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The Influence of Audit Opinion on Companies' Insolvency Risk. Evidence for Romania

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Abstract

Due to the increasing confidence of the population in tradable instruments and the opening of horizons towards investment policy, the Bucharest Stock Exchange (BVB) is recording a steady increase in market capitalization, similar to developed capital markets (New York, London, Paris, Tokyo etc.).

The financial auditor plays an increasingly active role in the sustainable development of a company, and its opinion is able to influence to a large extent the ability of audited companies to attract capital.

The goal of this research is to determine the role of the audit opinion in the sustainable development of a company listed on the Bucharest Stock Exchange and to determine its degree of insolvency using statistical procedures.

The results of the research show the importance of financial audit in increasing the financial performance of a company and in the quality of financial reporting, together with determining the influence of audit opinion on the future risk of insolvency.

***Key words**: auditor; insolvency; inability to pay; logistic regression; insolvency risk model;*

***JEL Classification**: M41, M42*

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Introduction

As the complexity of business increases, the financial auditor faces more and more diverse challenges in reasonably ensuring the accuracy of annual financial statements.

In a free market environment, the Stock Exchange is the body that governs and supervises the economic activity of listed companies. Through its own analysis, the Stock Exchange indirectly sends important signals to auditors about possible fraud or blatant errors, impairment of accounting principles or material misrepresentation in the financial statements of companies.

Among the general accounting principles, the *going concern principle*, the *periodicity principle* and the *prudence principle* are of particular importance for potential investors to substantiate their investment decisions (Mironiuc, 2012).

Given the fact that access to and trading of financial instruments is becoming easier and that, in this context, the auditor's responsibility is essential, through this study we seek to provide investors with a model that allows the determination of future insolvency risk based on current data.

Thus, at a time when the online world is increasingly making its mark on the economic activity of entities, when economic fraud is becoming more and more diversified, and when business development is beginning to depend on the attractiveness on the stock market, the financial auditor must respond to the expectations and needs of several categories of users of financial and accounting information, in particular financial and commercial creditors, existing or potential shareholders, employees, management, the public, and so on.

Literature review

Dobre & Brad (2015) conclude that the financial auditor's role together with the IT auditor is constantly growing in importance for the sustainable development of a company, providing a guarantee that there is no significant risk of fraud or error, together with an objective assessment of a company's risks and opportunities at a given point in time.

Mironiuc & Robu (2012) use a sample of one hundred NYSE and RASDAQ-listed companies to analyze the potential existence of a profile of financially distressed companies, concluding that distressed entities exhibit stock market indicators below the limits recommended by the economic literature. Applying this reasoning to the economic and financial analysis of listed companies is a relatively recent process developed by economic analysts in determining the true value of a listed company, based mainly on market capitalization.

Țurlea & Dobre (2015) correlate financial audit quality with corporate governance elements and conclude that entities that have better guidelines towards corporate governance principles are more inclined to delegate Big-Four (hereinafter referred to as *B4*) auditors to the detriment of local or international non-Big-Four (hereinafter referred to as *nB4*) auditors. Also, for companies with good corporate governance, audited annual financial statements present the auditors' recommendations as best practice standards and provide a more detailed picture of the company's economic situation.

With the development of the market economy in former communist states, Wyrobek and Stanczyk (2015) analyze the manipulation of financial statements of companies listed on the Polish Stock Exchange using a B4 and nB4 auditor classification. Thus, using a questionnaire type qualitative research, the study findings show that errors and frauds leading to manipulation of financial statements were more frequent and of higher intensity and scope in Big-Four companies than in companies audited by non-Big-Four (local or international) auditors.

At the same time, Moazedi & Khansalar (2016) find that for companies audited by B4 the net result reported at the end of the period is usually lower than for companies audited by nB4. The study also reveals an exponentially higher increase in qualified opinions in the case of B4 due to non-recording of income/expenses in the current period (accruals), a longer duration of non-collection of trade receivables and overdue debts than in the case of nB4 audit. Mironiuc & Robu (2012) conclude that for companies obtaining an unqualified audit opinion, the stock price is positively influenced by the reported net income.

Georgescu & Carp (2019) analyze the influence of audit opinion on the degree of manipulation of operating earnings, concluding that, for companies listed on the Bucharest Stock Exchange, auditing financial statements reduces the risk of sales manipulation, however without assessing the influence of B4 or nB4 auditors on the quality of financial reporting.

Since most of the works dealing with auditing topics mainly refer to the audit-performance relationship, respectively audit-governance and less to the audit-insolvency relationship, the authors' study proves its relevance by contributing to the development of the scientific literature in this less analyzed research area.

Research hypotheses

The mainstays of this research are the works of Mironiuc & Robu (2012), who profiled insolvent companies using a sample of listed US companies, and Georgescu & Carp (2019) respectively, who test the influence of audit opinion on the manipulation of financial-accounting information. In a similar vein, through this study we aim to identify a profile of companies with a high degree of uncertainty regarding compliance with the going concern principle. Thus, there is a possibility of reducing the risk of fraud and insolvency by omitting data and misleading existing and potential investors.

The model applied in this article is inspired by the models tested by the abovementioned researchers and adapted to the specifics of the Romanian market and the information relevant to the users of accounting information.

The data panel used is extracted from the Bucharest Stock Exchange's main trading segment, based on classical financial indicators, broken down by categories of firms grouped by type of opinion.

The research hypotheses we establish at the beginning of this study are:

H_1: *Audit opinion is able to directly influence the ability of companies to grow in the capital market by increasing attractiveness and investor confidence with the help of economic and financial indicators.*

H_2: *Audit opinion influences market capitalization over time, determined as the ratio of market share price to earnings per share*.

H_3: *Starting from the relevant indicators in the going concern assessment, a probabilistic equation can be derived to assess the financial performance of an economic entity and hence the risk of insolvency to which it is exposed*.

Principal component analysis is used to validate the research hypotheses. After identifying the financial dimensions of the research hypotheses, logistic regression analysis was used to estimate the profile of companies with a high risk of insolvency in the analyzed sample. The data was processed using the SPSS 20.0 computational tool.

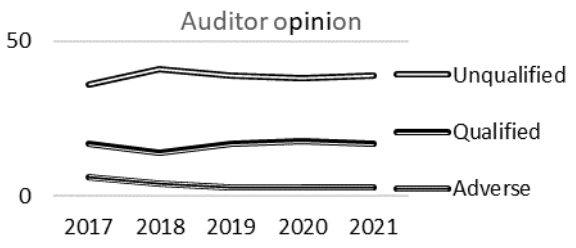
Research methodology

At the time of writing, 83 companies were trading on the main segment of the Bucharest Stock Exchange. Of these, we excluded financial credit institutions and insurance brokers (8 companies), companies under judicial reorganization (3 companies) and companies without available data for one or more of the financial years we analyzed (13 companies). The reasoning for excluding companies under judicial reorganization from the sample is that this study aims at a predictive analysis of current and future insolvency risk (prospective analysis) and not a post-factum or post-operative analysis. The sample analyzed totals 59 companies and its structure is divided into industry (45 companies), trade (8 companies) and services (6 companies).

The sample analyzed in this study is divided according to audit opinion and auditor types, as shown in **Tables no. 1 and 2**.

Table no. 1. Type of auditor opinion, 2017-2021 period

An	Opinion type:			Total
	Unqualified	Qualified	Adverse	
2017	36	17	6	59
2018	41	14	4	59
2019	39	17	3	59
2020	38	18	3	59
2021	39	17	3	59
Total	**193**	**83**	**19**	



Source: Own processing

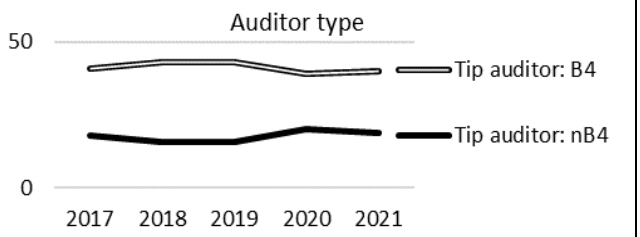
Note that the number of unqualified opinions is relatively constant over the analyzed period, with a minimum in 2017 (36 unqualified opinions) and a maximum in 2018 (41 unqualified opinions).

Similarly, there is also a constant number of qualified opinions, with a minimum in 2018 (14 qualified opinions) and a maximum in 2020 (18 qualified opinions).

In the case of adverse opinions, their number decreases progressively between 2017 and 2019, then remains constant from this year onwards (3 adverse opinions).

Table no. 2. Auditor type, 2017-2021 period

Year	Auditor type:		Total
	B4	nB4	
2017	41	18	59
2018	43	16	59
2019	43	16	59
2020	39	20	59
2021	40	19	59
Total	**206**	**89**	



Source: Own processing

Depending on the type of auditor (Big Four, hereinafter B4, and non-Big Four, hereinafter nB4), the number of nB4 auditors increased during the period under review at the expense of B4 auditors, mainly due to the high audit fees charged by B4 and the attempt by nB4 auditors to corner the market.

Structuring the sample according to audit opinions is necessary in establishing the first research hypothesis of the study, namely that the type of opinion may influence the quality of financial and accounting reporting. Therefore, compliance with the going concern principle is better understood.

Similar to the study of Istrate & Robu (2019), it is important to delineate the main elements underlying the qualified opinions, as shown in **Table no. 3**.

Table no. 3. Basis for qualified opinion, 2017-2021 period

Basis for qualified opinion	Number of opinions	Share of total
Stocktaking (auditor's non-participation in the stocktaking process)	29	28%
Depreciation of trade receivables	24	24%
Amortization and reversible depreciation of tangible and financial fixed assets	13	13%
Other justifications	36	35%
Total	**102**	

Source: Own processing

We note that the top qualified opinions (28% of the total) feature the lack of auditor participation in the stocktaking process and the auditor's inability to confirm audit assertions such as the existence of assets (*existence*), the accuracy of the stocktaking procedure (*accuracy*) and the valuation of stocks (*valuation*). As a rule, the auditor's non-participation in the annual stocktaking process is already a basis for a qualified opinion, with very rare exceptions where the auditor, even if not participating in the stocktaking, gives an unqualified opinion. The relatively high proportion of qualified opinions on this basis may be the result of several factors, endogenous or exogenous to the auditor, such as lack of communication with audit clients to set the stocktaking date, completion of the engagement letter after the annual stocktaking, auditors' lack of availability to carry out stocktaking procedures, stocks held by third parties that cannot be checked during the audit engagement, etc.

The depreciation of trade receivables accounts for 24% of all qualified opinions. The large volume of qualified opinions with this explanation is mainly due to the underestimation of the collection period for receivables and implicitly the recording in the "*491 – Adjustments for depreciation of client receivables*" account of an amount that is below the levels prescribed by the rules in force. Six of the audit letters analyzed also call into discussion the treatment of stocks on consignment (known among practitioners as *consignment stock*), which entails a differentiated accounting treatment and the transfer of risk is carried out in different stages compared to a normal acceptance. Along with this, we also mention the transfer of risk on the purchase of stocks from non-EU countries where international INCOTERM rules apply.

Depreciation (group 28) and adjustment for depreciation or loss of value of fixed assets (group 29) also account for 13% of the total qualified opinions during the 2017-2021 period. The explanation for this type of qualified opinion refers to a change in the depreciation policy during the year, implicitly affecting the depreciation expense in the period (class 68). Along the same lines we also find the understatement of expenditure on decommissioning or amortization of a fixed asset, even if it has been fully amortized, if the value of the expenditure exceeds the materiality threshold set by the auditor. In this case, the auditor finds deficiencies which, cumulatively, may affect the table of Note 1 in the annual financial statements, implicitly distorting the basis of the assets that create more value in the long term.

A total of 10 scale variables are proposed for analysis in this study. The independent variables required to achieve the objective of the analysis have been selected taking into account the need to analyze both balance sheet assets, debt and equity, and financial and stock market performance ratios in order to get an overview of each significant category in the annual financial statements.

In order to validate the working assumptions, the *reporting technique* was used to obtain financial indicators. In terms of profiling companies at risk of insolvency, simple and multinomial logistic regression analysis is used in the study, together with principal components analysis.

Principal component analysis is a multivariate descriptive analysis procedure that aims to reduce the number of variables analyzed in a logistic function to the point where two or three variables can lead to the interpretation of a similar result as in the analysis of eight or ten variables by eliminating collinearity. The computation by this procedure takes the form:

$Cj\ (j = 1 \rightarrow m)$, where $Cj = bj_1X_1 + bj_2X_2 + (...) + bjnXn$, and $m \leq n$,

the resulting factors (or components) being independent of each other. Introduced in 1901 by Karl Pearson, this method of analysis is still widely used today because of its practicality and efficiency.

We suggest several testing methods for validating the *hypothesis of independence of the main factors*, including:

1. X^2 test statistic – for validating the existence of a significant connection between variables;
2. KMO testing – for checking the intensity of the connection between variables.

Once these factors are determined, logistic regression analysis (LRA) can be used to determine the parameters of the regression model. LRA considers regression models with alternative dependent factors and is calculated as:

$Y = \beta 0+\beta_1V_1+\beta_2V_2+\beta_3V_3 + \varepsilon$, where Y = 0 if the company is at risk of insolvency and $Y \geq 1$ if the company is not at risk of insolvency.

In the proposed model, Ci with (i=1,3) represents the independent component (factors/indicators identified via principal component analysis), and βi (i=0,3) are the coefficients of the logistic regression model, with ε representing the standard error. Last but not least, Y is a Bernoulli-type dichotomous variable that groups values one and zero according to the probability of occurrence: p if Y = 1 and q if Y = 0.

Thus, the proposed logarithmic equation will have the form:

$$Li = ln\ (pi/(1-pi)) = \beta_0 + \beta_1 \bullet X_1 + \beta_2 \bullet X_2 + \beta_3 \bullet X_3 + \varepsilon i,$$

Where:

pi = probability that a company has no associated risk;

$\beta 0$ = constant;

$\beta_1, \beta_2, \beta_3$ = weighting coefficients;

X_1, X_2, X_3 = independent variables considered.

Based on the study of Mironiuc & Robu (2012) conducted on the N.Y.S.E. (*New York Stock Exchange*), Georgescu & Carp (2019) on the Bucharest Stock Exchange, and the study conducted by Moazedi & Khansalar (2016), the variables presented in **Table no. 4** were chosen as representative, together with the justification of the choice.

Table no. 4. Variables selected for the study

Independent variables	Computation method	Choice significance and justification
W_1 - Economic profitability (ROI – return of investment)	$W_1 = \frac{Net\ profit}{Total\ assets} x100$	the possibility for a company to finance its current activity from its own resources without having to resort to external sources of financing, which is important in determining the degree of autonomy of the entity;
W_2 - Financial profitability (ROE – return of equity)	$W_2 = \frac{Net\ profit}{Equity\ capital} x100$	the viability of the entity before commercial or financial creditors. It is useful in shaping the attractiveness of the entity to investors and creditors in case the entity is facing insolvency;
X_1 - Payment ability ratio	$X_1 = \frac{Cash + short\ term\ investments}{Current\ liabilities} x100$	due to the importance of determining the company's ability to immediately repay its short-term debts, whether commercial (payment of suppliers due in less than one year) or financial (short-term loans);
X_2 - Cash conversion cycle	$X_2 = Inventory\ turnover + debt\ turnover - credit\ turnover$	choosing this indicator takes into account the positive conversion cycle (when supplier debts are paid before collection from clients) or negative conversion cycle (the opposite situation, unfavorable to the relevant company);
Y_1 - Financial leverage	$Y_1 = \frac{Total\ debts}{Equity\ capital} x100$	to determine the ratio between the contribution made by the company shareholders and the contribution made by lenders. It is important for determining the risks of the company if the lenders' contribution is higher than that of the shareholders;
Y_2 - General solvency ratio	$Y_2 = \frac{Total\ assets}{Total\ debts} x100$	because the degree of financial autonomy in terms of the total assets to total liabilities ratio is also an important indicator for shareholders and potential investors;
Z_1 - Dividend per share	$Z_1 = \frac{Payable\ dividend}{Number\ of\ issued\ shares} x100$	due to the investors' interest in making a profit on their investment in the company;
Z_2 - Global financial autonomy ratio	$Z_2 = \frac{Equity\ capital}{Permanent\ capital} x100$	it is important in the investors' assessment of the financial independence of the company they want to capitalize on;
Z_3 - Dividend payout ratio	$Z_3 = \frac{Payable\ dividend}{Net\ profit} x100$	indicates the extent to which dividends are distributed from the net profit. It is important in determining the return on investment and in deciding whether to invest in a particular company;
Z_4 - Net asset book-to-market ratio	$Z_4 = \frac{Stock\ exchange\ rate}{Earnings\ per\ share} x100$	shows the price that existing or potential investors are ready to pay for the net earnings per share. It is necessary in determining a company's potential to attract investment.

Source: Own processing

Although recent studies deal exclusively with stock market indicators in the analysis of insolvency, we believe, however, that classical indicators are still a viable basis of analysis for capital markets. Because the information conveyed by classical economic and financial indicators gives an overall picture of a company's performance, they can form the basis for a predictive analysis of financial development over a defined time span in a stable market economy (only stable because there is a risk that the effects of economic hazards – financial, health, human crises, etc. – cannot be determined).

Results and discussions

Following the processing of the sample data, the study presents the resulting information in the form of a series of descriptive statistics, necessary to outline the research hypotheses, and to test the first research hypothesis, the auditor's opinion and the degree of performance recorded through the indicators analyzed were taken into account.

The methodological approach is oriented towards a positivist, logical approach, based on a mathematical and statistical testing of hypotheses, in order to confirm or refute the established hypotheses in a valid and conclusive manner.

The analysis by auditor type (B4 and nB4) could not reveal any significant differences in terms of working with an established or a developing auditor. As national and international regulations are binding regardless of the size of the auditor, there are no different reporting quality standards.

Thus, **Table no. 5** presents descriptive statistics in the form of mean and standard deviation, function of the auditor's opinion. It can be noted that entities with qualified audit opinions have values of the analyzed indicators well below those recorded by companies with unqualified opinions, all the more so as the threshold values set by the literature are not reached.

Since the descriptive analysis of the sample determined a significant influence of the auditor's opinion in the attractiveness and implicitly the financing capacity of listed companies, it is possible to validate the research hypothesis and implicitly the possibility of creating on a sustainable basis the premises for business continuity for companies whose audit opinion was unqualified, thus validating hypothesis H1.

Table no. 5. Descriptive analysis of categorical variables, 2017-2021 period

Categorical variable considered	Average			Standard deviation		
	Unqualified opinions	Qualified opinions	Adverse opinions	Unqualified opinions	Qualified opinions	Adverse opinions
W1 – Economic profitability (ROI – return of investment)	0.0502	0.0247	0.041	0.04922	0.0086	0.05232
W2 – Financial profitability (ROE – return of equity)	0.08834	0.05328	0.05582	0.09252	0.07554	0.08158
X1 – Payment ability ratio	0.7532	0.6834	0.7638	1.4898	0.838	0.8626
X2 – Cash conversion cycle	30.4	90.6	115.4	164.4	142.6	53
Y1 – Financial leverage	0.3804	0.2852	0.2368	0.396	0.33602	0.1476
Y2 – General solvency ratio	8.772	10.688	6.072	9.898	12.404	2.618
Z1 – Dividend per share	0.1768	0.06854	0.0392	0.0836	0.0346	0.0498
Z2 – Global financial autonomy ratio	0.6624	0.63602	0.7128	0.2286	0.2324	0.178
Z3 – Dividend payout ratio	0.371568	0.1772	0.3092	0.6894	0.54526	0.5086
Z4 – Net asset book-to-market ratio	0.48416	0.1598	0.0361	1.25472	1.07178	1.39432

Source: Own processing in SPSS 20.0

With small exceptions, the categorical variables analyzed show a continuously upward trend, regardless of the category in which they were classified, with the exception that in the case of companies with unqualified audit

opinions, the value of the indicators is higher than for qualified opinions. One explanation for the upward trend is that during the period under analysis (2017-2021) the positive development of the Romanian economy, the increase in living standards and the growth in the size of exports had a significant favorable impact on the development of listed companies on a sustainable basis, together with the increase in the level of private investment on the stock exchange.

The link between the auditor's opinion and the level of economic development is visible in **Table no. 5**, noting the level of development of companies function of the auditor's opinion.

Based on the averages calculated during the period under analysis, we can note an improved business management capacity of companies with unqualified audit opinions.

Following the descriptive analysis of the selected sample components we can conclude that the audit opinion plays an active role and positively influences the investment decision on the capital market, increasing attractiveness and significantly decreasing the future risk of insolvency. Using the principal component analysis (PCA), we will identify the main components that need to be considered in the analysis of a company's overall performance. The basis of calculation in this case will be the overall average of each descriptive coordinate analyzed above.

Table no. 6 illustrates the correlation matrix of the analyzed indicators, highlighting the positive and negative associations between indicators. Highly correlated associations (above 0.8 equivalent to 80%) suggest a strong connection between the analyzed components, allowing for logical inferences in the analysis of the main components.

Table no. 6. Categorical variables correlation matrix

Correlation Matrix[a]											
		W1	W2	X1	X2	Y1	Y2	Z1	Z2	Z3	Z4
Correlation	W1	1.000	**.837**	.796	-.400	-.565	.669	-.563	.294	**.920**	.330
	W2	**.837**	1.000	.674	-.150	-.260	.274	-.020	-.229	**.933**	.170
	X1	.796	.674	1.000	-.713	**-.884**	.618	-.464	.464	.584	-.137
	X2	-.400	-.150	-.713	1.000	.821	-.273	.562	-.664	-.093	.587
	Y1	-.565	-.260	**-.884**	.821	1.000	-.708	.668	-.795	-.220	.196
	Y2	.669	.274	.618	-.273	-.708	1.000	-.786	.722	.429	.550
	Z1	-.563	-.020	-.464	.562	.668	-.786	1.000	**-.896**	-.261	-.279
	Z2	.294	-.229	.464	-.664	**-.795**	.722	**-.896**	1.000	-.089	.015
	Z3	**.920**	**.933**	.584	-.093	-.220	.429	-.261	-.089	1.000	.422
	Z4	.330	.170	-.137	.587	.196	.550	-.279	.015	.422	1.000
a. Determinant = ,000											

Source: Own processing in SPSS 20.0

With the help of the correlation matrix, we can make a number of logical inferences about the cross-influence of the analyzed vectors. Thus, as far as economic profitability is concerned, we can note a very strong positive association with financial profitability of about 84%, leading to the hypothesis that an increase in economic profitability intrinsically leads to an increase in financial profitability, which is to be expected. However, in terms of the dividend payout ratio, we can conclude that the increase in the two profitability ratios translates almost automatically (through the coefficient of 93%) into an increase in dividends distributed to shareholders. Conversely (negative association), an increasing payout ratio leads over time to a decrease in leverage, mainly through a decrease in total debt.

Due to the fact that the correlation matrix does not show any significant association with the other indicators, we can conclude that the market capitalization index does not only take into account the classical indicators of profitability, liquidity and leverage, but rather considers, among others, the company's publicity, its development promises and leadership charisma as influential factors of the total value of the indicator.

By analyzing the main components, it is possible to assess the main economic and financial indicators that are relevant in determining the risk level of a company. In **Table no. 7**, we can note the influence of the most important components in the point cloud variance.

Table no. 7. Analysis of main components of categorical variables

Total Variance Explained							
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.287	52.867	52.867	5.287	52.867	52.867	4.398
2	2.591	25.906	78.774	2.591	25.906	78.774	3.994
3	**1.757**	**17.568**	**96.341**	**1.757**	**17.568**	**96.341**	**2.249**
4	.366	3.659	100.000				
Extraction method: Principal component analysis.							

Source: Own processing in SPSS 20.0

Thus, the Xi vectors of the equation for determining the best performing companies are established based on principal component analysis.

In order to obtain the scores for the components with the highest point cloud variance, the component matrix was determined on each vector analyzed. Therefore, **Table no. 8** summarizes the weighting coefficients β_i, which are necessary in establishing the equation for determining companies at risk. Determining the significant influence of each vector on the three components requires the extraction of the significant vectors in modelling the weight of the components in the total variance of the point cloud.

Table no. 8. Matrix of main components' coefficients

	Component		
	1	2	3
W1 – Economic profitability (ROI – return of investment)	.877	.455	-.063
W2 – Financial profitability (ROE – return of equity)	.551	.731	-.402
X1 – Payment ability ratio	.901	.031	-.369
X2 – Cash conversion cycle	-.674	.545	.457
Y1 – Financial leverage	-.875	.393	.144
Y2 – General solvency ratio	.830	.014	.501
Z1 – Dividend per share	-.783	.311	-.435
Z2 – Global financial autonomy ratio	.686	-.642	.341
Z3 – Dividend payout ratio	.622	.755	-.109
Z4 – Net asset book-to-market ratio	.149	.564	.811
Extraction method: Principal component analysis.			

Source: Own processing in SPSS 20.0

As regards the main determining vectors of the principal components in the total variance, it is possible to determine the influence exerted by the main indicators. The first component is positively influenced by economic profitability (0.877 vector points), together with financial profitability (0.551 vector points) and payment ability ratio (with 0.901 vector points), negatively influenced by financial leverage (-0.875 vector points).

In the case of the second component, the overall solvency ratio (Y2 with 0.731 vector points) can be significantly influenced in a positive direction and the overall financial autonomy ratio (Z2 with -0.642 vector points) in a negative direction.

Due to its smaller influence in explaining the total variance, component 3 is positively influenced only by the market capitalization ratio of net book assets.

The value of the KMO statistic (**Table no. 9**) for testing the independence of the vectors takes the value of 0.616, showing the existence of a significant link between the initial components that entered the structure of the main vectors analyzed. Thus, for a sig = 0, the test results show that the hypothesis of independence of the selected coordinates is accepted.

Table no. 9. Bartlett test and KMO statistics in assessing the suitability of selected vectors

	KMO and Bartlett's Test	
Kaiser-Meyer-Olkin Measure of Sampling		.616
Adequacy		
Bartlett's Test of Sphericity	Approx.	1639.95
	Chi-Square	
	df	96
	Sig.	.000

Source: Own processing in SPSS 20.0

Accordingly, three probabilistic equations for determining the degree of performance of an entity are derived from principal component analysis, as follows:

- **C1**: $0,877*W_1 + 0,551*W_2 + 0,901*X_1 – 0,875*Y_1 + 0,83*Y_2 + 0,686*Z_2 + 0,149*Z_4$;
- **C2**: $0,455*W_1 + 0,731*W_2 + 0,031*W_1 + 0,303*Y_1 + 0,014*Y_2 – 0,642*Z_2 + 0,564*Z_4$;
- **C3**: $-0,063*W_1 – 0,402*W_2 – 0,369*X_1 + 0,144*Y_1 + 0,501*Y_2 + 0,341*Z_2 + 0,811*Z_4$.

The proposed equations show that in the case of component 1, a directly proportional influence is exerted by the economic rate of return, the financial rate of return and the payment ability ratio, but financial leverage has an inversely proportional relationship in the influence of the component as a whole. The influence of leverage can be seen as a decrease in the attractiveness of a company in the capital market, especially if the total debt structure is predominantly short-term debt. As regards component no. 2, a positive (or directly proportional) association of the overall solvency ratio and a negative (inversely proportional) association of the overall financial autonomy ratio can be inferred. If we refer to the third component, a significant positive association of the market capitalization vector is noted, thus highlighting the importance of assessing these types of indicators in the overall assessment of an business entity, together with the classical economic and financial indicators.

In order to assess the insolvency risk level associated with each entity among the three sectors of activity, the calculation equation considers the splitting of the sample and the determination of the risk level by taking into account each main component.

Thus, we were able to determine the probability coefficients for each component, as shown in **Table no. 10**, using the Gaussian distribution which requires the assessment of the mean and standard deviation in the distribution of selected vectors.

Table no. 10. Determination of risk probability coefficients

	Activity sector	Component 1	Component 2	Component 3	Constant
Coefficient	*Industry*	0.786	-0.968	0.386	0,218
	Trade	3.557	0.025	0.889	
	Services	21.452	189.626	-174.592	
Error	*Industry*	0.545	0.356	1.225	0,899
	Trade	17540.255	24999.526	4295.663	
	Services	12.793	2.295	0.732	
Exponent	*Industry*	0.052	1.958	0.056	0,124
	Trade	0.001	0.000	0.006	
	Services	0.372	0.999	1.684	

Source: Own processing using SPSS 20.0

Consequently, given the scope of activity of the companies in the sample, the equations for determining the risk of insolvency will take the following form:

1. for industry: 0.218 + 0.786*C1 - 0.968*C2 + 0.386*C3;
2. for trade: 0.218 + 3.557*C1 + 0.025*C2 + 0.889*C3;

3. for services: 0.218 + 21.452*C1 + 189.626*C2 - 174.592*C3.

In order to test the validity of the proposed models, it is necessary to test them based on the sample analyzed. Thus, taking into account the previous descriptive statistical analysis, the working sample was broken down according to the two criteria stated in the first part of the study, namely *qualified opinions* and *unqualified opinions*.

Testing and validation of proposed models

The validity testing of the proposed models aims to verify the functionality of the statistical model determined on the Bucharest Stock Exchange sample.

Given that this stage of the study only seeks to verify the statistical probability of detecting a company at risk of insolvency, the risk determination equations will be applied on data extracted from the year 2021, as the last reference year of the study. The year 2021 was chosen due to the fact that in the validation of research hypotheses H_1 and H_2 a similar trend and ratio was observed in terms of the types of opinion analyzed, and we consider it inappropriate to validate all the periods analyzed since the result cannot undergo notable changes. At the same time, the validation of the last available year in terms of data extracted at the time of writing this study provides an increased veracity of the proposed model.

In order to validate the proposed econometric models, the sample has been divided according to audit opinions and business sector.

According to **Table no. 11**, the result of the calculation equations shows the values taken by each sampled category, function of business sector.

Table no. 11. Result of the insolvency risk detection equations for 2021

Business sector	Opinion type	Value	Variance (abs)	Variance (rel)
Trade	**Unqualified**	6.768	3.153	47%
	Qualified	3.615		
Industry	**Unqualified**	11.281	3.765	33%
	Qualified	7.516		
Services	**Unqualified**	- 862.056	-234.519	27%
	Qualified	- 627.538		

Source: Own processing

The application of probabilistic equations to determine the future risk of insolvency shows a significant difference between the two sampled categories.

In the *trade* sector, the calculated value is 6.678 for unqualified opinions and 3.615 for qualified opinions. Thus, a 47% higher risk of insolvency can be estimated for companies with qualified audit opinions only in terms of the type of opinion issued by the auditor.

In the *industry* sector, the calculated value of 11.281 for unqualified opinions compared to 7.516 for qualified opinions shows a 33% increase in future insolvency risk if the trend remains similar.

The value calculated for the *services* sector takes negative values due to the parameters estimated by the regression model, but this is not an impediment to the calculation and interpretation of the equation. Also, as regards the interpretation of the data obtained, we note that the difference between unqualified and qualified opinions leads to a 27% increase in the risk that a company with a qualified opinion will declare insolvency in future financial years.

The test values resulting from the application of the logistic regression model can be estimated for the trade sector as {5; ∞} for the interpretation of a low insolvency risk and {-∞; 5} for a high insolvency risk. In the case of industry, test values of {9; ∞} are accepted for interpreting a low insolvency risk and {-∞; 9} for an increased insolvency risk. For the services sector, due to the very low representativeness of the sample, it is not possible to assess thresholds for interpreting the outcome of the probabilistic equation, but it is possible to assess that values tending towards zero show a higher risk of insolvency.

The logistic regression model test value determination shows that when the value decreases by 1 (from 5 to 4, from 9 to 8 etc.), the risk of insolvency increases on average by 15-17%.

However, interpreting the regression model parameters in a more simplistic way, it is possible to appreciate that a calculated value of the probabilistic model that tends towards zero indicates an increased probability that an entity will experience periods marked by payment inability in future financial years.

The analysis of a company's insolvency risk using audit opinion is able to provide a reasonable investment to current and potential investors, mainly due to the fact that qualified audit opinions are awarded for failure to comply with the auditor's recommendations, thereby increasing the risk of financial fraud through omission or manipulation of financial information.

Conclusions

In this study, the hypotheses were validated through empirical results, thus meeting the research objectives.

The first research hypothesis helped to establish the auditor's role in the overall performance of a company, using profitability, liquidity, leverage and stock market indicators to validate the effect of the audit opinion both on the sustainability and sustainable development of a company and in terms of stock market attractiveness and ability to attract capital market funds.

In line with the first research hypothesis, we were able to establish that the type of audit opinion influences stock market capitalization, but could not establish a collinearity link between the stock market capitalization ratio and the other economic and financial indicators analyzed. Thus, we can appreciate that an increase in market capitalization does not only take into account the analysis of financial performance through hard data, but is also linked to series of non-financial data (social or environmental – as part of the overall performance).

Establishing a probabilistic model for determining a company's future risk of insolvency was the third research hypothesis. Thus, it is possible to assess the degree of solvency of a company via a multinomial logistic regression model that provides an indication of a company's financial performance. By testing the validity of the third research hypothesis, it was possible to establish threshold ranges for classifying a company as carrying a risk of insolvency and establishing that values tending towards zero show the highest degree of insolvency. As the footprint of small investors in the capital market is experiencing an upward trend, this study helps current and potential investors by offering an alternative model to the traditional means of assessing the attractiveness of a company.

Continuing the analysis of the reviewed literature, the authors have succeeded in adding to the current state of knowledge in the field, promoting a working methodology that addresses the ability of a company to add value to its shareholders and that creates the prerequisites for compliance with the going concern principle.

We believe that the results of our research are relevant because we managed to determine a commensurable procedure of statistical analysis of a company's likelihood to declare insolvency in future financial years. By establishing the auditor's role in compliance with accounting principles, the findings of the study show that the investment policy should also take into account the audit opinion, a distinct criterion in the choice of financing for an economic entity. This analysis is also aimed at auditors who wish to use statistical procedures to assess the probability of insolvency of the audited company, thus complementing the already standardized fraud (*forensic*) analyses.

The limitations of the study are the impossibility to determine a more representative sample, as data for 13 companies could not be found in the current research. Furthermore, the insolvency risk assessment also took into account the last two financial years (2020 and 2021), characterized by a cascade of crises (health, humanitarian, economic, armed conflicts at the Romanian border) and record inflation, therefore the research findings may be influenced by factors exogenous to the analyzed companies, and the natural response of most of the entities analyzed is investment and development prudence.

The current trend among economic practitioners and researchers alike is that crises caused by economic crime and the absurdity of greed should be, if not abolished, at least significantly reduced in order to avoid major financial crises as much as possible.

Future research directions in the field of insolvency seek a constant refinement of the procedures for testing and validating valid models, with continuous modifications and updates of current models being necessary in a fluctuating market facing new and diverse challenges.

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