

The Impact of Competition on the Sustainable Development of the Regional Food Market

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Abstract

The paper discusses the impact of the competition level on the sustainable development of a regional market in order to manage competitive and industrial policies. The authors proposed to calculate the impact of the competition level on the economic affordability of food products to the population according to the Herfindahl-Hirschman index. For this purpose, the paper determines the correlation coefficients between the Herfindahl-Hirschman index and indicators affecting the economic availability of milk for the population of the Russian Federation. According to the data for 2010-2016, the market of milk and dairy products of the region of the Russian Federation (by the example of the Republic of Tatarstan) was analyzed. On the basis of the approach proposed, a regression model was obtained depending on the level of competition on the share of population expenditures on milk and dairy products. The proposed tool can be applied in any territory, what determines its universality.

Keywords: Competition; Sustainable development; Regional markets; Local markets; Food security; Market structures.



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1. Introduction

Particular attention to sustainable development at both the global and national levels is given to such a task as ensuring the economic accessibility of food products to the population. 1 of the international agencies addressing issues in this direction is the Food and Agriculture Organization (FAO, 2010). In the Russian Federation, the policy on food security is implemented at the national level through the Doctrine of Food Security of the Russian Federation.

The scale and regional diversity of the Russian Federation require more vigorous state activity to create conditions for the sustainable development of all regions. Therefore, regional markets perform important functions in this direction. To achieve sustainable development of a region, it is necessary to develop a strategy for managing sustainable market development, while maximizing both the welfare of the population and the economic interests of producers, taking into account the environmental, political and other interests of society.

The reproduction concept of a regional consumer market is often examined in scientific works, where the market is viewed as a territorial organization of the sphere of circulation in conjunction with regional production, distribution and consumption. Approaching a stable equilibrium in the regional consumer market becomes possible if a balance is reached between the purchasing power of the population and the supply of goods and services, between the turnover of money and commodity resources, between the volume of commodity circulation and inventory, etc. (Simonov, 2015).

The management of sustainable market development should be carried out by influencing the elements forming the market system. Each type of market is based on three essential elements: price, supply and demand, and competition. These three categories are central to the market mechanism. The regional market should solve the questions: what to produce, how to produce and for whom to produce. Market instruments must ensure, firstly, the balance of supply and demand, and secondly, the balance of production and consumption.

The effective functioning of regional markets depends on the capacity and structure of consumption within the region, as well as on the nature and range of production (Saubanov and Malganova, 2015). In turn, the degree of satisfaction of the needs of the population and the parameters of regional production development are determined by the level of competition development in the industry market, that is, competition has a direct impact on the sustainable development of markets. In this regard, we believe that the sustainable development of the industry market should be viewed through the prism of types of market structures and factors of their management. Different types of market structures require different measures of competition policy.

Considering all the above, we believe that for a comprehensive analysis of the sustainable development of the regional sectoral markets, it is necessary to consider the influence of the level of monopolization on the exchange process between buyers (consumers) and sellers (producers). In this regard, the quantitative indicators of sustainable development can be divided into two large blocks:

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- First block — indicators affecting the level of demand;
- Second block — indicators affecting the volume of supply.

In our work, we consider the effect of the level of monopolization on the indicators affecting demand.

2. Methods

Special quantitative indicators have been developed to determine the type of market structure in the market; the most famous among them are: threshold market share, or Lind index, Herfindahl – Hirschman index and concentration index. In the economic and scientific literature, the following coefficients are also distinguished: the dispersion of market shares, the ratio of relative concentration, the Genie index, the entropy index, and the Hall-Tideman index

The most well-known and used in the practice of antitrust laws is the concentration degree indicator, or Herfindahl - Hirschman index (HHI). The Herfindahl - Hirschman index is calculated as the sum of squares of the shares of firms in the market. The share of each company is calculated as the proportion of the company's products in the market in terms of value or quantity:

$$HHI = S_1^2 + S_2^2 + S_3^2 + \dots + S_n^2 \quad (1)$$

Where S_1 – the market share of the company with the largest share;

S_2 – the market share of the next firm by weight, and so on till S_n ;

wherein:

$$S_i = \frac{q_i}{Q} \quad \text{b} \quad (2)$$

q_i - sales of the i-th company;

Q - the volume of market sales.

In the USA, the market in which the Herfindahl - Hirschman index exceeds 0.18 is considered highly monopolized (Nureev, 2002). The Russian legislation adopted the following boundaries for the Herfindahl - Hirschman index to determine the concentration level of the commodity market:

- high - at $0.2 \leq HHI \leq 1$;
- moderate - at $0.1 \leq HHI < 0.2$;
- low when $HHI < 0.1$.

3. Results and Discussion

Analysis of table 1 shows that the market for milk and dairy products in the Republic of Tatarstan by 2016 according to the Herfindahl - Hirschman index is close to the type of perfect competition.

Table-1.

Milk	2010	2011	2012	2013	2014	2015	2016
HHI in physical terms	0.04	0.02	0.01	0.01	0.02	0.02	0.02

We believe that different types of market structures may have different effects on the economic affordability of food. So, for example, a market close to monopolization can offer to buyers the goods at lower prices due to economies of the scale. At the same time, the volume of output may not cover the entire demand of the population. With perfect competition, manufacturers try to sell higher quality goods in order to conquer their niche. At the same time, the disadvantages of perfect competition affecting the sustainable development of the market include the presence of excess production capacity and inefficient use of resources.

Using linear correlation coefficients, we will reveal the degree of influence of the level of market monopolization on the main socio-economic indicators that form the demand in the market for milk and dairy products. We used data for 7 years (2010-2016) to calculate the indicators. The selection of indicators was based on the recommendations of the FAO economic affordability assessment and data generated by the statistical bodies in the Russian Federation.

Table-2. The coefficients of paired linear correlation between the indicators of the milk market concentration in the Republic of Tatarstan with the socio-economic indicators for 2010-2016.

No	Indicators	HHI in physical terms
1	Per capita consumption of milk and dairy products	0.41
2	The purchasing power of the population (milk and dairy products + animal butter + margarine)	-0.15
3	Share of expenses for milk and dairy products	 0.74
4	Cattle Milk Price Index	0.13
5	Consumer Price Index for Milk and Dairy Products	0.26
6	The share of cash costs for food	0.61
7	Funds ratio	-0,39
8	Genie coefficient	-0,42

Correlation coefficients indicate the presence of a relationship with only one indicator (the share of population spending on milk and dairy products). Consequently, a change in the level of monopolization in the milk market in the region does not affect the product purchasing power of the population and producer prices. Perhaps this fact is due to the fact that milk, along with bread and potatoes, is a product of basic necessities.

Thus, in the milk market, a close relationship was found between the Herfindahl – Hirschman index in terms of physical indicators (sales volume of a manufacturing company) and the share of expenses for milk and dairy products, which can be represented as follows:

$$\text{Milkeexpenses} = 3,3 + 42,74 \cdot \text{HHIvalueMilk} \quad (3)$$

Where Milkeexpenses - the share of expenses for milk and dairy products;
 HHIvalueMilk - Herfindahl-Hirschman index by physical indicators.

Table-3. MNC with the observations of 2010-2016 used (T = 7)

Dependent variable: Milkeexpenses

$$\text{Milkeexpenses} = 3,3 + 42,74 \cdot \text{HHIvalueMilk}$$

	<i>t-statistics</i>	<i>P-value</i>	
const	8,9651	0,00029	***
HHIvalueMilk	2.4629	0.05703	*
Mean dependent variable	4.142857	Statistical deviation of the dependent variable	0.489412
The sum of quadratic residues	0.649359	Statistical model error	0.360377
R-square	0.548159	Corrected R-squared value	0.457791
F (1, 5)	6.065850	P-value (F)	0.057026
Logical credibility	-1,610693	Akaike criterion	7.221387
Schwartz Criterion	7.113207	Hennan-Quinn criterion	5,884306
Rho parameter	0.099349	Durbin Watson Statistics	1,396111

Statistical deviation of the dependent variable

Statistical model error

Corrected R-squared value

P-value (F)

Akaike criterion

Hennan-Quinn criterion Null hypothesis: heteroscedasticity is absent; Test Statistics: LM = 0.399421

p-value = P (Chi-square (1) > 0.399421) = 0.527388

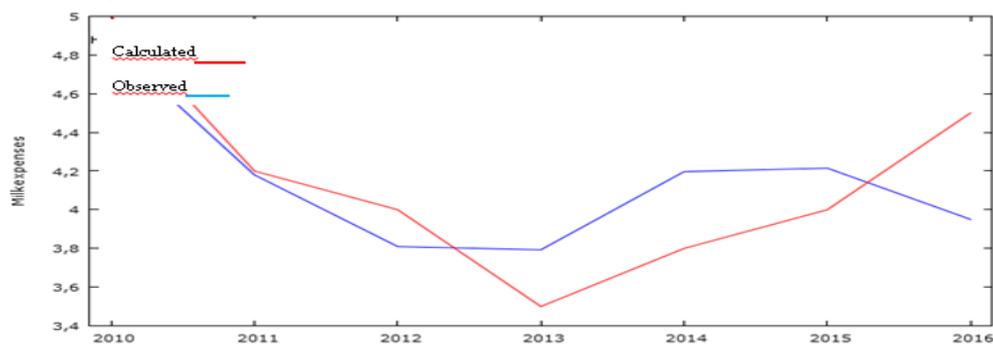
Statistics Darbin-Watson = 1,39611; P-value = 0.143832

t (5, 0.025) = 2.571

Variable	Coefficient	95% confidence interval
const	17.4783	(15.9719, 18.9847)
HHIprofitPotato	-11,4614	(-24.8167, 1.89397)

According to Table 3, Fisher's statistics show that the constructed equation is statistically significantly more than 90%, the statistical reliability of the regression coefficient is more than 90% confirmed by the Student's criterion. The model explains 54.82% (R²) of the variance of the dependent variable. The Brish-Pagan test shows the absence of heteroscedasticity with a reliability of more than 99%. The absence of autocorrelation in the studied time series with a probability of more than 99% confirms the Darbin – Watson test. The quality of the model is confirmed by the graph of observable and calculated values in Figure 1.

Figure-1. The diagram for the observed and calculated impact values of the milk market monopolization level on the proportion of household spending to milk and dairy products for 2010-2016



The influence of competition on local markets is studied by many authors (Bivens, 1968; Holdren, 1964; Leed, 1964). Oligopolistic competition has been frequently used to study various issues in international trade and economic geography, the impact of globalization on the size distribution of firms (Weisman, 1994; Zhou, 2013).

Scientific direction, which studies flexible capacity strategy (FCS) under oligopoly competition with uncertain demand. Each firm utilizes either the FCS or inflexible capacity strategy (IFCS). Flexible firms can postpone their productions until observing the actual demand, whereas inflexible firms cannot (Yang and Ng, 2014).

4. Summary

Let's summarize the results obtained according to the regression model data. The linear coefficient of average elasticity is 0.20, therefore, an increase in the market concentration index by 1% leads to an increase in the share of expenditures on milk and dairy products by 0.20%. Consequently, the strengthening of the monopoly power of a number of manufacturers does not significantly affect the share of expenditures for this product.

In this market, we can note the relatively high level of competition in the industry (the HHI value in 2016 is 0.02 units). If competition in the market would decline and the Herfindahl-Hirschman index value reaches 0.1, the share of expenditures on milk and dairy products will average 7.57, and will be in the range from 3.86 to 11.29 with 95% reliability. Under the scenario with the achievement of the monopolization assessment equal to a highly concentrated level, that is, a value of 0.2, the share of expenses for milk and dairy products will reach an average of 11.85, and with a 95% reliability will be in the range from 3.75 to 19.95.

5. Conclusion

Thus, the study of regression dependencies allows us to determine the industrial and competitive policy of a region in order to meet the demand of the population with quality local food at a sufficient level. It can be noted that it is precisely the high concentration of monopoly power in the milk market that increases the share of household spending, so it is important to maintain the current market conditions corresponding to the highly competitive market ones in the region.

Industrial policy involves the use of active mechanisms of economic policy, and competition policy provides for the use of passive ones. The question of the interaction between competitive and industrial policies in local markets where monopoly prevails can be expressed in the process of removing barriers to entry into these markets, setting prices, and ensuring product quality.

In the EU countries, industrial policy is introduced into the market mechanism only at certain minima, since the goal of creating the EU is determined by the development of the free market. The interrelation of industrial and competitive policies is realized in strengthening small business in its struggle against monopolies in the interests of consumers. In Japan, industrial policy is a priority, while the synergy of the two directions was due to the softening of antitrust regulation and the informal resolution of some issues in industrial policy.

Acknowledgment

The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

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