COMPARISON AND MODELING OF HOUSEHOLDS FOOD EXPENDITURES IN SLOVAKIA WITH REGARD TO THE ECONOMIC STATUS AND JOB POSITION OF THE HEAD OF HOUSEHOLD

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Abstract

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Paper focuses on analysis and development of nominal and real cash income as well as modeling of real cash household food expenditures in Slovakia. From the view of the head of household and his job position, paper compares the level and development of real money incomes and food expenditures, in terms of real money incomes quantifies the income elasticity and available demand saturation level for food in families of employees, self-employed persons and pensioners. Generally expected outcome of economic growth is raising standard of living of the population. Its measurement is based on the basic macroeconomic aggregates such as GDP growth and GDP per capita. Such indicators, despite their clearly accepted significance, have a number of limitations that undermine their informational value. These indicators are the product of highly aggregated data. Therefore submitted paper focuses on the analysis of the income situation of the population. This approach allows to obtain objective indicators of the true state income differentiation, respectively income inequality in particular social groups. Society with substantial income differentiation is less resistant against various extreme impact of globalization. The analysis results show that in the years 2004–2011 the real income increased least in the group of self-employed persons by an average of 4.89% (k' = 1.0489), while in the group of pensioners, the real income increased by an average of 7.08 % (k' = 1.0708).

income and food expenditures in the households of employees, self-employed persons and pensioners, average rates of growth, income and expenditure elasticity of demand, modeling of food expenditures

Analysis of demand and supply of food products is an essential part in consumers decision making as well as primary agricultural producers, processors and retail chains. In recent years, especially in the process of the ongoing economic crisis, in the professional community and practice, there has been noticed growing interest for analysing of consumer behavior in relation to changes in relative prices, income level and considering the differences in food consumption between the different social and income groups. Quality, quantity and price level of goods and services which individuals and individual households procure depends on the level of income. Price of purchased goods and services with other household expenses are the basis of households financial comfort. At present, it is necessary to highlight the importance of income in the family budget. Its height significantly affects the expenses we have to incur for goods and services needed for living. The purchasing power of many households currently does not allow full satisfaction of demand for food and other essential estates. Due to increasing prices of energy, rent, medicine and household services, for providing

food the households framed residual part from domestic budget. Recently, spread of poverty sector generates malnutrition among the population in Slovakia (Lošková, S. 2008, Bartová, Ľ. 2004). To issues of nutrition and food chain is given attention in Slovakia, as from the government, manufacturing sector, as well as from the queue of intellectual level. Previous studies and numerous works (Jurkovičová, J., 2005; Kubicová, Ľ. 2008; Betting, J., Toufarová, Z., Procházdzková, Z., 2008; Kleinová, K., Kretter, A., 2011; Turčinková, J., 2008) and others show, that nutrition and total food consumption in the Slovak and Czech households does not cover a healthy lifestyle.

MATERIALS AND METHODS

Food expenditures take a special place in the final consumption of households. When income grows, marginal propensity of food expenditures decrease until they reach a point where the energy consumption is not dependent on income. The food consumption does not increase any more and may even decrease due to changes in the objective conditions of consumption. Food costs are close to relative saturation and due to the quality effect, decrease of expenditures is relative and does not reach the absolute saturation (Grznár, M., 2004). On the goods as well as food which supply (consumption) comes close to saturation, demand responds inelastically to income growth.

When processing numerical material which was taken from the website of the Statistical Office of the Slovak Republic (income, expenditure and consumption of private households in the SR) was used regression and correlation analysis, basic and chain indexes. Changes in development of monitored indicators for the whole period of the time series are characterized by an average factor of growth k'.

$$k' = {}^{T-1}\!\sqrt{k_1} \times k_2.....k_i...k_T,$$

where:

$$k_i = \frac{y_t}{y_{t-1}} \qquad \text{for the period } i = 2, 3, …, T.$$

The impact of price changes and inflation, were taken into consideration by transfer of nominal monetary income and expenditure on food by means of the consumer price indexes for comparable realistic level.

The income elasticity of demand and the limit of saturation of consumer demand for food products were analyzed by linear regression function of logarithmic-hyperbolic function

$$RVP = \exp(b_0 + b_1) \times \frac{1}{RPP} \qquad b_0 > 0, b_1 < 0.$$

Tőrnquist's function

$$RVP = b_0 \times \frac{RPP}{RPP + b_1} \qquad b_0 > 0, b_1 > 0,$$

where:

RVP ....spending real money expenses on food in € per person per year

RPP.....real money income in € per person per year.

Since the stated regression functions are not linear in the parameters, it was necessary to estimate the regression coefficients by the method of least squares and their approximation to a linear shape. Statistical evidence of the regression parameters and appropriateness of the chosen regression model was verified by using the index of determination index R^2.

The text of the paper is supplemented by tables and charts that provide visual overviews of the obtained results. Data processing, calculation and construction of charts was performed electronically by using Microsoft Excel software.

RESULTS AND DISCUSSION

The obtained results of the analysis are divided into several smaller logical parts, which helps us to achieve better manageable outputs.

Development of Gross Domestic Product, Incomes and Household Consumption Expenditures in Slovakia

Development of incomes and expenditures of inhabitants is influenced also by the power of given state. Economic performance and stability of the state is determined by the development of economic indicators. Gross domestic product, incomes and consumer expenditures in recent years in Slovakia is characterized by the data in Tab. I.

Economic results in recent years in Slovakia show only a slight decrease in the growth of gross domestic product but also decrease of nominal and real

I: *Index of GDP growth, Incomes and Household Consumption Expenditures in Slovakia in %*

Indicator (1)	2010/2009	2011/2010
GDP Index (2)	104.2	103.3
Index of nominal income (3)	103.2	102.2
Index of real income (4)	102.2	98.4
Index of consumer expenses (5)	98.4	106.3

Source: www.statistics.sk

II: *Development of Indicators of Inflation in Slovakia in %*

Indicator (1)	2009	2010	2011
Total inflation in % (2)	1.6	1.0	3.9
Regulated prices in % (3)	4.2	–0.5	7.0
Core inflation in % (4)	0.5	1.2	2.3
Food prices in % (5)	–3.6	1.7	5.3

Source: www.statistics.sk.

III: *Development of Money Incomes and Expenditures on Food and Non-alcoholic Beverages by Member of Household in € per person per year in %*

Household	Indicator	Year					
		2004	2006	2008	2010	2011	k'
Employees	Net money incomes	3019.4	3505.4	4320.5	4338.08	4456.14	1.0572
	Net money expenditures	2890.9	3425.3	3947.7	3818.99	3936.48	1.0451
	Expenditures on food and non-alcoholic beverages in %	21.7	21.3	20.7	20.2	20.45	0.992
	Expenditures on hotels, restaurants and catering in %	5.1	5.6	6.2	6.2	6.6	1.0375
Self-Employed Persons	Net money incomes	3295.9	3541.7	4384.2	4419.32	4451.53	1.0439
	Net money expenditures	3223.4	3318.0	3943.2	3782.85	3910.76	1.0279
	Expenditures on food and non-alcoholic beverages in %	21.1	20.9	21.1	21.1	19.74	0.9905
	Expenditures on hotels, restaurants and catering in %	4.1	4.7	4.6	4.6	5.1	1.0317
Pensioners	Net money incomes	2900.6	3386.8	4014.1	4467.63	4526.84	1.0657
	Net money expenditures	2843.2	3460.8	3842.5	3933.46	3984.94	1.0494
	Expenditures on food and non-alcoholic beverages in %	30.5	26.7	26.5	26.7	26.15	0.9783
	Expenditures on hotels, restaurants and catering in %	1.3	1.8	1.8	1.6	2.2	1.0781

Source: SO SR, COICOP, Own calculations

incomes. On the other hand, there was increasing of total consumption expenditures, which in 2011 increased year on year by 6.3 percentage points. Assuming that inflation is low and stable, then consumers expectations are acceptable. The negative consequence is an uncertainty, which is associated with inflation, if the rate is volatile – unstable, and if the development of prices varies significantly during the period. This type of inflation can cause rapid changes in supply or demand in the economy. The development of indicators of inflation in recent years are highlighted by the data in Tab. II.

Development of the Money Incomes and Expenditures on Food and Non-alcoholic Beverages in Private Households by Economic Status and Job Position of the Head of Household

Transformation process of the Slovak economy and its European Union membership necessitated an increase of household variability types. Comparison and modeling of common demand expands the knowledge of economic theory and practice by quantifying the income and expenditure elasticities on the level of the average consumer, as well as at on the level of social groups of households. Disaggregation of social groups of consumers provides more accurate results and information about the level and differences in consumer behavior and the elasticity of demand for food in different social groups than is possible on the aggregate level of the average consumer (Tab. III).

In 2004, based on the recommendations of Eurostat was to national statistics of Slovakia implemented fourth level of classification of consumer expenses for family accounts COICOP-HBS (Eurostat, 2003) and re-classification of the characteristics of household members, the classification of money incomes and natural incomes. The result of these measures is the annual survey and disclosure (from 2004) of income and expenditure reviews (including expenditures on food and non-alcoholic beverages) in private households *by head of household's economic status and job position* (employee, self-employed, pensioner, other). From the statistical survey of household accounts conducted in 2011 by a two-stage random district was the unit of the economic household consisting of persons residing in the same apartment and paid all fees for running the household were

paid by these persons together, was following sample of private households in Slovakia – total number of households: 6143, of which employees 2,694, self-employed 528, pensioners 1551, other (unemployed, parent on parental leave, student etc.) 1370.
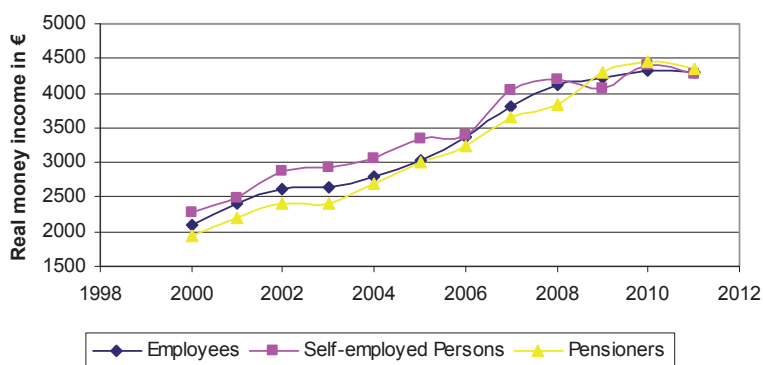
The available financial funds are sensitive reagent in each household of the ongoing processes in social and economic areas. Amount of income of the household, their resources and structure are determined by their social position especially in the labor market. In some social groups, the share of household income varies depending on the main source of income – from employment. Dividing of households to separate social groups provides official statistics based on the economic status of head of household at work. This criterion distinguishes households of employees, households of self-employed persons, households of pensioners and others (unemployed, students, persons on parental leave). It can be said that in recent years were understated differences between considered social groups of households that were in the achieved average annual cash income in 2011 was ranged from € 4400 to € 4500. The largest increase in net money income as shown in Tab. IV was recorded in the households of pensioners, with average annual increase by 6.57% (k' = 1.0657) in the years 2004 to 2011 and reached level of €

4526.84 in 2011. Money incomes of households of employees and self-employed persons in 2011 were almost the same, on level € 4451, in the effect of increased average annual increase of annual income of household of employees (k' = 1.0572), while households of self-employed persons reached only 4.39% increase of annual income (k' = 1.0439).

Real money income and real money expenditures on food and non-alcoholic beverages were based on different social groups by household net money income, by achieved level of annual inflation and so copied the trend of development and the differences between the households. The lowest increase in real money incomes in the period between 2004 and 2011 was recorded in the households of self-employed persons, which accounted 4.89% (k' = 1.0489), and these households on the other hand showed the highest increase (3.59%) of expenditures on food and non-alcoholic beverages. Households of pensioners and households of employees increased their average expenditures on food and non-alcoholic beverages by 2.43% per annum.
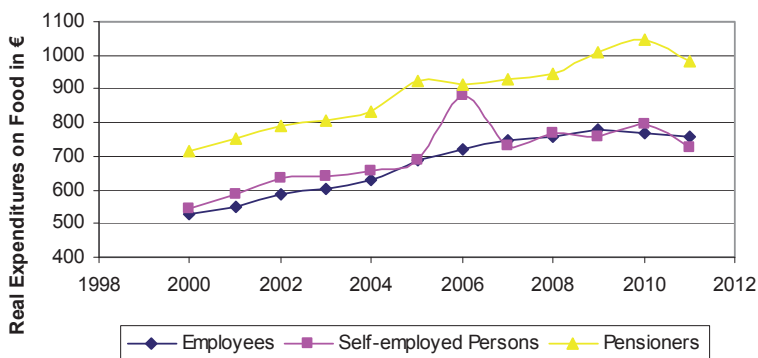
Comparison and Modeling of Expenditures on Food and Non-alcoholic Beverages and Saturation Borders for Food

In recent years, food expenditures recorded a growing trend in Slovakia and in 2011 accounted

1: *Real Money Income in €*
Source: SO SR, COICOP, Own calculations

2: *Real Expenditures on Food in €*
Source: SO SR, COICOP, Own calculations

IV: *Real Money Income, Real Expenditures on Food and Non-alcoholic Beverages and Real Expenditures on Milk and Dairy Products by Member of Households in 2004–2011 in € per person per year*

Household	Indicator	Year					
		2004	2006	2008	2010	2011	k'
Employees	Real money incomes	2808.73	3354.49	4130.48	4333.75	4288.87	1.0623
	Real food expenditures	631.70	721.13	758.28	766.74	758.67	1.0265
	Real expenditures on milk and dairy products	116.75	120.08	127.75	125.73	124.53	1.0093
Self-employed Persons	Real money incomes	3065.94	3389.15	4191.41	4414.90	4284.44	1.0489
	Real food expenditures	568.22	882.03	771.35	795.99	727.44	1.0359
	Real expenditures on milk and dairy products	124.37	115.79	128.90	130.02	124.15	0.9997
Pensioners	Real money incomes	2698.28	3240.97	3837.55	4463.17	4356.92	1.0708
	Real food expenditures	830.17	911.52	944.41	1049.01	982.14	1.0243
	Real expenditures on milk and dairy products	146.97	144.56	152.31	165.62	154.46	1.0071

Source: SO SR,COICOP, Own calculations,(CPI – previous year = 100)

V: *Share of Expenditures on Food and Dairy Products from the Food Expenditures per Household Member in 2004–2011 in %*

Household	Indicator	Year				
		2004	2006	2008	2010	2011
Employees	Food expenditures	21.7	21.3	20.7	20.2	20.45
	Expenditures on milk and dairy products	18.52	18.42	18.72	18.26	18.27
Self-employed Persons	Food expenditures	21.1	20.9	21.1	21.14	19.74
	Expenditures on milk and dairy products	18.90	18.82	18.69	18.20	18.95
Pensioners	Food expenditures	30.5	26.7	26.5	26.7	26.15
	Expenditures on milk and dairy products	18.08	17.29	17.62	17.37	17.23

Source: SO SR,COICOP, Own calculations

for 21.8% share of the total net money expenditures of households. The second position in the structure of consumer expenditures took consumer expenditures on housing, water, electricity and gas (20.21%) followed by expenditures on transport costs (7.96%), expenditures on recreation and culture (7.02%) and expenditures on various goods and services (6.5%). However, substantial differences could be noticed in the structure of consumer expenditures if there are considered differently, in terms of opportunities arising from the economic status and job position of head of household. In 2011, households of pensioners showed the highest proportion of consumer expenditures on housing, water and energy, which were accounted for 27.2% and expenditure on food and non-alcoholic beverages with 26.15% share. On the other hand, households of pensioners showed a lower proportion of expenditures on various goods and services, hotels, restaurants and transportation, but their expenditures on health care were accounted for 4.87% share, while the nationwide population health expenses were accounted only for 2.89% of the consumer expenditures.

The empirical expression of amount of real money expenditures on food and non-alcoholic beverages dependence (RVP) in relation to real money income (RPP) for the period 2004 to 2011 we used the analytical form of the linear expenditure function, as well as model of Working's logarithmic-hyperbolic function and model of features Tőrnquist's function for essential goods.

Estimated parameters of the expenditure regression functions for food and non-alcoholic beverages (Tab. VI) are statistically highly significant, and express the share of food expenditures variability and dependence on the real money income explained by regression model from 76.6% to 98.5%. Lower leakage of dependence (76.6% to 84.4%) and an explanation of the variability of expenditures on food from real money incomes by used models could be seen in households of self-employed persons. Higher average real money incomes attributable to the household member of self-employed persons allow them to cover the nutritional needs on a higher level.

Based on the parameters of a linear regression model can be stated that in the households of pensioners with an increase in real money income of € 100 per person per year could be increased the expenditures on food increased by an average of € 11.44. In the households of self-employed allows an increase of average real money income of € 100 increase in spending on food and non-alcoholic beverages by an average of € 9.84 per person per year and in households of employees of € 10.82.

VI: *Estimated Parameters of Expenditure Functions (linear, Working's and Tőrnquist's) and Saturation of Demand for Food*

Household	Parameters of Function	Income Elasticity	Saturation of Demand in €	R²
Employees	$RVP = 318.427 + 0.1082\, RPP$	0.529	-	0.965**
	$RVP = \exp\left(7{,}0427 - 1667{,}81\dfrac{1}{RPP}\right)$	0.504	1 144.474	0.983*
	$RVP = \dfrac{1474{,}926 \times RPP}{3803{,}687 + RPP}$	0.535	686.237	0.980*
Self-employed Persons	$RVP = 362.885 + 0.0984\, RPP$	0.484	-	0.766**
	$RVP = \exp\left(7{,}0454 - 1646{,}04\dfrac{1}{RPP}\right)$	0.477	1 147.568	0.844**
	$RVP = \dfrac{1443{,}001 \times RPP}{3338{,}259 + RPP}$	0.510	707.185	0.874**
Pensioners	$RVP = 520.903 + 0.1144\, RPP$	0.413	-	0.943**
	$RVP = \exp\left(7{,}1915 - 1217{,}44\dfrac{1}{RPP}\right)$	0.379	1 328.094	0.982**
	$RVP = \dfrac{1502{,}502 \times RPP}{2123{,}108 + RPP}$	0.398	903.380	0.985**

Source: SO SR, COICOP, Own calculations Real incomes and expenses are adjusted by the consumer price index (previous year = 100)

Relative expression of changes in consumer demand due to changes in the evolution of real money income of the households are characterized by expenditure elasticity coefficients, which helps us to conclude that in the households of employees from the linear regression model is seen that one percent increase in real annual money income allows them to increase the annual expenditure on food and non-alcoholic beverages by 0.529%, in the households of self-employed persons an average annual rate by 0.484% and in households of pensioners only by 0.413%.

Based on the above mentioned values of the coefficients of expenditure elasticity could be noted that the nutritional needs of households of pensioners are satisfied in a lower extent than these can be met in the households of employees and self-employed persons. These results are consistent with existing knowledge of other authors. Syrovátka, P. (2012) provides a price expenditure elasticity for food, soft drinks and tobacco in the general population population at level of 0.486 and price demand elasticity of –0.514. Could be said, that the lower are coefficients of income (expenditure) elasticity, the smaller is impact of money incomes on food demand.

As can be seen from the data in Tab. VI, saturation of demand for food and non-alcoholic beverages in the households of pensioners, based on Tőrnquist's function, can be estimated at level € 903.380 per person per year. Saturation borders of demand for food and non-alcoholic beverages in the households of self-employed persons is reduced to € 707.185 per year and in the households of employees to € 686.237. It also highlights the fact that current nutritional needs of these households are satisfied on the higher level of saturation than those met in the households of pensioners.

Pensioners in terms of demographic trends are due to rising standards of living and levels of health care one of the fastest growing segments of the population. But yet do not form a homogenous group, neither in terms of income level or the structure of consumption expenditures and expenditures on food. According Kotler, P. (1995), pensioners can be divided at least into three groups. The group of active pensioners (go-gos) dedicated to the economic activity, the group of pensioners with certain health problems (go-slows) and pensioners requiring non-stop medical treatment and care (no-gos) and thus presents a very heterogeneous group of population segment.

SUMMARY

Economic and social conditions in connection with the economic crisis in Slovakia, contribute to further deepening of differences not only in the area of income, but also in the behavior of the population in the consumer market. In the current evolution can be observed both positive and negative tendencies. As summary conclusion can be stated that in recent years were minimized differences between mentioned social groups (employees, self-employed persons, pensioners) in achieved average annual money income in 2011 ranged from € 4451,53 at self – employed persons to € 4526,84 at pensioners.. The highest increase in net money income was recorded in the households of pensioners, which in the years 2004 to 2011 increased annually by an average of 6.57% (k' = 1.0657), especially in 2006 and 2007, and in 2011 reached a level of 4526.84 €. Money income of households of employees and self-employed persons in 2011 coped around € 4451, in the effect of increased average annual increase of income in the households of employees (k' = 1.0572), while households of self-employed persons amounted average annual revenue increase of only 4.39% (k' = 1.0439).

Real money income and real money expenditures on food and non-alcoholic beverages in different social groups of households were based on the money income achieved and on the level of annual inflation and so copied the trend of development and the differences between the mentioned groups. In development of money expenditures was recorded highest increase (approximately 12%) of annual consumer expenditures in the years 2006 to 2008, which during the reviewed period increased in monitored households consistently around by 4% in average annual growth. Significant differences remain in development of expenditures on food, in 2011 in the households of pensioners 26.15%, while in the households of employees 20.45% and in the households of self-employed persons 19.4%.

In the households of employees, based on linear regression model, can be stated that one percent increase in real annual money income allows them to increase annual expenditures on food and non-alcoholic beverages by 0.529%, in the households of self-employed persons in the average annual rate by 0.484% and the households of pensioners only by 0.413%. Saturation of demand for food and non-alcoholic beverages in the households of pensioners, based on Tőrnquist's hyperbolic function, can be estimated at level of € 903.380 per person per year. Saturation borders of demand for food and non-alcoholic beverages in the households of self-employed persons is reduced to € 707.185 per year and in the households of emplyees to € 686.237.

Application of linear regression model provides sententious interpretation size of dependency food expenditures on real income. Non – linear functions are enumeration difficult, but on other side provide qualified estimation of expenditures saturation in comparison with real incomes.

Based on the above mentioned values of the coefficients of expenditure elasticity and saturation of demand can be concluded that the nutritional needs of the households of pensioners are satisfied on a lower level than these can be met in the households of employees and self-employed persons.

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