

# Predicting Bankruptcy Using Financial Indicators

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**Abstract:** All companies are the topic to the bankruptcy risks. If we look at the definition, a bankruptcy risk is the business' disability to deal with payable responsibilities. In the recent past, as a consequence of the dynamization of the financial and economic action of different firms, it has become essential to obtain precise information about bankruptcy. The leading objective of this paper is to explore the impact of financial performance indicators on bankruptcy threat for the companies from our dataset. In order to summarize this analysis, I use a multiple regression because it is important to verify if some financial indicators could have an impact on bankruptcy. The software used is IBM SPSS Statistics. Also, I present descriptive statistics that show a general overview for the variables. The variables that are in the center of analysis Return on Assets, Return on Equity, Gross Profit to Sales and Total Asset Turnover.

**Keywords:** Bankruptcy, Statistical Analysis, Multiple regression, Predictive Analysis.

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## I. Introduction

Business bankruptcy is changing into a progressively significant subject in today's environment. The bankruptcy conclusion can be a matter of life and death for the companies, but the influence of the situation is upscaled by the diversity of business connections in which companies typically are implicated. We know that bankruptcy is not a favorable part for any type of business. If a business goes bankrupt, there will be damaged also a lot of other linked industries, not only the company itself.

Any firm that does business with customers will get itself in bankruptcy situation one day through the life of the company. However, owners know the situation and they need to understand how a client's bankruptcy instance will influence and effect the business. Consumer bankruptcy forms have risen drastically in the last 10 years. Companies have to realize the bankruptcy procedure from the perspective of a creditor dealing with a client debtor.

Bankruptcy is a legislative procedure that occurs within the national tribunal system. The aim of this paper is to serve business owners and businesses that are insolvent get remission from impossible-to-pay debts. Bankruptcy is supposed to be a last resource. When a debtor has experienced anything to produce money in order to carry on paying debts and sustain their business or essential living level, and collapsed, the debtor can get to the bankruptcy court for defense from creditors and to kick back their financial condition.

The threat of bankruptcy is concerned by plenty various aspects. For that reason, determining the elements influencing bankruptcy risks, particularly performance variables are significant and needed.

## II. Review of the scientific literature

Bankruptcy is one of the subjects that have gained considerable awareness from many researchers. Principally, the variables that show the financial performance of companies are crucial and statistically significant in research. Eljelly et al. (2001), Bandyopadhyay (2006) and Ohlson (1980) elaborated models of bankruptcy probability forecasting using logistic models. They used variables like after-tax profit/total assets, net profit/total assets and total debt/total assets.

According to Fulmer et al., (1984) and Altman et al., (2007) studied the correlation between financial index and bankruptcy risks: ROE, ROA and TAT were statistically significant for previsioning the bankruptcy risks.

Business that has higher liabilities and low earnings before interest and taxes (EBIT) are less potentially to continue their businesses. Gu (2002)

### III. Research Methodology

The database that I used in my research paper contains financial information about bankruptcy of different companies and was extracted from kaggle.ro. The dataset consists of approximately 6820 records.

In order to see what leads to bankruptcy, I will use a multiple linear regression where the dependent variable is ROA and the independent variables (predictors) are: ROE, Gross Profit to Sales and Total Asset Turnover.

Return on Assets (ROA) is a financial ratio that illustrate how profitable is an organization/company is in relation to total assets. ROA is a metric which determines if a company uses their assets in an efficient way in order to bring profits. As a formula, ROA is written:

$$\text{Return on Assets} = \frac{\text{Net Income}}{\text{Total Assets}} \tag{1}$$

Gross Profit is the profit a company makes after deducting all the costs.

Total Asset Turnover (TAT) is a financial ratio that calculates the value of a business' revenue or sales corresponding to the value of its assets.

Return of equity (ROE) is a measure of financial performance and it is calculated by splitting the net income by shareholder's equity. So, the higher the ROE, the more successful a business's management is at producing income and growth.

$$\text{Return on Equity} = \frac{\text{Net Income}}{\text{Average Shareholders Equity}} \tag{2}$$

### IV. Results and discussion

Regression analysis is a statistical technique for investigating and modeling the relationship between variables. Equation of regression is:  $y = \beta_0 + \beta_1 x$ , where  $\beta_0$  is the intercept and  $\beta_1$  is the slope.

**Table no. 1. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.587	.344	.342	.03481	1.704

*Source: Author own research results*

Using linear regression in IBM SPSS Statistics, there are generated the R and R Square. R Value equals 0.587, which indicates a good degree of correlation. R Square indicates how much of total variation in the dependent variable (ROA) is explained by the independent ones (ROE, Gross Profit Sales and Total Asset Turnover), so it is the correlation between the observed and predicted values of dependent variable. R Square=0.587, so 58.7% of the variance in ROA can be predicted by ROE, Gross Profit Sales and Total Asset Turnover. The predictors have a positive impact on ROE.

**Table no. 2. Coefficients**

Model		B	Std. Error	Beta	t	Sig	Tolerance	VIF
	Constant	-.832	.081		-10.299	.000		
	GrossProfittoSales	1.980	.123	.458	16.091	.000	.999	1.001
	TATTotalAssetTurnover	.225	.018	.347	12.168	.000	.998	1.002
	ROENetIncometoStockholdersEquity	.120	.041	.084	2.955	.003	.997	1.003

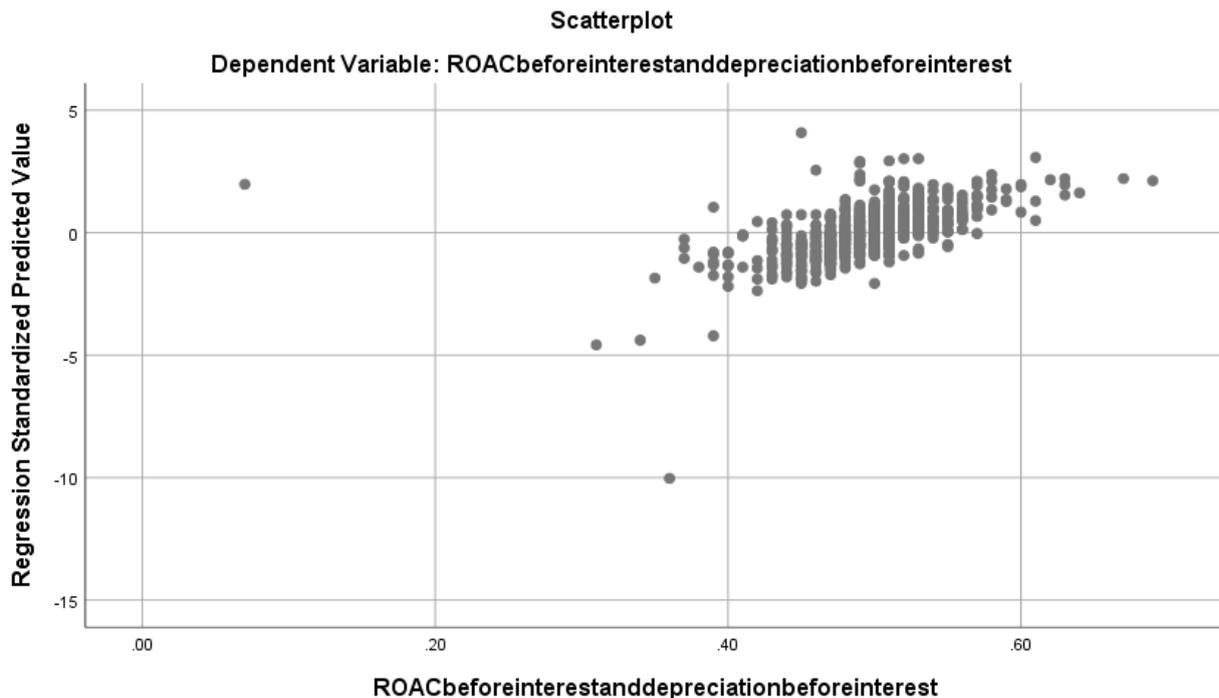
*Source: Author own research results*

The Coefficients Table provides the needed information to predict ROE from Revenue, Operating Expenses and Cost of Revenue and also if the predictors contribute statistically significantly to the model. This can be verified by looking at the Sig. (which is less than 0.05 for all the variables)

All the variables used in my analysis are continuous. The regression equation is written as:  $ROA = -0.832 + 1.980 * \text{Gross Profit Sales} + 0.225 * \text{Total Asset Turnover} + 1.130 * \text{ROE}$ .

Below, I present the regression line where the ROA is estimated through the regression model versus the real ROA.

Figure no. 1. The Regression Line



Source: Author own research results

In order to verify if the overall regression model is a good fit for the data, I used in my paper ANOVA. ANOVA is the analysis of variance and consists of calculations that provide information about levels of variability within a regression.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.515	3	.172	141.650	.000 <sup>b</sup>
	Residual	.980	809	.001		
	Total	1.495	812			

ANOVA is used for answering a question that sounds like this: “Do the ROE, Gross Profit Sales and Total Asset Turnover reliably predict the ROA?”. In this case, Sig = 0.000, which is less than 0.05, and it can be concluded that ROA reliably predict ROE, Gross Profit Sales and Total Asset Turnover. Also, the regression model is a good fit for the data and is statistically significant.

## V. Conclusion

Business bankruptcy is changing into a progressively significant subject in today’s environment. The bankruptcy conclusion can be a matter of life and death for the companies, but the influence of the situation is upscaled by the diversity of business connections in which companies typically are implicated. We know that bankruptcy is not a favorable part for any type of business. If a business goes bankrupt, there will be damaged also a lot of other linked industries, not only the company itself.

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