
EVOLUTION OF SALES OF METALLURGICAL PRODUCTS DISTRIBUTION COMPANIES IN VOLATILE MARKETS

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Abstract

Given the volatility of the construction materials market in Romania in terms of sales and sales prices for metallurgical products, I think it would be interesting to analyze the extent to which sales remain inert in the period when prices are falling further and when they fall grow. It is also interesting to know and during what time sales will show this inertial character.

The periods covered by this study are those for the years 2013 and 2014, during which prices of construction materials recorded a continuous decrease of 22.7% (average price calculated on a sample of seven companies), in this respect short time interval. Similar to this short time span, it was also the period between 2016 and 2017, but this time the prices recorded significant increases of 23.73% according to the same sample of companies.

Thus, during the period of declining prices on the market, the company also operated successive price reductions from 685 euro / ton to 565 euro / ton and in the 2016-2017 growth period operated successive increases of promotion and sales prices of metallurgical products from 560 euro / ton to 660 euro / ton.

Key words: variables, regression, coefficients, statistical tests, inertia, sales, prices

Classification JEL: C01, L11, L61

Introduction

Starting from the phenomenon described by physics, which refers to the property of a body to keep its state of rest or uniform rectilinear motion in the absence of external actions, we find that the phenomenon is also found in the economy. We have concluded, as a result of previous research, that the meaning in physics is kept directly and in the economy. Thus, the evolution of a company's sales responds inaccurately to price changes, and this sales inertia is higher for companies that run bigger than those with a lower sales volume. The phenomenon is similar to physics, where we have big bodies with large masses and have a large inertia, and also small bodies that have a

low inertia (for example, a 20 tonne truck is started harder and it will also stop heavier than a car that has a 1 tonne mass).

In this paper I propose to analyze to what extent the sales of a metallurgical material distribution company will respond in inertia to the price changes (increase and decrease) and which of the two periods will have a greater impact on this phenomenon.

Literature review

Anghelache, C., Angel, M.G. (2018), addresses econometric models to analyze economic phenomena. Gheorghiu, A. (2007) classifies different economic models and uses a number of physical models to analyze economic phenomena. Gheorghiu, A., Spanulescu, I. (2007) have studied aspects of applying physics and mathematics to economic theories. Gligor, M., Ignat, M. (2003) analyzed the applications of theoretical physics in macroeconomic modeling. Bulinski, M. (2007) addresses the field of economics. Brenneke R., Schuster G. (1973) describe and exemplify inertia, inert mass, and moment of inertia. Pecican E.S. (2005) addresses the regression models (linear unifactorial or multifactorial), the significance and insignificance of dependence between variables. Iacob Ș.V. (2019) investigates methods of econophysics analysis and analogies between phenomena that occur both in physics and economics, through concrete analyzes made to Romanian distribution companies. It also analyzes the inertial behavior of the distribution companies of construction materials. Isaic-Maniu A., Mitrut C., Voineagu V. (2004) analyzes indexes and calculates them as a ratio of two averages, indices of value, physical volume and prices. As regards the applications of the principle of inertia in the study of economic phenomena, a number of contributions can be mentioned. For example, Wimanda, Turner, Hall (2010) have interpreted Indonesian inflation data from the perspective of the concept of inertia, and Vuşlat și Ozkan (2005) have addressed the issue of inflation inertia in the recent Turkish economy.

Research methodology, data, results and discussions

In the economy dependence relations are quantified by elaborating some theories and methods, among which we refer to: elasticity, relative size calculation, multiplication theory, statistical regression, (direct, inverse) connection theory.

Wanting to quantify the inertial effect of sales due to price changes in two distinct periods, I will use linear regression, a model with a widespread use in the study of econometrics. The results of the regression analysis are to be statistically verified (t test, F test, etc.) in order to appreciate the effect of the cause change on the effect.

For the analysis, a first step consists of collecting and summarizing the statistical data on the monthly sales receipts of the distribution company subject to analysis between 2013 and 2014 and the price charged by that firm in line with market prices . So we'll have a set of twenty-four statistical data we'll operate with.

Since the analysis involves three independent variables: sales proceeds from t-1 and t-2 respectively, and prices, I will use the multiple or multi-factorial regression case.

Multiple or multifactorial linear regression model has the form:

$$y_t = a_0 + a_1 \cdot x_t + \dots + a_k \cdot x_{kt} + e_t \quad (1)$$

where: y_t is the dependent variable

x_t, \dots, x_{kt} are the independent variable

a_0, \dots, a_k are the regression parameters

e_t is the residual value

I will individualize the multiple regression model for the studied economic phenomenon and the relationship will take the following form:

$$Y = C_0 + C_1P + C_2Y_{t-1} + C_3Y_{t-2} + e \quad (2)$$

where: Y is sales revenue in the current period

C_0, C_1, C_2, C_3 are coefficients of the regression equation

P is the promotion and sales price of the products marketed

Y_{t-1}, Y_{t-2} are sales proceeds from t-1 and t-2 respectively

e is the residual value

The analysis is made using the smallest squares method, using the Eviews economic analysis program, and the results are quantified in Figure 1:

Period characterized by falling prices

Figure 1

Dependent Variable: Y
Method: Least Squares
Sample: 2013:01 2014:12
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	636152.7	461693.7	1.377867	0.1835
P	-515.7239	629.9310	-0.818699	0.4226
Y _{t-1}	0.550614	0.222846	2.470822	0.0226
Y _{t-2}	-0.232725	0.217056	-1.072191	0.2964
R-squared	0.360730	Mean dependent var		462231.3
Adjusted R-squared	0.264839	S.D. dependent var		108946.1
S.E. of regression	93412.04	Akaike info criterion		25.87844
Sum squared resid	1.75E+11	Schwarz criterion		26.07478
Log likelihood	-306.5413	F-statistic		3.761892
Durbin-Watson stat	2.136367	Prob(F-statistic)		0.027245

Data source: <http://www.mfinante.ro/infocodfiscal.html>
<https://www.listafirme.ro/search.asp>

According to the results for the economic agent analyzed during the period when the F-statistically low prices are 3.76 and the error Prob (F-statistic) is 2.7% validating the model used.

As for the t-statistic for Y_{t-1}, it records the value of 2.47 which is also higher than the table = 2.131 indicating a sales inertia in relation to the change in the high price for the next month. Also, the error probability for Y_{t-1} is 2.26%, which validates sales inertia for this period. However, sales inertia is lost during the Y_{t-2} period, namely for the second month following the date of the price change.

However, the low R-squared values of 0.36, which are closer to zero than the unit value and the high error of 42.26 for prices, indicate that there are other factors influencing sales.

Similarly, we will also analyze the period between 2016 and 2017, during which prices in the profile market have increased.

The analysis is also done with the smallest squares method, using the Eviews economic analysis program, and the results are quantified in Figure 2:

Period of higher prices

Figure 2

Dependent Variable: Y
Method: Least Squares
Sample: 2016:01 2017:12
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	914340.1	422832.1	2.162419	0.0429
P	-814.3641	655.1837	-1.242955	0.2283
Y _{t-1}	0.636795	0.231512	2.750595	0.0123
Y _{t-2}	-0.393619	0.238559	-1.649991	0.1146
R-squared	0.303373	Mean dependent var		560331.3
Adjusted R-squared	0.198879	S.D. dependent var		102880.4
S.E. of regression	92083.52	Akaike info criterion		25.84979
Sum squared resid	1.70E+11	Schwarz criterion		26.04613
Log likelihood	-306.1975	F-statistic		2.903257
Durbin-Watson stat	2.057175	Prob(F-statistic)		0.060137

Data source: <http://www.mfinante.ro/infocodfiscal.html>
<https://www.listafirme.ro/search.asp>

According to the results of the analyzed company during the period when prices increased F-statistically, it has a value of 2.90 and Prob error (F-statistic) is 6.01% validating the model used.

As far as the t-statistic for Y_{t-1} is concerned, the value of 2.75 is also higher than the table = 2.131 indicating a sales inertia in relation to the change in the high price for the next month. Also, the error probability for Y_{t-1} is 1.23%, which validates sales inertia for this period. However, sales inertia is lost during the Y_{t-2} period, ie for the second month following the change.

However, the low R-squared values of 0.30 and the high price error of 22.83 indicate that there are other factors influencing sales.

Conclusions

Following the analysis of the inertial nature of the sales proceeds of the metallurgical construction materials distribution company, we found that it is kept for the next month and is lost in the second month, regardless of whether there is a period of price increase or decrease. According to the analysis of the indicators, there are other factors that influence the evolution of the sales of the metallurgical construction materials distribution companies.

For example, a cause due to market volatility, in fact, of this unstable business environment with large variations in the sales and marketing prices of marketed products, is the prudence of the final beneficiary who, at the time

of price rises, sees and raises attention in terms of current purchases, returning to marketing to optimize costs.

Bibliografie

1. Anghelache, C. (2008) *Tratat de statistică teoretică și economică*, Editura Economică, București
 2. Anghelache, C., Angel, M.G. (2018) *Econometrie generală. Teorie și studii de caz*, Editura Economică, București
 3. Anghelache, C. Angel, M.G. (2016) *Bazele statisticii economice*, Editura Economică, București
 4. Brenneke R., Schuster G. (1973), *Fizica*, Ed. Did. Si pedagogica București
 5. Bulinski, M. (2007), *Econofizică și complexitate*, Editura Universitară, București
 6. Gheorghiu, A. (2007), *Econofizică Investițională*, Editura Victor, București
 7. Gheorghiu, A., Spanulescu, I. (2007), *Noi abordări și modele econofizice*, Editura Economică, București
 8. Gligor, M., Ignat, M. (2003). *Econofizică*, Ed. Economica, București
 9. Iacob Ș.V. (2018), *Inerția. Modele și aplicații în economie*, Revista Română de Statistică - Supliment nr. 5 / 2018, 106-115
 10. Iacob Ș.V. (2019), *Utilizarea metodelor statistico-econometrice și econofizice în analize economice*, Editura Economică, București
 11. Isaic-Maniu A., Mitrut C., Voineagu V. (2004). *Statistica*, Ed. Universala București
 12. Pecican E.S. (2005). *Econometria pentru...economisti: econometrie si aplicatii*, Ed. Economică, București
 13. Reif, F. (1983), *Fizica statistica* (Berkeley vol. V), Ed. did. si pedagogica București
 - 14 Rizki E. Wimanda, Paul M. Turner, Maximilian J. B. Hall (2011), „*Expectations and the inertia of inflation: The case of Indonesia*”, Journal of Policy Modeling, 33 (3), 426 – 428
 15. Vuslat U., Ozcan K. M. (2005), „*Optimal univariate expectations under high and persistent inflation: new evidence from Turkey*”, Physica A: Statistical Methods and its Applications, 346 (3 – 4), 499 – 517
- <https://www.listafirme.ro/search.asp>
 - <http://www.mfinante.ro>
 - <http://www.revistadestatistica.ro/supliment>
 - <https://www.sciencedirect.com/science/article/pii>