

RATING ESTIMATIONS OF THE ENTERPRISES: PROBLEMS AND MODELING

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Abstract. *In modern times improvement of the estimation techniques related to the productivity of economic objects is topical. The article deals with the problems of construction of the rating systems for the estimation of enterprises not related to the financial sector of the economy according to the results of their activity for a calendar year. In order to construct the aggregated indicators for the estimation of the efficiency of the enterprise activity it proposes to unite the possibilities of the classical financial analysis and the methods of the multidimensional statistical analysis. The created indicators accumulate the information on the initial indicators and are a convenient base for the construction of the rating estimations of enterprises.*

Keywords: *a rating of enterprises, the financial analysis, multidimensional statistical methods*

Introduction

The research problems of the economic inequality both between different systems and between elements of the same type (subsystems) of the same system are emerging in the process of the study of economic processes. Research of an economic inequality leads to the necessity of transition from a set of the indicators characterizing a subsystem, to one numerical characteristic – to a rating.

In the developed countries independent experts that help to take economic decisions, are rating agencies, which build the rating system of different economic objects, and rating space, structured by the regional and sector indication.

Rating of an international agency is necessary for an industrial enterprise if it is going to expand foreign financial markets or attract foreign investors. Procedure of the receiving of a rating assumes the audit of the financial activity according to the International standards of book keeping, competitiveness of production in the world market, presence of the modern system of management and the transparency of the activity of an enterprise.

At present the activities of such leading rating agencies as Standard&Poor's, Fitch Ratings and Moody's Corporation are criticized. US Securities and Exchange Commission (SEC) has sent letters to these institutions with the request to explain

their methodology of calculation and the assignment of ratings (Harchenko, 2009).

From the middle of 2008 rating agencies became the subject of criticism of the American financial regulating authorities. The agencies issued overestimated ratings to various securities as a result of various errors in the system of the assignment of ratings. According to one of the versions of the investigation conducted by the Office of the Public Prosecutor of the USA assignment of the overestimated ratings could have been one of the reasons for the aggravation of the crisis.

At the same time in 2008, Warren Buffet publicly recognized that the agency Moody's had tainted its reputation and the reputation of his holding Berkshire Hathaway Inc., which controlled Moody's shares (Buffet..., 2009).

Therefore the problem of the improvement of the rating calculations technique applied to various economic systems is vitally important.

Methods

Construction of the rating systems by means of mathematical-statistical methods is one of the modern approaches. Selection procedure of the most significant financial indicators for some group of the enterprises is performed. Their basic purpose is early forecast of the situations of insolvency and "unreliability". This group first and foremost, includes the systems Beaver and Weibel. The system of CAMEL indicators is used in the sphere of banking (Olenev, 2000).

The Technique of an integrated estimation of the appeal of enterprises and organizations (Kovalyov, 2003) and the

Technique of the profound analysis of a financial and economic conditions of the insolvent enterprises and the organizations (Kovalyov, 2003), that are developed to prevent bankruptcy, are guided by the indicators of the external financial analysis. As the external analysis is conducted on the limited quantity of the information related to the activity of an enterprise, it does not provide for the possibility to disclose all the reasons of the success or failures of the enterprise.

Results of the internal financial analysis are intended for the business management. The goal of the given analysis is the factorial analysis of profit (loss), profitability, costs of manufacture by kinds of production and kinds of expenses, search for the point of unprofitability (critical volume of production) and the financial analysis of investment projects. The orientation of the financial analysis is determined by the basic criteria of business management in three fields of activity – financial, investment and operational (industrial), which are bound up by the movement of financial resources. This division that is traditional for the countries of developed economy, is also used in the Ukraine (Sheremet, Sayfulin, 1995).

The efficiency of the financial analysis depends directly on the completeness and quality of the used information. Later, the received information is used to calculate relative indicators. Today the use of relative indicators to analyse the financial position of an enterprise is more effective and, at the same time, the greatest problem. Economic factors are efficient because they allow to define most precisely the weaknesses and strengths of the financial

position of the enterprise, to specify such spheres of the activity of the the enterprise that demand further investigation and research to reveal the basic tendencies of the company development. However, there is a set of questions related with the use and interpretation of factors. One of the main problems is a considerable quantity of the factors used in the analysis. It complicates the estimation of the financial position of the enterprise, therefore there is a necessity to create an optimal system of indicators from the point of view of their rationality and sufficiency.

After the choice of the system of informative indicators by way of the results of the enterprise's financial analysis, the transition to the rating indicator is made. Such transition may be made in at least two ways.

The first way consists in the replacement of an initial set of indicators with the ranks which are occupied by a subsystem on each indicator, with the subsequent averaging of these ranks (Zimin, Trishin, 2006). The second way consists in the preliminary combining of indicators to one dimension (for example to divide by the maximum value) with the subsequent weighed summation (Vigdorchik, Lipsits, 2005; Baranov, Skufyina, 2008).

In the research (Shapran et al., 2008) the authors build the rating system on the basis of an integrated indicator

$$\frac{((1 + 6F3) + (1 + 4F5) + (1 + 2F7)) \times 1000}{(1)},$$

which connects the share of company net income in the general sample (F3), the share of the payment fund and social deducti-

ons (F5), and the share of tax deductions (F7), by means of multipliers. Multipliers were defined by an expert.

In the article the technique of the construction of a rating indicator for the estimation of the results of enterprise's activity system by using the methods of the multidimensional statistical analysis (a method of the principal components, the factorial analysis, the cluster analysis) is offered.

Results of the Research

The object of the research was the group of the largest companies of non-financial sector of the Ukraine (Shapran et al., 2008).

The goal of the research was to carry out a deeper analysis of the the results of the activity of the specified group of the enterprises of 2007 by using the methods of the multidimensional statistical analysis. Further on, an integrated indicator was built on the basis of the allocated principal factors of the system of initial indicators by taking into consideration the cluster characteristic of the enterprises under investigation.

The database consisted of 17 indicators of the economic activity (Table 1) of 187 largest enterprises of the non-financial sector of the Ukraine. The enterprises the gross revenue for 2007 whereof exceeded 500 million hryvnas and the number of employees was not less than 500 persons were investigated.

Table 1. Indicators of the economic activity of the enterprises which are used in the model

Notation	The indicator name
F1	The integrated indicator depending on the shares of net sales, payment and social deductions, tax deductions
F2	Net sales
F3	Company share in net sales
F4	Payments and social expenses
F5	Company share in payments and social expenses
F6	The added tax payments without the tax credit
F7	Company share in tax payments
F8	Sales
F9	Net profit
F10	Net margin
F11	Assets
F12	Share of current assets
F13	Fixed assets amortization
F14	Autonomy factor
F15	Share of bank credits in liabilities
F16	Equity
F17	Return on equity

Source: calculations of the author.

Application of the method of the factorial analysis to the database has given the opportunity to allocate five principal com-

ponents which account for 89 % of the general dispersion (quality of components representation).

The first principal factor (MF1) characterizes the enterprise's economic activity, correlates with indicators F1 – F3, F6 – F9 and accounts for 51 % of the general dispersion. The second principal factor (MF2) characterizes the profitability of the enterprise, correlates with the indicators F10, F17 and accounts for 15 % of the general dispersion. The third principal factor (MF3) accounts for the social importance of the enterprise, correlates with the indicators F4, F5 and accounts for 9 % of the general dispersion. The fourth principal factor (MF4) characterizes the financial stability of the enterprise (F15, 8 %), and the fifth (MF5) – a liquid reserve (F12, 6 %).

Further on, factorial values for each enterprise, i.e. observation coordinates on the basis of principal factors, have been defined. In Figure 1 factorial values of the enterprises for the first and second principal factors are graphically presented. Thus

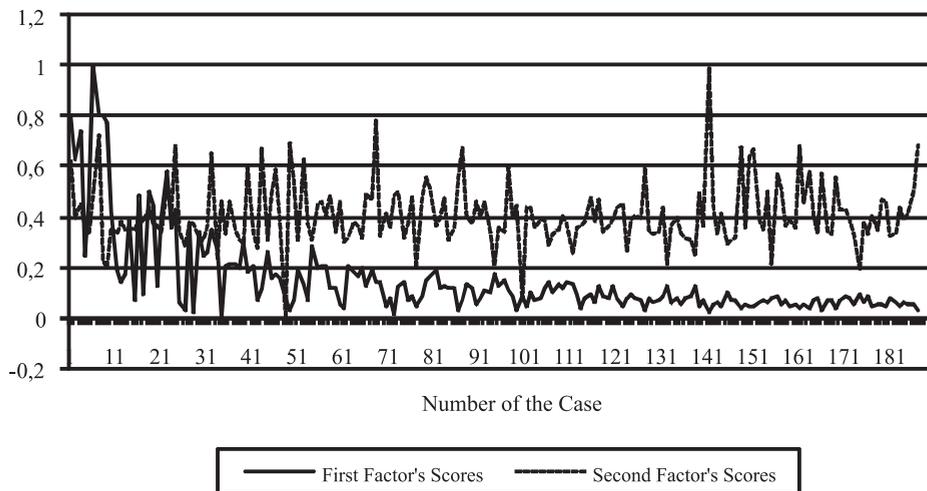


Figure 1. Factorial values observations for principal factors

Source: calculations of the author.

the enterprises are sorted in the descending order by an integrated indicator (1).

At the next stage 7 clusters were allocated (Table 2) by means of the cluster analysis method depending on the significance values of the factorial values observations (first four principal factors were considered).

Table 2. Levels of factorial values observations concerning the principal factors and allocated clusters

Principal factor	MF1	MF2	MF3	MF4
Cluster				
C1	high	high	average	average
C2	average	low	low	average
C3	low	high	average	high
C4	low	high	average	low
C5	low	average	low	high
C6	low	average	low	low
C7	low	low	average	high

Source: calculations of the author.

The first cluster includes the enterprises characterized by the high levels of values of efficiency indicators of the economic activities and the average levels of values of the social activity and financial stability. The second cluster unites the enterprises with the average levels of income, financial stability and low levels of profitability as well as social importance. The third cluster differs by high levels of profitability, financial stability against rather low economic activity and social importance.

Further on, the integrated indicator was built on the basis of the matrix of factorial values observations $Fs = (f_{ij})$, where i – observation number, j – principal factor number. Each indicator was normalized by the following way:

$$x_{ij} = \frac{f_{ij} - \min_i f_{ij}}{\max_i f_{ij} - \min_i f_{ij}}.$$

The rating indicator of each observation was calculated by the formula:

$$R_i = \sqrt{0,35x_{i1}^2 + 0,3x_{i2}^2 + 0,2x_{i3}^2 + 0,1x_{i4}^2 + 0,05x_{i5}^2},$$

where weight factors were defined by an expert.

The highest values of the rating indicator went to the enterprises, which belong to first three clusters. Leaders are the enterprises of mining, metals and mobile telecoms (Table 3).

Comparison of the obtained results with the rating estimations that were constructed on the model (1) shows that disregard for such indicators as profitability, financial stability and independence of the enterprise essentially influences the positions on the rating lists. First of all, it concerns the enterprises, which have rather low net sales, but show high profitability and financial stability. It is also necessary to take into account the indicator of the fixed assets amortization, which influenced the main factors of the constructed model indirectly.

Unfortunately, there is no possibility to compare the results of the research with the ratings, which are assigned to the issuers by the international rating agencies as the majority of the companies withdrew their ratings due to the problems in the market of ratings assignment and the world financial crisis.

On 9 October 2009 Fitch Ratings assigned OJSC "Iron and Steel Works "Azovstal" long-term issuer default ratings ("IDR") in foreign and national cur-

Table 3. A rating of non-financial companies of the Ukraine according to the results of 2007 (10 leaders)

The company name	Rating indicator	Share in the net sales	Net margin / Return on equity, %	Share in social expenses	Share of bank credits in liabilities
OJSC «Arcellor Mittal Kryviy Rig»	0,715	3,29	19,2/30,2	3,79	0,0
NSC «Naftogas Ukrainy»	0,663	3,02	14,6/16,9	0,22	31,2
JSC «Kyivstar G.S.M.»	0,649	1,93	30,6/38,5	1,19	46,3
JSC «Lisichansk oil investment company»	0,578	2,43	0,7/6,1	0,43	7,5
OJSC «Ilyich Iron and Steel Works of Mariupol»	0,570	3,13	7,5/13,9	3,09	14,1
JSC «Transnational financial and industrial oil company «Ukratnafta»»	0,567	2,37	0,0/0,03	0,37	3,3
National enterprise «National nuclear electricity generation company «Energoatom»»	0,554	1,45	3,5/1,1	3,07	9,1
OJSC «Iron and Steel Works «Azovstal»»	0,546	2,86	9,8/22,7	1,45	32,8
JSC «Ukrainian mobile communication (UMC)»	0,529	1,41	17,8/19,9	0,50	4,6
OJSC «Ukrtelecom»	0,522	1,19	3,3/3,0	4,21	68,5

Source: data of the companies, RA «Expert-rating», calculations of the author

rency at level “B” and short-term IDR in foreign and national currency at level “B” (Fitch..., 2009). The forecast on long-term IDR in a foreign currency →»Negative», the forecast on long-term IDR in national currency →»Stable». Also Fitch has assigned a national long-term rating “A+(ukr)” for the company, the forecast «Stable». The forecast on long-term IDR of Azovstal in a foreign currency is restrained by sovereign ratings of Ukraine (“B”/”B»/forecast «Negative”).

Conclusions

To carry out the rating estimation of the enterprise according to the results of their activity for the certain period it is necessary to use the possibilities of the financial analysis as much as possible. It is necessary to have the actual or the planned data of

the enterprise financial statement to accept the economic decisions. It is a question of reception of a relatively small amount of key parameters, which objectively and comprehensively characterize the financial condition of the enterprise.

Depending on the research goals it makes sense to use different approaches for the construction of the rating indicators. In some situations it is sufficient to analyze the convolution of several chosen indicators. To carry out a deeper analysis it is necessary to use the methods of the multidimensional statistical analysis, which allow to execute a complex research of the initial indicators. Thus the qualitative analysis should precede the quantitative one, and the adequacy of the received modeling calculations should be estimated by the expert.

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