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Full Length Research Paper

The evaluation of the market share of an insurance company: An econometric approach

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The society development involved the increased effort and endeavor of humans to protect and to defend their properties against undesirable events. Considering that whatever the care given by people to protect property, some events cannot be avoided and loss of profit can occur. For those reasons the insurance concept had been developed as a way of protection of people against the hazardous events and the history of insurance offers many examples. Taking into consideration the current global economics crisis, in this study we want to analyze the evolution of the market share of a particularly insurance company from Romania with econometric tools. The model proposed in this work can be applied to study any type of company, not just the case we follow here.

Key words: Fuzzy control theory, game theory, competition, marketing strategies.

INTRODUCTION

According to the "Insurance Profile" magazine, the top 10 insurance companies in Romania based on underwritten premium within January to September 2010 are shown in Table 1 (http://www.1asig.ro/). Given that our study target (Groupama Insurance SA) is the most important merger that occurred up to this point in Romania from the "BT Insurance SA", "OTP Garancia SA" and "Asiban SA" fusion in December 2007 to April 2008 period, we chose this company for our study (http://en.groupama-sa.com/finance/financial-information/group-s-financial-data).

The investment of "Groupama Insurance SA" in the Romanian insurance market had risen to 450 million euro, placing the company on the 3rd place in the top of general insurance companies. Sequel to the change of the shareholding, market share of foreign investments has reached 87.93% of total capital investment in Romania, local capital investment only reached 12.07%.

Also, in the study we have taken in consideration that before merger, "Asiban SA" had 165 million euro worth of underwritten premium and was placed on the 5th place on the market; "BT Insurance SA" had 85 million euro worth of underwritten premium and "OTP Garancia SA", 24 million euro. The data on which the study is based on are presented in the annex 1 (http://en.groupama-sa.com/finance/financial-information/group-s-financial-data).

Closely connected, the evolution of the economic activities like real estate, car sales, industrial production or bank lending and non-banking lending, the underwriting risk activity had tempered the growth in 2010 in comparison to previous years (Dobre et al., 2007, McCall and Whistler, 2009).

Taking in consideration that 2010 was a conservative year from risk insurance point of view, strategy changes, significant capital infusions, amending legislation to strengthen protection of policyholders, new procedures like amicable agreement, this year is under a big "if", even dough other changes are on the way, like bonus-malus system (Badea, 2007).

According to The Romanian Insurance Supervisory Commission, the insurance market could have a least a 5% growth in 2011, taking into consideration that the need for protection is more and more recognized by the potential clients, but also the interdependency with the car sales which generates more than 60% of the from underwritten premium general insurance market (The Romanian Insurance Supervisory Commission, 2010).

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Table 1. Top 10 insurance companies from Romania in January to September 2010 (http://www.1asig.ro/).

No.	Insurance company	Underwritten premium (mil. lei)
1	SC Astra SA	841,20
2	Allianz-Tiriac Insurance SA	791,50
3	Omniasig Vienna Insurance Group SA	723,40
4	Groupama Insurance SA	612,30
5	ING Life Insurance SA	404,40
6	Asirom Vienna Insurance Group SA	390,70
7	BCR Vienna Insurance Group SA	379,60
8	Generali Insurance SA	335,90
9	Uniqa Insurance SA	311,90
10	Euroins SA	248,90

Based on this information, we analyze the evolution of the market share for "Groupama Insurance SA" considering the underwritten premium, the number of contracts signed, the number of policyholders and the insured average income.

Thus, after we imported all the data series in *Eviews,* we began the econometric processing (Stancu and Andrei, 2009, http://intelsys.ase.ro/eco.html). Considering the fact that we process monthly data series, the first step is to check the seasonality by calling "Sesonal View-Geaph-stacked line" and we get the graphic shown in Figure 1. Thus, one can easily notice that the data series are not affected by seasonality because in the graph those are not parallel with the OX axis to take in account the non-seasonality of the series.

The next step is to check the stationarity of the series to avoid any problems in the parameters estimating, checking whether each set of data fluctuate around a benchmark. For this we have considered the unit root test, considering the fact that although, shocks of the root process remain forever in the system, the autocorrelation function in the presence of unit root will be shown as decreasing from zero.

Given the fact that in April 2008, a shock was recorded after the completion of the merger, it is required to generate a new set of data using genr: co_pi dummy => 10, returning the series dummy 0 for false and 1 for true. Thus, by the binary variables of correction we re-estimated the data series, entering it in the regression model to correct the disturbance that exposes the model to a potential chaotic.

Considering the importance of market share for the insurance company "Groupama Insurance SA", we started by testing the stationarity of this set of data in Eviews 6.0 by choosing View-Unit Root Test-Trend and intercept, user specified 0 (with 0 lag), and Table 2 was obtained.

The test fails to reject the null hypothesis of the existence of a unit type process over the analyzed series considering that the t-statistic value of the ADF test is more than 1% MacKinnon critical level (-1.289643 > -4.110440). Therefore, the series is non-stationary and stationarization is required, by applying the correction in the model with the function Genr: co_pi-co_pi co_pi_st = (-1) and we obtain Table 3.

We applied the same algorithm for other data sets. Since the data series was modified, a graphical analysis is necessary to study the need for adjustments on the data series to remove aberrant nature observations and contribute to the linearized model. In what follows, we apply the procedure from Eviews for Exponential smoothing, following the treatment of a series of erratic behavior so it becomes much more uniform, easier to be projected in the future. Therefore, we wanted a method to change the series in this way, without affecting their tendency, given their preparation for linearization and applying this only to the series that need to follow the trend.

The best known smoothing technique is average, because for any odd number of consecutive points the central value is replaced with the biggest value of the mean value of other points. However, it should be considered the following deficiencies:

1. The first and last point cannot be uniform.
2. The calculation is laborious, since each point involves summing all the values again.

After applying this procedure we obtained the graphic shown in Figure 2. Considering the need to use linear regression to estimate future values of the underwritten premium with other information, further analysis of existing information is required to reflect the possibility that the data is link to reality. Thus, we consider the realization of linear correlation matrix of data (Table 4).

You can see a strong link between the gross premium and other data sets, and to see how this is affected we use the equation (Figure 3), and we obtain the following result (Table 5).

Also, we consider that in the heteroskedasticity analysis,

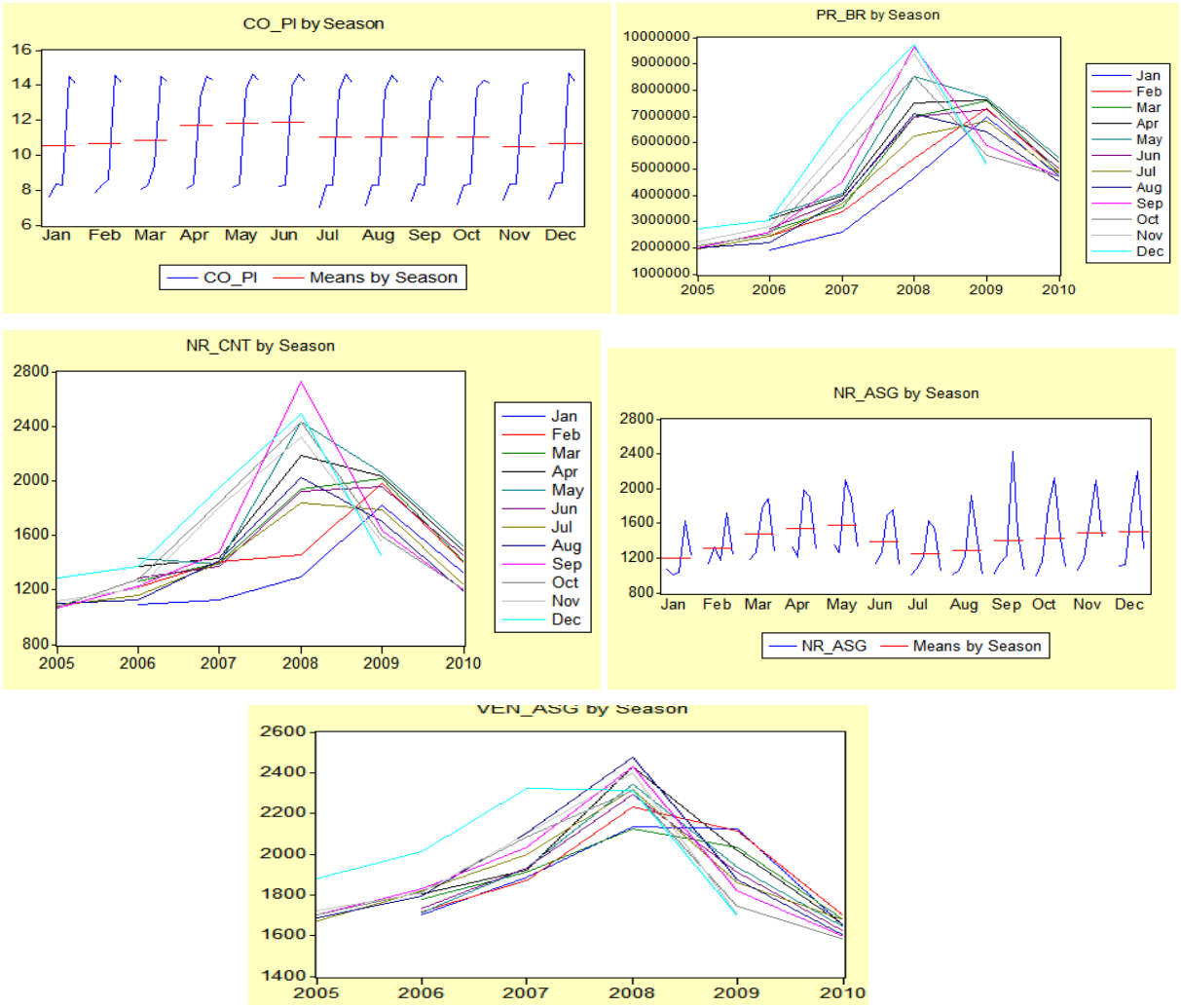

Figure 1. Seasonality representation of data series.

Table 2. Testing the stationarity of this set of data on the market share.

Null Hypothesis: CO_PI has a unit root **Exogenous: Constant, Linear Trend** **Lag Length: 0 (Fixed)**			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-1.289643	0.8815
Test critical values:	1% level	-4.110440	
	5% level	-3.482763	
	10% level	-3.169372	

Null Hypothesis: D(CO_PI) has a unit root **Exogenous: Constant, Linear Trend** **Lag Length: 0 (Fixed)**			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-5.720923	0.0001
Test critical values:	1% level	-4.113017	
	5% level	-3.483970	
	10% level	-3.170071	

Table 3. The stationarization of the data series on market share of insurance company.

Null Hypothesis: CO_PI_ST has a unit root **Exogenous: Constant, Linear Trend** **Lag Length: 0 (Fixed)**			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-5.720923	0.0001
Test critical values:	1% level	-4.113017	
	5% level	-3.483970	
	10% level	-3.170071	

"Groupama Insurance SA".

the amount of error does not increase with the introduction of new observations in the data series. To identify the effect of achieving heteroskedasticity in Eviews through using White, View-residual tests-white heteroskedasticity test and obtain the result shown in Table 6. The calculated value is of White test is 20.30, and to determine the critical value of test we use the following syntax at the command line window: = @ qchisq (0.95, 5) and get the following value 11.070497. Given that the test result is much greater than the tabulated value, we reject the hypothesis that there is no heteroskedasticity and get Table 7.

COMPARINGTHE T-STATISTIC VALUES MAY NOTICE A CHANGE IN THE DATA SERIES

An analysis should be made after the "t" test by comparing the t-Statistic values in the table with that calculated by using the syntax =@qtdist (0.95, (eq2.@regobs-eq2.@ncoef)) in the command line, which returns a value of 1.6720. Since the calculated "t" is greater than the tabulated "t" we can conclude that for all coefficients we can reject the assumption that they would be zero, statistically speaking. By applying the "F" test we verify if the coefficients gradient of the regression is equal to zero and observing the probability we can conclude that we can reject the hypothesis that the coefficients should be void for any level of significance.

An analysis of the error autocorrelation is required next through the Durbin-Watson test, since there is at least one positive serial autocorrelation in the model. Thus, by examining Table 6, we notice that the series are positively correlated and have to realize the autocorrelation of the error by calling the method of estimation through quasi differentiation of the 1st order, using the following syntax:

genr a = resid
genr z = a(-1)
z (1) = 0

We open the equation and we re-estimate integrating z in this equation, changing the heteroskedasticity and we obtain Table 8.

For a 6% level of significance is accepted that all variables are nonzero, the result looks as follows:

CO_PI_ST_SM = 0.2016274021 - 0.04051934192*DUMMY2 + 0.002669365488*NR_ASG_ST_SM - 0.00450503655*NR_CNT_ST_SM + 6.576284724e-007*PR_BR_ST_SM + 0.001231700869*VEN_ASG_ST_SM + 0.9490872677*Z.

Thus, the adjusted market share is shown in Figure 4. To examine the ability of forecasting future values, the study of range modification is necessary (Figure 5). Change the number of observations calculating the accuracy of the estimate by:

1. we generate co_pi_forecast;
2. we generate a dummy variable to reveal the accuracy of the binary model to a deviation of 0.05 and check deviation: series co_pi_prob = (co_pi_st_sm-co_pi_forecast)> 0;
3. we calculate the probability using the syntax R2pOLS=scalar(@obs(co_pi_prob)-@ sum (co_pi_prob)) /@obs(co_pi_prob).

After their application, the result is 0.90. Therefore, the model's capacity to estimate future values is 90%.

CONCLUSIONS

We analyzed the market share because it is the most relevant indicator for the development of an insurance market in Romania. Analyzing all this information is apparent that the activity of Groupama Insurance Company SA is increasing, even if the insurance market in Romania does not have the same development as in previous years.

We believe that the evolution of the insurance market in Romania will be able to modify favorably when the following necessary requirements will be made:

1. Economy returns to a growth phase.

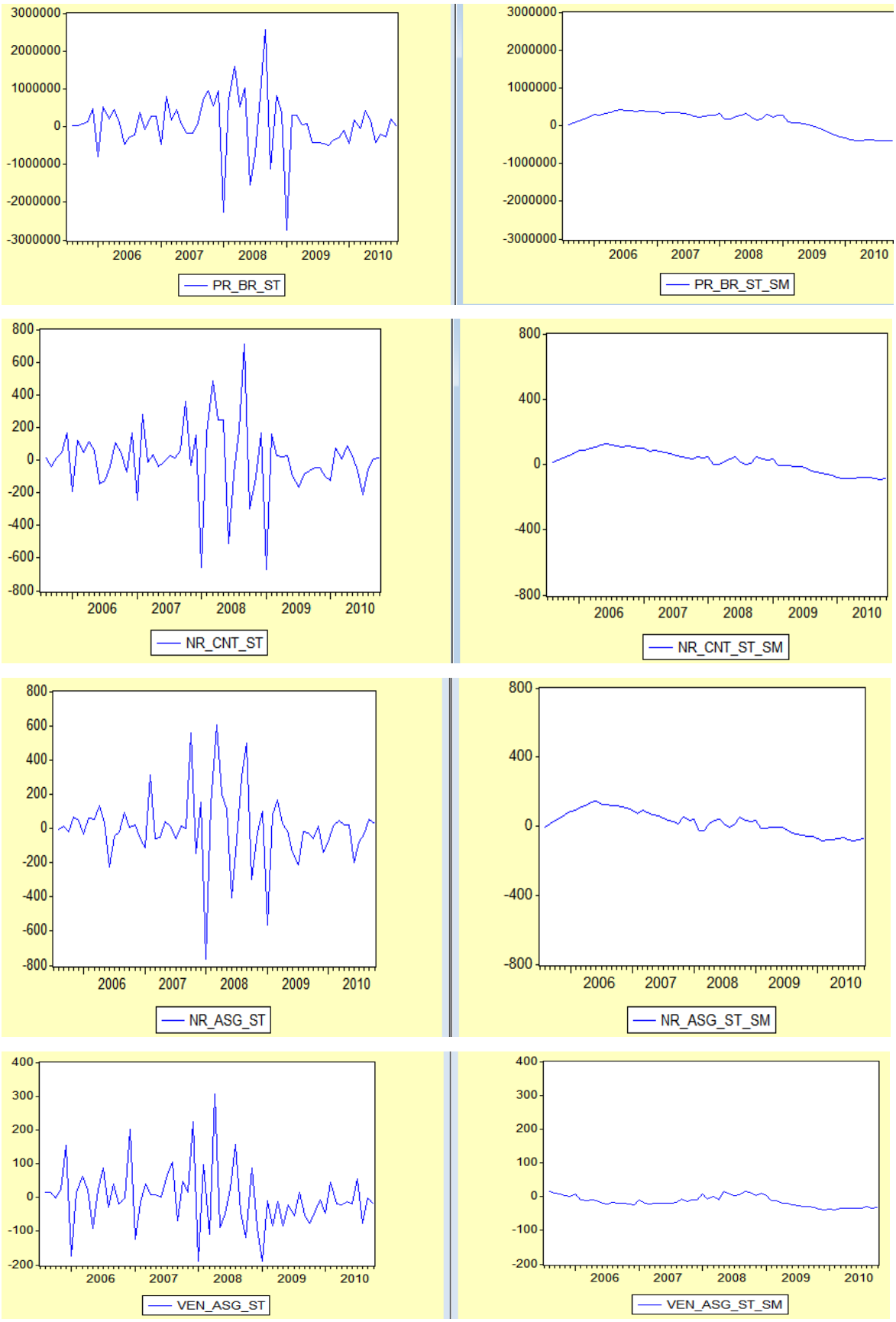

Figure 2. Application f "Exponential smoothing".

Table 4. Correlation matrix of standardized data series.

	NR_ASG…	NR_CNT_S…	PR_BR_ST…	VEN_ASG…	CO_PL_ST…
NR_ASG…	1.000000	0.988928	0.915036	0.400836	0.495410
NR_CNT_S…	0.988928	1.000000	0.951095	0.462473	0.498023
PR_BR_ST…	0.915036	0.915095	1.000000	0.596599	0.597046
VEN_ASG…	0.400836	0.462473	0.596599	1.000000	0.524409
CO_PL_ST…	0.495410	0.498023	0.597046	0.524409	1.000000

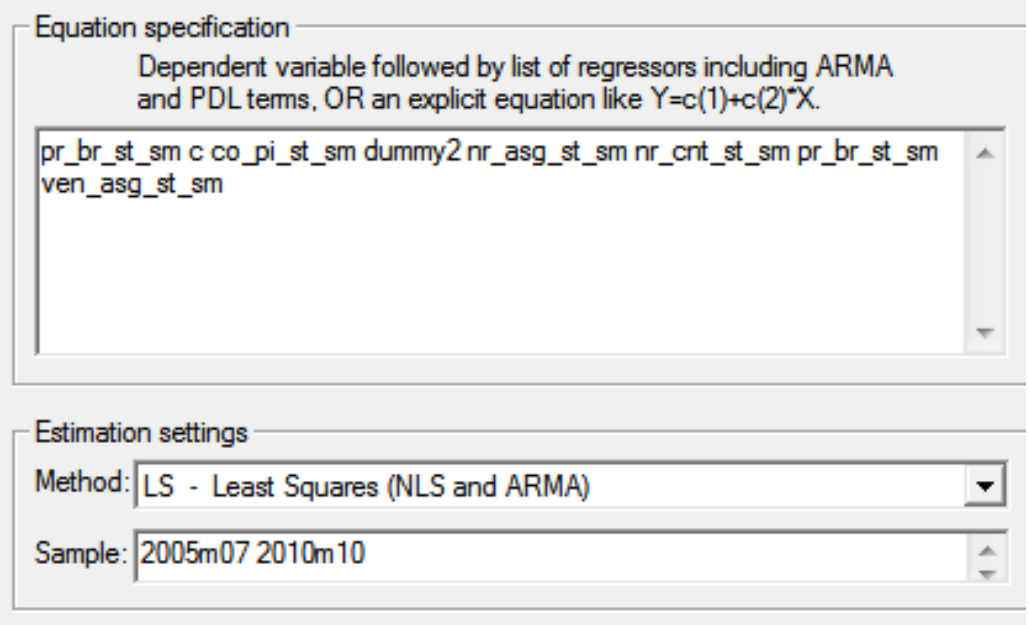

Figure 3. Equation specification of the model.

Table 5. The relationship between market share and other data series.

Dependent Variable: C_PL_ST_SM
Method: Least squares
Date: 02/20/11 Time: 10:47
Sample (adjusted): 2005M08 2010M10
Included observations: 63 after adjustments

Variable	Coefficient	Std. Error	T- Statistic	Prob.
C	0.209638	0.018931	11.07387	0.0000
DUMMY2	-0.177575	0.076143	-2.332117	0.0233
NR_ASG_ST_SM	0.004376	0.001144	3.826380	0.0003
NR_CNT_ST_SM	-0.006517	0.001505	-4.330665	0.0001
PR_BR_ST_SM	7.13E-07	1.54E-07	4.631371	0.0000
VEN_ASG_ST_SM	0.001482	0.000812	1.824324	0.0733

R-squared	0.564774	Mean dependent var	0.222815
Adjusted R-squared	0.526596	S.D. dependent var	0.105955
S.E. of regression	0.072902	Akaike info criterion	-2.309017
Sum squared rasid	0.302935	Schwarz criterion	-2.104909
Log likelihood	78.73404	F-statistic	14.79327
Durbin-Watson stat	0.374355	Prob(F-statistic)	0.000000

Table 6. Testing the heteroskedasticity.

White heteroskedasticity test			
F-statistic	2.799882	Probability	0.009168
Obs*R-squared	20.30121	Probability	0.016142

Table 7. The obtained result after correction of heteroskedasticity.

Dependent Variable: CO_PL_ST_SM
Method: Least squares
Date: 02/20/11 Time: 10:56
Sample (adjusted): 2005M08 2010M10
Included observations: 63 after adjustments
White Heteroskedasticity-Consistent Standard Errors and Covariance

Variable	**Coefficient**	**Std. Error**	**T- Statistic**	**Prob.**
C	0.209638	0.012604	16.63250	0.0000
DUMMY2	-0.177575	0.029011	-6.121023	0.0000
NR_ASG_ST_SM	0.004376	0.001059	4.130148	0.0001
NR_CNT_ST_SM	-0.006517	0.001337	-4.872791	0.0000
PR_BR_ST_SM	7.13E-07	1.50E-07	4.739594	0.0000
VEN_ASG_ST_SM	0.001482	0.000546	2.713563	0.0088
R-squared	0.564774	Mean dependent var		0.222815
Adjusted R-squared	0.526596	S.D. dependent var		0.105955
S.E. of regression	0.072902	Akaike info criterion		-2.309017
Sum squared rasid	0.302935	Schwarz criterion		-2.104909
Log likelihood	78.73404	F-statistic		14.79327
Durbin-Watson stat	0.374355	Prob(F-statistic)		0.000000

Table 8. Autocorrelation error analysis.

Dependent variable: CO_PI_ST_SM
Method: Least squares
Date: 02/20/11 Time: 11:10
Sample (adjusted): 2005M08 2010M10
Included observations: 63 after adjustments
Newey-West HAC standard errors and covariance (lag truncation = 3)

Variable	**Coefficient**	**Std. error**	**t-statistic**	**Prob.**
C	0.201627	0.007744	26.03790	0.0000
DUMMY 2	-0.040519	0.020307	-1.995297	0.0509
NR_ASG_ST_SM	0.002669	0.000648	4.121552	0.0001
NR_CNT_ST_SM	-0.004505	0.000849	-5.303213	0.0000
PR_BR_ST_SM	6.58E-07	7.93E-08	8.297085	0.0000
VEN_ASG_ST_SM	0.001232	0.000411	2.995782	0.0041
Z	0.949087	0.069103	13.73446	0.0000
R-squared	0.886002	Mean dependent var		0.222815
Adjusted R-squared	0.873787	S.D. dependent var		0.105955
S.E. of regression	0.037642	Akaike info criterion		-3.616953
Sum squared resid	0.079348	Schwarz criterion		-3.378827
Log likelihood	120.9340	F-statistic		72.53916
Durbin-Watson stat	1.997403	Prob(F-statistic)		0.000000

obs	Actual	Fitted	Residual	Residual Plot
obs	Actual	Fitted	Residual	Residual Plot
2005M08	0.17000	0.16520	0.00480	
2005M09	0.19065	0.20557	-0.01492	
2005M10	0.21254	0.23667	-0.02412	
2005M11	0.20785	0.22762	-0.01977	
2005M12	0.22814	0.23253	-0.00439	
2006M01	0.23685	0.23002	0.00684	
2006M02	0.25008	0.23979	0.01029	
2006M03	0.26661	0.24626	0.02035	
2006M04	0.27744	0.27040	0.00704	
2006M05	0.28058	0.28042	0.00015	
2006M06	0.28182	0.24614	0.03568	
2006M07	0.28382	0.23311	0.05070	
2006M08	0.28407	0.29661	-0.01254	
2006M09	0.27680	0.26463	0.01218	
2006M10	0.27627	0.27280	0.00347	
2006M11	0.26516	0.24621	0.01896	
2006M12	0.26223	0.29207	-0.02984	

Figure 4. The adjusted market share.

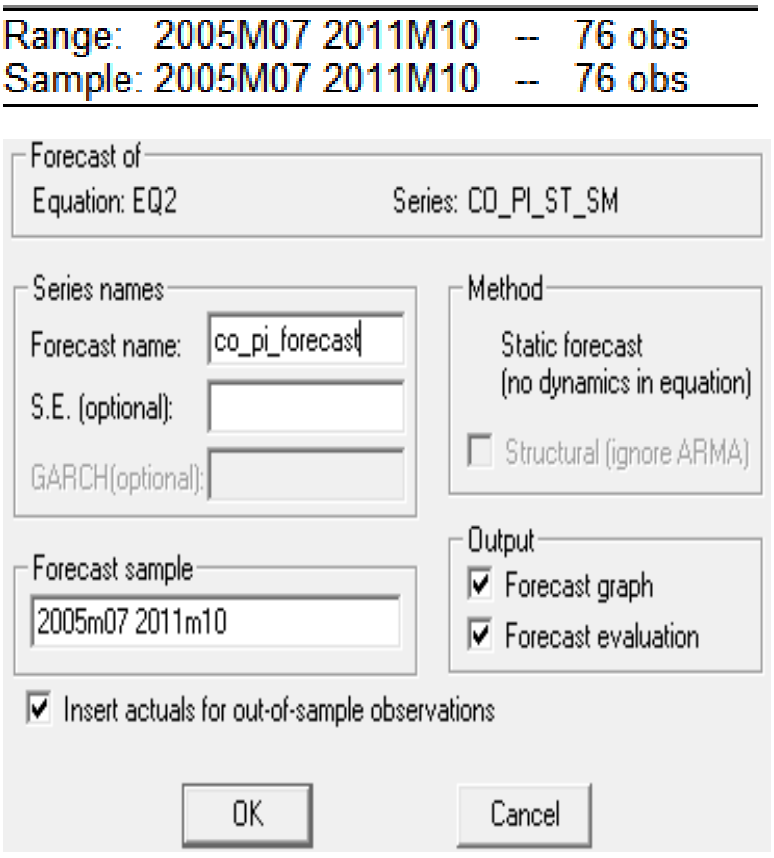

Figure 5. Change the number of observations calculating the accuracy of the estimate.

2. Leasing market will stop falling.
3. Bank loans will be resumed.
4. The national currency will not depreciate substantially.
5. Unemployment rate will not increase dramatically.
6. Revenues will increase.
7. Housing market will be revived.
8. Automotive industry will be on an upward direction.

It should be borne in mind that the insurance industry is directly connected to the evolution of main economic sectors and is also dependent on consumption.

According to data provided by the Romanian Insurance Supervisory Commission, the potential demand for insurance is high, but actual demand is low (The Romanian Insurance Supervisory Commission, 2010). Great potential application is the result of a large number of existing property and real needs of the population and economy, while actual demand is influenced by economic prosperity and the knowledge of the insurance benefits. The application has no uniformity in terms of geographical distribution, being dispersed, and is concentrated in areas with high economic potential.

The supply of insurance it is much higher than the registered demand and competition between companies operating in the market is growing, as everyone tries to promote new products adapted to the Romanian market and try to retain existing customers. In recent years, an online insurance market has developed through the emergence of specialized sites which offer the possibility of an offer to purchase or request a specific product through the Internet. Completing an online form does not require that the person completing the form sign an insurance contract.

To continue to develop the insurance market requires a global effort to increase the confidence of potential customers in this segment of the financial market, which requires a strengthening of internal control and risk management at insurers, and a high degree of transparency both on activity and in terms of underwriting procedures and liquidation of claims.

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