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AFFLUENCE AND FOOD A Simple Way to Infer Incomes

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Abstract

Accurate and timely measures of cross-country real incomes are still a rarity. As the share of expenditure devoted to food is readily available, we use of Engel's law in reciprocal form to measure affluence. Analysis of real income data for the OECD countries indicates that this approach is viable. To recognise the role of uncertainty in the analysis, we present the results in the form of stochastic cross-country income comparisons.

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1. Introduction

Economists' fascination with international income differences must go back to at least 1776 with Adam Smith's The Wealth of Nations. The most popular approach to measuring incomes in different countries is to use the purchasing-power-parity based estimates of the Penn Table. As market exchange rates are volatile, and are known to reflect the prices of nontraded goods (especially services) less than adequately, the PPP method is a substantial improvement over older approaches that make currency conversions on the basis of market exchange rates. However, the disadvantage of PPP is that as numerous matched goods and services have to be priced in many countries, it is demanding in its data requirements, so that PPP estimates can be subject to long publication delays. This paper investigates a short-cut method of measuring real incomes across countries.

Engel's law states that food has an income elasticity of less than unity, or equivalently, the share of food in the consumption basket declines with income. We use Engel's law in reciprocal form by inferring income from the value of the food share. Such an approach is consistent with Engel (1857, pp. 28-29) who writes "The poorer a family, the greater the proportion of its total expenditure that must be devoted to the provision of food", and then goes on to argue that the richer a country, the smaller the food share (Stigler, 1954). This approach has several advantages: First, as the food share is dimensionless, it can be compared across time, regions and countries, without any adjustment for differing currency values. Second, the food share is objective, not subject to great controversy and readily available for many time periods in a large number of countries. Third, the link between the food share and income as enshrined in Engel's law is well established and arguably the most widely-accepted empirical regularity in all economics. Finally, as the approach uses just one share and two parameters to make inferences regarding incomes, it is attractive in its simplicity. We analyse jointly the determinants of all elements in the consumption basket and embed Engel's law in a system-wide demand model, thereby allowing for the dependence of food share on relative prices (in addition to income). The food share, adjusted for differing relative price structures across countries, is then used to infer income.

While the basic idea of employing the food share as an inverse measure of welfare has been used by others (see, e. g., Orshansky, 1965, 1969, Van Praag et al., 1982, Rao, 1981), it seems that the approach of including food in a microeconomic demand model, and then using the price-adjusted share as the basis for inferring income, has been relatively unexplored, especially in a cross-country context. Chua (2003) made a preliminary investigation of estimating "true income" in different countries from information on the food share, but did not allow for international differences in relative prices. For related studies that deal with the CPI bias and economic performance in the US, see Costa (2001), Hamilton (2001) and Nakamura (1996).

It is also appropriate to mention two other short-cut approaches proposed in the early literature for countries (or regions) that do not have reliable information of real incomes. The first is the use of “non-monetary factors” such as calories consumed, infant mortality, the number of physicians, etc. Countries are ranked according to each factor, and these rankings are then averaged to yield an overall index (Bennett, 1951). The problem with this approach is that the equal weighting of indicators has no economic justification (Beckerman and Bacon, 1966). The second approach is to estimate income on the basis of easily-observed physical indicators such as the consumption of steel, energy, electricity, cement, etc. (see, e. g., Beckerman and Bacon, 1966, Erlich, 1969, and Janossy, 1963). The basic idea lying behind this approach is a type of reciprocal demand relation that excludes the usual relative price term. For those countries that have all the required data, income is regressed on the consumption variable and then the estimated relationship is extrapolated to yield income estimates for other countries.² Heston (1973) is critical of this approach as it tends to (i) give rise to large errors for low-income countries, those countries least-well endowed with real-income information; and (ii) gives rise to too little dispersion of the cross-country income distribution. On the other hand, Barlow’s (1977) results are more favourable to the physical indicator approach.³

The next two sections of the paper set out the basic analytical relationships between food consumption, income and prices. In Sections 4 and 5 these relationships are embedded in a system-wide demand model, which is then essentially inverted to solve for income. This leads in Section 6 to what we call “stochastic cross-country income comparisons” in the form of probability distributions that compare incomes for each country pair. These distributions reflect the uncertainty inherent in at all steps of the analysis, in the food share, the estimated parameters and incomes. Concluding comments are given in Section 7.

2. Consumption, Income and Prices

In this section, we set out the dependence of consumption on income and prices. As this material is well-known, the presentation will be brief. For more details, see, e. g., Theil (1975/76, 1980) or Theil and Clements (1987).

Let p_i be the price of good i and q_i be the corresponding quantity demanded. Then if there are n goods, $M = \sum_{i=1}^n p_i q_i$ is total expenditure (“income” for short), and $w_i = p_i q_i / M$ is the budget share of i . The Marshallian demand equation for good i is $q_i = q_i(M, p_1, \dots, p_n)$, or using a circumflex (“ $\hat{}$ ”) to denote a proportional change (so that $\hat{x} = dx/x$),

² Variations of this theme are provided by Duggar (1969), who uses money holdings instead of consumption variables, and Sahn and Stifel (2003), who use the stock of consumer durables.

³ It is also worth mentioning that in the fields of economic history and economic development the link between stature and real incomes, and the degree to which the former can be inferred from the latter, has been studied; for a survey, see Steckel (1995).

$$(1) \quad \hat{q}_i = \eta_i \hat{M} + \sum_{j=1}^n \eta'_{ij} \hat{p}_j,$$

where η_i is the income elasticity of demand for i and η'_{ij} is the $(i, j)^{\text{th}}$ uncompensated price elasticity. If we define the change in the cost of living index as a budget-share weighted-average of the n price changes, $\hat{P} = \sum_{j=1}^n w_j \hat{p}_j$, then the change in real income is the excess of the change in money income change over this index, $\hat{Q} = \hat{M} - \hat{P}$, and the Slutsky demand equation takes the form

$$(2) \quad \hat{q}_i = \eta_i \hat{Q} + \sum_{j=1}^n \eta_{ij} (\hat{p}_j - \hat{P}),$$

where η_{ij} is the $(i, j)^{\text{th}}$ compensated price elasticity. In deriving this equation (2) from (1), we have used (i) the Slutsky decomposition $\eta'_{ij} = \eta_{ij} - w_j \eta_i$, and (ii) demand homogeneity, according to which $\sum_{j=1}^n \eta_{ij} = 0$.

Next, we note that $\hat{w}_i = \hat{p}_i + \hat{q}_i - \hat{M} = (\hat{p}_i - \hat{P}) + \hat{q}_i - \hat{Q}$. Combining this with equation (2) then yields

$$(3) \quad \hat{w}_i = (\eta_i - 1) \hat{Q} + \sum_{j=1}^n \eta_{ij} (\hat{p}_j - \hat{P}) + (\hat{p}_i - \hat{P}).$$

If the n commodities are broad aggregates, it would be likely that there would only be limited substitutability between them. We thus take the utility function to be of the preference independent form, $u(q_1, \dots, q_n) = \sum_{i=1}^n u_i(q_i)$, with $u_i(\bullet)$ the sub-utility function for good i , so that the marginal utility of i depends only on own consumption. This form of tastes implies that as an approximation, own-price elasticities are proportional to income elasticities and cross-price elasticities are zero,

$$(4) \quad \eta_{ii} \approx \phi \eta_i, \quad i = 1, \dots, n, \quad \eta_{ij} \approx 0, \quad i, j = 1, \dots, n, i \neq j,$$

where ϕ is the reciprocal of the income elasticity of the marginal utility of income (the “income flexibility” for short). Equations (3) and (4) then imply

$$(5) \quad \hat{w}_i \approx (\eta_i - 1) \hat{Q} + (\phi \eta_i + 1) (\hat{p}_i - \hat{P}),$$

which shows the dependence of the budget share on income and the relative price of the good. The two parameters in equation (5) are the income elasticity and the income flexibility.

3. Income and Food

On the basis of the budget shares, in most countries food is the most important single commodity. Thus, in what follows we concentrate on this commodity. In this section, we analyse the relationship

between food consumption and income, and defer a discussion of the role of its relative price until the next section.

We apply equation (5) to $i = \text{food}$ and for simplicity, subsequently omit the commodity subscript. When the relative price of food is constant, this equation implies $dw \approx \beta \hat{Q}$, with $\beta = w(\eta - 1)$. The marginal share of food is $\partial(pq)/\partial M$, which answers the question, if income rises by one dollar, what fraction of this is spent on food? As $w\eta = \partial(pq)/\partial M$, it follows that the coefficient β is the excess of the marginal share over the corresponding budget share w . Using $\hat{x} = d(\log x)$, the above suggests a convenient way to relate food consumption and income in countries a and b is

$$(6) \quad w^a - w^b = \beta \log\left(\frac{Q^a}{Q^b}\right).$$

Table 1 gives for 42 OECD countries in 2002 real per capita total consumption, which we interpret as Q , and the food budget share.⁴ As can be seen, on the basis of Q , Luxembourg is the richest country and Turkey the poorest, with a ratio of $30,258/4,882 \approx 6$, while the food budget shares range from less than 10 percent to about 30 percent. The budget share of each country can be systematically compared to that of all others via 42×42 skewed symmetric matrix $[w^a - w^b]$. The upper triangle of this matrix is given in Table 2, where countries are ordered in terms of decreasing affluence in the rows and increasing affluence in the columns. Thus, for example, moving from left to right along the first row, we compare the food budget share of Luxembourg with poorer countries that become successively less poor: The share for Turkey is 17 points above Luxembourg's, Macedonia's 22 above, etc. As the diagonal elements of this table would be all zero, these elements are suppressed. But as we move further away from where the diagonal would have been, in a north-westerly direction, countries differ more on the income scale and the budget shares differ by more. With only a few exceptions, for each pairwise comparison, the share in the poorer country is greater than that in the richer country, which is a reflection of Engel's law.

Table 3 gives the corresponding matrix comparisons of incomes, which for short we write as $\Delta \log Q^{ab} = \log(Q^a/Q^b)$. Table 4 contains the ratios $\Delta w^{ab}/\Delta \log Q^{ab}$, where $\Delta w^{ab} = w^a - w^b$. These ratios can be interpreted as "readings" on the coefficient β in equation (6). Figure 1 shows that while there are a few outliers (associated with near zeros in the denominators for countries having very similar incomes), the distribution has a reasonable well defined median of about -0.13. This result is confirmed by the corresponding scatter of Figure 2. When $\beta = -0.13$, a country that is 50 percent richer than another has a

⁴ The data are from OECD (2004). For details, see the Appendix.

food budget share about 5 percentage points lower. If we only used information on the food share, we could employ this relationship in reciprocal form whereby $\Delta \log Q^{ab} = (1/\beta) \Delta w^{ab}$ to make inferences regarding income differences. In Section 5 we extend this basic relationship to allow for the role of differences in relative prices, and demonstrate the importance of allowing for the impact of this additional factor.

Before concluding this section, it is worthwhile noting that by integration, equation (6) is consistent with the Working (1943)-Leser (1963) Engel curve, $w = \alpha + \beta \log Q$, where α is a constant. Figure 3 reveals that this model fits the OECD data quite well, and the least-squares estimate of the slope coefficient β is close to the above-value of -0.13.

4. Modelling the Consumption Basket

As indicated by equation (5), the change in the budget share of good i is related to the change in income and under the assumption of preference independence, the change in the relative price of the good. The parameters in this relationship are the income elasticity and the income flexibility. To efficiently estimate these parameters, we need to consider the demand for all n goods simultaneously by jointly modeling the determinants of the consumption basket. There are a number of alternative models that could be used for this purpose including the linear expenditure system, the almost ideal demand model, the translog, etc. We choose the Florida model (Theil et al., 1989) as it is probably the most extensively applied and assessed in a cross-country context.

In this section, we reinstate the commodity subscript $i = 1, \dots, n$, and denote countries by $c = 1, \dots, C$. The Florida model is based on Working's model,

$$(7) \quad w_i^c = \alpha_i + \beta_i \log Q^c,$$

where α_i and β_i are coefficients satisfying $\sum_{i=1}^n \alpha_i = 1$, $\sum_{i=1}^n \beta_i = 0$. If we denote the logarithm of real income in country c by $q^c = \log Q^c$, it can be easily shown that model (7) implies that the marginal share of good i takes the form $\alpha_i + \beta_i q^{*c}$, where $q^{*c} = 1 + q^c$. The Florida model supposes that (7) holds at world prices, as measured by geometric means, $\log \bar{p}_i = (1/C) \sum_{c=1}^C \log p_i^c$. The i^{th} equation of the model takes the form

$$(8) \quad w_i^c = \alpha_i + \beta_i q^c + (\alpha_i + \beta_i q^c) \left[\log \frac{p_i^c}{\bar{p}_i} - \sum_{j=1}^n (\alpha_j + \beta_j q^c) \log \frac{p_j^c}{\bar{p}_j} \right] \\ + \phi (\alpha_i + \beta_i q^{*c}) \left[\log \frac{p_i^c}{\bar{p}_i} - \sum_{j=1}^n (\alpha_j + \beta_j q^{*c}) \log \frac{p_j^c}{\bar{p}_j} \right] \\ + \varepsilon_i^c,$$

where ϕ is the income flexibility (as before) and ε_i^c is a zero-mean disturbance term, drawn from a multivariate normal distribution with a constant covariance matrix. The second term on the right-hand side of this equation, $\beta_i q^c$, deals with the role of real income on the budget share of good i , while the first term in square brackets is the relative price of the good, compared to the world relative price. When the relative price changes, the budget share changes even when the corresponding quantity demanded is unchanged; this effect is measured by the term $(\alpha_i + \beta_i q^c) \left[\log \frac{p_i^c}{p_i} - \sum_{j=1}^n (\alpha_j + \beta_j q^c) \log \frac{p_j^c}{p_j} \right]$. The second line of equation (8) deals with the substitution effect of a change in the relative price of the good; the weights employed in this relative price are marginal shares, $\alpha_j + \beta_j q^{*c}$, whereas in the first line of the equation they are budget shares, $\alpha_j + \beta_j q^c$. The final thing to note about the Florida model is that it holds under preference independence, so it is consistent with the analysis of Section 2 above.

We estimate model (8) using the maximum likelihood (ML) procedure set out in Theil et al. (1989) with data from the OECD (2004) for $n = 12$ goods listed in Table 5 and the $C = 42$ countries listed in Table 1. The results are given in columns 2-5 of Table 5. The largest estimate of β_i (in absolute value) is for food at -0.10, a value that is highly significant. That this value is about 25 percent lower than the estimate of this same coefficient discussed in the previous section indicates the importance of controlling for differences in the relative price of food across countries. An examination of the data reveals that this relative price tends to fall with real income per capita, so that omitting it has the effect of biasing upwards the estimate of $|\beta_i|$ for food.

To assess the quality of the estimates, we conduct a Monte Carlo experiment that involves the following steps. First, we write model (8) for $i = 1, \dots, 12$ as

$$(9) \quad \mathbf{w}^c = \mathbf{f}(\mathbf{X}^c, \boldsymbol{\theta}) + \boldsymbol{\varepsilon}^c,$$

where \mathbf{w}^c and $\boldsymbol{\varepsilon}^c$ are vectors of budget shares and disturbances for country c , \mathbf{X}^c is a matrix of the observed values of the independent variables and $\boldsymbol{\theta}$ is a vector of parameters. We simulate the budget vector for country c from equation (9) by (i) drawing $\boldsymbol{\varepsilon}_c$ from a normal distribution with mean vector zero and covariance matrix equal to its data-based ML estimate; (ii) using for $\boldsymbol{\theta}$ its data-based estimate; and (iii) using the observed values of \mathbf{X}^c . Repeating this for each of the 42 countries leads to 42 values of the simulated vector of budget shares, $\mathbf{w}^{c(s)}$, $c = 1, \dots, 42$, which are used together with the observed values of the independent variables to reestimate the model by the same ML procedure. Second, we repeat the procedure 1,000 times to yield 1,000 simulated values of the vector of estimated parameters, $\boldsymbol{\theta}^{(s)}$, $s = 1, \dots, 1,000$.

Columns 6-11 of Table 5 summarise the results in the form of the mean, RMSE and RMASE for each parameter. As can be seen, all estimates are unbiased, while the asymptotic standard errors tend to understate the sampling variability of the estimates, but not by a huge amount.

5. Simulating Income

In this section we draw inferences on cross-country incomes from the behaviour of the food budget share after controlling the influence of the relative price. As before, we concentrate exclusively on food and drop the commodity subscript.

We return to equation (5) and write it as

$$(5') \quad \hat{Q} = \frac{\hat{w}}{\eta - 1} - \frac{(\phi\eta + 1)(\hat{p} - \hat{P})}{\eta - 1},$$

where \hat{Q} is the change in income, \hat{w} the change in the food budget share, η is the income elasticity of food, ϕ is the income flexibility, $\hat{p} - \hat{P}$ is the change in the relative price of food, and where we have ignored the approximation error. This equation says that the change in income is equal to the difference between a term involving the change in the food share and a term that adjusts for the change in the relative price of food. To apply equation (5') to countries a and b, we could express it as

$$(5'') \quad \log\left(\frac{Q^a}{Q^b}\right) = \frac{\log(w^a/w^b)}{\eta^{ab} - 1} - \frac{(\phi\eta^{ab} + 1)[\log(p^a/p^b) - \log(P^a/P^b)]}{\eta^{ab} - 1},$$

where $\eta^{ab} = \frac{1}{2}(\eta^a + \eta^b)$ is the average of the income elasticity of food in the two countries. To allow for uncertainty in the budget shares and the elasticities of equation (5''), we embed it in the Monte Carlo simulation described above and define the base country as the geometric mean of the 42 countries which now plays the role of country b. Thus write the realisation at trial s as

$$(5''') \quad \log\left(\frac{Q^a}{Q^*}\right)^{(s)} = \frac{\log(w^{a(s)}/w^*)}{\eta^{a*(s)} - 1} - \frac{(\phi^{(s)}\eta^{a*(s)} + 1)[\log(p^a/p^*) - \log(P^a/P^*)]}{\eta^{a*(s)} - 1},$$

where an asterisk (*) denotes the geometric mean over the 42 countries and $\eta^{a*(s)} = \frac{1}{2}(\eta^{a(s)} + \eta^{*(s)})$ is the average of the income elasticity in a and the base country in trial s.

The experiment yields 1,000 values of the right-hand side of equation (5''') for $a=1, \dots, 42$ countries, which are summarised in Table 6. Take the case of Luxembourg as an example. According to the

first entry of column 2, this country's observed income is about 87 percent greater than the average country. On the basis of the mean of the 1,000 trials of the adjusted food shares (column 3), Luxembourg is estimated to be 63 percent richer than average, so that its income is underestimated by about 24 percent. While this error is substantial, for all countries other than Luxembourg, the USA, Malta and Russia the errors are much smaller, mostly in the range ± 5 percent; the average error is 0.3 percent, while the average absolute error is 4.2 percent. The closeness of the observed and simulated income is confirmed more formally in Figure 4 which shows that in a regression of actual on predicted, $\text{actual}_c = \kappa + \lambda \cdot \text{predicted}_c$, we are unable to reject the unbiasedness hypothesis whereby $\kappa = 0$, $\lambda = 1$. Figure 5 provides a plot of the observed and simulated income differences for each pair of countries. While the simulated "income mountain" is a bit more uneven than its observed counterpart, in general, the two shapes match quite well. Interestingly, a distinct local peak occurs for comparisons between Malta and its neighbours; in addition to being mentioned above, this country distinguishes itself as being an outlier in Figure 2. A measure of the underlying uncertainty of simulated income is given by the standard deviation of its 1,000 values. As can be seen from column 4 of Table 6, the standard deviations are of the order of 20 percent. More will be said about the uncertainty of incomes in the next section.

Next, we use equation (5''') to decompose simulated income into two components,

$$\log\left(\frac{Q^a}{Q^*}\right)^{(s)} = \text{food share}^{a(s)} + \text{relative price}^{a(s)},$$

where the components for country a in trial s are

$$\text{food share}^{a(s)} = \frac{\log(w^{a(s)}/w^*)}{\eta^{a(s)} - 1}, \quad \text{relative price}^{a(s)} = -\frac{(\phi^{(s)}\eta^{a(s)} + 1)[\log(p^a/p^*) - \log(P^a/P^*)]}{\eta^{a(s)} - 1}.$$

Column 7 of Table 6 reveals that with a couple of exceptions, the relative price component increases as income falls, reflecting that on average food is relatively more expensive in poorer countries. In most cases, this component is substantial, accounting for about 30 percent of the income differences on average, so that ignoring it would lead to serious distortion. The dependence of simulated income on the relative price of food is given by the term $-(\phi^{(s)}\eta^{a(s)} + 1)/(\eta^{a(s)} - 1)$; as $-(\eta^{a(s)} - 1) > 0$, the sign of this term hinges on that of the numerator $(\phi^{(s)}\eta^{a(s)} + 1)$. It is reasonable to expect the income flexibility to be a negative fraction and the food income elasticity to be a positive fraction, so it is likely that $(\phi^{(s)}\eta^{a(s)} + 1) > 0$. In this case, the direct impact of an increase in the relative food price in increasing its budget share dominates the substitution effect (which decreases the share), so the net effect is for the food share to increase with its price. Consequently, ignoring the rise in food prices for poorer countries fails to exclude this part of the

higher share, so that in effect we *over* estimate the food share and *under* estimate income in those countries. The opposite is true for rich countries, where food is cheaper. Figure 6 plots the income differences against countries and reveals that the curve with no adjustment for prices is mostly steeper than that for when prices are held constant, so that the neglect of prices overstates the dispersion of income. Additionally, the adjustment for prices smoothes out most of the sharp spikes in the income differences.

6. Stochastic Income Comparisons

The income comparisons provided by equation (5''') involve two elements of uncertainty, viz., (i) the budget shares are random due to the error term in the demand model, and (ii) the estimation procedure leads to elasticity values that are also random. In this section, we show how the incorporation of this randomness enriches the analysis of cross-country income comparisons.

We start with a summary picture by combining on the basis of income the 42 countries into 6 groups each comprising 7 members, as indicated by the grid lines of Table 1. Denote these groups by $G=1, \dots, 6$ and order them in terms of increasing average income. If S_G denotes the set of countries in group G , then in trial s the average income in this group is $\log(Q^G/Q^*)^{(s)} = (1/7) \sum_{c \in S_G} \log(Q^c/Q^*)^{(s)}$. Group G 's income relative to group H 's is then $\log(Q^G/Q^H)^{(s)} = \log(Q^G/Q^*)^{(s)} - \log(Q^H/Q^*)^{(s)}$, and Figure 7 contains for all pairs of groups, histograms of relative incomes for the $s = 1, \dots, 1,000$ trials. Consider the first row, which refers to the richest group of countries. As we move from left to right along this row, we compare income in this group to those of other groups that become successively less poor; in other words, this move involves comparing groups that become closer together on the income scale. Thus, as expected, the centres of gravity of the histograms move in the direction of zero along the journey from left to right. The same pattern applies to the other four rows of the figure, as well as to the five columns, for the same reason. Note also that visually the dispersion of the 15 histograms seems to be more or less the same.

The above impression of similar dispersion is confirmed by the standard deviations given in Table 7, which lies in the modest range of 8-10 percent. This table also contains the mean of each income-difference distribution and for all pairs, the probability that income in a richer group is greater than that in a poorer country. These probabilities reflect the uncertainty of this approach to income comparisons, and convey useful information about the precision of the ranking of countries. The last element in each "probability column" of the table refers to adjacent countries on the income scale, and tells us the probability that the ostensibly richer country is more affluent than its poorer neighbour. These probabilities are as follows:

Income	Comparison of country groups G,H	Probability that G is richer than H $P(Q^G > Q^H)$
Richer	1,2	0.834
	2,3	0.867
	3,4	0.979
	4,5	0.998
Poorer	5,6	1.000

As the probability that group 1 is richer than group 2 is 83 percent, while that between the bottom two is 100 percent, we can say that the first two groups are less distinct on the income scale than the last two. In fact, as the probabilities in the last column above always increase as we move from the top to the bottom, there is a systematic tendency for the contrast between the poorer groups to be more distinct than that between the richer. But as the probabilities are all reasonably high, at the country-group level of aggregation, it is fair to say that there is not a great deal of stochastic overlap between groups.

Next, we descend from high-level income comparisons involving groups and consider more detail by applying the same approach to individual countries. We compare the distribution of income in richer country a with that in a poorer country b by means of the probability $P(Q^a > Q^b)$. When this probability is near one, there is little overlap in the income distributions of the two countries, so they are more distinct on the income scale. Figure 8 plots these probabilities for all pairs of countries. The one-step-removed diagonal elements of this figure refer to comparisons of adjacent countries, and the probability of income differences among these pairs is of the order of one-half. Thus, in contrast to the result for groups, this shows that these countries are not really distinct at all. In other words, as the precise ranking of individual countries is not too reliable, for purposes of income comparisons it makes more sense to locate countries in broad groups.

As countries become more distant from each other, the probability of income differences rises. In Figure 8, as we move away from the diagonal (which compares neighbouring countries), and travel in a northerly or westerly direction, or any linear combination thereof, we encounter pairs of countries more distant on the income scale. There is a distinct tendency for the probability surface in the figure to increase with such a move, which reflects that incomes are more likely to differ the greater the distance between countries, or the more “exotic” or “foreign” they are. This idea is perused in Table 8 which tabulates the probability of income differences by the distance separating countries, with distance interpreted as the difference in the income ranking. As can be seen, according to both the marginal and cumulative probability concepts, as the distance between countries increases so does the probability that they have different incomes. Surprisingly, the probability of income differences jumps the most in moving to immediately

adjacent countries; e. g., from column 2 of Table 8, $P(Q^c > Q^{c+x})$ jumps from 0 to 0.6 as the band width increases from $x=0$ (same countries) to $x=1$ (neighbouring countries).

7. Concluding Comments

This paper has reconsidered the old, but fundamental problem of measuring the wealth of nations. We argued that the share of total consumption expenditure devoted to food (the food budget share) has several attractive features as an inverse measure of affluence. As it is a pure number that is independent of the price level and currency units, it is readily compared across time and countries. Additionally, fairly reliable information on the food budget share is available in most countries. Finally, the relation between this share and income is one of the most studied in economics and is enshrined in Engel's law. We demonstrated that once differences in food prices are allowed for, the food budget share provides a method of estimating incomes across countries that is a viable alternative to that provided by the PPP measures of the International Comparisons Project of the World Bank. Our approach offers estimates of international incomes that are more timely than the alternatives and can even serve as an independent check on them.

Our rule for measuring international income differences is given by equation (5''). This implies that the estimate of per capita income of country a, Q^a , in terms of country b, Q^b , can be formulated as

$$\log\left(\frac{Q^a}{Q^b}\right) = \frac{1}{\eta^{ab} - 1} \left\{ \log\left(\frac{w^a}{w^b}\right) - \Delta \log\left(\frac{w^a}{w^b}\right) \right\},$$

where η^{ab} is the average food income elasticity, w^a and w^b are the food budget shares in the two countries, $\Delta \log(w^a/w^b) = (\phi\eta^{ab} + 1) [\log(p^a/P^a) - \log(p^b/P^b)]$ is the change in the log ratio of the shares on account of the different relative food prices, and ϕ is the income flexibility (the reciprocal of the income elasticity of the marginal utility of the income). Thus as our measure of income differences just depends on two basic elements:

- The food budget shares and prices in the two countries, which are readily observable.
- Two parameters, the food income elasticity and the income flexibility, for which many estimates are available.

The workings of this rule can be illustrated with two very different countries, a = Romania (to be denoted by R) and b = France (F). The observed food budget shares are $w^R = 0.310$, $w^F = 0.114$, so that their ratio is $w^R/w^F = 2.72$, as indicated by the first entry in column 2 of Table 9. The results of Table 5 imply that the average food income elasticity is 0.4, while the income flexibility is -0.8. When these parameters are used to adjust for the higher food prices in Romania, the ratio of shares falls from 2.72 to 2.35, as shown in the first entry of column 3 of Table 9. The last row of the table reveals that Romania is estimated to be 81

percent poorer than France if the price differences are ignore, while it is 76 percent poorer once we adjust for prices. On a PPP basis, the observed volumes of total consumption per capita in the two countries are $Q^R = \$5,336$, $Q^F = \$18,439$, so that Romania is “in fact” 71 percent poorer. Accordingly, our estimate of Romania being 76 percent poorer is to be compared with the more comprehensive PPP measure of 71 percent. Although the agreement is not perfect, the discrepancy is modest and points to the practical usefulness of our short-cut approach when data are lacking.

APPENDIX

All data are from the OECD (2004) and refer to 42 countries that were members of the OECD in 2002. To describe the data, let p_{ic} be the price of consumer good i ($i = 1, \dots, 12$) in country c ($c = 1, \dots, 42$), expressed in terms of the currency of that country, and q_{ic} be the corresponding per capita quantity consumed. Thus, $p_{ic}q_{ic}$ is the expenditure on i and if we write $M_c = \sum_{i=1}^{12} p_{ic}q_{ic}$ for total consumption expenditure, $w_{ic} = p_{ic}q_{ic}/M_c$ is then the share of the total devoted to i , with $\sum_{i=1}^{12} w_{ic} = 1$. These w_{ic} are known as “budget shares”. Lines 2-13 of Table 1.1 of OECD (2004) contain $p_{ic}q_{ic} \times (\text{population of } c)$, from which the budget shares can be derived. These are given in Table A1. Here countries are ranked in terms of decreasing per capita affluence as measured by the volume of total consumption, which is described below. The second entry in column 2 of Table A1, for example, tells us that Americans devote 6.4 percent of their total consumption expenditure to food. Details of the 12 commodities are as follows:

Description	Abbreviation
Food and non-alcoholic beverages	Food
Alcoholic beverages, tobacco and narcotics	Alcohol & tobacco
Clothing and footwear	Clothing
Housing, water, electricity, gas and other fuels	Housing
Household furnishings, equip. and maintenance	Durables
Health	Health
Transport	Transport
Communication	Comm
Recreation and culture	Recreation
Education	Education
Restaurants and hotels	Restaurants
Miscellaneous goods and services	Other

Let p_i^* be the “world” price of good i , defined as the OECD average, expressed in terms of US dollars. As one US dollar buys $1/p_i^*$ units of commodity i at the world price, the ratio p_{ic}/p_i^* is interpreted as the domestic-currency cost of a US dollar’s worth of this good. Accordingly, we shall refer to p_{ic}/p_i^* as the “purchasing-power-parity (PPP) price” of good i . Table A2, from lines 2-13 of Table 1.2 of OECD (2004), give the price ratios p_{ic}/p_i^* . To illustrate, consider the second entry in column 2 of Table A2, 0.95. This means that the volume of food that can be purchased with one US dollar at average OECD prices costs \$US0.95 in the US, implying that food is 5 percent cheaper in the US than in the OECD in general.

If we use the PPP price to deflate domestic expenditure $p_{ic}q_{ic}$, we obtain

$$(A1) \quad \frac{p_{ic}q_{ic}}{p_{ic}/p_i^*} = p_i^*q_{ic},$$

which is the per capita volume of consumption of i , evaluated at the world price. As a uniform set of prices is used in all countries, the OECD refer to (A1) as “real expenditure”. As each of the $i=1,\dots,12$ commodities is measured in terms of US dollars, they can be added over commodities to yield

$$(A2) \quad Q_c = \sum_{i=1}^{12} p_i^*q_{ic},$$

which is a measure of the volume of total consumption per capita. This Q_c is a measure of affluence per capita, and is used to rank countries. Lines 2-13 of Table 1.7 of OECD (2004) give $p_i^*q_{ic} \times (\text{population of } c)$, so that deflating by population (line 39 of Table 1.1) we derive the per capita volume of consumption $p_i^*q_{ic}$. These data are given in columns 2-13 of Table A3, while column 14 gives the total volume of consumption Q_c , as defined by equation (A2).

Next, consider a budget-share weighted geometric average of the PPP prices in country c . In logarithmic form, this is

$$\log P_c = \sum_{i=1}^{12} w_{ic} \log \left(\frac{p_{ic}}{p_i^*} \right) = \log P'_c - \log P_c^*,$$

where $\log P'_c = \sum_{i=1}^{12} w_{ic} \log p_{ic}$ is the conventional cost-of-living index for country c and $\log P_c^* = \sum_{i=1}^{12} w_{ic} \log p_i^*$ is a budget-share weighted average of the world prices. The c subscript on $\log P_c^*$ reflects the use of country c 's budget shares as weights in this index. The index $\log P_c$ is a measure of the price level, in terms of PPP, in country c . A measure of the price level in country a relative to that in b is

$$\log \frac{P_a}{P_b} = \log P'_a - \log P'_b - \sum_{i=1}^{12} (w_{ia} - w_{ib}) \log p_i^*.$$

If the budget shares in the two countries are not too different, as would be the case if they were about equally affluent, and more or less shared the same structure of relative prices, then the last term on the right-hand side of the above equation is near zero and

$$(A3) \quad \log \frac{P_a}{P_b} \approx \log \frac{P'_a}{P'_b}.$$

In words, if the budget shares are similar in the two countries under consideration, then we can compare relative price levels with either conventional cost-of-living indexes or the PPP versions.

A measure of the PPP price of good i relative to the corresponding price level is

$$(A4) \quad \log\left(\frac{P_{ic}/P_i^*}{P_c}\right) = \log\frac{P_{ic}}{P_i^*} - \log P_c.$$

This relative price compares the cost in country c of a US dollar's worth of good i with the cost of a market basket, priced at PPP, in the same country. A budget-share weighted average of these relative prices is

$$\sum_{i=1}^{12} w_{ic} \log\left(\frac{P_{ic}/P_i^*}{P_c}\right) = 0,$$

so that not all relative prices can move in the same direction, as required. We use equation (A4) and the information contained in Tables A1 and A2 to define the relative prices of the 12 goods in the 42 countries, and the results, in logarithmic form, are contained in Table A4.

It is clear that the (logarithmic) PPP price of good i in terms of good j is just the difference between the left-hand side of (A4) for i and that for j :

$$(A5) \quad \log\frac{P_{ic}/P_i^*}{P_{jc}/P_j^*} = \log\left(\frac{P_{ic}/P_i^*}{P_c}\right) - \log\left(\frac{P_{jc}/P_j^*}{P_c}\right).$$

To illustrate the above interpretation, consider the prices of $i = \text{food}$ and $j = \text{health}$ in the USA. From row 2 of columns 2 and 7 of Tables A2 and A4, we have:

Price	Source table	Food	Health
1. PPP in dollars	A2	0.95	1.59
2. Logarithmic relative PPP $\times 100$	A4	-19.7	31.9

From row 1 of the above, the logarithmic PPP price of food in terms of health is

$$\log\frac{P_{ic}/P_i^*}{P_{jc}/P_j^*} = \log\left(\frac{0.95}{1.59}\right) = -51.5 \times 10^{-2},$$

so that food is approximately 52 percent cheaper than health in the USA. This is exactly the same (apart from rounding) as what we get from row 2 of the above for the difference between the two logarithmic relative PPP prices,

$$\log\left(\frac{P_{ic}/P_i^*}{P_c}\right) - \log\left(\frac{P_{jc}/P_j^*}{P_c}\right) = -19.7 - 31.9 = -51.6 \text{ (all } \times 10^{-2}\text{)}.$$

Although goods like food and health involve very different units of measurement (kilograms of food versus the number of visits to the doctor, for example), the above formulation allows meaningful comparisons of their prices to be made.

To further interpret the relative price measure (A4), consider a logarithmic comparison of the relative price of i in countries a and b :

$$\log \left(\frac{\frac{P_{ia}/P_i^*}{P_a}}{\frac{P_{ib}/P_i^*}{P_b}} \right) = \log \left(\frac{P_{ia}/P_a}{P_{ib}/P_b} \right) = \log \frac{P_{ia}}{P_{ib}} - \log \frac{P_a}{P_b}.$$

Using approximation (A3), the above can be expressed as

$$(A6) \quad \log \left(\frac{\frac{P_{ia}/P_i^*}{P_a}}{\frac{P_{ib}/P_i^*}{P_b}} \right) \approx \log \left(\frac{P_{ia}/P'_a}{P_{ib}/P'_b} \right).$$

This equation assures us that cross-country comparisons of relative PPP prices are the same as comparing conventional relative prices, at least as an approximation.

In view of the above material on the measurement of prices, it is worthwhile to comment further on the underlying issue. Due to the homogeneity of demand functions, it is only relative prices that matter for observed consumption behaviour. Results (A3), (A5) and (A6) tell us that as the use of PPP prices do not change relative prices, it is legitimate to use these prices in demand analysis. Another perspective on PPP prices is to think in terms of units of measurement considerations. We observe as a fact expenditure on good i in country c expressed in terms of domestic currency units, $p_{ic}q_{ic}$. We are then free to decompose this expenditure into price and volume components in any way we choose, as long as two conditions are satisfied. (i) The product of the two components must equal the given value of expenditure. (ii) The same decomposition must be employed in all countries. Thus, for example, we could equally use grams of food consumed and the price of a gram, or express both the quantity and price of food in terms of pounds. In other words, prices and quantities are subject to one multiplicative degree of freedom. As $\{p_{ic}/p_i^*, p_i^*q_{ic}\}$, and $\{p_{ic}, q_{ic}\}$ both satisfy the condition that (price) \times (quantity) = (given expenditure), they are equally acceptable ways of measuring prices and quantities.

Finally, Table A5 gives two versions of GDP per capita, as well as reproducing from Table A3 the volume of total consumption per capita. The PPP version of GDP, given in column 3 of the table, is from line 21 of Table 1.7 (total GDP) and line 39 of Table 1.1 (population) of OECD (2004). The market exchange rate version, given in column 5 of Table A5, is derived from three lines of Table 1.1 of the same publication: Lines 21 (total GDP in domestic currency), 39 (population) and 40 (exchange rate). Columns 4

and 6 of Table A5 give the two version of GDP in index form; a comparison of these columns shows that market exchange rates lead to an amplification of cross-country inequality in GDP, as is well known.

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TABLE 1
AFFLUENCE AND FOOD,
42 COUNTRIES IN 2002

Country	Consumption per capita (US dollars)	Food budget share (×100)
(1)	(2)	(3)
1. L'bourg	30,258	7.7
2. USA	24,768	6.4
3. UK	20,899	7.6
4. S'land	19,424	9.6
5. Austria	19,161	8.8
6. Norway	18,691	10.6
7. France	18,439	11.4
8. Iceland	18,358	13.9
9. Denmark	18,145	8.8
10. Sweden	17,934	8.7
11. N'lands	17,871	8.7
12. Canada	17,736	8.0
13. Belgium	17,735	10.4
14. Australia	17,443	9.2
15. Italy	17,403	12.2
16. Germany	16,941	9.8
17. Cyprus	15,969	13.6
18. Ireland	15,965	6.3
19. Japan	15,788	12.3
20. Spain	15,701	13.5
21. Finland	15,596	9.6
22. NZ	14,390	11.4
23. Israel	14,358	14.6
24. Greece	13,691	14.5
25. Malta	13,669	16.0
26. Portugal	13,156	15.1
27. Slovenia	11,993	13.9
28. Czech	11,229	14.1
29. Hungary	10,381	15.1
30. Korea	9,717	13.4
31. Slovakia	9,218	19.2
32. Croatia	8,918	22.3
33. Poland	8,729	17.7
34. Lithuania	8,581	23.8
35. Estonia	8,374	18.4
36. Latvia	7,330	21.3
37. Mexico	6,756	21.7
38. Bulgaria	5,567	22.9
39. Russia	5,499	27.3
40. Romania	5,336	31.0
41. Macedonia	5,123	29.8
42. Turkey	4,882	24.6

TABLE 2
MATRIX OF CHANGES IN FOOD BUDGET SHARES FOR 42 COUNTRIES
 $\Delta w^{ab} \times 100$

	Turkey	Macedonia	Romania	Russia	Bulgaria	Mexico	Latvia	Estonia	Lithuania	Poland	Croatia	Slovakia	Korea	Hungary	Czech	Slovenia	Portugal	Malta	Greece	Israel	NZ	Finland	Spain	Japan	Ireland	Cyprus	Germany	Italy	Australia	Belgium	Canada	N'lands	Sweden	Denmark	Iceland	France	Norway	Austria	S'lant	UK	USA
L'bourg	-17	-22	-23	-20	-15	-14	-14	-11	-16	-10	-15	-12	-6	-7	-6	-6	-7	-8	-7	-7	-4	-2	-6	-5	1	-6	-2	-5	-2	-3	0	-1	-1	-1	-6	-4	-3	-1	-2	0	1
USA	-18	-23	-25	-21	-16	-15	-15	-12	-17	-11	-16	-13	-7	-9	-8	-7	-9	-10	-8	-8	-5	-3	-7	-6	0	-7	-3	-6	-3	-4	-2	-2	-2	-2	-7	-5	-4	-2	-3	-1	
UK	-17	-22	-23	-20	-15	-14	-14	-11	-16	-10	-15	-12	-6	-8	-7	-6	-8	-8	-7	-7	-4	-2	-6	-5	1	-6	-2	-5	-2	-3	0	-1	-1	-1	-6	-4	-3	-1	-2		
S'lant	-15	-20	-21	-18	-13	-12	-12	-9	-14	-8	-13	-10	-4	-6	-4	-4	-6	-6	-5	-5	-2	0	-4	-3	3	-4	0	-3	0	-1	2	1	1	1	-4	-2	-1	1			
Austria	-16	-21	-22	-19	-14	-13	-12	-10	-15	-9	-13	-10	-5	-6	-5	-5	-6	-7	-6	-6	-3	-1	-5	-3	3	-5	-1	-3	0	-2	1	0	0	0	-5	-3	-2				
Norway	-14	-19	-20	-17	-12	-11	-11	-8	-13	-7	-12	-9	-3	-5	-3	-3	-5	-5	-4	-4	-1	1	-3	-2	4	-3	1	-2	1	0	3	2	2	2	-3	-1					
France	-13	-18	-20	-16	-11	-10	-10	-7	-12	-6	-11	-8	-2	-4	-3	-2	-4	-5	-3	-3	0	2	-2	-1	5	-2	2	-1	2	1	3	3	3	3	-2						
Iceland	-11	-16	-17	-13	-9	-8	-7	-4	-10	-4	-8	-5	0	-1	0	0	-1	-2	-1	-1	2	4	0	2	8	0	4	2	5	3	6	5	5	5							
Denmark	-16	-21	-22	-19	-14	-13	-12	-10	-15	-9	-13	-10	-5	-6	-5	-5	-6	-7	-6	-6	-3	-1	-5	-3	3	-5	-1	-3	0	-2	1	0	0								
Sweden	-16	-21	-22	-19	-14	-13	-13	-10	-15	-9	-14	-10	-5	-6	-5	-5	-6	-7	-6	-6	-3	-1	-5	-4	2	-5	-1	-4	-1	-2	1	0									
N'lands	-16	-21	-22	-19	-14	-13	-13	-10	-15	-9	-14	-10	-5	-6	-5	-5	-6	-7	-6	-6	-3	-1	-5	-4	2	-5	-1	-4	-1	-2	1										
Canada	-17	-22	-23	-19	-15	-14	-13	-10	-16	-10	-14	-11	-5	-7	-6	-6	-7	-8	-6	-7	-3	-2	-6	-4	2	-6	-2	-4	-1	-2											
Belgium	-14	-19	-21	-17	-12	-11	-11	-8	-13	-7	-12	-9	-3	-5	-4	-3	-5	-6	-4	-4	-1	1	-3	-2	4	-3	1	-2	1												
Australia	-15	-21	-22	-18	-14	-13	-12	-9	-15	-9	-13	-10	-4	-6	-5	-5	-6	-7	-5	-5	-2	0	-4	-3	3	-4	-1	-3													
Italy	-12	-18	-19	-15	-11	-10	-9	-6	-12	-6	-10	-7	-1	-3	-2	-2	-3	-4	-2	-2	1	3	-1	0	6	-1	2														
Germany	-15	-20	-21	-17	-13	-12	-11	-9	-14	-8	-12	-9	-4	-5	-4	-4	-5	-6	-5	-5	-2	0	-4	-2	4	-4															
Cyprus	-11	-16	-17	-14	-9	-8	-8	-5	-10	-4	-9	-6	0	-2	0	0	-1	-2	-1	-1	2	4	0	1	7																
Ireland	-18	-24	-25	-21	-17	-15	-15	-12	-18	-11	-16	-13	-7	-9	-8	-8	-9	-10	-8	-8	-5	-3	-7	-6																	
Japan	-12	-18	-19	-15	-11	-9	-9	-6	-12	-5	-10	-7	-1	-3	-2	-2	-3	-4	-2	-2	1	3	-1																		
Spain	-11	-16	-17	-14	-9	-8	-8	-5	-10	-4	-9	-6	0	-2	-1	0	-2	-3	-1	-1	2	4																			
Finland	-15	-20	-21	-18	-13	-12	-12	-9	-14	-8	-13	-10	-4	-5	-4	-4	-5	-6	-5	-5	-2																				
NZ	-13	-18	-20	-16	-11	-10	-10	-7	-12	-6	-11	-8	-2	-4	-3	-2	-4	-5	-3	-3																					
Israel	-10	-15	-16	-13	-8	-7	-7	-4	-9	-3	-8	-5	1	-1	1	1	-1	-1	0																						
Greece	-10	-15	-16	-13	-8	-7	-7	-4	-9	-3	-8	-5	1	-1	0	1	-1	-2																							
Malta	1	2	2	1	3	-3	-6	-2	-8	-2	-5	-6	-7	-11	-15	-14	-9																								
Portugal	-9	-15	-16	-12	-8	-7	-6	-3	-9	-3	-7	-4	2	0	1	1																									
Slovenia	-11	-16	-17	-13	-9	-8	-7	-5	-10	-4	-8	-5	0	-1	0																										
Czech	-11	-16	-17	-13	-9	-8	-7	-4	-10	-4	-8	-5	1	-1																											
Hungary	-9	-15	-16	-12	-8	-7	-6	-3	-9	-3	-7	-4	2																												
Korea	-11	-16	-18	-14	-9	-8	-8	-5	-10	-4	-9	-6																													
Slovakia	-5	-11	-12	-8	-4	-3	-2	1	-5	1	-3																														
Croatia	-2	-8	-9	-5	-1	1	1	4	-2	5																															
Poland	-7	-12	-13	-10	-5	-4	-4	-1	-6																																
Lithuania	-1	-6	-7	-4	1	2	3	5																																	
Estonia	-6	-11	-13	-9	-5	-3	-3																																		
Latvia	-3	-9	-10	-6	-2	0																																			
Mexico	-3	-8	-9	-6	-1																																				
Bulgaria	-2	-7	-8	-4																																					
Russia	3	-2	-4																																						
Romania	6	1																																							
Macedonia	5																																								

TABLE 3
MATRIX OF CHANGES IN INCOMES FOR 42 COUNTRIES
 $\Delta \log Q^{ab} \times 100$

	Turkey	Macedonia	Romania	Russia	Bulgaria	Mexico	Latvia	Estonia	Lithuania	Poland	Croatia	Slovakia	Korea	Hungary	Czech	Slovenia	Portugal	Malta	Greece	Israel	NZ	Finland	Spain	Japan	Ireland	Cyprus	Germany	Italy	Australia	Belgium	Canada	N'lans	Sweden	Denmark	Iceland	France	Norway	Austria	S'land	UK	USA			
L'bourg	182	178	174	171	169	150	142	128	126	124	122	119	114	107	99	93	83	79	79	75	74	66	66	65	64	64	58	55	55	53	53	53	52	51	50	50	48	46	44	37	20			
USA	162	158	154	150	149	130	122	108	106	104	102	99	94	87	79	73	63	59	59	55	54	46	46	45	44	44	38	35	35	33	33	33	32	31	30	30	28	26	24	17				
UK	145	141	137	134	132	113	105	91	89	87	85	82	77	70	62	56	46	42	42	38	37	29	29	28	27	27	21	18	18	16	16	16	15	14	13	13	11	9	7					
S'land	138	133	129	126	125	106	97	84	82	80	78	75	69	63	55	48	39	35	35	30	30	22	21	21	20	20	14	11	11	9	9	8	8	7	6	5	4	1						
Austria	137	132	128	125	124	104	96	83	80	79	76	73	68	61	53	47	38	34	34	29	29	21	20	19	18	18	12	10	9	8	8	7	7	5	4	4	2							
Norway	134	129	125	122	121	102	94	80	78	76	74	71	65	59	51	44	35	31	31	26	26	18	17	17	16	16	10	7	7	5	5	4	4	3	2	1								
France	133	128	124	121	120	100	92	79	76	75	73	69	64	57	50	43	34	30	30	25	25	17	16	16	14	14	8	6	6	4	4	3	3	2	0									
Iceland	132	128	124	121	119	100	92	78	76	74	72	69	64	57	49	43	33	29	29	25	24	16	16	15	14	14	8	5	5	3	3	3	2	1										
Denmark	131	126	122	119	118	99	91	77	75	73	71	68	62	56	48	41	32	28	28	23	23	15	14	14	13	13	7	4	4	2	2	2	1											
Sweden	130	125	121	118	117	98	89	76	74	72	70	67	61	55	47	40	31	27	27	22	22	14	13	13	12	12	6	3	3	1	1	0												
N'lans	130	125	121	118	117	97	89	76	73	72	70	66	61	54	46	40	31	27	27	22	22	14	13	12	11	11	5	3	2	1	1													
Canada	129	124	120	117	116	97	88	75	73	71	69	65	60	54	46	39	30	26	26	21	21	13	12	12	11	10	5	2	2	0														
Belgium	129	124	120	117	116	97	88	75	73	71	69	65	60	54	46	39	30	26	26	21	21	13	12	12	11	10	5	2	2															
Australia	127	123	118	115	114	95	87	73	71	69	67	64	59	52	44	37	28	24	24	19	19	11	11	10	9	9	3	0																
Italy	127	122	118	115	114	95	86	73	71	69	67	64	58	52	44	37	28	24	24	19	19	11	10	10	9	9	3																	
Germany	124	120	116	113	111	92	84	70	68	66	64	61	56	49	41	35	25	21	21	17	16	8	8	7	6	6																		
Cyprus	119	114	110	107	105	86	78	65	62	60	58	55	50	43	35	29	19	16	15	11	10	2	2	1	0																			
Ireland	118	114	110	107	105	86	78	65	62	60	58	55	50	43	35	29	19	16	15	11	10	2	2	1																				
Japan	117	113	108	105	104	85	77	63	61	59	57	54	49	42	34	27	18	14	14	9	9	1	1																					
Spain	117	112	108	105	104	84	76	63	60	59	57	53	48	41	34	27	18	14	14	9	9	1																						
Finland	116	111	107	104	103	84	76	62	60	58	56	53	47	41	33	26	17	13	13	8	8																							
NZ	108	103	99	96	95	76	67	54	52	50	48	45	39	33	25	18	9	5	5	0																								
Israel	108	103	99	96	95	75	67	54	51	50	48	44	39	32	25	18	9	5	5																									
Greece	103	98	94	91	90	71	62	49	47	45	43	40	34	28	20	13	4	0																										
Malta	103	98	94	91	90	70	62	49	47	45	43	39	34	28	20	13	4																											
Portugal	99	94	90	87	86	67	58	45	43	41	39	36	30	24	16	9																												
Slovenia	90	85	81	78	77	57	49	36	33	32	30	26	21	14	7																													
Czech	83	78	74	71	70	51	43	29	27	25	23	20	14	8																														
Hungary	75	71	67	64	62	43	35	21	19	17	15	12	7																															
Korea	69	64	60	57	56	36	28	15	12	11	9	5																																
Slovakia	64	59	55	52	50	31	23	10	7	5	3																																	
Croatia	60	55	51	48	47	28	20	6	4	2																																		
Poland	58	53	49	46	45	26	17	4	2																																			
Lithuania	56	52	48	44	43	24	16	2																																				
Estonia	54	49	45	42	41	21	13																																					
Latvia	41	36	32	29	28	8																																						
Mexico	32	28	24	21	19																																							
Bulgaria	13	8	4	1																																								
Russia	12	7	3																																									
Romania	9	4																																										
Macedonia	5																																											

TABLE 4

MATRIX OF RATIOS OF CHANGES IN FOOD BUDGET SHARE TO INCOME CHANGES FOR 42 COUNTRIES

$$\Delta w^{ab} / \Delta \log Q^{ab} \times 100$$

	Turkey	Macedonia	Romania	Russia	Bulgaria	Mexico	Latvia	Estonia	Lithuania	Poland	Croatia	Slovakia	Korea	Hungary	Czech	Slovenia	Portugal	Malta	Greece	Israel	NZ	Finland	Spain	Japan	Ireland	Cyprus	Germany	Italy	Australia	Belgium	Canada	N'lands	Sweden	Denmark	Iceland	France	Norway	Austria	S'land	UK	USA					
L'bourg	-9	-12	-13	-12	-9	-9	-10	-8	-13	-8	-12	-10	-5	-7	-6	-7	-9	-11	-9	-9	-5	-3	-9	-7	2	-9	-4	-8	-3	-5	-1	-2	-2	-2	-12	-8	-6	-3	-4	0	6					
USA	-11	-15	-16	-14	-11	-12	-12	-11	-16	-11	-16	-13	-7	-10	-10	-10	-14	-16	-14	-15	-9	-7	-16	-13	0	-16	-9	-16	-8	-12	-5	-7	-7	-8	-25	-17	-15	-9	-13	-7						
UK	-12	-16	-17	-15	-12	-13	-13	-12	-18	-12	-17	-14	-8	-11	-10	-11	-16	-20	-16	-19	-10	-7	-21	-17	5	-22	-11	-25	-9	-17	-3	-7	-7	-9	-49	-31	-27	-15	-28							
S'land	-11	-15	-17	-14	-11	-12	-12	-10	-17	-10	-16	-13	-6	-9	-8	-9	-14	-18	-14	-17	-6	0	-18	-13	17	-21	-2	-24	4	-9	17	11	11	11	-76	-35	-26	55								
Austria	-12	-16	-17	-15	-11	-12	-13	-12	-19	-11	-18	-14	-7	-10	-10	-11	-17	-21	-17	-20	-9	-4	-23	-18	14	-26	-8	-35	-4	-21	11	2	2	0	-118	-67	-70									
Norway	-10	-15	-16	-14	-10	-11	-11	-10	-17	-9	-16	-12	-4	-8	-7	-7	-13	-17	-13	-15	-3	5	-17	-10	27	-19	7	-23	20	3	49	42	46	59	-183	-63										
France	-10	-14	-16	-13	-10	-10	-11	-9	-16	-8	-15	-11	-3	-6	-5	-6	-11	-15	-10	-13	0	11	-13	-6	36	-15	19	-13	40	25	88	88	99	161	-556											
Iceland	-8	-12	-14	-11	-8	-8	-8	-6	-13	-5	-12	-8	1	-2	0	0	-4	-7	-2	-3	10	26	2	11	54	2	50	31	92	100	171	193	222	433												
Denmark	-12	-17	-18	-15	-12	-13	-14	-12	-20	-12	-19	-15	-7	-11	-11	-12	-20	-25	-20	-25	-11	-5	-32	-25	20	-37	-15	-81	-9	-70	36	10	12													
Sweden	-12	-17	-18	-16	-12	-13	-14	-13	-21	-13	-19	-16	-8	-12	-11	-13	-21	-27	-21	-27	-12	-7	-36	-28	21	-42	-20	-117	-18	-157	62	1														
N'lands	-12	-17	-18	-16	-12	-13	-14	-13	-21	-13	-20	-16	-8	-12	-12	-13	-21	-27	-22	-27	-13	-7	-37	-29	21	-44	-22	-132	-21	-229	90															
Canada	-13	-18	-19	-17	-13	-14	-15	-14	-22	-14	-21	-17	-9	-13	-13	-15	-24	-31	-25	-31	-16	-13	-45	-37	16	-53	-40	-222	-71	-130006																
Belgium	-11	-16	-17	-14	-11	-12	-12	-11	-18	-10	-17	-13	-5	-9	-8	-9	-16	-22	-16	-20	-5	6	-25	-16	40	-30	13	-93	75																	
Australia	-12	-17	-18	-16	-12	-13	-14	-13	-21	-12	-19	-16	-7	-11	-11	-12	-21	-28	-22	-28	-12	-4	-41	-31	33	-50	-23	-1309																		
Italy	-10	-14	-16	-13	-9	-10	-11	-8	-16	-8	-15	-11	-2	-6	-4	-4	-10	-16	-9	-12	4	23	-13	-1	69	-16	87																			
Germany	-12	-17	-18	-16	-12	-13	-14	-12	-21	-12	-19	-15	-6	-11	-10	-12	-21	-29	-22	-29	-10	2	-48	-35	60	-64																				
Cyprus	-9	-14	-16	-13	-9	-9	-10	-7	-16	-7	-15	-10	0	-4	-1	-1	-8	-16	-6	-9	21	168	6	117	28105																					
Ireland	-15	-21	-23	-20	-16	-18	-19	-19	-28	-19	-27	-23	-14	-21	-22	-27	-46	-63	-53	-78	-50	-144	-434	-540																						
Japan	-10	-16	-17	-14	-10	-11	-12	-10	-19	-9	-17	-13	-2	-7	-5	-6	-15	-26	-15	-24	9	215	-222																							
Spain	-9	-15	-16	-13	-9	-10	-10	-8	-17	-7	-15	-11	0	-4	-2	-1	-9	-18	-7	-12	24	572																								
Finland	-13	-18	-20	-17	-13	-14	-15	-14	-24	-14	-23	-18	-8	-14	-13	-16	-32	-48	-37	-60	-22																									
NZ	-12	-18	-20	-17	-12	-14	-15	-13	-24	-13	-23	-17	-5	-11	-11	-13	-41	-90	-61	-1386																										
Israel	-9	-15	-17	-13	-9	-9	-10	-7	-18	-6	-16	-10	3	-2	2	4	-6	-30	2																											
Greece	-10	-16	-17	-14	-9	-10	-11	-8	-20	-7	-18	-12	3	-2	2	5	-16	-984																												
Malta	1	2	2	1	3	-4	-10	-3	-17	-5	-12	-14	-20	-41	-76	-105	-223																													
Portugal	-10	-16	-18	-14	-9	-10	-11	-7	-20	-6	-18	-11	6	0	7	13																														
Slovenia	-12	-19	-21	-17	-12	-14	-15	-13	-30	-12	-28	-20	2	-9	-3																															
Czech	-13	-20	-23	-19	-13	-15	-17	-15	-36	-14	-36	-26	5	-14																																
Hungary	-12	-21	-24	-19	-12	-15	-18	-15	-46	-15	-47	-34	26																																	
Korea	-16	-26	-29	-24	-17	-23	-28	-33	-84	-40	-103	-109																																		
Slovakia	-9	-18	-22	-16	-7	-8	-9	8	-65	27	-94																																			
Croatia	-4	-14	-17	-11	-1	2	5	62	-41	213																																				
Poland	-12	-23	-27	-21	-12	-16	-21	-16	-357																																					
Lithuania	-1	-12	-15	-8	2	9	16	224																																						
Estonia	-11	-23	-28	-21	-11	-16	-22																																							
Latvia	-8	-24	-30	-21	-6	-6																																								
Mexico	-9	-29	-39	-27	-6																																									
Bulgaria	-13	-83	-190	-360																																										
Russia	23	-35	-120																																											
Romania	72	28																																												
Macedonia	109																																													

FIGURE 1
RATIOS OF FOOD-BUDGET-SHARE CHANGES
TO INCOME CHANGES
($\times 100$)

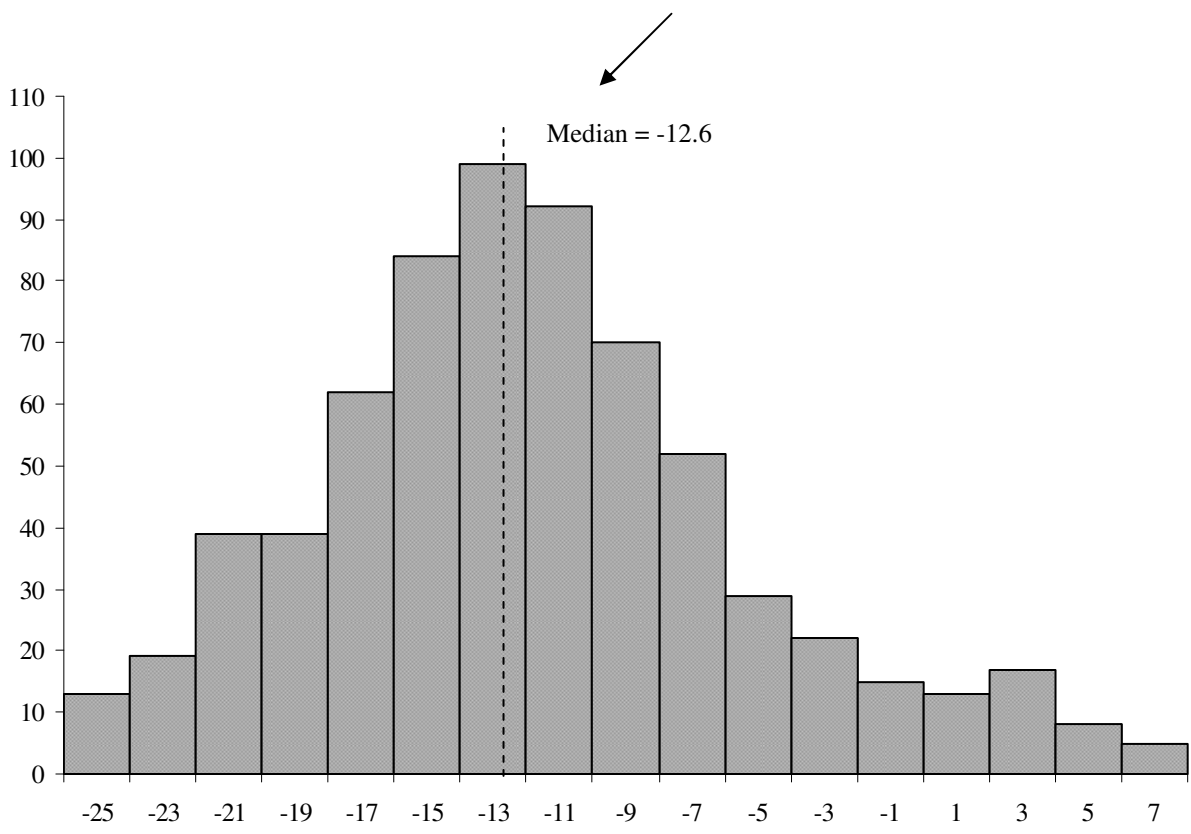
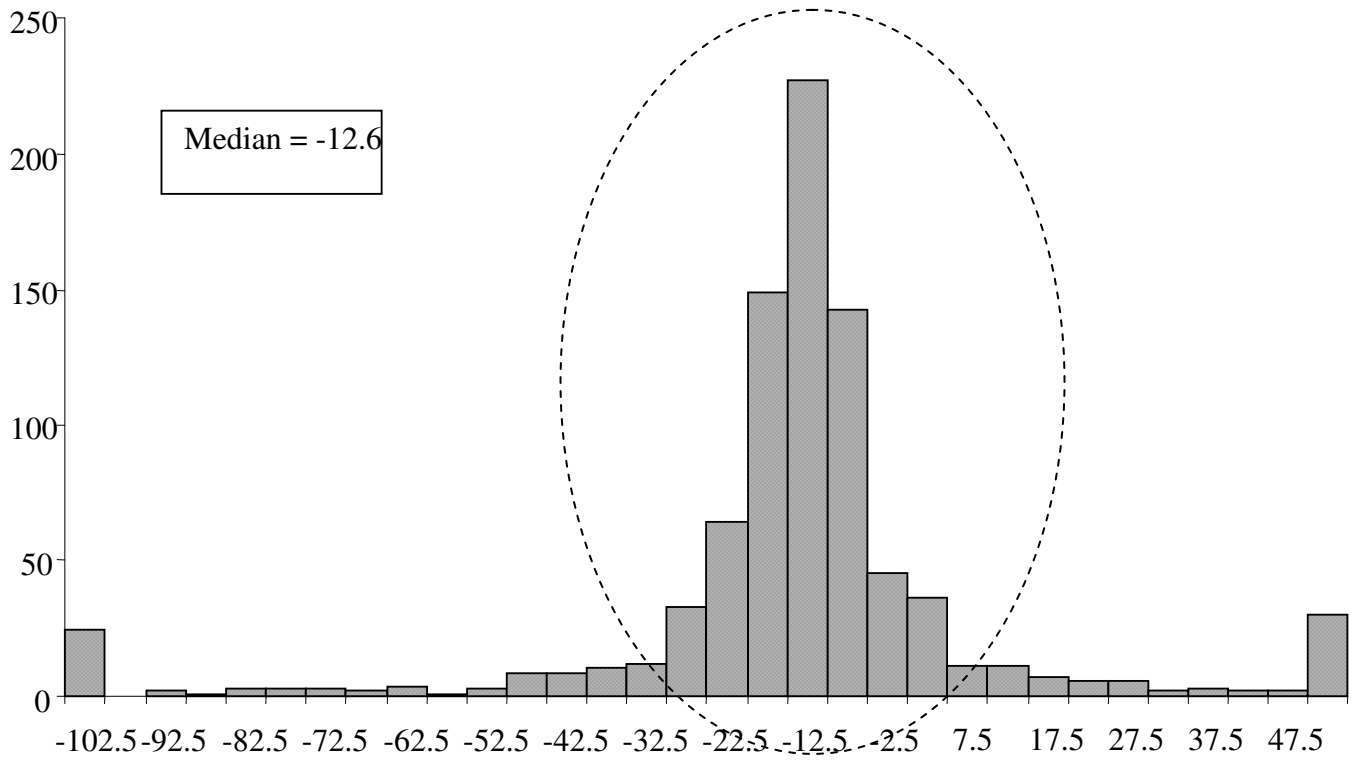
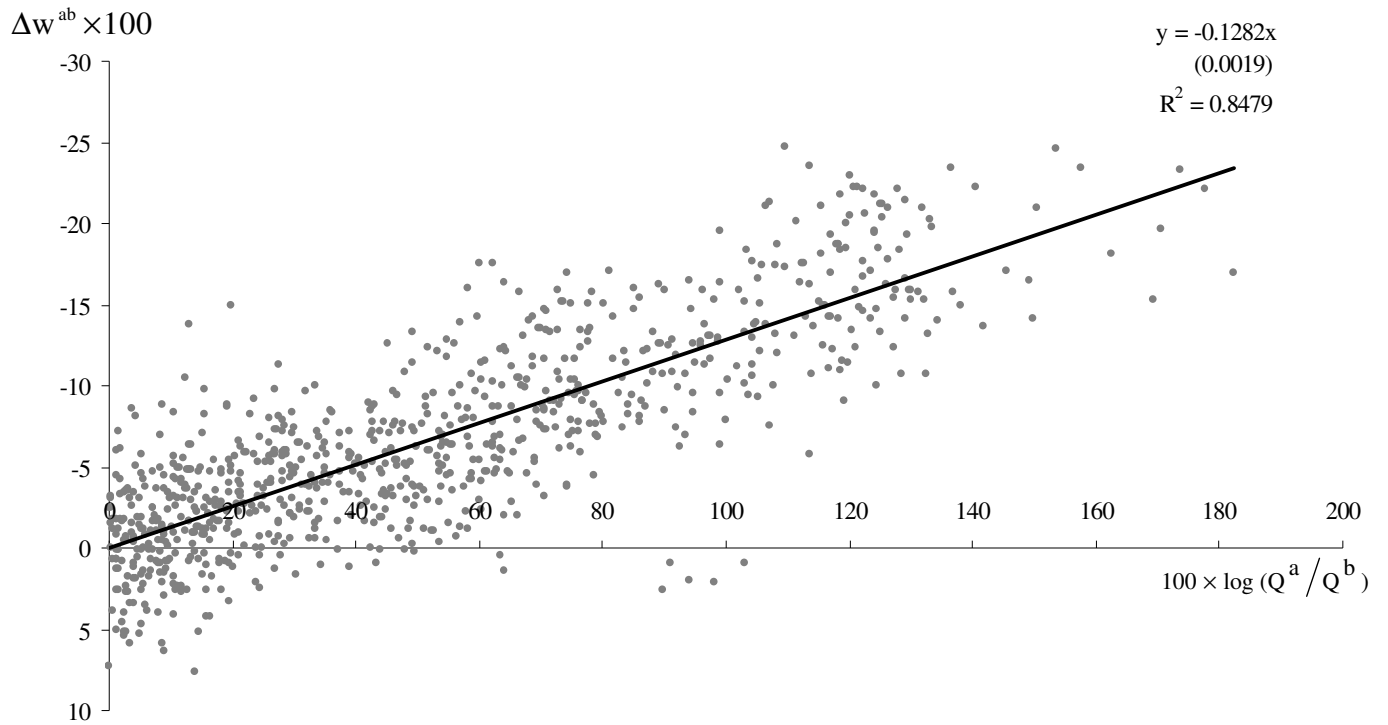


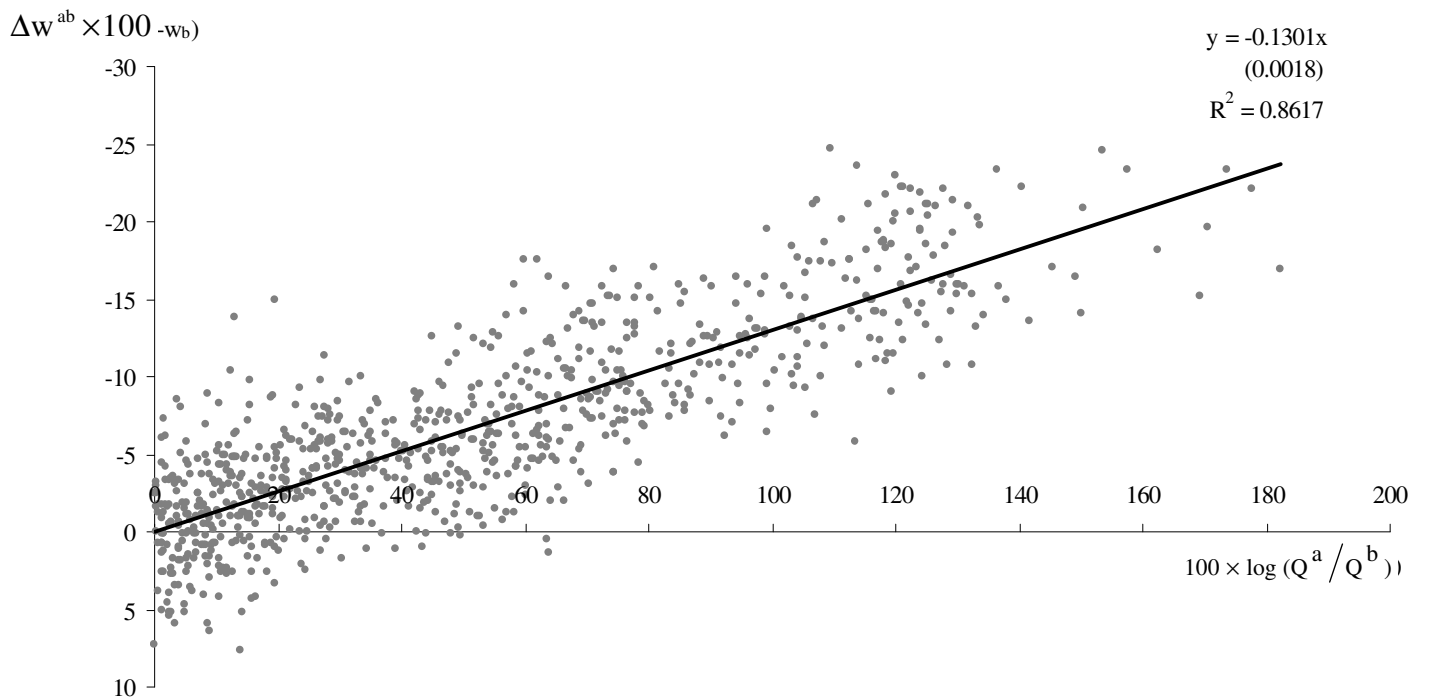
FIGURE 2

SCATTER OF CHANGES IN FOOD BUDGET SHARE
AGAINST INCOME CHANGES IN 42 COUNTRIES

I. All pairs of countries



II. Five outlining pairs excluded



Note: The 5 excluded pairs of countries in panel II are Malta with Turkey, Macedonia, Romania, Russia, and Bulgaria.

FIGURE 3
SCATTER OF FOOD BUDGET SHARE
AGAINST INCOME

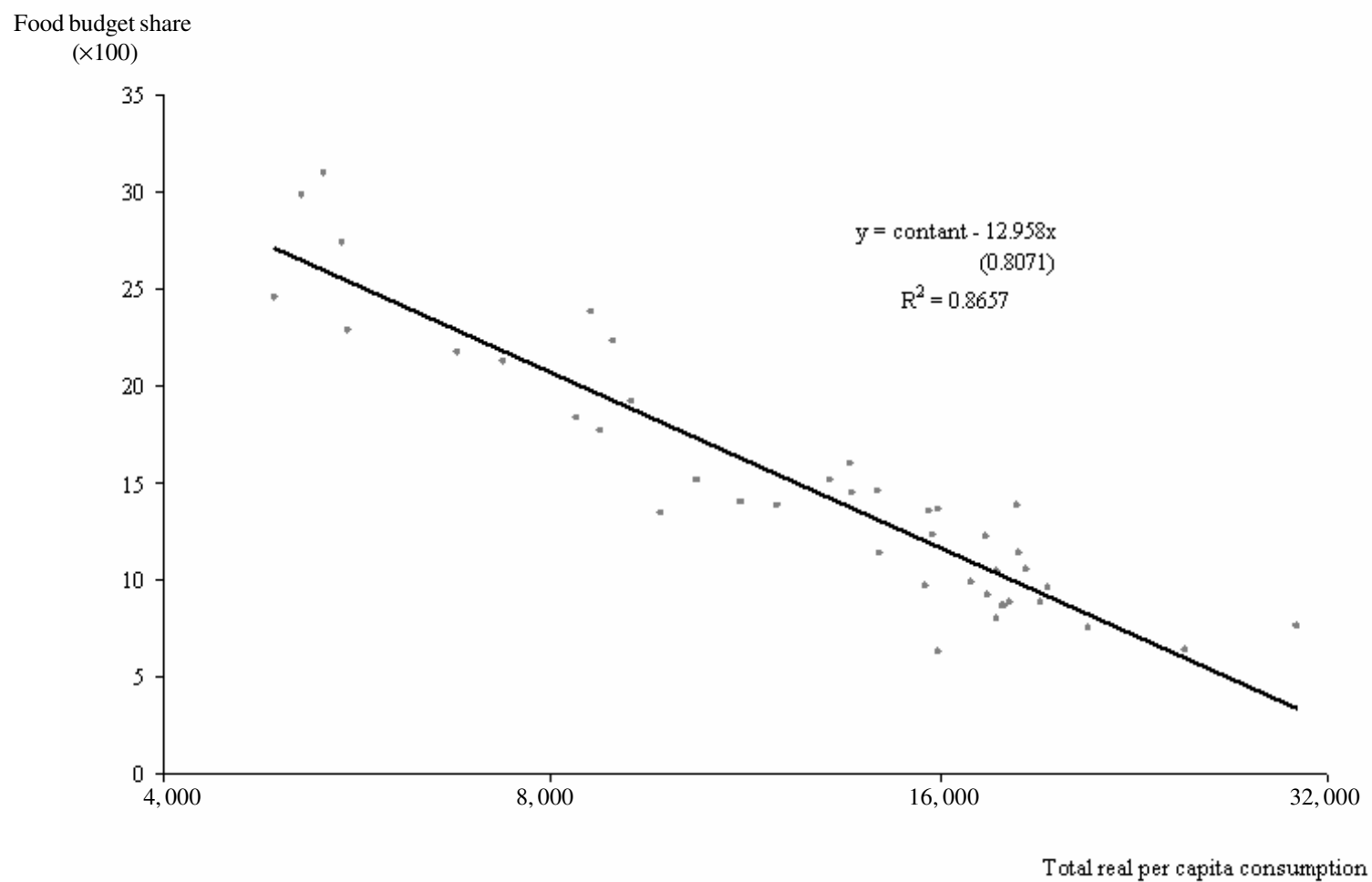


TABLE 5
THE FLORIDA MODEL: ESTIMATES AND SIMULATION RESULTS

$$w_i^c = \alpha_i + \beta_i q^c + (\alpha_i + \beta_i q^c) \left[\log \frac{p_i^c}{p_i} - \sum_{j=1}^{12} (\alpha_j + \beta_j q^c) \log \frac{p_j^c}{p_j} \right] \\ + \phi(\alpha_i + \beta_i q^{*c}) \left[\log \frac{p_i^c}{p_i} - \sum_{j=1}^{12} (\alpha_j + \beta_j q^{*c}) \log \frac{p_j^c}{p_j} \right] + \varepsilon_i^c$$

Commodity	Data based				Monte Carlo simulation					
	Intercept α_i		Slope β_i		Intercept α_i			Slope β_i		
	Point estimate	ASE	Point estimate	ASE	Mean	RMSE	RMASE	Mean	RMSE	RMASE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. Food	0.0789	0.0051	-0.1010	0.0059	0.0792	0.0051	0.0048	-0.1008	0.0061	0.0055
2. Alcohol & tobacco	0.0356	0.0042	-0.0073	0.0050	0.0356	0.0041	0.0040	-0.0073	0.0050	0.0046
3. Clothing	0.0453	0.0034	-0.0039	0.0036	0.0451	0.0035	0.0032	-0.0041	0.0038	0.0034
4. Housing	0.1511	0.0097	-0.0306	0.0123	0.1515	0.0104	0.0090	-0.0301	0.0132	0.0111
5. Durables	0.0553	0.0028	0.0084	0.0031	0.0553	0.0029	0.0026	0.0083	0.0032	0.0029
6. Health	0.1184	0.0067	0.0313	0.0094	0.1186	0.0070	0.0063	0.0315	0.0100	0.0086
7. Transport	0.1099	0.0049	0.0090	0.0055	0.1099	0.0051	0.0046	0.0091	0.0056	0.0050
8. Communication	0.0231	0.0019	-0.0049	0.0018	0.0230	0.0019	0.0018	-0.0049	0.0019	0.0016
9. Recreation	0.0978	0.0040	0.0301	0.0046	0.0978	0.0042	0.0038	0.0300	0.0048	0.0043
10. Education	0.0743	0.0062	-0.0019	0.0093	0.0744	0.0067	0.0055	-0.0017	0.0105	0.0080
11. Restaurants	0.0785	0.0080	0.0219	0.0094	0.0780	0.0082	0.0076	0.0213	0.0098	0.0087
12. Other	0.1320	0.0079	0.0488	0.0097	0.1317	0.0081	0.0075	0.0486	0.0100	0.0091
Income flexibility	Point estimate = -0.7728, ASE = 0.0533				Mean = -0.7754, RMSE = 0.0619, RMASE = 0.0446					

Notes: 1. $q^{*c} = 1 + q^c$

2. The Monte Carlo simulation involves 1,000 trials.

3. ASE = asymptotic standard error.

4. RMSE is the root mean squared error over the 1,000 trials.

5. $RMASE = \sqrt{(1/1000) \sum_{s=1}^{1,000} (ASE^{(s)})^2}$ where $ASE^{(s)}$ is the asymptotic SE of a given parameter at trial s.

TABLE 6
A CROSS-COUNTRY INCOME COMPARISON

Country	log (Q ^c /Q [*])			Components of simulated log (Q ^c /Q [*])			
	Observed	Simulated		Food share		Food relative price	
		Mean	SD	Mean	SD	Mean	SD
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1. L'bourg	86.6	62.6	11.5	73.1	11.6	-10.6	0.7
2. USA	66.6	42.2	10.9	73.3	11.0	-31.1	2.0
3. UK	49.6	45.5	16.0	59.9	15.4	-14.4	0.7
4. S'land	42.3	43.3	18.0	46.8	17.8	-3.5	0.1
5. Austria	41.0	39.6	17.6	53.0	17.2	-13.4	0.6
6. Norway	38.5	40.6	19.2	41.4	19.2	-0.8	0.0
7. France	37.1	38.4	19.3	40.3	19.3	-1.9	0.1
8. Iceland	36.7	40.2	18.9	30.4	19.2	9.7	0.4
9. Denmark	35.5	37.5	18.2	47.4	17.9	-10.0	0.4
10. Sweden	34.3	36.6	17.6	46.6	17.3	-9.9	0.4
11. N'lands	34.0	33.5	18.3	47.4	17.8	-13.9	0.6
12. Canada	33.2	32.5	17.8	52.5	17.1	-20.0	0.9
13. Belgium	33.2	35.3	18.6	45.4	18.3	-10.1	0.4
14. Australia	31.6	33.1	18.9	44.5	18.5	-11.4	0.5
15. Italy	31.3	32.0	18.7	39.4	18.5	-7.4	0.3
16. Germany	28.6	28.8	18.9	46.9	18.3	-18.1	0.8
17. Cyprus	22.7	19.7	20.0	24.4	19.8	-4.7	0.2
18. Ireland	22.7	23.3	18.7	37.1	18.3	-13.7	0.6
19. Japan	21.6	25.5	20.3	2.5	20.8	23.1	0.9
20. Spain	21.0	20.2	20.1	32.1	19.8	-11.8	0.5
21. Finland	20.4	22.5	20.2	36.5	19.8	-14.0	0.6
22. NZ	12.3	14.0	20.2	16.9	20.1	-2.9	0.1
23. Israel	12.1	18.8	20.5	19.3	20.5	-0.5	0.0
24. Greece	7.3	3.7	20.9	10.6	20.8	-6.9	0.3
25. Malta	7.2	-1.3	20.9	0.6	20.9	-1.9	0.1
26. Portugal	3.4	-2.2	21.0	1.8	21.0	-4.0	0.2
27. Slovenia	-5.9	-3.6	21.3	-11.7	21.4	8.1	0.3
28. Czech	-12.5	-8.0	21.1	-13.0	21.2	4.9	0.2
29. Hungary	-20.3	-19.4	20.4	-32.5	20.6	13.2	0.6
30. Korea	-27.0	-20.6	20.1	-44.6	20.5	24	1.1
31. Slovakia	-32.2	-28.1	20.4	-48.3	20.7	20.2	0.9
32. Croatia	-35.5	-37.3	19.7	-60.0	20.1	22.7	1.1
33. Poland	-37.7	-32.2	20.4	-30.2	20.4	-2.0	0.1
34. Lithuania	-39.4	-40.2	19.9	-54.4	20.1	14.3	0.7
35. Estonia	-41.8	-37.1	20.1	-55.0	20.3	17.9	0.8
36. Latvia	-55.1	-49.4	18.9	-70.6	19.2	21.2	1.0
37. Mexico	-63.3	-53.9	20.4	-41.2	20.2	-12.7	0.6
38. Bulgaria	-82.6	-81.9	17.8	-110.2	18.3	28.3	1.5
39. Russia	-83.9	-100.4	17.2	-114.4	17.4	14.1	0.8
40. Romania	-86.9	-86.4	17.3	-109.9	17.7	23.5	1.2
41. Macedonia	-91.0	-90.7	16.7	-109.2	16.9	18.5	1.0
42. Turkey	-95.8	-91.3	17.0	-111.9	17.3	20.7	1.1

Notes: 1. All entries are to be divided by 100.

2. Q^* = geometric mean of Q^c
3. SD=standard deviation.

FIGURE 4
ACTUAL AND PREDICTED INCOME
(Logarithms $\times 100$)

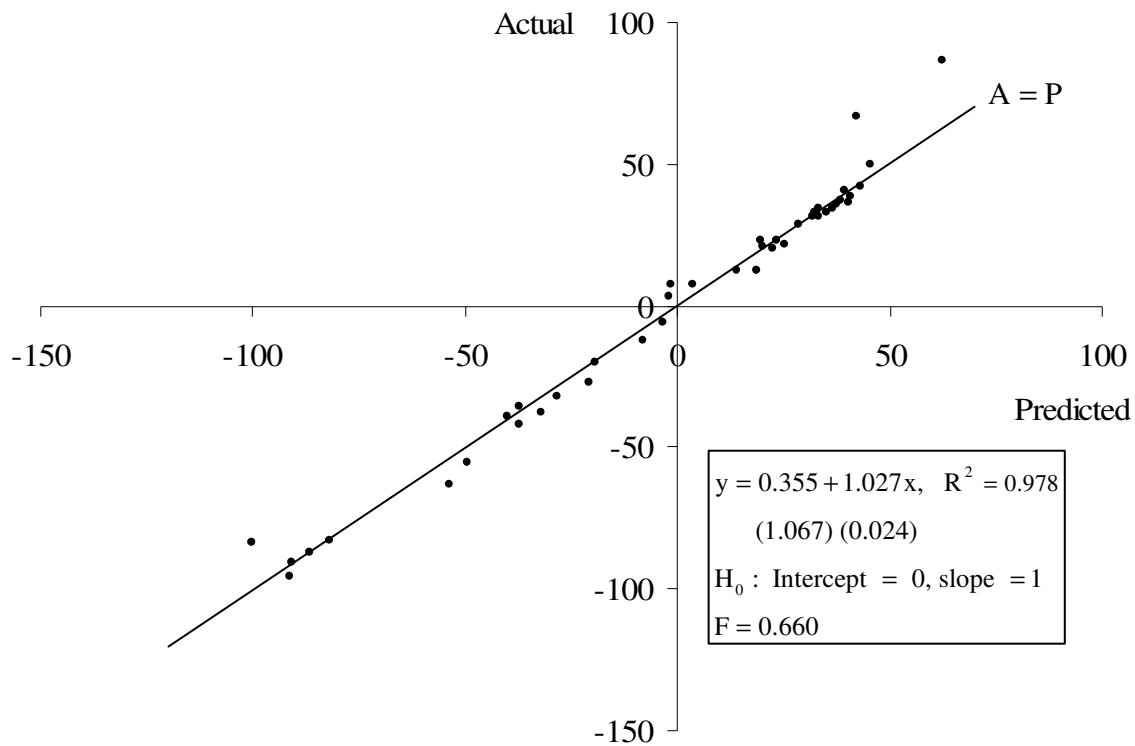
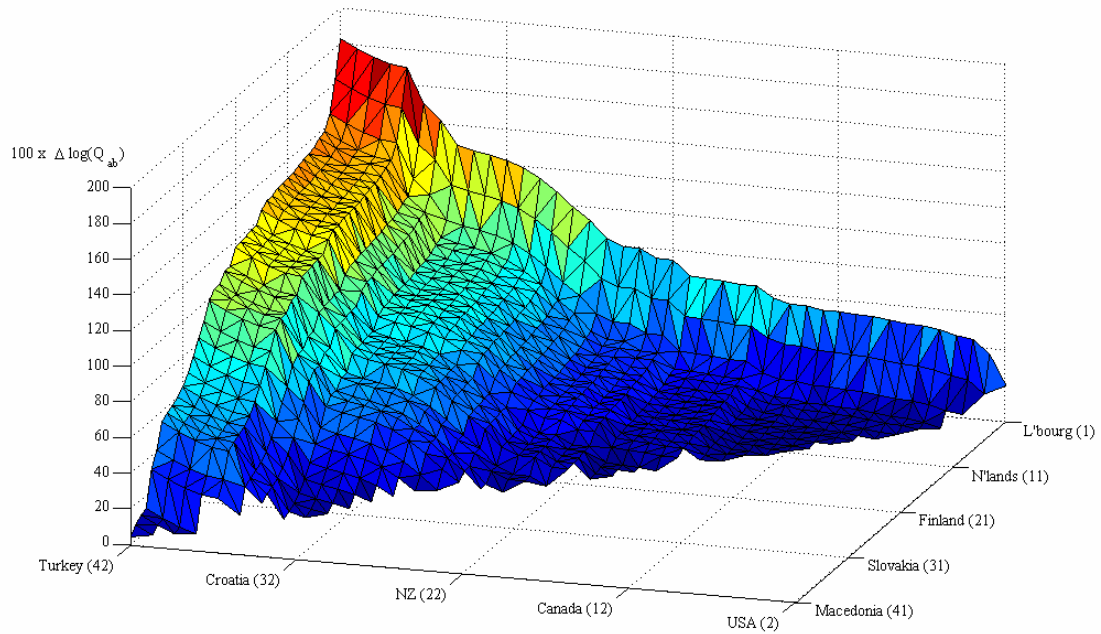


FIGURE 5
OBSERVED AND SIMULATED CROSS-COUNTRY INCOME COMPARISONS

I. Observed



II. Simulated

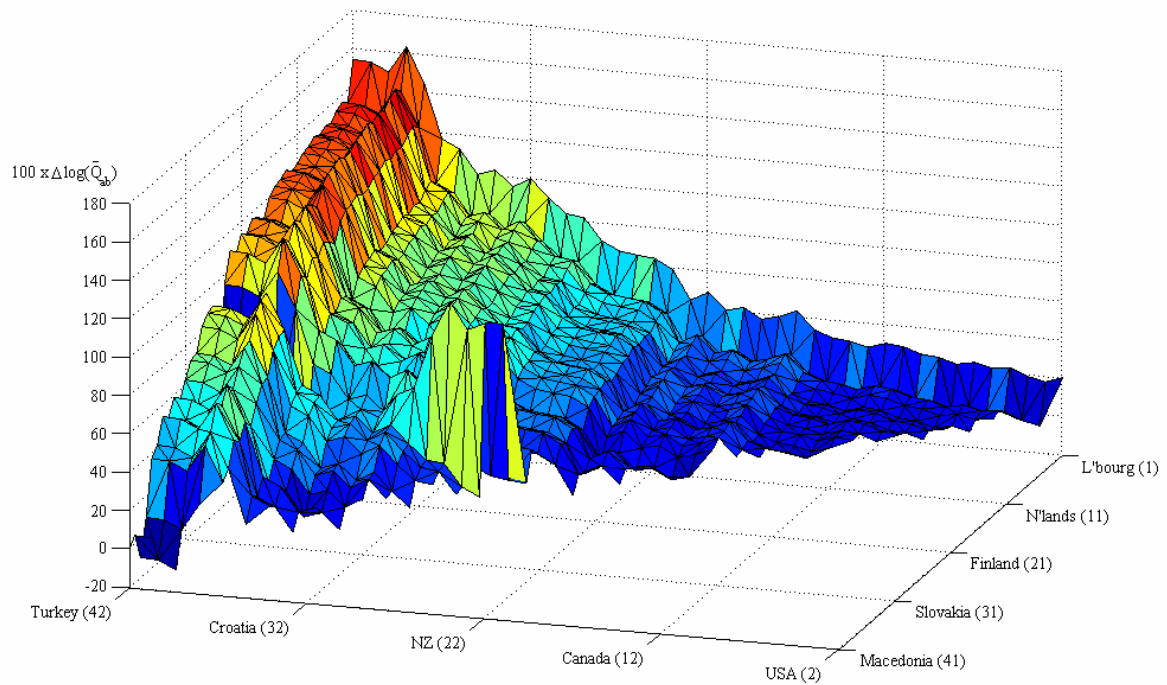


FIGURE 6

TWO MEASURES OF INCOME DIFFERENCES

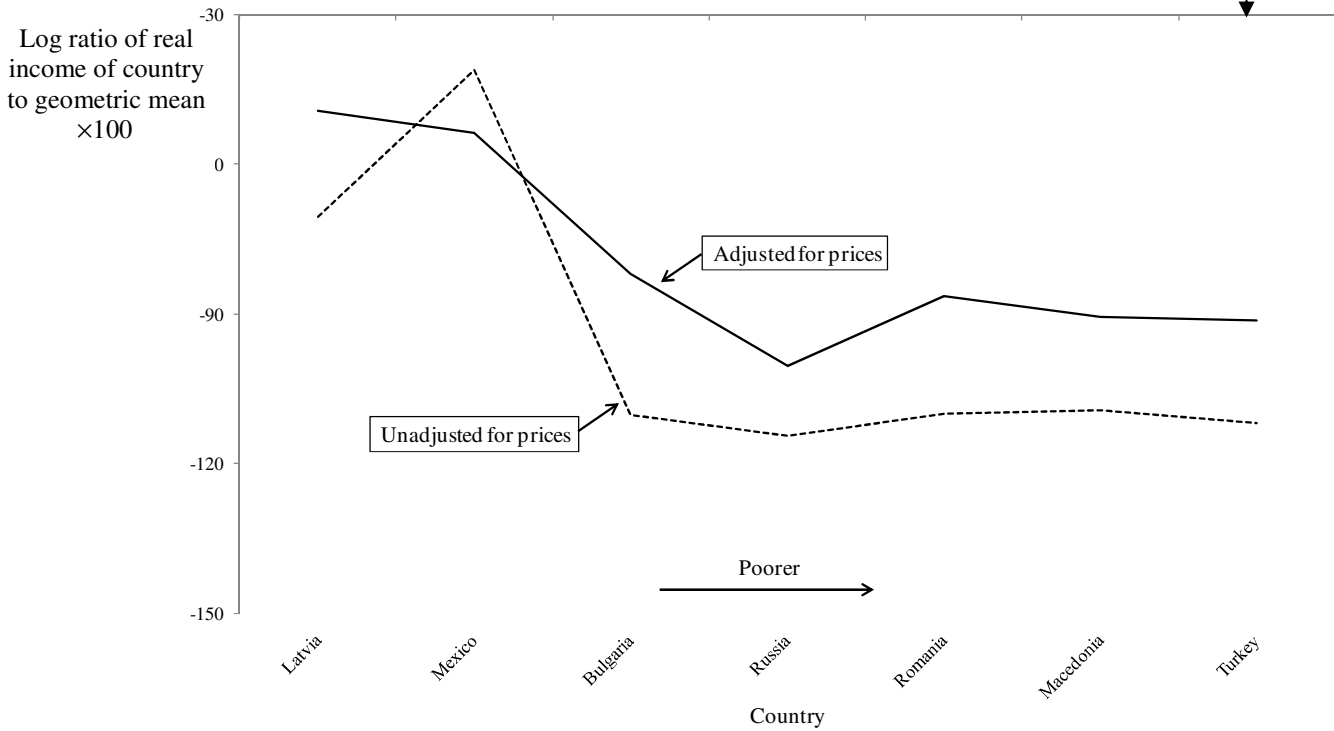
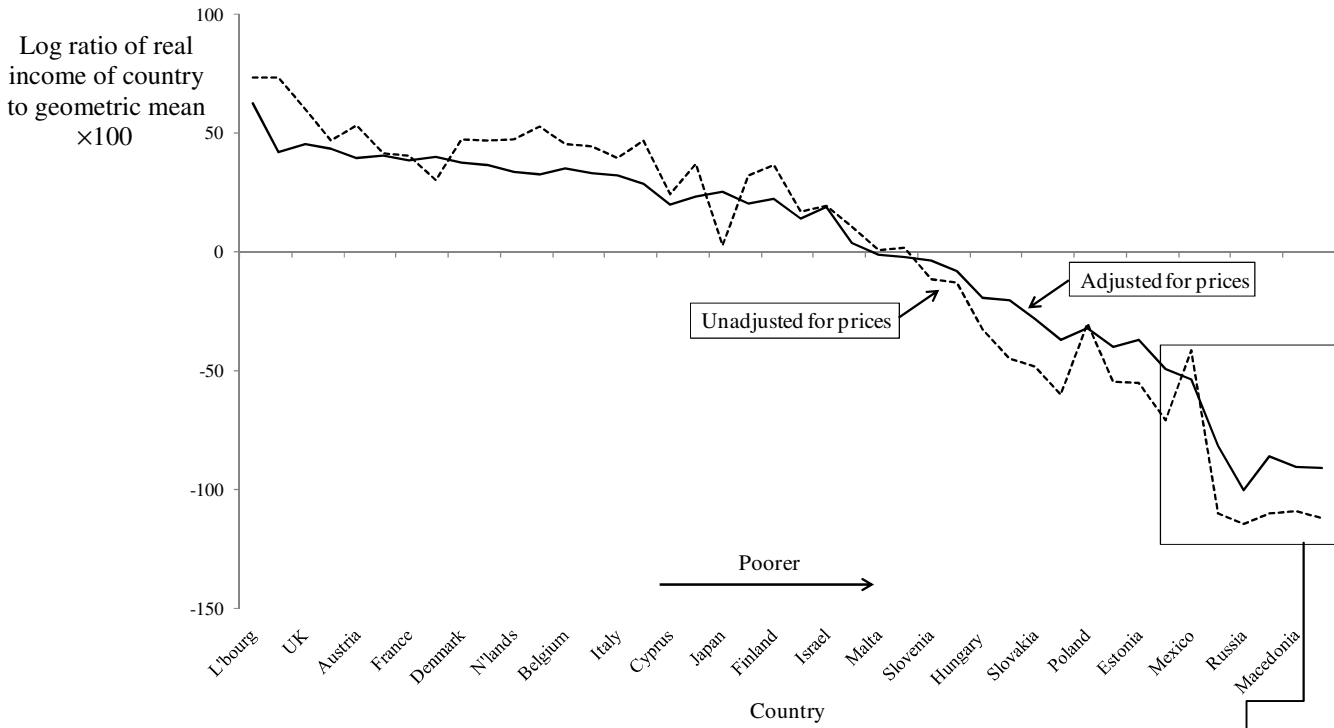


FIGURE 7

MATRIX OF HISTOGRAMS OF SIMULATED INCOME DIFFERENCES FOR SIX COUNTRY GROUPS

(Logarithmic ratios×100)

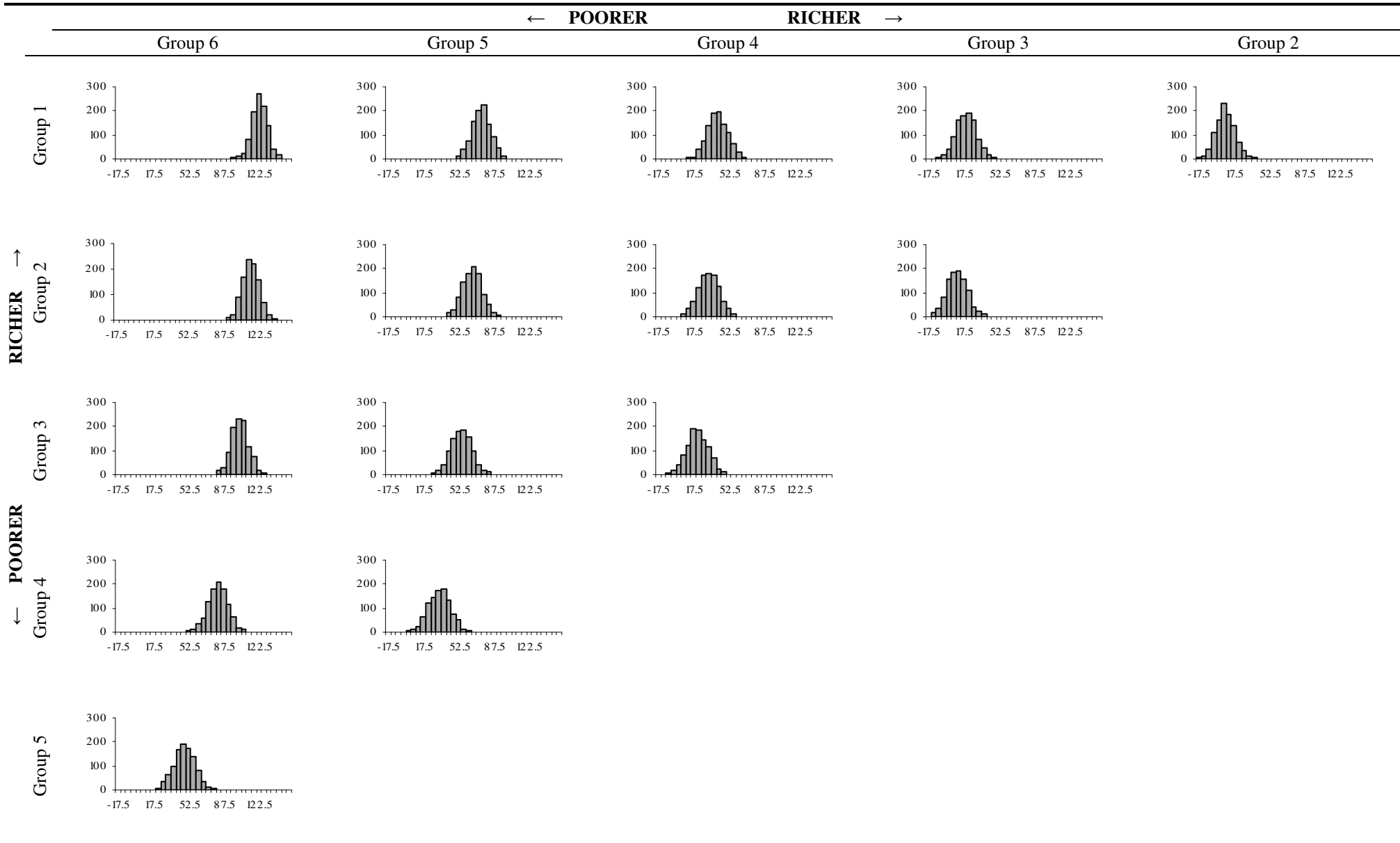


TABLE 7
SIMULATED INCOME DIFFERENCES FOR
SIX COUNTRY GROUPS

		← POORER						RICHER →								
		Group 6			Group 5			Group 4			Group 3			Group 2		
RICHER ↑ ↓ POORER	Group	Mean	SD	$P(Q^G > Q^6)$	Mean	SD	$P(Q^G > Q^5)$	Mean	SD	$P(Q^G > Q^4)$	Mean	SD	$P(Q^G > Q^3)$	Mean	SD	$P(Q^G > Q^2)$
		1	123.7	7.7	1.000	75.3	9.2	1.000	41.5	10.1	1.000	20.0	9.9	0.980	9.1	9.3
	2	114.6	7.9	1.000	66.2	9.6	1.000	32.5	10.3	1.000	10.9	10.1	0.867			
	3	103.7	8.4	1.000	55.2	10.3	1.000	21.5	10.6	0.979						
	4	82.2	9.7	1.000	33.7	10.8	0.998									
	5	48.4	10.2	1.000												

- Notes:
1. SD = standard deviation.
 2. In all cases, the underlying variable is the logarithmic ratio of real incomes $\times 100$.
 3. $P(Q^G > Q^H)$ is the probability that income of country group G exceeds that of H, for $G < H$, $G = 1, \dots, 5$, and $H = 2, \dots, 6$.

FIGURE 8

PROBABILITY OF INCOME DIFFERENCES

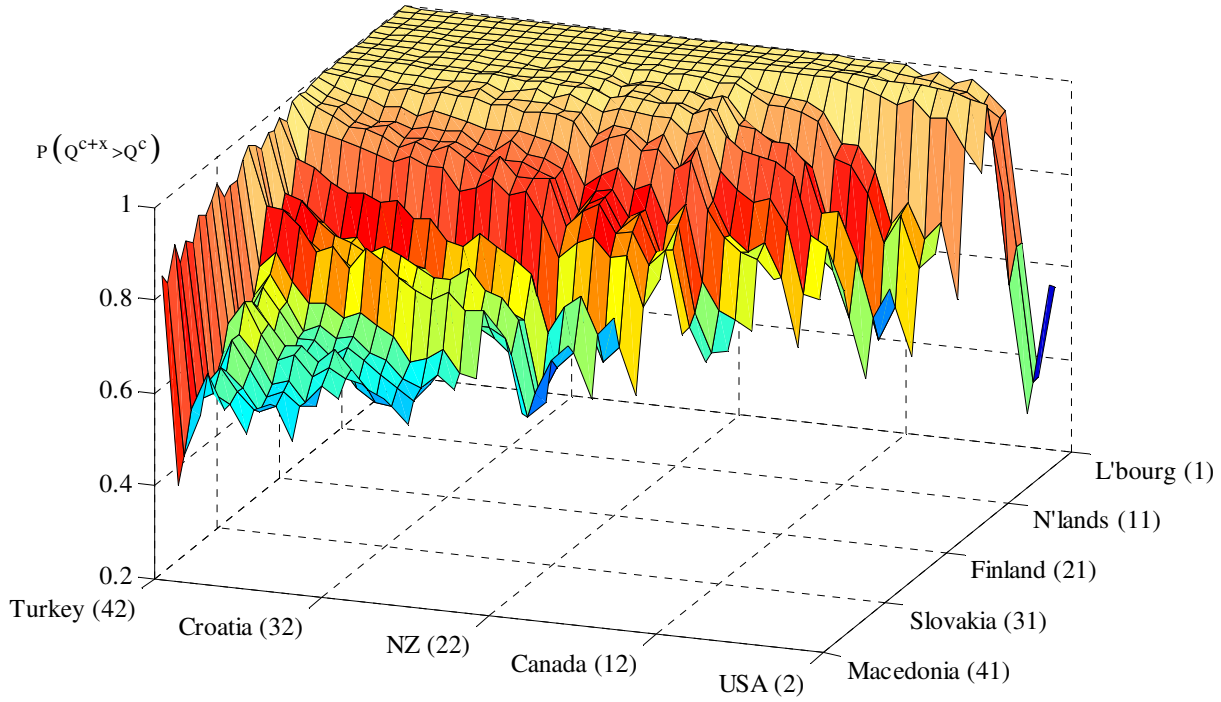


TABLE 8
PROBABILITY OF INCOME DIFFERENCES BY
DISTANCE BETWEEN COUNTRIES

Distance as measured by band width (Number of countries)	Probability that country c is richer than c+x	
	Marginal	Cumulative
x	$P(Q^c > Q^{c+x})$	$\sum_{y=0}^x P(Q^c > Q^{c+y})$
(1)	(2)	(3)
0	0.000	0.000
1	0.553	0.273
2	0.594	0.377
3	0.633	0.439
4	0.682	0.485
5	0.719	0.522
6	0.747	0.551
7	0.777	0.577
8	0.799	0.599
9	0.823	0.619
10	0.836	0.636
11	0.856	0.651
12	0.872	0.666
13	0.887	0.679
14	0.904	0.691
15	0.918	0.702
16	0.925	0.712
17	0.934	0.721
18	0.945	0.730
19	0.956	0.738
20	0.967	0.745
21	0.972	0.752
22	0.980	0.758
23	0.987	0.764
24	0.989	0.770
25	0.992	0.775
26	0.996	0.779
27	0.997	0.783
28	0.999	0.787
29	0.999	0.79
30	0.999	0.793
31	1.000	0.796
32	1.000	0.798
33	1.000	0.800
34	1.000	0.802
35	1.000	0.804
36	1.000	0.805
37	1.000	0.806
38	1.000	0.807
39	1.000	0.808
40	1.000	0.808
41	1.000	0.808

Notes:

- Countries are indexed by $c = 1, \dots, 42$ and ranked in terms of decreasing per capita income. Column 2 gives the relative frequency that country c is richer than country $c+x$ ($x \geq 0$, the "band width"), for $c = 1, \dots, 42$. Alternatively, in the 1,000 realisations of the 42×42 matrix $Q^{(s)} = [Q^{a(s)} - Q^{b(s)}]$, $s = 1, \dots, 1,000$, the entry in column 2 corresponding to band width x , is the average of the relative frequencies on the sub diagonal x steps away from the main diagonal once removed.
- Column 3 gives the relative frequencies of positive values contained in the bands of $Q^{(s)}$, $s = 1, \dots, 1,000$, x steps away from the main diagonal once removed.

TABLE 9

COMPARISON OF ROMANIA AND FRANCE

Concept (1)	Observed (2)	Price adjusted (3)
<i>Ratio of food shares:</i>		
w^R/w^F	2.72	
$\exp\left\{\log\left(\frac{w^R}{w^F}\right) - \Delta\log\left(\frac{w^R}{w^F}\right)\right\}$		2.35
<i>Estimated income difference:</i>		
$\frac{1}{\eta^{RF}-1} \log\left(\frac{w^R}{w^F}\right)$	-1.67	
$\frac{1}{\eta^{RF}-1} \left\{\log\left(\frac{w^R}{w^F}\right) - \Delta\log\left(\frac{w^R}{w^F}\right)\right\}$		-1.42
Percentage difference	-81%	-76%

TABLE A1
BUDGET SHARES OF 12 GOODS IN 42 COUNTRIES
(Percentages)

Country (1)	Food (2)	Alcohol & tobacco (3)	Clothing (4)	Housing (5)	Durables (6)	Health (7)	Transport (8)	Comm (9)	Recreation (10)	Education (11)	Restaurants (12)	Other (13)
1. L'bourg	7.7	9.4	3.8	17.3	6.5	7.6	14.7	1.4	8.1	7.2	6.0	10.1
2. USA	6.4	2.0	4.3	16.4	4.4	17.8	10.5	1.7	8.5	8.5	5.5	13.8
3. UK	7.6	3.2	4.9	14.7	4.9	9.2	11.7	1.8	10.7	5.7	9.5	16.1
4. S'land	9.6	3.2	3.7	20.7	4.1	12.8	7.0	2.0	8.7	7.7	6.8	13.8
5. Austria	8.8	2.4	5.5	16.1	6.6	9.7	10.6	2.1	9.6	8.0	9.7	10.9
6. Norway	10.6	3.4	4.3	15.4	4.7	13.6	10.8	2.1	11.3	8.2	4.7	10.9
7. France	11.4	2.7	3.7	19.5	4.8	12.9	11.7	1.8	8.0	6.8	6.0	10.8
8. Iceland	13.9	3.6	4.2	14.9	5.3	14.1	8.7	0.9	10.0	8.7	6.4	9.1
9. Denmark	8.8	3.1	3.6	20.2	4.1	10.1	8.5	1.5	9.1	9.7	3.8	17.4
10. Sweden	8.7	2.9	3.9	19.8	3.5	11.2	8.9	2.3	10.1	10.0	3.5	15.1
11. N'lands	8.7	2.4	4.6	16.7	5.6	10.4	9.4	3.1	9.6	7.1	4.5	17.8
12. Canada	8.0	3.3	4.2	19.3	5.4	12.0	12.1	1.8	9.6	7.9	6.1	10.3
13. Belgium	10.4	2.9	4.3	18.2	4.4	12.3	11.0	1.8	8.0	9.4	4.2	13.0
14. Australia	9.2	3.7	3.4	17.9	5.2	12.2	10.1	2.4	10.6	6.8	6.8	11.6
15. Italy	12.2	2.0	7.7	16.5	7.4	10.9	9.9	2.5	6.8	7.0	8.1	8.8
16. Germany	9.8	3.2	4.9	20.0	5.4	12.5	11.7	2.3	8.2	5.8	3.8	12.3
17. Cyprus	13.6	4.3	6.4	11.8	5.9	5.4	13.3	2.2	7.5	6.2	11.7	11.7
18. Ireland	6.3	5.2	4.9	17.3	5.6	9.7	8.3	2.1	6.2	9.9	13.8	10.8
19. Japan	12.3	2.5	3.9	22.0	3.7	12.3	8.9	2.3	7.9	6.4	6.2	11.6
20. Spain	13.5	2.7	5.3	12.2	4.9	9.7	10.3	2.3	7.7	6.7	16.5	8.1
21. Finland	9.6	4.4	3.5	19.2	3.7	11.1	9.2	2.5	9.7	8.3	4.9	13.9
22. NZ	11.4	4.1	4.0	18.5	5.3	9.4	11.6	2.5	11.6	6.7	6.6	8.3
23. Israel	14.6	2.1	2.7	20.9	5.8	10.2	7.8	3.2	6.9	12.4	3.0	10.3
24. Greece	14.5	4.3	9.5	14.4	5.9	8.1	7.3	2.6	5.5	6.3	15.9	5.6
25. Malta	16.0	3.1	5.1	7.9	7.7	7.7	12.2	4.1	8.7	7.5	12.0	7.8
26. Portugal	15.1	3.3	5.8	8.8	5.9	11.3	13.7	3.0	6.7	8.9	8.0	9.7
27. Slovenia	13.9	3.8	5.1	16.3	5.0	10.9	12.0	2.2	8.8	8.2	5.3	8.4
28. Czech	14.1	7.1	4.3	18.5	4.4	10.6	8.2	2.4	10.7	7.1	5.4	7.1
29. Hungary	15.1	6.8	3.5	14.4	5.4	11.1	12.0	4.1	7.8	7.9	3.9	7.9
30. Korea	13.4	2.1	4.1	14.4	3.9	4.1	10.3	5.2	7.5	9.4	6.7	18.9
31. Slovakia	19.2	4.8	3.7	20.0	4.5	9.1	8.0	3.3	9.0	5.8	6.5	6.1
32. Croatia	22.3	5.4	5.7	16.5	4.5	6.7	11.5	2.7	4.8	6.5	6.3	7.4
33. Poland	17.7	5.7	4.0	21.5	3.9	8.7	9.2	2.8	6.7	7.6	2.6	9.6
34. Lithuania	23.8	5.9	5.1	14.4	4.3	9.2	11.6	2.8	6.4	7.7	2.8	6.1
35. Estonia	18.4	7.9	5.2	19.9	4.1	6.7	9.5	2.5	7.3	8.2	4.6	5.8
36. Latvia	21.3	6.6	6.4	18.5	2.6	8.6	7.8	3.1	8.0	8.7	4.0	4.2
37. Mexico	21.7	2.4	3.1	11.9	7.5	7.0	15.3	1.5	3.0	8.9	7.0	10.8
38. Bulgaria	22.9	2.8	3.2	20.5	2.9	7.0	13.8	5.3	4.8	5.6	7.6	3.5
39. Russia	27.3	7.4	10.9	6.8	4.6	8.2	9.3	3.2	4.9	7.0	2.4	7.9
40. Romania	31.0	4.8	3.2	20.7	3.7	6.9	10.2	2.7	4.9	4.0	4.3	3.6
41. Macedonia	29.8	3.6	5.5	16.4	3.9	7.9	10.2	5.2	2.7	5.2	3.4	6.2
42. Turkey	24.6	3.8	5.8	25.5	6.8	3.6	8.2	4.2	2.4	5.6	4.2	5.3

TABLE A2

PPP PRICES OF 12 COMMODITIES IN 42 COUNTRIES
(Domestic-currency cost of a US dollar's worth of each good)

Country (1)	Food (2)	Alcohol & tobacco (3)	Clothing (4)	Housing (5)	Durables (6)	Health (7)	Transport (8)	Comm (9)	Recreation (10)	Education (11)	Restaurants (12)	Other (13)
1. L'bourg	1.07	0.82	1.29	1.12	1.10	0.84	1.08	0.81	1.16	1.32	1.04	1.00
2. USA	0.95	1.02	0.95	1.17	1.05	1.59	0.87	0.99	0.95	1.88	0.97	1.07
3. UK	0.67	1.22	0.58	0.48	0.77	0.48	0.93	0.78	0.75	0.59	0.80	0.66
4. S'land	2.24	1.67	1.86	2.34	1.81	1.67	2.11	1.74	2.25	1.84	2.22	1.92
5. Austria	1.01	0.99	1.17	0.83	1.09	0.77	1.33	1.06	1.16	0.86	1.06	1.09
6. Norway	12.04	20.12	10.34	7.52	10.15	8.24	15.53	8.86	12.55	8.29	13.44	11.39
7. France	1.09	1.05	1.00	1.07	0.96	0.67	1.17	1.20	1.09	0.68	0.98	0.96
8. Iceland	134.00	177.90	113.70	79.40	115.90	77.50	128.50	69.10	142.50	74.70	152.90	106.90
9. Denmark	9.70	10.71	9.09	8.82	8.82	7.07	13.37	7.37	10.45	7.80	10.92	9.87
10. Sweden	10.56	13.51	10.98	9.60	11.68	7.59	13.57	7.25	11.93	7.98	11.56	10.86
11. N'lands	0.98	0.98	1.17	1.02	1.05	0.68	1.34	0.94	1.02	0.76	1.05	0.96
12. Canada	1.33	2.09	1.51	1.33	1.62	1.18	1.46	1.04	1.62	1.44	1.55	1.36
13. Belgium	1.00	0.95	1.20	0.92	0.99	0.75	1.16	1.15	1.07	0.81	1.02	1.00
14. Australia	1.54	2.28	1.67	1.54	1.56	1.05	1.69	1.44	1.73	1.22	1.55	1.54
15. Italy	1.00	0.89	1.09	0.77	1.03	0.77	1.14	1.23	1.11	0.71	1.05	0.91
16. Germany	1.01	0.92	1.16	1.06	1.02	0.85	1.32	1.00	1.12	1.05	0.93	1.06
17. Cyprus	0.56	0.66	0.57	0.35	0.55	0.40	0.65	0.37	0.60	0.39	0.65	0.45
18. Ireland	1.14	1.74	0.90	1.27	1.08	0.79	1.41	1.08	1.21	0.85	1.34	1.07
19. Japan	0.24	0.13	0.17	0.21	0.16	0.11	0.16	0.15	0.14	0.15	0.19	0.16
20. Spain	0.83	0.71	1.17	0.68	1.01	0.57	1.08	1.04	0.98	0.55	0.89	0.73
21. Finland	1.14	1.66	1.16	1.09	1.13	0.82	1.49	1.09	1.37	0.88	1.31	1.17
22. NZ	1.86	2.73	2.05	1.67	2.12	1.00	1.98	1.55	1.83	1.02	1.70	1.62
23. Israel	4.69	5.05	4.11	5.12	3.66	2.73	5.53	3.71	5.05	2.67	5.02	3.92
24. Greece	0.84	0.87	1.21	0.63	0.88	0.43	0.92	1.06	0.95	0.45	0.90	0.73
25. Malta	0.33	0.47	0.35	0.15	0.37	0.18	0.39	0.58	0.37	0.18	0.32	0.26
26. Portugal	0.85	0.81	0.88	0.36	0.79	0.52	1.18	1.20	0.93	0.70	0.81	0.78
27. Slovenia	195.60	151.70	209.50	133.30	159.10	105.60	226.10	156.60	206.80	113.30	155.20	151.70
28. Czech	17.64	18.91	26.20	10.71	21.61	8.50	25.86	29.70	18.59	7.20	15.59	13.45
29. Hungary	0.16	0.15	0.19	0.08	0.16	0.06	0.24	0.24	0.16	0.06	0.14	0.10
30. Korea	1.30	0.94	0.96	1.12	0.90	0.56	0.96	0.76	0.97	0.68	0.89	0.81
31. Slovakia	22.70	23.58	29.72	10.06	26.69	9.14	31.00	45.46	20.71	6.88	14.57	14.77
32. Croatia	5.80	5.50	5.77	1.74	4.99	2.78	7.04	6.16	5.20	2.54	5.03	3.91
33. Poland	2.18	3.05	3.28	1.28	2.69	1.13	3.41	5.36	2.81	0.92	2.72	1.94
34. Lithuania	2.08	2.24	2.82	0.93	2.31	0.72	2.80	5.39	2.11	0.53	2.25	1.31
35. Estonia	11.12	10.42	14.10	6.55	10.99	4.11	12.64	13.10	10.74	2.84	11.33	7.00
36. Latvia	0.38	0.38	0.45	0.19	0.41	0.13	0.47	0.76	0.36	0.10	0.40	0.25
37. Mexico	7.49	7.92	9.23	10.33	6.97	4.15	8.19	13.44	8.65	4.19	7.80	7.46
38. Bulgaria	1.05	0.79	1.10	0.44	0.94	0.36	1.30	1.53	0.96	0.17	0.69	0.58
39. Russia	13.10	10.80	20.00	3.40	18.40	2.90	15.10	23.00	13.50	3.00	15.70	10.80
40. Romania	16.17	12.94	13.02	7.74	15.60	5.00	19.18	29.96	14.58	2.68	12.72	8.19
41. Macedonia	30.00	21.30	30.00	13.60	30.60	9.40	40.50	33.30	28.70	9.30	23.20	21.20
42. Turkey	903.94	789.09	1029.75	385.86	856.43	364.25	1086.31	2092.93	918.79	243.11	642.38	634.68

Note: Nominal prices are in thousands for Japan, Hungary, Korea, Romania, and Turkey.

TABLE A3
VOLUME OF CONSUMPTION PER CAPITA OF 12 GOODS IN 42 COUNTRIES
(US dollars)

Country (1)	Food (2)	Alcohol & tobacco (3)	Clothing (4)	Housing (5)	Durables (6)	Health (7)	Transport (8)	Comm (9)	Recreation (10)	Education (11)	Restaurants (12)	Other (13)	Total (14)
1. L'bourg	2,247	3,655	937	4,870	1,883	2,863	4,323	547	2,211	1,738	1,812	3,173	30,258
2. USA	1,884	560	1,273	3,900	1,180	3,121	3,384	491	2,519	1,259	1,593	3,606	24,768
3. UK	1,550	361	1,139	4,148	873	2,607	1,716	319	1,945	1,313	1,611	3,317	20,899
4. S'land	1,670	752	769	3,459	886	3,000	1,298	444	1,511	1,624	1,196	2,815	19,424
5. Austria	1,664	464	896	3,694	1,152	2,387	1,524	373	1,584	1,773	1,748	1,904	19,161
6. Norway	1,682	320	798	3,923	893	3,163	1,331	447	1,724	1,901	670	1,839	18,691
7. France	1,839	442	644	3,196	869	3,350	1,741	266	1,289	1,764	1,073	1,966	18,439
8. Iceland	1,955	385	705	3,542	868	3,444	1,278	236	1,330	2,205	795	1,615	18,358
9. Denmark	1,522	489	656	3,837	778	2,387	1,060	335	1,461	2,076	588	2,954	18,145
10. Sweden	1,474	379	640	3,702	534	2,655	1,182	558	1,514	2,253	546	2,497	17,934
11. N'lands	1,527	423	681	2,799	920	2,615	1,205	576	1,612	1,599	732	3,181	17,871
12. Canada	1,497	389	694	3,595	828	2,538	2,050	442	1,478	1,357	979	1,888	17,736
13. Belgium	1,766	518	605	3,335	759	2,771	1,602	258	1,261	1,951	701	2,209	17,735
14. Australia	1,540	424	527	3,002	871	3,013	1,545	430	1,583	1,431	1,132	1,945	17,443
15. Italy	1,963	360	1,131	3,454	1,163	2,275	1,391	329	984	1,577	1,236	1,541	17,403
16. Germany	1,726	620	753	3,330	941	2,588	1,561	403	1,284	969	725	2,042	16,941
17. Cyprus	1,932	520	900	2,739	869	1,079	1,644	472	1,000	1,263	1,442	2,108	15,969
18. Ireland	976	527	961	2,407	930	2,193	1,043	346	909	2,054	1,836	1,783	15,965
19. Japan	1,339	489	595	2,786	607	2,863	1,438	394	1,451	1,109	837	1,881	15,788
20. Spain	2,020	469	566	2,232	612	2,135	1,190	273	983	1,507	2,319	1,396	15,701
21. Finland	1,476	467	522	3,076	568	2,375	1,082	403	1,236	1,651	651	2,088	15,596
22. NZ	1,428	347	449	2,571	577	2,201	1,358	379	1,473	1,521	895	1,189	14,390
23. Israel	1,776	233	371	2,336	911	2,140	808	493	780	2,660	342	1,509	14,358
24. Greece	1,762	507	806	2,322	683	1,940	812	252	591	1,426	1,800	791	13,691
25. Malta	1,821	253	566	2,063	788	1,657	1,205	270	889	1,598	1,417	1,144	13,669
26. Portugal	1,702	382	628	2,303	717	2,068	1,111	236	681	1,211	941	1,177	13,156
27. Slovenia	1,308	467	451	2,254	585	1,902	977	264	788	1,337	634	1,027	11,993
28. Czech	1,217	577	252	2,637	308	1,897	486	126	878	1,515	526	811	11,229
29. Hungary	1,090	514	210	2,088	386	1,960	572	197	562	1,619	328	852	10,381
30. Korea	903	193	371	1,118	382	651	934	597	671	1,199	654	2,044	9,717
31. Slovakia	1,146	275	170	2,697	231	1,345	351	100	588	1,147	604	564	9,218
32. Croatia	1,256	319	324	3,106	295	783	532	141	302	837	408	616	8,918
33. Poland	1,243	287	185	2,573	224	1,174	414	79	368	1,281	147	756	8,729
34. Lithuania	1,328	306	209	1,796	215	1,476	481	59	350	1,681	142	537	8,581
35. Estonia	1,021	467	227	1,882	233	1,007	462	117	422	1,773	249	514	8,374
36. Latvia	978	304	249	1,738	114	1,204	293	73	394	1,506	179	297	7,330
37. Mexico	1,377	142	157	546	510	801	884	52	165	1,009	424	688	6,756
38. Bulgaria	729	118	99	1,539	104	642	353	116	169	1,127	370	203	5,567
39. Russia	899	297	237	859	108	1,214	268	59	157	1,021	65	315	5,499
40. Romania	1,015	196	132	1,420	125	736	282	47	177	793	181	231	5,336
41. Macedonia	1,014	175	189	1,229	132	852	257	159	95	573	149	300	5,123
42. Turkey	773	136	159	1,882	227	282	213	57	76	653	185	237	4,882

Note: Totals may not check due to rounding.

TABLE A4
RELATIVE PPP PRICES FOR 12 COMMODITIES IN 42 COUNTRIES
(Logarithmic ratios×100)

Country (1)	Food (2)	Alcohol & tobacco (3)	Clothing (4)	Housing (5)	Durables (6)	Health (7)	Transport (8)	Comm (9)	Recreation (10)	Education (11)	Restaurants (12)	Other (13)
1. L'bourg	2.1	-25.5	20.5	6.4	4.1	-22.5	2.2	-26.0	9.9	22.4	-1.0	-5.2
2. USA	-19.7	-12.7	-20.2	1.1	-9.6	31.9	-29.2	-15.8	-20.3	48.4	-18.3	-7.8
3. UK	-0.9	59.3	-14.3	-32.9	14.1	-33.0	32.9	14.4	11.1	-13.3	17.9	-1.5
4. S'land	10.1	-19.6	-8.8	14.2	-11.5	-19.3	4.0	-15.3	10.2	-9.5	8.9	-5.4
5. Austria	0.3	-2.0	15.2	-19.5	8.1	-26.6	27.5	4.6	13.8	-15.8	4.7	7.6
6. Norway	12.7	64.1	-2.5	-34.3	-4.4	-25.2	38.2	-17.9	16.9	-24.6	23.8	7.2
7. France	11.7	8.4	3.0	9.6	-0.6	-36.5	19.3	21.5	12.2	-35.6	1.3	-0.9
8. Iceland	22.6	50.9	6.2	-29.6	8.0	-32.2	18.3	-43.3	28.7	-35.8	35.9	0.0
9. Denmark	3.8	13.7	-2.7	-5.7	-5.7	-27.8	35.8	-23.7	11.2	-18.0	15.6	5.5
10. Sweden	3.9	28.5	7.7	-5.7	13.9	-29.2	28.9	-33.7	16.1	-24.2	12.9	6.7
11. N'lands	0.0	0.4	18.1	4.8	7.1	-36.1	32.0	-4.0	4.8	-24.7	7.2	-1.3
12. Canada	-6.1	39.2	6.8	-5.7	13.5	-18.2	3.6	-30.9	13.7	2.1	9.1	-4.1
13. Belgium	3.7	-1.1	21.9	-4.1	2.6	-24.7	19.0	18.1	10.5	-17.0	5.4	3.7
14. Australia	2.5	41.4	10.4	2.3	3.4	-36.2	11.6	-4.2	14.2	-20.7	3.1	2.6
15. Italy	6.4	-4.4	15.3	-19.8	9.5	-19.2	20.4	27.8	17.4	-26.9	12.2	-2.6
16. Germany	-4.1	-12.6	9.8	0.9	-2.6	-20.5	22.9	-4.9	7.1	0.1	-11.6	1.2
17. Cyprus	9.1	24.5	9.5	-40.0	5.8	-25.5	23.3	-33.1	15.7	-27.8	23.3	-14.7
18. Ireland	0.4	42.8	-23.1	11.4	-5.5	-37.0	21.8	-5.1	6.0	-28.7	16.2	-6.1
19. Japan	34.5	-25.0	1.8	19.4	-7.2	-41.6	-5.2	-10.4	-17.2	-12.2	13.6	-5.1
20. Spain	2.3	-14.3	36.5	-17.7	21.3	-35.9	27.9	24.2	18.6	-38.8	8.4	-11.3
21. Finland	0.2	37.4	1.4	-4.5	-1.4	-32.9	26.4	-5.0	18.1	-25.8	13.8	2.0
22. NZ	10.8	49.2	20.7	0.3	24.2	-51.5	17.0	-7.4	9.4	-49.2	2.1	-2.9
23. Israel	13.0	20.4	-0.4	21.7	-11.8	-41.2	29.4	-10.4	20.3	-43.3	19.8	-5.1
24. Greece	7.2	11.4	43.4	-21.1	11.9	-60.2	16.9	30.8	19.9	-54.5	14.3	-7.3
25. Malta	11.7	45.8	14.5	-71.3	21.5	-51.9	26.0	66.7	22.5	-51.0	8.2	-14.1
26. Portugal	9.8	5.8	13.3	-74.5	2.5	-38.6	42.9	44.7	19.6	-9.0	5.0	2.0
27. Slovenia	20.7	-4.7	27.6	-17.6	0.0	-40.9	35.3	-1.5	26.3	-33.8	-2.4	-4.7
28. Czech	17.9	24.8	57.4	-32.0	38.2	-55.1	56.1	70.0	23.1	-71.8	5.5	-9.3
29. Hungary	25.1	19.5	44.5	-45.0	25.8	-64.8	66.6	66.0	25.0	-79.9	10.3	-15.7
30. Korea	34.4	2.5	4.5	19.8	-1.9	-50.4	4.5	-18.4	5.9	-29.8	-3.5	-12.9
31. Slovakia	31.0	34.8	57.9	-50.3	47.2	-59.9	62.2	100.4	21.9	-88.4	-13.3	-12.0
32. Croatia	33.0	27.9	32.6	-87.6	18.1	-40.6	52.5	39.0	22.2	-49.4	18.8	-6.4
33. Poland	11.7	45.1	52.6	-41.8	32.6	-53.9	56.4	101.7	37.0	-75.2	33.7	0.0
34. Lithuania	25.8	33.2	56.2	-54.8	36.4	-80.5	55.5	121.2	27.5	-110.3	33.9	-20.3
35. Estonia	29.0	22.4	52.7	-24.0	27.6	-70.7	41.8	45.0	25.4	-107.5	30.8	-17.3
36. Latvia	31.6	31.4	48.4	-39.8	37.7	-79.8	52.1	99.1	25.1	-101.1	34.7	-11.1
37. Mexico	2.4	8.0	23.2	34.5	-4.8	-56.6	11.3	60.8	16.7	-55.7	6.4	1.9
38. Bulgaria	37.1	8.4	41.9	-48.7	25.8	-69.1	58.7	74.5	28.1	-147.3	-4.9	-21.9
39. Russia	25.2	5.7	66.9	-109.7	58.7	-124.8	38.9	81.2	28.2	-123.2	43.1	5.7
40. Romania	33.1	10.8	11.4	-40.5	29.5	-84.3	50.2	94.8	22.7	-146.7	9.1	-34.9
41. Macedonia	28.9	-5.4	29.0	-50.2	30.8	-86.9	58.7	39.1	24.2	-88.8	3.1	-5.6
42. Turkey	30.7	17.1	43.7	-54.4	25.3	-60.2	49.1	114.7	32.3	-100.6	-3.5	-4.7

TABLE A5
CONSUMPTION AND GDP PER CAPITA IN 42 COUNTRIES

Country	Consumption per capita (US dollars)	GDP per capita			
		Using PPP		Using market exchange rates	
		US dollars	Index (L'bourg = 100)	US dollars	Index (L'bourg = 100)
(1)	(2)	(3)	(4)	(5)	(6)
1. L'bourg	30,258	47,271	100.0	48,104	100.0
2. USA	24,768	32,798	69.4	36,202	75.3
3. UK	20,899	26,188	55.4	26,393	54.9
4. S'land	19,424	29,449	62.3	37,624	78.2
5. Austria	19,161	27,270	57.7	25,818	53.7
6. Norway	18,691	33,232	70.3	42,035	87.4
7. France	18,439	25,096	53.1	23,455	48.8
8. Iceland	18,358	26,594	56.3	29,550	61.4
9. Denmark	18,145	27,217	57.6	32,059	66.6
10. Sweden	17,934	25,504	54.0	27,084	56.3
11. N'lands	17,871	27,123	57.4	25,935	53.9
12. Canada	17,736	26,807	56.7	23,176	48.2
13. Belgium	17,735	25,938	54.9	23,780	49.4
14. Australia	17,443	25,276	53.5	20,255	42.1
15. Italy	17,403	24,219	51.2	20,745	43.1
16. Germany	16,941	24,148	51.1	24,034	50.0
17. Cyprus	15,969	18,556	39.3	14,677	30.5
18. Ireland	15,965	29,789	63.0	30,993	64.4
19. Japan	15,788	24,648	52.1	31,170	64.8
20. Spain	15,701	21,014	44.5	16,208	33.7
21. Finland	15,596	25,192	53.3	25,287	52.6
22. NZ	14,390	19,875	42.0	14,874	30.9
23. Israel	14,358	20,490	43.3	16,529	34.4
24. Greece	13,691	17,275	36.5	12,157	25.3
25. Malta	13,669	16,500	34.9	10,270	21.3
26. Portugal	13,156	17,069	36.1	11,668	24.3
27. Slovenia	11,993	16,729	35.4	11,095	23.1
28. Czech	11,229	15,025	31.8	7,232	15.0
29. Hungary	10,381	13,013	27.5	6,383	13.3
30. Korea	9,717	16,709	35.3	11,481	23.9
31. Slovakia	9,218	11,418	24.2	4,503	9.4
32. Croatia	8,918	9,583	20.3	5,046	10.5
33. Poland	8,729	10,141	21.5	4,985	10.4
34. Lithuania	8,581	9,421	19.9	4,050	8.4
35. Estonia	8,374	10,195	21.6	5,164	10.7
36. Latvia	7,330	8,655	18.3	3,939	8.2
37. Mexico	6,756	8,489	18.0	6,390	13.3
38. Bulgaria	5,567	6,400	13.5	1,984	4.1
39. Russia	5,499	7,327	15.5	2,392	5.0
40. Romania	5,336	6,357	13.4	2,089	4.3
41. Macedonia	5,123	5,464	11.6	1,877	3.9
42. Turkey	4,882	5,903	12.5	2,605	5.4

