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SOME ASPECTS OF CONSTRUCTION OF THE ENTERPRISES RATING ESTIMATIONS

1. Introduction

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

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

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

Recently the activities of leading rating agencies such as Standard&Poor's, Fitch and Moody's have been criticized. US Securities and Exchange Commission (SEC) has sent the letters to these structures with the request to explain methodology of calculation and assignment of ratings [Harchenko 2009]. Therefore a problem of improvement of a technique of rating calculations carrying out for various economic systems is timely.

2. Methods

Construction of the rating systems by means of mathematical-statistical methods is one of modern approaches. Selection procedure of the most significant financial indicators for some group of the enterprises is performed. Their basic purpose is early forecasting of situations of insolvency, "unreliability." This group first of all includes systems Beaver and Weibel. For bank sphere the system of indicators CAMEL is used [Olenev 2000].

The technique of an integrated estimation of appeal of the enterprises and the organizations [Kovalyov 2003] and the technique of the profound analysis of a financial and economic conditions of the insolvent enterprises and organizations [Kovalyov 2003], that are developed concerning the bankruptcy prevention, are carried on with the use of indicators of the external financial analysis. As the external analysis is conducted on the limited quantity of the information on enterprise activity, it does not give the possibility to open all reasons of enterprise success or failures.

Results of the internal financial analysis are intended for the business management. The basic maintenance of this analysis is the factorial analysis of profit (loss), profitability, the manufacture cost by kinds of production and kinds of expenses, search of an unprofitableness point (critical volume of production), the financial analysis of investment projects. The orientation of the financial analysis is caused by the basic criteria of business management in three fields of activity – financial, investment and operational (industrial), which are connected by movement of financial resources. This division that is traditional for the countries with developed economy has been adopted also in Ukraine [Sheremet, Sayfulin 1995].

Efficiency of the financial analysis directly depends on completeness and quality of the used information. Further the received information is used for relative indicators calculation. In modern conditions the use in practice of relative indicators in the analysis of an enterprise financial position is more effective and, at the same time, is the great problem. Economic factors are efficient because they allow most precisely to define weaknesses and strengths of a financial position of the enterprise, to specify the enterprise's activity moments that demand further studying and research, to reveal the basic tendencies of the company development. However, there is a set of the questions connected with the use and interpretation of factors. One of the main problems is the considerable quantity of the factors used at the analysis. It complicates an estimation of an enterprise financial position, therefore there is the necessity of creation of optimum system of indicators from the point of view of their rationality and sufficiency.

After the choice of informative indicators system by results of the enterprise financial analysis, transition to a rating indicator is carried out. Carrying out such transition may be done probably at least in two ways.

The first way consists in replacement of an initial set of indicators with places (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 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 of V. Shapran et al. [2008] the authors build rating system on the basis of an integrated indicator

$$((1+6F_3)+(1+4F_5)+(1+2F_7))\times100, \tag{1}$$

which connects the share of company net income in the general sample (F_3), the share of payment fund and social deductions (F_5), and the share of tax deductions (F_7), by means of multipliers. Multipliers were defined by an expert.

In the article the technique of construction of a rating indicator for an estimation of results of enterprises activity system with the use of methods of the multidimensional statistical analysis (the method of the principal components, the factorial analysis, the cluster analysis) is offered.

3. Research results

The research object was the group of the largest companies of not financial sector in Ukraine [Shapran et al. 2008].

The research goal was carrying out deeper analysis of the specified group of the enterprises activity results of 2007, using the methods of the multidimensional statistical analysis. Further the integrated indicator on the basis of the allocated principal factors of the initial indicators system was built taking into consideration cluster characteristics of the investigated enterprises.

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

Application of the method of the factorial analysis to a database has given the opportunity to allocate five principal components which explain 89% of the general dispersion (quality of components representation).

The first principal factor (MF_1) characterizes enterprise economic activity, correlates with indicators F_1-F_3, F_6-F_9 and explains 51% of the general dispersion. The second principal factor (MF_2) characterizes profitability of the enterprise, correlates with indicators F_{10}, F_{17} and explains 15% of the general dispersion. The third principal factor (MF_3) characterizes the social importance of the enterprise, correlates with indicators F_4, F_5 and explains 9% of the general dispersion. The fourth principal factor (MF_4) characterizes financial stability of the enterprise (F_{15}, 8%), and the fifth (MF_5) – a liquid reserve (F_{12}, 6%).

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

Notation	The indicator name
F_1	The integrated indicator depending on shares of net sales, payment and social deductions, tax deductions
F_2	Net sales
F_3	Company share in net sales
F_4	Payments and social expenses
F_5	Company share in payments and social expenses
F_6	The added tax payments without the tax credit
F_7	Company share in tax payments
F_8	Sales
F_9	Net profit
F_{10}	Net margin
F_{11}	Assets
F_{12}	Share of current assets
F_{13}	Fixed assets amortization
F_{14}	Autonomy factor
F_{15}	Share of bank credits in liabilities
F_{16}	Equity
F_{17}	Return on equity

Source: calculations of the author.

Further factorial values for each enterprise, i.e. observation coordinates in basis of principal factors, have been defined. On Figure 1 factorial values of the enterprises for the first and second principal factors are graphically presented. Thus the enterprises are ordered on decrease of an integrated indicator (1).
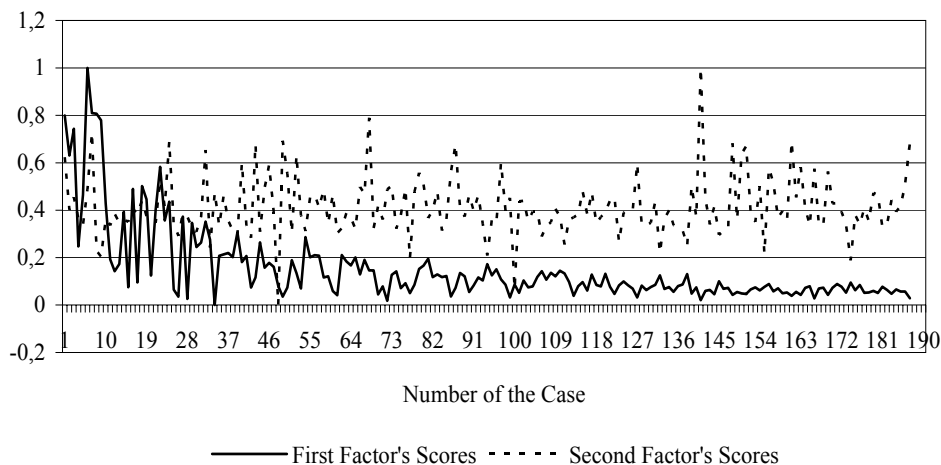

Figure 1. Factorial values of principal factors observations

Source: calculations of the author.

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

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

Cluster	Principal factor			
	MF_1	MF_2	MF_3	MF_4
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 enterprises with high levels of values of efficiency indicators of economic activities and average levels of values of social activity and financial stability. The second cluster unites the enterprises with average levels of incomes, financial stability and low levels of profitability, the social importance. The third cluster differs by high levels of profitability, financial stability against rather low profitableness and the social importance.

Further integrated indicator were built on the basis of the matrix of factorial values observations $Fs=(f_{ij})$, where i – observation number, j – principal factor number. Preliminary each indicator was normalized in 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 under the formula:

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

where weight factors were defined by expert.

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

Table 3. A rating of non-financial companies of Ukraine by 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 "Ukrtatnafta"	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.

Comparison of the received results with the rating estimations constructed on the model (1) shows that ignoring the indicators of profitability, financial stability and independence of the enterprise essentially influences rating lists places. First of all it concerns the enterprises which have rather low net sales, but show thus high profitability and financial stability. It is necessary to consider also an indicator of fixed assets amortization which influenced main factors of the constructed model indirectly.

4. Conclusions

In carrying out the enterprises rating estimation by the results of their activity for the certain period it is necessary to use possibilities of the financial analysis as much as possible. It is necessary to have actual or forecasting data of the enterprise financial statement for the economic decisions acceptance. It is a question of reception of relatively small amount of key parameters which objectively and comprehensively characterize financial condition of the enterprise.

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

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