Estimating interaction between income and expenditures for food and non-alcoholic beverages in Slovakia

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Abstract
The main aim of the paper is to evaluate the relationship between incomes and expenditures for foodstuff categories, the level, and structure of expenditures and next statistical evaluation of their interaction. Budget shares and elasticity coefficients were estimated for food and non-alcoholic beverages consumption for the individual household categories according to the economical activity of head during the period 2004-2012. Using the aggregate data, we estimate the elasticities on income and price for the food demand in Slovakia. Knowing the values of demand elasticities for food is widely used approach to correct trade policy making and analysing trade patterns.

Keywords: income, expenditures, foodstuff, elasticity, individual households’ categories

JEL Classification: D12, D31, O52

Introduction
In most EU countries final household consumption accounts for more than half of GDP (56.5 % of GDP in 2011). The consumption patterns are thus one of the most frequently discussed topics in theoretical as well as empirical literature. From the economic point of view is important to know the elasticities of disposable income or other variables and to be able to forecast the future development of the consumption and individual expenditures.

By 2010 in Slovakia the food expenditure ratio has dropped to about 16% for high-income households – a level comparable with demand patterns in the richer EU-15. The ratio is still quite high though, at about 26% for the low-income households (Rizov et al., 2015).

Michalek and Keyzer (1992), Abdulai (2002), and Chern et al. (2003) find that for majority of the population food demand is price and income inelastic and food is perceived as necessity rather than luxury.

The shares for food and non-alcoholic beverages increased, which would be consistent with the fact that household expenditures on basic needs tends to be more resilient than other consumption items in an economic recession. Regarding private households with lower incomes, it can be seen that basic needs (food, housing payments) take up a significant part of their budget in terms of the structure of their consumption.

In recent years, many households of the Central and East European countries have been exposed to the consequences of the process of their accession to the EU. This fact strongly influenced their situation on the market and caused changes of consumption patterns. Consumption is positively correlated with income level.

Rizov et al. (2014) note that the findings presented for Slovakia are consistent with studies from other developed countries, where food security does not present a significant challenge. Households tend to perceive food as a necessity rather than a luxury.
Private consumption acts as an economy growth accelerator. Higher consumer spending means a faster development of the country. In particular, increasing consumer spending in the households of Central and Eastern Europe is accelerating the development of these countries.

Consumer expenditure patterns and estimates of expenditure elasticities can give an indication of the potential for demand-led growth in a particular economy. An expenditure elasticity is a measure of the responsiveness of expenditure on, or consumption of, a good to a change in real income, ceteris paribus (Tomek, Robinson, 2003) where expenditure is a proxy for income.

**Data and methodology**

We apply statistical evaluation to the Slovak Household Budget Survey (HBS) data collected by the Statistical Office of the Slovak Republic. The HBS data is commonly used for defining expenditures, incomes, social policy and for estimating household consumption in the national accounts. Applied dataset consists of annual levels from 2004 to 2012. Later data were publicised only as future predictions. The survey provides detailed information on private household incomes and expenditures on food and non-alcoholic beverages by economic activity of head.

The main aim of the paper is to evaluate the relationship between incomes and expenditures for main foodstuff categories, the level, and structure of expenditures and next statistical evaluation of their interaction.

In the estimation process the fixed effect specification of the panel data is used. Fixed effect specification is preferred in case of omitted variable problems in the regressions, by means of capturing idiosyncratic factors that might affected the demand and consumption for foodstuffs.

The fixed effect model assumes that individual specific time invariant effects should be treated as the intercept term of the regression. This presents opportunities for a number of transformations of the data, which eliminate this effect. Essentially, any transformation that rids the model of the fixed effect produces a fixed effect estimator (Baltagi, 2001).

The dependent variable is chosen to represent per capita expenditures on food and non-alcoholic beverages and explanatory variables which are price levels for food and non-alcoholic beverages and net cash income of the population. The coefficients are estimated with OLS method. Applied variables were the Consumer Price Index (CPI) for food and non-alcoholic beverages and net monthly income per capita in Euro.

**Results**

Analysis was oriented on the category expenditures of each private household group for food and non-alcoholic beverages as a major part of individual spending in the proportion of 22.6% for the period 2004-2012.

By 2012 the food and non-alcoholic beverages expenditure was 23.4% for high-income households – a level comparable with demand patterns in the richer EU-15. The ratio is still quite high though, at about 29% for the low-income households.

The trend of the annual indexes in net cash income and expenses for analysed period represents table 1. For a broader view, we have also incorporated into the table year over year indices of consumer spending and expenditure on food and non-alcoholic beverages.
Table 1: Year over year indices of households’ incomes and expenditures (2004 – 2012)

<table>
<thead>
<tr>
<th></th>
<th>index 05/04</th>
<th>index 06/05</th>
<th>index 07/06</th>
<th>index 08/07</th>
<th>index 09/08</th>
<th>index 10/09</th>
<th>index 11/10</th>
<th>index 12/11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Income in Total</td>
<td>103.95</td>
<td>113.86</td>
<td>112.05</td>
<td>109.78</td>
<td>99.67</td>
<td>99.53</td>
<td>103.67</td>
<td>101.26</td>
</tr>
<tr>
<td>Net Expenditures in</td>
<td>104.18</td>
<td>114.74</td>
<td>108.39</td>
<td>106.75</td>
<td>94.43</td>
<td>100.37</td>
<td>104.24</td>
<td>100.56</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption</td>
<td>104.31</td>
<td>113.24</td>
<td>107.75</td>
<td>105.49</td>
<td>93.72</td>
<td>101.07</td>
<td>104.40</td>
<td>101.11</td>
</tr>
<tr>
<td>Expenditures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food and Non-Alcoholic Beverages</td>
<td>102.23</td>
<td>106.73</td>
<td>106.45</td>
<td>105.87</td>
<td>92.37</td>
<td>103.45</td>
<td>102.69</td>
<td>103.10</td>
</tr>
</tbody>
</table>

Source: SO SR, own calculations

Net money incomes of Slovak households increased during period 2004-2008 year by year. In the year 2008 were by 45.58% higher than in 2004. In period 2009, 2010 incomes had declining trend, this was caused due to world financial crisis, private incomes decline due to increasing unemployment and inflation. During next two years of analysed period incomes started to increase and in 2012 reached their maximum 366.34 Euro per person and month. Income level increased from 2004 to 2012 by 51.6%. Very similar trend was also observed by the net total expenditures and expenditures on food and non-alcoholic beverages. The increased level of households’ income allow them to spend more, thereby increasing their consumption. Income growth is accompanied by growth in consumption, with income growing faster than consumption, except for the crisis period (2009, 2010).

Main aim of research was estimation of interaction between net incomes and expenditures for main foodstuff categories. Results of quantitative analysis of expenditure on food and non-alcoholic beverages in individual households’ categories are recorded in table 2.

Table 2: Estimation results of expenditure on food and non-alcoholic beverages modelling

<table>
<thead>
<tr>
<th></th>
<th>CPI</th>
<th>Income</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee</td>
<td>0.5868**</td>
<td>0.4436***</td>
<td>0.9362</td>
</tr>
<tr>
<td>Self-employed</td>
<td>0.5280*</td>
<td>0.5418***</td>
<td>0.9281</td>
</tr>
<tr>
<td>Pensioners</td>
<td>0.4029</td>
<td>0.4082***</td>
<td>0.9369</td>
</tr>
<tr>
<td>Other</td>
<td>0.1688*</td>
<td>0.5677***</td>
<td>0.9196</td>
</tr>
<tr>
<td>Average household</td>
<td>0.5440</td>
<td>0.4484***</td>
<td>0.9686</td>
</tr>
</tbody>
</table>

Source: authors’ calculations

* significant at α=0.1
** significant at α=0.05
*** significant at α=0.01

Based on the statistical results we determine elasticity coefficients for the foodstuffs for analysed period 2004-2012. In recent years is evident increase of living standards according to the fact that the share of expenditures for food and non-alcoholic beverages on net household income is degressive.

Regression analysis confirmed the economic fact that the rise in prices has resulted in increased expenditure. Food needs are fundamental to our lives and therefore we cannot
drastically reduce the growth of prices. Any price increases will be reflected also in household expenditure.

The demand for food and non-alcoholic beverages is for all household categories income inelastic with strong significance. That confirm fundamentals of economic, that foodstuffs are normal necessities. Inelastic income reactions in the case of the others households category mean increase of yearly real level of incomes by 1% induced the rise in the given expenditures by 0.57%. Social household group of others is characterized by lower level of net incomes in comparison with other studied groups. The lowest income reactions have households of pensioners, 1% increase of the monthly income per capita should generate expenditure increase by 0.41% on food and non-alcoholic beverages.

Spending for food is “price inelastic” for all household groups. This means that the percent change in quantities consumed of food and non-alcoholic beverages will be less than the percent change in their prices. Price elasticities for foods and nonalcoholic beverages ranged from 0.17 to 0.59. As an example, a 10% increase in foodstuff prices should increase expenditures by 1.7% to 5.9%. Although demand for food is relatively inelastic, the power of small price changes should not be underestimated given that their effects accumulate across a population. Higher elasticity estimates suggest greater changes in population purchases as prices shift. Richer households are slightly less sensitive to price changes, most inelastic foodstuff demand occurred during analysed period in households of „others“.

Conclusion

Reliable estimations of income, expenditure and price elasticities provides indispensable information for food chain markets. Household consumption patterns are investigated to determine the impact of an income shock on household expenditure. Budget shares and expenditure elasticities were estimated for food and non-alcoholic beverages consumption for the individual household categories according to the economical activity of head, allowing for a comparison of expenditure elasticities between the private household categories.

The analysed time period 2004-2012 can be characterized as a period of positive economic development in Slovakia. The real household consumption and also the disposable income grow over the whole period. Spending for food was “price inelastic” for all household groups. Results suggest that expenditure elasticities for food and non–alcoholic beverages were inelastic.

Economic shocks such as falling income in a recession or dramatic increases in food prices can lead to changes in purchasing behavior that are not necessarily predicted by elasticity estimates calculated with data collected under normal market conditions.

References


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