

Prediction of Bank Failures Based on Zmisky and Toffler Models in The Banking Industry of Iran

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Abstract

This article Bankruptcy of 17 banks and private banking networks in Iran based on two models examined Toffler and Zmisky and it was chosen due to the 17 banks, all of whom were involved in 87 and the financial ratios of 87 to 91 years has been studied and the results obtained in this study is based on a model of a bank is insolvent but other models examined in the same bank that was insolvent but mostly the results of these two models were so close so there are no significant differences between the two models. Finally the results of the models examined when considering the model Zmisky more banks than Toffler's model was more conservative than the model Zmisky Toffler's model. In addition, the models predict a bankruptcy of one of the tools used to decide to invest in a company, also. Investors are anticipating a possible bankruptcy, unpaid principal and interest risk their capital to a minimum. Hence they are seeking ways by which they can predict the financial collapse.

Introduction

Investment and credit are the most important investors about the financial management of individual and legal entities are discussed. Many researchers in the field of research decision-making process in the developed countries have done. Appropriate tools and models assess the financial condition of the topics that can help investors' decisions. If an investor has a precise estimate of the investment does not intend to do, he has done a good choice. Bankruptcy prediction models are tools that are used in the decision to invest in a company. Investors are always looking to avoid the risk of a major capital investment and related environmental damages and make it possible to forecast the bankruptcy of a company is doing. Thus, they are seeking ways to evaluate the company's financial collapse, because when bankruptcy occurs, a company's stock price comes down considerably. (Nazari Ahmadi-Kashani, 2005).

Due to the fact that a company's commercial failure and the high cost of heavy losses will have on profitability; if we fail to predict accurately and more quickly it will be very profitable predictions, companies and businesses can better protect and minimize the risk of job losses and even bankruptcy to stop. (Rahnama Rodpooshti 2009). Develop a model to predict the position of commercial and academic long as broad and important subject has been studied.

Forecasting Bankruptcy can be a major impact on the profitability of financial institutions has the ability to lend. (Soleimani Amiri, 2003). Today, rapid technological advances and changes in the economic environment have accelerated and growing competition and limited profit institutions has increased the possibility of bankruptcy. The strategy is therefore more financial decisions. A true indicator of the financial decisions for each institution is required. Suitable indicators are for this purpose and accurate assessment of the possible bankruptcy of the company. Financial stocks, financial issues and research tool for analyzing multivariate models to predict bankruptcy by the combination of these shares have been introduced. (Mehran Karimi, 2004). Bankruptcy prediction models, techniques and tools to predict the future is now the possible bankruptcy of some financial stocks combining forecasts. The ability to predict bankruptcy, business and finance, both from the point of view of the investor community are important. So this is a clear sign of misallocation of resources. A quick understanding of bankruptcy allows management and investors to carry out preventive measures and appropriate investment opportunities from Ghrymnas detected. (Mehran et al, 2005). Bankruptcy prediction model is a tool to assess the company's future. More demanding investors and creditors during bankruptcy prediction bankruptcy business Choi incur large costs. Each of these models has its own profit and loss. (Aziz et al, 2002)

In 1930, a formal investigation was initiated to study the reasons for business failure. Researchers have documented that the stock of bankrupt financial companies have been successful in conditions comparable companies and analysis of financial stocks may be useful in predicting bankruptcy. Researcher's multivariate models before bankruptcy Benny combining these stocks actually among the most successful products of the Academy of decision-making tools are presented. (Hronkaii, Kadkhodaei, 2003)

Statement of problem

In 40 years the issue of corporate bankruptcy prediction as one of the main topics of research in financial literature has become. Several academic studies attempted based on available data and statistical techniques, to create the best bankruptcy prediction model, not only in developed countries but also in developing countries, researchers to build new models, efforts have several predictive models regarding various financial and economic environment, are presented.

Later, other researchers have presented different models in the field of bankruptcy prediction. Among the various models proposed to predict bankruptcy, the study of corporate bankruptcy prediction model using model predictive Bankruptcy Toffler, Zmisky deals. The second reason for the bankruptcy prediction model research in addition to their special characteristics, this is due to the aforementioned models 2 models of 8 famous models in bankruptcy prediction. (8 popular models include: Models Altman, Falmr, Toffler, Zmisky, Aspirin, Gate Shyrata, Hlsvn and Zood - Square) the special features of these models can be high precision in the assessment and prediction of bankruptcy mentioned. The problem studied in this research is that, according to the banking network models of failed banks among the easiest, and each of the models examined how many of these companies are presented as bankrupt and whether there are significant differences between the results of each model or not?

Review of Literature

Adnan al (2011) Research on the comparison between the models, z-score, Altman and sprains gate model for predicting bankruptcy has been in private manufacturing companies. Variables used in this study, the variables in the model z-score, Altman and gate model are aspirin. This sample of six companies of the New Zealand Stock Exchange from 2005 to 2009 was studied. This study assumes random sampling was done using SPSS and EXCEL. The results show a significant difference between the results of Altman and Aspirin Gate for bankruptcy prediction models exist.

Kumar et al (2012) Research on the comparison between the models predict bankruptcy began. They believed that financial analysis can lead to very different situations on the job managers for decision-making is crucial. In this study three well-known models were used to assess the industrial organizations that include Z-score, Aspirin Gate Zmisky model. The three models for predicting bankruptcy within two years of the utility companies that have gone bankrupt used measurement and calculation, as well as to investigate the causes of failure and control financial instruments in the financial condition of these companies have been incurred during the academic studies are discussed

Rahnamie Rodpshty et al (2008) provided the theoretical foundations of the research and compare the results of applying the model to predict bankruptcy Altman and Falmr paid based on data collected for the years 2000 to 2004 has been tested for data analysis, nonparametric methods were used. The results of this research indicate that the prediction of bankruptcy of companies, there are significant differences between the results of the two models, Altman's bankruptcy prediction model so that more conservative Falmr model works. Ghodrati et al (2012) to evaluate the efficacy of the models Altman, Shyrata, Hlsvn, Zmisky, Aspryngyt, genetic pattern Farajzadeh Mackay model began. Predict the results of each of these models provide the opportunity to compare the performance results of the prediction coefficients modifying the models together and ultimately determine the strength of each of these models in predicting bankruptcy of the company paying the Tehran Stock Exchange. The results of this study indicate that Aspryngyt models, Zmisky, c-score, the genetic pattern Farajzadeh Mackay genetic pattern that was used in this study able to predict the financial situation and the ongoing activities of listed companies in Tehran stock exchange and securities. The study also concluded the models developed in the artificial intelligence techniques developed models with statistical techniques, to predict failure conditions are better.

Limitations

Bankruptcy prediction models are often used to evaluate the financial health of companies and are used by researchers but the remarkable thing about it is that each of the models in predicting bankruptcy period using a limited sample obtained and the possible predictive power of the models for the period beyond the original model are not useful. Over time and due to changes in economic conditions such as inflation, interest rates, availability of credit to firms and technological changes may variables and coefficients used in the model is changed. The other thing about this is that the models predict all the events that led to the bankruptcy or insolvency introduction, they do not consider. As a result, it is possible that the model of unforeseen events lead to bankruptcy, while the model predicts the probability of bankruptcy is considered low.

Research objectives

The overall objectives of this research are:

- 1- Examines how Iran's banking network status.
- 2- Determination of bankrupt and non-bankrupt banks, the banking network using different models to predict bankruptcy.
- 3- Comparison of the final results bankruptcy prediction models.
- 4- Determine the more conservative of the two models of bankruptcy prediction model.

Hypothesis

- 1- Toffler and Zmisky the results of two models in predicting bankruptcy of a company, there are significant differences
- 2- In bankruptcy prediction model, a more conservative Zmisky Toffler model works

Research methods, statistical sample

The method used in this survey using historical data as the data is used after the event. Data and information requirements of the basic financial statements of the sample banks balance sheet, income statement and statement of cash flows and other information released by banks was collected. The theoretical discussion about library resources including books, magazines and specialized sites has been gathered accounting. The population of this study is of 17 public and private banks during the period 2008 to 2012.

Variables

In this article there are two types of variables:

Does any research require that each variable is defined? Based on the variables involved in the study have been divided into two categories:
1. Independent variable 2. Dependent variable

The dependent variable in this study is a dependent variable that has two modes. In terms of financial capabilities of the company or bankrupt or fail

Independent variable: The independent variables in this study are the financial ratios.

Testing hypotheses

The data for this research by examining the financial statements of the Bank during the years 2008 to 2012 have been collected. Then, for analyzing the data using EXCEL to calculate the financial ratios based on each model bankrupt and non-bankrupt firms, and based on the model set in the next step, given the quality of the results, the bankrupt company's coefficient of zero and non-bankrupt firms was a factor. Then, with the help of SPSS software using Wilcoxon tests to examine the first hypothesis, i.e., there were no significant differences between the results of the evaluation of the different models using a paired t-test related to the second hypothesis, i.e., determining the most conservative prediction of bankruptcy is dealt with.

First hypothesis: the results of two models and Zmisky Toffler in a company bankruptcy prediction, there are significant differences

| Test Statistics ^a | |
|-------------------------------|----------|
| | zem - ta |
| Z | -1.342-b |
| Asymp. Sig. (2-tailed) | .180 |
| a. Wilcoxon Signed Ranks Test | |

As is clear from the above table using spss software and Wilcoxon test results were examined therefore, the smaller Sig .05 is a significant relationship between the two models therefore, in this study, sig vs. 0.18 is a result of the greater than .05 hypotheses is rejected and there is no significant relationship.

As is clear from the above table using spss software and Wilcoxon test results were examined therefore, the smaller Sig .05 is a significant relationship between the two models is Therefore, in this study, sig vs. 0.18 is a result of the greater than .05 hypotheses is rejected and there is no significant relationship.

Second hypothesis: the bankruptcy prediction model, a more conservative Zmisky Toffler model works

| Group model prediction Zmisky | Group model prediction Toffler | Default group | | |
|-------------------------------|--------------------------------|---------------|--------|--------------|
| Percent | Number | Percent | Number | |
| 24 | 4 | 6 | 1 | Bankrupt |
| 76 | 13 | 94 | 16 | Non Bankrupt |

The results of model-based diagnosis of bankrupt companies and non-bankrupt models in the above table are presented in a frequency table.

The table indicates that the number of firms (%) out of bankruptcy or bankruptcy.

So Zmisky model Toffler model is more conservative than the second hypothesis is proven.

Research models

Model Zmisky

$$Z = -4 / 3 - 4/5 X1 + 5/7 X2 + 0/004 X3$$

The ratio of net income to total assets: x1

Total debt to total assets ratio: x2

Than current income, current debt x3

If $Z \leq 0/5$ the company go bankrupt.

Toffler models:

$$Z = 0/53 X1 + 0 / 13 X2 + 0 / 18 X3 + 0 / 16 X4$$

The ratio of net income to total assets: 1 x

Working Capital: x2

Debt to equity ratio (financial risk): 3 x

Liquidity: 4 x

If $Z < 0$, the firm will go bankrupt.

Research findings

| 91 | 90 | 89 | 88 | 87 | Index | Name of Bank |
|-----------------------|---------|---------|---------|---------|--|--------------|
| Figures billion rials | | | | | | |
| 1.5 | 1.0 | 1.1 | 0.8 | 0.6 | ratio of net income to total assets (percent) | |
| -11,045 | 34,891 | 8,805 | 44,574 | 47,139 | Working Capital | |
| 149,036 | 74,766 | 77,786 | 85,595 | 53,486 | Liquidity | Mellat |
| 6 | 8 | 8 | 8 | 8 | Mutual earnings ratio (current) to Current liabilities (percent) | |
| 95 | 94 | 96 | 96 | 96 | Ratio of total debt to total Assets (ROA) | |
| 91 | 90 | 89 | 88 | 87 | Index | Name of Bank |
| 0.03 | 0.03 | 0.06 | 0.15 | 0.08 | ratio of net income to total assets (percent) | |
| -107,570 | -67,814 | -30,811 | -24,147 | -20,234 | Working Capital | |
| 71,371 | 84,633 | 49,961 | 46,567 | 44,858 | Liquidity | Meli |
| 10 | 7 | 9 | 8 | 7 | Mutual earnings ratio (current) to Current liabilities (percent) | |
| 89 | 96 | 96 | 95 | 94 | Ratio of total debt to total Assets (ROA) | |
| 91 | 90 | 89 | 88 | 87 | Index | Name of Bank |
| 0.9 | 0.9 | 1.8 | 1.4 | 1.8 | ratio of net income to total assets (percent) | |
| -73,027 | -32,841 | 4,203 | 13,945 | 28,977 | Working Capital | |
| 20,468 | 29,157 | 35,443 | 25,475 | 14,807 | Liquidity | Saderat |
| 7 | 7 | 9 | 7 | 6 | Mutual earnings ratio (current) to Current liabilities (percent) | |
| 90 | 95 | 95 | 91 | 90 | Ratio of total debt to total Assets (ROA) | |
| 91 | 90 | 89 | 88 | 87 | Index | Name of Bank |
| 0.2 | 0.3 | 0.2 | 0.2 | 2.1 | ratio of net income to total assets (percent) | |
| -21,002 | -11,479 | -8,934 | 150 | -4,349 | Working Capital | |
| 11,472 | 6,695 | 5,670 | 5,872 | 5,401 | Liquidity | Rafah |
| 9 | 9 | 8 | 11 | 11 | Mutual earnings ratio (current) to Current liabilities (percent) | |
| 94 | 91 | 98 | 97 | 97 | Ratio of total debt to total Assets (ROA) | |
| 91 | 90 | 89 | 88 | 87 | Index | Name of Bank |
| 0.2 | 0.2 | 0.3 | 0.2 | 0.9 | ratio of net income to total assets (percent) | |
| 238,995 | 16,801 | 48,882 | 2,017 | 6,193 | Working Capital | |
| 93,273 | 21,908 | 19,197 | 8,669 | 7,501 | Liquidity | Maskan |
| 13 | 9 | 9 | 9 | 10 | Mutual earnings ratio (current) to Current liabilities (percent) | |
| 96 | 95 | 96 | 95 | 94 | Ratio of total debt to total Assets (ROA) | |
| 91 | 90 | 89 | 88 | 87 | Index | Name of Bank |
| 4.1 | 4.7 | 4.5 | 4.6 | 3.3 | ratio of net income to total assets (percent) | |
| 4,674 | 4,705 | 2,735 | 231 | -72 | Working Capital | |
| 12,852 | 8,369 | 5,972 | 4,092 | 3,412 | Liquidity | Karafarin |
| 18 | 17 | 17 | 19 | 17 | Mutual earnings ratio (current) to Current liabilities (percent) | |
| 84 | 83 | 86 | 89 | 90 | Ratio of total debt to total Assets (ROA) | |

| | | | | | Index | Name of Bank |
|---------|---------|---------|---------|---------|--|---------------------|
| 91 | 90 | 89 | 88 | 87 | | |
| 0.0 | 0.0 | 0.1 | -0.3 | 0.3 | ratio of net income to total assets (percent) | |
| -38,533 | -22,711 | -14,102 | -14,570 | -12,089 | Working Capital | |
| 29,230 | 22,460 | 14,572 | 9,830 | 9,996 | Liquidity | |
| 9 | 9 | 10 | 9 | 9 | Mutual earnings ratio (current) to Current liabilities (percent) | Keshavarzi |
| 96 | 95 | 94 | 96 | 95 | Ratio of total debt to total Assets (ROA) | |
| | | | | | | |
| | | | | | Index | Name of Bank |
| 91 | 90 | 89 | 88 | 87 | | |
| 0.5 | 0.3 | 0.2 | 0.7 | 1.2 | ratio of net income to total assets (percent) | |
| 59,212 | 39,709 | 31,968 | 22,830 | 30,982 | Working Capital | |
| 5,409 | 5,479 | 6,409 | 1,792 | 2,116 | Liquidity | |
| 6 | 10 | 8 | 7 | 12 | Mutual earnings ratio (current) to Current liabilities (percent) | |
| 85 | 78 | 73 | 68 | 54 | Ratio of total debt to total Assets (ROA) | Mining and Industry |
| | | | | | | |
| | | | | | Index | Name of Bank |
| 91 | 90 | 89 | 88 | 87 | | |
| 2.5 | 2.9 | 2.8 | 2.2 | 1.7 | ratio of net income to total assets (percent) | |
| -4,277 | -1,212 | -1,046 | -2,334 | -1,815 | Working Capital | |
| 19,426 | 4,329 | 1,160 | 2,159 | 2,408 | Liquidity | |
| 18 | 16 | 17 | 17 | 18 | Mutual earnings ratio (current) to Current liabilities (percent) | Sina |
| 91 | 88 | 91 | 92 | 91 | Ratio of total debt to total Assets (ROA) | |
| | | | | | | |
| | | | | | Index | Name of Bank |
| 91 | 90 | 89 | 88 | 87 | | |
| 0.1 | -0.1 | -0.4 | 0.1 | 0.1 | ratio of net income to total assets (percent) | |
| -54,802 | -36,551 | -18,548 | -8,003 | -6,809 | Working Capital | |
| 27,689 | 23,149 | 20,485 | 20,323 | 16,621 | Liquidity | |
| 8 | 8 | 8 | 9 | 10 | Mutual earnings ratio (current) to Current liabilities (percent) | |
| 98 | 98 | 97 | 94 | 94 | Ratio of total debt to total Assets (ROA) | Sepah |
| | | | | | | |
| | | | | | Index | Name of Bank |
| 91 | 90 | 89 | 88 | 87 | | |
| 2.1 | 0.2 | 2.5 | 2.4 | 2.3 | ratio of net income to total assets (percent) | |
| -3,655 | 9,463 | 4,899 | 2,676 | 4,010 | Working Capital | |
| 17,912 | 7,266 | 3,148 | 1,269 | 1,206 | Liquidity | |
| 13 | 15 | 20 | 21 | 20 | Mutual earnings ratio (current) to Current liabilities (percent) | Sarmaye |
| 93 | 92 | 88 | 86 | 82 | Ratio of total debt to total Assets (ROA) | |
| | | | | | | |
| | | | | | Index | Name of Bank |
| 91 | 90 | 89 | 88 | 87 | | |
| 1.1 | 0.9 | 2.0 | 1.7 | 1.1 | ratio of net income to total assets (percent) | |
| -5,810 | -406 | 5,240 | -1,246 | -2,119 | Working Capital | |
| 27,264 | 16,594 | 9,178 | 4,503 | 5,222 | Liquidity | |
| 11 | 10 | 10 | 14 | 14 | Mutual earnings ratio (current) to Current liabilities (percent) | |
| 93 | 93 | 94 | 94 | 94 | Ratio of total debt to total Assets (ROA) | Saman |

| 91 | 90 | 89 | 88 | 87 | Index | Name of Bank |
|---------|---------|---------|---------|---------|--|----------------|
| 1.9 | 1.4 | 1.0 | 1.5 | 4.0 | ratio of net income to total assets (percent) | |
| 20,793 | 16,884 | 12,168 | 23,316 | 20,164 | Working Capital | |
| 12,368 | 10,291 | 9,777 | 8,664 | 10,807 | Liquidity | |
| 4 | 4 | 3 | 5 | 5 | Mutual earnings ratio (current) to Current liabilities (percent) | Tosee Saderat |
| 61 | 66 | 67 | 56 | 48 | Ratio of total debt to total Assets (ROA) | |
| 91 | 90 | 89 | 88 | 87 | Index | Name of Bank |
| 1.1 | 1.5 | 1.1 | 0.9 | 0.8 | ratio of net income to total assets (percent) | |
| 11,886 | 31,306 | 41,365 | 58,309 | 44,712 | Working Capital | |
| 46,865 | 43,592 | 47,151 | 42,392 | 31,612 | Liquidity | |
| 11 | 10 | 8 | 10 | 8 | Mutual earnings ratio (current) to Current liabilities (percent) | Tejarat |
| 94 | 93 | 94 | 94 | 95 | Ratio of total debt to total Assets (ROA) | |
| 91 | 90 | 89 | 88 | 87 | Index | Name of Bank |
| 2.3 | 2.5 | 2.3 | 1.9 | 1.7 | ratio of net income to total assets (percent) | |
| -13,815 | -11,997 | -16,300 | -23,505 | -20,468 | Working Capital | |
| 45,327 | 23,529 | 14,336 | 8,899 | 8,909 | Liquidity | |
| 16 | 16 | 15 | 18 | 16 | Mutual earnings ratio (current) to Current liabilities (percent) | Parsian |
| 93 | 92 | 92 | 93 | 93 | Ratio of total debt to total Assets (ROA) | |
| 91 | 90 | 89 | 88 | 87 | Index | Name of Bank |
| 5.1 | 4.9 | 4.0 | 3.1 | 2.5 | ratio of net income to total assets (percent) | |
| 30,853 | 28,791 | 13,531 | -2,641 | -4,170 | Working Capital | |
| 52,246 | 36,766 | 28,901 | 13,733 | 7,296 | Liquidity | |
| 18 | 18 | 16 | 18 | 14 | Mutual earnings ratio (current) to Current liabilities (percent) | Pasargad |
| 84 | 83 | 82 | 90 | 89 | Ratio of total debt to total Assets (ROA) | |
| 91 | 90 | 89 | 88 | 87 | Index | Name of Bank |
| 2.2 | 2.9 | 2.4 | 1.9 | 1.6 | ratio of net income to total assets (percent) | |
| -11,933 | -2,259 | -6,600 | -4,242 | -6,505 | Working Capital | |
| 17,410 | 12,966 | 7,375 | 6,704 | 7,307 | Liquidity | |
| 16 | 14 | 16 | 18 | 16 | Mutual earnings ratio (current) to Current liabilities (percent) | Eghtesad Novin |
| 92 | 92 | 93 | 93 | 86 | Ratio of total debt to total Assets (ROA) | |

Conclusions

The following table is a summary of research results as follows:

| Results | Detailed assumptions | No. |
|--------------|--|-----|
| Rejection | There are significant differences between the results of the models. | 1 |
| Confirmation | Zmisky model of bankruptcy prediction model Toffler more conservative act. | γ |

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