ECONOMETRIC MODELING OF INTELLIGENT REPORTING

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Abstract

Creating a smart model for processing financial statements in order to provide all the necessary aspects to the managers and to help them with their informational needs represents a current challenge for specialists. The global dimension of the business requires quick decisions, so the information analysis at corporate can represent a hindrance in taking a strategically substantiated decision. In this context, it has been proposed a model for transforming the financial information reported to the monitoring and verification tax authorities in financial management information useful in preventive business management. The research done is useful in the academic field and in the business environment. The results will be supplemented by new tests, by verifying the functioning of the model in certain real situations

Keywords

information, smart model, managerial performance, financial reporting

JEL Classification

M21

Introduction

The use of internet as a means for disseminating financial information is a phenomenon in full development at present. Internet of Things (IoT) has become the main source of information for the financial statement users. In this context, for the international business environment, the creation of a smart model of adapting the information from the financial statements to the informational needs of the managers is a challenge approached by specialists in various reference works. Thereby, we propose to issue a model for transforming the financial information available on-line to financial management information useful in preventive business management. At international level, the business entities have difficulties

in the interpretation of the reporting, appealing often to their own informational system for generating the reports necessary for the management decision process. The global dimension of the business requires quick decisions, fact for which the information analysis at corporate level can represent a hindrance in taking a strategically substantiated decision. In practice, there is an ever-growing talk about real time management.
Another aspect of major interest for management is represented by the economic reality of the company's performance in dynamics, for a historical period of 3 years. This reality is concisely evaluated based on the reports on the turnover, commercial margin and added value. The added value analysis represents a complex tool integrating the workforce productivity analysis in relation to work factor remuneration, forecast capacity analysis based on cash flow and empowerment analysis of the fixed owed assets, through technological upgrade.
The proposed model deals with the integration of these analyses through the weight of the financial indicators, reported through the financial statements, which would allow obtaining for a quality prognosis.

Literature Review

Despite the fact that internet represents a means more and more used for the dissemination of the financial information, the academic researches on the usage of internet in the financial reporting are still in the incipient phase in emergent economies. The use of internet as a means of communication influences significantly the financial reporting practices at company level (Khadaroo, 2005).
According to Munter and Robinson (1999), internet and information technology have transformed the way by which information is disseminated to and demanded by users. The world must be prepared to meet the future challenges with innovative financial reporting that continues to meet the needs of those who participate in the capital markets and who give companies the access to capital that is so vital in today's global marketplace.
Internet financial reporting has become a popular practice of communicating with stakeholders. The use of internet enables companies to provide information to global users. Using the Internet allows a company to deliver on-line a large volume of information which users can access on demand, in function of their particular area of interest (Bonson & Escobar, 2006).
The first studies about the financial reporting on internet have been published in 1996 when the internet was first becoming used for advertising and commercial purposes (Allam & Lymer, 2003). Regarding the content of studies about e-financial reporting we can observe that these are descriptive and exploratory in nature. These studies focused on the existence of companies' websites and whether these companies posted some types of financial information on their Websites (Khan & Ismail, 2011).
Most of the studies on e-financial reporting were conducted in developed countries such as America, United Kingdom or Germany, buth very few studies have been conducted in developing countries (Dolinšek, 2014).
Other studies dealt with recognizing factors which might determine noticeable differences between companies regarding the internet financial reporting.
In relation to the Internet as a medium for financial disclosure, the management can reduce the agency problem and improve information asymmetry due to its unlimited space, wide coverage, easy-access reports, and real-time information (Arussi et al, 2009).
In the context of internet financial reporting, smart business intelligence enables managers of companies to access, analyses, and use available internet financial reporting data for decision making. It is used for long-term strategic planning, short-term tactical analysis, and managing daily operational business activities. As smart business intelligence could be defined as the ability of a company to make meaningful use of available data (Kimble & Milolidakis, 2015).

The smart business intelligence could play an important role in improving the profitability of the company by finding new opportunities and identify potential threats, revealing new business visions and improving decision making processes (Xia & Gong, 2014). At present, smart business solutions mostly focus on structured and internal data of company. Our paper seeks to contribute to the literature by proposing a new model of using external available financial data.

Research methodology

The research aims to quantify the financial information reported by the business entities through econometric methods, in order to obtain the business characteristics needed to apply the medium and long term development strategies. It has been evaluated the financial information reported by Top 55 business entities from Bucharest - Ilfov Area, between 2016-2018. The period 2016-2018 represented for Romania a favourable macroeconomic climate, with economic growth, inflation stabilized and policies for development sustainable.

The analysis of those 55 entities generated information on the dynamics of turnover (CA), achieved income and profit (financial section of the reporting), as well as the analysis on accumulation of capital and assets.

This research methodology has enabled the development of model and permitted to obtain a relevant analysis for all 55 business entities, by using EViews 10.

Elaboration of model with EViews 10

1.The transformation of the financial information corresponding to the opportunity analysis of the target market, criteria-wise segmented

The opportunity analysis deals with obtaining some precise information on business development in certain market segments, through the usage of sale and promotion techniques in the conditions of an insufficiently used surplus of endowments, logistics and human resource. Accordingly, the first step in obtaining a pertinent analysis is determined by the calculation of fixed assets' efficient usage. This calculation can be synthesized by Fixed assets / Turnover **(**r_{CAF}**)** ratio, which identifies an empowerment of the assets' usage.

2.The transformation of the financial analysis corresponding to the entity's performance analysis

A pertinent interpretation of the mutations produced within the financial performances supplied by the financial statements imposes a dynamics analysis of the entity's financial performance structure. By analysing the lines' structure from the Profit and Loss Account (financial performance), the structural mutations on the financial performances are highlighted, on one hand, taking as comparison basis the gross result of the fiscal year, as global synthetic indicator, which reflects the performance of the activity as a whole. On the other hand, the level of total income is taken into consideration as the synthetic indicator expressing the volume of the entire activity.

The transformation of the financial information starts from calculating the weights of the operating and financial profit/loss, as follows:

$$GE + GF = 1 \Longrightarrow \frac{RE}{RBE} + \frac{RF}{RBE} = 1 \quad (1)$$

where:

GE – entity's economic global performance indicator

GF – entity's financial global performance indicator

RE – the profit/loss of the operational activity

RF – financial profit/loss

RBE – gross profit/loss of the operation

Another aspect related to financial performance is represented for the transformation of the financial – accounting information in business information through the calculation of profitability ratios.

Gross margin ratio RMB $=\frac{RBE}{CAN}\times 100$ (2)

where:
RMB –Gross margin ratio
RBE – Gross profit/loss of the operation
CAN – Net turnover

Commercial margin ratio RMC $=\frac{MC}{VM}\times 100$ (3)

where:
RMC - Commercial margin ratio
MC - Commercial margin
VM - sale of goods

The financial rates of return in relative form reflect how the capital invested in the entity is remunerated. The rates of return on ownership equity and invested capital are usually known. The rate of return on ownership equity can be expressed through some factors and causes of inter-conditioning within a multiplicative model of the form:

$$ROE = \frac{RNE}{CAN}\times\frac{CAN}{AT}\times\frac{AT}{CP}=\frac{RNE}{CP} \quad (4)$$

where:
ROE – Return on Common Equity
RNE –Net operational profit/loss
CAN – Net turnover
AT –Total assets
CP –Ownership equity

The rate of return on the invested capital reflects the financial performance capitalised by the entity following to the capital invested into the business.

$$RCP=\frac{profit/loss\_before\_taxes\_\wedge\_payment\_of\_debts}{revolving\_working\_capital}x100 \quad (5)$$

The target market opportunity analysis presented above allows the effective usage of the fixed assets hold by the entity in the context of a market potential turned to advantage, based on a business quantified at the turnover level. It results thus a potential turnover to which the entity can aim in the conditions of a medium term strategy, correlated with the macroeconomic climate.

3. Added value analysis

The added value analysis represents a strong tool for managers in assessing the business potency. The added value supposes the quantification of all factors and resources which, although they do not appear in the financial statements, are used by the entity and can produce real benefits to it.

The added value is calculated on average through multiplicative model, as follows:

$$VA=\overline{N_p}x\overline{W_p}x\overline{V_a}=\frac{N_{p0}+N_{p1}}{2}x\frac{Q_{E0}+Q_{E1}}{2}x\frac{V_{a0}+V_{a1}}{Q_{E0}+Q_{E1}}=\frac{(N_{p0}+N_{p1})\times(V_{a0}+V_{a1})}{4} \quad (6)$$

where:
VA – added value
Np – personal number
Wp – workforce productivity

Q_E – production of the exercise
V_a– Added value to 1 monetary unit of production exercise
The finance management performance is synthetically analysed according to the following analysis grids:

- $\frac{\overline{V_a}}{\overline{W_p}} > 1 \rightarrow$ the ratio confirms an efficient usage of the productive human resource and capitalization of the competitive advantage
- $0.5 < \frac{\overline{V_a}}{\overline{W_p}} < 1 \rightarrow$ the ratio represents a rational usage of the human resource and an average capitalization of the competitive advantage. It is required an opportunity analysis regarding the necessity of investments in order to increase the added value and its impact in the cash flow
- $\frac{\overline{V_a}}{\overline{W_p}} < 0.5 \rightarrow$the comparative advantage is not capitalised at optimum level, the company requiring business managerial redesign.

Based on the assumptions expressed at points 4.1, 4.2, 4.3, it can be determined an econometric model which transforms the financial information into business information on performance assessment criteria, quantifying the average added value in average productivity factors through economic and financial regressions and the commercial margin and gross margin ratios, as well RCAF and GE/GF.Through the independents variables GE/GF, RMC/RMB, RCAF and ROE/RCP, the estimated model which can be represented econometrically through the following regression equation, by the Least Squared Multiple Correlation (OLS) is presented in table 1.

Table no. 1 Model OLS-Dependent variable: VAWP

Dependent Variable: VAWP
Method: Least Squares
Date: 04/13/20 Time: 10:53
Sample: 1 55
Included observations: 55

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1142.490	0.000296	-3856371.	0.0000
GEF	-0.219359	5.97E-08	-3675154.	0.0000
RMCB	4448.183	3.70E-05	1.20E+08	0.0000
RCAF	-0.000111	0.000134	-0.826626	0.4124
ROERCP	0.000199	0.000257	0.772910	0.4432

R-squared	1.000000	Mean dependent var	-884.5609
Adjusted R-squared	1.000000	S.D. dependent var	23682.81
S.E. of regression	0.001315	Akaike info criterion	-10.34338
Sum squared resid	8.65E-05	Schwarz criterion	-10.16090
Log likelihood	289.4430	Hannan-Quinn criter.	-10.27281
F-statistic	4.38E+15	Durbin-Watson stat	1.942493
Prob(F-statistic)	0.000000		

Source: Authors compilation with EViews 10

So, we obtain the following regression equations, with Least Squares Method:
Estimation Equation:
VAWP=C(1)+C(2)×GEF+C(3)×RMCB+C(4)×RCAF+C(5)×ROERCP (7)
Substituted Coefficients:

VAWP= -1142.49038814-0.219358640155×GEF+4448.18349048×RMCB- (8)
-0.000110887135514 × RCAF+0.000198600091526×ROERCP

The actual and forecast values are presented in figure 1.

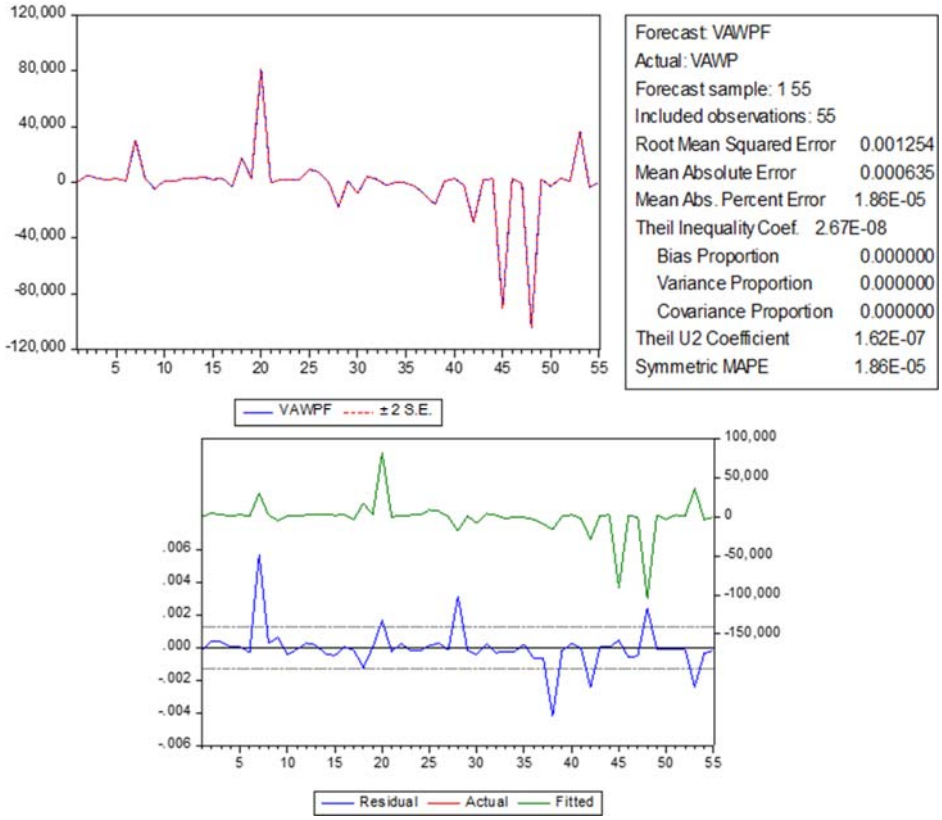

Fig. no. 1 Presentation of the actual and forecast values

Source: Authors compilation with EViews 10

Also, according to the error correlation, in Eviews Workfile on observed it that there is no serial correlation of the errors, and the distribution of residuals is shows in figure 2.

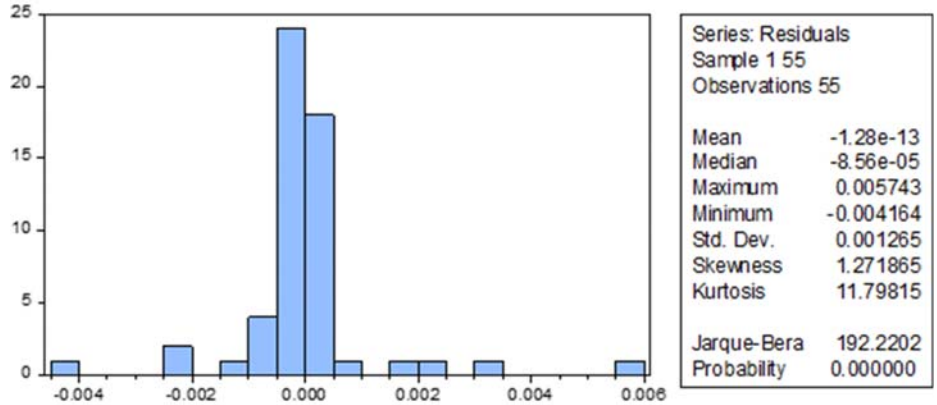

Fig. no. 2 Distribution of residuals

Source: Authors compilation with EViews 10

The model estimated with Eviews 10 is representativeness of 1.00 for "VA/WP", and the value for test F -statistic is 0,026020, so close to 0 and the errors are normally distributed for the Chi-square (2) statistical test. (Table 2)

Table no. 2 Model homogeneity testing

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.026020	Prob. F(2,48)	0.9743
Obs*R-squared	0.059565	Prob. Chi-Square(2)	0.9707

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 04/13/20 Time: 11:12
Sample: 1 55
Included observations: 55
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.34E-05	0.000314	-0.042643	0.9662
GEF	3.62E-09	6.33E-08	0.057232	0.9546
RMCB	4.25E-07	3.82E-05	0.011115	0.9912
RCAF	-2.53E-06	0.000139	-0.018211	0.9855
ROERCP	1.13E-05	0.000276	0.040821	0.9676
RESID(-1)	0.030939	0.150431	0.205666	0.8379
RESID(-2)	0.014947	0.152902	0.097756	0.9225

R-squared	0.001083	Mean dependent var	-1.28E-13
Adjusted R-squared	-0.123782	S.D. dependent var	0.001265
S.E. of regression	0.001341	Akaike info criterion	-10.27174
Sum squared resid	8.64E-05	Schwarz criterion	-10.01626
Log likelihood	289.4728	Hannan-Quinn criter.	-10.17294
F-statistic	0.008673	Durbin-Watson stat	1.999856
Prob(F-statistic)	0.999997		

Heteroskedasticity Test: White
Null hypothesis: Homoskedasticity

F-statistic	12.31421	Prob. F(14,40)	0.0000
Obs*R-squared	44.64213	Prob. Chi-Square(14)	0.0000
Scaled explained SS	199.1951	Prob. Chi-Square(14)	0.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/13/20 Time: 12:24
Sample: 1 55
Included observations: 55

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.93E-06	1.46E-06	-1.326096	0.1923
GEF^2	2.05E-13	1.03E-13	1.985185	0.0540
GEF*RMCB	5.08E-09	6.94E-10	7.319028	0.0000
GEF*RCAF	-1.49E-09	1.48E-08	-0.100556	0.9204
GEF*ROERCP	-1.13E-08	6.24E-09	-1.805917	0.0785
GEF	5.17E-09	6.35E-09	0.814377	0.4203
RMCB^2	2.33E-08	5.96E-09	3.901000	0.0004
RMCB*RCAF	-5.08E-08	1.33E-07	-0.382688	0.7040
RMCB*ROERCP	4.37E-07	3.24E-07	1.349253	0.1848
RMCB	-9.46E-07	3.58E-07	-2.643056	0.0117
RCAF^2	-6.31E-08	2.22E-07	-0.283605	0.7782
RCAF*ROERCP	-8.10E-08	4.54E-07	-0.178323	0.8594
RCAF	3.32E-07	8.91E-07	0.373120	0.7110
ROERCP^2	1.61E-07	4.54E-07	0.355473	0.7241
ROERCP	2.90E-06	1.62E-06	1.783418	0.0821

R-squared	0.811675	Mean dependent var	1.57E-06
Adjusted R-squared	0.745761	S.D. dependent var	5.21E-06
S.E. of regression	2.63E-06	Akaike info criterion	-22.63304
Sum squared resid	2.76E-10	Schwarz criterion	-22.08558
Log likelihood	637.4085	Hannan-Quinn criter.	-22.42133
F-statistic	12.31421	Durbin-Watson stat	2.112346
Prob(F-statistic)	0.000000		

Source: Authors compilation with EViews 10

The homogeneity of model is demonstrated based of the following statistical tests: Breusch-Pagan-Godfrey, Harvey, Glejser and Test White.
For the equation analyzed, the recursive coefficients are represented in figure 3.

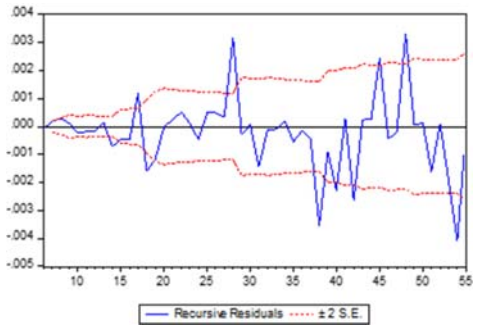

Fig. no. 3 Recursive coefficients
Source: Authors compilation with EViews 10

Using a dynamic forecast, the predicted values and error margins, symbolized by red lines, are shown in figure 4.

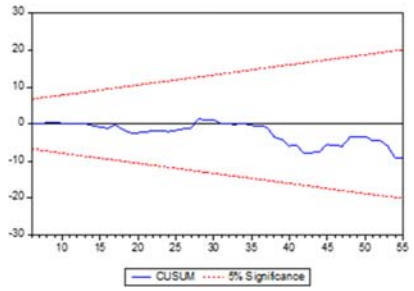

Fig. no. 4 Predicted values and error margins
Source: Authors compilation with EViews 10

According to the statistical results obtained with Eviews 10 it is found that the coefficients of the equation are stable.

Conclusions

The financial system represents an important source of information for the entities' managers, but it must be transformed in a smart way so that to be able to reflect the performance in sustainable terms on a forecast horizon and to confirm to the managers the possibility to build reliable strategies for business development. The model proposed transforms smartly the financial information to analysis elements and work tools necessary for the strategic planning. Through the margin and ratio enclosing grids described in the paper, it can be obtained a fast performance diagnosis, existing the premises of development of an informational model, enclosed in units' ERP model, for smart capitalization of financial information and for the evaluation of the company's status onto the market.

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