Methods of Analysis and Evaluation of the Bankruptcy Risk

Mihaela BÎRSAN
mihaelab@seap.usv.ro

Ştefăniţă ŞUŞU
stefanitas@seap.usv.ro

Alina BALAN
alinab@seap.usv.ro
Trade and Tourism Department
Faculty of Economics and Public Administration
"Ştefan cel Mare" University of Suceava

Abstract. The profitableness of an enterprise cannot be appreciated irrespective of the risks wherewith this is confronting, risks corresponding to economic and financial profitableness: the economic risk, carried out into organizational lever effect and the financial risk, in terms of the negative lever. The financial lever deepens the economic risk, turning into a greater vulnerability of treasury (to the outgoings concerning the interest, those of loan's reimbursement are added), which finally generates the enterprise's inability of payment, meaning the bankruptcy risk.

Keywords: Profitableness, risk, bankruptcy, analysis, evaluation.

1. Introduction

Within the market economy, the entire existence of an enterprise is pertinent to risk, because the present and future results are under unforeseen events. In practice, the frequency of situations where promising investments have become echo's loss is known as just disquietingly. In this way, the high concernment of financial analysts over the research within quantification and forecast field regarding the enterprise's risks becomes justified.

The financial analysis allows a fast and synthetic estimation of risk. An enterprise with a solvable profitableness and which does not have a financial structure coherent and adaptable to changes will not theoretically present risk. Notwithstanding, that is also submissive to risk, because it has to confront permanently to a certain level of uncertainty generated by the economic, social, political, technological and financial environment, in which its activity is carried out. The risk turns into the result's variableness, affecting the assets profitableness and the invested capital, accordingly. This fluctuation can be as better known by the enterprise as it owns a certain flexibility degree, by which it adapts to the environment.

The risk wherewith the enterprises confront with is always connected to the future, reason, for which it is subjectively appreciated, as much more as data concerning to it cannot be considered secure information. But, at certain moments the risk has to be evaluated, either by the factors within the enterprise or by those external, being a permanent component over substantiating the strategic decisions. The analysis of an enterprise's risk has a complex character, representing the result on stored impact of all the risks involved by its activity

(exploitation, investments, financing). The risk can also be approached in a different way, when considering the enterprise's point of view or on investors and creditors position.

There exists an opinions' convergence of those that study economy and especially of those that carry out activities on this field, according to whom the risk on business becomes something normal. This represents a matter-of-course and irremovable piece over business world. Its disappearance creates discomfiture, inefficacy and generates unnatural behavior of enterprises, as totalitarian systems met. At that time, the risk reduced, often even disappeared, because the economy was guided through controlling levers of administrative source.

2. Hypostasis of manifesting the business risk

The market risk

No matter the market study which a company might perform, the fact of all what is produced will be sold will not be precisely found. The request towards a company's products is usually more elastic rather than steady, because consumer's preferences and orientations, the price's level and offer's proportion of competitors are unpredictable. So that, the unsteadiness of request, of sales and of price determines appearance of risk upon the enterprises' life.

The economic risk (operational or of exploitation)

The activity of an enterprise is submitted to the economic risk (operational or of exploitation), because this cannot certainly correlate and anticipate the component elements of the result related to exploitation activity (cost, quantity, price) with those of exploitation cycle (supplying, production, sales by retail). In other words, the operational risk represents the probability for which the incomes given by the exploitation activity cannot cover up the outgoings involved within this process, as a result of their structure. Hence, the risk does not depend upon general factors only, but also upon the structure of fix and variable expenses, and respectively upon their behavior toward the activity volume, which decisively influence the profitableness, carrying out *a lever effect* upon the exploitation result.

The analysis of the lever effect on exploitation has as objective the evaluation of result's sensitivity from exploitation on volume variation of activity, consisting in the elasticity measuring the percentage growth of this result, as response in growth of sales with a percent (physical volume or turnover).

The financial risk

The financial risk's analysis assumes as concerns the methodological point of view the same steps as on operational risk situation, but explaining that for a certain level of activity (for a given capital need), the financial expenses with interests are considered fix expenses. Evaluation of the financial risk will be accomplished with the help of *position indicator* toward the global profitableness threshold. Moreover for evaluation, *the analysis of sensitivity* on own capital profitableness will be used, under the incidence of financing policy. The model used with a view to studying it is named *the financial lever effect* or *the financial key factor effect*.

Appreciating and evaluating the financial risk may be done upon basis of *financial lever's coefficient (CLF)*. This coefficient expresses the net result sensitivity of the exercise towards the exploitation result's variations, being the elasticity that measures the percentage modification of net result as response to the modification with a percent of the exploitation result and its size being directly proportional with the financial risk degree.

The importance of this coefficient derives from the fact that net result conditions both the size of benefit and of stock dividends, and self-financing of enterprise, which shares concernment over the staff, shareholders and owners of the enterprise.

It is ascertained that CLF value grows along with increasing the financial expenses and reflects the level of greater or smaller financial risk entered in obligations by the enterprise that requires duty.

With a view to prevent the financial risk, the enterprises have to calculate and assure a profitableness threshold, configured as a confidence range and not as predetermined value mark. The amplitude of this range is determined by the level of incertitude where that enterprise carries out its evolution. When it leans towards zero, it will be certainly about a punctual profitableness and not a range where profitableness is accomplished with satisfying profitableness. And, when the incertitude is high, the confidence range has a greater size, so as it will become unusable within the decisional process.

The risk due to technology changing

Because the technology evolution has such significant part over the competition activity, estimating the changes within this field can improve a company's position on market. So, any hesitation, delay or error over estimating the technology's evolution or over purchasing the most adequate accomplishments on field, can bring not suspicious prejudices to enterprises. For instance, concentrating the technological change onto production process and not onto product's innovation, although being on the beginning of lifetime, will generate unjustified costs on sales volume. Just after a product becomes more and more standardized, the innovation on process has to replace the product's innovation, so as to reduce the manufacturing cost. Usually, the product's innovation has in view to improve its performances and not cost's decreasing. Who doesn't discover and doesn't reach to know branch' features, which determines the technology's evolution particularities, will lose. The explanation lays on fact that factors, resources and effects of progressive changes over technology won't be the same as on situation of discontinuity as concerns this plan.

The currency risk

The enterprises that use foreign exchange on their activity carrying out are exposed to currency risk. This displays under form of loss registering possibility, either as result of preserving or cashing the currency, or due to performing or just of planning to realize currency exchange operations, on a predetermined future date. Modifying the exchange course, on owned currency or of that used on a contract of foreign bills credit or import-export, produce different effects toward involved parties, depending on the new report between the transactional currencies. In this way, if that certain currency is depreciated, its owner and the creditor will register a loss, while the debtor achieves earnings. This exposes him to an exchange risk and will lose if until due date of his payment the currency in which the obligation of payment is expressed will be assigned in value.

To an identical situation will reach the person that invests in another country, in which the rates of installments and earnings views under the form of benefit are higher, if the exchange rate of currency decreases where the capital was paid abroad. The currency exchange risk similarly affects the financial results of enterprises from a country, when they convert on the moment of discount, the contract price expressed on national currency into a foreign currency.

The bankruptcy risk

The bankruptcy, as the success, represents a reality, essential part of a competitive business environment. Generally, a company's bankruptcy is the result of a continuous process of

degradation over its economical-financial status, predictable process, in accordance to specialists' opinion, to about 70% o situations, upon basis of symptoms that anticipate the enterprise's failure.

The causes and factors that determine bankruptcy have different types, perform enchaining and lead each time on decreasing *the profitableness and the liquidation* of the enterprise. In this way, the enterprise meets difficulties on respecting always the contracting relations with partners (customers, suppliers, creditors, staff, shareholders, public power) because it doesn't dispose of *a minimal profitableness and satisfying liquidation.*

All the potential symptoms of enterprise's bankruptcy reflect the activity's degradation due to many causes. A significant part of these causes derive from the economic-social and competitive environment, where the company carries out activity:

- emphasizing the internal and international competition;
- appearance of substitution products;
- loss of an important customer or its bankruptcy;
- a provider's bankruptcy that assures certain materials, components, essential subsets with a view to continue an enterprise's activity;
- a bank's bankruptcy, wherewith the enterprise had preponderant financial relations;
- appearance of certain regulations on line of security and environment protection;
- continuous decrease of stock market quotation.

The statistical studies show that these causes own a weight of about 51% on starting a bankruptcy. Another part of difficulties' causes, which lead on enterprise's bankruptcy, named *internal causes*, is in generally connected to an adverse management and can be:

- the rotation of stock and customers is inferior reported on sector's standard;
- practicing some inferior margins towards sector's regulations;
- financing the investments with sources related to exploitation;
- persisted loss of exploitation;
- the impossibility of renewing the credits.

These causes lay on the source of over half the number of registered bankruptcy over the years. Depending on their type, the causes of difficulties can be:

a) Causes concerning the volume decreasing on activity due to:

- tendency of request decrease for products performed by the enterprise;
- loss of significant customers;
- competitiveness in decrease as concerns the enterprise's products;
- the reduced degree of renewal the products, respectively of adapting to needs;
- conjuncture decreasing of requirement;
- intensifying the internal and international concurrency;
- bankruptcy of a provider.

b) Causes concerning the decrease of margins and of profitableness:

- improper strategic decisions;
- rigidity of selling prices;
- too high expenses with staff;
- presence of outmoded physical means as technical point of view;
- great weight of financial expenses;
- growth of raw materials prices.

c) Causes specific to the enterprise's treasury

- bankruptcy of important customers;
- difficulties on achieving credits;
- high duration of stocks' rotation;
- extending of credit-customers time;
- decreasing the credit-customers time

d) Causes specific to the management system:

- inadequate professional training of managers and the inability of adapting to the new market conditions;
- misunderstanding between the managing members;
- deficit analytical accountancy and not recognizing the complete cost;
- the lack of substitutes for the present managers;
- excessively remuneration of managers.

e) Accidental causes:

- defalcations;
- calamities;
- manager's death;
- internal social problems.

The study of bankruptcy causes lead on conclusion that this is not brutal phenomenon, but a result of progressive damaging over the enterprise's financial status, the risk of insolvability becoming thus predictable, with few years before payments' stopping.

Accumulating the economical and financial risk by means of ***total lever's coefficient (CLT)*** expresses *the sensitiveness of net result on sellers' results* and allows a value for ***the global risk*** – economical and financial – as much higher as the expenses related to capital depreciation and interests own a greater weight within total expenses.

$$CLT = \frac{\frac{\Delta Rnet}{Rnet}}{\frac{\Delta q(Ca)}{q(Ca)}}$$

The total lever's coefficient is calculated by the product:

$$CLT = CLE \times CLF$$

Factorial, the total lever's coefficient can be thus expressed:

$$CLT = \frac{q \times (p - v)}{q \times (p - v) - Chf} \times \frac{q \times (p - v) - Chf}{q \times (p - v) - Chf - Chfin} = \frac{q \times (p - v)}{Rexp - Chfin}$$

The total risk is ***inexistent*** when the result of exploitation is maximum ($p = v$) and ***maximum***, in situation of great financial expenses, which annul it (*Rexp = Chfin*).

The dimension of the economical-financial activity concerns not only the enterprise that applies to credits, but especially the crediting banks, which consider that in view of a credit beneficiating, an enterprise has to present financial solvability; this has to express a warranty of strong managing to all levels, from the operational level towards that strategic.

Damaging in time of enterprise's results, the difficulties wherewith it confronts and are not just of financial type, have provided to financial analysis an especial plentiful investigations field, with a view to reach new methods of precocious detecting and foreseeing of the bankruptcy risk.

3. Evaluating the bankruptcy risk

The classical investigation of bankruptcy risk allows emphasizing the old performances of the enterprise, even of economical, financial, of duty etc. risks, shortly informing over its future and not evaluating the global risk of bankruptcy. As a reaction of these practical requirements, the researchers and international financial bodies have paid attention of elaborating certain methods of bankruptcy risk's prediction, such as: static analysis, dynamic and strategic

analysis of bankruptcy risk, the scores, flows' method and functional analysis of bankruptcy risk.

The static analysis – established by studying the chain, having in view great potential conceptions of it: patrimonial and functional.
As concerns the instruments of patrimonial analysis on bankruptcy risk, we can mention:

a) the analysis of solvability
The patrimonial balance allows checking of own funds, in accordance to the accountancy's principles. The difference between assets and duties set is constituted by the net accountancy assets, which represents the accountancy value of own funds and the financial basis of the enterprise.

The net Assets Balance interferes on analyzing the solvability, with a view to estimate the enterprise's ability of respecting its obligations taken, thanks to these assets.

The solvability is traditionally measured by reporting the adjusted net assets (or of the accountancy net assets) to liabilities' total, the minimal value accepted by banks being in generally comprised between 1/5 and 1/3 of liabilities.
Difficulties are met because of not knowing the real value of certain assets because of clear regulations' lack, concerning the requirements to be accomplished, in situations when net assets become negative.

Taking into consideration the principle of cautiousness, the solvability represents an element of the financial diagnostic over bankruptcy risk, that doesn't have to be neglected.

b) the analysis of exigible feature-liquidation
The analysis of bankruptcy risk, which is based on concepts of exigible feature and liquidation, creates a correspondence between the structures of assets with that of liabilities. The main elements whom this analysis is based of are: the working capital (FR), the liquidation installments and the rate of financial autonomy.

The concept of working patrimonial was created by comparing the assets liquidity structure with that of liabilities being exigible, making possible an appreciation on short term of bankruptcy risk.

Concerning the analysis of exigible feature-liquidation, with the help of liquidation installments, this lays on comparing the fast realizable assets with the duties on short term. The traditional installments are the follows:

The rate of general liquidation, established as relating to liquid assets in less than one year and the exigible dues in less than one year. Naturally, this rate has to be over unitary, fact that equalizes with a positive patrimonial working capital and allows elaboration of certain relative appreciations on level of the patrimonial working capital.

The rate of reduced liquidation, established as a report between the assets that can be dissolved in les than one year (without stocks) and debts that can be exigible in generally in less than one year. This rate excludes from the assets on short term the materials' stocks and unfinished production, which often constitute the elements that value and liquidation are uncertain. It is estimated that optimal level for this rate of 80%.

The rate of immediate liquidation, established as report between disposal and availability titles, on the one hand and on debts that can be exigible in less than one year other, on the other hand. This rate takes into consideration the most liquid products and duties on short term.

The third indicator which the analysis being exigible-liquidation bases upon is *the rate of financial autonomy*, computed as related to financial duties on long term and environment (eligible for more than one year) and own capitals.

Most of financial bodies resort to this rate and appreciate that it has to be under unitary. On other words, mean and long term duty has to be inferior to the amount of own capitals.

As a conclusion, the patrimonial analysis does not allow very strictly appreciation of bankruptcy risk. It may be foreseen that, a negative patrimonial working capital or having an unfavorable evolution, represents in most situations the signals of a bankruptcy risk, knowing the fact that working capital is the security reserve for the enterprise, creditors, wishing that to be positive.

Considering the functional analysis of the bankruptcy risk, this leads on identifying the resources and their using depending on operations cycle (investments, exploitation and financing):

- gross immobilizations correspond to investments cycle;
- the need of having working capital on exploitation represents the need of financing associated to exploitation cycle (supplying, production, storing, selling);

NFRE= Stocks + liabilities of exploitation – duties of exploitation, where:

NFRE - the necessary of working capital of exploitation

- the set of resources corresponds to financing cycle, which can be own external funds, own internal funds resulted from enterprise's activity and financial duties.

The rule of functional equilibrium starts from the principle according to whom an enterprise will be viable if it has a negative structural treasury. In fact, observing the financial structures of enterprises shows that they present a negative structural treasury, fact that would signify for most of them an important bankruptcy risk, such a conclusion being often exaggerated.

The rule of functional balance is based upon the principle of current bank credits' precariousness. But some of these credits are almost automatically renewed, depending of their predictions over production and often financing a good part of NFRE.

If the fact by which a good part of NFRE allows limitation of bankruptcy risk is incontestable, one cannot affirm that the risk will be unbearable if there is such a covering. As a result, certain critical thresholds were established on level of current bank credits or for covering NFRE by FRF, such as:

- the current bank credit are not allowed to exceed the turnover on two months or to be greater than half of NFRE;
- FRF has to be greater that half of NFRE.

These standards are yet arbitrary. The FRF level, in comparison cu NFRE, depends upon the NFRE variability and if the risk of bankruptcy that creditors are allowed to support.

The dynamic analysis - established on flows' studies, which lay on the analysis of bankruptcy risk, comprises the funds flows and treasury's funds. The concept of *funds flow* can be easily understood, considering the functional balance. A funds' flow appears as variation of utilizations or resources; there can exist either funds' flows representing utilizations or funds' flows representing resources. As concerns *the treasury flows*, these are encashment flows (entrances of liquidations) or payment flows (goings of liquiditations). If the static analysis allows the evaluation of financial unbalance at a certain moment, it is enough for explaining the unbalance evolution. Instead, the dynamic analysis presents certain limits, which consist on the impossibility of appreciating thee; proportions of unbalance' properties.

The strategic analysis
The operational instruments used by the specialists are the matrices of strategic analysis (Boston Consulting Group-BCG, A.D.Little-ADL, etc.), which allow approaching the financial balance problems, of the risk in comparison to activity portfolio of the company, having its competitive position.

The method of scores (scoring)
The analysis of bankruptcy risk has known an important development on statistical many-sized methods, which allow the financial situation analysis starting from a set of rates give. The most used method lays on discriminatory analysis.The principle of this analysis consists on knowing the financial features described by using the rates, for a set of healthy and weak enterprises, thus determining the best linearly combination of rates, which have to allow differentiating of enterprises, the good and bad ones.

The achieved results also allow on one hand the description in a systematic way of the weak enterprise's features and on the other side, to foreseen the bankruptcy risk. For each enterprise, after applying the discriminatory analysis, a Z score, depending on rates, is achieved. The distribution of different scores allows distinguishing of powerful and weak enterprises.

The Score Z is assigned to each enterprise, where through a linear function of type:

$$Z = a_1 \times X_1 + a_2 \times X_2 + ... + a_n \times X_n,$$

where:
X_i – variables that correspond to different data introduced within analysis
a_i – weighting coefficients

Starting from the value of different rates, the score for each enterprise will be determined. The value of the score allows classifying of an enterprise within the weak enterprises group (vulnerable) or to that of healthy enterprises. Among these methods of scoring with a view to evaluate the bankruptcy risks, only a few will be mentioned: Altman pattern, Conan-Holder pattern, Varetto pattern, the pattern of Bank Balances Centre from France, Argenti pattern, the pattern of Romanian Commercial Bank, Agricultural Bank Agricole pattern, Anghel pattern, Cămăşoiu/Negoescu etc. pattern.

Study concerning the analysis of bankruptcy risk
Among the scoring methods known within the speciality literature, with a view to evaluate the bankruptcy risk, ***Conan-Holder*** method was used.

The Conan-Holder pattern issued in 1978 on a sample of 190 middle and mean enterprises, allowed anticipation of bankruptcy with three years before their producing, during 1970-1975.
The scoring function includes 5 variables (rates) and it it's thus presented:

$$Z = 0{,}24 \times R_1 + 0{,}22 \times R_2 + 0{,}16 \times R_3 - 0{,}87 \times R_4 - 0{,}1 \times R_5,$$

where:

$$R_1 = \frac{EBE}{\text{Total duties}}$$

$$R_2 = \frac{\text{Continuous capital}}{\text{Total assets}}$$

$$R_3 = \frac{\text{Circulatin assets - Stocks}}{\text{Total assets}}$$

$$R_4 = \frac{\text{Financial expenses}}{\text{Turnover}}$$

$$R_5 = \frac{\text{Expenses with the staff}}{\text{Added value}}$$

The specialty literature emphasizes that values of scoring function, specific to this pattern, are interpreted in accordance to the following table:

The situation of enterprise	The value of Z score	The bankruptcy risk
High	Z > 0,16	sub 10%
Good	0,10 < Z < 0,16	10% - 30%
Uncertain	0,04 < Z < 0,10	30% - 65%
Unfavorable	-0,05 < Z < 0,10	65% - 90%
Catastrophic	Z < - 0,05	Over 90%

The calculus of scoring function has lead to the following values, presented in below table:

Table no. 1.

No. cr.	Specification	Analyzing duration			
		2003	2004	2005*	2006*
1	Gross excess from exploitation	15090826000	25798122000	1884807	2737035
2	Total duties	38962566000	66425555000	9778591	11553018
3	Continuous capital	62448683000	144609582000	18246445	22446850
4	Total assets	66541644000	147410552000	18618239	23186407
5	Circulating assets	11568513000	10066170000	873268	779077
6	Stock	2755772000	4534227000	406756	369942
7	Financial expenses	4919191000	8129401000	823015	976446
8	Turnover	65508032000	83211152000	8886228	10949660
9	Expenses with the staff	8511049000	12877970000	2201704	2762574
8	Added value	27529105000	44658629000	4715014	6030034
9	R_1 = EBE/total duties	0.38731602	0.388376461	0.192748321	0.236910823
10	R_2 = Continuous capital /Total assets	0.938490233	0.98099885	0.980030657	0.968103855
11	R_3 = (Circulating assets - Stocks) / Total assets	0.132439484	0.037527456	0.02505672	0.017645468
12	R_4 = Financial expenses/turnover	0.075092944	0.097696052	0.092616912	0.08917592
13	R_5 = Expenses with the staff / Added value	0.309165481	0.288364652	0.466955984	0.458135725
14	**Function-score Z**	**0.22**	**0.20**	**0.14**	**0.15**

** values, on levels of 2005 and 2206 on, expressed in RON*

From the above table's data, the following conclusions can be made:

- the values of scoring-function superior to ***minimal*** limit of 0.16 in 2003 and 2004 locate the trading society within a high financial situation. It can be also seen a descendent tendency of scoring function until the level of 2005, when the value of 0.44 is registered (under the minimal value of 0.16), growing at the level of 2005 with 0.01.
- the probability that the analyzed trading society of entering on bankruptcy is situated in the first two years under 20%, thus growing in the following years up to 30%, the society being in this case in a good financial situation, with the possibility of beneficiating of credits on view of continuing the investments that aim both on extension and modernization of treatment basis, of hotels' complex and on totality replacing of medical devices and purchasing high performance equipments, which would offer the possibility of accomplishing the functional exploration.

The vulnerability trading society, depending upon the value of scoring-function calculated on the above table, can be thus further appreciated:

Years	Value of Z score	Probability of bankruptcy	Condition of enterprise
2003	0,22	sub 10%	High
2004	0,20	sub 10%	High
2005	0,14	10% - 30%	High
2006	0,15	10% - 30%	High

The evolution of scoring-function value and the proximity toward the minimal level of 0.16 are the following:

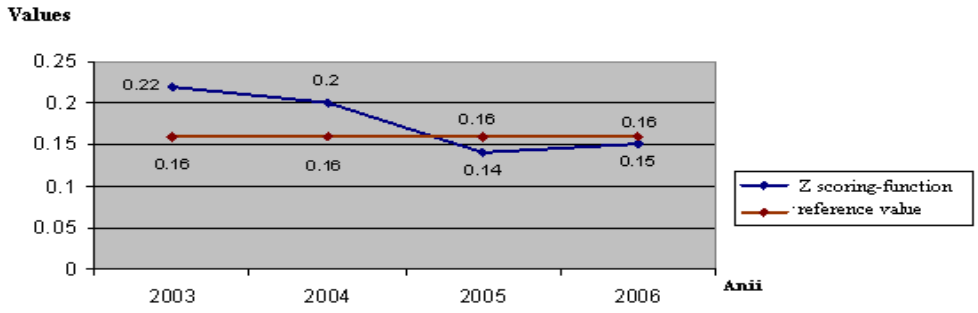

Figure no. 1 The evolution of scoring-function value and the proximity toward the reference level

Conclusions

On company's level, the risk reflects the possibility and respectively the probability that the economical-financial results might have an evolution of a certain manner that can lead the company towards bankruptcy, thus to payment' inability. The level of sensitivity of the economical result on functioning risks determines of every enterprise an investment more or less risking. Evaluating the risk represents a management requirement of monitoring the risk factors and of initiating prevention measures, limitation or counterworking their effects.

The risk represents in generally the possibility of an event appearance that might prejudice an enterprise activity; it represents a society' inability of adapting, on time and least price, to economical and social environment' conditions variations, where they carry out. In this way, on its activity assembly, the enterprise is submitted to three categories of major risks: of exploitation (economical), of financing (financial), of bankruptcy (insolvability).

References

1. *Burciu, A., MBO&ciclul afacerilor, Editura Economică, Bucureşti, 1999*
2. *Cişmaşu, I. D., Riscul-element în fundamentarea deciziei. Concept, metode, aplicaţii, Editura Economică, Bucureşti, 2003*
3. *Mironiuc, M., Analiză economico-financiară. Elemente teoretico-metodologice şi aplicaţii, Editura Sedcom Libris, Iaşi, 2006*
4. *Onofrei, M., Management financiar, Editura C. H. Beck, Bucureşti, 2006*
5. *Petrescu, S., Analiză şi diagnostic financiar-contabil. Ghid teoretico-aplicativ, Editura CECCAR, Bucureşti, 2006*
6. *Petrescu, S., Diagnostic economic-financiar. Metodologie, studii de caz, Editura Sedcom Libris, Iaşi, 2004*
7. *Prunea, P., Riscul în activitatea economică. Ipostaze. Factori. Modalităţi de reducere, Editura Economică, Bucureşti, 2003*
8. *Vâlceanu Gh., Robu V., Georgescu, N., Analiză economico-financiară, Editura Economică, Bucureşti, 2005*