ECONOMETRIC MODEL CONCERNING THE STATUS AND EVOLUTION OF THE AUTOMOTIVE INDUSTRY IN ROMANIA

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ABSTRACT: *The year when the automobile appear, 1885, changed irreversibly the world, revolutionizing the people lifestyle. This creation anticipated new industrial domains, stimulated the massive employments, and eroded the "class struggle" offering the opportunity to travel also to those without financial possibilities, offering the pleasure of hobby to thousands of people. These considerations coupled with the fact that the automotive industry in Romania is one of the industries with the highest value added, made us choose this industry for our study. The paper aims to make a presentation of the characteristics and evolution of the automotive industry in Romania, also proposing an econometric model through which to be able to predict its evolution.*

KEY WORDS: *competitiveness; automobile industry; performance; evolution; economic crisis.*

JEL CLASSIFICATION: *L25; L62; C53; C52.*

1. INTRODUCTION

The XXI century is a challenge for the automobile producers, but one aspect is universally recognized: the desire to own an automobile is spread or universal across the globe. The automobiles with engine remain the most used way to get somewhere: in the proper sense as a means of transport, and figuratively, as the image of a social status. Automobile production is one of the most important economic activities, involving different balances also in other sectors, such as relations with manufacturers of spare parts, technical research, petroleum products, the design and construction of highways, international tourism, marketing firms, organizing automotive rallies, and others. The automobile revolutionized people moments: the universal desire to possess an automobile has its source in the historical aspirations of the people for freedom,

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mobility, speed, comfort, security, independence and quality of life increasing, representing the largest acquisition of the human, after housing. Today, the automobile ensures conjunction with pleasure, but also with its quality of mean of work, being also subject of legislative disputes.

The knowledge revolution generates profound and essential changes of all the economical activities` components, radically influencing the productiveness and competitiveness of firms and of national or global economies. (Sîrbu et. al., 2009)

The automobile represents nowadays a delicate problem that should be solved by moderating the dependence of people from urban environment towards the automobile, reducing the negative effects on the environment, valuing the public transport offer. Romania adherence to European Union meant major responsibilities for Romanian environment, respective economic environment, politic, demographic and socio-cultural. The automotive Romanian industry is quite internationalized, being one of the few, if not the only competitive national sector able to be integrated in the situation of internationalization and globalization of the global economy. The single market means for the Romanian automobiles producers a new challenge, that of creating a highly competitive sector.

In the context of an economy in full uptrend, the Romanian automobile and auto parts industry is characterized by an effervescence generated on one side of the infusion of foreign capital attracted by cheap labor force, well qualified, low costs, Romanians experience and on the other hand by the Romanian automotive manufacturers. (Drăghici & Mihai, 2008).

In 1990, the automotive market from our market included three Romanian brands: Dacia, Aro and Olcit. Apart from these, in Timisoara there was also a small factory for the production of a car brand with small fuel consumption (600 cm3), manufactured only in Romania under the name Lastun. (Bâldan & Ungureanu, 2007).

Currently on the Romanian market there are two autochthon producers, respectively Dacia Groupe Renault and Ford Romania, and about 43 important brands of automobiles. In fact, even these two major producers are no longer with Romanian capital, but they have majority foreign capital. Automotive industry was not the only one who has recorded massive privatizations from 1990 to the present. The largest privatization deals concluded are: Romanian Commercial Bank (sold to Erste Bank at the end of 2005), Petrom (the national oil company, sold to OMV in 2004), Agricultural Bank (sold to Raiffeisen Bank in 2001), Sidex – the giant steel mill (sold to ArcelorMittal in 2000), Romanian Development Bank (sold to Société Générale in 1998), and Dacia car manufacturer (sold to Renault in 1997). The most recent important privatization contracts were signed for car maker Automobile Craiova with Ford, in 2007 (Rădulescu, 2010).

The late privatization of Dacia Company delayed the investments in the horizontal industry (Manea, 2005). The automobile market liberalization from 2006 concerning the integration of Romania in the European Union, determined the competition increase on the Romanian automobile market.

After 1990, Romanian people took by storm the second hand automobile market in Western Europe, which led the Romanian automobile market to be up of such automobiles. Thus APIA statistics indicate that in 1999 there were recorded sales

of 6764 new automobiles from the import and in 9038 from national production. In time, the proportion between the sales of second hand automobiles and new automobiles changed, in 2007 in Romania selling 204719 automobiles from import and 110902 autochthon automobiles.

The economic and financial crisis broke the joy of new automobiles importers, in January 2010 on the Romanian market selling 2728 new automobiles form the import and 715 from internal production. This evolution enjoys the sellers of second hand automobiles and displeases the producers.

The object of the research has been the presentation of the automobile industry at both the European as well as the Romanian level, the effects of the world economic crisis on the automobile industry and the conception of an econometric model of forecasting the evolution of the Romanian automobile industry.

Theoretical support of the scientific research focused on studying both the fundamental work of specialists from several countries, as well as regular publications of EUROSTAT, World Bank, OECD, Dacia Group's internal publications; there have been analyzed statistical data of Romania's National Statistics Institute, Association of Automobile Manufacturers in Romania, the Association of Automotive Manufacturers and Importers, the European Automobile Manufacturer's Association, etc..

The procedures mainly used in our research were: logical analysis and synthesis, induction and deduction, analogy and the statistical and econometrical method. An important role has benchmarking process used in formulating ideas on Romanian automotive industry. To study the evolution of the automobile industry was used the case study method, which allowed drawing conclusions on the automotive industry in Romania.

The theoretical aspects are supplemented with examples, cases and numerical models where necessary. All these are subjected to the same fundamental goals, namely to facilitate understanding and using concepts and tools and encourage initiative and creativity of those who study the paper. In this way we hope this can help build a modern, dynamic and optimistic way of thinking.

2. THE EFFECT OF THE ECONOMIC CRISIS ON THE EUROPEAN AUTOMOTIVE INDUSTRY

The world has not been through something like this from over 70 years. Since spring 2008, the ominous signs were multiplied: first in the American immovable sector, then in the banking domain and of the investments funds, and lastly in the industrial domain. The lack of liquidity, the reluctance of banks to grant loans became within a few months phenomenon that affected all major world economies.

The headlines of the newspapers announced resounding insolvency of some financial giants like the size of Lehman Brothers corporate, of some industrial symbols such as General Motors, or even an entire country, as in the case of Iceland, whose people found themselves in spring of 2009, under the burden of a public debt higher than Germany went down at the end of World War I.

Since the first trimester of 2008, all major industrialized countries of the world have entered in recession in turn, inducting into the same downward spiral a good part

of the world economy. In some cases, such as in the Baltic States or Ukraine, the economic decline has been particularly abrupt, of over 10% in a few months.

Romania also went from, the record economic growth from 2007-2008, to a deep recession, some analysts estimating for this year a decrease of over 6% of GDP.

The automotive industry also experienced a series of dramatic developments: the American giants General Motors and Chrysler were forced to search relief in bankruptcy, brands like Opel, Saab and Ssangyong have been saved from collapse after the takeover by investors in more or less related to the automotive industry. On the other hand, the difficult access to finance of the customers made the auto markets to decrease highly: with more than 25% in the United States, with over 40% in Russia, 60% in Ukraine. Countries such as Germany and France managed to avoid this collapse, launching ample programs to stimulate the purchase of new automobiles. Thus, the government in Berlin has allocated 5 billion Euros for German version of scrappage program, establishing a scrapping premium for 2500 Euros. In Italy, the value of the scrapping premium was established at 3500 Euros. These measures proved their efficiency, contributing to the selling revival on the respective markets.

The European automotive industry represents the key of power and competitiveness of Europe, the EU produces almost one third of the automobiles produced in the world. This has an essential role for economic growth (with a major contribution to EU GDP), exports, innovation and employment.

The economic crisis affected intensively the automobile sector, for its sustaining being necessary a focalized support, that treats the structural problems through the competitiveness increasing and through the adaptation on future needs. (Hagiu, 2011)

As a result of the facts that between 60 and 80% from the new automobiles from Europe are purchased through the credits, the financial crisis that generated the deceleration of the economic growth affected widely also the industry of automobiles. The difficult situation of the European industry of automobiles is due to some three major causes:

- First, there has been a suddenly and uniform reduction of the automobile demand, both in the EU and worldwide, due to lower consumer purchasing power.
- Second, some segments of the automotive industry reported difficulties in accessing credit and concerns of liquidity absence, caused by the fact that many companies were unable to obtain credit on reasonable terms, having low credit ratings due to negative prospects of the market.
- In the third, the automotive industry has suffered from structural problems before the crisis; automobile companies were already finding themselves in a highly competitive business environment.

The year 2010 had a disappointed end in what concern the automobile industry, because the sales went down with 4, 7% compared with 2009.

Sales were down by 3 of the top 5 European markets compared to 2009, as: in France fell by 0.7%, Italy 9.2% and Germany with 23.4%, while in the Great Britain and Spain have registered slight increases of 1.8% and 3.1% respectively. (Table 1)

The automobiles sales that were achieved in Central Europe and East Europe in 2010, were well behaved, most markets in the region showing positive growth

compared to previous year. For example, in Lithuania and Latvia in 2010 the sales increased to 6.1% and 18.6%, in big contrast to figures from the end of 2009, showing a decrease of 72.9% and 66,.2%. Despite having sold with 13.7% fewer cars in 2009 than the Golf, Volkswagen remained the bestselling brand in Europe, with sales of 492,556 units during the year.

Table 1. Automobiles sales according to the market

			Change %			Change %
Country	**Dec_10**	**Dec_09**	**Dec**	**Year 2010**	**Year 2009**	**Full year**
Austria	20,366	19,422	+4.9%	328,565	319,404	+2.9%
Belgium	29,243	26,449	+10.6%	547,347	476,194	+14.9%
Cyprus	1,171	1,014	+15.5%	14,099	15,004	-6.0%
Czech	14,210	14,815	-4.1%	168,220	161,663	+4.1%
Denmark	9,372	11,790	-20.5%	146,721	112,436	+30.5%
Estonia	764	697	+9.6%	10,295	9,946	+3.5%
Finland	6,191	4,144	+49.4%	111,961	90,664	+23.5%
France	228,316	228,392	-0.03%	2,251,669	2,268,671	-0.7%
Germany	230,371	215,564	+6.9%	2,916,260	3,807,175	-23.4%
Great Britain	123,817	150,936	-18.0%	2,030,846	1,994,999	+1.8%
Greece	3,675	9,680	-62.0%	140,691	220,074	-36.1%
Hungary	3,935	4,360	-9.7%	43,815	60,743	-27.9%
Iceland	225	102	+120.6%	3,106	2,132	+45.7%
Ireland	433	304	+42.4%	88,423	57,461	+53.9%
Italy	131,220	167,699	-21.8%	1,970,142	2,170,688	-9.2%
Latvia	804	339	+137.2%	6,365	5,367	+18.6%
Lithuania	857	591	+45.0%	7,970	7,515	+6.1%
Luxemburg	2,503	2,800	-10.6%	49,726	45,186	+10.0%
Norway	10,578	10,250	+3.2%	128,196	98,675	+29.9%
Poland	35,940	28,710	+25.2%	334,395	322,108	+3.8%
Portugal	22,703	17,385	+30.6%	218,052	161,001	+35.4%
Slovakia	7,754	5,864	+32.2%	66,063	85,298	-22.6%
Slovenia	3,399	3,553	-4.3%	59,226	55,712	+6.3%
Spain	69,438	90,825	-23.5%	985,526	955,823	+3.1%
Sweden	29,769	19,368	+53.7%	289,683	213,408	+35.7%
Switzerland	27,796	24,146	+15.1%	290,758	265,544	+9.5%
Netherlands	11,593	7,980	+45.3%	483,947	385,564	+25.5%
Total	**1,026,443**	**1,067,179**	**-3.8%**	**13,692,067**	**14,368,455**	**-4.7%**

Source: http://www.jato.com/PressReleases/A%20Tough%20Year%20for%20the%20European%20Car%20Industry%20as%20Overall%20Sales%20Fall%20During%202010.pdf

2011 was another difficult year for the industry, due to the cuts in national budgets of the countries from Europe and the lack of consumer confidence. It is worrying that many markets registered a significant diminution in sales in December, reiterating the fragile nature of the recovery. It is expected that the producers to be very active throughout 2011, deploying a range of strategies to support their sales performance.

3. FORECASTING THE NUMBER OF AUTOMOBILES PER 1000 INHABITANTS

Despite the crisis in the automotive industry, recent years have seen record levels on the volume of automobiles produced by worldwide brands. If in 2007 was recorded for the first time a level of 70 million automobiles in 2010 this record was broken, reaching 72 million, and for this year, if the effects of stopping production in Japan, with chain implications on all continents, will not be higher than calculated so far, will be produced over 76 million automobiles and light commercial vehicles. (Finance, 2011)

Specialists are convinced that the provided signs by all the markets with low demand and a stability more and more obvious, are arguments for better sales, which will be with an equivalent with an increase of production.

In the following subchapter we will example the econometric approach on the auto industry from Romania, Thus, we will justify the applicable model for the description of auto industry from Romania and we will estimate formulated model components (including verification of its meaning). At the end of the subchapter, we will estimate the values of the auto industry for the next period (2 years).

For the beginning we will present a statistic situation of the number of automobiles reported to 1.000 inhabitants from the last years. (Table 2)

Table 2. The statistical evolution of the number of automobiles (medium class) reported to 1.000 de inhabitants

Year	Number of automobiles
1998	77.20
1999	79.10
2000	81.10
2001	84.80
2002	85.10
2003	86.80
2004	91.30
2005	95.20
2006	98.40
2007	97.70
2008	100.40
2009	104.70
2010	114.20

Because this statistic situation is a chronological series, the model specification will start from the graphic representation of data, respective the building of waveforms.

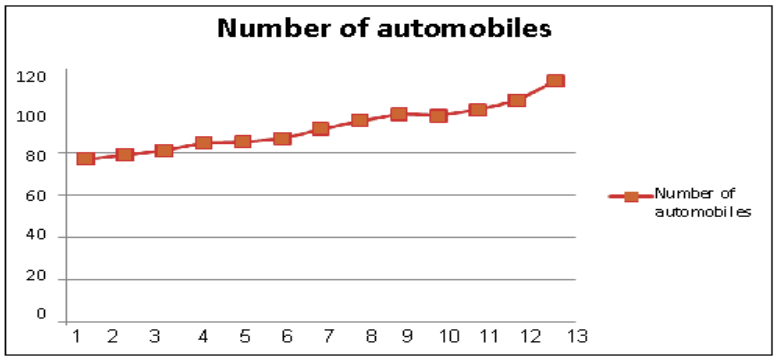

Figure 1. Evolution of the automobiles number

Because in the analyzed period, the phenomenon evolution represents a permanent increase, without significant oscillations, and the empirical points curve present a shape that can be approximated with a straight line model, which can be used to approximate the evolution of the phenomenon is:

(1) $$y_t = f(t) + u_t$$

where:

y_t – registered values by the number of automobiles in the analyzed years

f(t) – the trend component that can be described by a linear function:

$y_{1t} = f(t) = a_1 + b_1 \times t$

u_t – residual variable

The previous model will be:

(2) $$y_t = y_{1t} + u_t$$

Solving the model involves estimating the two variables:

y_{1t} = estimated component trend;

$u_{1t} = y_t - y_{1t}$ = estimated residual variable.

Trend component estimation is performed using the method of the least squares, which is to minimize the function:

(3) $$F(a1,b1) = \min \sum (y_t - y_{1t})^2 = \min \sum (y_t - a1 - b1 \times t)^2$$

The minim condition of this function results from:

(4) $$F'(a) = 0, \; n \times a + b \times \sum t = \sum y_t$$

and

(5) $$F'(b) = 0, \; a \times \sum t + b \times \sum t^2 = \sum y_t \times t$$

The calculation of this system is represented in Table. 3. From the 3 table result the following situation:

(6) $$13 \times a1 + 91 \times b1 = 1196$$

(7) $$91 \times a1 + 819 \times b1 = 8872.9$$

From (6) and (7) equations result that:

$$a1 = 72.7346 \text{ and } b1 = 2.7522$$

Table 3. The calculation of the system for which the trend function have the minimum value

Year	Year (t)	y_t	t^2	$y_t \times t$
1998	1	77.20	1	77.20
1999	2	79.10	4	158.20
2000	3	81.10	6	243.30
2001	4	84.80	16	339.20
2002	5	85.10	25	425.50
2003	6	86.80	36	520.80
2004	7	91.30	49	639.10
2005	8	95.20	64	761.60
2006	9	98.40	81	885.60
2007	10	97.70	100	977.00
2008	11	100.40	121	1104.40
2009	12	104.70	144	1256.40
2010	13	114.20	169	1484.60
TOTAL	**91**	**1196**	**819**	**8872.90**

Using the software package EViews to estimate model parameters were obtained the results shown in Table. 4.

Table 4. Parameter estimation using the software package Eviews

Dependent Variable: y_t Method: Least Squares Sample: 1998 - 2011 Included observations: 13								
Variable	Coefficient	Semnif. ind.	Std. Error	Semnif. ind.	t-Statistic	Semnif. ind.	Prob.	
C	72,7346	a1	1,386	S_{a1}	52,4785		0,000	p(a1)
t	2,7522	b1	0,1746	S_{b1}	15,7612		0,000	p(b1)
R-squared	0,9576	R^2	Mean dependent var		92,0000	y med		
Adjusted R-squared	0,9537	R^2_c	S.D. dependent var		10,9530	S_y		
S.E. of regression	2,3557	S_{e1}	Akaike info criterion		4,6922	AIC		
Sum squared resid	61,0441		Schwarz criterion		4,7791	SC		
Log likelihood	-28,4994	L	F-statistic		248,4160	F_c		
Durbin-Watson stat	1,2079	d	Prob(F-statistic)		0,0000	p(F)		

Based on these estimates were calculated estimated values of y variable, namely:

(8) $$y_1 = 72.7346 + 2.7522 \times t$$

and the ut residual variable namely:

$$u_{1t} = y_t - y_{1t}$$

The values registered by these variables are presented in the table 5.

Table 5. The values registered by the y and u variables (using Eviews program)

Actual y_t	Fitted y_{1t}	Residual $u_{1t} = y_t - y_{1t}$
77.20	75.4868	1.7132
79.10	78.2390	0.8610
81.10	80.9912	0.1088
84.80	83.7434	1.0566
85.10	86.4956	-1.3956
86.80	89.2478	-2.4478
91.30	92.0000	-0.7000
95.20	94.7522	0.4478
98.40	97.5044	0.8956
97.70	100.2566	-2.5566
100.40	103.0088	-2.6088
104.70	105.7610	-1.0610
114.20	108.5132	5.6868

To test the significance of parameters and model it will be calculated:

a) The dispersion of residual variation:

(9) $$S_{u1}^2 = \sum u_t^2 / (T - k - 1)$$

where:

T = number of terms of the series (13)

k = number of explanatory variables (1)

(10) $$S_{u1}^2 = 61.0441/ (13 - 2) = 5.5495$$
$$S_{u1} = 2.3557$$

b) The deviations of the quadric average of the two estimators a1 and b1:

$$S_{a1} = 1.386$$
and
$$S_{b1} = 0.1746$$

Because the terms number of the series is less than 30, estimators will be tested using the test „t" D - Student. From the table of Student distribution, for a significance threshold $\alpha = 0.01$ and in according to the number of freedom degrees $v = n - k - 1 = 11$, it takes the value $t_{0.01;\,11} = 3{,}106$.

(11) $$ta1 = a1/S_{a1} = 72.7346/1.386 = 52.4784 > t_{0.01;\,11} = 3.106$$

and

(12) $$tb1 = b1/S_{b1} = 2.7522/0.1746 = 15.7612 > t_{0.01;\,11} = 3.106$$

So for a significance level of 1%, both estimators are significantly different from zero. The value of the correlation is:

(13) $R = \sqrt{(1 - \sum u_t^2/\sum(y_t\text{-ymed})^2)} = \sqrt{(1 - 61.0441/1439.62)} = \sqrt{0.9576} = 0.9786$

Testing the significance correlation report is performed using Fisher Snedecor test:

(14) $Fc = (T - k - 1)/k \times R^2/(1 - R^2) = 11/1 \times 0.9576/0.0424 = 248.416$

From the table of Fisher – Snedecor distribution, for a significance threshold $\alpha = 0.01$ and according to the number of freedom degrees $v1 = k = 1$ şi $v2 = T - k - 1 = 11$, it takes the value $F_{0.01;1;11} = 9.65$.

Because $Fc = 248.416 > F_{0.01;\ 1;\ 11} = 9.65$, the value of the correlation report is significantly different from zero, for a significance threshold $\alpha = 0.01$.

In order to check the independence of residual variable values will be used Durbin-Watson test, which consists in calculating:

(15) $d = \sum (u_{1t} - u_{1t-1})^2/\sum u_{1t}^2 = 73.7325/61.0441 = 1.21$

From the table of Durbin-Watson distribution, for a significance threshold $\alpha = 0.01$, according to the number of observations $T = 13$ and the number of exogenous variables $k = 1$, it takes the values (for the case n = 15):

$d1 = 0.81$; $d2 = 1.07$.

Because $d = 1.21 > d2 = 1.07$ and $d = 1.21 < 4 - d2 = 2.79$, can be accepted the hypothesis of independence of the residual variable values.

The verification of the homoscedasticity hypothesis of the errors for this model will be performed using White test. White test is part of the software package Eviews and with its help were obtain the result from the table no. 6.

Table 6. The representation of the obtained results using the test White

White Heteroskedasticity Test:

F-statistic	5,3762	Probability	0,0260
Obs*R-squared	6,7357	Probability	0,0345

Test Equation:
Dependent Variable: u_t^2
Method: Least Squares
Sample: 1998 2011
Included observations: 13

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7,9641	6,4478	1,2352	0,2450
t	-3,4209	2,1182	-1,6150	0,1374
t^2	0,3282	0,1472	2,2293	0,0499

R-squared	0,5181	Mean dependent var	4,6957
Adjusted R-squared	0,4218	S.D. dependent var	8,6629
S.E. of regression	6,5875	Akaike info criterion	6,8074
Sum squared resid	433,9527	Schwarz criterion	6,9378
Log likelihood	-41,2481	F-statistic	5,3762
Durbin-Watson stat	2,0327	Prob(F-statistic)	0,0260

Using EViews program and analyzing the results shown it is found that Fc = 5.3762 < $F_{0.01;1;11}$ = 9.65, and model parameter estimators are insignificant for a significance threshold α = 0,01 ($t_{0,01;10}$ = 3,169), so the homoscedasticity hypothesis is certified.

The checking of the model plausibility is performed using variance analysis method, aspect represented in table 7.

Table 7. Model plausibility checking

Source of variation	Measure of variation	No. degrees of freedom	Dispersion corrected	Value of F test	
				Fc	$F_{\alpha;v1;v2}$
Variance explained by the tendency	$V_t^2 = \sum(y1_t - y_{med})^2$ = 1378.5759	k = 1	$S_{y/t}^2 = V_t^2/k$ = 1378.5759	$Fc = S_{y/t}^2 / S_u^2$ = 248.416	$F_{0.01;1;11}$ = 9.65
Residual variation	$V_u^2 = \sum(y_t - y1t)^2$ = 61.0441	T – k – 1 = 11	$S_u^2 = V_u^2/(T - k - 1)$ = 1378.5759	-	-
Total variation	$V_0^2 = \sum(y_t - y_{med})^2$ = 1439.62	T – 1 = 12	-	-	-

According to this method because Fc = 248.416 > F001111 = 9.65, the model is accepted, with a significance threshold α = 0.01. From the equation of variation analyses:

(16) $$V_0^2 = V_t^2 + V_u^2$$

(17) $$100 = V_t^2/V_0^2 \text{ x } 100 + V_u^2/V_0^2 \text{ x } 100$$
$$100 = 95.76 + 4.24$$

Hence results that the model explains 95.76% of the total variation in the number of automobiles per one thousand inhabitants. In conclusion, the econometric model is:

(18) $$y_{1t} = 72.7346 + 2.7522 \text{ x } t$$
$$(1.386 \text{ and } 0.1746)$$
$$R = 0.9786$$
$$d = 1.21$$
$$S_{u1} = 2.3557$$

The model is accepted as significant and can be used to estimate the number of automobiles evolution. The analysis of forecasting ability of the model on the evolution of the number of automobiles per 1000 inhabitants during 1998-2011 can be made based on statistical indicators proposed by H. Theil.

Following the calculations performed using EViews software package to test the forecasting ability of the model on the evolution of the number of automobiles per 1000 inhabitants in the period 1998-2011, resulted the data from the table 8.

Table 8. The test results of the forecasting ability of the proposed model

Indicator name	Indicator symbol	Indicator value
Theil Coefficient	T	0.0117
Deviation balance	T^A	0.0000
Dispersion balance	T^D	0.0108
Covariance balance	T^C	0.9892

The analysis of the obtained results shows that the model has good a forecasting ability due to low values reported for the Theil coefficient, the weight ratio deviation and dispersion, for the deviation balance and dispersion balance and, so, can be accepted in order to make a forecast in the domain of automobiles.

The forecasted level of the model will be for 2011:

(19) $y1_{14}$ = 72.7346 + 2.7522 x 14 = 111.3 automobiles (medium class) to 1.000 inhabitants.

The standard deviation of the forecasted level of the phenomenon will be:

$Sy1_{14}$ = 2.7331

Confidence interval of the forecasting phenomenon, estimated with a significance threshold α = 0,01, for which the value of t_α, taken from the table of Student distribution, is $t_{0.01;11}$ = 3.106, it is calculated with the relation:

(20) $P(y_{14}\ [y1_{14} \pm t_{\alpha;v}\ x\ Sy1_{14}]) = 1 - 0.01 = 0.99$

$P(y_{14}\ [111.3 \pm 3.106\ x\ 2.7332]) = 0.99$

$P(y_{14}\ [102.80;119.8]) = 0.99$

The forecasted level of the model will be for 2012:

$y1_{14}$ = 72.7346 + 2.7522 x 15 = 114 automobiles (medium class) to1.000 inhabitants.

The standard deviation of the forecasted level of the phenomenon will be

$Sy1_{14}$ = 2.8156

Confidence interval of the forecasting phenomenon, estimated with a significance threshold α = 0.01, for which the value of t_α, taken from the table of Student distribution, is $t_{0.01;11}$ = 3.106, it is calculated with the relation:

(21) $P(y_{14}\ [y1_{14} \pm t_{\alpha;v}\ x\ Sy1_{14}]) = 1 - 0.01 = 0.99$

$P(y_{14}\ [114.00 \pm 3.106\ x\ 2.8156]) = 0.99$

$P(y_{14}\ [105.30;122.8]) = 0.99$

In conclusion, following the calculations, we can estimate that in 2011 the level of phenomenon will be in the interval of [102.8; 119.8], and in 2012 in the interval [105.3; 122.8], the probability of achieving these forecasts is 99%.

The appreciation of the prognosis based on linear model, can be done with two notions, forecasting safety and forecasting accuracy, concepts which are inversely related.

The safety forecasting is given by the probability (p) that is estimated the confidence interval, and the accuracy forecasting by the relation:

a) Absolute error:

(22) $e1 = |y^{\square}_{n+v} - y1^{\square}_{n+v}| = |t_{\alpha} \times Sy1^{\square}_{n+v}|$

$e1_{2011} = |3.106 \times 2.7332| = |8.4893|$

$e1_{2012} = |3.106 \times 2.8156| = |8.7454|$

b) Relative erros:

(23) $e2(\%) = e1/ y1^{\square}_{n+v} \times 100 = | t_{\alpha} \times Sy1^{\square}_{n+v}/ y1^{\square}_{n+v}| \times 100$

$e2_{2011}(\%) = |8.4893/111.30| \times 100 = 7.63\%$

$e2_{2012}(\%) = |8.7454/114.00| \times 100 = 7.67\%$

After calculating the relative error of forecast (e2%) corresponding to the model, it is find that it leads to errors that do not exceed 15%, which means that these can be accepted as significant for making forecasts under this test.

4. CONCLUSIONS

Given that the general perception concerning the ideal car suffered important changes, the automobile more a necessity then a standard of financial potency, it will be interesting to see the competition between the two producers. Thus, as an effect of the increase of service costs, increase of the combustible price and the traffic and parking problems, Romanians began to lead towards low class models, which consume less. On the other hand, I think the price will have the most important say in this regard.

The studies show that the sales of low cost automobile will increase by over 500% globally by 2020, which will determine many auto producers to lead to this segment where Dacia is well positioned. The economic situation pretty precarious on global level will encourage also in the next period, consumers to buy cheap cars, and the producers to target this segment not only to meet the demand, but to survive.

Dacia will have to make efforts to remain competitive in this segment, because other major producers such as Hyundai, Volkswagen, Toyota, Tata Motors and Ford have indicated their intention to develop automobiles between 2500 and 5000 dollars.

Romania has great chances to become the sixth automobiles producer in the region until 2014, after countries such as Russia, Turkey, Czech Republic, Poland and Slovakia.

If it will be reached the forecast level of production, Romania will record the third fastest growth rate of automobile production capacity of countries in Central and Eastern Europe by 2014. First place is expected to be occupied by Ukraine (242%) and Russia third (235%).

Regarding the econometric model proposed by us, different tests used to check the plausibility show that it can be accepted as significant and can be used to the evolution prognosis estimation of the number of automobiles in Romania and elsewhere.

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