THE MILK MARKET CONCENTRATION AND COMPETITION THRESHOLDS IN ROMANIA

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Abstract

The paper aimed to determine the concentration and competition degree in Romania's milk market using a sample of the top 10 dairies, their market share in terms of turnover, and Herfindhal-Hirschman Index highest and lowest thresholds and concentration rate. The Herfindhal-Hirschman Index had a low value varying between 597.68 and 484.2602, therefore lower than 1,000, meaning a low concentration degree and a high competition among the companies operating in milk processing industry. As a conclusion, a higher competition among the dairies on this market could be an incentive to find solutions to reduce production and marketing costs by improving the distribution channels.

Key words: *competition, concentration, Herfindhal- Hirschman Index, milk market, thresholds*

INTRODUCTION

Milk market in Romania is characterized by a large variety of companies regarding their size, production capacity, offer of milk and dairy products, turnover and economic power. In 2013, there were still operating 472 dairies in Romania, but because of the milk market crisis, year by year some of these companies disappear (Mihu Cristian, 2015) [6].
The main cause of the milk market industry and market crisis is the reduction of dairy cows live stock, the lack of raw milk compared to the processing capacity, the imports of fresh milk and powdered milk by milk processing industry which affects the Romanian producers, the lack of financial support for dairy farmers, the invasion of dairy products from the Western countries in the Romanian market (Demetriad Maria, 2015, Popescu Agatha, 2015) [3, 8]
The turnover of those 472 dairies accounted for Euro Million 882.6 in the year 2013.However, a few companies, more exactly about 30 dairies are in the top, registering a higher market share, while all the others have a very low market share.
Concentration degree offers a general picture on a market, as well as on the competition running among various companies with the same profile and purpose operating on that market.
Among the market concentration degree and the economic performance of the firms operating on that market there is a direct connection. Thus, the companies with high economic performance have the capacity to dominate and influence the market.
The assessment of concentration and competition in a market is usually carried out using specific methods and indicators such as "market share", "concentration rate" and "Herfindhal-Hirschman Index".
The purpose of the paper was to determine the highest and lowest thresholds of Herfindhal-Hirschman Index based on the turnover and market share of the top 10 dairies operating in milk processing industry and milk and milk products market. This is justified by the fact that in the milk market there are 472 dairies and it is difficult to collect information from all of them to calculate the concentration degree in terms of Herfindhal-Hirschman Index.
In this respect, it was used the mathematical model presented and used to analyze the competition and concentration degree in the field of insurance (Busu Mihai, 2012, 2013) [1,2].

MATERIALS AND METHODS

In order to set this paper, the empirical data were collected from the Ministry of Finance, regarding the turnover of the top 10 dairies operating in food industry and in the market in the period 2011-2013 [7].

To characterize the concentration and competition degree in the milk market, there were determined the following indicators: Market Share (MS), Concentration Rate (CR) and Herfindhal-Hirschman Index (HHI) using the turnover of the top 10 dairies.

(a)Market Share (MS) shows the weight of the turnover the company i (T_i) in the total turnover in the field of milk processing, $\sum_{i=1}^{K} Ti$, according to the formula:

$$MS_i =(T_i/ \sum_{i=1}^{K} Ti)*100$$

The firm with the highest market share is the most powerful company in the market, while the company with a low market share has an weak economic performance and reduced influence in that market. The market share values could range between 0 % up to 100 %.

(b)Concentration Rate (CR) is given by the sum of the market shares of the top companies operating in the market, according to the formula:

$$CR_K = \sum_{i=1}^{K} MS$$

where MS = market share and k represents the top companies operating in that market.

The concentration rate varies between zero and 1, 0>CR< 1. If CR = 0, it is said that there is a perfect competition or there is no concentration, because the market share is uniformly distributed among the firms operating in that market, therefore it is about oligopoly. If CR=1, it is about a perfect concentration or no competition, therefore it is monopoly, only one firm is operating.

(c) Herfindahl-Hirschman Index (HHI) is given by the sum of the squares of the market share of all the companies operating in the market. Its formula is:

$$HHI= \sum_{i=1}^{K} MS^2$$

HHI value varies between 0, meaning perfect competition, in case of an oligopoly economy and 10,000, meaning monopoly in the field, only one company is operating.

According to the EU Commission Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations from 2004 and Federal Trade Commission and U.S. Department of Justice Issue Revised Horizontal Merger Guidelines from 2010 (DOJ FTC), markets are classified in three categories: (i)low concentrated market, (ii) middle concentrated market and (iii) strong concentrated market.

Table 1. Market types and concentration degree in terms of HHI Value

HHI	Source	Low concentrated market	Middle concentrated market	High concentrated market
	EU Commission	<1,000	1,000-2,000	>2,000
	DOJ-FTC	<1,500	1,500-2,500	>2,500

Source: EU Commission and DOJ-FTC, [4, 5]

Most of times it is difficult to exactly calculate HHI because of a lack of information as long as many companies are operating in the market.

In this case, the concentration degree in the market should be calculated based on the market shares of the best K companies situated in the top positions. These firms will be of much help in providing information about the HHI superior and inferior threshold.

In this purpose, considering the best 10 companies in the field whose market share is known, they should be arranged in the decreasing order of their market share as follows:

$$MS_1 \leq MS_2 \leq MS_3 \leq MS_4..... \leq MS_{10}.$$

Then, we should continue with the unknown market share of the other companies operating in the same field of activity as follows:

$MS_k \leq MS_{k+1} \leq MS_{k+2} \leq MS_{k+3......} \leq MS_n$.
The HHI formula will be in this case:

$HHI = MS_1 \leq MS_2 \leq MS_3 \leq MS_4..... \leq MS_{10} \leq MS_k \leq MS_{k+1} \leq MS_{k+2} \leq MS_{k+3......} \leq MS_n$.

Starting from this equation, using mathematical demonstrations, we may determine:
(a) HHI highest threshold (HHI-HT) based on the formula:

$HHI\text{-}HT = MS_1^2 + MS_2^2 + ... MS_K^2 + [\ 100 - (\ MS_1 + MS_2 + ...MS_n)\ ]* MS_k$

(b) *HHI lowest threshold (HHI-LT) based on the formula:*

$HHI\text{-}LT = MS_1^2 + MS_2^2 + ... MS_K^2 +$

$+ \dfrac{(MS_{K+1} + ... + MS_n)^2}{n - K}$

Therefore, $HHI\text{-}LT \geq HHI \leq HHI\text{-}HT$.
This is the model described by Busu, M.(2012, 2013). [1, 2]

RESULTS AND DISCUSSIONS

The turnover of the top 10 Romanian dairies. In 2011, the turnover varied between Lei Million 502.9, the highest level, in case of SC Danone PDPA SRL Bucharest and Lei Million 90.4, the lowest level among the top 10 dairies, in case of SC Covalact SA, Sfantul Gheorghe, Covasna. In 2012, SC Danone PDPA SRL Bucharest remains on the 1st position with the highest turnover, Lei Million 506.4 and on the 10th position also came SC Covalact SA, Sfantul Gheorghe, Covasna with Lei Million 96.4 sales. In 2013, in the top is also SC Danone PDPA SRL Bucharest with Lei Million 481 sales and on the 10th position is Industrializarea laptelui Mures SA, Tg.Mures with Lei Million 128 turnover.
Analyzing the evolution of their turnover, one can notice that almost all the dairies recorded an increase of their sales, except SC Danone PDPA SRL Bucharest, SC Friesland Cimpina Romania SA, Cluj-Napoca, and La Dorna Lactate SA, Dorna Candrenilor, Suceava,

which registered a decline of their sales. (Table 2).
The market share of the top 10 Romanian trademarks in milk processing industry. In the year 2013, Danone Company was situated in the top position with 12.11 % market share. On the 2nd position it was Albalact Company with 10.65 % and Friesland Company with 9.09 %. Fabrica de lapte Company had 6.07% market share, Napolact Company had 5.61 %, Hochland Company 5.43 %, La Dorna lactate 4.42 %, Simultan 4.04 %, Covalact 3.31 % and Industrializarea laptelui Mures 3.22 %. All these top 10 Romanian trademarks operating in the milk market totalized 63.90 % market share (Table 3) (Popescu Agatha, 2015) [8]
Calculation of Herfindahl-Hirschman Index Thresholds.

(a) HHI highest threshold (HHI-HT) based on the formula:

$HHI\text{-}HT = MS_1^2 + MS_2^2 + ... MS_K^2 + [\ 100 - (\ MS_1 + MS_2 + ...MS_n)\ ]* MS_k$

Replacing the symbols with the corresponding figures, it was obtained:

$HHI\text{-}HT = 12.11^2 + 10.65^2 + 9.09^2 + 6.02^2 + 5.61^2 + 5.43^2 + 4.42^2 + 4.04^2 + 3.31^2 + 3.22^2 + MS_{11}^2 + ...MS_{472}^2 = 481.4394 + (100 - 63.90)*3.22 = 597.68$.

(b) HHI lowest threshold (HHI-LT) based on the formula:

$HHI\text{-}LT = MS_1^2 + MS_2^2 + ... MS_K^2 + \dfrac{(MS_{K+1} + ... + MS_n)^2}{n - K}$

Replacing the symbols with the corresponding figures, it was obtained:

$HHI\text{-}LT = 481.4394 + \dfrac{(100 - 63.9)^2}{472 - 10} = 484.2602$

Table 2. The turnover of the top 10 Romanian dairies in Milk Processing Industry, 2011-2013 (Lei Million)

Romanian Brands	2011	2012	2013	2013/ 2011 %
SC Danone PDPA SRL Bucharest	502.9	506.4	481.0	95.6
Albalact SA Oiejdea, Alba	338.2	343.8	423.1	125.1
SC Friesland Cimpina Romania SA, Cluj-Napoca	382.7	407.1	361.3	94.4
Fabrica de lapte Brasov SA, Baraolt, Covasna	97.1	169.3	239.1	242.2
SC Napolact SA, Cluj-Napoca	222.3	224.5	222.8	100.2
Hochland, Sighisoara, Mures	197.9	197.4	216.0	109.1
La Dorna Lactate SA, Dorna Candrenilor, Suceava	185.2	182.0	175.7	94.8
Simultan SRL, Faget, Timis	127.7	96.4	160.6	125.7
SC Covalact SA, Sfantul Gheorghe, Covasna	90.4	118.5	131.8	145.7
Industrializarea laptelui Mures SA, Tg.Mures	124.3	135.0	128.0	102.9

Source: Own calculations based on the data provided by Ministry of Finance Database, 2014. [7]

Therefore, even though we do not know exactly the market share of all the 472 dairies operating in the milk market, we know that Herfindahl-Hirschman Index has the highest threshold equal to 597.68 and the lowest threshold equal to 484.2602.

$484.2602 \geq HHI \leq 597.68$.

According to the data mentioned in Table 1, we can notice that the values of HHI are smaller than 1,000, that is the concentration degree in the milk and dairy products market in Romania is a low one.

A low concentration degree involves a higher competition in the milk market, but besides the market share, the companies could adopt various distribution channels and direct sales

as measures to diminish the competition impact.

Table 3. The market share of the top 10 dairies operating in the milk industry and market in Romania in 2013.

Crt. No.	Romanian Dairy name	Market share (%)
1	SC Danone PDPA SRL	12.11
2	Albalact SA Oiejdea, Alba	10.65
3	SC Friesland Cimpina Ronania SA, Cluj-Napoca	9.09
4	Fabrica de lapte Brasov SA, Baraolt, Covasna	6.02
5	SC Napolact SA, Cluj-Napoca	5.61
6	Hochland, Sighisoara, Mures	5.43
7	La Dorna Lactate SA, Dorna Candrenilor, Suceava	4.42
8	Simultan SRL, Faget, Timis	4.04
9	SC Covalact SA, Sfantul Gheorghe, Covasna	3.31
10	Industrializarea laptelui Mures SA, Tg.Mures	3.22
11	Total Top 10	63.90

Source: Own calculations based on the data provided by Ministry of Finance, 2014. [7]

The concentration rate (CR) varied between 59.3 % in the year 2011 and 63.9 % in the year 2013 taking into account only the top 10 dairies in Romania. This shows an ascending trend of concentration in the milk market in the analyzed period, which could be considered a positive aspect encouraging the milk processing companies to increase their size and benefit, to have a higher economic performance and resist better to the market pressure.

CONCLUSIONS

The paper proved that using various mathematical models it is possible to assess the thresholds of concentration and competition degree in case that there are no sufficient data about all the companies operating in a field of the economy.

Using a sample of 10 top Romanian brands in milk processing industry in the period 2011-2013: Danone, Friesland, Albalact, Napolact, Fabrica de lapte, Hochland, La Dorna, Simultan, Industrializarea laptelui Mures and Covalact, whose total turnover accounted for

63.9 % of the total turnover in the field, it was possible to determine the highest and lowest thresholds of Herfindhal-Hirschman Index.

Regarding the milk market analyzed in Romania during the period 2011-2013, it was found a low concentration degree as the Herfindhal-Hirschman Index had a low value varying between 597.68 and 484.2602.

As a conclusion, a higher competition among the companies operating on this market but also an incentive to find solutions to reduce production and marketing costs by improving the distribution channels.

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