



**MIXED SIGNALS FOR FOOD CONSUMPTION IN BULGARIA
FOR THE PROGRAMMING PERIOD: 2014-2020
(AN ATTEMPT FOR APPLICATION
OF THE PRICE ELASTICITY OF DEMAND CONCEPT)**

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Abstract: This paper illustrates behavior of elasticities of demand for food commodities in Bulgaria for the 7-year EU programming period: 2014 – 2020. More specifically, the paper investigates how price elasticity of demand (PED) for food commodities oscillate for food – generally considered “normal” and “inferior/staple”. Due to the large dataset of food commodities and specifics of the panel data computations, the paper is centered upon primarily on computing the own-price elasticity of demand (OPED) of 78 foods. The OPED showed that food items in the panel data demonstrated various price elasticities along with price inelastic behaviors for the investigated period. The study finds that for some food commodities the own-price elasticities of demand are normal food items, while others are considered staple food items. All computations are based on official data, published by the National Statistical Institute of Bulgaria.

JEL Classification: D12

Introduction

This paper investigates the elasticities of 78 food commodities in Bulgaria, based on their average prices for an observed period of 7 consecutive years. This period coincides with the EU’s programming period 2014 – 2020, in order to utilize the data results for analytical and comparative purposes for consumption of foods in Bulgaria. Computations are based on statistically reported data by the National Statistical Institute (NSI) of Bulgaria on an annual basis. Theoretically speaking, estimation of food price elasticities are preferred to derivatives in this paper, as elasticities are unitless and may be employed to better explain consumer behavior preferences for food and marketing patterns of consumers.

Methodology and Research Model

Theoretically speaking, PED measures how demand of goods responds to a given change in price. In this case, PED will demonstrate how changes of the prices of food commodities will impact their demand. Concretely, OPED is utilized to compute values of elasticities for each of the 78 food items, statistically observed in the programming period 2014–2020. OPED for each and every food item is the ration between the percentage change in quantity of food demanded (dependent variable) and percentage change of the price of that very same food commodity.

The rule of the thumb is that the greater the food price elasticity (independent variable), the more sensitive is demand for this specific food (dependent variable) to price changes. And vice versa, price inelastic behavior is observed, when there is less responsiveness to changes of the price.

Also, when OPED for a food commodity is high – then the scale effect is observed at the market. This stands to mean that when the demand for food is elastic – an increase in price of the food commod-

ity will bring greater change in the quantity of the food demanded; and this food commodity shall be taken for “normal good” (positive elasticity). Other food commodities shall behave as “inferior goods”, called also “staple foods”: when the prices go up and their elasticities get negative values, and then OPED gets inelastic (negative elasticity), respectively.

To circumvent any economic ambiguity, which may arise – it is worth clarifying that professionally speaking, the price elasticity demand function may also be called either ordinary demand function, or uncompensated demand function, or Marshallian demand function (after Alfred Marshall (Marshall 1890) and compensated demand function, or Hicksian demand function (Silberberg 2008). And to differentiate between the two – it is imperative to underline that in the Marshallian demand function the income variable (independent variable) shall be held constant and it has to be solved as an utility maximization problem, while in the Hicksian demand function – the utility variable (independent variable) shall be held constant and it has to be solved as an expenditure minimization problem. However, the datasets available for Bulgaria for the investigated period do not provide enough figures to check for reliability of income sets and utility sets against the changes in prices in the investigated 78 food commodities, in order to compose robust functions to finely model the food consumption behavior in the country (NSI Data, CPI). This is one of the serious limitations of the paper and additional researches are needed.

The other main challenge is that food price inflation for EU comparative purposes is measured as stipulated by Regulation (EU) 2016/792 (ECOICOP Classification). It must also be clarified that the national Consumer Price Index /CPI/ of Bulgaria differentiates for two consumer baskets: “the regular” consumer basket, which observes a very high number of consumer items (a bundle of 846 goods and services with approximately 41’000 planned observations per month for the statistical 2022), and “the small” consumer basket /Price Indices of Small Consumer Basket, PISCB/ of 100 most needed goods and services to live (NSI Annual Data), which are taken to be staple goods, and mainly staple foods. It is also of high importance to stress upon the fact that according to published official information by the National Statistical Institute of Bulgaria the data for CPI, HICP, and PISB series are revisable under new EU stipulations of July, 2020, which impose some technical notes and methodological specification in compliance to the above mentioned Regulation (EU) 2016/792 (Ibid. DRP).

Having into consideration all these technical specifics, this paper thus is oriented towards practical aspects of elasticities and their meaningful comprehension.

The Data and Results

The standard data panels for observing prices of food commodities in Bulgaria may vary from year to year, in accordance to consumption patterns, methodological purposes, and technical necessities. For example, the planned bundle of food commodities, along with the alcohol drinks and tobacco products, which are to be consumed for 2022 is set at 15’681 goods. This food basket is dynamic throughout the years, in contrast to the PISCB, which is deemed to be stationary at 100 most needed goods and services for Bulgarians to live. This bundle of goods is utilized to compute the existence minimum in the country. Hence, from methodological point of view, it is important to know which food commodities shall be considered “normal foods”, and which shall be considered “inferior/staple foods”. Formally, there shall be a consistent bundle of goods throughout the investigated period of years to analyze whether a good is normal or inferior and to track consumer behavior.

In Bulgaria, for the years observed – the total CPI oscillates from minus 1,4% in 2014 to 3,1% in 2019 in its peak, as illustrated by Table-1. Prices of food commodities also greatly oscillate, hinting for significant volatility in prices. Thus, it is questionable to dive into the problem and investigate which food commodities are elastic or highly elastic, and which demonstrated inelastic behavior.

Table 1. Consumer Price Index /CPI/: 2014–2020

Year	2014	2015	2016	2017	2018	2019	2020
Total CPI (in %)	-1.4	-0.1	-0.8	2.1	2.8	3.1	1.7
Food and Non-Alcoholic Beverages (in %)	-1.0	0.3	-0.2	4.0	2.2	5.2	5.4
Alcohol Drinks and Tobacco Products (in %)	1.1	0.8	2.0	1.5	3.4	2.2	1.6

Source: Adapted Table (Ibid., CPI)

Delving further into the problem, it is reasonable to assume that a stock bundle of more than 15 000 food commodities shall demonstrate various price volatilities in the years, and this would impact in different extents the quantities consumed. However, the general disaggregation of food commodities for the observed period of 7 years goes to 40 broad categories of food and beverages, which demonstrate various perspectives. For example, as it is demonstrated in Table-2 – in 2014 consumption of bread and pasta products diminish from 93,2 kilograms per capita to 80,4 kg., while the flour increases from 8,9 kg. to 9,3 kg.; other food commodities are presented in Table-2.

Once having familiarized with the dataset for the investigated period, it gets clear that general CPI for food groups /Table-1/ and statistics of quantities consumed in the years /Table-2/ do not bring enough valuable and practical information to distinguish what shall be considered “normal food” or “inferior food” for the Bulgarian consumer, in compliance to the standard data sets reported. Thus, the data panel shall be enlarged, in order for demand function to be thoroughly investigated.

Table 2. Bulgarian Household Consumption of Main Food Commodities per capita (2014–2020)

	Foods and beverages	2014	2015	2016	2017	2018	2019	2020
1	Bread and pasta products – kg	93.2	89.5	88.0	87.1	85.3	82.4	80.4
2	Flour – kg	8.9	8.7	8.9	8.7	8.6	8.4	9.3
3	Rice – kg	6.4	6.0	6.1	5.9	5.8	5.7	6.0
4	Other cereals – kg	0.5	0.6	0.5	0.6	0.6	0.6	0.6
5	Other bakery products – kg	6.1	6.0	5.9	6.1	6.0	6.0	6.1
6	Meat – kg	32.5	32.6	32.5	32.8	34.3	35.7	36.1
	Pork	8.6	9.3	9.5	9.4	10.5	10.6	10.9
	Beef and veal	0.9	0.9	1.0	1.0	1.2	1.2	1.3
	Lamb	1.0	0.8	1.1	1.0	1.1	1.2	1.2
	Mutton and goat	0.2	0.1	0.2	0.2	0.1	0.1	0.1
	Minced meat	7.6	7.2	7.0	7.2	7.2	7.7	7.8
	Poultry meat	11.0	11.2	10.8	11.0	11.4	12.0	12.0
	Other kinds of meat	0.3	0.3	0.2	0.2	0.2	0.2	0.1
	Edible offals	2.9	2.8	2.7	2.8	2.8	2.8	2.7
7	Meat products – kg	14.0	13.7	13.1	13.4	13.6	13.6	13.4
	Non-perishable sausages and dry meat	3.9	3.9	3.7	3.8	4.0	4.1	4.0
	Perishable sausages	7.7	7.3	6.9	7.2	7.1	7.2	7.0
	Bacon	0.1	0.1	0.1	0.1	0.1	0.1	0.2
	Meat cans	0.7	0.7	0.7	0.6	0.7	0.6	0.7
	Ready-to-cook	1.6	1.7	1.6	1.7	1.8	1.6	1.6
8	Fish and fish products – kg	5.7	5.2	5.0	4.9	5.2	5.3	5.6
9	Milk – litre	18.8	18.5	17.3	17.2	16.8	16.9	18.0
10	Yoghurt – kg	26.9	25.8	27.5	27.6	29.3	29.2	29.6
11	White cheese – kg	12.1	11.7	11.8	11.5	11.8	12.1	11.8
12	Yellow cheese – kg	3.7	3.9	3.9	4.0	4.2	4.5	4.6
13	Other milk products – kg	2.3	2.4	2.3	2.8	2.8	2.8	2.8
14	Eggs –in numbers	140	135	140	143	146	152	157
15	Sunflower oil – litre	12.8	12.3	12.4	12.1	12.0	12.0	12.0
16	Margarine – kg	1.5	1.3	1.5	1.0	0.9	0.9	0.8
17	Butter – kg	0.9	1.0	1.0	1.0	1.0	1.1	1.3
18	Lard – kg	0.1	0.0	0.1	0.0	0.0	0.0	0.0
19	Fruit (fresh and frozen) – kg	50.5	47.6	49.0	50.7	49.5	51.9	53.7
	Apples	12.6	12.4	11.9	11.4	11.7	12.8	12.9
	Pears	0.7	0.9	0.8	0.8	1.0	0.7	1.0
	Grapes	1.8	2.2	2.1	2.3	2.4	2.6	2.7

	Tropical fruit	14.7	13.7	14.0	14.0	15.5	15.6	17.8
	Melons and watermelons	12.3	10.0	12.5	13.1	10.4	11.1	11.1
	Pumpkins	2.5	2.2	2.1	2.3	2.5	2.6	2.7
	Other fruit	5.9	6.2	5.6	6.7	6.0	6.6	5.5
20	Nuts – kg	1.1	1.1	1.0	1.2	1.2	1.3	1.4
21	Canned Food – kg	10.1	8.7	8.3	7.7	7.3	6.1	6.3
22	Jam, preserves and marmalade – kg	0.9	0.8	0.7	0.7	0.7	0.7	0.8
23	Juices, syrups and nectars – litre	4.9	5.1	4.9	5.1	5.1	5.3	5.5
24	Fresh and frozen vegetables – kg	70.9	68.4	70.0	68.0	70.7	72.7	73.0
	Tomatoes	20.0	19.6	20.6	19.5	21.0	21.4	20.5
	Cucumbers	11.0	10.7	11.0	10.8	11.4	11.9	12.0
	Cabbage	7.2	6.8	6.5	6.4	6.8	6.8	7.4
	Peppers	7.4	7.2	7.8	6.9	6.7	7.2	7.3
	Onions	10.9	10.2	10.3	10.1	10.3	10.2	10.7
	Other vegetables	14.3	11.4	13.7	11.8	14.6	15.2	12.2
25	Dry beans – kg	4.2	4.1	4.2	4.1	4.0	4.1	4.3
26	Lentils – kg	2.8	2.6	2.6	2.7	2.6	2.7	2.9
27	Canned vegetables – kg	12.4	11.2	10.6	10.5	9.8	8.7	9.5
28	Vegetable juices and nectars – litre	1.0	0.8	0.6	0.5	0.6	0.6	0.7
29	Pickled vegetables – kg	6.9	6.3	5.6	5.9	5.8	5.4	5.7
30	Mushrooms – kg	1.1	1.2	1.0	1.1	1.2	1.3	1.4
31	Potatoes – kg	28.5	28.1	27.5	26.6	26.6	26.7	27.2
32	Sugar – kg	7.5	7.0	7.2	6.9	6.9	6.8	6.6
33	Sugar products – kg	1.9	1.8	1.7	1.7	1.7	1.7	2.0
34	Chocolate products – kg	1.5	1.4	1.4	1.4	1.5	1.6	1.6
35	Salt – kg	1.8	1.8	1.8	1.8	1.8	1.8	1.7
36	Vinegar – litre	1.6	1.6	1.6	1.5	1.3	1.4	1.4
37	Non-alcoholic beverages – litre	61.1	59.5	58.8	65.3	66.5	70.4	72.1
38	Alcoholic drinks – litre	28.4	29.2	27.3	28.9	31.0	32.6	31.7
	Beer	19.9	21.7	20.3	22.1	23.6	25.0	24.1
	Wine	5.5	4.6	4.4	4.3	4.6	4.7	4.6
	Brandy	2.4	2.2	1.9	1.9	2.0	2.1	2.1
	Other spirits	0.6	0.7	0.6	0.7	0.7	0.8	0.8
39	Cigarettes – in numbers	603	647	639	656	674	733	727

Source: Adapted Table (Ibid., HCMFB)

There are some statistics on expenditures for food commodities, which are presented in the composite Table-3. On average, the expenses of a Bulgarian household were € 5 588 for food commodities in 2014, while they increased significantly to € 6'853 in 2020. This is an increase of expenses on foods of 22% on average for the 7-year period, while the overall CPI for the same period is 1% on average. Disaggregated, the food commodities induce approximately 14% inflation for the period, while the alcohol drinks and tobacco products increased by 26% for the period. This is a tremendous discrepancy in figures for the period, having into consideration that the expenditure shares on food commodities remain relatively constant for the same period: 34% – 36%.

It is necessary to search for different explanations, due to heterogeneity of the food bundle. Hence, it comes the question to look for any previous data and computations to reason what could explain these significant variations and whether price volatilities of food commodities are due to special factors.

Table 3. Panel Data – Various Indicators /2014–2020/
3.1. Expenditure of Bulgarian Households

Expenditure Groups	2014	2015	2016	2017	2018	2019	2020
<i>Average per Household - EUR</i>							
Total expenditure	5588	5723	5699	6130	6601	6922	6853
Foods and beverages	1807	1795	1755	1847	1960	2042	2063
Alcoholic drinks and tobacco	231	250	247	258	269	290	292

3.2. Structure of Expenditures of Bulgarian Households

Expenditure Groups	2014	2015	2016	2017	2018	2019	2020
<i>Structure - %</i>							
Total expenditure	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Foods and beverages	32.3	31.4	30.8	30.1	29.7	29.5	30.1
Alcoholic drinks and tobacco	4.1	4.4	4.3	4.2	4.1	4.2	4.3

Source: Adapted Table (HCMFB-APC)

In order to compose a broader view to the problem in question, it is worth bringing some relevant estimates for different categories of the price elasticities of demand for Bulgarian households. These estimates are delivered for five categories, including Marshallian and Hicksian elasticities, which bring negative values of elasticities. This stands to mean that according to reported estimates in 2005, as demonstrated in Table-4, that all foods – in general – in Bulgaria, are considered staple goods. However, income elasticity for food commodities demonstrate that there is positive value, which translates that foods – in general – shall be considered normal goods. Therefore, additional researches must be conducted to accept or refute either of the two statements, or suggest for detailed computations to show if there are some food commodities, which are considered normal goods, and other – which are considered inferior goods.

Table 4. Price Elasticities of Demand /PED/ – Bulgarian Households /2005/

Categories	Values
Income per Capita	0.228
Income Elasticity for Food, Beverages & Tobacco	0.667
Uncompensated /Marshallian/ Own-price Elasticity for Food, Beverages & Tobacco	-0.600
Compensated /Hicksian/ Own-price Elasticity for Food, Beverages & Tobacco (Marginal Utility of Income, held Constant)	-0.490
Compensated /Hicksian/ Own-price Elasticity for Food, Beverages & Tobacco (Real Income, held Constant)	-0.383

Source: Adapted Table (USDA 2005)

In the next six tables: from Table-5 to Table-10 are delivered computations on the uncompensated (Marshallian) own-price elasticity of demand for the investigated period. There are some positive values (normal goods), some negative values (inferior goods or staple foods), some zero values (neither positive or negative elasticity), and no available data for certain food commodities for certain years (designated as “n.a.”). In addition, there are certain food commodities, which may be considered as extremely elastic foods, due to their super high value, in respect to the average values in the groups. Also, for each period there is an intra-group average value of elasticities for the whole bundle of 78 food commodities, which are consumed relatively sustainable for the observed period. As it may be observed from Table-6

there are 3 food commodities in the period 2014/2015, which are extremely elastic to changes in price: canned fish, beer, and vegetable juices. They obtain values – more than 10. For the period 2015/2016 extremely elastic behavior demonstrate consumption of meat mix, lamb meat, canned fish, canned fruits, and marinated sour cabbage. To summarize the result of Table-6 in which period how many normal and inferior food commodities are estimated – Table-5 is delivered. Thus, Table-5 shows that for the period 2014/2015 there were 17 normal goods in the bundle of food commodities, there were 39 inferior goods (staple foods) in the bundle, there were 19 goods, which demonstrated neither positive, nor negative elasticity, and finally – there were 3 goods with no available information for them. Accordingly, this is computed for the period 2015/2016.

Table 5. Normal or Inferior Food Commodities: 2014–2016

2014/2015		2015/2016	
Normal Goods (greater than 0)	17	Normal Goods (greater than 0)	20
Neutral Goods (equal to 0)	19	Neutral Goods (equal to 0)	18
Inferior Goods (less than 0)	39	Inferior Goods (less than 0)	35
No Available Information	3	No Available Information	5
Total	78	Total	78

Source: Own Computations

Table 6. Uncompensated (Marshallian) Own-Price Elasticity of Demand /OPED/: 2014–2016

№	2014/2015		2015/2016	
1	Canned fish	76.667	Meat mix	32.476
2	Beer	54.595	Lamb meat	25.368
3	Vegetable juices	11.333	Canned fish	23.100
4	Candy products	4.374	Canned fruits	13.500
5	Onions	4.019	Marinated sour cabbage	11.067
6	Bread-white	3.838	Apples	9.243
7	Canned vegetables	2.839	Pears	5.923
8	Salami – short expiry period	2.458	Fish – fresh & frozen	3.783
9	Pumpkins	2.061	Sugar-made items	3.589
10	Meat mix	1.864	Canned jams	2.660
11	Pears	1.727	Milk-based oils	2.511
12	Meat sub-products	1.609	Canned marinated salads	2.349
13	Wines	1.011	Chicken meat	2.122
14	Olives	0.815	Candy products	1.775
15	Grapes	0.338	Pasta	1.524
16	Beans	0.180	Tomatoes	1.042
17	Sugar	0.109	Beans	0.620
18	Salami – long expiry period	0.000	Green Onions	0.454
19	Canned meat	0.000	Pork meat	0.327
20	Processed fish	0.000	Cabbage	0.139
21	Cheese – other types	0.000	Bread products	0.000
22	Other milk products	0.000	Canned meat	0.000
23	Dried Fruits	0.000	Processed fish	0.000
24	Canned fruits	0.000	Other plant-based oils	0.000
25	Canned jams	0.000	Dried Fruits	0.000
26	Dried Vegetable Seasonings	0.000	Cucumbers	0.000
27	Other beans and seeds	0.000	Garlic	0.000
28	Canned marinated salads	0.000	Fresh Vegetable Seasonings	0.000

29	Mushrooms – fresh	0.000	Dried Vegetable Seasonings	0.000
30	Mushrooms – canned & dried	0.000	Other beans and seeds	0.000
31	Sugar-made items	0.000	Vegetable juices	0.000
32	Coffee – all types	0.000	Mushrooms – canned & dried	0.000
33	Tea, incl all kind of dried herbs	0.000	Honey	0.000
34	Cocoa	0.000	Coffee – all types	0.000
35	Vinegard	0.000	Tea, incl all kind of dried herbs	0.000
36	Seasonings	0.000	Cocoa	0.000
37	Potatoes	-0.189	Seasonings	0.000
38	Green Onions	-0.295	Alcohol drinks	0.000
39	Eggs	-0.331	Peaches and apricots	-0.190
40	Cabbage	-0.413	Olive oil	-0.467
41	Cucumbers	-0.425	Strawberries and raspberries	-0.581
42	Chicken meat	-0.554	Sugar	-0.635
43	Nuts	-0.667	Grapes	-0.779
44	Bread products	-0.692	Nuts	-0.795
45	Apples	-0.750	Cheese – white	-0.880
46	Marinated sour cabbage	-0.756	Potatoes	-0.935
47	Chocolate	-0.760	Chocolate	-0.941
48	Melons and watermelons	-0.843	Eggs	-0.950
49	Other plant-based oils	-0.896	Lentils	-0.973
50	Cheese – yellow	-0.969	Meat sub-products	-1.091
51	Salt	-1.099	Cherries – sweet and sour	-1.198
52	Garlic	-1.117	Processed meat	-1.203
53	Tomatoes	-1.143	Vinegard	-1.373
54	Pork meat	-1.167	Cheese – other types	-1.635
55	Peaches and apricots	-1.169	Olives	-1.925
56	Plums	-1.347	Beverages and Mineral waters	-2.072
57	Pasta	-1.438	Salt	-2.349
58	Alcohol drinks	-1.540	Milk – fresh	-2.436
59	Olive oil	-1.626	Onions	-2.500
60	Flour	-1.663	Canned vegetables	-3.151
61	Sheep/Goat meat	-2.000	Flour	-3.314
62	Beverages and Mineral waters	-2.071	Salami – long expiry period	-3.969
63	Rice	-2.255	Cheese – yellow	-4.826
64	Fish – fresh & frozen	-2.271	Plums	-5.149
65	Lentils	-2.409	Melons and watermelons	-6.000
66	Cherries – sweet and sour	-3.092	Sheep/Goat meat	-6.229
67	Processed meat	-4.075	Other milk products	-6.597
68	Pastry	-4.448	Wines	-7.070
69	Margarine	-4.514	Margarine	-8.150
70	Cheese – white	-5.775	Mushrooms – fresh	-8.365
71	Milk – fresh	-8.053	Pastry	-10.528
72	Lamb meat	-9.541	Pumpkins	-11.375
73	Milk – youghurt	-9.863	Salami – short expiry period	-42.176
74	Fresh Vegetable Seasonings	-27.571	Rice	n.a.
75	Strawberries and raspberries	-31.015	Bread–white	n.a.
76	Milk-based oils	n.a.	Milk – youghurt	n.a.
77	Honey	n.a.	Beer	n.a.
78	Cigarettes	n.a.	Beer	n.a.
	GROUP AVERAGE	0.387	GROUP AVERAGE	-0.127

Source: Own Computations

Extremely inelastic behavior in Table-6 demonstrate the categories of strawberries and raspberries and fresh vegetables seasonings for the period 2014/2015, and the pastry, pumpkins, and salamis with short expiry period for the period 2015/2016. The computed group average shows that demand for the period 2014/2015 was relatively elastic, while demand for the period 2015/2016 was relatively inelastic.

Table-7 shows that the number of normal goods increased to 25 for the period 2016/2017, and then diminished to 22 for the period 2017/2018, while the number of inferior goods was 32 and 35, correspondingly. In these two periods extremely elastic were the following food products: wines and nuts (2016/2017), and teas, cheese, and fresh vegetable seasonings (2017/2018). Other relatively elastic food commodities remain canned vegetables, canned fruits, as well as marinated sour cabbage. Extremely inelastic remain strawberries and raspberries, beer, and canned meat.

For these two periods (2016/2017 and 2017/2018), the group averages demonstrate mixed signals, as it was the case with the group averages in Table-6. Due to unexplained reasons, different food commodities change their dynamics of elasticities and deliver group average of -0,430 and +0,417, correspondingly

Table 7. Normal or Inferior Food Commodities: 2016–2018

2016/2017		2017/2018	
Normal Goods (greater than 0)	25	Normal Goods (greater than 0)	22
Neutral Goods (equal to 0)	19	Neutral Goods (equal to 0)	19
Inferior Goods (less than 0)	32	Inferior Goods (less than 0)	35
No Available Information	2	No Available Information	2
Total	78	Total	78

Source: Own Computations

Table 8. Uncompensated (Marshallian) Own-Price Elasticity of Demand /OPED/: 2016–2018

№	2016/2017		2017/2018	
1	Wines	13.181	Tea, incl all kind of dried herbs	76.700
2	Nuts	10.215	Cheese – other types	47.647
3	Canned vegetables	6.274	Fresh Vegetable Seasonings	11.194
4	Olives	4.669	Canned vegetables	7.652
5	Canned fruits	2.544	Sheep/Goat meat	7.576
6	Pears	2.406	Canned fruits	6.472
7	Green Onions	1.954	Flour	5.641
8	Mushrooms – fresh	1.917	Marinated sour cabbage	5.300
9	Salt	1.740	Nuts	4.127
10	Canned jams	1.720	Lamb meat	3.675
11	Bread products	1.667	Chocolate	3.053
12	Candy products	1.139	Bread products	2.483
13	Pasta	0.878	Tomatoes	0.823
14	Rice	0.843	Olive oil	0.766
15	Lentils	0.785	Cheese – yellow	0.749
16	Sugar-made items	0.775	Green Onions	0.591
17	Meat sub-products	0.743	Salami – long expiry period	0.473
18	Meat mix	0.705	Fish – fresh & frozen	0.454
19	Salami – short expiry period	0.668	Milk – yoghurt	0.302
20	Coffee – all types	0.387	Sugar	0.274
21	Beans	0.376	Cabbage	0.241
22	Salami – long expiry period	0.370	Cucumbers	0.046
23	Cigarettes	0.169	Canned meat	0.000

24	Milk – yoghurt	0.148	Processed fish	0.000
25	Eggs	0.058	Canned fish	0.000
26	Lamb meat	0.000	Milk-based oils	0.000
27	Sheep/Goat meat	0.000	Pears	0.000
28	Processed fish	0.000	Olives	0.000
29	Canned fish	0.000	Dried Fruits	0.000
30	Cheese – yellow	0.000	Canned jams	0.000
31	Dried Fruits	0.000	Dried Vegetable Seasonings	0.000
32	Dried Vegetable Seasonings	0.000	Other beans and seeds	0.000
33	Other beans and seeds	0.000	Vegetable juices	0.000
34	Vegetable juices	0.000	Canned marinated salads	0.000
35	Canned marinated salads	0.000	Mushrooms – canned & dried	0.000
36	Marinated sour cabbage	0.000	Honey	0.000
37	Mushrooms – canned & dried	0.000	Coffee – all types	0.000
38	Chocolate	0.000	Cocoa	0.000
39	Honey	0.000	Seasonings	0.000
40	Tea, incl all kind of dried herbs	0.000	Alcohol drinks	0.000
41	Cocoa	0.000	Cigarettes	0.000
42	Vinegard	0.000	Eggs	-0.056
43	Seasonings	0.000	Cheese – white	-0.123
44	Alcohol drinks	0.000	Beverages and Mineral waters	-0.175
45	Pork meat	-0.154	Pastry	-0.275
46	Melons and watermelons	-0.182	Bread-white	-0.400
47	Milk-based oils	-0.201	Onions	-0.502
48	Onions	-0.361	Processed meat	-0.503
49	Bread-white	-0.443	Plums	-0.599
50	Processed meat	-0.488	Salt	-0.861
51	Milk – fresh	-0.594	Apples	-0.862
52	Other plant-based oils	-0.612	Vinegard	-0.988
53	Apples	-0.639	Cherries – sweet and sour	-1.035
54	Strawberries and raspberries	-0.647	Candy products	-1.043
55	Cheese – white	-0.648	Pumpkins	-1.089
56	Cucumbers	-0.812	Melons and watermelons	-1.245
57	Cabbage	-0.923	Meat sub-products	-1.308
58	Pumpkins	-1.167	Pasta	-1.321
59	Olive oil	-1.168	Wines	-1.431
60	Tomatoes	-1.349	Peaches and apricots	-1.460
61	Fish - fresh & frozen	-1.358	Other plant-based oils	-1.506
62	Margarine	-1.736	Other milk products	-1.535
63	Cherries – sweet and sour	-2.571	Grapes	-1.678
64	Flour	-2.717	Margarine	-1.746
65	Fresh Vegetable Seasonings	-3.087	Meat mix	-2.455
66	Peaches and apricots	-3.154	Garlic	-2.523
67	Pastry	-3.343	Milk – fresh	-2.546
68	Chicken meat	-3.531	Sugar-made items	-2.779
69	Garlic	-4.302	Salami – short expiry period	-3.551
70	Beverages and Mineral waters	-4.942	Mushrooms – fresh	-4.698
71	Plums	-5.250	Rice	-5.043
72	Cheese – other types	-6.000	Pork meat	-10.971
73	Grapes	-6.374	Chicken meat	-11.641
74	Beer	-8.635	Lentils	-13.833
75	Canned meat	-10.214	Beer	-26.667

76	Other milk products	-11.417	Strawberries and raspberries	-46.118
77	Potatoes	n.a.	Beans	n.a.
78	Sugar	n.a.	Potatoes	n.a.
	GROUP AVERAGE	-0.430	GROUP AVERAGE	0.417

Source: Own Computations

And, finally, for the period 2018/2019 and 2019/2020 there are 23 and 32 normal goods, and 34 and 28 inferior goods, correspondingly, as it is demonstrated in Table-9.

Table 9. Normal or Inferior Food Commodities: 2018–2020

2018/2019		2019/2020	
Normal Goods (greater than 0)	23	Normal Goods (greater than 0)	32
Neutral Goods (equal to 0)	20	Neutral Goods (equal to 0)	12
Inferior Goods (less than 0)	34	Inferior Goods (less than 0)	28
No Available Information	1	No Available Information	6
Total	78	Total	78

Source: Own Computations

Table-10 shows that highly elastic are marinated sour cabbage, garlic, and mushrooms (canned and dried) for the period 2018/2019. However, for the next period: 2019/2020 these categories change drastically their behavior and turn into staple foods. Also, there are some other strange behaviors of other food commodities, which might need extra clarification in further researches.

Table 10. Uncompensated (Marshallian) Own-Price Elasticity of Demand /OPED/: 2018–2020

№	2018/2019		2019/2020	
1	Marinated sour cabbage	21.125	Other plant-based oils	11.157
2	Garlic	18.679	Sugar-made items	6.500
3	Mushrooms – canned & dried	10.086	Canned meat	4.332
4	Candy products	4.211	Canned jams	4.331
5	Chicken meat	4.152	Pasta	3.765
6	Canned vegetables	3.644	Canned marinated salads	3.615
7	Canned fruits	3.177	Garlic	3.240
8	Beans	1.776	Cabbage	2.939
9	Cigarettes	1.509	Flour	2.630
10	Olives	1.452	Plums	2.248
11	Beer	1.409	Nuts	1.959
12	Milk – fresh	1.180	Coffee – all types	1.919
13	Mushrooms – fresh	1.052	Honey	1.901
14	Olive oil	0.964	Candy products	1.651
15	Melons and watermelons	0.947	Pumpkins	1.646
16	Cucumbers	0.914	Mushrooms – fresh	1.620
17	Pasta	0.895	Wines	1.256
18	Pastry	0.847	Cheese – yellow	1.253
19	Cheese – yellow	0.644	Bread products	1.096
20	Lentils	0.603	Grapes	1.090
21	Beverages and Mineral waters	0.548	Canned vegetables	1.052
22	Meat mix	0.540	Olives	0.999
23	Tomatoes	0.061	Fish – fresh & frozen	0.676

24	Processed meat	0.000	Beans	0.636
25	Salami – long expiry period	0.000	Pork meat	0.578
26	Processed fish	0.000	Alcohol drinks	0.559
27	Canned fish	0.000	Cucumbers	0.524
28	Other milk products	0.000	Milk – youghurt	0.413
29	Dried Fruits	0.000	Vinegard	0.371
30	Nuts	0.000	Rice	0.275
31	Fresh Vegetable Seasonings	0.000	Olive oil	0.217
32	Dried Vegetable Seasonings	0.000	Meat mix	0.205
33	Other beans and seeds	0.000	Pastry	0.000
34	Canned marinated salads	0.000	Sheep/Goat meat	0.000
35	Potatoes	0.000	Processed fish	0.000
36	Chocolate	0.000	Canned fish	0.000
37	Honey	0.000	Canned fruits	0.000
38	Tea, incl all kind of dried herbs	0.000	Fresh Vegetable Seasonings	0.000
39	Cocoa	0.000	Dried Vegetable Seasonings	0.000
40	Vinegard	0.000	Other beans and seeds	0.000
41	Seasonings	0.000	Vegetable juices	0.000
42	Wines	0.000	Chocolate	0.000
43	Alcohol drinks	0.000	Cocoa	0.000
44	Onions	-0.040	Seasonings	0.000
45	Cheese – white	-0.130	Sugar	-0.047
46	Milk – youghurt	-0.177	Cheese – white	-0.053
47	Salami – short expiry period	-0.216	Apples	-0.097
48	Cheese – other types	-0.285	Chicken meat	-0.099
49	Bread-white	-0.317	Tomatoes	-0.264
50	Pork meat	-0.450	Potatoes	-0.270
51	Strawberries and raspberries	-0.502	Melons and watermelons	-0.317
52	Pumpkins	-0.519	Onions	-0.369
53	Green Onions	-0.562	Salt	-0.374
54	Fish – fresh & frozen	-0.572	Salami – long expiry period	-0.411
55	Eggs	-0.588	Salami – short expiry period	-0.456
56	Bread products	-0.627	Processed meat	-0.719
57	Meat sub-products	-0.717	Meat sub-products	-0.790
58	Salt	-0.885	Strawberries and raspberries	-0.814
59	Flour	-1.012	Cheese – other types	-0.842
60	Cherries – sweet and sour	-1.200	Green Onions	-1.185
61	Cabbage	-1.568	Beverages and Mineral waters	-1.241
62	Rice	-1.726	Bread-white	-1.330
63	Apples	-1.844	Peaches and apricots	-1.506
64	Milk-based oils	-1.906	Milk-based oils	-1.737
65	Plums	-2.019	Margarine	-1.958
66	Lamb meat	-2.609	Other milk products	-2.290
67	Sugar	-2.727	Beer	-2.956
68	Pears	-3.128	Dried Fruits	-4.634
69	Canned meat	-3.315	Cherries – sweet and sour	-17.053
70	Sugar-made items	-3.587	Pears	-18.714
71	Peaches and apricots	-4.589	Tea, incl all kind of dried herbs	-21.580
72	Grapes	-4.592	Marinated sour cabbage	-48.000
73	Vegetable juices	-4.804	Lamb meat	n.a.
74	Canned jams	-4.933	Milk – fresh	n.a.
75	Coffee – all types	-14.633	Eggs	n.a.

76	Margarine	-18.700	Lentils	n.a.
77	Other plant-based oils	-34.629	Mushrooms – canned & dried	n.a.
78	Sheep/Goat meat	n.a.	Cigarettes	n.a.
	GROUP AVERAGE	-0.515	GROUP AVERAGE	-0.881

Source: Own Computations

Here, the groups averages bring negative values, which stand to mean that as a whole demand of foods, were relatively inelastic to prices for the 2018/2019 and 2019/2020.

Conclusions

This paper is the first microeconomic attempt of its kind to analyze in details price elasticities of demand of food commodities in Bulgaria for the programming period 2014 – 2020. Although this paper aims to deliver a systematic and comprehensive analysis on consumption of food and detect and trace hyper consumption patterns, if any – either for normal or inferior goods, it needs further refinement. As it is demonstrated, there are rising food prices for numerous food commodities; and high variations in elasticities may be due to external shocks to the supply chain of foods in general, as Bulgaria is an open economy, thus – prone to inflation and other types of economic shocks.

This research could incorporate extra analytical features and extend its scope to detect and predict any health problems of consumers through analyzing the regular/irregular intake of food nutrients and minerals. Binding marketing behavior to food consumption models to dietary recordings of individuals may deliver greater awareness for the general public, private corporations and public institutions and organizations to produce comprehensive policies to protect peoples' health, as well. For sure, this shall need extended and regular collection of data sets to compose a robust model to predict different consumer trends and gaps into maintaining healthy life style.

And, finally, the computational model may be extended in further researches to either employ the Rotterdam model, as suggested by Barten and Theil (Barten 1964) and (Theil 1965), or the Almost Ideal Demand System model, as supposed by Deaton and Muellbauer (Deaton, Muellbauer 1980), or the Florida model (Theil, Chung, Seale 1989) and (Seale, Regmi, Bernstein 2003) to deliver robust and meaningful data for food consumption in Bulgaria.

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REFERENCES

1. **Barten, AP, 1964.** *Consumer Demand Functions Under Conditions of Almost Additive Preferences*, *Econometrics*, 32: pp. 1–38
2. **Deaton, A, Muellbauer, J, 1980.** *An Almost Ideal Demand System*, *The American Economic Review*, 70 (3): pp. 312–326
3. **Marshall, A, 1890.** *Principles of Economics*, Macmillan, London, 8th rev. ed. 1952, Book III, Chapter III, pp. 162–174. and pp. 738–740.
4. **Seale, JL, Regmi, A, Bernstein, J, 2003.** *International evidence on food consumption patterns*, Economic Research Service, US Department of Agriculture
5. **Silberberg, E, 2008.** *Hicksian and Marshallian Demands*, London: Palgrave Macmillan, London. ISBN 978-1-349-95121-5
6. **Theil, H., Chung C-F, Seale, JL, 1989.** *International evidence on consumption patterns* JAI Press, Inc; *Appendix B: The Differential Approach to Consumption Theory*
7. **Theil, H, 1965.** *The Information Approach to Demand Analysis*, *Econometrica*, 33: pp. 67–87

8. ECOICOP classification – the European Classification of Individual Consumption According to Purpose, according Regulation (EU) 2016/792 of 11 May 2016 of the European Parliament and of the Council on harmonised indices of consumer prices and the house price index, and repealing Council Regulation (EC) No 2494/95 (OJ L 135, 24.05.2016, p. 11

9. National Statistical Institute /NSI/ Data, Republic of Bulgaria, <https://nsi.bg/en/content/2445/inflation-and-consumer-price-indices>, English version, Metadata and Methodology, Notes on CPI, HICP, PISB, information retrieved on Feb. 23, 2022

10. Ibid., Annual Data, <https://www.nsi.bg/en/content/3239/annual-data>, English version, Metadata and Methodology, Notes on CPI, HICP, PISB, information retrieved on Feb. 23, 2022

11. Ibid., Section: Data Revision Policy /DRP/, <https://nsi.bg/en/content/2445/inflation-and-consumer-price-indices>, English version, Metadata and Methodology, information retrieved on Feb. 23, 2022

12. Ibid., CPI, <https://nsi.bg/en/content/2518/annual-average-cpi-previous-year-100>, English version, File: CPI_1.6_EN.xls, information retrieved on Feb. 24, 2022

13. Ibid., HCMFB, <https://www.nsi.bg/en/content/3255/annual-data>, English version, File: HH_3.1.3_en.xls, information retrieved on Feb. 24, 2022

14. Ibid., Household Consumption of Main Foods and Beverages – Average per Capita /HCMFB-APC/, <https://www.nsi.bg/en/content/3168/households-income-expenditure-and-consumption>, English version, information retrieved on Feb. 24, 2022

15. USDA, Economic Research Service, <https://www.ers.usda.gov/data-products/international-food-consumption-patterns.aspx>, International Food Consumption Patterns, Data Set 2005, Bulgaria, information retrieved on Feb. 24, 2022

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