

# Investigation of the effect of the value added, earning quality and leverage ratio on bankruptcy in organizations accepted in Tehran's stock market

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## Abstract

The recent bankruptcy of large organizations, internationally, and the frequency of stocks in the stock and share market in Iran show the necessity of some tools in order to evaluate the financial ability of organizations. One of the tools for evaluating the financial ability of organizations is using the key criteria as an independent variable and analyzing some earning figures to study the bankruptcy of organizations. This article is going to investigate the effect of economic value added, earning quality and leverage ratio on the bankruptcy of the amount of credit indices in Tehran's stock and shares market. The results of the research will show that in accepting organizations in stock and share market of Tehran, the economic criteria of value added and the leverage ratios are better indices to predict the bankruptcy and are able to show the possibility of bankruptcy to the shareholders. One of the other results of this research is to mention that the economic value added is an index which is capable to be exchanged with other indicators of performance evaluation for managers and owners in order to achieve the goal of maximizing the wealth of shareholders.

**Keywords:** economic value added, earning quality, leverage ratios, bankruptcy.

## Introduction

The increasing developments of technology and global competitions give an increasing momentum to economy and have brought the issue of earning

benefit and increasing the wealth of shareholders into serious challenge. In such an environment to keep the competitive ground of the organizations and their survival we need more strategic decisions comparing to the past. On the other hand, making financial decisions has always been accompanied with risks as there is a lack of future trust. So, one of the ways to help the investors is to present a prediction of the organization's place and a general view over it. The closer these predictions are in reality the more they would be the basis of corrector decisions. According to the researches done in financial areas, one of the most important issues is to predict the financial bankruptcy that has brought into concern in the field of finance and accounting. The financial bankruptcy happens when the organization has continuous and serious losses or not having the ability to pay back the debts. That is beyond the organization's assets. The highest influence of these researches is on loan giving decisions of financial institutes and their ability in Profitability. Before the financial institutes respond to the organizations loan requests, it's necessary to evaluate the possibility of the bankruptcy for that organization. So, the correct and in time prediction of bankruptcy has an important role in the process and durability of financial institutes. Additional to the financial institutes, the investors and creditors have greater tendencies to predict the bankruptcy of organizations, because in case of bankruptcy they would endure the expenses. That is the reason for predicting the bankruptcy of organizations is an important issue to make decisions for financial in-

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stitutes. A wrong decision could end in crisis or financial straits. In general, it can be mentioned that for all of the users of Financial Statements (managers, investors, employees, shareholders, creditors and other beneficiary persons), being aware of this prediction is in great value from managing point of view, the tools to predict the financial bankruptcy are able to activate the strategic actions when needed and to avoid bankruptcy.

### *Reasons for bankruptcy*

To determine the exact reason or reasons for bankruptcy and financial problems is not an easy issue in any case. In most cases there are different issues that result in bankruptcy. However, according to Dan and Brad Street the major reasons for bankruptcy are financial and economic problems. Newton (2008) divided the major reasons of bankruptcy into two different categories as the internal and the external:

The internal reasons:

- Develop of excessive credit
- Inefficient management
- Inadequate capital
- Competitive
- Infidelity and cheating

The external reasons:

- Characteristics of economic systems
- Business fluctuations
- Competition
- Financing
- Changes in practice and improve financing

### *Economic value associated with bankruptcy*

If companies do not meet the return expectations of the shareholders and if they aren't able to supply the interest expense of their loans, the economic value of these companies will be negated. Obviously in such companies capital investors, including shareholders and creditors will be reluctant to continue investing, by continuing this gradually, the expense of loans to companies increases and the companies will face the financial crisis. This will deprive the advantage of available opportunities for the profitable investments. So, the company would face bankruptcy, that's why it is expected that there is a direct correlation between bankruptcy and the companies with the economic value added negative. The opposite is also true, in other words companies that supply the shareholder return and their expense of loans, the EVA positive will be gained. Howev-

er, the different EVA in organizations in one market can down the investment from an organization to another or from an industry to another industry, but anyway such an issue is absolutely temporary in a successful economy and with the increase of investment for the efficient section, slowly the return of that section would be normal and with this the organizations with low yield positive economic value would not be eliminated.

### *Earnings quality and its relation to bankruptcy*

Investors need some clear, correct and useful information on investing in order to make decisions. One of the main factors selected by the Firms Accounting Systems is the income statement. The importance of this financial statement is the possibility of predicting the cash flow for the future and also to examine the management performance (Shabahang, 2005). But if the earning does not have the necessary quality, the investors (investors and shareholders) would face an ambiguity in order to predict and calculate the future cash flows which are on the basis for investors to evaluate the organizations stock and to provide credit to the company. With the increased uncertainty about the future, or in another sense increased risk in corporate investment, can decrease the will of the investors (creditors and shareholders) to invest in the organization, this continuity can cause financial problems for the organization in a long term period and if the financial problems in any organization continue, would bring upon the increased Risk Double Company and increased problems in financing to repay principal and interest on debt which may put the firm on the one way road of bankruptcy. According to what mentioned, there is a relationship between the earnings quality and bankruptcy.

### *Financial leverage associated with the bankruptcy*

Financial leverage is being used for the shareholders in the form of earn excess returns, this issue can be at use as long as the firm has the ability to pay interest and has not lost its principal debt and the efficiency resulting from the use of leverage over its use of expense. But when the firm loses such a situation faces problems in returning the obligations and interest, high financial leverage will cause a decrease and gradually the companies would not be able to pay the interest and principal debt. In this situation the organizations risk rises and the investors (creditors and shareholders') won't continue

their cooperation with the organization, therefore, the company will face a crisis in its financial. So it will keep the company on track to bankruptcy. So we can expect that there is a relationship between financial leverage and bankruptcy, of course the amount of leverage for each company and each industry according to the level of profitability and market products that can make a difference.

### *Empirical research background*

Etemadi (2008) used genetic programming (extended mode, genetic algorithms) to predict corporate bankruptcy. This sample consists of 140 companies, including 70 companies' bankrupt and 70 non-bankrupt firms. The survey of the results indicates 94% accuracy for predicting bankruptcy one year prior. This study also compared the genetic model and the traditional models predict (predictive models presented earlier bankruptcy in 1980), it was voted the superiority of the genetic process, in addition to this model regardless of the restrictive assumptions that traditional models also have higher accuracy. In the traditional models by increasing the time interval between the occurrences of bankruptcy, the accuracy of the model reduces; while this reduces the accuracy of the model based on genetic patterns is less.

Pourzamani in 2005 in her thesis entitled "Corporate Governance and Bankruptcy Prediction" examines the relationship between corporate governance and bankruptcy payments. Her study showed that a financial crisis warning system cannot be complete without considering the characteristics of corporate governance.

In 2005 Khodayar in his research showed that "the relationship between the three levels of smoothing Gross profit, operating earnings and net profit and corporate bankruptcy has been studied in three steps: 1. Incubation, 2. Cash deficit of the commercial and financial debt to pay, 3. Phase of the dues paid in full (complete failure)". Their findings suggest that the managers of business units in various stages of bankruptcy, to better show the financial position and performance of their company in order to preserve their capital market with the help of the tools at their disposal do things that will lead to income smoothing.

## **Methodology**

### *Sample preparation*

#### **Hypothesis:**

The hypotheses of this study are as follows:

Hypothesis 1: EVA is a factor influencing bankruptcy.

Hypothesis 2: Earnings quality is a factor influencing bankruptcy.

The hypothesis 3: Financial leverage ratios are factors affecting bankruptcy.

The first sub-hypothesis of Hypothesis Three: The ratio of debt to assets has the effect of bankruptcy.

The second sub-hypothesis of Hypothesis Three: The payment of interest can affect bankruptcy.

#### **Population**

To test hypotheses the population must be chosen so that information can be collected with greater confidence. Therefore, in this study, all textiles and pharmaceutical industry were selected as the target population.

#### **Sample**

This test measures the impact of economic value, quality, and profitability and leverage ratios on bankruptcy information on bankrupt and non-bankrupt groups were required and of the 21 industries in the Stock Exchange, all eligible and ineligible firms in the textile industry and pharmaceutical have been selected.

#### **Spatial and temporal scope of the study**

Given the critical role of capital markets in economies where research is the domain of the Tehran Stock Exchange. And the scope of this study included five consecutive years beginning in 2005 until the end of 2010.

The aim of the research is that the researcher can determine what method or methods to be adopted to achieve his best to help answer research questions. Research methods that investigator chooses to do depend on his own subject and object. Because this study sought to examine the effects of independent variables on the dependent variable and as for the independent variables the study data will be used and cannot be manipulated, so the methodology of this study is causal or events. Also, the results of this study can be used for a wide range of stakeholders, the authorities in Tehran Stock Exchange, financial analysts and researchers in applied research.

#### **The research model**

Variables examined in this study, are divided into two groups of independent variables (economic value, quality, profitability, financial leverage ratios) and the dependent variable (bankruptcy). General model variables can be expressed as a function of the following form:

(Bankruptcy)  $P = f$  (Economic value, quality, profitability, financial leverage ratios)

**The first hypothesis test: EVA is a factor influencing bankruptcy.**

The significance level provided in square inde-

pendence test (at a significance level of 95%) EVA model is based on the impact of bankruptcy.

**Table 1. The accuracy of the results obtained by the EVA index, with Inter method.**

Percent accuracy EVA measures the Prototype	Total	The EVA index group predicted by the Inter		Suppose Group
		Total non-bankrupt	Total bankrupt	
96/1	63	6	57	Bankrupt
-	142	140	2	non-bankrupt
-	205	-	-	-

The Wald test also provided significant EVA ratio and fixed ratio model. The negative coefficient sign impact of EVA model is based on reverse Bankruptcy. In other words, the probability of bankruptcy decreases with increasing economic value and economic value of reducing the probability of bankruptcy increases. Based on the output provided by the legit model, the following model can predict the probability of failure:

$$P = \frac{e^{-1.363-16.005REVA}}{1 + e^{-1.363-16.005REVA}}$$

EVA represents the value added in the economy, and P is the probability of bankruptcy.

### Testing Hypothesis 2: Earnings quality is a factor influencing bankruptcy

Due to the significant chi-square independence test proposed, (at the 95% significance level) bankruptcy does not validate the impact on earnings quality. But the 93 percent level is significant.

The Wald test also provided significant, earnings quality factor of the model is not significant, but significant is the constant factor model. The sign of the coefficient on the earnings quality model, which is negative in this model, the impact on earnings quality is negatively bankruptcy (but not significant) in other words, the increase in earnings quality, earnings quality by reducing the probability of bankruptcy and reduce the probability of bankruptcy increases. Based on the output provided by the legit model the following model can predict the probability of failure:

$$P = \frac{e^{-.792-0.06EQ}}{1 + e^{-.792-0.06EQ}}$$

EQ indicates that the relationship between earnings quality and P is the probability of bankruptcy.

**Table 2. The inter-assay precision of the results obtained from the EQ index.**

Percent accuracy EVA measures the Prototype	Total	The EVA index group predicted by the Inter		Suppose Group
		Total non-bankrupt	Total bankrupt	
70/2	63	61	2	Bankrupt
-	142	142	0	non-bankrupt
-	205	-	-	-

### Testing Hypothesis 3: Financial leverage ratios are factors affecting bankruptcy.

The first sub-hypothesis: The ratio of debt to assets has the effect of bankruptcy.

Due to the significant chi-square independence test proposed (at the 95% significance level) the ratio of debt to assets has the effect of bankruptcy. Also logistic regression analysis of the data calculated by the model coefficient of determination equal to 94/3 percent and it means that 94/3% of the variance (bankruptcy) by the independent variable (the ratio of debt to assets) can be explained. Between two hundred and five models mentioned only two failures occurred that the classification error of two all of them are related to type-one error and there are no any type-two errors. According to this output the sensitivity of this model in the non-bankrupt firms is 100 percent and is 89 percent of the bankrupt firms and generally, 99 percent of companies have been properly classified. The following table shows the accuracy obtained by using leverage from Inter modal.

**Table 3. The accuracy of the results obtained by the ratio of debt to assets with Inter.**

Percent accuracy EVA measures the Prototype	Total	The EVA index group predicted by the Inter		Suppose Group
		Total non-bankrupt	Total bankrupt	
99	63	2	61	Bankrupt
-	142	142	0	non-bankrupt
-	205	-	-	-

Also based on the Wald test significance level offered, and the ratio of debt to assets ratio is fixed by the model significantly. According to the signal model by model ratio of debt to assets is positive and it argues that the impact on assets and liabilities of the direct bankruptcy are related. In other words, the increase in debt increases the probability of bankruptcy and debt asset ratio reduces the probability of bankruptcy. The legit model output can be provided as follows:

$$P = \frac{e^{-17.354+0.06LR_1}}{1+e^{-17.354+0.06LR_1}}$$

The assets and liabilities of the LR1 model P is the probability of bankruptcy.

The second sub-hypothesis: Bankruptcy can affect the payment of interest:

Due to the significant chi-square independence test proposed of K-2 (at the 95% significance level) bankruptcy can affect the payment of interest. Logistic regression analysis of the data calculated by the model coefficient of determination equal to 86/6 percent and it means that 86/6% of the variance (bankruptcy) by the independent variable (the ratio of interest payment) can be calculated. Based on the 205 data of this model ten errors have occurred and four of these errors were typed-one and the rest six of them were typed-two errors. According to this output, the sensitivity of this model in the non-bankrupt firms is 95/8 percent and was 93/7 in determining the bankrupt firms and generally 95/1 percent of firms are correctly classified and 4/9 percent error are classified. The following table shows the accuracy of the results obtained by using the payment method of Inter.

**Table 4. The accuracy of the results obtained by the ratio of interest payments to be using the Inter.**

Percent accuracy EVA measures the Prototype	Total	The EVA index group predicted by the Inter		Suppose Group
		Total non-bankrupt	Total bankrupt	
94/6	63	4	59	Bankrupt
-	142	136	6	non-bankrupt
-	205	-	-	-

The significance level provided in the parent test, coefficients and the constant coefficient model is sig-

nificant LR2. Also according to the sign of the coefficient LR2, impact LR2 (The payment of interest) is the inverse of bankruptcy. In other words, the interest payments can increase or decrease the likelihood of bankruptcy by reducing the interest payment increases the probability of bankruptcy. The legit model output can be provided as follows:

$$P = \frac{e^{0.696-1.356LR_2}}{1+e^{0.696-1.356LR_2}}$$

In this model, the LR2 can pay interest and P is the probability of bankruptcy.

**Optimization model for predicting bankruptcy**

Finally, after each test the effect of independent variables on the dependent variable, and confirmed three hypotheses from the four theories to provide a general model for predicting bankruptcy we used the progressive (forward) method. That finally, regarding the data derived from the statistical analysis with the progressive and significant in the logistic model to optimize a combination of chi-square test provided in the second step, which includes measures of economic value is the ratio of debt to assets a model for predicting bankruptcy was presented as follows:

$$P = \frac{e^{-5.486REVA+15.052LR_1-15.926}}{1+e^{-5.486REVA+15.052LR_1-15.926}}$$

P in the above equation yields the probability of bankruptcy EVA and REVA LR1 is the ratio of debt to assets.

**Table 5. Accuracy of the proposed hybrid model and optimization for bankruptcy prediction.**

Percent of the sample mixture models	Total	The Progressive Group predicted by the combined model		Suppose Group
		Total non-bankrupt	Total bankrupt	
98.5	63	2	61	Bankrupt
-	142	141	1	non-bankrupt
-	205	-	-	-

The model, the resolution of 205 bankrupt and non-bankrupt firms into two groups, has three statistical errors of both types-one error and a type-two er-



ror. This model is based on the classification sensitivity of the non-bankrupt firms 99/3 percent and of firms in bankruptcy 96/8 percent and overall 98/5% of firms

correctly classified and only 1/5 percent error is classified. Table 5 shows the efficiency and accuracy of hybrid model presented for predicting bankruptcy.

**Table 6. Summary of results.**

Test Result	Description of the hypothesis	Hypothesis
Be confirmed (negative relation)	EVA is a factor influencing bankruptcy	Hypothesis 1
Not be confirmed (93% confidence level inversely)	Earnings quality is a factor influencing bankruptcy	Hypothesis 2
Be confirmed (direct link)	Bankruptcy is on the impact of debt on the property	Sub-hypothesis 1
Be confirmed (negative relation)	Bankruptcy can affect the ratio of interest payments	Sub-hypothesis 2

## Conclusions

### *Key findings of research*

EVA has the opposite effect on bankruptcy. Or in other words, the increase in “economic value” of bankruptcy and back down to the lower “economic value” of bankruptcy is increased.

Bankruptcy does not affect the quality of earnings. It is worth noting that the bankruptcy will affect the quality of earnings at 93% confidence level.

The financial leverage ratios, debt to asset ratio has a direct impact on bankruptcy. In other words, by increasing “debt to equity” risk of bankruptcies rise and fall “of the debt-asset” bankruptcy risk is reduced.

Financial leverage ratios than the payment of interest to the bankruptcy has a negative impact. With the increase of “pay per use” bankruptcy risk and to reduce loss “pay per use” bankruptcy risk is increased.

Among the independent variables “debt asset ratio” has more power than the other independent variables to classify firms into two groups of bankrupt and non-bankrupt.

### *Suggestions Offered to companies listed on the Tehran Stock Exchange*

1. Given that the overall objective of financial statements is to provide information to meet the needs of internal users and external organizations. And the most important information that is important to include both follows:

1- Liquidity; 2- the company’s ability to meet its obligations and 3- financial flexibility.

2. It offers financial indicators such as economic value in the financial statements so far to meet the needs because the decisions to discuss the financial details of the company’s overall performance are the most relevant information.

### *Proposal of the Tehran Stock Exchange*

1. Regarding the confirmation financial leverage ratios measure of economic value added as factors in predicting the financial crisis suggested the criteria used for evaluation of listed companies in Tehran stock exchange according to the classification of listed companies are expected to notify users.

2. Also the experts of the Supervision Organization examining the firms in stock and shares can use this ratio as a warning sign.

### *Offer to investors and creditors*

It is proposed to the investors and creditors that in investing regard to factors such as economic value and financial leverage ratios. Because these indicators are also an expression of agency performance can ensure long-term operation of the institution and thus reduce investment risk and have more confidence to invest.

### *Proposal to auditors*

According to the auditing standards, the auditor is required to evaluate the continuity of the entity’s activities and report it to the ambiguity. So criteria such as economic value and financial leverage ratios could handle the audit for the financial institutions to help address. Therefore suggested that these ratios as criteria to evaluate the continuity of the institution’s activities is used auditing.

***Proposal for further research***

1. Subject to further research and better identify factors bankruptcies among listed companies in stock and shares market, we can examine the subject of study in other industries available and accepted in the Tehran Stock Exchange and reach the overall results.

2. As mentioned in the theoretical number of factors could affect the company is in bankruptcy that in this study, only three factors: economic value, quality, profitability, and financial leverage ratios mentioned, the study of the effect of other factors such as performance management, and competitive nature of the industry is also recommended.

3. Identification and analysis of financial ratios extracted from the financial statements in order to present the firms' bankruptcy prediction models to internal and external users to make reasonable decisions.

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