

STRUCTURAL CHANGES OF HOUSEHOLD EXPENDITURES IN BULGARIA – ENGEL’S LAW AND BAUMOL’S “COST DISEASE”

This study examines the change in the structure of household expenditures in the light of different income and price elasticity of demand for certain groups of goods and services. The laws of Engel and Baumol were largely followed, according to the former, as wealth is growing the structure of consumption changed, while the latter focus on productivity and relative prices. Econometric techniques have been implemented to correctly determine elasticity coefficients, as well as quantitative methods for expressing the contribution of rising income and prices to household expenditure. The results of the analysis show that income growth is a more significant factor for the change in household expenditure patterns in a developing country like Bulgaria. Considerations have also been made about the effectiveness of monetary policy on the consumption of different groups of goods and services.

JEL: D12; O12; P36

1. Introduction

The level and structure of consumption are one of the basic criteria for the socio-economic development of society.² With the increase in income, household expenditures are being allocated to a growing range of additional new goods and services as new and higher level preferences are being met. In post-industrial societies, human motivation is increasingly directed towards services and to some extent overcoming the previous greater material dependence. Modern notions of value, which are well represented and developed in the concepts of the post-industrial and information society, are being re-aligned with the leading role of the creative personality and the desire for self-realization and self-improvement, which drives the need to acquire new skills and knowledge. All this is reflected in the increasing consumption (and demand, respectively) of services. These new structural features of consumption have a stimulating effect on the production and supply and thus contribute

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² This refers to individual household consumption, which is different from total consumption. The latter covers individual household consumption and government consumption, which may be individual or collective.

significantly to structural change – to expand and increase the share of the services sector in the economy.

The development of consumption theory is due to the change of scientific paradigms during the various stages of the development of society. The need to systematize the accumulated knowledge and the presentation of alternative, largely complementary, methodological approaches examining consumption as an integral part of the overall structural change of household expenditures are increasing. In this regard, the aim of the article is to determine the driving forces behind the structural changes in household expenditures in Bulgaria. The object of the study is the structure of consumer spending in Bulgaria and the subject are its fundamental drivers. In order to achieve the aim of the study, it is necessary to present and understand the basic theoretical paradigms that determine the structure of consumer spending. A second task is to group the different product types of expenditures in the framework of the main three economic sectors – agriculture, industry and services. And lastly, an econometric approach has been implemented in order to determine the magnitude that fundamental factors have over the household expenditures structure. In addition, some thoughts about the relationship between consumer spending and structural transformation of Gross value added (GVA) are made. The methods used in the study are synthesis, deduction and induction, description, as well as econometric procedures.

2. Literature Review

The very first study of consumption preferences shows that as household disposable income increases, consumption patterns change and this accompanies the shift of consumption structure. On the basis of the Ernst Engel's law (Engel, 1857), the Engel's curves are also constructed, which graphically describe the relationship between the consumption of a particular type of good or service and wealth. They create the basis for determining the income elasticity of demand for different types of goods. This dependence shows that as the income increases, the structure of the goods sought by the consumer changes, which also implies a change in the production structure. Most studies use income as a measure of wealth, while consumption is usually represented by households expenditures, amount consumed or a relative share of the household budget.

After reaching a certain level of saturation, the increase of the costs for a particular good or service is less than the increase in income. Manufacturers of this product or service will redirect part of their resources to the production of another, where the preferences are not yet fully met. (Yoshikawa, 2002; Saviotti, Pyka, 2008) This will change the structure of investment, aggregate production and the difference in productivity between sectors, which in the next stage will transform the whole economy (Clark, 1957).

The increase in disposable income expands the consumer's choice by contributing to more goods being made available to him. For high-income households, the choice is much more diverse and depends on the tastes, social attitudes and consumer experience (Witt, 2001). The distribution of income between different social groups is important in shaping the structure of consumption. If increasing proportion of the population manages to meet a high level of saturation of particular preference, the income elasticity of demand will begin to decline and

the good or service that satisfies the need may turn from luxurious to normal, or necessary. Ivanova, T. (2015) confirms that there is a difference in marginal propensity to consume between low and high-income households in Bulgaria. The different elasticity and accessibility of consumption can be a turning point in the consumer spending structure.

Innovations, the introduction of new goods and services, also influence consumer choice. Buying innovative products is associated with a person's inner attitude towards the search for the new and the unknown, expressing creative thinking, a high-value system, rejection of accepted norms and a high image in society. Introducing a new product to the market requires additional marketing, advertising, branding, and so on. In the post-industrial society, consumption is not limited to the product itself, but covers a whole range of services that accompany it. In most cases, product innovation is associated with a higher quality of the product itself, and at high levels of income, consumer preferences are shifted from low to high-quality goods and services (Bils, Klenow, 2001). When income elasticity exceeds price elasticity in absolute terms, manufacturers are more inclined to focus their efforts on quality improvement rather than a price reduction. The reasons for the changes of consumption pattern have a microeconomic basis, which is why their research methodology should start from there.

William Baumol and William Bowen formulate the hypothesis of the so-called „cost disease”, at the heart of which is the different labour productivity across sectors (Baumol, 1967). The productivity gap is mainly explained by the peculiarities of the technological process, the lack of new technologies and the differences in the technological diffusion. According to W. Baumol, the different growth rates of the different sectors is due to the different speed at which the sectors introduce new technologies, which in turn leads to a decrease in the cost of production in the high-performing industries and a change in relative prices. Since the production of goods is capital intensive in nature and the production of services is labour-intensive, technological diffusion takes place faster in the branches of material production than in intangible production. New technologies create cost-cutting conditions, leading to price reductions. Such change is more difficult to occur in the services sector because of its labour-intensive nature. In response to this hypothesis, W. Baumol divides economic activities into two types, which he describes as technologically progressive and stagnant. According to him, the production of the technologically advanced activities prices is more prone to decline or increase at a slower pace compared to the product of other activities. The later are defined as stagnant activities, such as the face-to-face services, healthcare, education, cultural activities, etc.

The law of E. Engel and William Baumol's so-called “cost disease” have different views about the forces that drive the change in the consumer spending structure. Engel's law describes the change in consumption of food and non-food items as dependent on the change in income, i.e. the factors are mainly on the demand side. According to W. Baumol, the restructuring of household spending is driven by a shift in relative prices caused by the different speed of technology spread and productivity across sectors. Redistribution of costs leads to a change in the structure of consumption, i.e. in Baumol the change is mainly due to supply-side factors. Thus, the effect of the “cost disease” on consumer expenditures is, in fact, reflected in the substitution effect known in microeconomics.

Another significant difference between the two concepts lies in the different approach used. While Engel's law reflects the income elasticity of demand, the magnitude of Baumol's "cost disease" is determined by the price elasticity of demand. The prevailing effect is determined by the elasticity value in absolute terms. If the income elasticity has a higher value, the law of Engel determines the structural change and vice versa. Elasticity is at the heart of consumer preferences. Engel's law shows how, as income increases, households' relative spending on a particular good change, which is described by the different shape and slope of Engel's curves. The advantage of this approach is that it can be used in a wide range of countries with different levels of economic development and different preferences generated by socio-cultural and natural-geographical reasons. However, it is difficult to explain how, as income increases, a good or service can go from luxurious to normal, something that Baumol's concept is able to do. At the same time, however, the "cost disease" fails to explain why in low-technology countries, with low levels of foreign trade, low relative FDI, consumer preferences and household spending are still changing.

In a study on the nature of services, Robert Summers examine in detail the relationship between the increase of household incomes and changes in final demand structure, which is expressed in terms of final consumption expenditure (Summers, 1985). His analysis reveals the relationship between the structure of aggregate production and the way prices are reflected. When he is using current prices in the analysis, the link between income growth and production structure is obvious. The picture changes when internationally comparable prices are applied, expressed in terms of purchasing power standard (PPS). In this case, the slope of the regression line goes from positive to zero. Replacing current prices with internationally comparable ones eliminates the price difference between countries, which suggests that the quantities demanded are price independent. As a result, it is concluded that the share of services in final demand is independent of income. Therefore, the different price levels between developing and developed countries are the reason for the different structure of aggregate demand.

In another study, entitled *The Service Economy*, Victor Fuchs also analyze the consumption of goods and services by households (Fuchs, 1968). His results show that the elasticity of demand for services is slightly higher than that of demand for goods. The main contribution to the low elasticity of goods comes from food products. If they are excluded from the equation, the income elasticity of demand for goods is close to the one for services. A common characteristic of non-food products is that there is an upper bound on saturation, after which the increase in income does not have a significant effect on demand. One of the important findings of the analysis is that "income growth and the subsequent shift in demand have not been a major source of relative employment growth in services" (Fuchs, 1968, p. 3). The main reason for the change in the employment structure is the lagging productivity growth in services. At the same time, the volume of aggregate demand and employment in the tertiary sector proves to be more stable throughout the business cycle, which is explained by the inability of services to be stored for future periods.

The speed of economic transformation and household consumption are two economic characteristics that are not interdependent. Any change in income implies a change in the pattern of consumption, once a higher proportion of the population's needs are met. With increasing productivity in the individual sector/industry, the price of some goods becomes

relatively lower, making them accessible to the majority of consumers. During the competition for greater market share, manufacturers are focusing their efforts on introducing new products and investments in sectors where demand is growing (Gualerzi, 2012). In this way, the opportunities for consumption are widened, productivity in certain sectors is increased, the structure of intermediate consumption and supply is changed. Therefore, the increase in income is followed not only by changes in the distribution of expenditures, but also by the entire production structure of the economy.

3. Structure of Household Expenditures

The main reasons for the changes in the size and structure of households consumption can be summarized by the level of income, the level and structure of taxes, the magnitude of interest rates, which determines the credit activity and savings, the redistribution of government spending, transfers from abroad, the level of prices and consumer preferences. According to Keynesian theory, demand-side factors are crucial for shaping the product-market equilibrium. Fisher (1930) is among the first economists who supported the view that interest rates may have a significant impact on the restructuring of consumption over time. Damyanov, D. (2019) believes that households in Bulgaria have significant credit constraints as most of the loans are mortgages, which significantly hinders the change in the structure of consumption. These changes are of big importance in Bulgaria, like in many other countries, household's consumption forms a major part of GDP (Raleva, 2015).

In order to gain an overall picture of how the structure of consumer demand in Bulgaria has changed over the years, statistics on household final consumption expenditures by product groups according to the Classification of Individual Consumption by Purpose (COICOP)³, which covers the period 1995-2018, were first used. Eurostat data were used by regrouping to form three product groups that match the demand of households for the products of the three main economic sectors - agriculture, industry, and services.⁴ The reported expenditure on *food and non-alcoholic beverages, alcoholic beverages and tobacco* has been taken as a substitute indicator for the demand for agricultural products. Demand for end products from the activity of the industry sector includes household spending on *water, electricity and fuels, clothing and footwear, furnishings, household equipment and routine household maintenance, purchase of vehicles and operations of transport equipment*. The demand for services includes the costs for *healthcare, transport services, communications, housing and real estate rental, recreation and culture, education, restaurants and hotels, miscellaneous goods and services (including social protection, insurance, financial services)*. On the basis of this distribution are also calculated data on the relative share of household expenditure on

³ See International Labor Organization, Classification of Individual Consumption by Purpose (COICOP) – Extract, <https://www.ilo.org/public/english/bureau/stat/download/cpi/coicop.pdf>; United Nations, Classification of Individual Consumption by Purpose (COICOP) 2018, Statistical Papers, Series M Vol. 99, NY, https://unstats.un.org/unsd/classifications/business-trade/desc/COICOP_english/COICOP_2018_-_pre-edited_white_cover_version_-_2018-12-26.pdf.

⁴ The allocation made is entirely at the discretion of the author and aims at grouping COICOP spending categories in a manner that is as consistent as possible with the sectoral grouping that would be derived from the international classification of economic activities (NACE Rev.2).

the purchase of goods and services from the activities of each of the three sectors individually in the total expenditure of households. They are calculated in two ways – on the basis of data on total household expenditures at current prices, as well as at constant 2010 prices for selected years from 1995-2018 and presented in Table 1.

Table 1

Share of expenditure by economic sectors in the total consumer expenditure of households for selected years 1995-2018 (%)

Sector/year	1995	2001	2007	2013	2018
at current prices					
Agriculture	33.2	34.8	28.3	25.2	24.3
Industry	22.9	22.8	26.1	27.0	25.1
Services	43.9	42.4	45.6	47.8	50.6
at 2010 prices					
Agriculture	35.3	30.9	29.0	22.9	24.2
Industry	23.7	21.7	24.2	30.1	26.8
Services	41.0	47.4	46.8	47.0	48.9

Source: Own calculations based on Eurostat data, <http://appsso.eurostat.ec.europa.eu/nui/show.do>.

Over the period considered, the share of household spending on food and non-alcoholic beverages, alcoholic beverages and tobacco decreased significantly, with a more significant fall in real terms. At the same time, till 2012, households were allocating a growing proportion of their nominal income to acquiring products from industrial activity. In real terms, this growth is more pronounced and continues until 2013. The major contributor to the trend, both in real and nominal terms, is the increasing expenditures for cars and auto parts, home furnishings and home maintenance. The costs increase for water, electricity, and fuels are also important for the total nominal increase of expenditures. Since 2013, there has been a shift and real decrease in the share of costs for water, electricity, and fuels, as well as a lower share of costs for home furnishings and maintenance. The total nominal costs for furnishings, household equipment and routine household maintenance declined, but the expenditures for car and auto parts also remained lower than in 2012. As regards services, the tendency is to increase the share of costs for them, both at current and constant prices. The share of real costs for communications, leisure and cultural leisure has increased almost throughout the whole period 1996-2018. On the other hand, expenditures on education, health care, transport services, hotels and restaurants increase with a pace that is near or a little bit lower than the growth of total household expenditures.

The results in Table 1 indicate a restructuring of household spending, as the degree of change depends on the nature of the prices used. Nevertheless, households spend less and less of their disposable income on acquiring groceries, which is consistent with the hierarchy of needs hypothesis, and shifting consumption towards higher-level goods and services (Schettkat, Yocarini, 2006). The structure, as well as the absolute amount of funds allocated to different types of goods, could stimulate production in a particular industry or sector. On the next level, increased demand would stimulate investment activity in the industry/sector, leading to economies of scale, boosting competitiveness and increasing exports. Such a causal link would make a significant contribution to the economic development of the

country and increase the well-being of the population. Consumer spending patterns are changing as a result of rising income (real and nominal) and changing needs. The latter are also a result of the increase in income and the saturation of this part of the preferences having a lower character. The economic theory considers the restructuring of costs as a result of qualitative change in needs, which causes a series of causal phenomena, and their result is a qualitative change in aggregate demand and production structure.

4. Measurement of the Income and Price Elasticities

In order to analyze the driving forces of the consumer expenditures structural changes, the approaches and methods of other studies have been applied (Summers, 1985). They highlight the different income and price elasticities of demand between different groups of goods and services. The different income and price elasticity between goods and services would allow explaining why the structure of final consumption is changing. Elasticity analysis follows the methodology (Falvey, Gemmell, 1996) of previous studies that use the following equation:

$$\ln (RE_i) = \alpha_i + \beta_i \ln(RY) + \gamma_i \ln (Ps_i/Pgdp) + u_i \quad (1)$$

where RE is the real expenditures per capita for a particular commodity or service, RY is the real GDP per capita, Ps indicates the prices for the different goods or services, and $Pgdp$ refers to the GDP deflator.

The notation \ln is a natural logarithm, i denotes the different types of goods and services, α_i is a constant, with β_i and γ_i the regression coefficients of the independent variables are represented, and u_i is a random variable with a mathematical expectation of zero and variance σ^2 . Annual data are used according to the Classification of Individual Consumption by Purpose (COICOP) for the period 1995-2018, available from Eurostat. The real costs of households are calculated using constant 2010 prices, as GDP deflator with a base year 2010 is applied in the left and right-hand side of the equation. Some of the price indices are obtained as weighted values from the price indices of the relevant goods/services. Such are the Real estate rent price index that is calculated as a weighted average of Actual rentals for housing and Imputed rentals for housing price indices; the Water, electricity, gas and other fuels price index as a weighted average of Water supply and miscellaneous services relating to the dwelling, and Electricity, gas and other fuels price indices; the Vehicles and auto parts price index as a weighted average of Purchase of vehicles and Operation of personal transport equipment price indices. For these three groups, household’s consumption expenditures are obtained as the sum of expenditures of the constituent subgroups already indicated.

In equation (1) the ratio between the price index of a particular good or service and the GDP deflator on the right-hand side reflects the relative price increase for the respective group, with the aim of eliminating the effect of nominal wage increase and labour costs. From a purely technical point of view, prices tend to increase over time, i.e. exhibit a trend and are often integrated of order I(1). This may compromise the estimates of the elasticity coefficients. If the price index and the other variable on the right-hand side of the equation show a common trend, it may also lead to issues with multicollinearity. All these issues are solved by dividing the price index by GDP deflator, eliminating this way the trend problem.

Table 2
Relative price and total income elasticities of demand for goods and services, 1995-2018

	Coefficient of		Adj. R ² , F-criteria [in brackets]	LM Breusch-Godfrey test of 2nd degree for autocorrelation
	Total income elasticity (β_i)	Relative price elasticity (γ_i)		
Food and non-alcoholic beverages	0,400***	-0,956***	0,89 [95,197]	Obs*R ² =2,215 Prob.Chi-Square=0,3305
Alcoholic beverages and tobacco [§]	0,751***	-0,892***	0,81 [51,593]	Obs*R ² =15,335 Prob.Chi-Square=0,0005
Clothing and footwear	0,069	-1,903***	0,96 [254,706]	Obs*R ² =3,538 Prob.Chi-Square=0,1705
Furnishings, household equipment and routine household maintenance [§]	2,695***	-0,254	0,95 [229,835]	Obs*R ² =13,285 Prob.Chi-Square=0,0013
Vehicles and auto parts	1,994***	0,234	0,96 [304,171]	Obs*R ² =2,086 Prob.Chi-Square=0,3524
Water, electricity, gas and other fuels [§]	1,025***	-1,037***	0,90 [100,340]	Obs*R ² =8,469 Prob.Chi-Square=0,0145
Health	0,817***	-0,285***	0,56 [15,471]	Obs*R ² =0,261 Prob.Chi-Square=0,8775
Transport services [§]	0,250***	-0,100	0,17 [3,359]	Obs*R ² =13,670 Prob.Chi-Square=0,0011
Communications [§]	1,391***	-0,869***	0,97 [423,908]	Obs*R ² =8,965 Prob.Chi-Square=0,0113
Real estate rent [§]	0,656***	0,130	0,74 [33,551]	Obs*R ² =13,375 Prob.Chi-Square=0,0012
Recreation and culture [§]	2,242***	-0,540	0,96 [274,239]	Obs*R ² =8,254 Prob.Chi-Square=0,0161
Education	1,105***	-0,743***	0,78 [42,610]	Obs*R ² =4,764 Prob.Chi-Square=0,0924
Restaurants and hotels [§]	1,101***	-0,646***	0,68 [25,659]	Obs*R ² =7,292 Prob.Chi-Square=0,0261
Miscellaneous goods and services	1,994***	-1,489***	0,96 [280,213]	Obs*R ² =4,120 Prob.Chi-Square=0,1275

Notes: The coefficients denoted by *, **, *** are statistically significant at 10%, respectively; 5% and 1% risk of error.

§ indicates the presence of autocorrelation and/or heteroskedasticity. The values of Fisher's F-criterion are indicated in [].

Source: Own calculations based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_co3_p3&lang=en.

From a purely economic point of view, this method shows how the price of one group of goods or services changes compared to all the others. In this way, the familiar substitution effect is separated, which, as we know from the theory, is the pure substitution of a good/service with a cheaper alternative when the price of the former increases. As already mentioned in the previous part the substitution effect is in practice the response of households

to the “cost disease”. The real GDP per capita is used as a proxy⁵ indicator for household’s income per capita as the data series for the latter are currently limited to 2004 while the accuracy of estimates requires longer time period. As the equation (1) is in logarithmic form the regression coefficients should be interpreted as elasticities (Petkov, 2010, p. 133). Thus the first coefficient β_1 measures the elasticity of household expenditures to the changes in real GDP per capita. As GDP represents the total income in the economy the according elasticity coefficient will be named shortly total income elasticity. The second regressor shows the change in household expenditures when the price of a good/service changes relative to the prices of all others, so that it can be called the coefficient of relative price elasticity. Table 2 presents the results of the applied equation (1), which reflects both the total income and the relative price elasticity of demand.

Before interpreting the coefficient values obtained, it is necessary to diagnose the models and their corresponding coefficients. First, one can see the results of the LM Breusch-Godfrey test for autocorrelation presented in the last column of the table above. It is obvious that some of the equations do have problems with autocorrelation. Second, the equations presented are tested for a structural break in the intercept. As a result of the structural break, the regression coefficients can become biased and not efficient as the standard errors are not properly estimated. The later have a negative effect on another test for autocorrelation, heteroscedasticity, etc. However, there are two well-known problems with structural break estimation. The first one is the difficulty of differentiating data that is subject to a structural break from data from having data with a unit root. The second one is that although break locations in data can be estimated consistently, there is no efficiency condition for the limiting distribution of the estimates. As there can be more than one break in the data, the estimators could be divided into single and multiple break estimators. Actually, it is theoretically proven that consistency for the break date estimates is satisfied for single break estimators even if more than one break in the data exist (Bai, 1997). That is why a Quandt-Andrews breakpoint test is applied to test for a structural break in the intercept. The testing sample is trimmed in the beginning and in the end by 7.5% on each side, or by 15% in total. The null hypothesis of Quandt-Andrews method is for no breakpoint so the rejection of the hypothesis means that there is deflection in the year in question. The results are shown in the Appendix, Table 1. The test shows that in only two of the equations, there is no structural break, they represent the household expenditures for the most basic needs of food, non-alcoholic beverages, and healthcare. For the rest of the equations, the breakpoint does exist as the year of the break is presented in the second column of the table.

To solve the issue with the structural break, one should add a dummy variable for the years since the date of the break. Thus equation (1) takes the following form.

$$\ln (RE_i) = \alpha_i + \beta_i \ln(RY) + \gamma_i \ln (Ps_i/Pgdp) + \delta_i \text{DummyXXXX} + u_i \quad (2)$$

⁵ A possible proxy can be the Gross national income and Gross national disposable income but they are expressed in current prices and the choice of appropriate deflator is questionable as the factor income and transfers from/to abroad are in nominal terms. The Compensations per employee are not a good proxy as well considering they do not include the income from rents, equities, pensions, self-employment, ect.

Where *DummyXXXX* is a variable that takes one for the year since the break appears, while *i* refer to the group of household expenditures. It should also be noted that the test may be misleading in small samples due to the 15% time series limiting. This effect occurs at the household expenditures equations for clothing and footwear, as well as water, electricity, gas and other fuels. They get better results if a dummy variable is added in the year following the structural break indicated by the Quandt-Andrews method. The results based on equation (2) are presented on Table 3.

Table 3
Relative price and total income elasticities of demand for goods and services
with an added dummy variable, 1995-2018

	Coefficient of		Dummy (δ_i)	Adj. R2, F- criteria (in brackets)
	Total income elasticity (β_i)	Relative price elasticity (γ_i)		
Food & non-alcoholic beverages	0,400***	-0,956***		0,89 [95,197]
Alcoholic beverages and tobacco	1,147***	-0,808***	-0,378***	0,97 [220,702]
Clothing and footwear	0,458**	-1,723***	-0,176***	0,97 [264,601]
Furnishings, household equipment and routine household maintenance	2,525***	-0,636**	-0,459***	0,98 [389,492]
Vehicles and auto parts	1,396***	-0,175	0,320***	0,98 [457,692]
Water, electricity, gas and other fuels	0,797***	-1,034***	0,201***	0,93 [105,404]
Health	0,817***	-0,285***		0,56 [15,471]
Transport services	0,245***	-0,925***	0,422***	0,64 [14,425]
Communications	1,421***	-1,036***	-0,249***	0,99 [565,154]
Real estate rent	0,797***	0,037	-0,217	0,87 [54,560]
Recreation and culture	1,227***	-0,766***	0,528***	0,99 [654,861]
Education	1,167***	-0,773***	-0,311***	0,85 [44,317]
Restaurants and hotels	1,509***	-0,602***	-0,314***	0,82 [34,809]
Miscellaneous goods and services	2,282***	-1,303***	-0,205***	0,97 [261,250]

Notes: The coefficients denoted by *, **, *** are statistically significant at 10%, respectively; 5% and 1% risk of error.

Source: Own calculations based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_co3_p3&lang=en

A second pair of tests was made on each of the models for the presence of heteroskedasticity – using the Breush-Pagan-Godfrey test, as well as for the presence of autocorrelation in residuals – using the Breusch-Godfrey LM-test. The null hypothesis of the test implies a lack of heteroscedasticity or autocorrelation, accordingly. According to the results in Table 2 in the Appendix, it was found that in none of the cases, autocorrelation can be confirmed at 5% significance level after the dummy variable was added. In only one case (the real estate rent equation), the presence of heteroscedasticity can't be excluded. Thus, in this case Huber-White coefficient covariance method was applied. In practice, this method recalculates the standard errors of the regression coefficients, which makes the estimates of the t and F-criteria reliable and aims to clear the residual heteroskedasticity effect.

The results obtained from equation (2) generally confirm the expectation of the negative relative price elasticity of demand and supports the results of Radilov and Chernevski (2016). In some cases, it even exceeds one, which means that a small change in prices would have a significant effect on demand. These are the groups of various goods and services like clothing and footwear, water, electricity, gas and other fuels, communications, miscellaneous goods and services. For other groups such as food and non-alcoholic beverages; transport services, the relative price elasticity is close to one.

The demand for food and non-alcoholic beverages is more sensitive to changes in prices compared to changes in income. The results also show that as household income increases, household spending on foodstuffs increases at a slower pace than the rate of income itself, i.e. households aim initially to meet their lower preferences, which includes meeting the needs for living. Once they are met, any further increase in income is associated with a greater increase in costs for other goods and services, respectively with a relative reduction in the cost of food and non-alcoholic beverages. An important feature is the high negative value of relative price elasticity, which in absolute value is higher than the total income per capita elasticity and shows that the demand for food will decrease with the increase of prices. This would cause a decline in agricultural demand and could subsequently be the cause of a decline in production. A similar logic is valid for the demand for clothing and footwear, water, electricity and fuels, transport services.

For other commodities such as alcoholic beverages and tobacco; home furnishings and home maintenance, the effect of rising income outweighs that of price changes. In particular, the cost of home furnishing and housekeeping increases more than the increase in income itself, i.e. the elasticity of demand relative to the change in income is much above one, which has a greater positive effect on industrial production than the increase in income itself. Costs for vehicles and auto parts are highly dependent on changes in income, but the validity of the relative price elasticity coefficient cannot be confirmed. Overall, the demand for goods is positively resilient to changes in income but negatively resilient to changes in price. In three of the six commodity groups, the absolute value of relative price elasticity is higher than the total income elasticity.

Most types of services (except healthcare, transport and real estate rent) have a high total income elasticity of demand, i.e. above one, which is consistent with the results of other similar studies. The high positive total income elasticity indicates the tendency of the population to meet their higher level preferences. Services are generally more sensitive to changes in income compared to changes in prices. This is somewhat in line with expectations

given the understanding that most services are positioned higher in the hierarchy of needs. Expenditures for healthcare services, transport and real estate rent have total income per capita elasticity below one, which confirms their place of necessities in the hierarchy of needs. At the same time, the groups of communication services and the mixed category of miscellaneous goods and services, which mainly include services, are characterized by a relative price elasticity above one. Overall, the monitoring of services is consistent with the individual subcategories, i.e. the sensitivity of their demand to income is high (above one) and to price is low (below one).

Based on the data presented and the methodology applied, it can be concluded that as household income increases, their expenditures for services and some types of goods increase to a greater extent compared to the increase in income itself. At the same time, the average relative price elasticity of demand for services is lower than one and the average relative price elasticity of goods is approximately one. This means that an equivalent change in the price level in all groups will have a greater impact on the overall demand for goods. In the context of structural change of households expenditures, the elasticities show that an increase in income stimulates demand for services to a greater extent, which translates into a greater incentive to increase their production and causes a structural transformation of the economy towards an increase in the share of the sector services. The relative price elasticity is higher compared to total income elasticity in absolute value in three of the six types of goods. At the same time, this phenomenon is observed only in transport services out of the eight categories of services.

This pattern is important for producers in case of increasing the average wage, since the individual producer is not able to determine its value independently. Let us assume that wages increase by 1%, which result in an equivalent 1% increase in the prices of all goods and services as a result of increased costs. Under these conditions, demand will decrease in sectors where relative price elasticity is higher in absolute value compared to the total income per capita elasticity, since the effect of price increase will be greater than the effect of income. This pattern is most unfavourable in the demand for transport services and clothing and footwear, where the absolute value of total income-to- relative price elasticity ratio is 0.266 and 0.265, accordingly. This means that a 1% increase in income (or labour costs, respectively) can result in no more than a 0.265% or 0.266% increase in the price of the final product in order to keep the amount of demand unchanged. Any attempt by companies to increase their product/services prices more than this (i.e. 0.26%) would cause a contraction in demand in the sector. This dependence limits the flexibility of production and it could become a reason for slower growth and development of such sectors. Similar patterns can be seen in the demand for food & non-alcoholic beverages, where the absolute value of total income-to-relative price elasticity is 0.418, and in the case of water, electricity and fuels with a ratio of 0.771.

5. Contributions of Income and Prices To the Growth of Household Expenditures

In order to measure the contributions to the growth of household expenditures, one can aggregate the effects of income and price changes on demand for the three main groups – agriculture, industry and services. The aggregation is made on the basis of the already applied and presented method that was used to compile the results shown in Table 1. In order to measure the contributions of total income per capita and relative price changes on the demand for different groups of goods and services, the following model (3) was estimated.

$$\Delta \ln (RE_i) = \alpha_0 + \beta_i \Delta \ln (RY) + \gamma_i \Delta \ln (P_{s_i}/P_{gdp}) + u_i \quad (3)$$

The abbreviations of the variables follow those in equation (1), the only difference is that the first differences of the logarithms Δ are used. The results for the respective regression coefficients are presented in Table 4 together with the LM Breusch-Godfrey test for serial autocorrelation, while the results from Breusch-Pagan-Godfrey test for homoscedasticity can be found in the Appendix, Table 3. One can see that the results from the previous equations and equation (3) do not differ much. It was only the estimates for food and non-alcoholic beverages that revealed the presence of heteroskedasticity, which is solved by applying the HAC (Newey-West) method for re-evaluation of the t-statistics of the coefficients (Verbeek, 2004, p. 111). The same procedure was followed in order to re-estimate the t-statistics in the equation for Health as the results showed some evidence of autocorrelation. However, the autocorrelation itself shouldn’t have a significant impact on the coefficient estimates, especially after the first differences are already applied (Petkov, 2010, p. 333).

In order to estimate the contributions of each component to the household’s expenditures growth, first we sum the changes of household expenditures for each subgroup in order to get the change for the main group. For example, to get the growth of consumer expenditures for agricultural products, we sum up the growth of expenditures for food and non-alcoholic beverages with alcoholic beverages and tobacco. This way, the dynamics of consumer spending for each of the three main groups are represented by the sum of its constituent subgroups. The right-hand side of the formula follows a similar logic. The contribution of the change in total income per capita and relative prices are obtained by multiplying them by the corresponding coefficient from Table 4 for the subgroup. However, it should be borne in mind that adjusted R^2 is below one, which means that some of the changes in consumer spendings remain unexplained.

Table 4
Coefficients of price and income growth to demand growth for goods and services, 1995-2018

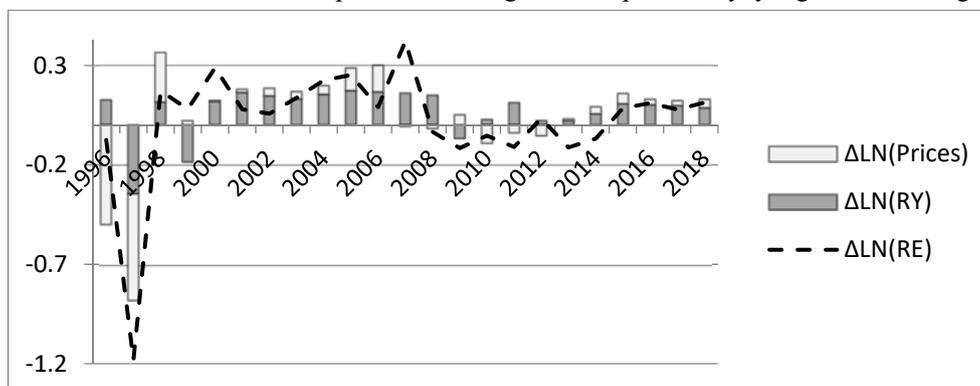
	Coefficient of		Adj. R ²	LM Breusch-Godfrey test of 2nd degree for autocorrelation
	Total income growth (β_i)	Relative price growth (γ_i)		
Food and non-alcoholic beverages	1,235**	-0,786***	0,71	Obs*R ² =3,319 Prob.Chi-Square=0,1902
Alcoholic beverages and tobacco	1,078***	-0,586***	0,60	Obs*R ² =1,999 Prob.Chi-Square=0,5488
Clothing and footwear	0,940**	-0,977*	0,48	Obs*R ² =2,195 Prob.Chi-Square=0,3337
Furnishings, household equipment and routine household maintenance	1,602***	-0,585*	0,39	Obs*R ² =0,350 Prob.Chi-Square=0,8393
Vehicles and auto parts	1,216***	-0,572**	0,38	Obs*R ² =0,778 Prob.Chi-Square=0,6779
Water, electricity, gas and other fuels	0,619*	-1,071***	0,75	Obs*R ² =0,956 Prob.Chi-Square=0,6199
Health	1,281***	-0,490**	0,34	Obs*R ² =6,292 Prob.Chi-Square=0,0430
Transport services ^s	0,612**	-0,257	0,19	Obs*R ² =4,849 Prob.Chi-Square=0,0885
Communications	1,067***	-1,043***	0,48	Obs*R ² =2,824 Prob.Chi-Square=0,2437
Real estate rent	0,795***	0,092	0,35	Obs*R ² =3,259 Prob.Chi-Square=0,1960
Recreation and culture	1,499***	-0,961**	0,17	Obs*R ² =0,505 Prob.Chi-Square=0,7770
Education	1,263***	-1,099***	0,81	Obs*R ² =0,858 Prob.Chi-Square=0,6511
Restaurants and hotels	1,063**	-1,024***	0,43	Obs*R ² =2,774 Prob.Chi-Square=0,2498
Miscellaneous goods and services	1,543***	-1,282***	0,69	Obs*R ² =1,439 Prob.Chi-Square=0,4869

Notes: The coefficients denoted by *, **, *** are statistically significant at 10%, respectively; 5% and 1% risk of error.

Source: Own calculations based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_co3_p3&lang=en.

Household expenditures on agricultural products are the first group represented.

Figure 1
Contribution to household expenditures for agricultural products, yoy logarithmic change



Source: Own calculations based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_co3_p3&lang=en.

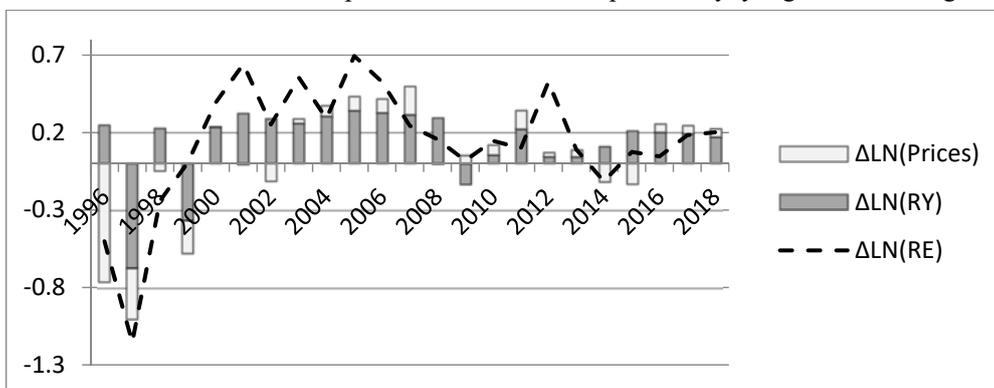
It can be seen from the graph, the contribution of income to the increase in expenditures for agricultural products has been relatively stable over the years. Even in times of crisis and weak economic activity, such as in 1997 and 2009, the magnitude of the negative contribution of this component is not particularly large. This confirms the place of these goods in the hierarchy of needs as essential goods. On the other hand, the impact of prices on their demand is not so clear. For example, in the period of currency shocks in 1996-97, the relative increase in prices of agricultural products compared to the prices of other goods and services had a devastating effect on consumer demand. The same applies for the period 2010-2012, but with a much smaller magnitude. During periods of economic upturn, the relative price level of these goods is stable and even declining compared to the rest, which implies a positive price contribution. In the period 2000-2006, the pre-accession processes accompanying the country’s membership in the EU, the increasing openness of the country and international competition are likely to have a positive effect.

Next, the contributing factors of overall expenditure dynamics for clothing and footwear, water, electricity and fuels, furnishing, household equipment and maintenance, vehicles are analyzed.

In fact, the contribution of prices to the demand for industrial products does not differ significantly from that of agricultural demand in terms of both dynamics and magnitude. The main difference is rooted in the effect of rising income. Any increase in income stimulates the demand for the products of the industry by far more than it applies to agricultural commodities. Improving consumer well-being leads to a shift in demand for goods whose preference has been less met so far. This is in full compliance with the Engel’s law.

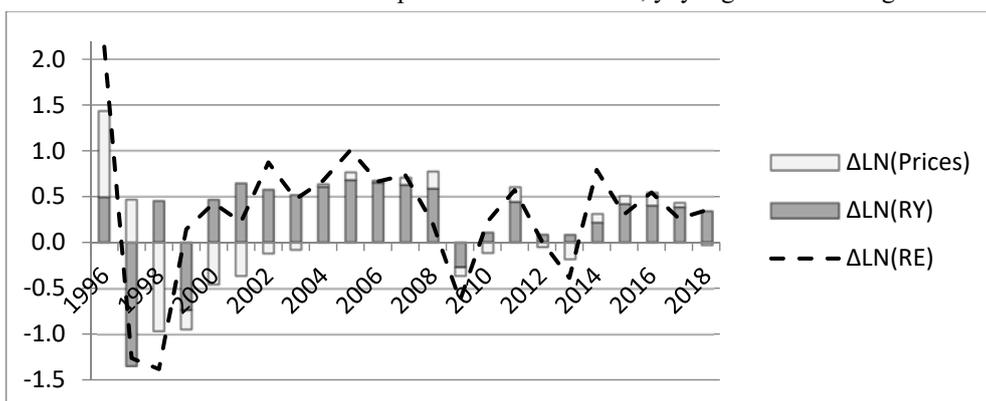
Finally, we pay attention to the fundamental factors driving the demand for services.

Figure 2
Contribution to household expenditures for industrial products, yoy logarithmic change



Source: Own calculations based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_co3_p3&lang=en.

Figure 3
Contribution to household expenditures for services, yoy logarithmic change⁶



Source: Own calculations based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_co3_p3&lang=en.

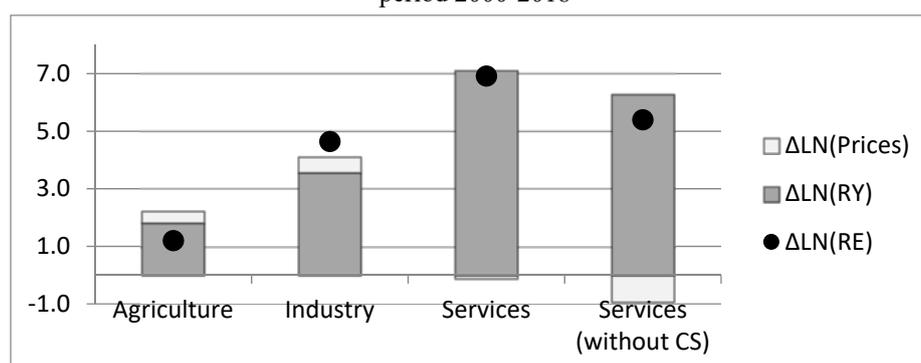
The volatile nature of household expenditures for services is the first thing one can see. The alternation of upswings and downswings is much more common compared to the other two groups. In a favourable economic environment, income growth has a significantly higher contribution than in the case of commodities. The opposite is observed in times of income volatility, when this part of household expenditures is most significantly affected. This is another confirmation of Engel's law since most services are at a higher level in the hierarchy

⁶ The figure is limited in relation to the vertical line in order to provide better comparability with the other two graphs. This limitation was imposed due to the high growth in services expenditures in 1996. However, much of it cannot be explained by the fundamental drivers this year.

of needs, their demand is very susceptible to changes in income. At the same time, the prices of most services prove to be quite flexible during a currency crisis like the one in 1996-97. In order to respond to the decline in demand, service providers are able to reduce prices more easily. Why is this happening? The production of goods is highly dependent on imports, which appreciates significantly in the context of currency depreciation. This relationship is not so strong in the case of services. Due to their labour-intensive nature, services prices are much more dependent on wages, i.e. internal economic factors. For the rest of the period, prices often have a negative contribution.

Obviously, the period of weak economic activity and the volatile exchange rate has a very different effect on the demand for individual groups of goods and services. This, in fact, makes it difficult to properly assess the Baumol’s “cost disease”. To correct this shortcoming, we will use the period 2000-2018. Again, we use Formula 3, this time calculating the differences over the entire period, i.e. the end date versus the starting date.

Figure 4
Contribution to household expenditures by sector of production, logarithmic change for the period 2000-2018



Source: Own calculations based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_co3_p3&lang=en.

Figure 4 confirms Engel’s law, showing that as income increases consumer spending reorients towards higher-level goods/services in the hierarchy of needs. A more interesting observation is shown after excluding the subgroup of communication services (CS) from all services. W. Baumol himself reformulated and refined his theory by rejecting the notion of all services as stagnant (Baumol, et al., 1985). On the contrary, some of the services are among the fastest-growing and most progressive activities. Another important point is the changed image of slow-developing activities, which can be progressive in the short term due to the introduction of new technologies. A similar case is with communication services, where improvements in information and communication technologies and the regulatory

framework⁷ cause a significant fall in prices after 2008. However, this partly compromises the effect of Baumol's "cost disease" on services. If the communication services are excluded, the validity of his hypothesis on the services can be confirmed. So, due to the slow increase in productivity in services, their prices are relatively higher than goods, which limit their demand growth. The opposite is true for different kinds of goods, especially industrial ones. As Bulgaria joins the EU, international competition increases and some of the commodity prices start to increase by a slower pace or even to decrease compared to the level of inflation. That actually leads to a positive contribution of price to the growth of household expenditures for agriculture and industry products.

6. Conclusion

The current study examined the change in the structure of household expenditures, focusing on the effects of the changes in prices and income. The laws of Engel and Baumol were largely followed, according to the former, as wealth is growing, the structure of consumption changed, while the latter focus on productivity and relative prices. In fact, both laws act simultaneously, exerting different degree and magnitude on the individual groups of goods and services. The overall conclusion of the analysis is that the increase in income has a more significant effect on the structure of household expenditures compared to the effect of changes in prices. The Engel effect outweighs that of Baumol's "cost disease" because the country is still developing and incomes are growing at a significant rate. The low level of saturation of needs also implies a faster change in the structure of consumption as income increases. Once the needs of inferior goods are satisfied, consumption is directed to those of higher levels in the hierarchy of needs.

Based on the analysis performed, some other valuable observations can be added. For example, for some types of goods such as food and non-alcoholic beverages, clothing and footwear, water, electricity and fuels, the relative price elasticity of demand is higher in absolute value compared to the total income elasticity. This puts pressure on the production of these types of goods, since in the case of rising labour costs (respectively wages) an equivalent price increase would limit their demand. Another interesting observation is that the prices of services are proving to be quite flexible in times of economic crisis. This is especially true for periods of exchange rate volatility, as most services are non-tradable and weakly dependent on imports. The question arises as to what the effect of monetary policy would be on the demand for goods and services. It is likely that a policy that leads to a depreciation of the currency would have a more limited effect on the demand for services and a greater effect on the demand for goods. On the other hand, an increase in money supply will lead to an overall increase in prices and a greater effect on goods/services with relative price elasticity close to one. For some products, highly sensitive to price changes and with low total income elasticity, the effect will be a decreasing demand. These dependencies merit

⁷ By virtue of Decision, No 2/03.01.2008 and Decision No 1962/11.09.2008 of Communications Regulation Commission of Bulgaria, a Directive 2002/21/EC of the European Parliament and of the Council is being implemented in practice.

more attention and in-depth analysis that can provide a powerful framework for monetary policy effectiveness in a different environments.

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APPENDIX

Table 1

Results of Quandt-Andrews breakpoint test with 15% trimming for equation (1)

	Year	Maximum LR F-statistic [p-values in brackets]	Maximum Wald F-statistic [p-values in brackets]
Food and non-alcoholic beverages	2006	4.030 [0.370]	4.030 [0.370]
Alcoholic beverages and tobacco	2014	95.345 [0.000]	95.345 [0.000]
Clothing and footwear	2009	130.18 [0.006]	130.18 [0.006]
Furnishings, household equipment and routine household maintenance	2014	31.923 [0.000]	31.923 [0.000]
Vehicles and auto parts	2002	26.484 [0.000]	26.484 [0.000]
Water, electricity, gas and other fuels	2012	17.219 [0.000]	17.219 [0.000]
Health	2006	6.344 [0.1383]	6.344 [0.1383]
Transport services	2000	27.939 [0.000]	27.939 [0.000]
Communications	2015	21.464 [0.000]	21.464 [0.000]
Real estate rent	1999	23.782 [0.000]	23.782 [0.000]
Recreation and culture	2004	53.183 [0.000]	53.183 [0.000]
Education	2006	10.238 [0.0236]	10.238 [0.0236]
Restaurants and hotels	2007	16.132 [0.002]	0,68 [25,659]
Miscellaneous goods and services	2009	9.030 [0.041]	9.030 [0.041]

Source: Own calculations based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_co3_p3&lang=en.

Table 2

Results of autocorrelation and heteroscedasticity tests after adding a dummy variable in equation (2)

	LM Breusch-Godfrey test of 2nd degree for autocorrelation	Breusch-Pagan-Godfrey test for homoscedasticity
Food & non-alcoholic beverages	Obs*R ² =2,215 Prob.Chi-Square=0,3305	Obs*R ² =5,063 Prob.Chi-Square=0,0796
Alcoholic beverages and tobacco	Obs*R ² =0,004 Prob.Chi-Square=0,9982	Obs*R ² =4,536 Prob.Chi-Square=0,2091
Clothing and footwear	Obs*R ² =3,086 Prob.Chi-Square=0,2137	Obs*R ² =6,058 Prob.Chi-Square=0,1088
Furnishings, household equipment and routine household maintenance	Obs*R ² =4,946 Prob.Chi-Square=0,0843	Obs*R ² =2,384 Prob.Chi-Square=0,4967
Vehicles and auto parts	Obs*R ² =1,547 Prob.Chi-Square=0,4612	Obs*R ² =2,066 Prob.Chi-Square=0,5588
Water, electricity, gas and other fuels	Obs*R ² =2,0746 Prob.Chi-Square=0,3544	Obs*R ² =0,870 Prob.Chi-Square=0,8326
Health	Obs*R ² =0,261 Prob.Chi-Square=0,8775	Obs*R ² =3,134 Prob.Chi-Square=0,2087
Transport services	Obs*R ² =0,096 Prob.Chi-Square=0,9530	Obs*R ² =3,151 Prob.Chi-Square=0,3689
Communications	Obs*R ² =1,316 Prob.Chi-Square=0,5178	Obs*R ² =3,383 Prob.Chi-Square=0,3363
Real estate rent	Obs*R ² =4,105 Prob.Chi-Square=0,1284	Obs*R ² =11,221 Prob.Chi-Square=0,0106
Education	Obs*R ² =3,611 Prob.Chi-Square=0,1644	Obs*R ² =5,156 Prob.Chi-Square=0,1607
Recreation and culture	Obs*R ² =0,634 Prob.Chi-Square=0,7284	Obs*R ² =6,593 Prob.Chi-Square=0,0861
Restaurants and hotels	Obs*R ² =1,265 Prob.Chi-Square=0,5313	Obs*R ² =2,865 Prob.Chi-Square=0,4129
Miscellaneous goods and services	Obs*R ² =0,491 Prob.Chi-Square=0,7822	Obs*R ² =4,607 Prob.Chi-Square=0,2029

Source: Own calculations based on Eurostat data, http://appsso.eurostat.ec.europa.eu/mui/show.do?dataset=nama_10_co3_p3&lang=en.

Table 3

Heteroscedasticity test results for equation (3)

	Breush-Pagan-Godfrey test for homoscedasticity
Food & non-alcoholic beverages	Obs*R ² =9,840 Prob.Chi-Square=0,0073
Alcoholic beverages and tobacco	Obs*R ² =0,036 Prob.Chi-Square=0,9821
Clothing and footwear	Obs*R ² =0,121 Prob.Chi-Square=0,9412
Furnishings, household equipment and routine household maintenance	Obs*R ² =0,003 Prob.Chi-Square=0,9984
Vehicles and auto parts	Obs*R ² =0,673 Prob.Chi-Square=0,7142
Water, electricity, gas and other fuels	Obs*R ² =0,869 Prob.Chi-Square=0,6475
Health	Obs*R ² =2,170 Prob.Chi-Square=0,5379
Transport services	Obs*R ² =1,998 Prob.Chi-Square=0,3682
Communications	Obs*R ² =0,177 Prob.Chi-Square=0,9155
Real estate rent	Obs*R ² =0,511 Prob.Chi-Square=0,7747
Education	Obs*R ² =0,305 Prob.Chi-Square=0,8583
Recreation and culture	Obs*R ² =0,152 Prob.Chi-Square=0,9269
Restaurants and hotels	Obs*R ² =1,040 Prob.Chi-Square=0,5945
Miscellaneous goods and services	Obs*R ² =1,010 Prob.Chi-Square=0,6035

Source: Own calculations based on Eurostat data, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_10_co3_p3&lang=en.