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Analysis of food away from home in Slovakia

Cupak Andrej^{1,2}, Pokrivcak Jan² and Rizov Marian³

¹ National Bank of Slovakia/Research Department, Bratislava, Slovakia

² Slovak University of Agriculture/Department of Economics, Nitra, Slovakia

³ Middlesex University Business School/Department of Economics, London, UK

jpokrivcak@yahoo.com

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Summary

We analyse demand for food away from home (FAFH) in Slovakia by double-hurdle model from the Household Budget Survey data covering period 2004-2010. Results reveal an increasing trend in food away from home expenditure between the two periods with a considerable heterogeneity among different household types. The estimated income elasticities of FAFH in Slovakia also differ among different household groups. For example, single person households perceive out of home eating as a necessity. On the other hand, households consisting of multiple adults without children, single parent with children, and traditional families with parents and children perceive eating out of home as a luxury. FAFH in Slovakia differs substantially between regions as well as between the annual seasons. Slovak households appear to have higher demand for FAFH in western regions and during the winter season. An important feature of the applied household model is to measure the effect of wife's opportunity costs regarding the food preparation at home. Results reveal the fact that households with employed wife have significantly higher expenditure on FAFH than unemployed (housekeeping) wife.

Keywords: Double-hurdle model, elasticity, food away from home, Slovakia
JEL Classification codes: C21, C24, D12

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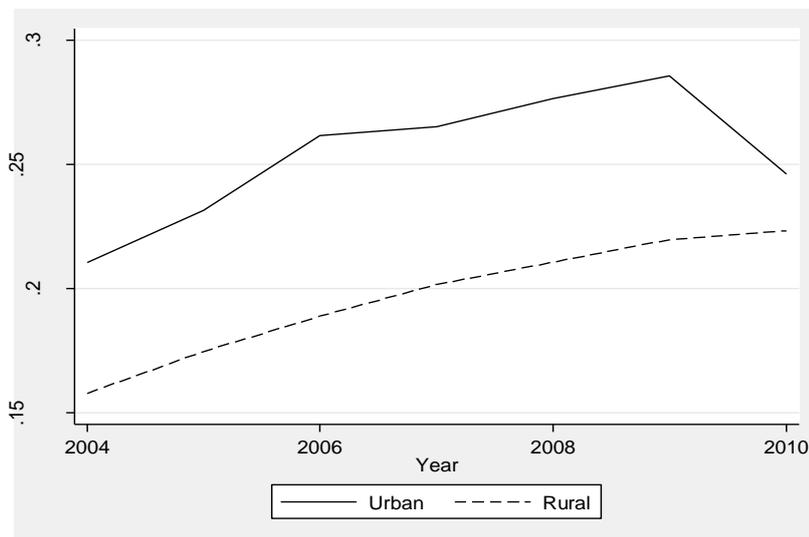
² Slovak University of Agriculture/Department of Economics, Nitra, Slovakia

³ Middlesex University Business School/Department of Economics, London, UK

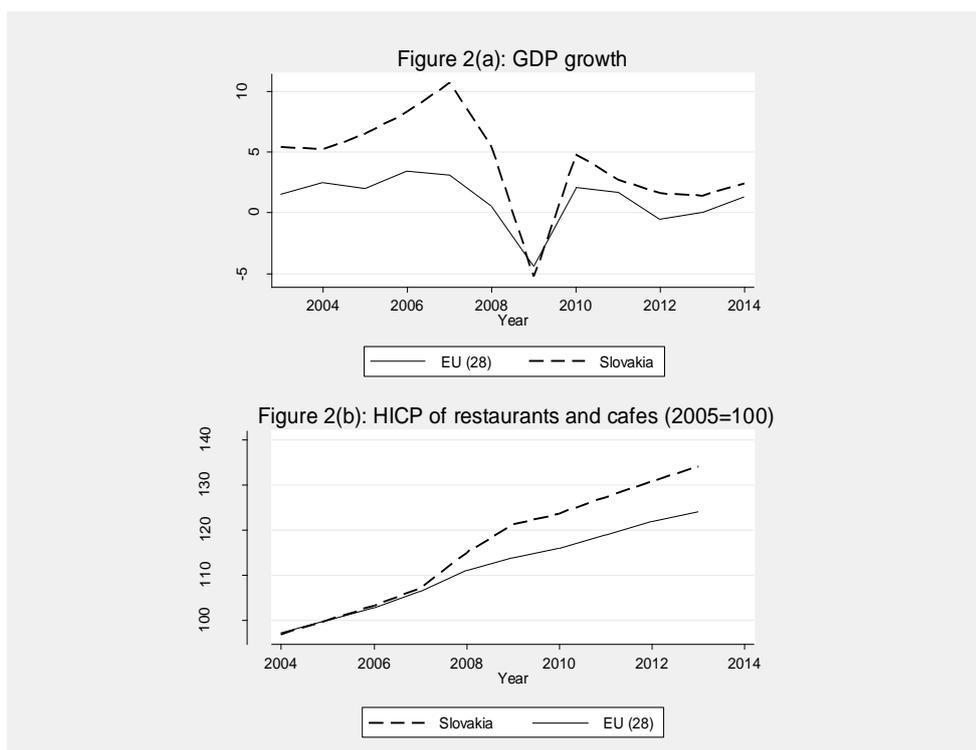
1. INTRODUCTION

Consuming food away from home (FAFH) has become an important part of the contemporary diet as consumers spend more money on meals purchased away from home than ever before. According to the United States Department of Agriculture (2014) the share of expenditure on FAFH out of the total food expenditure in the US more than doubled from around 20% in 1970 to almost 45% in 2012. This share is estimated to rise in the future. The trend for increasing consumption of food away from home is similar in Europe but the situation is more heterogeneous. Angulo et al. (2002) show that expenditure share on FAFH in Spain more than doubled, from 10% to 25% during the last 30 years. Households in the Central and Eastern European countries (CEECs) used to spend smaller share of their income on eating out of home during transition period but recently consumption of FAFH has become more popular. For example, the share of FAFH spending of total food expenditures by Slovak households increased between 2004 and 2010 from around 15% to 22% for rural households and from 20% to 25% for urban households (Statistical Office of the Slovak Republic, 2014). Economic slowdown of 2007 – 2009 caused decline of eating out by Slovak households. In that period GDP per capita declined while costs of restaurant services kept increasing which negatively affected expenditures on FAFH in Slovakia (Figure 2).

Figure 1: Food away from home as a share of household food expenditures



Household Budget Survey, Slovak Statistical Office; authors' calculations

Figure 2: GDP growth and inflation of restaurant prices in Slovakia

Source: Eurostat

Even though there has been substantial research on demand for food away from home and its determinants mostly in developed countries such as US, or Spain and Ireland in Western Europe, this kind of research has been neglected in the CEECs. We therefore think that conducting such an analysis for Slovakia, as a typical CEE country, is timely. The importance of this study is twofold. First, food consumption patterns of consumers in CEEC can be different from those in the Western Europe or USA due to different historical development in these two parts of the World. For example, global restaurant chains (especially fast-foods) entered the Central and East European market much later compared to for example Western Europe. It is therefore important to study the determinants of consumption of FAFH in CEECs too. Second, it has been argued and shown in the nutrition literature, that the consumption of the food away from home is closely linked to inadequate diet and consequent rise in overweight and obesity. Furthermore, the current report of the OECD (2014) has shown that overweight and obesity might be a threat in the CEECs with rates ranging from around 17% of adults in Slovakia, 21% in Czech Republic to almost 28.5% in Hungary.¹ Many authors find negative association between income and overweight and obesity. Our study can benefit policy-makers on the determinants of FAFH and its link to malnutrition.

While there has been some research on demand for the food away from home in Western Europe or the USA, the situation in the CEECs has not been, to our knowledge, analysed yet. The main contribution of the present study is an analysis of the food away from home expenditure patterns based on the detailed and representative household data for the period from 2004 to 2010. The present study aims to fill the gap on the FAFH literature in the CEECs that will help to better understand what determines the FAFH among different household groups in Slovakia, a typical former socialist economy, now a new member state of the EU.

The paper is organized as follows. The next section offers a brief overview of the previous studies on the food away from home. Section 3 describes the theoretical model that is applied to study FAFH demand. Econometric estimation techniques are discussed in section 4. Data and variables are described in section 5

¹ For a comparison, according to the OECD (2014) the average obesity rate in the OECD (34) countries was around 18% and 35.3% in the US.

along with the summary statistics. Estimated results and discussion are presented in section 5 while the concluding remarks and policy implications are discussed in the last section.

2. PREVIOUS STUDIES

Analysts have usually been interested in how factors such as economic growth, changes of demographic variables, level of urbanization, composition of households, changes in prices of food outlets, and other factors affect the out of home eating patterns. Demand for the food away from home services has been analysed worldwide while the majority of the studies have predominantly focused on the out of home eating patterns in the United States (e.g., Prochaska and Schrimper, 1973; Byrne et al., 1996; Stewart et al., 2004), in China (e.g., Liu et al., 2015; Bai et al., 2010; or Huang et al., 2006) and in Europe, specifically in Spain (e.g., Angulo et al., 2007; Mutlu and Gracia, 2006), in Greece (e.g. Mihalopoulos and Demoussis, 2001) or in Ireland (e.g., Newman et al., 2003). Majority of those studies have found evidence that rising incomes contribute to increase in the food away from home expenditure. Another important finding is that family structure plays an important role in determining the out of home eating. For example, it has been shown by Redman (1980) that families with preschool children and older women, particularly in the US, eat out of home less than other families. Interestingly, authors have found that the out of home eating is considered a necessary service in the US, in urban China, or in Ireland. On contrary, out of home eating has been found a luxury service by Spanish consumers.

Food away from home analysis can have important implications also from the perspective of food and nutrition security. On the one hand it has been argued by Liu et al. (2015) that growing demand for FAFH creates a pressure on the whole food system including supply chain infrastructure, transportation, distribution of resources and growing import of food if domestic food production does not meet the quantity and quality criteria, especially in the less developed countries. On the other side increasing demand for food away from home services is closely associated with the unhealthy diet and consequent problems with health including overweight and obesity as an outcome of the access in calorie intake mostly being caused by the oversized portion of the meals eaten in restaurant services, mostly fast-food ones. This issue has been studied worldwide and such evidence have been found, for example in the US (see e.g., Thompson et al., 2003), in Brazil (e.g., Bezerra and Sichieri, 2009) or in Europe (Naska et al., 2011).

Majority of the recent food away from home studies (see, e.g. Liu et al., 2015; Mutlu and Gracia, 2006; Newman et al., 2003) have been based on the theoretical models which originate from the household production theory proposed by Becker (1965) and Lancaster (1971). Likewise, many of the empirical studies have analysed food away from home expenditure patterns applying several limited dependent variable econometric models. As it has been pointed out by Liu et al. (2015) or Mutlu and Gracia (2006) the standard OLS is not applicable due to the large share of zero values in the FAFH expenditure and would produce biased estimates. To overcome the issue with zero FAFH expenditure data, studies have mostly applied Tobit or Double-hurdle models.

3. THEORETICAL FRAMEWORK

To study food away from home expenditure patterns in Slovakia we follow standard model derived from the household production theory developed by Becker (1965) and Lancaster (1971) that has been applied and modified in other follow up studies (see, e.g. Yen, 1993; or Nayga, 1996). An important feature of the Becker's model is that consumers (households) are assumed to maximise their utility subjected not only to the income (budget) constraint but also to a time constraint meaning that consumers demand specific products/services associated with a convenience to save time regarding the food preparation at home. In Becker's model households are assumed to be both producing and utility maximizing subjects. The utility function is defined as:

$$U = U(z_i) \equiv U[f(x_i, T_i, D_k)] \quad (1)$$

Where T_i represents time needed to produce z_i ($i=1, \dots, n$) and D_k exhibits a k-variables vector reflecting demographic and socio economic characteristics of a household. Moreover, the time constraint can be defined as follows:

$$T = \sum_{i=1}^n T_i + T_w \quad (2)$$

where T describes the total time and T_w is the time devoted to the labor market participation. Therefore, the budget constraint of this model can be defined as:

$$T_w W + V = \sum_{i=1}^n x_i p_i \quad (3)$$

with W being a vector of earned wage, V representing a non-wage income and p_i being the market prices of the goods x_i used to produce z_i vector of consumer goods. Maximising the utility function subject to the time and budget constraints and solving the utility model with respect to x_i and T_i , the demand function for the good x_i can be derived as:

$$x_i = f(p_i, W, V, D_k) \quad (4)$$

In order to obtain expenditure function, Yen (1993) and Nayga (1996) suggest to multiply equation (4) by price vector p_i . Then the household expenditure on market-purchased food away from home can be written as:

$$p_i x_i = f(W, V, D_k) \quad (5)$$

The final demand function for food away from home expenditure can be written as:

$$E_i = f(m, L, D_k) \quad (6)$$

Where E_i represents the expenditure on FAFH, m devotes the household income, L represents opportunity cost of women's time and D_k is set of demographic and socio-economic household characteristics.

4. METHODOLOGY

When analysing food away from home expenditure, we have to deal with the presence of zero values in the data (see Appendix1, Figure A1). The presence of zeros is due to different reasons which affect the choice of a proper estimator. An excellent comparison of several dependent variable censored models is made in the study of Humphreys (2013) who offers a guideline on which model to choose in a presence of skewed data due to zero values (see Figure 1). Humphreys (2013) further explains that zero observations usually appear in economic data because of three main reasons: i) zeros represent a choice made by the agents in the survey. This outcome can be attributed to the corner solution to a constrained utility maximization problem (a consumer gives up consuming a specific good in favor to other bundles of goods); ii) zeros represent missing or non-response outcomes (e.g. infrequent purchase of durables such as cars etc.); iii) zeros occur due to a decision that the agent does not have control over from whatever reason.

Double-hurdle model proposed by Cragg (1971) has been introduced as an alternative approach to Tobit model (Tobin, 1958) which had been typically applied to analyse corner-solution situation in consumer's basket. Participation stage of the double-hurdle is given by equation:

$$d_i^* = X'_{1i} \beta_1 + u_i, \quad u_i \sim N(0,1) \quad (7.a)$$

and

$$d_i = \begin{cases} 1 & \text{if } d_i^* > 0 \\ 0 & \text{if } d_i^* \leq 0 \end{cases} \quad (7.b)$$

The level of consumption is given by:

$$y_i^* = X'_{2i}\beta_2 + v_i, \quad v_i \sim N(0, \sigma^2) \quad (8.a)$$

and

$$y_i = \begin{cases} y_i^* & \text{if } d_i = 1 \text{ and } y_i^* > 0 \\ 0 & \text{else} \end{cases} \quad (8.b)$$

In double-hurdle model participation and consumption stages are determined by separate sets of factors. Such a two-stage decision process is affected by set of explanatory variables X'_{1i} and X'_{2i} with corresponding vectors of parameters β_1 and β_2 to be estimated. Furthermore, such covariates are also assumed to be uncorrelated with the error terms u_i and v_i . Whereas d_i^* represents a latent index variable of binary censoring, d_i is the observed household's participation decision (1 if participates in the FAFH market and 0 otherwise). The actual observed expenditure on FAFH given by y_i is equal to y_i^* only if the latent variable takes positive values and the first participation stage is fulfilled. Parameters of the double-hurdle model are estimated maximizing the following log-likelihood function:

Following the Cragg's model probabilities that FAFH expenditure takes positive values are given by:

$$P(y_i = 0 | x_{1i}) = 1 - \Phi(x_{1i}\beta_1) \text{ and} \quad (9)$$

$$P(y_i > 0 | x_{1i}) = \Phi(x_{1i}\beta_1), \quad (10)$$

where Φ exhibits the standard normal cumulative distribution function. Then the expected value of the dependent variable, conditional on $y > 0$ is given by:

$$E(y_i | y_i > 0, x_{2i}) = x_{2i}\beta_2 + \sigma \times \lambda(x_{2i}\beta_2/\sigma), \quad (11)$$

with $\lambda(c)$ being the inverse Mills ratio (IMR):

$$\lambda(c) = \frac{\phi(c)}{\Phi(c)},$$

where ϕ represents the standard normal probability distribution function. The unconditional expected value of dependent variable can be finally written as:

$$E(y_i | x_{1i}, x_{2i}) = \Phi(x_{1i}\beta_1) \{x_{2i}\beta_2 + \sigma \times \lambda(x_{2i}\beta_2/\sigma)\}. \quad (12)$$

Analytical derivation of the partial effects (elasticities) of independent variables in the Cragg's double-hurdle model is straightforward and follows the same approach as has been introduced by Burke (2009). First, to partially differentiate the expression (8) with respect to x_j we get the partial effect of an explanatory variable around the probability of $y > 0$:

$$\frac{\partial P(y > 0 | x_1)}{\partial x_j} = \beta_{1j} \phi(x_1 \gamma), \quad (13)$$

with γ_j being the element of γ exhibiting the coefficient on x_j . Second, the partial effect of an explanatory variable on the expected value of dependent variable, while $y > 0$ can be derived as:

$$\frac{\partial E(y_i | y_i > 0, x_{2i})}{\partial x_j} = \beta_{2j} [1 - \lambda(x_{2i}\beta_2/\sigma) \{x_{2i}\beta_2/\sigma + \lambda(x_{2i}\beta_2/\sigma)\}], \quad (14)$$

where β_j is the element of β exhibiting the coefficient on x_j . Finally, the partial effect of an explanatory variable on the unconditional expected value of dependent variable can be written as:

$$\frac{\partial E(y_i|x_1, x_2)}{\partial x_j} = \beta_{1j}\phi(x_1\gamma) \times \{x_{2i}\beta_2 + \sigma \times \lambda(x_{2i}\beta_2/\sigma)\} + \Phi(x_{1i}\beta_1) \times \beta_{2j}[1 - \lambda(x_{2i}\beta_2/\sigma)\{x_{2i}\beta_2/\sigma + \lambda(x_{2i}\beta_2/\sigma)\}] \text{ if } x_j \in x_1, x_2 \quad (15)$$

The above expression only holds when x_j is an element of both vectors x_1 and x_2 .

5. DATA

FAFH analysis is applied to the Household Budget Survey (HBS) data collected by the Statistical Office of the Slovak Republic covering seven annual rounds, from 2004 to 2010. The survey provides detailed information on household incomes and expenditures on food and non-food goods and services. The data also contain detailed information on household characteristics such as its location and size, composition as well as individual household member characteristics such as age, education, occupation, marital status etc. Each of the annual samples contains approximately between 4500 and 6000 households, however, the samples do not form a genuine panels. Surveyed households are randomly selected from the population each round and do not remain in the survey for two or more consecutive periods.

Demand for a specific good or service is usually modeled as a function of income and prices along with the demographic variables to account for the heterogeneity in preferences. As it has been argued by Dybczak et al. (2014), the list of demographic controls can be very long. Since we want to estimate a parsimonious model, we have decided to model FAFH as a function of the variables which are presented in Table 1. These variables have been commonly used in other empirical studies on the FAFH (see, e.g. Mutlu and Gracia, 2006; Newman, Henchion and Matthews, 2003; Ma et al., 2006).

Table 1. Definition of variables entering the model

Variable	Definition
<i>FAFH_expenditure</i>	Monthly expenditure on food away from home (€)
<i>FAFH_participation</i>	Participation in the food away from home; 1 if a household participates and 0 otherwise
<i>Income</i>	Net monthly household disposable income (€)
<i>Employed_HH</i>	Dummy variable indicating working status of the head of household; 1 if employed and 0 otherwise
<i>Education_HH</i>	Educational level of the household's head: this variable contains 4 categories of education (no education, primary education, high school, and university)
<i>Gender_HH</i>	Gender of the household's head; 1 if male; 0 if female
<i>Age_HH</i>	Age of the household's head
<i>Employed_wife</i>	Dummy variable indicating whether the household head (woman) is employed or not
<i>Familysize</i>	Size of a household
<i>N_children</i>	Number of children (below age 16)
<i>Single</i>	Dummy variable indicating a single person household
<i>Urban</i>	Dummy variable; 1 if household resides in urban area and 0 if rural

Source: own processing

Descriptive statistics of the selected variables are presented in Table 2 with comparison made for years 2004 and 2010. Around 56% of households decided to enter the FAFH market in 2004 and 60% in 2010 with the average monthly expenditure of 26€ (2004) and 37 € (2010). The share of households and the corresponding level of expenditure on the out of home eating by each year is presented in Table 4. Based on the previous studies on the FAFH, one of the most important economic factors being considered is income. The net monthly household income was about 443€ in 2004 and 686 € in 2010. Significantly higher incomes are reported in more developed Western Slovakia than in Central or Eastern Slovakia. Considering the other economic and non-economic factors, around 59% of the household heads declared participation at the job market in 2004 and 55% in 2010. Furthermore, around 31% of household's wives declared employed working status in 2004 and 35% in 2010. Another important factor affecting the food away from home expenditure patterns is undoubtedly the household head's education. Since the methodology of measuring

the educational level changed several times between 2004 and 2010, we decided to create a simple categorical variable with 4 levels of education (0- no education, 1- primary education, 2- high school, and 3- university). Among all the household heads, the average education was about 2 both in 2004 and 2010 indicating a high school education in most cases. FAFH patterns are influenced by the age as well. The average age of the household head was approximately 50.9 years in 2004 and 52.1 in 2010, what indicates the aging of population in Slovakia. The average Slovak family consisted of 2.8 household members both in 2004 and 2010 what is in line with the total population of Slovakia (around 5.5 millions) assuming nearly 2 million households. A more detailed household structure is presented in Figure 2. A recent trend of having only a few children is present in Slovakia as well, when the average Slovak family had 0.53 children in 2004 and 0.46 in 2010. Furthermore, around 17% of all the households consisted only of one member in 2004 and around 20% in 2010. While 61% of the interviewed households resided in urbanized area in 2004, this number decreased to 55% in 2010 what could be driven by a gradual deurbanisation and movement to rural areas.

Table 2. Summary statistics, (2004 and 2010)

Variable	2004			2010		
	Mean	Min	Max	Mean	Min	Max
<i>FAFH_expenditure</i> ^a	26.308 (21.311) ^b	0.157	120.160	37.904 (28.554)	0.200	120.426
<i>FAFH_participation</i>	0.558 (0.497)	0.000	1.000	0.604 (0.489)	0.000	1.000
<i>Income</i>	442.997 (244.818)	118.371	1763.567	685.683 (353.866)	118.902	1762.142
<i>Employed_HH</i>	0.594 (0.491)	0.000	1.000	0.554 (0.497)	0.000	1.000
<i>Age_HH</i>	50.906 (15.051)	18.000	95.000	52.140 (14.439)	18.000	95.000
<i>Gender_HH</i>	0.680 (0.467)	0.000	1.000	0.681 (0.466)	0.000	1.000
<i>Education_HH</i>	1.991 (0.524)	0.000	3.000	2.030 (0.488)	0.000	3.000
<i>Employed_wife</i>	0.310 (0.462)	0.000	1.000	0.351 (0.477)	0.000	1.000
<i>Familysize</i>	2.899 (1.427)	1.000	10.000	2.843 (1.418)	1.000	10.000
<i>N_children</i>	0.532 (0.861)	0.000	6.000	0.458 (0.793)	0.000	6.000
<i>Single</i>	0.174 (0.379)	0.000	1.000	0.203 (0.403)	0.000	1.000
<i>Urban</i>	0.612 (0.487)	0.000	1.000	0.552 (0.497)	0.000	1.000

^a Summary statistics for the *FAFH_expenditure* have been computed only for households participating in the FAFH.

^b Standard errors are presented in parentheses.

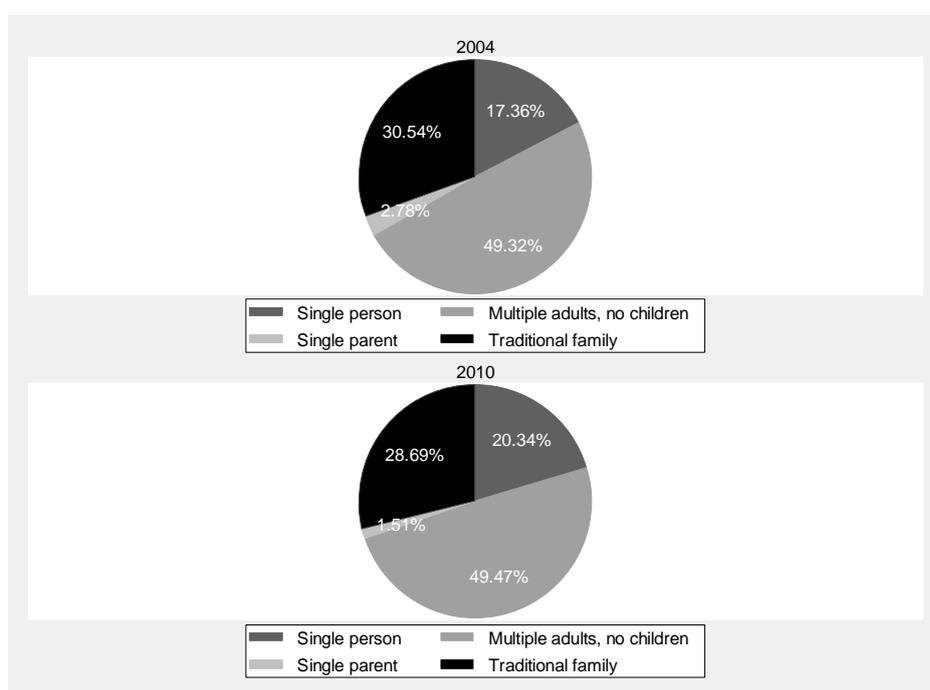
All the monetary values for years 2004-2008 have been converted to Euros with the corresponding exchange rates and adjusted by CPI's. According to the NUTS III level of classification there are eight regions in Slovakia, Bratislava, Trnava, Trencin, Nitra, Zilina, Banska Bystrica, Presov, and Kosice which are approximately equally represented in the HBS survey.

Source: Household Budget Survey, Slovak Statistical Office; authors' calculations

Table 3. Participation and expenditure on the food away from home

Year	Participation (share)	Expenditure (Euros)
2004	0.558	26.308
2005	0.612	27.385
2006	0.619	31.081
2007	0.633	34.239
2008	0.649	39.304
2009	0.633	39.625
2010	0.584	37.904

Source: Household Budget Survey, Slovak Statistical Office; authors' calculations

Figure 3: Composition of the Slovak households (%), 2004 and 2010

Source: Household Budget Survey, Slovak Statistical Office; authors' calculations

6. RESULTS AND DISCUSSION

Since the observations do not form a genuine panel and to maximize the number of observations we estimate food away from home demand functions on the pooled cross sectional data. The model has been estimated using Stata routine *craggit* developed by Burke (2009). The maximum likelihood estimates of the double-hurdle and tobit models are presented in Table 4. Most of the estimated parameters are statistically significant at the 10% level of significance or better. Besides the effects reported in the table, we have also controlled for fixed and time effects including controls for regions and years into our models.

Out of home eating patterns are influenced by economic as well as non-economic factors. An increase in income positively affects the probability of entering the FAFH market and the level of consumption out of home. Both participation and consumption stages of the FAFH are positively influenced if the head of household is employed. An important feature of the applied Becker's model is to measure the opportunity costs of wife's time regarding the convenience of eating out of home or preparing food at home. The wife's opportunity cost is measured by her working status, i.e. if she is employed, unemployed or a housekeeping

wife. Our results indicate that households with employed wives significantly increase the probability of entering the FAFH market as well as the level of consumption. Moreover, there is a considerable number of households in Slovakia where women stay at home and take care of housekeeping (including at home cooking) and therefore such households spend significantly less on the out of home eating services. Among the other variables included in the models, education level of the household's head positively affects both the participation and consumption of the FAFH. On the other hand, the impact of the household head's age is significantly negative on both stages of the FAFH market participation and consumption. Whereas the household size negatively affects the participation stage, the effect on consumption level is significantly positive. Moreover the number of children in household significantly increases the probability of participation, but the second consumption stage is not influenced at all. Households consisting of only one person have significantly higher demand for FAFH, as the both stages are positively affected since it is more convenient (considering the time of food's preparation and sometimes even the prices of meals) for singles to eat out than cooking at home. Moreover, households residing in urban areas are significantly more likely to enter the FAFH market. Because of the nonlinear nature of the double-hurdle model, we cannot interpret the estimated coefficient as marginal effects.

Table 4. Double-hurdle and Tobit maximum likelihood estimates (pooled sample 2004-2010)

Variable	Double-hurdle participation stage	Double-hurdle consumption stage	Tobit
<i>Income (ln)</i>	0.921*** (0.026) ^a	0.740*** (0.019)	1.827*** (0.037)
<i>Employed_HH</i>	0.395*** (0.023)	0.396*** (0.020)	1.005*** (0.039)
<i>Age_HH</i>	-0.015*** (0.001)	-0.003*** (0.001)	-0.027*** (0.001)
<i>Gender_HH</i>	-0.147*** (0.021)	-0.073*** (0.017)	-0.277*** (0.034)
<i>Education_HH</i>	0.242*** (0.018)	0.028** (0.013)	0.363*** (0.026)
<i>Employed_wife</i>	0.207*** (0.022)	0.208*** (0.015)	0.407*** (0.031)
<i>Familysize</i>	-0.051*** (0.011)	0.018** (0.007)	-0.022 (0.015)
<i>N_children</i>	0.136*** (0.015)	-0.004 (0.009)	0.113*** (0.019)
<i>Single</i>	0.202*** (0.029)	0.192*** (0.025)	0.376*** (0.047)
<i>Urban</i>	0.088*** (0.017)	0.020 (0.013)	0.144*** (0.025)
<i>Constant</i>	-5.228*** (0.150)	-2.037*** (0.112)	-10.099*** (0.221)
N	33,300	33,300	33,300
Pseudo R ²			0.1398
Log pseudolikelihood	-41475.6		-51573.9

^a Robust standard errors are presented in parentheses.

* p<0.05, ** p<0.01, *** p<0.001.

In addition, dummy variables capturing time, seasonal and regional effects have been included to the models.

Source: Household Budget Survey, Slovak Statistical Office; authors' calculations

The average marginal effects of the double-hurdle model are presented in table 6 with respect to both continuous and discrete variables. Magnitudes and signs of the estimated effects are generally consistent with other previous FAFH empirical studies. Among the continuous variables, household income has the strongest impact on the FAFH purchases. For example, a 1% increase in household income increases the probability of participation in FAFH market by around 0.26%, conditional FAFH expenditure by 0.72%. The total income elasticity of FAFH is approximately 1.18% meaning that FAFH is perceived as a luxury among Slovak. Generally, the discrete effects appear to have weaker impact on the FAFH. For example employment status and education level of the household's head and the employment status of the household's wife positively influence the probability of participation (0.11, 0.07 and 0.06 %) as well as the conditional (0.39, 0.03 and 0.20%) and unconditional (0.55, 0.21 and 0.29%) level of spending.

Table 5. Estimated elasticities effects of the Double-hurdle model

	Probability ^a	Conditional ^b	Unconditional ^c
<i>Income (ln)</i>	0.258 (0.083) ^d	0.722 (0.031)	1.175 (0.320)
<i>Age_HH</i>	-0.004 (0.001)	-0.002 (0.000)	-0.014 (0.004)
<i>Employed_HH</i>	0.110 (0.036)	0.386 (0.017)	0.551 (0.154)
<i>Education_HH</i>	0.068 (0.022)	0.027 (0.001)	0.207 (0.060)
<i>Gender_HH</i>	-0.041 (0.013)	-0.071 (0.003)	-0.160 (0.043)
<i>Employed_wife</i>	0.058 (0.019)	0.203 (0.009)	0.290 (0.081)
<i>Familysize</i>	-0.014 (0.005)	0.018 (0.001)	-0.029 (0.013)
<i>N_kids</i>	0.038 (0.012)	-0.004 (0.000)	0.104 (0.033)
<i>Single</i>	0.057 (0.018)	0.187 (0.008)	0.276 (0.076)
<i>Urban</i>	0.025 (0.008)	0.020 (0.001)	0.082 (0.023)

^a Probability: Effect on probability of participation;

^b Conditional: Effect on conditional level of expenditure;

^c Unconditional: Effect on unconditional level of expenditure.

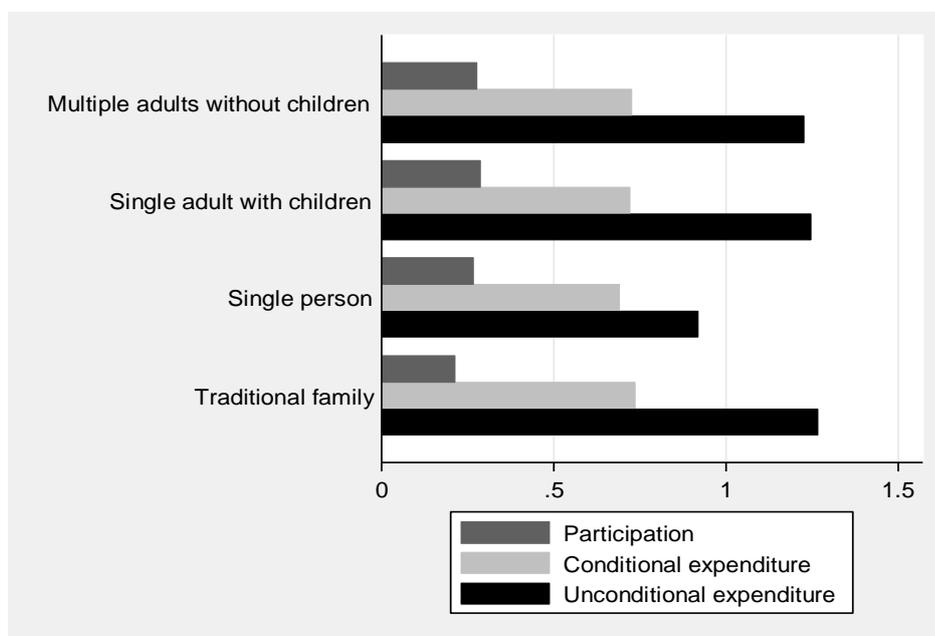
^s Standard errors are presented in parentheses.

Source: Household Budget Survey, Slovak Statistical Office; authors' calculations

The estimated income elasticities of FAFH in Slovakia for different household types are presented in Figure 5. For example, a single person household has unconditional income elasticity of FAFH around 0.92 meaning a normal good. On the other hand, households consisting of multiple adults without children, single parent with children, and traditional families consisting of parents and children have estimated unconditional income elasticity about 1.22, 1.24, and 1.26, suggesting that such households perceive eating out of home as a luxury. Such results show an important heterogeneity in consumers' perception regarding the out of home eating and demand for restaurant services. While it is hard to compare the estimated results with other studies on FAFH in the CEE due to the fact that out of home eating patterns have not been analysed in the

region recently, we can make a global comparison. For example, the US society perceives the out of home eating as a necessary good with income/expenditure elasticity 0.2 (see, Byrne et al., 1996). Similarly, FAFH is considered as necessity by urban Chinese people with income elasticity 0.6 (see, Liu et al., 2015) or in Ireland where the income elasticity is about 0.38 (see, Newman et al., 2003). On the other hand, the out of home eating is perceived as luxury with income elasticity 1.83 by Spanish society (see, Mutlu and Gracia, 2006).

Figure 4: Elasticity estimates with respect to household income by different household types



Source: Household Budget Survey, Slovak Statistical Office; authors' calculations

7. CONCLUSIONS

The aim of this study was to analyse the food away from home expenditure patterns in Slovakia using the recent Household Budget Survey data covering the period from 2004 to 2010. Our analysis is built on the Becker's (1971) household production and consumption theoretical framework. Results have been estimated by several econometric techniques and Cragg's double-hurdle model seems more appropriate than the standard corner solution Tobit model to analyse FAFH expenditure patterns being confirmed by several statistical tests. Majority of the estimated coefficients is statistically significant on the conventional levels and have expected signs.

Furthermore, results show that on average around 62% of households decided to eat out of home between 2004 and 2010. The average share of the FAFH expenditure out of the total food expenditure ranged from 15 to 22 % being different for urban, rural, low and high-income households. Moreover, such shares were quite stable over the analysed time period with a slight increasing trend. The estimated income elasticity of FAFH in Slovakia differs among the household type. For example, single person households perceive out of home eating as a necessity. On the other hand, households consisting of multiple adults without children, single parent with children, and traditional families with parents and children perceive eating out of home as a luxury. FAFH in Slovakia differs substantially between regions and also between the annual seasons. Slovak households appear to have higher demand for FAFH in western regions and during the winter season. An important feature of the applied household model is to measure the effect of wife's opportunity costs. Results reveal the fact that households with employed wife have significantly higher expenditure on FAFH than unemployed (housekeeping) wife. The share of consumers using out of home

eating/ restaurant services in Slovakia slightly increased between 2004 and 2010, but still has not reached levels of the Western developed countries such as US or Ireland. Therefore the providers of restaurants can expect the further grow of this industry in Slovakia. The presented results could help restaurants and similar establishments to better target different consumer groups within their marketing strategies.

On the other hand, policy makers coping with the health and food policies should be aware of a possible worsening in populations' diet as a consequence of rising demand for food away from home services, especially the fast-food ones. A recent study of the OECD (2014) has already warned about the high rates of overweight and obese people living in the CEE countries.

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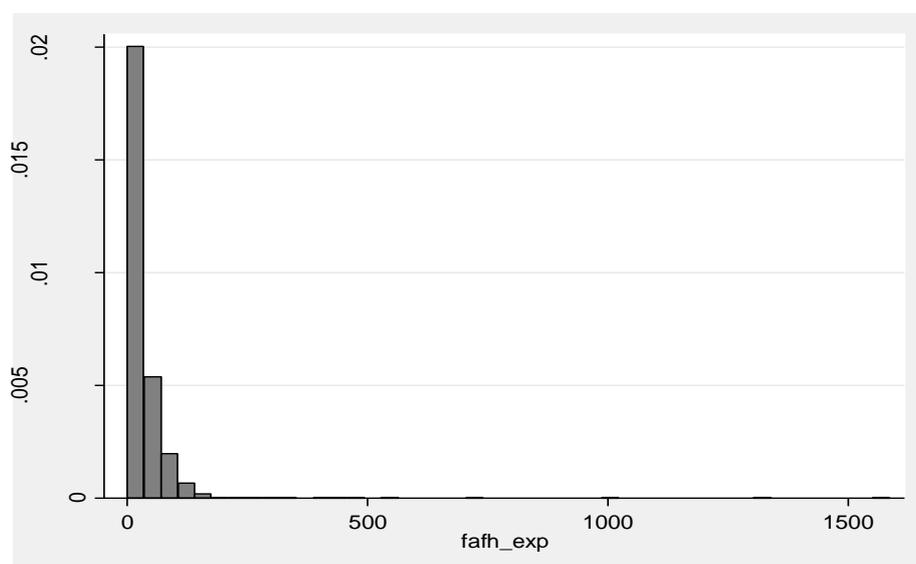
REFERENCES

- Angulo, A.M, Gil, J.M and Mur, J. (2007). Spanish Demand for Food Away from Home: Analysis of Panel Data. *Journal of Agricultural Economics* 58 (2): 289-307.
- Bai, J., Wahl, T., Lohmar, B. and Huang, J. (2010). Food away from home in Beijing: effects of wealth, time and “free” meals. *China Economic Review* 21 (3): 432–441.
- Becker, G. S. (1965). A Theory of allocation of time. *Economic journal* 75: 493-517.
- Bezerra, I.N. and Sichieri, R. (2009). Eating out of home and obesity: a Brazilian nationwide survey. *Public Health Nutrition* 12 (11): 2037–2043.
- Byrne, P.J., Capps, O. and Saha, A. (1996). Analysis of Food-Away-from-Home Expenditure Patterns for U.S. Households, 1982–89. *American Journal of Agricultural Economics* 78 (3): 614-627.
- Cragg, J. (1971). Some statistical models for limited dependent variables with application to the demand for durable goods. *Econometrica* 39(5): 829–844.
- Dybczak, K., Tóth, P. and Vonka, D. (2014). Effects of Price Shocks on Consumer Demand: Estimating the QUAIDS Demand System on Czech Household Budget Survey Data. *Czech Journal of Economics and Finance (Finance a uver)*, vol. 64(6): 476-500.
- Eurostat (2015). Available at: <http://ec.europa.eu/eurostat/data/database>.
- Humphreys, B. R. (2013). Dealing With Zeros in Economic Data. University of Alberta, Department of Economics, April 4, 2013.
- Lancaster, K. (1971). Consumer demand. Columbia University Press: New York.
- Liu, H., Wahl, T.I., Seale, J.L. and Bai, J. (2015). Household composition, income, and food-away-from-home expenditure in urban China. *Food policy* 51: 97- 103.
- Ma, H., Huang, J., Fuller, F. and Rozelle, S. (2006). Getting Rich and Eating Out: Consumption of Food Away from Home in Urban China. *Canadian Journal of Agricultural Economics* 54(1): 101–119.
- Mihalopoulos, V. and Demoussis, M. (2001). Greek household consumption of food away from home: a microeconomic approach. *European Review of Agricultural Economics* 28: 421–432.
- Naska, A., Orfanos, P., Trichopoulou, A., May, A.M., Overvad, K., Jakobsen, M.U., Tjønneland, A., Halkjær, J., Fagherazzi, G., Clavel-Chapelon, F., Boutron-Ruault, M.C., Rohrmann, S., Hermann, S., Steffen, A., Haubrock, J., Oikonomou, E., Dilis, V., Katsoulis, M., Sacerdote, C., Sieri, S., Masala, G., Tumino, R., Mattiello, A., Bueno-de-Mesquita, H.B., Skeie, G., Engeset, D., Barricarte, A., Rodríguez, L., Dorronsoro, M., Sánchez, M.J., Chirilaque, M.D., Agudo, A., Manjer, J., Wirfält, E., Hellström, V., Shungin, D., Khaw, K.T., Wareham, N.J., Spencer, E.A., Freisling, H., Slimani, N., Vergnaud, A.C., Mouw, T., Romaguera, D., Odysseos, A. and

- Peeters, P., (2011) Eating out, weight and weight gain. A cross-sectional and prospective analysis in the context of the EPIC-PANACEA study. *International Journal of Obesity* 35, 416–426.
- Nayga, R. M., Jr. (1996). Wife's Labor Force Participation And Family Expenditures For Prepared Food, Food Prepared At Home, And Food Away From Home. *Agricultural and Resource Economics Review* 25 (2): 179-186.
- Newman, C., Henchion, M. and Matthews, A. (2003) A double-hurdle model of Irish household expenditure on prepared meals. *Applied Economics* 35(9): 1053-1061.
- Prochaska, F.J. and Schrimper, R.A. (1973). Opportunity cost of time and other socioeconomic effects on away-from-home food consumption. *American Journal of Agricultural Economics* 55 (4): 595–603.
- Redman, B.J., 1980. The impact of women's time allocation on expenditure for meals away from home and prepared foods. *American Journal of Agricultural Economics* 62 (2), 234–237.
- Mutlu, S. and Gracia, A. (2006). Spanish food expenditure away from home (FAFH): by type of meal. *Applied Economics*, 38:9: 1037-1047.
- Statistical Office of the Slovak Republic (2014). Final consumption of households by Classification COICOP in Mill.EUR at current prices. Available at: http://www.statistics.sk/pls/elisw/objekt.send?uic=1896&m_sso=3&m_so=81&ic=209
- Stewart, H., Blisard, N., Bhuyan, S. and Nayga, R.M. (2004). The demand for food away from home. Full-service or fast food? United States Department of Agriculture. Agricultural Economic Report Number 829.
- Thompson, O.M., Ballew, C., Resnicow, K., Must, A., Bandini, L.G., Cyr, H. and Dietz, W.H. (2004). Food purchased away from home as a predictor of change in BMI z-score among girls. *International Journal of Obesity* 28: 282–289.
- Tobin, J. (1958). Estimation of relationships for limited dependent variables. *Econometrica* 26: 24–36.
- United States Department of Agriculture (2014) Food-Away-from-Home. Available at: http://www.ers.usda.gov/topics/food-choices-health/food-consumption-demand/food_away-from-home.aspx
- Yen, S.T. (1993). Working wives and food away from home: the Box-Cox double hurdle model. *American Journal of Agricultural Economics* 75: 884-895.
- OECD (2014). Obesity update, June 2014.

Appendix 1

Figure A1: Histogram of the food away from home expenditure, 2004- 2010



Source: Household Budget Survey, Slovak Statistical Office; authors' calculations