Cross-national Comparisons of Changes in Expenditure Patterns Over Time

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Abstract

Equivalence scales are an important part of any comparison of economic well-being across families of different sizes and types. While there is much theoretical work on appropriate methods of calculating such scales, in practice statistical agencies tend to pick a particular scale and then stick to it over time. If patterns of consumption change over time, however, a fixed scale can fail to reflect actual changes in well-being for some types of families. Similarly, there is some tendency in the literature to use a standardized equivalence scale for cross-national comparisons across time, but that may also be problematic if the distribution of expenditures on necessities by family size varies across countries, or consumption patterns change at different rates in different countries.

The goal of this paper is to examine these issues empirically for a variety of countries. This paper uses data from expenditure surveys conducted in 2000 and 2005 (or as close to those years as possible, given data limitations) to examine shifts in the composition of expenditures both within and across countries between those two years. Survey data from the United States, Canada, France, Hungary, Israel, Mexico, Switzerland and Poland are included. The paper compares patterns of expenditure (e.g., shares for major categories such as food, shelter and medical) across family size groups within each country in both years, and estimates cross-year changes by family size categories. Differences in expenditure changes across groups are identified for each country, and are compared cross-nationally. Simple equivalence scales by year, country, and demographic group are also estimated and compared.

I. Introduction

The measurement of economic well-being requires some adjustment of income or resources to reflect differences in need relating to family size, family composition, or other factors. Equivalence scales are adjustment factors that can be applied to family or household incomes to reflect differences in the characteristics that affect economic needs[1]. Equivalence scales that have been used for such adjustments have included everything from simple adjustments based on per capita income (i.e., dividing total income by the number of persons in the income unit), to complex formulas that are based on many characteristics of the income unit and the consumption bundle assessed.

In general, per capita adjustments of income are unsatisfactory because they fail to take into account economies of scale in the purchase of shelter and other basic needs. Choosing the specific adjustments to be used to estimate such economies of scale, however, is a difficult task, and there is a large literature on potential methods that could be used. In particular, two types of choices affect equivalence scale construction: first, the choice of consumption items to be included in the definition of "need," and second, the choice of household or family characteristics to be taken into account in the construction of the scales.

Some of the earliest equivalence scales used to compare needs were based on Engel's observation that the poor spend a larger proportion of their incomes on food than do the rich[2]. Further, at any given income level larger families spend a higher share of their income on food than do smaller ones. The proportion of total income spent on food could therefore be used as a proxy for the relative share of the family budget going to necessities. Assuming that the proportion of income spent on necessities is indicative of material well-being (i.e. households that devote the same share to necessities are equally well-off, all else constant), we can use an Engel methodology to estimate equivalence scales using expenditure data. Under this approach the amounts that must be spent on food (or on a mixed basket of goods deemed to be necessities, as has been more common in recent practice),[3] may be regarded as approximately fixed at a given point in time for any given family size, or at least less subject to differences in consumption preferences and capacity than a measure based on total family consumption would be.

For the purposes of this paper, we have largely focused on the definition of need as reflected in the consumption bundles chosen as the basis for comparison. While other factors, such as the number and ages of children in the household, are also likely to have some independent impact on family needs, we have not yet extended our analysis to such issues. We examine equivalence scales based on food alone, food, clothing, and shelter, and food, clothing, shelter, and health care. Health care costs (and therefore, their proportion of the consumption bundle), in particular, differ greatly across countries, and

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[1] Computation of equivalence scales is of course not the only approach that can be taken to comparisons of well-being. For a recent discussion of the literature on the alternatives, see Koen Decancq, Marc Fleaurbaey, and Erik Schokkaert, 'Inequality, Income and Well-being,' CORE Discussion Paper 2014/18, Center for Operations Research and Econometrics, April 2014.

[2] ENGEL, E.: "Der Werth des Menschen; I. Teil: Der Kostenwerth des Menschen," in Volkswirt-schaftliche Zeitfragen, Vol. 37-38. Berlin: L. Simion, 1883, 1-74. "Die Lebenskosten Belgischer Arbeiter-Familien Friuher und Jetzt," International Statistical Institute, Bulletin 9, Rome, 1895, 1-124.

[3] Although originally, as noted, the Engel methodology referred to the proportion of income spent on food, the measures used in this paper generalize to other necessities as is common in the literature (e.g. Phipps and Garner, 1994).

thus their inclusion in consumption necessities may have important implications for cross-national comparisons.

II. Methods

This paper focuses on estimating the impacts of family size differences on consumption needs across eleven different countries. The estimates are confined to differences in family size; we have not yet attempted to account for other family characteristics such as the ages of family members. We estimate equivalence scales for family size in two ways: (1) using dummy variables to distinguish families of different sizes; (2) using single-parameter approximations to facilitate comparisons across time and place. The first of these approaches examines the proportion of income spent on a bundle of necessities (under alternate definitions) by families of different sizes, using an approach based on the assumptions underlying the Engel methodology. The second set of estimates essentially collapses our findings into a single-parameter estimate of family-size effects for specific countries, to allow for simpler comparisons across a wider array of countries and time periods.

Dummy Variables to Distinguish Families of Different Sizes

This approach is based on that used by Statistics Canada to estimate Low Income Cut-Offs (LICOs). Phipps and Garner (1994)[4] use a similar methodology to compare equivalence scales for Canada and the United States (US); we adapt their regression specification, functional form and variable definitions for our purposes. Specifically, we estimate the following for each country:

Equation 1

$$lnEXP = \beta_0 + \beta_1 lnY + \sum_{N=2}^{6} \gamma_N HHSIZE\ N + \cdots + \varepsilon$$

EXP is expenditure on the necessities. We estimate scales using three necessity bundles: (1) food; (2) food, shelter and clothing; (3) food, shelter, clothing and health care. The first conforms to the original Engel methodology. The second corresponds to the definition of necessities used by Statistics Canada in estimating LICOs, and is similar to the list of necessities considered in estimating poverty thresholds under the US Supplemental Poverty Measure (SPM). The third bundle includes health care, which is administered differently across countries. Y is real household income. We estimate scales using before- and after-tax income; the latter are not available for the US. $HHSIZE$ is a set of categorical variables to indicate household size; the base is a single person. We also control for rural/urban status and region. For example, we include dummy variables for Atlantic, Quebec, Prairies and West in the Canadian regressions; Ontario is the base group. Finally, we control for time in pooled regressions; we do not estimate this type of scale by year since it is more cumbersome for comparisons (i.e. it does not reduce to a single parameter). β_j and γ_N parameters to be estimated. ε is the error term.

Rearranging predicted values yields an expression for log income share devoted to necessities (i.e. $SHARE$ equals EXP divided by Y).

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[4] Phipps, S. and Garner, T. (1994). 'Are equivalence scales the same for the United States and Canada?' *Review of Income and Wealth*, 40(1), 1-17.

Equation 2

$$lnSHARE = \beta_0 + (\beta_1 - 1)\ln Y + \sum_{N=2}^{6} \gamma_N HHSIZE\ N + \cdots$$

All else constant, a household with N members and Y_N will be equally well-off as a single person with Y_1 if:

Equation 3

$$\beta_0 + (\beta_1 - 1)\ln Y_1 + \cdots = \beta_0 + (\beta_1 - 1)\ln Y_N + \gamma_N + \cdots$$

Cancelling and rearranging terms yields the equivalence scale for a household with N members (i.e. relative income needed to spend the same share on necessities, and thus be equally well-off as an otherwise similar single person).

Equation 4

$$\frac{Y_N}{Y_1} = e^{\frac{\gamma_N}{1-\beta_1}}$$

We evaluate Equation 4 for each household size with the respective dummy variable coefficient (i.e. γ_N) and that related to income (i.e. β_1). For instance, $e^{\frac{\gamma_1}{1-\beta_1}} = 1$ because $\gamma_1 = 0$. Suppose $e^{\frac{\gamma_2}{1-\beta_1}} = 1.2$. This would imply that a household of two requires 1.2 times the income as an otherwise similar single person to have the same material standard of living.

Single-Parameter Approximations

We construct a second type of equivalence scale to facilitate comparisons across time and place. It is similar to the widely accepted Luxembourg Income Study (LIS) scale, which is defined as the square root of household size (i.e. household size raised to the power of 0.5)[5]. The LIS-style scale facilitates comparisons because it reduces complex comparisons of relative needs to a single parameter. Following the LIS methodology, we estimate the following for each country:

Equation 5

$$lnEXP = \beta_0 + \beta_1 lnY - \beta_2 lnN + \cdots + \varepsilon$$

EXP and Y are defined above. N denotes household size; it is top-coded at six. Again, we control for rural/urban status, region and time in pooled regressions; we construct this type of equivalence scale using pooled data and by year. β_j are parameters to be estimated. ε is the error term.

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[5] For a discussion of the origin of the LIS scale see Buhmann, B., Rainwater, L., Schmaus, G. and Smeeding, T. (I988). 'Equivalence scales, well-being, inequality, and poverty: sensitivity estimates across ten countries using the Luxembourg Income Study (LIS) database.' Review of Income and Wealth, vol. 34, pp. I I5-42.
For a discussion of parameterized equivalence scales in general see for example Coulter, F. A. E., Cowell, F. A. and Jenkins, S. P. 'Equivalence scale relativities and the extent of inequality and poverty.' The Economic Journal, vol. I02, (1992) pp. I067-82.; and Stephen P . Jenkins and Frank A . Cowell, 'Parametric Equivalence Scales and Scale Relativities'', The Economic Journal, Vol. 104, No. 425 (1994), pp. 891-900.

Rearranging predicted values yields an expression for log income share devoted to necessities.

Equation 6

$$lnSHARE = \beta_0 + (\beta_1 - 1)\ln Y - \beta_2 lnN + \cdots$$

All else constant, a family with Y_N will be equally well-off as a single person with Y_1 if:

Equation 7

$$\beta_0 + (\beta_1 - 1)\ln Y_1 + \cdots = \beta_0 + (\beta_1 - 1)\ln Y_N - \beta_2 lnN + \cdots$$

Cancelling and rearranging terms yields the single-parameter approximation.

Equation 8

$$\frac{Y_N}{Y_1} = N^{\frac{\beta_2}{\beta_1-1}}$$

Suppose $\frac{\beta_2}{\beta_1-1}$ = 0.3. This would imply that a household of two requires 1.23 (i.e. two raised to the power of 0.3) times the income as an otherwise similar single person to have the same material standard of living; a household of three requires 39 percent more income, and so on.

III. Data

We chose countries for inclusion in this study if expenditure and income data were available for analysis for at least two points in time. Expenditures include those for food, clothing, shelter/housing (including utilities), and health care. For some countries before tax and after tax income are available; for others only one of these.   Eleven countries were identified as meeting this requirement. These countries include: Canada, France, Hungary, Israel, Mexico, Poland, Russia, South Africa, Taiwan, Switzerland and the United States. Data from these 11 countries have been used to produce single parameter and family or consumer unit size equivalence scales. The majority of the data are from the harmonized Luxembourg Income Study (LIS). LIS is a data archive,[6] which harmonizes household survey data on income, expenditures and assets rendering them as much as possible comparable. Not from LIS are the data for Canada and the U.S. The Canadian data are from Statistics Canada cross-sectional micro-data, public use files. The U.S. data are from the U.S. Bureau of Labor Statistics cross-sectional micro-data internal filed. Data are collected from samples of the non-institutional populations in each country. As far as we know, participation in all of these surveys is voluntary.

The earliest data in the study are from 1998 and the most recent from 2012. Mexico's data cover the largest time span, with data collected periodically from 1998 to 2010. The shortest time spans are for South Africa, for 2008 and 2010. Data from Canada and the U.S. cover years continuously, from 2004 to 2009 for Canada and 2004 to 2012[7] for the U.S. Although earlier data are available for these two countries, we started with 2004 as this is the first year that the Bureau of Labor Statistics, the source of the U.S. data, imputes missing income data and we wanted the Canadian and U.S. data to cover the

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[6] Avaliable via http://www.lisdatacenter.org.
[7] Data collected in 2013 quarter one are also used for the U.S. These data are combined with 2012 data for the analysis.

same time period as much as possible. Table 1 includes the names of countries, times period for the data we used, and website links for details regarding the data.

For most countries, data are collected using household income and expenditure surveys, with two exceptions. These are Hungary and Russia, with data from household monitoring surveys. Across the countries, data are collected using personal interviews, diaries, and sometimes both. Expenditures can refer to those from the most recent week to the last year. When reported in the survey, income is reported for up to a year. In some cases, for example for Canada, income data are not collected from survey respondents but instead are recovered from administrative records (i.e., tax files) with respondents' permission. Depending upon the country, data are collected at the individual, family, household or consumer unit level. Table 2 includes descriptions of the collection units by country and more details regarding time periods when data were collected.

The definition of expenditures used for this study is monetary, what some refer to as out-of-pocket or obligated expenditures, and include transactions costs, including taxes that families/households/consumer units pay for food, clothing, shelter/housing, and health care for their own consumption. U.S. data also include expenditures made by consumers for gifts of goods and services given to individuals outside their consumer units. We expect other country data sets include these expenditures as well; this is an issue we need to address in the future. Table 3 includes definitions of expenditures and income. Table 4 includes definitions of food, clothing, shelter/housing, and health care expenditures. The definitions for the LIS countries is general; specifics are available from the authors.

All expenditures and income are annualized in the country data files with one exception, those for the U.S.. The U.S. data are collected quarterly. In order to have annual expenditures with income referring to the same time period, consumer units with four complete quarters of expenditures are used. For example, the 2005 sample includes consumer units with data collected in 2004 quarter two through 2005 quarter one; expenditures are summed over these four quarters with annual income coming from the last interview. Population weights were adjusted using consumer unit size (one, two, three, four, five, and six or more people) such that the resulting sample has the same distribution as the total population in each year.

IV. Results

Canada-U.S. Comparisons

Table 5 presents equivalence scales estimated using dummy variables to distinguish families of different sizes. Scales are estimated for: a) food; b) food +clothing+shelter; c) food+clothing+shelter+healthcare. These scales are based on the use of before-tax income. For comparison (but not discussed here), results using after-tax income for Canada and select LIS countries are presented in Table 6.

Consider, first, a comparison of equivalence scales estimated for Canada and the U.S., with data pooled for all cycles, as the 'necessity' bundle is expanded and where 'food' is 'food purchased for home consumption'. To aid in understanding patterns of results, Figures 1 and 2 plot equivalence scale parameters against family size for Canada and the U.S., respectively.

For both countries, estimated economies of scale are smaller when the necessity bundle includes only food purchased at home, with point estimates of scales smaller in the U.S.[8] For example, in the U.S. two people spend almost exactly twice as much on food as one person; whereas in Canada, two people spend only 1.75 as much. In the U.S., a family of four people spends about 3.25 times as much on food as a single person; whereas, in Canada, four people spend under 3 times as much as one. (In many cases, the third and fourth family members will be children who will eat less if very young but much more if teenage boys.) Presumably, this reflects differences between the countries in food prices as well as in culture/lifestyle.

Figure 1. Equivalence Scales for Canada (Food=Food at Home)

Figure 2. Equivalence Scales for the United States (Food= Food at Home)

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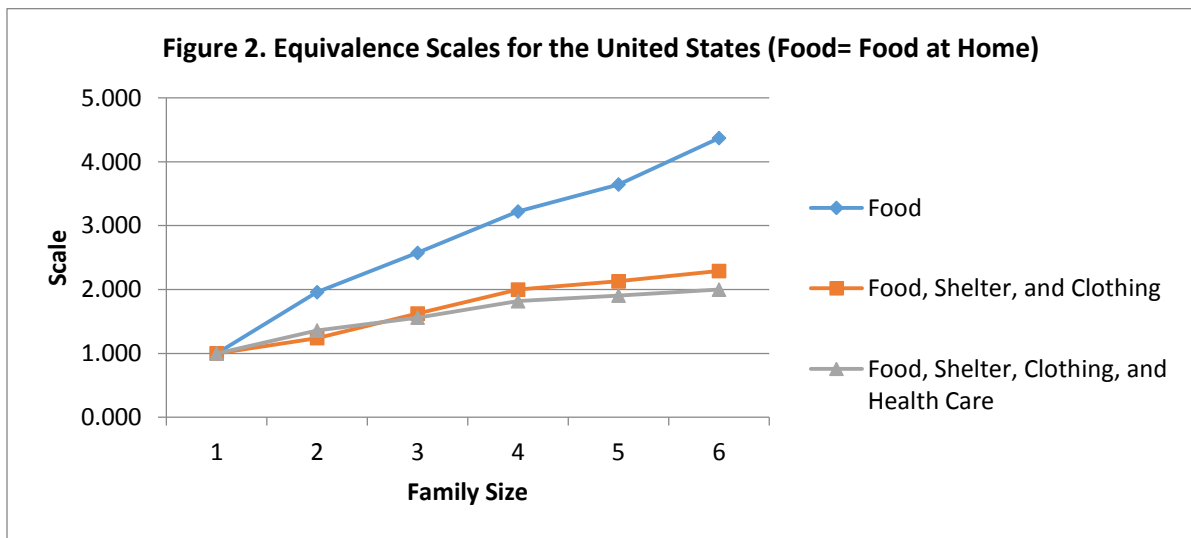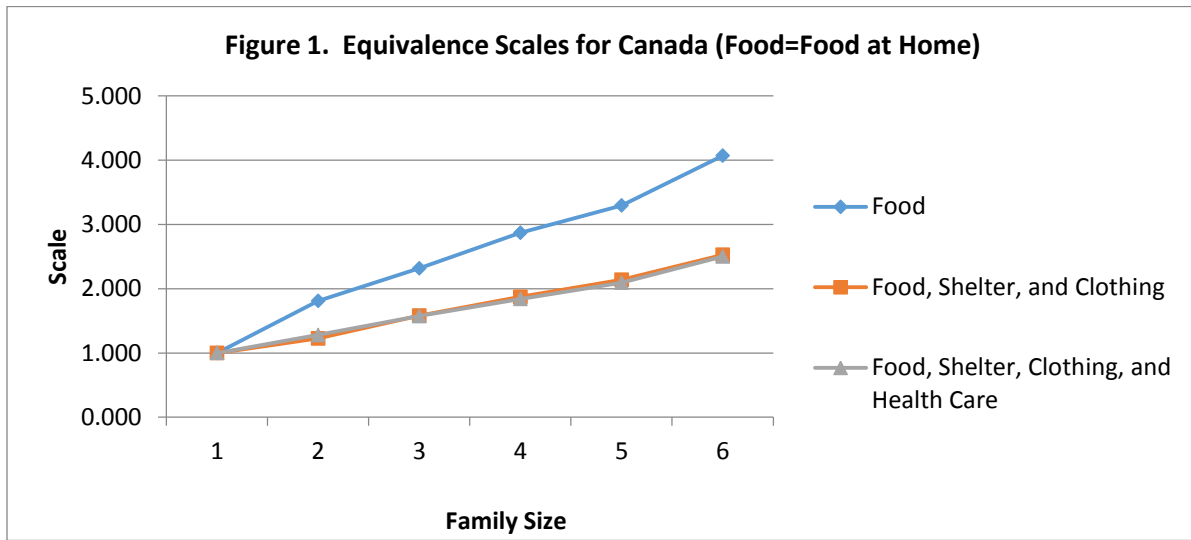
[8] We are in the process of calculating standard errors for all scales in order to assess statistical differences.

When clothing and shelter are added to food purchased for home consumption, estimated economies of scale increase dramatically in both countries, since most of the economies of scale available to people who live together come from shared shelter and utilities. In fact, the estimated increase in economies of scale for the U.S. are so large that the ranking of the two countries reverses. Whereas larger economies of scale in food expenditures were apparent for Canadian families, economies of scale for food+clothing+shelter are larger for U.S. families. (Of potential relevance here is the fact that Canadians spend relatively more on clothing -- perhaps more Canadians need parkas and winter boots.)

 For the U.S., adding expenditures on health care further increases economies of scale for larger households in the U.S.;, but, adding health expenditures has effectively no impact on estimated scales for Canada where expenditures on health are lower.

Thus, our final estimated scales for food, clothing, shelter and healthcare suggest larger economies of scale for the U.S. than Canada. For example, Table 5 (or Figures 1 and 2) indicate that a Canadian household with six members spends 2.5 times as much money on necessities as a single person while a six-person U.S. household spends only 2 times as much.

Food from Restaurants and Take-Aways

In both Canada and the U.S., families faced with time crunches are more likely than in the past to purchase take-away or restaurant food. In the U.S., roughly 30 percent of total food expenditures are on take-away or restaurant food; in Canada, about 20 percent of food is purchased away from home. To the extent that this is a necessary fact of life for many families, we may want to include food purchased away from home in the necessity bundle. The decision of whether or not to do this makes a significant difference to estimates of food equivalence scales, especially for the U.S. See Figure 3, which compares food scales for Canada and the U.S., including and excluding food purchased at restaurants and take-aways, using samples with all years pooled.

Figure 3. Equivalence Scales for Food. Canada and the U.S. Pooled
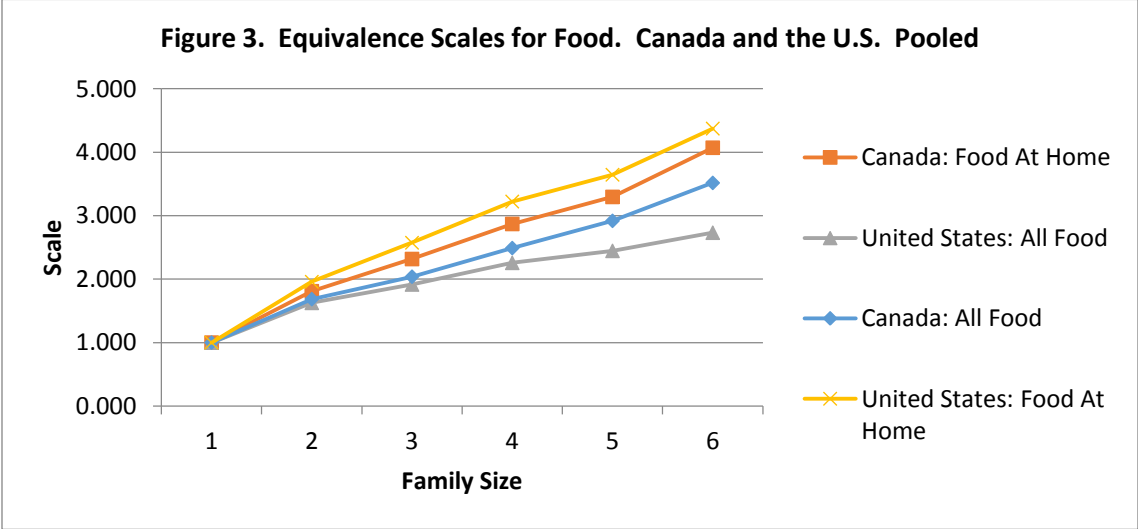
Estimated economies of scale are larger for 'total food' than for food purchased for home consumption. This is, at first, counter-intuitive since we would expect more economies to be available when cooking soup or a turkey for a large family rather than buying each family member a burger and fries. The explanation for this puzzling finding appears to be that families with more members are less likely to eat out. For example, in the U.S., 30 percent of total food purchased by single-person households is from restaurants or take-aways whereas only 18 percent of total food comes from these sources for families of six or more. The same pattern is apparent for Canada (23 percent versus 16 percent). This is not consistent with Engel's idea that poorer families and larger families spend more on necessities than richer or smaller families. Of course, the Engel approach does not take into account families who are poor in terms of available time.

Multi-Country Comparisons

With expenditure data from the Luxembourg Income Study, we are able to expand our comparisons to include a diverse set of countries, including: France, Israel, Hungary, Mexico, Poland, Russia, South Africa, Switzerland and Taiwan. As noted earlier, we provide the family size scale for the LIS countries as well in Table 5 using before-tax income and in Table 6 using after-tax income. The table below summarizes our findings for the most inclusive bundle of needs and for after-tax income.

Summary Table A: **Needs Ratios for Families with Two and Four Members, Based on After-Tax Income and Food at Home Plus Housing, Clothing and Health Care Expenditures**

Family Size				NEEDS RATIOS								
	Canada	France	Hungary	Israel	Mexico	Poland	Russia	S. Africa	Switzerland	Taiwan	U.S.	Mean
2 people	1.26	1.47	1.49	1.60	1.37	1.49	1.33	1.71	1.29	1.60	1.36	1.45
4 people	1.78	2.00	1.82	1.89	1.64	1.81	1.95	1.89	1.45	2.42	1.82	1.86
ratio--2 to 4 persons	0.71	0.74	0.82	0.85	0.84	0.82	0.68	0.90	0.89	0.66	0.75	0.78

Note: Hungary and Mexico based on after-tax income.

As this table demonstrates, and as can be seen in much more detail in tables 5 and 6, family size adjustments do differ quite a bit across countries. For example, the increase in resources needed under the definitions shown for an increase in family size from one person to two ranges from a low of 26 percent increase in Canada to a high of 71 percent increase for South Africa. The mean increase for two people compared to one is about 45 percent.

Ratios for larger families also differ across countries, but the rate of increase is not constant compared to the two-person level, and the highs and lows occur in different places. For four person families, the needs ratio compared to a single person is lowest in Switzerland at 1.45, and highest in Taiwan, at 2.42. The Taiwan estimate is something of an outlier, but the next-highest ratio for this family size occurs in France, where needs for a four person family are estimated to be about twice those for one person. As these estimates and the figures below demonstrate, the shape of the estimated equivalence curves can be quite different in different countries. This in turn implies that in undertaking cross-country comparisons a single parameter estimate that assumes a smooth relationship may be misleading for some purposes, particularly if one is interested in issues such as the addition to needs resulting in the addition of an extra child to the family, for example. On the other hand, some of the observed differences may result from anomalies in the specifics of family composition across family sizes within each country, or other factors that are not directly relevant to cross-country comparisons.

France (Food= Food at Home)

Israel (Food= Food at Home)

Poland (Food= Food at Home)

South Africa (Food= Food at Home)

Taiwan (Food= Food at Home)

Switzerland (Food= Food at Home)
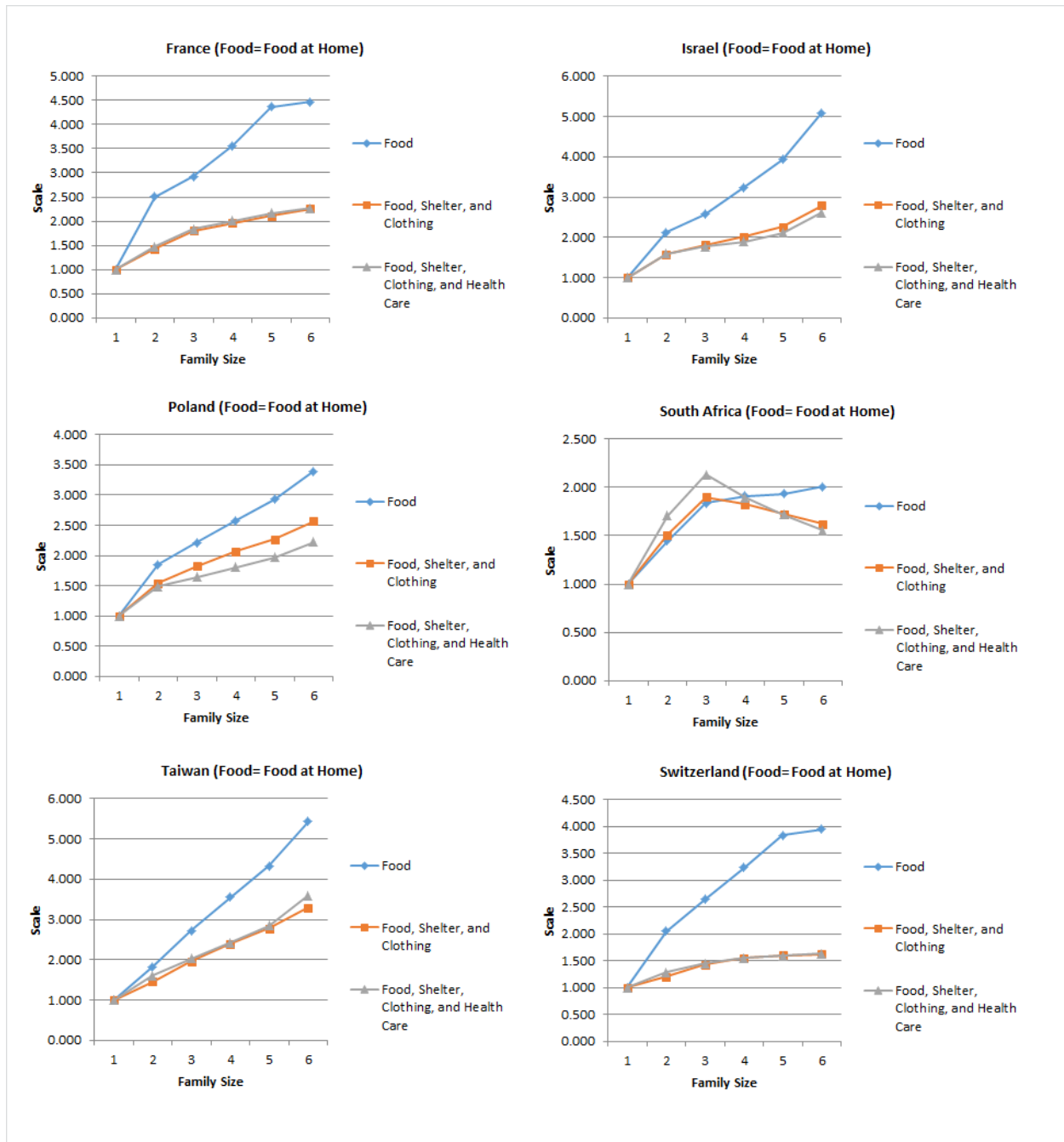
Single Parameter Estimates

Single parameter approximations provide a useful summary of family-size differences in needs for comparison purposes where levels rather than shapes of the distribution are of most interest, or where differences in the shape of the curves may result from factors that are not relevant for the comparison at hand. Single parameter estimates have been computed for 8 of the countries included in this study, as shown in summary table B below and tables 7 and 8. The often-used 'LIS' equivalence scale is the 'square-root of family size,' or, in our terms, a single-parameter approximation of 0.5. A number *less* than 0.5 indicates *larger* estimated economies of scale than the LIS scale. For example, with the LIS

scale, a family of four is estimated to need twice the income of a family of two (i.e., 4**0.5=2). Using total food + clothing+shelter+healthcare, our single-parameter estimate for the U.S. is 0.358, suggesting that a family of four needs only 1.6 times as much as a single person (i.e., 4**0.358 = 1.64)[9]. This difference is less than implied by the summary table above, because single parameter estimates such as these smooth any discontinuities within the estimated distributions and the ratios for other family sizes in the US are relatively lower than the 4 person ratio, thus bringing down the curve as a whole.

Summary Table B: Pooled Single Parameter Estimates of Implicit Equivalence Scales, based on Food, Clothing, Shelter and Health Care

	Canada	France	Israel	Hungary	Poland	S. Africa	Switzerland	U.S.	Mean
Parameter Estimate	0.44	0.50	0.45	0.43	0.41	0.22	0.31	0.36	0.39

Note: Estimate shown for Hungary based on after-tax income; all others are before tax.

The summary table above and final column of Table 7 (using before tax income and the full bundle of necessities) suggests that for most of the countries included in this study, pooled estimates are generally in the range of 0.3 to 0.5, with a mean around 0.4. The table suggests that the estimated relationship of needs to family size reflects a flatter distribution in the US, Switzerland, and South Africa[10], and a distribution with a steeper slope in France, Israel, Canada, Hungary, and Poland. Overall, our estimated economies of scale are generally a bit larger than those suggested by the LIS square-root scale.[11] In future work we hope to disaggregate these estimates further to help understand what structural differences may underlie these differences in the distribution of estimated needs.

For some LIS countries we are able to compare equivalence scales calculated based on after-tax income and the full bundle of necessities as well (see Table 8). Here, the pooled estimates are also generally in the range of 0.4 and 0.5 and again estimated economies of scale are a bit larger than those suggested by the LIS square-root scale.

Differences over Time

As shown in tables 7 and 8, For Canada, Poland and the U.S., where we have more years of data (6 years, 4 years and 8 years, respectively), we see relatively few changes in estimated equivalence scales over the period of our study (roughly, the 2000's).[12] Within-country variation over time does not appear to move outside what we would expect to see from sample variation.

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[9] Additionally, this estimate is based on before-tax rather than after-tax income, and so is not strictly comparable to the estimates shown in the summary table.

[10] The estimates for South Africa suggest much larger economies of scale--a four-person family is estimated to spend only 1.3 times as much as a single person (4**0.22 = 1.34). The fact that the South African scale provides lower needs for family sizes above 4—that is, the addition of extra unit members actually causes estimated needs to decline—suggests that the basket of necessities estimated for South Africa may include more than the usual amount of discretionary spending for smaller family sizes, and in fact does not represent a minimum needs level.

[11] Again, we are in the process of estimating the standard errors for these single-parameter approximations. There are also some puzzles to resolve; one would expect countries where spending on food is much larger than spending on shelter (e.g., Poland, South Africa, Taiwan, Russia) to have smaller economies of scale than countries where shelter is the major expenditure.

[12] We do see some variation for Mexico (using after-tax income) and a lot of variation over time in Russia.

It is interesting, then, to compare estimates from a much earlier time period to illustrate the extent to which different changes in consumption patterns across countries over time can affect estimated equivalence scales. We thus compare our results for Canada and the U.S. from this study with those reported by Garner and Phipps (1994) using data from 1986.[13]

Summary Table C: Share of Total Income Spent on Various Goods Over Time: Canada and U.S.

	Canada 1986	Canada 2004-2009	U.S. 1986	U.S. 2004-2013
Food at Home/Income After Tax and Transfer	13.0	10.1	10.8	8.2
Clothing/Income After Tax and Transfer	7.0	4.8	3.7	1.7
Shelter Out of Pocket/Income After Tax and Transfer	19	23.9	19.9	20.8
Health/Income After Tax and Transfer	2	3.4	4	4.5

The pattern of consumption has changed most in Canada, but in both countries, relative to disposable income, less is spent on food at home and less is spent on clothing whereas more is spent on shelter and healthcare.

Figure 4 provides a comparison of equivalence scales for the full necessity bundle of food at home, clothing, shelter and health for the two countries and time periods.

For both Canada and the U.S., estimated economies of scale have increased (i.e., the additional income needed by larger families relative to smaller families has fallen) between the late 1980's and the late 2000's. This may be explained by the fact that expenditures on goods with relatively smaller economies of scale (i.e., food and clothing) have fallen relative to expenditures in areas with larger economies of scale (i.e., especially shelter in Canada).

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[13] Of course, data sources are not directly comparable. For example, our current work for Canada uses the Survey of Household Spending which has replaced the Family Expenditure Survey used in the 1994 paper.

Figure 4. Equivalence Scales for Canada and the U.S. in 1986 versus 2000s. Necessities= Food at Home+Clothing+Shelter+Health
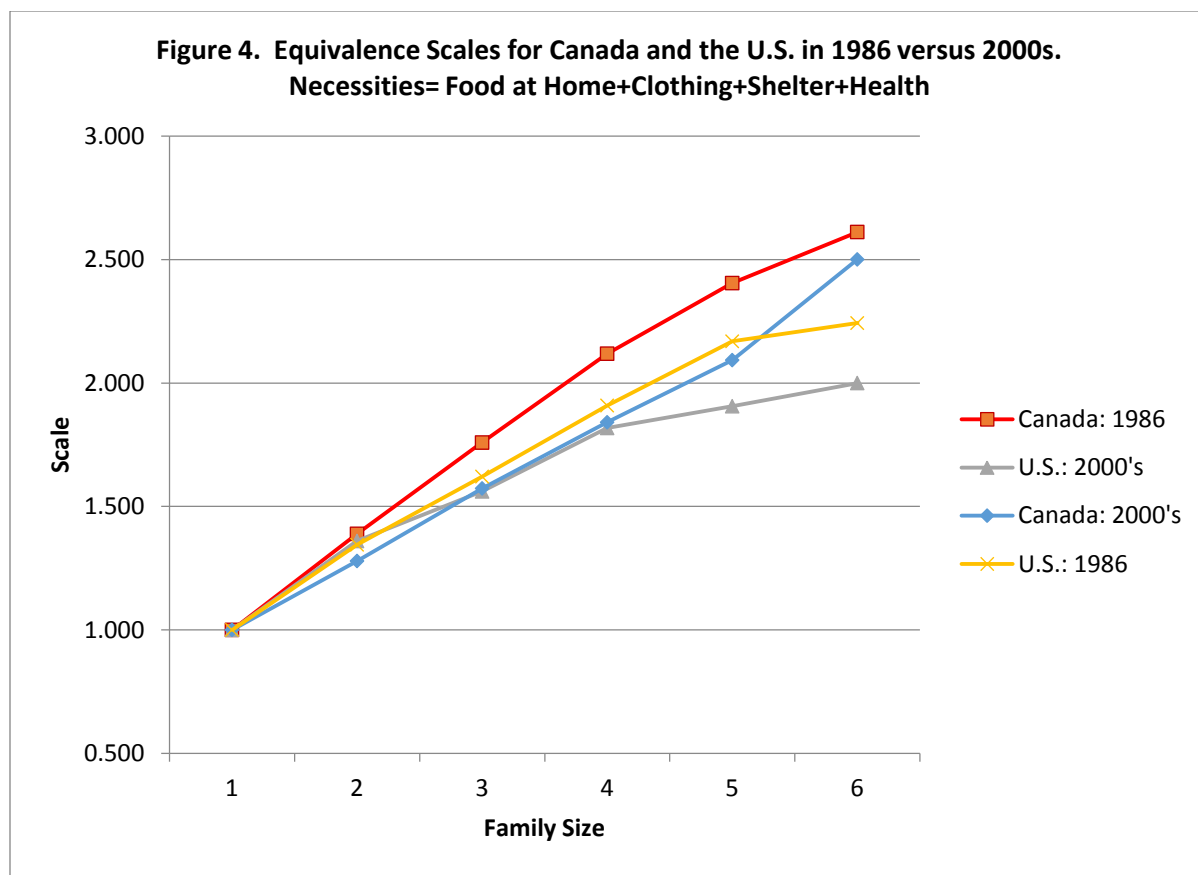
V. Summary and Conclusions

This paper demonstrates that the specific bundle of necessities chosen does have an impact on the family size adjustments estimated under an Engels-type methodology, across all of the countries studied. Specifically, for data from recent decades the inclusion of necessities other than food decreases the size of the adjustment as family size rises in every country except South Africa. However, the inclusion of health care in the bundle makes surprisingly little additional difference in the scales compared to estimates for the same country based on food, clothing and shelter alone. This is true even in the United States, where out-of-pocket medical expenditures can form a large share of family expenditures. The South African data appear to represent a significant outlier, but the shape of the distribution for that country suggests that the market basket used does not in fact represent necessities alone. It would be interesting to follow up these findings with work comparing across groups such as the elderly and the disabled, where medical issues in particular might have greater impacts.[14]

We also observed substantial differences in adjustments for specific family sizes across the countries investigated. The move from one to two persons in the unit, for example, increased estimated needs by amounts ranging from 25 percent to more than 60 percent. For four person units, increases in needs relative to a one person unit ranged from less than 50 percent more to over twice as much.

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[14] For a discussion of these issues, see for example Morciano, M., Hancock, R. and Pudney, S. (2014), Disability Costs and Equivalence Scales in the Older Population in Great Britain. Review of Income and Wealth. doi: 10.1111/roiw.12108e

Further, we found that the shapes of the needs distribution by family size varied substantially across countries. The addition of a single person to a unit increased needs by amounts that varied both within a given country and in comparisons between the same family size differences across countries. For example, moving from one to two persons in Canada, using a scale based on before-tax income, the complete needs bundle, and total food expenditures, increased needs by 22 percent. Moving from 2 to 3 persons increased needs by about 25 percent, while moving from 3 to 4 resulted in a 20 percent increase. For Israel, on the other hand, the jump from one to two persons increased needs by almost 60 percent, while the increase from 2 to 3 resulted in an increase of only 11 percent, and the move from 3 to 4 increased needs by only 7 percent. The US pattern fell somewhere in between the relatively constant rate of increase seen in Canada and the sharp downturn in the supplement for additional family members seen in Israel and in other countries such as France. We believe that these differences probably reflect differences in living situations across families of different sizes as well as in the types of housing available and similar structural factors, but such issues remain to be explored further in future work.

Finally, our investigation of differences in estimated equivalence scales over time found that for any given country among those studied equivalence scales tend to be fairly constant in the short run. Comparisons of estimates from the 1980s with more recent estimates for the U.S. and Canada do show some greater changes, however. These appear to be principally linked to changes in housing prices and markets in these two countries over this time period.

What do these findings imply for conducting cross-national comparisons of economic well-being? Such comparisons are always imperfect, because there is no single summary measure that can actually allow us to account for differences in social structure and customs, consumer preferences, relative prices, and the myriad of other ways in which countries and their inhabitants may differ. Simple equivalence scales of the type estimated here do not provide information on the welfare derived from expenditures on basic needs by families of different types, or on the views of those families themselves relating to their needs. These scales are intended only to allow comparisons of necessary expenditures across families of different sizes in different countries.

Of course, bundles of the goods considered necessary will never be exactly equivalent in different societies and cultures, so these estimates can be at best approximations. And as noted in the discussion above, structural factors such as the distribution of housing types and prices and the age distribution within each country will result in differences across needs that are specific to individual countries. Nevertheless, the findings presented here do point to some basic similarities in the distribution of needs by family size across a diverse group of countries. While estimated family size parameters varied across countries, most clustered fairly close to an estimate of approximately 0.4. This estimate implies somewhat greater economies of scale than 0.5 parameter estimated by Buhmann et al. in 1988 using the LIS data.[15] As seen in our comparisons of Canadian and US data from the 1980s and the past decade, economies of scale do appear to have increased somewhat over that time period, using similar expenditure bundles and methodologies. These findings suggest that contemporary comparisons might be more accurate if a lower parameter is used.

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[15] Buhmann et al., op. cit. (note 5).

Much work remains to be done in this area. One clearly important area for further investigation is the disaggregation of our estimates by household characteristics other than size. These might usefully include the ages of family members, disability/health status, and perhaps employment status. We hope to be able to expand the current study to examine such issues in the future.

Table 1. Countres, Time Periods, and Data Sources

Time Period	Canada[1]	France[2]	Hungary[3]	Israel[4]	Mexico[5]	Poland[6]	Russia[7]	South Africa[8]	Taiwan[9]	Switzerland[10]	United States[11]
					Countries						
1998					X						
1999			X			X					
2000		X			X		X		X	X	
2001				X							
2002					X					X	
2003											
2004	X				X	X	X			X	X
2005	X	X	X						X		X
2006	X										X
2007	X			X		X	X				X
2008	X				X				X		X
2009	X										X
2010				X	X	X	X	X			X
2011											X
2012											X

[1]Canada	Survey of Household Spending	http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getInstanceList&SDDS=3508&InstaId=15492&SurvId=64678
[2]France	Family Budget Survey	http://www.lisdatacenter.org/our-data/lis-database/by-country/france-2/
[3]Hungary	Household Monitor Survey	http://www.lisdatacenter.org/our-data/lis-database/by-country/hungary-2/
[4]Israel	Household Expenditure Survey	http://www.lisdatacenter.org/our-data/lis-database/by-country/israel-2/
[5]Mexico	Household Income and Expenditure Survey (ENIGH)	http://www.lisdatacenter.org/our-data/lis-database/by-country/mexico-2/
[6]Poland	Household Budget Survey	http://www.lisdatacenter.org/our-data/lis-database/by-country/polandn/
[7]Russia	Russia Longitudinal Monitoring Survey _Higher School of Economics (RLMS-HSE)	http://www.lisdatacenter.org/our-data/lis-database/by-country/russia-2/
[8]South Africa	National Income Dynamics Study (NDIS)	http://www.lisdatacenter.org/our-data/lis-database/by-country/south-africa/
[9]Taiwan	Survey of Family Income and Expenditure, Taiwan Area	http://www.lisdatacenter.org/our-data/lis-database/by-country/taiwan-2/
[10]Switzerland	Income and Consumption Survey (EVE/ERC)	http://www.lisdatacenter.org/our-data/lis-database/by-country/switzerland-2/
[11]United States	U.S Consumer Expenditure Survey, Quarterly Interview	http://stats.bls.gov/cex/

Table 2. Collection Unit, Data Collection Time Period, and Sample Sizes for Analysis		
Country	**Collection Unit**	**Time Period**
Canada	Data are collected at the household-level. A household is an individual or group who occupy the same dwelling and do not have a usual residence elsewhere. The household may consist of a family, two or more families sharing a dwelling, a group of unrelated persons or an individual who lives alone. We use full-year private households as the unit of analysis (i.e. at least one member is present throughout the reference year). Also, our sample is restricted to households with one economic family. An economic family is defined as two or more people living in the same dwelling who are related by blood, marriage, common-law or adoption.	Data are collected annually from 2004 to 2009. Data pertain to the entire year, and are collected in the first three months of the following year.
France	The collection unit is mostly individual (persons aged 16 or more), except for housing allowances, family allowances, capital income, transfers received from other households and exceptional incomes, which are asked at the household level only; Household is defined as a group of people (related or not) habitually residing in the same dwelling (whether or not their main residence) and who have a common budget (i.e. who have incomes serving common household expenditures, and/or who simply benefit from those expenditures).	May 9th, 2000 to May 6th, 2001 and March 2005 to February 2006
Hungary	The collection unit is mostly individual, excluding income from household production (raising animals or agriculture), rental income, maintenance and support payments from other households and irregular lump-sums (prizes and premiums). A household is defined as a community of people living together in one house or flat.	April 19th, 2000 to May 23rd, 2000 and September 16th, 2005 - October 15th, 2005
Israel	The collection unit is the household for all income sources (plus individual incomes for income from employed work, self-employed work and work related pensions).A household is a group of people who live together in one dwelling most of the week and have a joint food budget	January 2001 to January 2002; January 2007 to January 2008; January 2010 to January 2011. Investigation of the sample was spread across the entire survey period, so that all weeks in the investigation period would be represented.
Mexico	Collection unit: Monetary incomes and in-kind earnings are collected at the individual level for all household members (the income subcategories are more detailed for adults). Other non-monetary incomes (in-kind transfers, own consumption and gifts from other households) are collected at the household level. A household is a group of persons (not necessarily related by blood) who reside usually in the same private dwelling and share the meals. Domestic servants and guests who usually reside and share meals in the dwelling are nsidered as usual residents of the dwelling, but not as household members (they are part of the sample, but little information is collected for them). Several households can share the same dwelling in which case the one including the owner of the dwelling (or the erson in the name of which the dwelling is rented or made available) is the principal household.	Unspecified 1998; 3rd quarter 2000 (August 10th, 2000 to November 17th, 2000); August 10th, 2004 and November 24th, 2004, split in 9 decades, during each of which the information is collected for 7 consecutive days; August 21st, 2008 and November 17th, 2008; August 21st, 2010 and November 18th, 2010.
Poland	Collection unit: All monetary net incomes are reported at the individual level (with the exclusion of dwelling support); non-monetary incomes, taxes, social contributions and operating farm costs are reported at the household level only.	January to December 1999; January to December 2004; January to December 2007; January to December 2010.
South Africa	Collection unit: Individual level for all income sources, except imputed rental income. In order to be considered a household member, an individual should have resided in the dwelling for at least 15 nights in the last 12 months at the household and shared food and resources when staying at that household. In order to be considered a resident household member, however, the individual should usually stay in the dwelling for four or more nights per week and should share food and resources from a common pool. Only "resident" household members were interviewed.	February - December 2008; Fieldwork for Wave 2 (including both Phase 1 & Phase 2 fieldworks) commenced in May 2010 and concluded in September 2011. There were breaks in fieldwork from 15 December 2010 to 3 January 2011 and again from 9 May to 1 August 2011.

Table 2 (continued). Collection Unit, Data Collection Time Period, and Sample Sizes for Analysis		
Country	**Collection Unit**	**Time Period**
Taiwan	The members of the household consist of those who partake the common living of the household and comprising the following cases: 1.Those who are officially registered under the household head, living in Taiwan area and are (1)Sending more than 50% of one's personal income to fund the household. (2)Acquiring more than 50% of one's personal consumption from the household. (3)Supplying more than 50% of the household expenditure. 2.Those who are not officially registered under the household head but partake the common living of household in accordance with (1) to (3) above	January and February 2001 and January and February 2006
Russia	Collection unit: Household, individual and income source level. A household is defined as a group of people who live together in a given domicile, and who share common income and expenditures. Households are also defined to include unmarried children, 18 years of age or younger, who are temporarily residing outside the domicile at the time of the survey.	September 21st to December 23rd, 2000; September 2004 - December 2004; September 2007 - December 2007; October 2010 - March 2011.
United States	Data are collected at the consumer unit level. A consumer unit comprises either: (1) all members of a particular household who are related by blood, marriage, adoption, or other legal arrangements; (2) a person living alone or sharing a household with others or living as a roomer in a private home or lodging house or in permanent living quarters in a hotel or motel, but who is financially independent; or (3) two or more persons living together who use their income to make joint expenditure decisions. Financial independence is determined by the three major expense categories: Housing, food, and other living expenses. To be considered financially independent, at least two of the three major expense categories have to be provided entirely, or in part, by the respondent.	Data collected quarterly. Use data from 2004 quarter two through 2013 quarter one

Table 3. General Definition of Expenditures and income by Country			
Country	Expenditures	Before Tax Income	After Tax Income
Canada	Expenditures are given by net costs of goods/services received for private use, regardless of whether they were paid for during the reference year or whether expenditures were made in Canada or abroad. All expenditures include taxes, tips, customs, duties and other additional charges. Expenditures may include gifts. Only deductibles are included where insurance settlements are used to repair or replace property.	Before-tax income includes: earnings (e.g. wages/salaries, self-employment income, receipts from rooming/boarding non-relatives); investment income (e.g. dividends, interest, rental income, interest received from loans or mortgages); government transfer payments (e.g. child tax benefits, Old Age Security, Guaranteed Income Supplement, Spouse's Allowance, Canada Pension Plan/Quebec Pension Plan, employment insurance, Goods and Services Tax credit, provincial tax credits, social assistance, workers' compensation, veterans' pensions); other (e.g. income from retirement pensions, superannuation, annuities, alimony, child support, retirement allowance, scholarships, income from outside Canada). Personal income tax refunds are not included.	After-tax income is net of employment insurance premiums and payments to the Canada Pension Plan/Quebec Pension Plan, as well as personal taxes paid in the reference year minus refunds received.
United States	Consist of the transaction costs, including excise and sales taxes, of goods and services acquired during the interview or recordkeeping period. Expenditure estimates include expenditures for gifts, but exclude purchases or portions of purchases directly assignable to business purposes. Also excluded are periodic credit or installment payments on goods or services already acquired. The full cost of each purchase is recorded (with the exceptoin of owed housing), even though full payment may not have been made at the date of purchase. The order of the expenditures listed here follows the order of presentation in published CE tables.	Money earnings and selected money receipts during the 12 months prior to the interview date. Includes income from wages and salaries, self-employment, Social Security, private and government retirement, Interest, dividends, rental income, and other property income, unemployment and workers' compensation and veterans' benefits, public assistance, supplemental security income, and food stamps/debit card values ,regular contributions for support including alimony and child support, as well as any regular contributions from persons outside the consumer unit. Other income includes money income from care of foster children, cash scholarships, fellowships, or stipends not based on working and meals and rent as pay.	*Missing income taxes are currently not imputed in the CE data; thus, after tax income data are not used for the analysis.*
	Out-of-pocket expenditures for owned housing used for primary defintion of housing expenditures.		
	Rental requivalence of owned dwelling replaces out-of-pocket expenditures for alternative definiiton of housing.		
Luxembourg Income Study Countries			
	We use monetary consumption (expenditures). In LIS the following definitions hold: Total consumption, includes that stemming from expenditures (monetary consumption) and that stemming from own-production or gifts (non-monetary). More precisely, a consumption item is considered monetary if the good or service consumed has been purchased by the household, whereas it is considered as non-monetary if it has not been purchased, but either given to the household from somebody else, or self-produced.	Total monetary and non monetary (goods and services) payments received by the household or its individual members at annual or more frequent intervals, that are available for current consumption and that do not reduce the net worth of the household.	Total monetary and non-monetary current income net of income taxes and social security contributions.

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Table 4. Defintions of Food, Clothing, Housing, and Health Care by Country or Country Group				
Country	Total Food	Clothing	Housing Out-of-pocket	Health
Canada	Food at Home + Food Away from Home. Food at Home: spending on food/non-alcoholic beverages from stores, farmer stalls and home delivery; bulk purchases of food/non-alcoholic beverages; food/non-alcoholic beverages purchased from stores while away overnight or longer; food/non-alcoholic beverages for parties, weddings, etc. Food Away from Home: restaurant purchases; board paid to other private households (e.g. day board and children's lunches, board paid while away overnight or longer). We do not include spending on alcoholic beverages in any of the above.	Clothing includes outerwear, suits, dresses, skirts, pants/slacks, shirts, sweaters, sleepwear, sportswear, specialized clothing, socks, hosiery, footwear, accessories (e.g. gloves, hats, mitts, belts, wallets, purses, umbrellas), cloth diapers, jewelry, watches, material not intended for curtains or furnishings, notions excluding craft yard, services such as dressmaking, tailoring, storage, rentals, engraving, maintenance, repair and alterations. We do not include dry cleaning or laundry services.	Utilities + Renter or Owner Expenses. Utilities: water; sewage; elecricity; natural gas; other fuel for heating and cooking (e.g. oil, propane, wood); telephone services (e.g. landline, long distance, installation, repairs, rentals, pay phones, phone cards); cellular and pager services. Renter Expenses: rent; additional amounts paid to landloards (e.g. security deposits); tenants' insurance; repairs/improvements to rented dwellings not reimbursed by landlords. Owner Expenses: mortgage interest and reductions in principal; condominium fees; property taxes; homeowners' insurance; miscallaneous fees related to the dwelling (e.g. legal, real estate, registration/transfer, pad rentals for mobile homes, surveying, appraisals); maintenance and repairs (e.g. fences, driveways, patios, swimming pools, major landscaping projects, roofs, eavestroughing, interior and exterior walls, chimneys, foundations, windows, doors, ceilings, painting, flooring, plumbing, heating and air conditioning equipment, electrical fixtures and equipment, built-in appliances).	Direct Health Care Costs + Insurance Premiums. Direct Health Care Costs: prescription eye wear; other eye care goods and services (e.g. non-prescription eye wear, supplies for contact lenses, exams, surgery including laser); dental services including orthodontic and periodontal procedures; physicians' care; hospital care; nursing homes and other residential care facilities; health care practitioners in the home; other health care practitioners (e.g. therapists, chiropractors, osteopaths, podiatrists, homeopaths, naturopaths); weight control and quit-smoking programs; other medical services (e.g. ambulances, rental of medical equipment, laboratory services); medicines, drugs and pharmaceutical products; health care supplies (e.g. first aid kits, hearing aids, thermometers, wheelchairs, bathroom scales, elastic hosiery). Insurance Premiums: provincially/territorially administered hospital, medical and drug plans; private health insurance (e.g. supplementary coverage to public plans, out-of-country benefits); dental plans; accident and disability insurance.
United States	Food at Home plus Food Away from Home. Food at home: food purchased at grocery stores (or other food stores) and food prepared by the consumer unit on trips (excludes the purchase of nonfood items). Plus Food Away from Home: All meals (breakfast and brunch, lunch, dinner and snacks and nonalcoholic beverages) including tips at fast food, take-out, delivery, concession stands, buffet and cafeteria, at full-service restaurants, and at vending machines and mobile vendors. Also included are board (including at school), meals as pay, special catered affairs, such as weddings, bar mitzvahs, and confirmations, school lunches, and meals away from home on trips.	Clothing including coats and jackets, sport coats and tailored jackets, trousers and slacks, shorts and short sets, sportswear, shirts, nightwear, hosiery, uniforms, furs, sweaters and vests, blouses and shirts, dresses, jeans, culottes, slacks, shorts, sportswear, and other accessories, snowsuits, underwear, diapers, dresses, crawlers and other sleeping garments for infants, hosiery, footwear and accessories. Footwear excludes footwear for children under age 2 and special footwear used for sports such as bowling or golf shoes. Includes apparel products and services including material for making clothes, shoe repair, alterations and repairs, sewing patterns and notions, clothing rental, clothing storage, , watches, jewelry, and repairs to watches and jewelry. Excludes dry cleaning and sent-out laundry.	Renter and owner shelter and utilities. Renter expenses including rent paid for dwellings, rent received as pay, parking fees, maintenance, and other expenses. Owneder expenses include mortgage principal payments, interest on mortgages, property taxes and insurance, ground rent, expenses for property management and security, homeowners' insurance, fire insurance and extended coverage, expenses for repairs and maintenance contracted out, and expenses of materials for owner-performed repairs and maintenance for dwellings used or maintained by the consumer unit. Utilities, fuels, and public services includes natural gas; electricity; fuel oil and other fuels, such as wood, kerosene, coal, and bottled gas; water and other public services, such as garbage and trash collection, sewerage maintenance, septic tank cleaning; and telephone charges.	Health insurance including traditional fee-for-service health plans, preferred-provider health plans, health maintenance organizations (HMO's), commercial Medicare supplements, and other health insurance. Medical services including hospital room and services, physicians' services, service by a professional other than a physician, eye and dental care, lab tests and X-rays, medical care in a retirement community, care in convalescent or nursing home, and other medical care service. Drugs including nonprescription drugs and vitamins and prescription drugs. Medical supplies including appliances (such as braces, canes, crutches, walkers, eyeglasses, and hearing aids), and rental and repair of medical equipment.

Table 4 (continued). Definitions of Food, Clothing, Housing, and Health Care by Country or Country Group

Country	Total Food	Clothing	Housing Out-of-pocket	Health
Luxembourg Income Study Countries use monetary consumption (expenditures)				
	Expenditures on food and non-alcoholic beverages for consumption at home	Expenditures on clothing and footwear	Expenditures on housing (actual rentals, maintenance and repair of the dwelling), water (water supply and miscellaneous services relating to the dwelling), electricity, gas and other fuels. Renovation costs as well as expenditure on furniture are excluded, as well as expenditure on mortgage (both the capital and interest part). Ideally, corresponds to Code 04.1, 04.3, 04.4, 04.5 of the COICOP classification. Does not include imputed rentals for housing (04.2 COICOP category)	Expenditures on health, including medical products, appliances and equipment, outpatient services, and hospital services. Payments for health insurances are excluded. Ideally, corresponds to Code 06 of the COICOP classification.

Table 5. Pooled Regression Coefficients and Implicit Equivalence Scales Using Before-Tax Income and Size Dummy Variables

Country	Variables	Unweighted Sample Size	Food		Food, Shelter, and Clothing		Food, Shelter, Clothing, and Health	
			Coefficient	Equivalence Scale parameter	Coefficient	Equivalence Scale parameter	Coefficient	Equivalence Scale parameter
Canada (using total food)								
	Before Tax Income	64,737	0.414		0.488		0.492	
	One Person	17,167	0.000	1.000	0.000	1.000	0.000	1.000
	Two People	23,482	0.306	1.685	0.094	1.202	0.115	1.255
	Three People	9,915	0.418	2.039	0.218	1.532	0.215	1.526
	Four People	9,405	0.535	2.490	0.302	1.803	0.292	1.777
	Five People	3,441	0.628	2.919	0.371	2.065	0.359	2.026
	Six or More People	1,327	0.737	3.517	0.454	2.429	0.446	2.407
Canada (using food at home)								
	Before Tax Income	64,733	0.283		0.460		0.466	
	One Person	17,164	0.000	1.000	0.000	1.000	0.000	1.000
	Two People	23,482	0.425	1.810	0.110	1.225	0.131	1.279
	Three People	9,914	0.603	2.317	0.247	1.581	0.242	1.573
	Four People	9,405	0.756	2.870	0.339	1.872	0.326	1.841
	Five People	3,441	0.855	3.296	0.411	2.139	0.394	2.093
	Six or More People	1,327	1.007	4.071	0.501	2.528	0.489	2.501
France (using food at home)								
	Before Tax Income		0.472		0.421		0.448	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.485	2.506	0.206	1.427	0.213	1.471
	Three People		0.567	2.927	0.343	1.808	0.337	1.841
	Four People		0.671	3.564	0.391	1.965	0.386	2.012
	Five People		0.778	4.364	0.433	2.112	0.427	2.167
	Six or More People		0.79	4.465	0.472	2.260	0.452	2.268
Israel (using food at home)								
	Before Tax Income		0.295		0.378		0.401	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.531	2.124	0.284	1.579	0.28	1.596
	Three People		0.665	2.568	0.37	1.813	0.34	1.764
	Four People		0.827	3.232	0.435	2.012	0.38	1.886
	Five People		0.966	3.936	0.506	2.256	0.446	2.106
	Six or More People		1.146	5.081	0.638	2.789	0.574	2.607

Country	Variables	Unweighted Sample Size	Food		Food, Shelter, and Clothing		Food, Shelter, Clothing, and Health	
			Coefficient	Equivalence Scale parameter	Coefficient	Equivalence Scale parameter	Coefficient	Equivalence Scale parameter
Poland (using food at home)								
	Before Tax Income		0.323		0.497		0.517	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.418	1.854	0.217	1.539	0.193	1.491
	Three People		0.538	2.214	0.303	1.826	0.239	1.640
	Four People		0.641	2.578	0.365	2.066	0.286	1.808
	Five People		0.727	2.927	0.411	2.264	0.327	1.968
	Six or More People		0.826	3.387	0.475	2.571	0.385	2.219
South Africa (using food at home)								
	Before Tax Income		0.465		0.602		0.663	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.198	1.448	0.164	1.510	0.18	1.706
	Three People		0.326	1.839	0.255	1.898	0.255	2.131
	Four People		0.346	1.909	0.239	1.823	0.215	1.893
	Five People		0.353	1.934	0.217	1.725	0.182	1.716
	Six or More People		0.373	2.008	0.192	1.620	0.149	1.556
Switzerland (using food at home)								
	Before Tax Income		0.139		0.276		0.282	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.617	2.047	0.137	1.208	0.181	1.287
	Three People		0.837	2.644	0.258	1.428	0.265	1.446
	Four People		1.011	3.236	0.318	1.552	0.314	1.549
	Five People		1.158	3.838	0.342	1.604	0.336	1.597
	Six or More People		1.183	3.951	0.352	1.626	0.351	1.630
Taiwan (using food at home)								
	Before Tax Income		0.283		0.369		0.311	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.431	1.824	0.239	1.460	0.325	1.603
	Three People		0.719	2.726	0.424	1.958	0.487	2.028
	Four People		0.908	3.548	0.55	2.391	0.608	2.417
	Five People		1.05	4.325	0.645	2.779	0.719	2.839
	Six or More People		1.212	5.422	0.751	3.288	0.88	3.587

Table 5 (continued). Pooled Regression Coefficients and Implicit Equivalence Scales Using Before-Tax Income and Size Dummy Variables

Country	Variables	Unweighted Sample Size	Food		Food, Shelter, and Clothing		Food, Shelter, Clothing, and Health	
			Coefficient	Equivalence Scale parameter	Coefficient	Equivalence Scale parameter	Coefficient	Equivalence Scale parameter
United States (using total food)								
	Before Tax Income	34,363	0.410		0.525		0.512	
	One Person	8,299	0.000	1.000	0.000	1.000	0.000	1.000
	Two People	11,640	0.287	1.626	0.094	1.220	0.138	1.326
	Three People	5,510	0.384	1.916	0.206	1.541	0.196	1.494
	Four People	5,134	0.480	2.257	0.294	1.857	0.264	1.717
	Five People	2,297	0.527	2.446	0.320	1.959	0.284	1.788
	Six or More People	1,483	0.593	2.732	0.345	2.064	0.298	1.842
United States (using food at home)								
	Before Tax Income	34,873	0.228		0.483		0.475	
	One Person	8,498	0.000	1.000	0.000	1.000	0.000	1.000
	Two People	11,825	0.397	1.959	0.102	1.240	0.150	1.360
	Three People	5,553	0.557	2.574	0.231	1.624	0.217	1.561
	Four People	5,174	0.690	3.223	0.329	1.999	0.292	1.818
	Five People	2,322	0.763	3.646	0.359	2.128	0.315	1.906
	Six or More People	1,501	0.870	4.373	0.394	2.290	0.338	1.999
United States (using reported rental equivalence for owner occupied dwellings)								
	Before Tax Income	32,276	0.432		0.516		0.516	
	One Person	7,218	0.000	1.000	0.000	1.000	0.000	1.000
	Two People	10,830	0.270	1.581	0.118	1.283	0.148	1.354
	Three People	5,387	0.377	1.895	0.147	1.363	0.151	1.363
	Four People	5,097	0.474	2.235	0.203	1.533	0.193	1.484
	Five People	2,273	0.520	2.417	0.229	1.618	0.212	1.545
	Six or More People	1,471	0.589	2.715	0.254	1.706	0.231	1.606

Table 5 (continued). Pooled Regression Coefficients and Implicit Equivalence Scales Using Before-Tax Income and Size Dummy Variables

Table 6. Pooled Regression Coefficients and Implicit Equivalence Scales Using After-Tax Income and Size Dummy Variables								
			Food		Food, Shelter, and Clothing		Food, Shelter, Clothing, and Health	
Country	Variables	Unweighted Sample Size	Coefficient	Equivalence Scale parameter	Coefficient	Equivalence Scale parameter	Coefficient	Equivalence Scale parameter
Canada (using total food)								
	After Tax Income	64,737	0.480		0.562		0.570	
	One Person	17,167	0.000	1.000	0.000	1.000	0.000	1.000
	Two People	23,482	0.280	1.716	0.067	1.166	0.086	1.221
	Three People	9,915	0.388	2.110	0.187	1.534	0.181	1.522
	Four People	9,405	0.506	2.646	0.272	1.861	0.259	1.824
	Five People	3,441	0.590	3.112	0.331	2.129	0.314	2.078
	Six or More People	1,327	0.681	3.707	0.392	2.450	0.380	2.422
Canada (using food at home)								
	After Tax Income	64,733	0.333		0.530		0.541	
	One Person	17,164	0.000	1.000	0.000	1.000	0.000	1.000
	Two People	23,482	0.405	1.836	0.084	1.196	0.103	1.251
	Three People	9,914	0.578	2.381	0.218	1.590	0.209	1.576
	Four People	9,405	0.731	2.995	0.310	1.934	0.293	1.894
	Five People	3,441	0.824	3.443	0.372	2.207	0.351	2.151
	Six or More People	1,327	0.963	4.240	0.442	2.563	0.426	2.530
France (using food at home)								
	After Tax Income		0.486		0.433		0.461	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.48	2.544	0.202	1.428	0.209	1.474
	Three People		0.557	2.955	0.334	1.802	0.327	1.834
	Four People		0.654	3.569	0.376	1.941	0.369	1.983
	Five People		0.754	4.336	0.412	2.068	0.404	2.116
	Six or More People		0.761	4.395	0.447	2.200	0.425	2.200
Hungary (using food at home)								
	After Tax Income		0.479		0.529		0.512	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.34	1.921	0.189	1.494	0.194	1.488
	Three People		0.411	2.201	0.255	1.718	0.237	1.625
	Four People		0.453	2.386	0.323	1.985	0.293	1.823
	Five People		0.575	3.015	0.38	2.241	0.351	2.053
	Six or More People		0.734	4.091	0.458	2.644	0.426	2.394

Country	Variables	Unweighted Sample Size	Food		Food, Shelter, and Clothing		Food, Shelter, Clothing, and Health	
			Coefficient	Equivalence Scale parameter	Coefficient	Equivalence Scale parameter	Coefficient	Equivalence Scale parameter
Israel (using food at home)								
	After Tax Income							
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.531	1.701	0.284	1.328	0.280	1.323
	Three People		0.665	1.944	0.37	1.448	0.340	1.405
	Four People		0.827	2.286	0.435	1.545	0.380	1.462
	Five People		0.966	2.627	0.506	1.659	0.446	1.562
	Six or More People		1.146	3.146	0.638	1.893	0.574	1.775
Mexico (using food at home)								
	After Tax Income							
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.569	1.766	0.311	1.365	0.312	1.366
	Three People		0.766	2.151	0.416	1.516	0.411	1.508
	Four People		0.912	2.489	0.509	1.664	0.494	1.639
	Five People		0.996	2.707	0.553	1.738	0.532	1.702
	Six or More People		1.065	2.901	0.573	1.774	0.55	1.733
Poland (using food at home)								
	After Tax Income		0.315		0.495		0.515	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.424	1.857	0.22	1.546	0.196	1.498
	Three People		0.543	2.209	0.302	1.819	0.238	1.633
	Four People		0.646	2.568	0.364	2.056	0.285	1.800
	Five People		0.731	2.907	0.407	2.239	0.323	1.946
	Six or More People		0.831	3.364	0.47	2.536	0.38	2.189
Russia (using food at home)								
	After Tax Income		0.64		0.787		0.789	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.187	1.681	0.074	1.415	0.06	1.329
	Three People		0.231	1.900	0.165	2.170	0.13	1.852
	Four People		0.258	2.048	0.182	2.350	0.141	1.951
	Five People		0.32	2.432	0.189	2.429	0.142	1.960
	Six or More People		0.263	2.076	0.105	1.637	0.055	1.298

Table 6 (continued). Pooled Regression Coefficients and Implicit Equivalence Scales Using After-Tax Income and Size Dummy Variables

Country	Variables	Unweighted Sample Size	Food		Food, Shelter, and Clothing		Food, Shelter, Clothing, and Health	
			Coefficient	Equivalence Scale parameter	Coefficient	Equivalence Scale parameter	Coefficient	Equivalence Scale parameter
South Africa (using food at home)								
	After Tax Income		0.487		0.629		0.692	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.181	1.423	0.144	1.474	0.158	1.670
	Three People		0.303	1.805	0.226	1.839	0.223	2.063
	Four People		0.327	1.892	0.214	1.780	0.187	1.835
	Five People		0.335	1.921	0.195	1.691	0.158	1.670
	Six or More People		0.34	1.940	0.15	1.498	0.103	1.397
Switzerland (using food at home)								
	After Tax Income		0.12		0.253		0.257	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.628	2.041	0.151	1.224	0.197	1.304
	Three People		0.852	2.633	0.278	1.451	0.287	1.471
	Four People		1.027	3.212	0.338	1.572	0.336	1.572
	Five People		1.175	3.801	0.361	1.621	0.359	1.621
	Six or More People		1.202	3.919	0.361	1.621	0.363	1.630
Taiwan (using food ast home)								
	After Tax Income		0.284		0.37		0.313	
	One Person		0.000	1.000	0.000	1.000	0.000	1.000
	Two People		0.432	1.828	0.241	1.466	0.326	1.607
	Three People		0.723	2.745	0.429	1.976	0.491	2.044
	Four People		0.913	3.579	0.558	2.425	0.613	2.441
	Five People		1.055	4.364	0.652	2.815	0.724	2.869
	Six or More People		1.216	5.465	0.757	3.325	0.884	3.621

Table 6 (continued). Pooled Regression Coefficients and Implicit Equivalence Scales Using After-Tax Income and Size Dummy Variables

Table 7. Regression Coefficients and Single Parameter Implicit Equivalence Scales Using Before-Tax Income

Country	Cycle	Food				Food, Clothing, and Shelter				Food, Clothing, Shelter, and Health Care			
		Sample Size	Coefficient on Income	Coefficient on Size	Equivalence Scale parameter	Sample Size	Coefficient on Income	Coefficient on Size	Equivalence Scale parameter	Sample Size	Coefficient on Income	Coefficient on Size	Equivalence Scale parameter
Canada (using total food)													
	Pooled	64,737	0.416	0.387	0.662	64,737	0.481	0.234	0.450	64,737	0.487	0.224	0.437
	2004	12,052	0.405	0.398	0.669	12,052	0.477	0.237	0.453	12,052	0.482	0.228	0.440
	2005	12,312	0.404	0.380	0.638	12,312	0.460	0.234	0.432	12,312	0.468	0.224	0.421
	2006	12,242	0.406	0.434	0.730	12,242	0.477	0.251	0.479	12,242	0.485	0.240	0.466
	2007	11,446	0.418	0.379	0.651	11,446	0.496	0.226	0.448	11,446	0.502	0.215	0.433
	2008	8,221	0.434	0.373	0.658	8,221	0.494	0.226	0.446	8,221	0.497	0.215	0.428
	2009	8,464	0.425	0.358	0.623	8,464	0.479	0.232	0.445	8,464	0.484	0.225	0.436
Canada (using food at home)													
	Pooled	64,733	0.287	0.539	0.755	64,733	0.453	0.260	0.475	64,733	0.462	0.248	0.460
	2004	12,052	0.257	0.566	0.763	12,052	0.444	0.266	0.479	12,052	0.451	0.255	0.465
	2005	12,310	0.265	0.545	0.741	12,310	0.426	0.265	0.461	12,310	0.438	0.252	0.449
	2006	12,242	0.265	0.595	0.809	12,242	0.447	0.277	0.502	12,242	0.458	0.264	0.488
	2007	11,445	0.285	0.529	0.739	11,445	0.470	0.251	0.473	11,445	0.479	0.237	0.456
	2008	8,220	0.322	0.515	0.760	8,220	0.469	0.248	0.467	8,220	0.475	0.235	0.448
	2009	8,464	0.322	0.487	0.718	8,464	0.455	0.256	0.470	8,464	0.463	0.246	0.459
France (using food at home)													
	Pooled	19298	0.493	0.462	0.911	19298	0.426	0.278	0.484	19298	0.454	0.272	0.498
	2000	9690	0.485	0.508	0.986	9690	0.438	0.254	0.452	9690	0.465	0.254	0.475
	2005	9608	0.503	0.418	0.841	9608	0.392	0.315	0.518	9608	0.425	0.300	0.522
Israel (using food at home)													
	Pooled	16369	0.301	0.568	0.813	16369	0.380	0.309	0.498	16369	0.402	0.270	0.452
	2001	4888	0.270	0.611	0.837	4888	0.369	0.273	0.433	4888	0.391	0.251	0.412
	2007	5745	0.302	0.558	0.799	5745	0.348	0.316	0.485	5745	0.376	0.264	0.423
	2010	5736	0.324	0.546	0.808	5736	0.384	0.309	0.502	5736	0.404	0.270	0.453
Poland (using food at home)													
	Pooled	128960	0.335	0.435	0.654	128960	0.502	0.252	0.506	128960	0.523	0.196	0.411
	1999	28787	0.364	0.403	0.634	28787	0.521	0.230	0.480	28787	0.535	0.183	0.394
	2004	29447	0.381	0.429	0.693	29447	0.530	0.240	0.511	29447	0.559	0.177	0.401
	2007	35282	0.362	0.404	0.633	35282	0.511	0.248	0.507	35282	0.531	0.190	0.405
	2010	35444	0.335	0.404	0.608	35444	0.500	0.238	0.476	35444	0.516	0.190	0.393
South Africa (using food at home)													
	Pooled	8814	0.468	0.187	0.352	8814	0.606	0.098	0.249	8814	0.668	0.073	0.220
	2008	4835	0.452	0.206	0.376	4835	0.597	0.123	0.305	4835	0.672	0.097	0.296
	2010	3979	0.490	0.170	0.333	3979	0.619	0.074	0.194	3979	0.667	0.052	0.156
Switzerland (using food at home)													
	Pooled	10433	0.159	0.717	0.853	10433	0.274	0.224	0.309	10433	0.287	0.220	0.309
	2000	3585	0.164	0.708	0.847	3585	0.269	0.223	0.305	3585	0.285	0.226	0.316
	2002	3653	0.147	0.723	0.848	3653	0.282	0.220	0.306	3653	0.303	0.214	0.307
	2004	3195	0.166	0.719	0.862	3195	0.274	0.225	0.310	3195	0.277	0.216	0.299
Taiwan (using food at home)													
	Pooled	26093	0.281	0.656	0.912	26093	0.366	0.414	0.653	26093	0.304	0.455	0.654
	2000	13256	0.280	0.652	0.906	13256	0.363	0.410	0.644	13256	0.294	0.450	0.637
	2005	12837	0.285	0.659	0.922	12837	0.369	0.417	0.661	12837	0.319	0.460	0.675

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Table 7 (continued). Regression Coefficients and Single Parameter Implicit Equivalence Scales Using Before-Tax Income													
		Food				Food, Clothing, and Shelter				Food, Clothing, Shelter, and Health Care			
Country	Cycle	Sample Size	Coefficient on Income	Coefficient on Size	Equivalence Scale parameter	Sample Size	Coefficient on Income	Coefficient on Size	Equivalence Scale parameter	Sample Size	Coefficient on Income	Coefficient on Size	Equivalence Scale parameter
United States (using total food)													
	Pooled	34,363	0.417	0.327	0.561	34,363	0.521	0.201	0.421	34,363	0.515	0.174	0.358
	2005	4202	0.413	0.352	0.600	4202	0.542	0.197	0.429	4202	0.528	0.169	0.359
	2006	4567	0.412	0.335	0.570	4567	0.532	0.190	0.405	4567	0.522	0.161	0.337
	2007	4388	0.434	0.327	0.577	4388	0.537	0.195	0.421	4388	0.524	0.170	0.357
	2008	4241	0.413	0.331	0.565	4241	0.525	0.205	0.432	4241	0.513	0.186	0.381
	2009	4382	0.413	0.336	0.573	4382	0.499	0.215	0.430	4382	0.495	0.189	0.374
	2010	4333	0.426	0.297	0.517	4333	0.523	0.184	0.387	4333	0.519	0.155	0.321
	2011	4106	0.417	0.298	0.512	4106	0.511	0.209	0.428	4106	0.512	0.180	0.368
	2012	4144	0.410	0.340	0.575	4144	0.495	0.220	0.436	4144	0.501	0.186	0.373
United States (using food at home)													
	Pooled	34,873	0.236	0.476	0.623	34,873	0.479	0.227	0.436	34,873	0.477	0.194	0.371
	2005	4,241	0.223	0.515	0.663	4,241	0.501	0.221	0.444	4,241	0.491	0.188	0.370
	2006	4,608	0.241	0.477	0.628	4,608	0.494	0.216	0.428	4,608	0.489	0.182	0.357
	2007	4,451	0.243	0.486	0.642	4,451	0.496	0.219	0.435	4,451	0.486	0.189	0.368
	2008	4,313	0.232	0.485	0.631	4,313	0.483	0.232	0.450	4,313	0.475	0.209	0.398
	2009	4,448	0.226	0.480	0.620	4,448	0.455	0.239	0.438	4,448	0.457	0.207	0.381
	2010	4,425	0.249	0.448	0.596	4,425	0.479	0.210	0.404	4,425	0.480	0.174	0.335
	2011	4,176	0.244	0.443	0.586	4,176	0.466	0.239	0.448	4,176	0.472	0.203	0.386
	2012	4,211	0.226	0.480	0.621	4,211	0.451	0.245	0.446	4,211	0.464	0.204	0.380
United States (using reported rental equivalence for owner occupied dwellings)													
	Pooled	32,276	0.43826	0.32483	0.578	32,276	0.51877	0.13765	0.286	32,276	0.52215	0.12599	0.264
	2005	3,937	0.432	0.352	0.620	3,937	0.545	0.131	0.287	3,937	0.543	0.120	0.264
	2006	4,273	0.439	0.335	0.597	4,273	0.530	0.129	0.275	4,273	0.530	0.114	0.244
	2007	4,130	0.455	0.325	0.597	4,130	0.529	0.133	0.282	4,130	0.528	0.123	0.261
	2008	4,008	0.435	0.327	0.579	4,008	0.520	0.142	0.296	4,008	0.520	0.136	0.283
	2009	4,112	0.434	0.336	0.593	4,112	0.493	0.161	0.317	4,112	0.499	0.147	0.294
	2010	4,081	0.442	0.292	0.523	4,081	0.510	0.131	0.268	4,081	0.516	0.119	0.245
	2011	3,864	0.434	0.296	0.522	3,864	0.514	0.141	0.290	3,864	0.522	0.127	0.266
	2012	3,871	0.433	0.336	0.593	3,871	0.503	0.137	0.275	3,871	0.517	0.123	0.254

Table 8. Regression Coefficients and Single Parameter Implcit Equivalence Scales Using After-Tax Income

Country	Cycle	Food				Food, Shelter and Clothing				Food, Shelter, Clothing and Health Care			
		Sample Size	Coefficient on Income	Coefficient on Size	Equivalence Scale parameter	Sample Size	Coefficient on Income	Coefficient on Size	Equivalence Scale parameter	Sample Size	Coefficient on Income	Coefficient on Size	Equivalence Scale parameter
Canada (using total food)													
	Pooled	64,737	0.4826	0.3628	0.7011	64,737	0.5528	0.2099	0.4694	64,737	0.5634	0.1976	0.4526
	2004	12,052	0.4756	0.3737	0.7126	12,052	0.5554	0.2111	0.4748	12,052	0.5644	0.1999	0.4590
	2005	12,312	0.4740	0.3547	0.6743	12,312	0.5322	0.2092	0.4472	12,312	0.5453	0.1969	0.4331
	2006	12,242	0.4662	0.4138	0.7752	12,242	0.5401	0.2331	0.5069	12,242	0.5523	0.2200	0.4915
	2007	11,446	0.4917	0.3483	0.6851	11,446	0.5730	0.1967	0.4606	11,446	0.5845	0.1829	0.4403
	2008	8,221	0.5005	0.3500	0.7007	8,221	0.5660	0.2029	0.4675	8,221	0.5733	0.1895	0.4442
	2009	8,464	0.4834	0.3383	0.6549	8,464	0.5453	0.2095	0.4608	8,464	0.5560	0.1993	0.4488
Canada (using food at hoome)													
	Pooled	64,733	0.3380	0.5189	0.7838	64,733	0.5205	0.2373	0.4949	64,733	0.5347	0.2221	0.4772
	2004	12,052	0.3067	0.5478	0.7901	12,052	0.5170	0.2422	0.5014	12,052	0.5295	0.2282	0.4851
	2005	12,310	0.3166	0.5241	0.7669	12,310	0.4939	0.2418	0.4778	12,310	0.5113	0.2262	0.4628
	2006	12,242	0.3147	0.5742	0.8380	12,242	0.5071	0.2603	0.5280	12,242	0.5229	0.2444	0.5122
	2007	11,445	0.3430	0.5027	0.7651	11,445	0.5436	0.2224	0.4872	11,445	0.5586	0.2057	0.4661
	2008	8,220	0.3740	0.4971	0.7941	8,220	0.5383	0.2258	0.4891	8,220	0.5486	0.2098	0.4647
	2009	8,464	0.3651	0.4725	0.7442	8,464	0.5175	0.2351	0.4873	8,464	0.5317	0.2218	0.4736
France (using food at home)													
	Pooled	19292	0.508	0.448	0.911	19292	0.438	0.266	0.473	19292	0.467	0.259	0.486
	2000	9684	0.513	0.487	1.000	9684	0.461	0.235	0.436	9684	0.491	0.233	0.458
	2005	9608	0.507	0.411	0.834	9608	0.393	0.311	0.512	9608	0.427	0.295	0.515
Hungary (using food at home)													
	Pooled	3145	0.483	0.342	0.662	3145	0.529	0.233	0.495	3145	0.513	0.211	0.433
	1999	1392	0.460	0.409	0.757	1392	0.530	0.260	0.553	1392	0.516	0.246	0.508
	2005	1753	0.467	0.317	0.595	1753	0.503	0.233	0.469	1753	0.483	0.208	0.402
Israel (using food at home)													
	Pooled	16369	0.350	0.553	0.851	16369	0.419	0.303	0.522	16369	0.447	0.262	0.474
	2001	4888	0.344	0.588	0.896	4888	0.449	0.252	0.457	4888	0.476	0.228	0.435
	2007	5745	0.345	0.545	0.832	5745	0.393	0.304	0.501	5745	0.426	0.251	0.437
	2010	5736	0.357	0.536	0.834	5736	0.425	0.296	0.515	5736	0.448	0.256	0.464