Distributional Impacts of Food Price Changes on

Consumer Welfare in Hungary and Romania following EU Accession

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Abstract - **This paper focuses on the estimation of changes in economic welfare (real income) on different groups (income deciles) of Hungarian and Romanian consumers following food price changes as a result of accession to the European Union (EU) in 2004 and 2007. It identifies in both countries those consumer groups most vulnerable to food price changes using the most recent, official, post accession data. Slutsky Compensating Variation, based on Laspeyres indexes is employed for a food basket of 16 products. The results show that real food prices have changed with some going up and others falling. However, overall both Hungary and Romania have experienced a rise in real food prices by 9 per cent and 20 per cent, respectively. The rise in food prices has resulted in a welfare loss for all income deciles, particularly for those in the lower income groups. Although, in absolute terms, Romanian food consumers seem to be more affected (the decrease in their real income varies between 4 per cent for decile 10 and 12 per cent for decile 1) than Hungarian consumers (0.4 per cent for decile 10 and 2.2 per cent for decile 1), the distribution of the impact is higher in Hungary, a five-fold difference between decile 1 and decile 10 as opposed to a three-fold difference in Romania.**

Keywords – **prices, consumers, welfare**

I. INTRODUCTION

Accession to the EU means *inter alia* adoption of the Common Agricultural Policy (CAP) and integration in the Single Market. Although the CAP does not affect directly retail food prices, particularly if there is a high component of value-added in food products, it still results in higher prices of agricultural products than under free market conditions. Additionally, integration in the Single Market and the removal of trade barriers means that prices, at least for tradable goods and services, should converge towards EU levels. In the case of both Hungary and Romania, this has, in general, meant rises in food prices.

Moreover, in Romania the value added in food products is still low. Also, food expenditure accounts for a much higher share of total household consumption expenditure as compared with most EU member states, e.g. 30 per cent in 2008. In Hungary, the proportion of food expenditure in total household consumption expenditure is lower than in Romania, but still accounts for approximately 20 per cent.

Previous studies have demonstrated that EU accession entails higher food prices. [1] showed that accession increased the price of food in Greece by 8.5 per cent. [2] estimated the average increase in the cost of food for the UK as a result of EU membership to be between 2.4 per cent and 3.7 per cent of gross income. In the case of the Netherlands, [3] estimated an increase in the total cost of food of about 7 per cent of average disposable income. [4] estimated an overall increase in Hungarian food prices of 8.7 per cent, and [5] in Poland calculated a 7.8 per cent rise in total prices of food and non-alcoholic drinks, in the first year after accession. Nonetheless, the literature regarding distributional effects of food price changes (i.e. on different groups of consumers) following EU accession, either in established or new EU members, is sparse.

[4] found that the short-term impact of food price changes in Hungary varied between 0.5 per cent, for the highest-decile income group, and 2 per cent for the lowest group. [6] estimated the short-term economic welfare effects on a 12-fold breakdown of Romanian households, i.e. six socio-economic categories from urban and rural areas, as a result of assumed food price changes. Relative Romanian food prices were aligned to relative food prices in neighbouring Hungary, who joined the EU in 2004. In addition, an 8 per cent increase in the real level of food prices in Romania was assumed. The results showed that although, on average the welfare loss was 2.6 per cent, the impact was much higher for the most vulnerable groups, i.e. unemployed, pensioners and farmers, from both urban and in rural areas. However, the high share of self-consumption diminished these impacts, in particular for rural households.

This paper focuses on the estimation of changes in economic welfare (real income) on different groups (deciles) of Hungarian and Romanian consumers following food price changes as a result of accession to the European Union in 2004 and 2007, respectively. It updates and develops [4] and identifies in both countries those consumer groups most vulnerable to food price changes using the most recent, official, post accession data.

The paper is organised as follows. Section 2 presents the main data sources and the method employed for the estimation of the welfare effects due to food price changes. Results and discussions are presented in Section 3, followed by some conclusions in Section 4.

II. MATERIALS AND METHODS

Data Source

Data for the distributional analysis were collected by deciles, using official sources, i.e. the Household Budget Survey (HBS) for 2003 and 2008 published by the Hungarian Central Statistical Office and the Family Budget Survey (FBS) for 2003 and 2008, carried out by the Romanian National Institute of Statistics. The samples included in both HBS and FBS are representative at the national level. Every year approximately 10,000 Hungarian households and 37,000 Romanian households are randomly chosen to participate in these surveys. Information such as income, expenditure, food consumption and consumption from own resources are collected on a monthly basis.

Method

The most common method used in applied welfare economics for the estimation of gains or losses of a consumer (i.e. individual or household) due to prices changes is the Marshallian consumer surplus. However, unless the income effect is negligible, this is not an exact measure of a change in consumer welfare (6). A negligible income effect requires that the income elasticity of demand for the good in question is small or that the expenditure on the good represents a minor share of total expenditure.

Compensating Variation (CV) and Equivalent Variation (EV) are considered the correct theoretical measures of consumer surplus [7] and typically viewed as alternative welfare measures of the changes in consumer surplus [8]. [9] defined the CV as "the amount of compensation, paid or received, that will leave the consumer in his initial welfare position following the change in price if he is free to buy any quantity of the commodity at the new price" (p.99). The analogous EV "is the amount of compensation, paid or received, that will leave the consumer in his subsequent welfare position in the absence of the price change if he is free to buy any quantity of the commodity at the old price".

However, Hicks's technique of analysing consumer surplus by computing CV or EV on the basis of ordinal indifference curves has been criticised for its lack of real world applicability, i.e. the deficiency of our knowledge to measure utility (indifference curves) [8]. Thus, by approximating the consumer real income as the ability to buy the same bundle of goods as was bought before the price change, Slutsky CV and EV assess to what extent the consumer's real income changes when the price of a good changes, i.e. the extent to which the consumer's standard of living changes when price varies. Moreover, in practice, CV and EV can be easily computed by constructing index numbers (e.g. Laspeyres and Paache indexes) based on information about prices and quantities [10]. Assuming that the relevant standard of living equates with the initial bundle of goods, the Slutsky CV is obtained by multiplying the initial money income by a ratio of the cost of obtaining a bundle of goods at the new set of price, to that of obtaining the same bundle of goods at the old set of prices [8].

Against this background and given that, in both Hungary and Romania, food expenditure still represents a large share of total household expenditure, the Slutsky Compensating Variation based on Laspeyres indexes is considered as an appropriate measure for estimating changes in consumer welfare. Thus, to estimate the minimum amount of money that a person from each decile should pay or receive in order to remain as well off as before the food prices change, a food consumption model based on [11] was constructed for both Hungary and Romania. For each decile, 16 food products were selected: bread, wheat flour, rice, potatoes, sugar, vegetable oil, margarine, eggs, milk, cheese, pork, poultry, beef, dry onion, apples and pears, and citrus fruits. These were considered as the main food intake and overall they account for more than half of total food expenditure. For each

product and each decile the model calculates food expenditure using 2003 quantities (consumed on average per month per person) and unit prices. These were then aggregated at the decile level resulting in total food expenditure before accession. To compute total food expenditure after EU accession, real food prices were applied to the base year (2003) consumed quantities. The respective Consumer Price Index (CPI) for Hungary and Romania was used to obtain the real prices for 2008. However, the following assumptions were made for each decile: a) prices for all other goods (non-food and services) remain constant; and b) total income equals total expenditure (no net savings). Specifically, for Hungary, prices were assumed the same across decile groups, whereas in Romania it was possible to calculate unit prices for each decile.

Laspeyres prices indexes (L) for each decile (i), were calculated using total food and non-food expenditure before (2003) and after (2008) accession:

$$L_i = \frac{\sum_{1}^{16} q_{0i} p_{1i} + TNF_{0i}}{\sum_{1}^{16} q_{0i} p_{0i} + TNF_{0i}}$$

where:

- i = 1, ..., 10 (deciles)

- q_0 = quantity consumed of each product before accession/decile
- p_0 and p_1 = prices before (0) and after (1) accession
- TNF_0 = total non-food expenditure before accession (assumed constant)

In consequence, the compensating variation as a measure of change in welfare was computed as follows:

$$CV_i = Y_i \times L_i$$

where Y_i represents the initial money income (for 2003) per decile.

An increase, for example, in the food prices, *ceteris paribus*, means that the initial bundle of goods is obtained at a higher cost, and so according to the Laspeyres index a positive Compensating Variation is required because the consumer's cost of living has risen.

III. RESULTS

Estimates of food price changes per decile for each country are presented in table 1 and table 2.

Table 1 shows, in the form of Laspeyres indexes, the changes in the cost of living for each decile in each country as a result of food price changes following accession to the European Union. The figures highlight clearly an increase in the cost of living, and thus a consumer's welfare loss, for all deciles for both countries. For Hungary, this varies between 0.4 per cent for a person in decile 10 and 2.2 per cent for a person in decile 1. This means more than a five-fold difference between decile 10 and decile 1. In Romania, the consumer's welfare (real income) loss is much higher. It varies between 4 per cent for decile 10 and 12 per cent for decile 1. However, the distribution of welfare loss between decile 10 and decile 1 is just under a five-fold difference in Hungary and a three-fold difference in Romania. As to be expected, the persons in the lowest income groups are the most affected, as they spend a higher proportion of their income on food.

Table 1 Changes in cost of living 2008/2003 based on Laspeyres price indexes (%)

Decile	Hungary	Romania
1	2.2	12.1
2	1.5	11.0
3	1.4	9.5
4	1.3	8.4
5	1.1	8.1
6	1.1	8.2
7	1.0	7.4
8	0.8	6.7
9	0.7	6.1
10	0.4	4.0

Source: authors' estimates

Table 2 shows the economic welfare loss in monetary terms using the measure of Slutsky CV. In Hungary, the amount of money that a person should receive in order to remain as well off as before the price changes is around €2 per person per month for

all deciles, whereas in Romania it varies between €5 and €8 per person per month. Although the figures may look small by Western European standards they are not negligible, particularly for the poorer people, and those in Romania. Table 3 presents the average monthly income per decile for both countries in 2003.

Table 2 Slutsky Compensating Variation
(€/person/month)

Decile	Hungary	Romania
1	1.84	3.86
2	1.86	4.69
3	2.04	4.94
4	2.11	4.87
5	2.10	5.12
6	2.20	5.73
7	2.30	5.83
8	2.12	6.04
9	2.18	6.84
10	2.07	8.02

Source: authors' estimates

Table 3 Average monthly income per decile
Hungary and Romania, 2003, (€/person/month)

Decile	Hungary	Romania
1	83	32
2	122	42
3	145	52
4	165	58
5	193	63
6	203	70
7	227	79
8	256	91
9	304	113
10	470	198

Source: authors' estimates
Exchange rate €1= 253.31 forints (HU); €1=37,600 Lei (RO)

As regards the overall change in price for those selected 16 products, both Hungary and Romania have experienced a rise in real terms between 2003 and 2008, i.e. a 9 per cent increase for the Hungarian products and a 20 per cent rise for the Romanian products, respectively. In Hungary, the products for which the price went up most were apples, wheat flour, vegetable oil, rice, eggs and poultry whereas in Romania pork, beef, rice, vegetable oil and wheat flour (Table 4).

Table 4 Food price changes (%) 2008/2003,
Hungary and Romania (real terms)

Product	Hungary	Romania
Pork	7.2	130.3
Beef	9.4	79.6
Poultry	16.2	-33.1
Eggs	20.1	-86.7
Milk	4.1	21.7
Cheese	-10.8	-31.9
Vegetable oil	32.3	80.7
Margarine	-9.2	-20.1
Wheat flour	37.7	65.2
Rice	26.6	76.1
Bread	19.4	22.5
Sugar	-11.7	-2.6
Potatoes	-20.3	-0.9
Onion	-17.2	-7.8
Apples	41.4	39.3
Citrus fruits	-5.6	-13.3

Source: authors' estimates

More interestingly for Romania is, however, the decomposition of Slutsky CV into two components: a) market (goods purchased) and non-market (self-consumption[1]) estimated using the same approach as presented in Section 2. In Romania, self-consumption (or more precisely the imputed value of self-consumption) represents an important percentage of total food expenditure for almost all deciles. For example, for the selected 16 products, the share of self-consumption in total food expenditure varies between 40 per cent for decile 1 and 6 per cent for decile 10. The decomposition of effects into these two components highlights the role played by the non-market component, particularly for the lower income deciles. More precisely, for the first five deciles (decile 1 to decile 5), the increase in real income required to maintain the same standard of living as before the food price changes is mainly due to the non-market component which accounts for at least half of the rise in the cost of living. However, even for the higher income deciles the non-market component still represents an important share. For the Slutsky market component the variation of welfare loss across deciles is much

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[1] This represents goods produced within the household or received/supplied from/by relatives or friends usually located in rural areas. This may also be the case in Hungary but data was not available at the time of submission of this paper.

lower than that of the non-market component (Table 5).

Table 5 Decomposition of Slutsky CV in market and non-market components based on Laspeyres price indexes (%)

Decile	Market	Non-Market
1	4.0	8.1
2	4.6	6.4
3	4.2	5.4
4	3.9	4.6
5	4.0	4.1
6	4.3	3.8
7	4.0	3.4
8	3.7	3.0
9	3.3	2.8
10	2.2	1.8

Source: authors' estimates

IV. CONCLUSIONS

This paper focused on the estimation of changes in economic welfare (real income) on different groups (income deciles) of Hungarian and Romanian food consumers following changes in real food prices as a result of these countries accession to the EU in 2004 and 2007, respectively. To calculate the economic welfare effects (CV in income) Slutsky technique based on the construction of Laspeyres indexes was employed. The results show that overall both countries have experienced an increase in food prices in real terms, i.e. by 9 per cent in Hungary and 20 per cent in Romania. The rise in prices has resulted in a welfare loss for all deciles, but especially for those in the lower income groups. The change in the cost of living across deciles is much higher (in absolute terms) in Romania than in Hungary, varying between 12 per cent for the lowest income decile to 4 per cent for the highest income decile. However, the distribution of the impact is higher in Hungary, a five-fold difference between decile 1 and decile 10 as opposed to a three-fold difference in Romania. For Romania, the decomposition of Slutsky CV into two components (market and non-market) reinforces the importance of self-consumption within the total food expenditure, particularly for the first five lower income deciles. For these income groups the increase in their cost of living is mainly due to the non-market component. This means that these income groups purchase considerably less food than they consume. Although this component is not explicitly an expenditure item its opportunity cost needs to be taken into account.

Overall, for both countries, the negative impacts experienced by all deciles maybe countered in medium and long term by increased economic growth and higher incomes. The results are also conditional on the choice of years and further research could examine similar data for other pre and post accession years. Moreover, a greater coverage of the range of food products given data availability will enhance the results.

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