poverty Reduction Act legislates key commitments made in the strategy and mandates that Statistics Canada review the content of Canada's official measure of poverty, the Market Basket Measure (MBM), on a regular basis.

During consultations for the MBM's second comprehensive review, as well as during the analysis leading to the creation of the 2018-base MBM, several MBM research items were identified as requiring further study (e.g., MBM thresholds for remote regions, updating the other necessities component and a poverty index).[1] These research topics and their related methodological underpinnings form the basis for the MBM's forward-looking research agenda and are being explored in detail through MBM research papers. The MBM research papers will be published in preparation for the third comprehensive review of the MBM, launched in June 2023.[2]

This discussion paper begins by providing the reasons for using equivalization methods. Following this, the square root scale is described, and the motivations for its use are discussed. Finally, a series of new tests are conducted to evaluate the efficiency of the square root scale, and these results are discussed in some detail as they reveal many insights.

This paper also provides an opportunity for the public and stakeholders to share feedback and comments on measuring poverty by different family characteristics in Canada.

Introduction

The MBM establishes poverty thresholds based on the cost of a basket of food, clothing, shelter, transportation and other necessities for a family of four that reflects a modest, basic standard of living. A family with a disposable income below the appropriate MBM threshold for the size of the family and the region of residence is considered to be living in poverty.[3]

A basic needs measure, like the MBM, requires a reference family to cost the standards used to define the contents of the basket. The MBM uses a four-person family size that consists of one male and one female adult aged 25 to 49 with two children (a female child aged 9 and a male child aged 13).[4] To arrive at thresholds for different family sizes, the MBM methodology uses a square root equivalence scale. Statistics Canada has been asked by the MBM user community to evaluate whether the square root equivalence method accurately adjusts the costs calculated of the four-person reference family to other family sizes.

This paper begins by providing an overview of the methodology behind the equivalence scale. It then explores other options for costing baskets for different family sizes before considering the reasons for using the equivalence scale. Finally, the paper concludes with a summary analysis that assesses the effectiveness of the square root equivalence method in adjusting the MBM basket for different family sizes.

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1. A complete list of research topics can be found in Appendix A.
2. For more information on the third comprehensive review of the MBM, see Launch of the Third Comprehensive Review of the Market Basket Measure.
3. For more information on the MBM's methodology, see Report on the second comprehensive review of the Market Basket Measure.
4. The choice of the reference family was motivated by two factors. The first was to ensure the new measure of low income was responsive to changes in low income among children to evaluate the effectiveness of the National Child Benefit, an initiative to reduce the incidence and depth of child poverty in Canada. The second was that the two-parent, two-child household was the most prevalent household type among the population at that time (Hatfield [2002], Human Resources Development Canada [2003]).

Equivalence scales

It is common in discussions of family (or household) income to need to compare the incomes of families of different sizes or compositions and ask how well off they are relative to each other, or relative to another standard such as a poverty threshold. To make this comparison, families are often compared with one another in terms of their "equivalent incomes." An equivalent income is the income a family with one set of characteristics needs to be as well off as a family with a different set of characteristics.[5]

Debates around the poverty line in Canada often centre on the appropriateness of the methods used to make families with different characteristics comparable in terms of how well off they are.[6] This is a value-laden judgment, but the usual practice is to compare expenditure shares on necessities such as food and deem that families are equally well off when they have the same share of income or total expenditures going to necessities.[7]

With the MBM, Statistics Canada calculates the levels of disposable income needed for families living in each of the 66 different MBM regions of Canada to maintain a modest, basic standard of living.[8] The MBM is built on the direct costing of a basket of goods and services deemed necessary to attain a basic, modest standard of living for a family of four. This family is called the "reference family." Having a detailed description of an MBM reference family allows Statistics Canada to make a clear assessment of the needs of this family.

Equivalent incomes for other family types are then derived using a formula that yields the level of disposable income they each would need to meet the same modest, basic standard of living. The key advantage of using the reference family approach is that it is not feasible to calculate poverty thresholds for every family type. The assumption underlying the equivalization method is that two different families are equally well off when they have disposable income equal to their respective poverty lines.[9]

The underlying equivalization theory can be described in the following way. Defining P_i as the poverty line for family i and P_r as the poverty line for the reference family, P_i is related to P_r by the following equation:

$$P_i = P_r / E \, ,$$

(1)

where E is an equivalence factor. For example, if it were the case that family i needed half the income of the reference family to be considered not in poverty, then E in the above equation would equal 2.

E can be defined across any family dimension. In the MBM context, E is defined according to family size in the following relationship:

$$E = \sqrt{S_r} / \sqrt{S_i} \, ,$$

(2)

where S_i is the size of family i and S_r is the size of the reference family. This is an application of the square root equivalization scale, which is recommended for use internationally to create equivalized income for different family sizes.[10]

Putting equations (1) and (2) together would yield

(3)

$$P_i = P_r \times \left(\sqrt{S_i} / \sqrt{S_r} \right)$$

5. Lewbel, Arthur, and Krishna Pendakur (2006).
6. Chen, Wen-Hao (2008).
7. Lewbel, Arthur, and Krishna Pendakur (2006).
8. More detail on the methods used to price goods and services is provided in Report on the second comprehensive review of the Market Basket Measure.
9. Lewbel, Arthur., Pendakur, K. (2006).
10. United Nations Economic Commission for Europe (2011).

and because the reference family size for the MBM (S_r) is 4, equation (3) would simplify to

$$P_i = P_r \times \left(\sqrt{S_i} \middle/ 2 \right)$$

(4)

In Table 1, the MBM disposable income amounts needed for the reference family of four to be considered above the poverty line are presented for the 2018 reference year and for selected MBM regions in Canada. The table also shows the disposable income amounts needed for other family sizes to be considered not living in poverty. These disposable income amounts are determined by creating equivalent incomes for the different family sizes—incomes at which they would be as well off as the reference family and escape poverty—using equation (4). Using this approach, E is equal to 2 if the family size equals one, 1.414 if the family size is two, 1.155 if the family size is three, 1 (unchanged) if the family size is four, 0.894 if the family size is five, etc.

Table 1
Market Basket Measure thresholds for the reference family and selected target family sizes, by selected Market Basket Measure region, 2018

	Target family size				
	One	**Two**	**Three**	**Four**[1]	**Five**
Market Basket Measure region					
Halifax, Nova Scotia	22,599	31,959	39,142	45,197	50,532
Quebec, rural	18,902	26,731	32,739	37,804	42,266
Toronto, Ontario	24,071	34,042	41,692	48,142	53,824
British Columbia, population 100,000 to 499,999	23,556	33,313	40,799	47,111	52,672
Equivalence factor					
E	2.000	1.414	1.155	1.000	0.894

1. The MBM threshold.
Notes: Using the 2018-base Market Basket Measure (MBM) methodology. Selected family sizes were adjusted using the square root equivalization method.
Source: Statistics Canada. Table 11-10-0066-01 Market Basket Measure (MBM) thresholds for the reference family by Market Basket Measure region, component and base year. Authors' calculations.

The rest of this discussion paper concerns additional information and evaluations of the equivalization method used in the MBM.

> **Other ways to determine equivalent income used in the Market Basket Measure**
>
> Similar to the way the square root equivalence scales are used to adjust the poverty thresholds for different family sizes, another method could be used to adjust for differences in costs caused by geography. By costing out regionally defined baskets for 66 different MBM regions, the methodology implicitly establishes income levels at which families from these regions are considered equally well off. This practice could be replaced by using an equivalence formula for geographical adjustments, thereby reducing the data requirements and the number of calculations needed to derive the thresholds, and consequently, making the MBM more transparent to users. For an example of what this process could look like, see Appendix B.

Appropriateness of the square root equivalence scale

One question that commonly arises is whether the square root scale is the most appropriate or whether some other set of equivalization factors would more accurately derive thresholds for other family sizes.

An in-depth statistical analysis of equivalence scales is described in Equivalence scales, well-being, inequality, and poverty: sensitivity estimates across ten countries using the Luxembourg income study (LIS) database. In this paper, the authors argue that most equivalization scales in use are well approximated by the formula:

$$W = D \middle/ S^e ,$$

(5)

Where:

W is the equivalent income per person

D is the reference family's disposable income

S is the target family size

e is the equivalence elasticity.

When:

$e = 0$ then $W = D$, which would represent complete economies of scale between family sizes (i.e., no adjustment is needed for family size).

When:

$e = 1$ then $W = D/S$, which would represent no economies of scale between family sizes (i.e., income divided by family size would yield income per capita).

Using the terminology introduced in the previous section, equation (3) is simply a special form of equation (5), where $S_i = 1$ and $e = 1/2$.

Rearranging the terms in equation (5) gives a formula for calculating the equivalence elasticity:

$$e = \frac{\left(\ln D - \ln W \right)}{- \ln S} \qquad (6)$$

Using equation (6), various equivalization schemes can be easily compared.

Since equation (5) has an implied reference family size of one, equation (6) would need to be adjusted slightly when using other family sizes in the following way:

$$e = \frac{\left(\ln D - \ln W \right)}{\left(\ln S_r - \ln S_i \right)} \qquad (7)$$

Where:

S_r is the reference family size

S_i is the target family size

In their analysis, the authors found that varying the size of e from low to high values could lead to differences in inequality measures. At the same time, a value of $e = 1/2$, which yields the "square root scale," was seen as delivering a "compromise" level of equivalence between complete and no economies of scale and yielded fairly similar equivalence elasticities as other scales commonly in use. For example, they estimated the e for Canada's low-income cut-offs (LICOs) to be 0.56—very close to the square root scale.

Table 2
Market Basket Measure thresholds for the reference family assuming different economies of scale elasticities, Halifax, Nova Scotia, 2018

Equivalence elasticity	e=0	e=0.25	e=0.5[1]	e=0.75	e=1	e=0.56[2]
Family size			MBM threshold			
1	45,197	31,959	22,599	15,980	11,299	20,795
2	45,197	38,006	31,959	26,874	22,599	30,657
3	45,197	42,061	39,142	36,426	33,898	38,472
4	45,197	45,197	45,197	45,197	45,197	45,197
5	45,197	47,790	50,532	53,431	56,496	51,213
Family size			Equivalence factor			
E[1]	1.0	1.4	2.0	2.8	4.0	2.2
E[2]	1.0	1.2	1.4	1.7	2.0	1.5
E[3]	1.0	1.1	1.2	1.2	1.3	1.2
E[4]	1.0	1.0	1.0	1.0	1.0	1.0
E[5]	1.0	0.9	0.9	0.8	0.8	0.9

1. Square root (Market Basket Measure [MBM]).
2. Low-income cut-off.
Notes: The thresholds presented are using the 2018-base MBM methodology.
Source: Statistics Canada, Table 11-10-0066-01 Market Basket Measure thresholds for the reference family by Market Basket Measure region, component and base year. Authors' calculations.

In Table 2, the MBM poverty thresholds based on different equivalence factors in the 2018 reference year are presented for Halifax, Nova Scotia. When $e = 0$, there are complete economies of scale. Under this scenario, quantities and costs of necessities do not change based on family size (i.e., the threshold for the reference family would be appropriate for all family sizes). When $e = 1$, there are no economies of scale. Under this scenario, a family of one would need only one-quarter the income of the reference family. Since these are extreme examples, the table also presents results using different equivalence elasticity values, including the implied LICO adjustment factor of 0.56. This value (0.56) implies slightly lower economies of scale than the square root value (0.5). It also implies an 8% reduction in the poverty threshold for a family of one and a 4% reduction for a family of two. Fewer small families in poverty would have the effect of tilting the composition of poverty away from smaller families (e.g., seniors) towards larger families (e.g., families with children). In addition, the poverty rate could also change.

External researchers' evaluations of the square root scale

In the paper Equivalence scales: An empirical validation, the Centre d'étude sur la pauvreté et l'exclusion (CEPE) evaluated the appropriateness of using the square root scale in the context of the MBM in 2010. Using expenditure patterns drawn from the Survey of Household Spending, MBM inputs and other reasonable strategies, the CEPE estimated equivalence factors for families of unattached people in Quebec. If the equivalence factor derived empirically was close to the value of 2, this would support the use of the square root scale. According to the CEPE, the expenditure patterns of Quebec singles relative to Quebec parents with two children closely conformed (Table 3) to those approximated by the square root equivalence scale. A value of $E = 2.07$ suggests slightly lower economies of scale for necessities in Quebec compared with the values the square root scale would have produced. Therefore, it would have yielded a lower threshold for singles, although the differences would be small.

It is also of note that the CEPE paper reported values of *E* for the food, clothing, shelter and other necessities components of the MBM for Quebec.[11] According to the analysis in that paper, the equivalence coefficients for the clothing and other necessities components were the highest, reflecting relatively low economies of scale for these types of goods and services (i.e., a relatively low possibility of sharing these items). The food component's equivalence coefficient was the second lowest, implying that food items have relatively higher economies of scale compared with clothing. Finally, the shelter component had the lowest equivalence coefficient, suggesting that housing costs can be more easily shared. The fact that some components have high economies of scale while others have low economies of scale created a balancing effect. As a result, the MBM equivalencies based upon expenditure patterns closely replicated the square root method.

Table 3
Observed equivalization coefficient for a family size of one, by Market Basket Measure component,[1] Quebec, 2007

Equivalence elasticity	Total threshold	Food component	Clothing and footwear component	Shelter component	Other necessities component
Equivalence factors (E)	2.07	3.09	4.65	1.26	3.27

1. The CEPE paper did not present an equivalence factor (E) for the transportation component, please see "Equivalence scales: An empirical validation" for more information.
Notes: An equivalence factor of 2 corresponds to an equivalence elasticity of 1/2 for a family size of one.
Source: Fréchet, Guy, Pierre Lanctôt, Alexandre Morin and Frédéric Savard, 2010, "Equivalence scales: An empirical validation." Comité de direction du Centre d'étude sur la pauvreté et l'exclusion, catalogue no. 978-2-550-59521-2.

A common criticism of the MBM is that it fails to properly equivalize shelter.[12] Critics point to the disparity in shelter costs between single-bedroom units and three-bedroom units (the type needed by the reference family), noting that the rent for a one-bedroom apartment is more than half that for a three-bedroom apartment. Based on expenditure patterns, the CEPE shows that housing costs for unattached people were 79% of those of the reference family. Furthermore, items with high economies of scale, like housing, when combined with items with low economies of scale, like food and clothing, create a balance, resulting in the "compromise" square root method, which accurately captures these differences when the individual components are summed to the total threshold values.

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11. Relative expenditures on transportation were deemed relatively difficult to determine by the CEPE, as there were discrete jumps in costs between urban areas, where public transit could be used, and rural areas, where families need to rely on private transportation. Overall, transportation costs were determined to have high economies of scale, especially in rural settings, where the MBM dictates the need for one car, regardless of family size.
12. Griffin and Tabbara (2023); Scott, Berrigan, et al. (2022).

Statistics Canada's evaluation of the square root scale

This section will present the results from a similar analysis by Statistics Canada, which builds upon the CEPE study. Unlike the CEPE, Statistics Canada has access to all the component production data used by the MBM to create the basket for the reference family. Like the CEPE analysis, the Statistics Canada analysis selected different family types, including those with different numbers of children. In doing this, MBM-like thresholds can be directly estimated for different family sizes and compositions, and the appropriateness of the square root method for adjusting can be tested. More detail on the Statistics Canada analysis is presented in Appendix C.

As suggested, to compute the thresholds for different family sizes, the MBM methodology used for the reference family was modified to match the standards set out by experts in their fields for the selected family types. The following is a brief overview of the adjustments made to the components of the MBM.

> **Equivalencies for other characteristics**
>
> In Appendix D of the paper, considerations are raised for creating equivalencies to adjust the MBM thresholds for different types of families.

Food component

Health Canada provided Statistics Canada the food quantity requirements that meet individual basic nutritional needs for a female aged 25 to 49, a male aged 25 to 49, a female aged 9 to 13 and a male aged 9 to 13.[13] With these specified quantities, Statistics Canada used the prices from the 2018-base MBM to calculate the total food basket costs for various family compositions.

Clothing and footwear component

Statistics Canada used the clothing and footwear items, replacement schedule, and prices that were used for each member of the reference family, while changing the number of clothing and footwear items based on different family compositions.[14]

Transportation component

Statistics Canada used the same basket of compact cars for the private transportation subcomponent, while making certain adjustments (e.g., the number of licences, insurance requirements). For the public transportation subcomponent, the number of required public transit passes was altered according to the family composition.

Shelter component

The Canada Mortgage and Housing Corporation's National Occupancy Standard was maintained when determining the shelter needs for a selected family composition. Single people, for whom the standard is met using multiple different dwelling configurations, were assigned the average cost of renting a studio or one-bedroom unit.

Other necessities component

Unique "other necessities" multipliers were estimated for different family sizes (e.g., one to five), and cellphone expenses relevant to each family size were also computed.[15]

Analysis

The benefit of this analysis is that the costs of market baskets, based on the selected family compositions, reflect as much as possible the same methods used when costing out the basket for the MBM reference family.

A notable caveat is that only "per-unit" prices for food for the MBM baskets (i.e., on a price-per-kilogram basis) were available to Statistics Canada. Therefore, quantity discounts available to consumers cannot be factored in.

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13. Using the 2019 National Nutritious Food Basket standard.
14. Using the 2012 Winnipeg Harvest Acceptable Living Level list of clothing and footwear items.
15. For more information on the other multiplier, see Market Basket Measure Technical Paper: The other necessities component.

This could affect the degree of economies of scale observed in the food and other necessities components. Other economies of scale may have also been missed.

Because the MBM was specifically designed for the composition of the reference family, drawing overly strong conclusions from experimental calculations for other family types would be unreasonable. Therefore, the results shown here are intended for evaluating the square root method for different family sizes and should not be used for other purposes.

Once the basket costs for different family sizes and compositions are established, the equivalence factors (E) and the equivalence elasticity values (e) can be estimated and compared with those produced by the square root method. Table 4 shows the average values as computed for MBM thresholds across all regions in Canada.

According to the results in Table 4, thresholds calculated using the square root method are slightly higher than those calculated directly using the MBM components. For example, the threshold for an unattached individual using this method was $19,663, compared with the threshold of $21,394 derived using the square root method. Comparing the values of the equivalization factors (E), the value was 2.00 from the square root method and 2.18 for an unattached male. Recall that the CEPE found that the value for a one-person family was 2.07. Therefore, the direct MBM method of calculation and the results from the CEPE suggest that the economies of scale for the MBM basket are smaller than those suggested by the square root scale, a result confirmed by the estimate of 0.57 for e. With these methods, a single male needs 46% of the income of the reference family to be equally well off, compared with 50% as implied by the square root method.

Table 4
Alternative thresholds, averaged across all regions of Canada, and observed equivalization factors (E), 2018

	Family compositions[1]			Square root method[2]		
	Family size	Threshold (dollars)	E	Family size	Threshold (dollars)	E
One adult male	1	19,663	2.18	1	21,394	2.00
Adult couple	2	27,179	1.57			
Adult female in a one-parent family, one child	2	27,892	1.53	2	30,256	1.41
Couple plus one adult	3	36,620	1.17			
Adult female in a one-parent family, two children	3	35,854	1.19	3	37,056	1.15
MBM reference family	4	42,789	1.00			
Adult female in a one-parent family, three children	4	41,631	1.03	4	42,789	1.00
Couple, three children	5	48,609	0.88			
Adult female in a one-parent family, four children	5	47,066	0.91	5	47,839	0.89

1. The average value of equivalization elasticities (e) for the nine family compositions was 0.57.
2. The average value of equivalization elasticities (e) for the square root method was 0.5.
Source: Authors' calculations.

The method also allows for components of the MBM to be evaluated, with component threshold values for equivalization values (E) and equivalization elasticities (e) also computable. Results are shown in Table 5.

Table 5
Alternative component values and equivalization factors E (for a single adult male and the reference family) and e (for all nine alternate family types)

	Food component	Clothing and footwear component	Transportation component	Shelter component	Other necessities component
Component value (reference family)	11,710	2,153	4,399	13,038	11,488
Component value (adult male)	3,502	468	3,506	8,254	3,933
E (adult male)	3.34	4.60	1.25	1.58	2.92
e (all nine alternate family types)	0.92	1.11	0.15	0.25	0.79

Source: Authors' calculations.

Notably, none of the equivalization factors (E) for a single male are near 2. Transportation and shelter are less than 2, reflecting relatively high economies of scale in these components, while food and clothing are greater than 2, reflecting lower economies of scale in these components. The results underscore the conclusion made by the CEPE and elsewhere that the square root method should not be used to create equivalent values for MBM components.

To conclude this portion of the analysis, the evidence is relatively weak for the argument that the square root method does a poor job creating equivalent levels of poverty thresholds for different family sizes. Based on existing research, the square root method may create poverty thresholds that are higher than those obtained by directly pricing baskets for smaller family sizes. This should address concerns that the poverty thresholds may be too low for smaller families because of the poor performance of the square root method. However, this observation comes with important caveats, including the fact that the approach used in this section could not account for quantity discounts in food and potentially some other aspects of economies of scale. Given the absence of perfect accounting for economies of scale across some items, it is reasonable to agree with previous research by CEPE and conclude that the square root method produces valid standard of living adjustments by family size for the MBM's poverty thresholds.[16]

Conclusion

This discussion paper describes why equivalization methods are used, followed by an explanation of the square root scale and the motivations for using it. The paper concludes by providing a summary of the assessments of the efficiency of the square root scale and evaluates the results.

As with the other products in this series, this paper aims to foster engagement and debate with the public and stakeholders to explore research topics that could help inform discussions for the next comprehensive review of the MBM, improve the understanding of the MBM methodology, and potentially expand analytical tools that involve or rely on the MBM. Users are welcome to ask questions, provide feedback and make suggestions for future work on any topics relevant to the MBM.

Those who are interested in contacting us are encouraged to email statcan.market.basket.measure-mesure. du.panier.de.consommation.statcan@statcan.gc.ca.

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16. Fréchet, Lanctôt, Morin and Savard (2010) also found that the values of E for Quebec decreased from rural to urban areas. Statistics Canada observed a similar phenomenon for Quebec, but it was not replicated in other provinces. The value of E in separate Canadian regions appeared to vary randomly around the national average of 2.2.

Appendix A

Table A
List of forward-looking research agenda items

Research topic	Short description
Child care expenses	Currently, child care costs are represented in the Market Basket Measure (MBM) as a direct deduction from disposable income. This way, a family's needs are compared with an income measure that re-flects their available resources. Experts have asked Statistics Canada if this is the best way to deal with child care expenses in the MBM. Could child care costs be treated as a separate basket item instead?
Remoteness: Delineating remote regions for the Market Basket Measure Remoteness - Market Basket Measure thresholds for remote regions	Statistics Canada will research whether adjustments should be made to the MBM to account for higher costs faced by families living in remote regions and communities to derive (for example) better estimates for the northern parts of the provinces.
Different family types Equivalization analysis	Currently, Statistics Canada estimates MBM thresholds for a family of four and uses the square root equivalization scale to derive thresholds for families of different sizes. Does this method lead to the best possible thresholds for smaller families and unattached individuals? Additional study could also be conducted on whether it may be appropriate to construct separate basket values for families of the same size but with different compositions (e.g., one-parent family with three children versus a couple with two children) or other characteristics (e.g., age of family members).
Communications technology	Statistics Canada will look at how a separate communications component could best be added to the MBM. Presently, the need for communication goods and services is reflected in the "other necessities" component.
The other component	The other necessities component is meant to represent the costs of goods and services other than food, shelter, transportation and clothing. The list of items that could potentially be included in the other necessities component is large and could vary depending on the structure, age, location or other circumstances of a family. Ongoing research on the methodology underpinning the other component could verify whether the current method for setting the value of the other necessities component is adequate or must be improved.
Poverty index	Anchoring the MBM to specific base years, yet updating it regularly to reflect changes in the standards of living to ensure it remains relevant, is an underlying strength of the MBM. However, periodically rebasing the MBM leads to the creation of various poverty lines that can make it difficult to track poverty trends over longer periods. To improve transparency and help track poverty trends over longer periods, the implementation of a poverty reduction index will be considered.
Inverse correlation of shelter and transportation costs	Often, people in areas where shelter costs are relatively higher have transportation costs that are relatively lower and vice versa. For instance, people in rural areas typically pay lower rents or mortgages but must spend more on fuel and seldom access public transportation. We propose to explore whether the MBM could be improved by more precisely considering these differences in costs.
Using the Market Basket Measure with administrative data	As the MBM currently exists, its poverty rates can be accurately calculated using a combination of survey and administrative data. We propose to explore the feasibility of applying MBM thresholds to administrative data only.
Additional Market Basket Measure income inequality indicators	Because the majority of the current analytical products based on the MBM do not describe the full income distribution, as they typically compare the MBM threshold with disposable income, they do not fully describe income inequality. Proposed additional inequality indicators will be presented, allowing income disparities among Canadians to be better identified.

Appendix B

An alternative approach to costing regional-specific MBM thresholds would be to calculate the threshold for a reference family in one area and use a spatial price deflator to yield the thresholds for other regions. However, a price deflator with at the level of detail needed for the MBM does not currently exist. Nevertheless, given the set of thresholds for the 66 MBM regions, equivalence factors can also be expressed for each region. In Table B, regional equivalences (relative to Toronto) would range from a low of 0.779 for the Quebec communities with a population between 30,000 and 99,999 to a high of 2.150 for Iqaluit in Nunavut. Through this method, some researchers have used the MBM thresholds as a practical spatial price deflator.[17]

Table B
Spatial deflators using selected Market Basket Measure thresholds

Market Basket Measure region	Food component	Thresholds
Quebec, population 30,000 to 99,999	43,022	0.779
Toronto, Ontario	55,262	1.000
Nunavut, Iqaluit	118,787	2.150

Note: The thresholds presented are using the 2018-base MBM methodology.
Source: Statistics Canada, Table 11-10-0066-01 Market Basket Measure thresholds for the reference family by Market Basket Measure region, component and base year. Authors' calculations.

Appendix C
Additional detail on Statistics Canada's evaluation of the square root scale

This appendix includes an additional description of how Statistics Canada evaluated the square root scale for this study.

Alternate MBM thresholds were produced for different family sizes, from one-person families to five-person families, with different family compositions (i.e., combinations of adults and children), including the four-person reference family (Table C.1).

The family types were chosen to reflect different, common family sizes and types, but are not intended to be exhaustive. As in the MBM, adults are aged 18 or older.

The analysis was conducted for the 53 MBM regions in the Canadian provinces. The territorial regions, where the MBM calculation methodologies are slightly different, were excluded. This paper produces MBM thresholds for nine family types for each of the 53 regions. Statistics presented in the main paper are based on a weighted average of the 53 regions, with weights derived from the 2016 Census regional population shares.

Table C.1
Different family compositions used in Statistics Canada's analysis

Family size	Family composition description
1	One adult male
2	One adult female and one adult male
2	Adult female and one male child
3	Couple and one male child
3	Couple plus one adult male
4	Couple, one female child and one male child[1]
4	One adult female, one female child and two male children
5	Couple, one female child and two male children
5	One adult female, two female children and two male children

1. The Market Basket Measure reference family.

Alternate 2018 MBM thresholds by family size were created by repurposing the data points originally used in the 2018-base MBM methodology. Readers of this paper are expected to have a basic understanding of how the thresholds were constructed for the reference family in the 2018-base MBM.[18]

Modifications that were incorporated to reflect unique needs of different family sizes and compositions are presented in Table C.2.

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17. Chen, Wen-Hao (2008) and Picot, Garnett, and Yuqian Lu (2017).
18. For more detail on the 2018-base MBM methodology, see Report on the second comprehensive review of the Market Basket Measure.

Table C.2
Modifications to the 2018-base Market Basket Measure methodology to account for different family compositions

Component	Description
Food	The food basket for the current Market Basket Measure (MBM) reflects Health Canada's 2019 National Nutritious Food Basket. Health Canada recently provided a list of food that provides individual basic nutritional needs for the following people: females aged 25 to 49, males aged 25 to 49, females aged 9 to 13 and males aged 9 to 13. This makes the construction of food baskets for different family sizes and compositions possible. Otherwise, food products included are the same as those in the 2018-base MBM.[1]
Clothing and footwear	The Social Planning Council of Winnipeg and Winnipeg Harvest Acceptable Living Level basket is used as the standard for the clothing component of the MBM. This basket contains goods for a reference family of four (one adult female, one adult male, one 7-year-old girl and one 10-year-old boy). For this project, the baskets for children are assumed to vary only by sex and not by age.
Transportation	The MBM 2018-base methodology calculates transportation costs based on the weighted average of private and public transportation costs, with weights based on commuting patterns form the 2016 Census. The method used in this study follows a similar approach, after adjusting for the private and public transportation needs of the respective family. For private transportation, gasoline needs, the number of licences and the insurance needed were adjusted based on family size and the number of adults. For public transportation, a public transit pass was provided for each adult and every two children.
Shelter	Shelter costs are derived using different rental unit configurations, following the National Occupancy Standard and representative data from the 2016 census. Configurations are as follows:

	Family description	Number of bedrooms
	Adult male	Average of studio and one-bedroom unit
	Couple	one-bedroom unit
	Couple and one male child	two-bedroom unit
	One adult female and one male child	two-bedroom unit
	Couple plus one adult male	two-bedroom unit
	Couple, one female child and one male child[2]	three-bedroom unit
	One adult female, one female child antwo male children	three-bedroom unit
	Couple, one female child and two male children	three-bedroom unit
	One adult female, two female children and two male children	four-bedroom unit

Component	Description
Other Necessities	Unique multipliers by family size were calculated in the same manner as for the reference family size.[3] The multiplier values were 87.1, 85.2, 80.6, 75.4 and 73.3 for reference family sizes one through five, respectively. Cellphone expenses for each family size were estimated using the Survey of Household Spending.

1. Report on the second comprehensive review of the Market Basket Measure.
2. The MBM reference family.
3. Market Basket Measure Technical Paper: The other necessities component.
Note: The ages for food and clothing and footwear components do not line-up perfectly to the MBM reference family.

Equivalencies for other characteristics

The analysis presented in paper demonstrated how Statistics Canada created poverty thresholds for various family sizes using equivalence scales. However, as mentioned earlier, equivalence factors can be computed for any family characteristic and used to adjust poverty thresholds. Indeed, critics of the MBM sometimes focus on a particular group of people at risk of poverty and argue that a new set of poverty lines should be developed to recognize that group's additional costs of living. For example, Griffin and Tabbara (2023) argue the MBM does not properly capture seniors' poverty in Canada and that the development of a seniors-specific measure of income adequacy is therefore necessary. Also, Scott, Berrigan, Kneebone and Zwicker (2022) document caregiving services, assistive devices and aids, and other out-of-pocket expenses incurred by people with disabilities that may not be fully captured in the MBM methodology.

The fact that costs of living are sensitive to differences in family characteristics, beyond region and family size, is not under debate. However, the MBM is a statistical tool used to examine the effect of changes in family income, prices and government policy on poverty. It is not intended to be the final word on the cost of living for different groups at risk of poverty, nor is it meant to determine program eligibility or set a minimum income. Rather, MBM thresholds and the poverty rate are to be used with other statistics and knowledge to make informed decisions.

If one wishes to calculate alternative thresholds for families that consider specific characteristics, this paper has demonstrated this could be achieved by determining an equivalization factor (E) for a given characteristic. This could be done by examining the differences in expenditure patterns between families with those characteristics and those without. The information on expenditure patterns could come from a survey or another expert source.

References

Buhman, Brigitte, Lee Rainwater, Guenther Schmaus and Timothy M. Smeeding (1988). "Equivalence scales, well-being, inequality, and poverty: sensitivity estimates across ten countries using the Luxembourg income study (LIS) database." The review of income and wealth.

Chen, Wen-Hao (2008). "Comparing Low Income of Canada's Regions: A Stochastic Dominance Approach." Catalogue no. 75F0002M - no. 006.

Devin, Nancy, Eric Dugas, Burton Gustajtis, Sarah McDermott and José Mendoza Rodríguez (2023). "Launch of the Third Comprehensive Review of the Market Basket Measure." Catalogue no. 75F0002M.

Djidel, Samir, Burton Gustajtis, Andrew Heisz, Keith Lam, Isabelle Marchand and Sarah McDermott (2020). "Report on the second comprehensive review of the Market Basket Measure." Catalogue no. 75F0002M.

Fréchet, Guy, Pierre Lanctôt, Alexandre Morin and Frédéric Savard (2010). "EQUIVALENCE SCALES: AN EMPIRICAL VALIDATION ." Centre d'étude sur la pauvreté et l'exclusion. Catalogue no. 978-2-550-59521-2.

Griffin, Paloma and Mohy-Dean Tabbara (2023). "A fine line: Finding the right seniors' poverty measure in Canada." Maytree.

Gustajtis, Burton and Andrew Heisz (2022). "Market Basket Measure Technical Paper: The other necessities component." Catalogue no. 75F0002M2022006.

Hatfield, Michael (2002). "Constructing the Revised Market Basket Measure." Applied Research Branch, Strategic Policy, Human Resources Development Canada. Catalogue no. MP32-30/01-1E-IN.

Human Resources Development Canada (2003). "Understanding the 2000 Low Income Statistics Based on the Market Basket Measure." Applied Research Branch, Strategic Policy, Human Resources Development Canada. Catalogue no. RH63-1/569-03-03E.

Lewbel, Arthur, and Krishna Pendakur (2006). "Equivalence Scales." The New Palgrave Dictionary of Economics. Palgrave Macmillan, London.

Picot, Garnett, and Yuqian Lu (2017). "Chronic Low Income Among Immigrants in Canada and its Communities." Catalogue no. 11F0019M, no. 397.

Scott, C.W.M., Berrigan, P., Kneebone, R.D. et al. (2022). "Disability Considerations for Measuring Poverty in Canada Using the Market Basket Measure." Soc Indic Res 163, 389–407.

United Nations Economic Commission for Europe (2011). "Canberra Group Handbook on Household Income Statistics," Second Edition.