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# THE ROMANIAN AGRI-FOOD AGGREGATE DEMAND – EVOLUTIONS AND TRENDS IN THE CONTEXT OF THE ECONOMIC AND FINANCIAL CRISIS

ABSTRACT

The approach to the agri-food demand presents a real interest for all the European states, the changes produced in its structure being in the focus of all the authorities, mainly in the present period deeply affected by the economic and financial crisis. The aim of the present analysis is to investigate the main changes in the agri-food demand structure for a number of four products, as a result of the economic-financial crisis effects. From the methodological perspective, the analysis uses well-known statistical methods, such as comparisons, structures, production functions and econometric models. The demand rigidity or elasticity in certain agri-food products, considered to be essential for meeting the consumption needs, have induced changes not only in the evolution of the sector, but also in all the upstream and downstream branches that are directly connected to obtaining these products. Moreover, there are also other factors such as consumption diminution, as well as the fiscal policy measures (the diminution of wages, VAT increase, etc.) that have generated more or less significant contractions in the structure of the agri-food demand.

**Key words**: aggregate demand, agri-food sector, economic and financial crisis, impact.

**JEL Classification**: Q10, Q11.

## 1. INTRODUCTION

As a EU Member State, Romania is confronted with multiple problems in meeting the domestic demand of agri-food products from the domestic production, related to the non-performant sectoral structure or to the economic policy measures that have been adopted, sometimes in the absence of economic justification and pertinent economic analysis, which added to the effects of the economic-financial crisis in the last two years.

At the level of the European Community, in order to know the evolutions of each Member State, the European Commission, through its institutions, permanently monitors the modifications that took place in the aggregate demand structure, and the information obtained can be used and analyzed according to a multitude of criteria.

From the point of view of the agri-food sector, knowing the modifications produced in the demand structure is even more important, if we take into consideration the contribution of this sector in ensuring the food security of each Member State.

Knowing the main modifications produced at the aggregate demand level can represent, both for the decision-makers and for the economic entities involved in the production process, warning signals that the adopted measures do not reach their goals, namely ensuring the equilibrium between demand and supply, and the food security for the population, implicitly.

## 2. STATE OF KNOWLEDGE

The agri-food aggregate demand has been the object of several studies, both at international level and in Romania, given its importance in meeting the domestic consumption needs of the population in each state, in ensuring food security and for the identification of new niches for agri-food production in the countries where the domestic possibilities are low or insufficiently developed.

The investigation of the agri-food demand is made under the background of the globalization tendency, manifested with different intensities, and mainly under the background of population increase, as a result of a positive demographic rate. The 7 billion inhabitants of the Earth in the year 2011 raise problems for many states in relation with ensuring the necessary food and social and health care for their populations. Furthermore, the population increase forecast to 9 billion people in the next 30 years should be a warning signal in the identification of solutions for meeting the consumption needs.

In the investigation of the aggregate food demand, the econometric modeling is increasingly used, which has the advantage of developing scenarios/hypotheses that can represent a support in the design and implementation of economic and social policy measures in this field.

At national level, the approach to the agri-food demand made the object of several academic and basic research studies, whose aim was either to present theoretical approach modalities to this issue or to quantify the modifications produced in the domestic demand structure. These studies and research works give the authorities with attributions in this field the basic elements for the substantiation of the economic and social policy.

The approach to this theme is in the context of the multiple changes that have taken place in the period after Romania's accession to the European Union, correlated with the aggressive presence of the economic-financial crisis, whose effects are still manifested in the national economy and in the domestic demand of agri-food products implicitly.

## 3. MATERIAL AND METHOD

In order to identify the main changes that have been produced in the agri-food aggregate demand structure, we used the available information from the Tempo-Online Database of the National Institute of Statistics.

For data analysis, well-known statistical methods have been used, i.e. comparisons, dynamics and structure, the results being presented under the form of tables and graphic representations.

A special observation should be made, with regard to the period of the analysis, which was enlarged or limited, sometimes, to other time periods, due to the lack of available data.

At the same time, on the basis of data series, econometric models were also constructed, which enable the establishment of certain demand functions, according to certain effort indicators.

At the same time, it must be mentioned that in the case of value indicators, we used the transformation into comparable prices of the latest available statistical year, so as to avoid certain inadequate assessments of results that incorporate inflation into the nominal prices. For the transformation of values into comparable prices of the last year, the general consumer price index was used.

The present approach is structured into three parts dedicated to:

• the analysis of the monthly inflation modifications in the period January 2009–August 2011, together with capturing the main modifications produced in the consumer basket structure (of the share of different categories of products in the calculation of CPI);

• the analysis of the modifications produced in the structure of incomes, expenses, consumption of agri-food products and in the prices of certain products, by three types of households (total, employees and pensioners);

• modelling the demand of agri-food products, using the Eviews software, for a number of four products: milk, eggs, cow telemea cheese and potatoes.

## 4. RESULTS AND DISCUSSIONS

### 4.1. Inflation evolution in the agri-food products

In 5 years' time (2007–2011), the agri-food products changed their share in the calculation of the general price index (CPI), which reflects the change of the consumer basket structure, temporarily, as an effect of crisis, or definitively, following the modernization tendency and population's consumption improvement.

In the period 2007–2011, the share of food commodities in CPI calculation decreased by 3.8% (from 3892 in 2007 to 3745 in 2011). Out of this 3.8%, 0.3 percent represents the diminution in the period 2011–2009. Among the agri-food products that are used in CPI calculation, those with a significant diminution of their share in the year 2011 compared to 2007 are the following:

• margarine (-40.6%);
• wheat flour (-38.1%);
• canned fruit (-30%);
• fresh eggs (-22.5%);
• potatoes (-21.7%).

The bakery specialties and the fresh and frozen fish lie at the opposite pole, which increased their share in CPI calculation by 50%, followed by 11.5 percent in butter, whose specific weight increased by 38.5% in the period 2007–2011 (Table 1).

The modifications that took place in CPI calculation modality, generated by the food commodities, can be also explained by taking into consideration the reorientations in the sector of non-food commodities and services. In this respect, in the non-food commodities, the greatest increase of shares in CPI calculation was noticed for the following commodities in the period 2007–2011:

- tobacco and cigarettes (+29.8%);
- detergents (+28.1%);
- chemical items (+26.5%).

*Table 1*
Evolution of food commodities share in CPI calculation in the period 2007–2011

|  | 2007 | 2008 | 2009 | 2010 | 2011 | 2011/2007 (%) | 2011/2009 (%) |
|---|---|---|---|---|---|---|---|
| **Total** | **10000** | **10000** | **10000** | **10000** | **10000** | **0.0** | **0.0** |
| **Total food commodities** | **3892** | **3750** | **3758** | **3739** | **3745** | **-3.8** | **-0.3** |
| **Milling and bakery products** | **864** | **770** | **765** | **791** | **763** | **-11.7** | **-0.3** |
| - milling products | 59 | 46 | 48 | 48 | 43 | -27.1 | -10.4 |
| - wheat flour | 42 | 31 | 31 | 29 | 26 | -38.1 | -16.1 |
| - maize flour | 17 | 15 | 17 | 19 | 16 | -5.9 | -5.9 |
| - Bread, bakery products, specialties, by-products wheat, maize, rye | 721 | 646 | 642 | 658 | 624 | -13.5 | -2.8 |
| - Bread | 657 | 583 | 579 | 587 | 551 | -16.1 | -4.8 |
| - Bakery products | 16 | 15 | 15 | 19 | 19 | 18.8 | 26.7 |
| - Bakery specialties | 22 | 24 | 26 | 31 | 33 | 50.0 | 26.9 |
| **Vegetables and canned vegetables** | **399** | **380** | **404** | **362** | **363** | **-9.0** | **-10.1** |
| - White beans and other leguminous crops | 21 | 18 | 18 | 19 | 21 | 0.0 | 16.7 |
| - Potatoes | 92 | 106 | 92 | 68 | 72 | -21.7 | -21.7 |
| - Other vegetables and canned vegetables | 229 | 201 | 231 | 213 | 207 | -9.6 | -10.4 |
| **Fruit and canned fruit** | **209** | **216** | **242** | **245** | **235** | **12.4** | **-2.9** |
| - Fresh fruit | 104 | 105 | 120 | 126 | 119 | 14.4 | -0.8 |
| - Citrus and other exotic fruit | 95 | 102 | 113 | 110 | 109 | 14.7 | -3.5 |
| - Canned fruit | 10 | 9 | 9 | 9 | 7 | -30.0 | -22.2 |
| **Oil, lard, fats** | **169** | **145** | **141** | **176** | **136** | **-19.5** | **-3.5** |
| - Edible oil | 133 | 115 | 116 | 154 | 115 | -13.5 | -0.9 |
| - Margarine | 32 | 27 | 23 | 20 | 19 | -40.6 | -17.4 |
| **Meat, meat preparations and canned meat, out of which:** | **964** | **945** | **910** | **897** | **934** | **-3.1** | **2.6** |
| - Beef | 112 | 110 | 108 | 101 | 101 | -9.8 | -6.5 |
| - Pork | 232 | 229 | 210 | 213 | 226 | -2.6 | 7.6 |
| - Poultry meat | 243 | 227 | 231 | 231 | 249 | 2.5 | 7.8 |
| - Meat preparations | 313 | 317 | 304 | 283 | 289 | -7.7 | -4.9 |
| - Canned meat | 18 | 18 | 16 | 15 | 16 | -11.1 | 0.0 |
| **Fish and canned fish** | **115** | **119** | **115** | **115** | **126** | **9.6** | **9.6** |
| - Fresh and frozen fish | 60 | 62 | 91 | 81 | 90 | 50.0 | -1.1 |
| - Canned fish and other fish products | 4 | 4 | 8 | 8 | 8 | 100.0 | 0.0 |

| Milk and dairy products | 492 | 481 | 493 | 512 | 543 | 10.4 | 10.1 |
|---|---|---|---|---|---|---|---|
| - Milk – total | 252 | 239 | 247 | 261 | 271 | 7.5 | 9.7 |
| - Cow milk | 50 | 38 | 39 | 42 | 43 | -14.0 | 10.3 |
| - Cheese – total | 115 | 112 | 112 | 115 | 129 | 12.2 | 15.2 |
| - Cow cheese (telemea) | 60 | 54 | 63 | 65 | 72 | 20.0 | 14.3 |
| - Sheep cheese (telemea) | 48 | 45 | 45 | 46 | 52 | 8.3 | 15.6 |
| - Butter | 13 | 13 | 15 | 16 | 18 | 38.5 | 20.0 |
| **Eggs** | **80** | **70** | **68** | **61** | **62** | **-22.5** | **-8.8** |
| **Sugar, sugary products and bee honey** | **167** | **186** | **172** | **156** | **161** | **-3.6** | **-6.4** |
| - Sugar | 76 | 90 | 74 | 60 | 61 | -19.7 | -17.6 |
| - Bee honey | 12 | 12 | 12 | 12 | 14 | 16.7 | 16.7 |
| - Cocoa and coffee | 106 | 104 | 101 | 93 | 97 | -8.5 | -4.0 |
| - Coffee | 102 | 101 | 98 | 90 | 94 | -7.8 | -4.1 |
| **Alcoholic drinks** | **133** | **137** | **139** | **131** | **123** | **-7.5** | **-11.5** |
| - Wine | 26 | 27 | 28 | 26 | 24 | -7.7 | -14.3 |
| - Plum brandy, other brandies and other alcoholic beverages | 29 | 28 | 26 | 25 | 23 | -20.7 | -11.5 |
| - Beer | 73 | 78 | 81 | 76 | 73 | 0.0 | -9.9 |
| **Other food products** | **194** | **197** | **208** | **200** | **202** | **4.1** | **-2.9** |

*Source*: Calculations based on NIS data, 2011.

In these three categories of products, about 50% of this increase is generated by the evolutions in the last three years (2009–2011). Among the three large categories of commodities (food, non-food and services), the services experienced the most significant increase of their share in CPI, which was up by 4.5 percent in the period 2007–2011. In the category of services, the rents increased by 55.3% in total PCI in 2011 compared to 2007, only 2.8% representing the increase in the period 2009–2011.

"The moment July 2010", when VAT was up by 5 percent, represented an extremely important inflexion point in the monthly evolution of inflation. "The return of prices" in August 2010 to a lower level compared to July 2010 reflects the fact that VAT increase did not significantly feed inflation increase. Inflation increase in the early months of the year can be the result of either import price oscillations, as a result of the exchange rate, or of the increase of excise taxes in certain products (cigarettes, coffee, and alcohol). Among the food commodities that experienced high inflation, we can mention the edible oil, in which inflation fluctuated from 15.81% (January 2009/January 2008) to 20.75% (August 2011/August 2010), compared to the corresponding months of the previous year.

## 4.2. Modifications in the structure of agri-food demand in the period 2007–2010

As we have mentioned above, the values of data were deflated so as to eliminate inflation influence from the values of indicators. For this purpose, we used the general consumer price index[1], all the indicators being transformed in

[1] In the period 2007–2010, the consumer price index, on the 2007 basis, had the following values: 2007 = 1.000; 2008 = 1.0785; 2009 = 1.1388; 2010 = 1.2081.

2010 prices. In the period 2007–2010, the total incomes of households (except for the values of incomes related to self-consumption) rose by 15.2%, while in the period of crisis (2009–2010), incomes decreased by 6.8%. By the two investigated categories of households, i.e. employees and pensioners, the incomes oscillated, to reach an increase by 30% in the pensioners' households (2010/2007) and decreased by 4.6% (pensioners, 2010/2009) and 6.8% (employees, 2010/2009). The total expenditures for purchasing agri-food products followed the same trend (monthly averages per person, expressed in 2010 prices), yet by lower percentages compared to the level of incomes. Thus, the expenditures of the households of pensioners for the procurement of agri-food products increased by 18.7% in the year 2010 compared to 2007, while in the period 2009–2010 these diminished by 3.7% (Table 2).

*Table 2*

Evolution of total incomes of households (self-consumption excluded) and of expenditures for buying agri-food products in the period 2007–2010, by household types

| | 2007 | 2008 | 2009 | 2010 | 2010/2007 (%) | 2010/2009 (%) |
|---|---|---|---|---|---|---|
| *Incomes (RON 2010)* | | | | | | |
| Total | 1715.8 | 2057.0 | 2119.7 | 1976.5 | 15.2 | -6.8 |
| Employees | 2612.9 | 2969.1 | 3057.4 | 2854.5 | 9.2 | -6.6 |
| Pensioners | 1203.9 | 1563.8 | 1639.9 | 1564.5 | 29.9 | -4.6 |
| *Total expenditures agri-food products – monthly averages per person RON 2010* | | | | | | |
| Total | 150.6 | 174.1 | 177.7 | 168.6 | 11.9 | -5.2 |
| Employees | 178.2 | 200.4 | 203.2 | 191.8 | 7.7 | -5.6 |
| Pensioners | 146.7 | 174.2 | 180.9 | 174.2 | 18.7 | -3.7 |

*Source:* Calculations based on NIS data, 2011.

In the period 2007–2010, the household expenditures fluctuated, both overall and by certain types of households; thus, in the case of households of employees, the expenditures for food significantly increased compared to the households of pensioners, whose income sources and size, as well as a different consumption structure, induced a diminution of the expenditures allocated to foodstuffs.

The available information reveals the propensity of the households of pensioners for vegetables or low energy products, generated less from the desire to eat such products but rather by the low level of incomes and pensioners' orientation towards meeting their needs of first necessity (medicine, payment of utilities, etc.).

The involutions of the level of expenditures for buying foodstuffs in the throughout the period 2007–2010 are the result of the modifications imposed by the budgetary constraints under the background of the economic-financial crisis, whose first signs appeared in 2009. In 2009 and 2010, the expenditures for buying food-stuffs significantly decreased, being extremely noticeable in the households of employees, whose incomes, mainly from wages, significantly diminished. The diminution of the number of employees, simultaneously with the diminution of incomes, impacted the level of paid social contributions and the possibility of paying the pensions, which entailed, as expected, the deterioration of the living standard both on the households of employees and on the households of pensioners in particular.

These add to the increase of debt level (increase of VAT, excise taxes, of different contributions, taxes and fees), which led to the modification of expenditure distribution at household level both per total households and by household type.

Following the price fluctuations, the purchased quantities of agri-food products decreased by household types. For example, the purchased amount of bread and bakery products diminished in the period 2007–2010 by 5.1% per total households, the "drop" amounting to 7.2% in the household of employees and to 4.1% in the households of pensioners (Table 3).

As in the previous case, in the last two years (2009 and 2010) the consumption of agri-food products decreased, resulting in a significant diminution of the purchased amounts, by types of households. Thus, for example, in only two years, the purchased beef diminished by 16.2% in the case of households of employees and by almost 13% in the case of the households of pensioners.

*Table 3*

Quantities of foodstuffs bought by types of households, in dynamics 2010/2007 (%)

| Product | Total house-holds | Employees | Pensioners | Product | Total households | Employees | Pensioners |
|---|---|---|---|---|---|---|---|
| Cereals and cereal products (kg) | -4.6 | -5.2 | -4.6 | Plums | 150.0 | 95.2 | 195.0 |
| Bread and bakery products | -5.1 | -7.2 | -4.1 | Grapes | -14.4 | -25.6 | 62.7 |
| Maize flour | -3.3 | 1.8 | -10.2 | Strawberries and raspberries | 31.4 | 30.0 | 37.9 |
| Wheat flour | -9.1 | 3.8 | -7.4 | Nuts in shell | 40.0 | 60.0 | 31.6 |
| Pasta | -1.6 | -0.4 | -1.8 | Bananas | 4.4 | 1.2 | 16.5 |
| Rice | -2.4 | -0.8 | -1.8 | Oranges, mandarins and lemons | 25.3 | 19.8 | 33.3 |
| Fresh meat total (kg) | 14.8 | 6.6 | 24.1 | Melons and water melons (kg) | 25.1 | 19.9 | 35.0 |
| Beef | -19.7 | -29.4 | -5.3 | Dry beans and other leguminous crops (kg) | 6.0 | 0.6 | 11.4 |
| Pork | 19.4 | 13.1 | 26.3 | Potatoes | -7.2 | -9.4 | -6.1 |
| Poultry meat | 20.2 | 10.4 | 28.7 | Vegetables and canned vegetables | 6.9 | 5.9 | 12.1 |
| Meat preparations (kg) | 4.0 | -2.8 | 13.4 | Cabbages and cauliflower | 9.8 | 9.1 | 10.0 |
| Canned meat and canned meat and vegetables (kg) | 4.5 | 0.0 | 13.2 | Tomatoes | -6.2 | -7.8 | 0.3 |
| Fish, fish products and canned fish (kg) | 23.0 | 21.4 | 26.3 | Peppers and red peppers | 4.7 | 8.0 | 9.5 |
| Milk total (l) | 11.4 | 10.5 | 11.0 | Green beans | 28.6 | 29.8 | 30.4 |
| Cheese and sour cream (kg) | 10.3 | 5.2 | 15.5 | Carrots and other edible roots | 26.1 | 21.7 | 29.4 |
| Cow cheese (*telemea*) | 7.9 | 4.8 | 8.3 | Dry onions | 3.9 | 4.4 | 5.9 |
| Sheep cheese | 7.1 | 3.6 | 14.0 | Tomatoe paste and juice | 9.7 | 7.4 | 21.5 |
| Cottage cheese | 15.9 | 8.1 | 20.5 | Canned vegetables | -12.8 | -18.3 | -4.4 |
| Cream, sour cream | 19.1 | 11.4 | 28.0 | Sugar (kg) | -3.1 | -5.6 | -1.2 |
| Cashkaval cheese | 1.3 | -0.8 | 6.7 | Comfiture, jam, fruit stew and fruit jelly (kg) | -19.4 | -10.5 | -11.5 |

| Eggs (pieces) | | | | Chocolate, candies, Turkish delight and other sugary products (kg) | | | |
|---|---|---|---|---|---|---|---|
| | 2.9 | 0.9 | 5.0 | | 0.0 | -0.4 | 6.2 |
| Fats total (kg) | -0.3 | -2.6 | 1.4 | Ice-cream (kg) | -4.5 | -15.4 | 32.1 |
| Maize, sunflower and soybean oil | 8.4 | 5.2 | 10.2 | Bee honey (kg) | 29.0 | 21.1 | 41.2 |
| Margarine | -16.7 | -18.5 | -17.1 | Coffee, tea, cocoa (kg) | 7.6 | 4.4 | 13.6 |
| Butter | 32.3 | 29.5 | 40.7 | Mineral water and other soft drinks (l) | 13.4 | 6.5 | 29.7 |
| Fruit total (kg) | 17.6 | 10.3 | 32.8 | Alcoholic beverages (l) | -0.3 | -6.0 | 11.2 |
| Apples and pears | 21.6 | 13.3 | 27.3 | Wine | -7.8 | -9.3 | 12.9 |
| Cherries and morello cherries | 7.7 | 1.9 | 16.7 | Beer | 2.8 | -4.5 | 13.9 |
| Apricots and peaches | 7.1 | -3.5 | 31.3 | Plum brandy and other natural brandy | -16.3 | -13.8 | -22.0 |

*Source*: Calculations based on NIS data, 2011.

### 4.3. The approach to food demand by econometric methods

In order to construct econometric models for the agri-food demand analysis, the present approach started from the following hypotheses:

- the resultative factor is considered to be the level of monthly average expenses for the procurement of four foodstuffs, namely: milk, eggs, cow cheese *(telemea)* and potatoes;

- for these four products, data on the yearly price and average consumption evolution were identified;

- as influence factors, the following were tested, by calculating the correlation coefficients: total monthly average income, average monthly consumption of products, average yearly price, population level and the average monthly quantities of the respective product that were bought;

- the calculations were made by total households, for the period 1997–2010, in 2010 prices.

On the basis of these considerations, for the product "*milk*" the following data series were constructed, identified as:

- milk_expenses = average monthly expenses for buying milk;

- bought_quantities = average monthly quantities of the respective product that were bought;

- milk_consumption = average milk consumption;

- milk_price = average yearly milk price;

- population = number of the country's population (million inhabitants);

- total_income = average monthly income of households, except for the values of incomes from self-consumption

In order to determine which of the above-mentioned indicators have a significant influence upon the level of expenses for milk procurement, the correlation coefficients were determined. These put into evidence that significant correlations

exist between the level of expenses for milk procurement and: milk consumption, bought quantities, income level and price, the coefficient values ranging from 66.4% to 95.5%.

In determining the function that lies at the basis of the influence of effort indicators upon the level of expenses for milk procurement, the following indicators were taken into consideration:

- milk price;
- bought quantities;
- household income (self-consumption excluded).

On the basis of this information, the demand function was established under the form:

*Milk_expenses total_income bought_quantities milk_price population*

In other words, the increase of expenditures for the procurement of milk by the households is possible only under the conditions of increasing incomes and increasing bought quantities, under the background of population diminution and taking into consideration a selling price increase by about 2 percent. Following the analysis of estimated parameters, it can be noticed that these are statistically significant, at a significant threshold of 5%.

As in column *Prob* the values of the probabilities associated to the *t-statistic* tests are lower than 0.05, we can state with a 95% probability that the estimated parameters are statistically significant. At the same time, by analyzing the data from the table, it can be noticed that 99.7% of the resultative variable variation is explained by the variation of explanatory variables included in the model. This high value of $R^2$ reveals that the proposed model very well explains the economic phenomenon from the reality.

For the product "*cow cheese – telemea*" the following data series were constructed, identified as:

- cheese_expenses = expenses for buying cow cheese;
- bought_quantities = quantities of the respective product that were bought;
- cheese_consumption = average cheese consumption;
- cheese_price = price of cow cheese;
- population = number of the country's population (million inhabitants);
- total_income = income of households except for the values of incomes from self-consumption.

In order to determine which of the above-mentioned indicators have a significant influence upon the level of expenses for cow cheese procurement, the correlation coefficients were determined. These put into evidence that significant correlations exist between the level of expenses for cow cheese procurement and cheese consumption and its price, the coefficient values ranging from 67.5% to 69.4%.

In determining the function that lies at the basis of the influence of effort indicators upon the level of expenses for cheese procurement, the following indicators were taken into consideration:

- cheese price;
- average consumption.

On the basis of this information, a demand function under the following form was established:

*cheese_expenses c cheese-price cheese_consumption*

This function reveals that the level of expenses for cow cheese *(telemea)* procurement is also influenced by other parameters that can explain on a 20% basis the evolution of expenses. Analyzing the data from table, it can be noticed that 80.3% of the resultative variable variation is explained by the variation of explanatory variables included in the model. This high value of $R^2$ reveals that the proposed model explains the economic phenomenon from the reality very well.

For the product *"eggs"* the following data series were constructed, identified as:

- eggs_expenses = expenses for buying eggs;
- bought_quantities = quantities of the respective product that were bought;
- egg_consumption = average consumption of eggs;
- egg_price = price of eggs;
- population = number of the country's population (million inhabitants);
- total_income = income of households except for the value of incomes from self-consumption.

In order to determine which of the above-mentioned indicators have a significant influence upon the level of expenses for the procurement of eggs, the correlation coefficients were determined. These put into evidence that significant correlations exist between the level of expenses for the procurement of eggs, egg price and household income, the coefficient values ranging from 57.6% to 72.6%.

In determining the function that lies at the basis of the influence of effort indicators upon the level of expenses for the procurement of eggs, the following indicators were taken into consideration:

- price level;
- income level.

On the basis of this information, the demand function was established, under the form:

*Eggs_expenses c egg_price total_income*

This function reveals that the level of expenses for the procurement of eggs is also influenced by other parameters that can explain the evolution of expenses for buying this product. Analyzing the data from table, it can be noticed that 64.6% of

the resultative variable variation is explained by the variation of explanatory variables included in the model. This high value of $R^2$ reveals that the proposed model explains the economic phenomenon from the reality very well.

For the product "*potatoes*" the following data series were constructed, identified as:

- potatoe_expenses = expenses for the procurement of potatoes;
- bought_quantities = quantities of the respective product that were bought;
- potatoe_consumption = average potatoe consumption;
- potatoe_price = the price of potatoes;
- population = number of the country's population (million inhabitants);
- total_income = income of households except for the value of incomes from self-consumption.

In order to determine which of the above-mentioned indicators have a significant influence upon the level of expenses for the procurement of potatoes, the correlation coefficients were determined. These put into evidence that a relatively low correlation exists between the level of expenses for the procurement of potatoes, the average consumption and the household income, ranging from 37.2% to 41.7%.

In determining the function that lies at the basis of the influence of effort indicators upon the level of expenses for the procurement of potatoes, the following indicators were taken into consideration:

- average consumption;
- the level of income.

On the basis of this information, the demand function was established, under the form:

*Potatoe_expenses average_consumption total_income*

This function reveals that the level of expenses for the procurement of potatoes is also influenced by other parameters that can explain the evolution of expenses for buying this product. At the same time, analyzing the data from table, it can be noticed that 57% of the resultative variable variation is explained by the variation of explanatory variables included in the model. This value of $R^2$ reveals that the proposed model can explain the economic phenomenon from the reality.

For testing models the following steps were followed:

a) testing the existence of auto-correlations at residue level;

b) making a test for residual normality, in order to check up if these follow a relatively normal distribution;

c) testing model stability, by using the *Cusum and Square Cusum* tests, as well as the *recursive coefficient* tests.

From the analysis of tests, it results that there are certain explanatory variable shocks that do not create obvious instability at the level of explained variable. In

their attempt to identify certain valid models, the introduction of other variables was attempted, as an experiment, which led to poorer results as regards the model testing inclusively, so that the proposed model was maintained and it was considered relevant.

On the basis of results, we can conclude that **the utilized models are valid and capture the evolution of expenses in relation to the influence factors to a large extent.**

## 5. CONCLUSIONS

The analysis of agri-food demand in the period 2007–2010 and mainly in the last two years, fully affected by the economic-financial crisis, revealed oscillating evolutions in all products, following the modifications produced in the structure of consumption, of incomes and selling prices.

One of the elements with essential impact upon the agri-food demand was represented by the diminution of incomes, both in nominal and in real terms. The diminution of incomes, as a result of the imposed budgetary constraints and of tax increases led to the agri-food demand constraint, as the households rather preferred low energy foodstuffs. Thus, in very many products of first necessity the consumption decreased, as a result of income fluctuations correlated with price increases.

The alarming increase of prices for non-food commodities and services determined the population's re-orientation towards products and services represented by rents, payment of medicine and utilities, etc.

The construction of econometric models to measure the influence of certain effort factors upon an effect variable – expenses for the procurement of a certain product, revealed the following aspects:

• For the product "*milk*", the expenses allocated to the procurement of this product largely depends upon the price, the bought amounts as well as upon the household income;

• For the *cow (telemea) cheese*, 80% of the oscillations of expenses for the procurement of this product are due to prices and consumed quantities;

• However, in *eggs* the variation of expenses is determined by the selling price and the household incomes;

• Finally, in *potatoes*, as one of the most important products in the population's diet, the oscillations of expenses for buying this product depend on the average consumption and the average income level.

Yet, it should be specified that both in the case of cow (*telemea*) cheese and of potatoes, the demand also depends on a series of factors that are related to the population's food behaviour.

However, the diminution of the consumption of agri-food products should represent a warning signal for decision-makers. The diminution of consumption,

correlated with the diminution of incomes, even in the economic crisis period, puts under question the national economy sustainability, as well as the efficiency of the policies of social nature implemented by the government.

The increase of utilities prices, under the background of income diminution, will oblige a large part of the population to distribute their insufficient financial resources in a way that may affect the population's food security and health in our country.

In this respect, the state authorities must identify measures the applicability of which should influence the population's living standard and the national economy recovery implicitly.

## REFERENCES

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