NEAR EAST UNIVERSITY

Faculty of Economics and Administrative Sciences

Department of Banking and Finance

Bank 410 (Seminar on Banking)

Graduation Project

Topic: Altman`s Z-score

(Prediction of Corporate bankruptcy)

Submitted by: Daniela Hoxha

Student no : 20041905

Submitted to: Turgut Tursoy

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Nicosia

Greeting message from Prof. Edward Altman

Re: A greeting message for Daniela Hoxha
From: **ealtman@stern.nyu.edu**
Sent: Tue 7/01/08 8:27 AM
Reply-to: ealtman@stern.nyu.edu
To: Daniela Hoxha (daniela_hoxha@hotmail.com)
Cc: Oliviero Roggi (oliviero.roggi@alice.it)
Thank you.

I am pleased that student-researchers, like Daniela, are interested in analyzing my econometric Z-Score model on firms outside the US. Hope the model "travels well".

E. Altman
------Original Message------
From: Daniela Hoxha
To: ealtman@stern.nyu.edu
Sent: Jun 29, 2008 9:14 PM
Subject:A greeting message for Daniela Hoxha

Acknowledgement:

Spending four years in a country in which I was completely foreign was difficult for me. But thanks the people that have been next to me during all these years I finished this journey.

Firstly I am grateful to my advisor Mr.Turgut Tursoy. He has been giving me courage in any step I did, and helping me to gain my faith to go on. I owe this success to him.

Also in the same way I had a support from the other teachers of Banking and Finance Department; Nil Gunsel, Berna Serener and Okan Safakli and my English teacher Imren Ibrahimer, they have been part of my education mission.

Another very important acknowledgement is to my family, my father and mother Uzri and Jeta Hoxha, my brothers Viktor and Ani Hoxha, my second family (my aunt`s family) Mimoza and Basri with their children ERI and ILORA that gave me the chance to study abroad and believed in me, that I will finish this mission successfully.

And the last but not the least an important thank is to my partner Argun, best friends, Husam, Aida, Nilufer and all the others. They made me feel as a part of them, not as a foreigner. They occupied a very special place in my heart.

I AM TODAY HERE THANKS TO ALL OF YOU !!!

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Abstract:

Z-score, is a company bankruptcy prediction model based on multiple discriminatory analysis developed by Prof. Edward I. Altman of New York University (1968) in his Doctoral Dessertation.

This study investigates empirically the probability of default of 23 companies, selected from 345 companies that are trading in Istanbul Stock exchange (ISE), and in the same time part of index 50. Analyzing the Financial Statements of each company at a period (2006-2007).

The Purpose of this research is to see how this model works in Companies in Turkey and predict their company state in the next 2 years. After the model will be applied, according to the z-value we can be able to make the estimation and right decision for each company.

Introduction:

1.1 Aim of This study

The aim of this study is scoring the companies in ISE by the Z-score Model, demonstrating that this is a very practical and good method so the banks can use it for analyzing the credit. This will be realized by analyzing the financial statement of all the companies, especially the consolidated balance sheet and income statement of year end, replacing the values in the five ratios, multiplying them with the coefficients settled and find the result. By this way we will be able to estimate if a company carries risk to fail or not.

1.2 Methodology

The methodology used in this project is Multiple Discriminant Analysis (MDA). This statistical technique is used to classify and make predictions in problems where the dependent variable appears in a qualitative form, like bankrupt or non bankrupt in our case. The Z-score model has been applied by the help of multiple discriminant analysis.

1.3 Structure of the study

My Study is composed of 8 chapters totally, explaining step by step everything in details the project.

- Chapter 1 introduces shortly the way that is followed to do this project.
- Chapter 2 explains the structure of financial market, generally and in turkey, the Turkish econoy in the last years and also the history and structure of Istanbul Stock Exchange (ISE). So all the knowledge a person must possess before starting doing or understanding this research paper.
- Chapter 3. Firstly is explained briefly the biography of the originator of the model, and after that the theory. How did this model started, what is its function and how does it works?
- Chapter 4 Here are included the articles that are written over the same model by Mr. Altman his own and other people.

- Chapter 5 In this chapter is explained where the data is taken from, which period, how it is used and also the methodlogy helped us to me make the analysis?
- Chapter 6. And here it is the analyze of the values, quantative and qualitative, and also the result of all the companies taken into consideration.
- Chapter 7 The conclusion and a brief summary of all the paper, and a report thinking as a banks credit analyzer.
- Chapter 8 As anything is good to be updated, I gave an advice to go over the model and try to apply to even in other institutions.

CHAPTER 2

2. Financial Market and Turkey Economy

2.1 Financial Market

Financial Markets work as exchanges for capital and credits. They deal with the sale and purchase of shares, bonds, bills of exchange, commodities, future and option, foreign currency etc.

In Financial markets the funds are transferred from people who have an excess of available funds to those people who have a shortage. The promotion of funds from saver to borrower makes the market crucial to promoting greater economic efficiency. It must be mentioned that a well functioning financial market is a key factor in producing high economic growth. In this way also directly (relatively) is improved the standard of live of the consumers by allowing them to time their purchases.

2.1.1 Financial Market structure

Financial market is divided in several categorizations, which will be helpful to understand better its function.

1. Debt and equity Market

A firm or an individual can obtain funds in two ways; issuing a debt instruments and issuing equities.

a) Debt instrument is a contractual agreement by the borrower to pay the holder of the instrument fixed amounts, at regular intervals until the maturity date.
b) Issuing Equities, these are claims to share in the net income and the asset of a business, like common stock.

2. Primary and Secondary Markets

a) Primary market: In this financial market, new issues of security like bond or stock are sold to initial buyers by the corporation or government agency borrowing the funds. These issues generally are traded in the organized stock exchange.
b) Secondary market is the financial market in which such securities that have been previously issued can be resold. These operations generally are realized through foreign exchange markets, future markets and option markets.

3. Exchange and Over the counter markets

Secondary markets can be arranged in two ways:

a) Organized exchanges: where buyers and sellers of securities meet in one central location to conduct their trades; we can mention NYSE (New York Stock exchange) and ISE (Istanbul Stock Exchange).
b) OTC (Over-the-Counter market). Here the dealers stand ready to buy and sell the securities "over-the-counter" and have their own inventories of securities. They sell the securities to any one who comes and is willing to accept their prices.

4. Money and Capital Markets

a) Money market is the financial market in which in which only short term debt instruments are traded. Generally those with original maturities less than one year.
b) Capital Market is the market in which Long-Term debts with a maturity of one year or greater and also equity instruments are traded.

2.2 Ross Levine`s Classification of Financial Markets

According to the classification of Financial Markets made by Ross Levine, is stated that it exist two bases: Capital Market base and Bank base.

By bank based Financial System is meant when a bank plays a leading role in allocating the capital, supervising the investment decision of corporate managers and providing risk management equipments.

But in Capital-Market based financial system, securities market share center stage with banks in terms of getting society`s savings to firms, managing the corporate control and simplifying the risk management.

According to Levine, Financial Systems assess potential investment opportunities, exerts corporate control, facilitate risk management, enhance liquidity and ease savings mobilization.

Different financial systems promote economic Growth to a greater or lesser degree.

Generally countries with larger ratios are classified as bank based. Countries where the banking sector is less developed than the stock market, so their conglomerate ratio is below the mean than they are classified as market based. Turkey is a bank based country.

2.3 Turkish Economy (2005-2008)

As it is known, the Turkish economy used to experience boom-and-bust cycles throughout the 1990s. The economic crisis in 2001 was the low point of this period, when the economy contracted more than 5 percent. Since then, Turkey has put in place a very intense and ambitious structural reform agenda, coupled with sound monetary and fiscal policies, to establish macroeconomic and financial stability and to improve the business environment. But the time needed for this paper is 2006-2008.

2006 has been a year when the Turkish economy, experienced relatively the best macroeconomic indicators in a long time, inflation not included. This success is mainly attributed to a strict adherence to structural reforms and financial discipline, which helped strengthen Turkey's fragile economy and made it resilient to both internal and external shocks. As a result, Turkey achieved a real GDP growth that reached 6.1% in 2006, well above the 5% forecast. The Turkish economy has been growing for the fifth consecutive year since the devastating financial crisis of 2001.

It is experienced a significant disinflation process since 2001. The consumer price index came down from 68.5% in 2001 to 8.4% in 2007. Something that must have the attention is, the list of countries that lowered inflation in 2007 was quite short, thanks to global inflationary pressures in food and other commodities. In fact, the average inflation around the world increased from 3.5 percent in 2006 to 4.8 percent in 2007 and to 5.5 percent in January 2008. In this environment Turkey was able to reduce inflation by 1.3 percentage points in 2007. In fact, this was the sharpest drop among 60 major developed and emerging countries.

The disinflation process is even more pronounced in core inflation, which excludes energy and food prices. It stood at 4.36% as of February 2008. The favorable outlook in core inflation indicators despite the surge in energy and food prices has allowed the Central Bank to cut policy rates since September 2007. The cumulative rate cut reached to 225 basis points as of February 2008 bringing the overnight borrowing rate to 15.25% from 17.50%.

2.4 Istanbul stock Exchange

2.4.1 History of ISE

As the companies studied in my research paper are taken from the index 50 of ISE I thought is necessary to check back the History if ISE and its way of functioning.

The origin of an organized security market in Turkey has its roots in the second half of the 19th century. The first one was established in 1866 under the name "Dersaadet Securities Exchange". This created a medium for European Investors who were looking for higher returns in the vast Ottoman Markets.

On time the Bourse became very active and contributed substantially to the funding requirements of new enterprises across the country. In 1980`s a market improvement occurred in the Turkish capital market, and followed by the specified laws and regulatory bodies in 1981. And finally at the end of 1985 was officially inaugurated Istanbul Stock Exchange (ISE), but in early 1986 started performing.

Istanbul Stock exchange was established to provide trading in equities, bonds, bills, private sector bonds, revenue sharing certificates, real Estate Certificates, also foreign and international securities.

It is governed by an executive council consist of five members, that are elected by the General Assembly. One of the five is appointed as the chairman & executive officer of the ISE, the other four members: development banks, commercial banks and brokerage houses.

ISE experiences a high degree of self regulation. Its revenue is generated from fees charged on transactions, listing procedures, and miscellaneous services. The profits if ISE are hold to meet the expenses or to undertake investments and are not distributed to any third party. It has its own budget.

2.4.2 ISE Members of their activities

The ISE members are incorporated banks and brokerage houses. These members consist of three main groups:

a) Investment and development bank: The activities that are authorized here are primary market activities, portfolio management, investment consultancy, margin trading, short selling and securities lending, stock market, bill and bond market.

b) Commercial Banks: The authorized activities by both capital market board and ISE are primary and secondary markets, brokerage and stock markets.

c) *Brokerage House: here the authorized activities by both capital market board and ISE* are foreign security markets, international bond market, intermediation in derivatives instruments transactions and secondary market activities.

Table 2.

ISE MEMBERS					
Year	**Market**	**Brokerage Houses**	**Investment & Development Banks**	**Commercial Banks**	**Total**
2008/06	Stock Market	104	0	0	104
	Bonds and Bills Market	91	12	29	132
	Repo-Reverse Repo Market	64	12	28	104
	Foreign Securities Market International Bonds Market	91	12	29	132

2.4.3 SUPERVISION

The auditing process of members and comprehensive supervision are guaranteed by the capital markets boards and by the Istanbul stock exchange. The members of ISE are obligated to present operational figures both to capital market board of ISE upon the request. The ISE has also the authority to seek access to the records of members if required. Banks are also subject to the supervision of control bank, banking regulation and supervision agency.

2.4.4 ISE Indices

ISE indices are composed to calculate price and return performance of all shares as well as on the basis of relative markets and sectors. Before the 1996 was computed only by the ISE-100, financial and industrial price indices.

From 1997 they started to calculate sector and subsector indices on the basis of prices of total return. The prices are computed and published throughout the trading session while the return indices are published and calculated at the close session. But still the ISE National- 100 index is used as a main indicator of the national market.

The shares index is constituted of all national market companies:

ISE National 30: The companies of the National 30 are selected by analyzing some pre-determined criteria directed for the companies to be included in the indices. These are also used for trading in the derivatives market.

ISE National 50: Here the index 30 is included, the same composed of national market companies, laving out the investment trust. The companies here are selected according to some pre-determined criteria.

ISE National 100 Which has been calculated since the beginning of ISE trusts. The companies here are selected in the same way mentioned above.

There are also some other indices like: Sector and Subsector indices including national market companies, ISE second national market index that is traded in the second national market, ISE New economy market that is traded in the new economy market, and the last Investment Trade index composed of investment trust stock traded in the national market.

CHAPTER 3

3. Edward I. Altman and his theory

3.1 Biography of Prof. Altman

Edward Altman was born in June 5 1941 in New York City. He is the Max L. Heine Professor of Finance at the Stern School of Business, New York University. Since 1990, he has directed the research effort in Fixed Income and Credit Markets at the NYU Salomon Center and is currently the Vice-Director of the Center. Prior to serving in his present position, Professor Altman chaired the Stern School's MBA Program for 12 years. He has been a visiting Professor at the Hautes Etudes Commerciales and Universite de Paris-Dauphine in France, at the Pontificia Catolica Universidade in Rio de Janeiro, at the Australian Graduate School of Management in Sydney and Luigi Bocconi University in Milan.

Prof. Altman has an international reputation as an expert on corporate bankruptcy, high yield bonds, distressed debt and credit risk analysis. He was named Laureate 1984 by the Hautes Etudes Commerciales Foundation in Paris for his accumulated works on corporate distress prediction models and procedures for firm financial rehabilitation and awarded the Graham & Dodd Scroll for 1985 by the Financial Analysts Federation for his work on Default Rates on High Yield Corporate Debt and was named "Profesor Honorario" by the University of Buenos Aires in 1996. He is currently an advisor to the Centrale dei Bilanci in Italy and to several foreign central banks. Prof. Altman is also the Chairman of the Academic Council of the Turnaround Management Association.

Prof. Altman was named to the Max L. Heine endowed professorship at Stern in 1988. He was inducted into the Fixed Income Analysts Society Hall of Fame in 2001 and elected President of the Financial Management Association (2002). Professor Altman was named one of the 100 most influential people in the world in 2005 by the publication Treasury and Risk Management. He received his MBA and Ph.D. in Finance from the University of California, Los Angeles.

Professor Altman is one of the founders and was an Executive Editor of the international publication, the Journal of Banking and Finance and Advisory Editor of a publisher series, the John Wiley Frontiers in Finance Series. Professor Altman has published or edited almost two dozen books and well over 100 articles in scholarly finance, accounting and economic journals. He is the current editor of the Handbook of Corporate Finance and the Handbook of Financial Markets and Institutions and the author of a number books, including Recent Advances in Corporate Finance; Investing in Junk Bonds; Distressed Securities: Analyzing and Evaluating Market Potential and Investment Risk; and his most recent works on Corporate Financial Distress and Bankruptcy(2005); Managing Credit Risk: The Next Great Financial Challenge (2007); Recovery Risk (2005); Bankruptcy, Credit Risk and High Yield Junk Bonds (2002). His work has appeared in many languages including French, German, Italian, Japanese, Korean, Portuguese and Spanish.

Prof. Altman's primary areas of research include bankruptcy analysis and prediction, credit and lending policies, risk management in banking, corporate finance and capital markets. He has been a consultant to several government agencies, major financial and accounting institutions and industrial companies and has lectured to executives in North America, South America, Europe, Australia-New Zealand, Asia and Africa. He has testified before the U.S. Congress, the New York State Senate and several other government and regulatory organizations and is a Director and a member of the Advisory Board of a number of corporate, publishing, academic and financial institutions.

Dr. Altman is a member of the Board and past Chairman of the Board of Trustees of the InterSchool Orchestras of New York and was a founding member of the Board of Trustees of the Museum of American Financial History.

3.2 What is Z-score?

Z- score was developed in 1968 by Dr.Edward Altman (in his PH.D) as mentioned even above a financial Economists and professor at New York`s University Stern School of Business. This formula for predicting bankruptcy is a multivariable formula for measuring the financial health of a company and a strong diagnostic tool that forecasts the probability of a company entering bankruptcy within a 2 year period. According to various studies measuring the effectiveness of the z-score, have resulted the model accurate, in predicting the failure around 80% reliability.

3.2.1 How is this model`s judgment process?

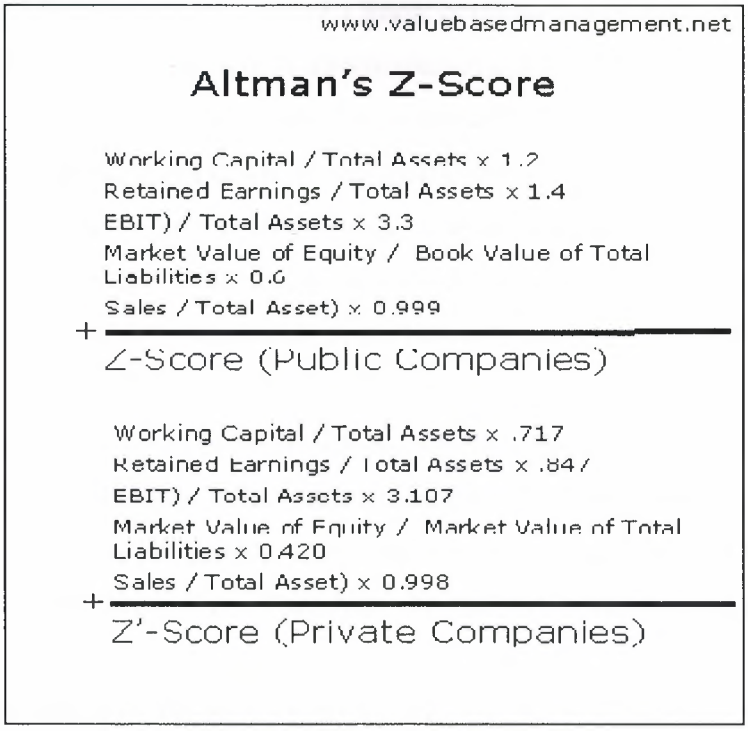
Firstly this model is combined in five common business ratios, using a weighting system calculated by Altman. Thus it determines the likelihood that a company will go bankrupt. It was derived based on data from manufacturing firms, but has since proven to be also effective (with some modifications) in determining the risk that a services firm will go bankrupt.

- **Original Z-SCORE,** that works only for public manufacturer. I f the score is 3.0 or above - bankruptcy is not likely. If the Score is 1.8 or less - bankruptcy is likely. A score between 1.8 and 3.0 is the gray area. Probabilities of bankruptcy within the above ranges are 95% for one year and 70% within two years. Obviously, a higher score is desirable.

- **Model A Z'-Score,** Model A of Altman's Z-Score is appropriate for a private manufacturing firm. Model A should not be applied to other companies. A score of 2.90 or above indicates that bankruptcy is not likely, but a score of 1.23 or below is a strong indicator that bankruptcy is likely. Probabilities of bankruptcy in the above ranges are 95% for one year and 70% within two years. Obviously, a higher score is desirable.

- **Model B Z'-Score.** Edward Altman developed this version of the Altman Z-Score to predict the likelihood of a privately owned non-manufacturing company going bankrupt within one or two years. Model B is appropriate for a private general (non-manufacturing) firm. Model B should not be applied to other companies. A score of 1.10 or lower indicates that bankruptcy is likely, while a score of 2.60 or above can be an indicator that bankruptcy is not likely. A score between the two is the gray area. Probabilities of bankruptcy in the above ranges are 95% for one year and 70% within two years. Again, obviously, a higher score is desirable.

Table. 3



Here is the table with the specified ratios.

3.2.2 Discriminant Analysis

After careful consideration of the nature of the problem and of the purpose of this analysis, I chose multiple discriminant analysis (MDA) as the appropriate statistical technique. Although not as popular as regression analysis, MDA has been utilized in a variety of disciplines since its first application in the 1930's. During those earlier years, MDA was used mainly in the biological and behavioral sciences. In recent years, this technique has become increasingly popular in the practical business world as well as in academia. Altman, et.al. (1981) discusses discriminant analysis in-depth and reviews several financial application areas.

MDA is a statistical technique used to classify an observation into one of several a *priori* groupings dependent upon the observation's individual characteristics. It is used primarily to classify and/or make predictions in problems where the dependent variable appears in qualitative form, for example, male or female, bankrupt or nonbankrupt. Therefore, the first step is to establish explicit group classifications. The number of original groups can be two or more. Some analysts refer to discriminant analysis as "multiple" only when the number of groups exceeds two. We prefer that the multiple concepts refer to the multivariate nature of the analysis.

After the groups are established, data are collected for the objects in the groups; MDA in its most simple form attempts to derive a linear combination of these characteristics which "best" discriminates between the groups. If a particular object, for instance, a corporation, has characteristics (financial ratios) which can be quantified for all of the companies in the analysis, the MDA determines a set of discriminant coefficients. When these coefficients are applied to the actual ratios, a basis for classification into one of the mutually exclusive groupings exists. The MDA technique has the advantage of considering an entire profile of characteristics common to the relevant firms, as well as the interaction of these properties. A univariate study, on the other hand, can only consider the measurements used for group assignments one at a time. Another advantage of MDA is the reduction of the analyst's space dimensionally, that is, from the number of different independent variables to G-1 dimension(s), where G equals the number of original a *priori* groups. This analysis is concerned with two groups, consisting of bankrupt and nonbankrupt firms. Therefore, the analysis is transformed into its simplest form: one dimension.

The discriminant function, of the form Z = V1X1 + V2X2 +...+ VnXn transforms the individual variable values to a single discriminant score, or z value, which is then used to classify the object where V1, X2, ... Vn = discriminant coefficients, and
V1, X2, ... Xn = independent variables
The MDA computes the discriminant coefficient; Vi while the independent variables Xi are the actual values.

When utilizing a comprehensive list of financial ratios in assessing a firm's bankruptcy potential, there is reason to believe that some of the measurements will have a high degree of correlation or collinearity with each other. While this aspect is not serious in discriminant analysis, it usually motivates careful selection of the predictive variables (ratios). It also has the advantage of potentially yielding a model with a relatively small number of selected measurements which convey a great deal of information. This information might very well indicate differences among groups, but whether or not these differences are significant and meaningful is a more important aspect of the analysis.

Perhaps the primary advantage of MDA in dealing with classification problems is the potential of analyzing the entire variable profile of the object simultaneously rather than sequentially examining its individual characteristics.

Just as linear and integer programming have improved upon traditional techniques in capital budgeting, the MDA approach to traditional ratio analysis has the potential to reformulate the problem correctly. Specifically, combinations of ratios can be analyzed together in order to remove possible ambiguities and misclassifications observed in earlier traditional ratio studies.

As we will see, the Z-Score model is a linear analysis in that five measures are objectively weighted and summed up to arrive at an overall score that then becomes the basis for classification of firms into one of the a *priori* groupings (distressed and nondistressed).

3.2.3 Ratio analysis

Ratios can be an invaluable tool for making an investment decision. Even so, many new investors would rather leave their decisions to fate than try to deal with the intimidation of financial ratios. The truth is that ratios aren't that intimidating, even if you don't have a degree in business or finance. Using ratios to make informed decisions about an investment makes a lot of sense, once you know how use them.

Ratios are comparison points for companies. They can be used to evaluate one stock in an industry versus another in the same field. Likewise, they can be used to measure a company today against its historical numbers. It's essential to remember, though, that when using ratios to make analyses, the comparisons need to make sense.

Think of each industry as having a map-like scale - you wouldn't take a ruler to a globe and to a map of your hometown and expect an inch to represent the same distance on both. Keep your scales straight and the numbers can reveal a lot.

The information is needed to calculate ratios are easy to come by; every single number or figure you need, can be found in a company's financial statements. Once you have the raw data, you can plug in right into your financial analysis and put those numbers to work for you

Everyone wants an edge in investing but one of the best tools out there frequently is frequently misunderstood and avoided by new investors. When you understand what ratios tell you, as well as where to find all the information you need to compute them, there's no reason why you shouldn't be able to make the numbers work in your favor.

But the ratios used in my project are some other ones, they will be mentioned below.

In order to arrive at a final profile of variables, the following procedures are utilized: (1) observation of the statistical significance of various alternative functions, including determination of the relative contributions of each independent variable; (2) evaluation of intercorrelations among the relevant variables; (3) observation of the predictive accuracy of the various profiles; and (4) judgment of the analyst.

The final discriminant function is as follows:

$$Z = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5$$

where X_1 = working capital/total assets,

X_2 = retained earnings/total assets,

X_3 = earnings before interest and taxes/total assets,

X_4 = market value equity/book value of total liabilities,

X_5 = sales/total assets, and

Z = overall index.

Note that the model does not contain a constant (Y-intercept) term. This is due to the particular software utilized and, as a result, the relevant cutoff score between the two groups is not zero. Other software program, like SAS and SPSS, have a constant term, which standardizes the cutoff score at zero if the sample sizes of the two groups are equal.

X_1, Working Capital/Total Assets (WC/TA).

The working capital/total assets ratio, frequently found in studies of corporate problems, is a measure of the net liquid assets of the firm relative to the total capitalization. Working capital is defined as the difference between current assets and current liabilities. Liquidity and size characteristics are explicitly considered. Ordinarily, a firm experiencing consistent operating losses will have shrinking current assets in relation to total assets. Of the three liquidity ratios evaluated, this one proved to be the most valuable. Two other liquidity ratios tested were the current ratio and the quick ratio. There were found to be less helpful and subject to perverse trends for some failing firms.

X_2, Retained Earnings/Total Assets (RE/TA).

Retained earnings is the account which reports the total amount of reinvested earnings and/or losses of a firm over its entire life. The account is also referred to as earned surplus. It should be noted that the retained earnings account is subject to "manipulation" via corporate quasi-reorganizations and stock dividend declarations. While these occurrences are not evident in this study, it is conceivable that a bias would be created by a substantial reorganization or stock dividend and appropriate readjustments should be made to the accounts.

This measure of cumulative profitability over time is what I referred to earlier as a "new" ratio. The age of a firm is implicitly considered in this ratio. For example, a relatively young firm will probably show a low RE/TA ratio because it has not had time to build up its cumulative profits. Therefore, it may be argued that the young firm is somewhat discriminated against in this analysis, and its chance of being classified as bankrupt is relatively higher than that of another older firm, *ceteris paribus*. But, this is precisely the situation in the real world. The incidence of failure is much higher in a firm's earlier years. In 1993, approximately 50% of all firms that failed did so in the first five years of their existence (Dun & Bradstreet, 1994).
In addition, the RE/TA ratio measures the leverage of a firm. Those firms with high RE, relative to TA, have financed their assets through retention of profits and have not utilized as much debt.

X_3, Earnings Before Interest and Taxes/Total Assets (EBIT/TA).

This ratio is a measure of the true productivity of the firm's assets, independent of any tax or leverage factors. Since a firm's ultimate existence is based on the earning power of its assets, this ratio appears to be particularly appropriate for studies dealing with corporate failure. Furthermore, insolvency in a bankrupt sense occurs when the total liabilities exceed a fair valuation of the firm's assets with value determined by the earning power of the assets. As we will show, this ratio continually outperforms other profitability measures, including cash flow.

X_4, Market Value of Equity/Book Value of Total Liabilities (MVE/TL).

Equity is measured by the combined market value of all shares of stock, preferred and common, while liabilities include both current and long term. The measure shows how much the firm's assets can decline in value (measured by market value of equity plus debt) before the liabilities exceed the assets and the firm becomes insolvent.

For example, a company with a market value of its equity of $1,000 and debt of $500 could experience a two-thirds drop in asset
value before insolvency. However, the same firm with $250 equity will be insolvent if assets drop only one-third in value. This ratio adds a market value dimension which most other failure studies did not consider. The reciprocal of X_4 is a slightly modified version of one of the variables used effectively by Fisher (1959) in a study of corporate bond yield-spread differentials. It also appears to be a more effective predictor of bankruptcy than a similar, more commonly used ratio; net worth/total debt (book values). At a later point, we will substitute the book value of net worth for the market value in order to derive a discriminant function for privately held firms (Z') and for non-manufacturers (Z").
More recent models, such as the KMV approach, are essentially based on the market
value of equity and its volatility. The equity market value serves as a proxy for the firm's asset values.

X_5, Sales/Total Assets (S/TA).

The capital-turnover ratio is a standard financial ratio illustrating the sales generating ability of the firm's assets. It is one measure of management's capacity in dealing with competitive conditions. This final ratio is quite important because it is the least significant ratio on an individual basis. In fact, based on the univariate statistical significance test, it would not have appeared at all. However, because of its unique relationship to other variables in the model, the sales/total assets ratio ranks second in its contribution to the overall discriminating ability of the model. Still, there is a wide variation among industries in asset turnover, and we will specify an alternative model (Z"), without X_5 at a later point.

Chapter 4

4. Literature Review

4.1 Introduction

The main article related the topic of my project is the dissertation of E.I. Altman in 1968, and most of the other articles are written by the same person, including different developments during the time. And there are included even some other articles done by other researches, discussing over Altman`s theories. A very important issue to be mentioned is that all the articles involved in my research are part of the most trustable journal "Journal of Finance" and from Mr. Altman's own library.

4.2 Altman`s articles

4.2.1 The Prediction of corporate bankruptcy and Discriminant Analysis (1967)

The aim of this paper is to investigate empirically the characteristics of bankrupt corporations and to develop a model for the bankrupt prediction. Multiple discriminant analysis was utilized with five different financial ratios serving finally as predictive variables.

This paper is composed of three main parts:

1- Prior studies dealing with corporate problems and failures; for example the case of financial ratios as indicators of bankruptcy. Studies are reviewed and the technique of discriminant analysis is established as the appropriate method.
2- The model is developed and the results determined both for initial sample and several subsequent samples.
3- Lastly the results are examined and several important applications for the bankruptcy prediction are suggested, selected from an original list of 22 ratios.

It is concluded that bankruptcy prediction model appears easily applicable in practical decision making situation, especially because of its simplicity and low cost. Important applications of the model pertain to business credit evaluation, internal and external management considerations and investments guidelines.

4.2.2 Financial ratios, Discriminant Analysis, and the prediction of corporate Bankruptcy (September 1968)

This paper was to attempt the quality of Ratio Analysis as an analytical technique. As an illustrative case, is used the prediction of corporate failure.

This article was composed of six sections:

1- Review of the development of traditional ratio analysis as a technique for investigating corporate performance.
2- Are discussed the short comings of the approach. And MDA (multiple discriminant analysis) is introduced with countering on its compatibility
3- Here is developed the discriminant model. Its is taken a sample of 66 firms, it is utilized to establish a function which best discriminated between bankrupt ones and non-bankrupt companies.
4- Explains the empirical results obtained from the samples
5- Explains the models adaptability to practical decision making situation, and its potential benefits in a variety of situations that are suggested.
6- And the final one summarizes the findings and conclusions of the study, the role and significance of traditional ratio analysis within a modern analytical context.

Here it is resulted, the discriminant-ratio model proved to be extremely accurate in predicting bankruptcy correctly in 94 % of the initial sample with 95 % of all firms in the bankrupt and non-bankrupt groups assigned to their actual group classification.

4.2.3 Predicting Financial distress of companies, revisiting the Z-score and Zeta model (July 2000)

This paper discusses two of the honored models for assessing the distress of industrial corporations: Z-score model (1967) and Zeta (credit risk) model (1977).

Purpose of this paper is that those unique characteristics of business failures are examined in order to quantify the variables which are effective indicators and predictors of corporate distress. It is expected to highlight the analytic and practical value inherent in the use of Financial Ratios.

This research is composed of two samples: non-bankrupt firms and bankrupt firms. He result of the first one is that is rejected the hypothesis that there is no difference between the groups and substantiate that the model does, it owns discriminating power on observations other than those used to establish the parameter of the model. The result in the other sample is superior to the initial discriminant sample, it is 96% versus 94%, something not actually expected. The two reasons that are possibly occurring are that: test is not manifesting here or it is not optimal.

4.2. 3-4 Ratio analysis and the prediction of Firm Failure (1970) "DEBATE"

There is a panel discussion between Graig G. Johnson and Edward I.Altman. He has been asking about the usefulness of ratio analysis in predicting firm failure against those who has made this kind of researches and proved the statement; Edward I. Altman (1968), William Beaver (1968) and Marc Blum (1969)[1,2,3]. He thinks that a question whose answer is missing in these studies is whether or not models composed solely of financial Ratios can be predictors of firm failure.

He concluded that in evidence of the ability of ratios to predict failure has not been presented in the current literature, nor has a logical link been established between the values of the ratios and the samples of bankrupt and non-bankrupt firms. Without additional evidence or a decision model, the practical value of the ratio analysis to the failure issue is still an open question.

The debate continues, and Altman in the same year wrote an answer to his article:

"*I feel it necessary to refute Professor Johnson`s comments because not only are they lacking in proper direction and substance but in presenting his argument he does a disservice to all who utilize the ratio-analysis as an important analytical tool*"[4].

He thinks that Johnson`s problem was that his failure to distinguish between aggregate type, stochastic statistical results and the use of ratios for normative individual firms analysis. The development of models which do not assume constancy in parameters but which analyze the general nature of economic processes has been sough for many years.

1. *Edward Altman "Financial ratios, Discriminant analysis and the Prediction of Failure" Journal of Finance (September 1968).*
2. *William Beaver, "Market prices, Financial Ratios, and the prediction of failure" Journal Of accounting research (1968).*
3. *Marc Blum, "The failing company doctrine" Ph.D dissertation, Columbia University (1969)*
4. *Witten exactly as it is from Altmans Reply to Proff.Johnson (1970)*

4.3 Articles written by other researchers

4.3.1 An Analysis of Risk and Return Characteristics of Corporate Bankruptcy using Capital Market Data (1980) JOSEPH AHARONY,CHARLES P.JONES, ITZHAK SWARY

The main aim of this study is to compare the characteristics of bankrupt and non-bankrupt companies, prior to actual bankruptcy, with respect to various risk and return measures suggested by the CAPM. In addition to this, the study suggests an approach to estimating the probability of corporate failure, using capital market data.

Using a sample of 45 industrial companies that went bankrupt during 1970-1978 and a control group of 65 firms, each of the components of the total risk borne by stockholders was examined in order to measure changes in the risk of failure.

An approach was suggested to estimate the probability of failure for each company based on quarterly rates of return data. Equity loss percentages that minimize the total misclassification of firms (both of the samples) were determined. The results are interesting and suggest possibilities of using a methodology and data such as used in this paper, they are preliminary and do not warrant conclusions about the predictive content of market data.

4.3.2 On The financial applications of Discriminant Analysis (1975) O.MOURICE JOY, JOHN O.TOLLEFSON

This paper investigates the methodology on discriminant analysis. Many of the methodological issues this paper is addressed are relevant to the general of developing and testing dichotomous (division into two) classification models and arise whether model developing is by discriminant analysis or some other method.

In particular was demonstrated that for research question addressed to the population with extremely asymmetric priors it will be very difficult to improve on chance classification and sample results may give a misleading impression of usefulness. Lastly was presented Bayesian evaluation approach. The main advantages were that it explicitly accounts for the costs of missclassificatin and its more decision-oriented than classical analysis.

4.3.3 Ratio stability and Corporate failure (1980) ISMAEL DAMBOLENA AND SARKIS J.KHOURY

This research paper investigates another model on corporate failure that uses financial ratios and discriminant analysis as its main core. The inclusion of the stability of ratios in the analysis improved considerably the ability of the discriminant function to predict failure. In this model was mentioned 78 % accuracy five years prior to failure.

The purpose was to have a measure of improvement in prediction by incorporating the measures of stability to discriminant analysis predictive models that are based on the ratios only.

As result the Profitability ratios offer a reasonable measure of management effectiveness. The leverage ratios and the stability of fixed assets to net worth ratio represents historical reasons for corporate failure.

cles name	Written by:	Year & Source	Brief explanation,aim:
e prediction of porate bankruptcy and criminant analysis.	E. Altman	1967, J- Store	-Investigates the characteristics o bankrupt corporations and develo model for bankrupt prediction.
nancial Ratios, riminant analysis & diction of corporate kruptcy.	E. Altman	Sept 1967, J-Store	To attempt the quality of Ratio Analysis as an analytical techniqu
redicting Financial ress of companies, siting Z-score & Zeta del.	E.Altman	July 2000, His own website	Discuss the two models for assessing the distress of industrial corporation
Ratio analysis and the diction of Firm value. EBATE)	Graig G.Johnson vrs. E.Altman	1970, J-Store	Is discussed the usefulness of ratio Analysis.
n analysis risk and rn characteristics of porate bankruptcy using tal market data.	Joseph Aharony, Charles P.Jones, Itzhak Swary	1980, J-Store	Comparing the characteristics of bankrupt&non-bankrupt company prior the failure.
n the Financial plications of criminant Analysis	O. Maurice Joy, John O. Tollefson	1975, J-Store	Methodology on Discriminant analysis.
atio Stability & porate failure	Ismael Dambolena, Sarkis J.Khoury	1980, J-Store	Investigates the model on corpora failure accuracy

CHAPTER 5

1. Data and Methodology

5.1 Data

The data of my paper is taken from the list of companies that are traded in Istanbul Stock Exchange ISE. There are totally 345 companies. The ones used in my paper are taken from index-50. As the model is for the prediction of failure for corporations I had to exclude the banks and insurance companies that were in the list, also there were some companies whose information was not available for the years that the research is realized. And the annual financial reports are supplied from the each companies web site, for the period needed.

The reason I selected to apply the model in the past two years 2006 and 2007 is that I wanted to make a prediction for the present time. In this way during the year 2008 we see the accuracy of the model, if the companies do not take into consideration the "red light" that is lightened up by the Z-score model.

There is a limitation of data in this study. The firms examined were all the non-bankrupted ones because for the bankrupted firms was not possible for me as a foreign student to get the published reports from the Turkish institutions, for the past years. I have included only the list of the companies de-listed from ISE in the appendix part.

5.1.2 Sample and Variable Selection

My sample is composed of a total number of 52 Companies, from which 23 are the non-bankruoted ones and 29 are the bankrupted companies. The bankrupted company names are taken from a period of 2000-2008, a the main ones were De-listed because the direct affection of the 2001 crises in Turkey

In order to arrive at a final profile of variables, the following procedures are utilized: (1) observation of the statistical significance of various alternative functions, including determination of the relative contributions of each independent variable; (2) evaluation of intercorrelations among the relevant variables; (3) observation of the predictive accuracy of the various profiles; and (4) judgment of the analyst.

5.2 Methodology

The method used to help me making analyze of the result is Mulltple discriminant analysis MDA. After careful consideration of the nature of the problem and of the purpose of this analysis, I chose MDA as the appropriate statistical technique. As explained also in the theory part MDA is a statistical technique used to classify an observation into one of several a *priori* groupings dependent upon the observation's individual characteristics. It is used primarily to classify and/or make predictions in problems where the dependent variable appears in qualitative form, for example, male or female, bankrupt or nonbankrupt. Therefore, the first step is to establish explicit group classifications. The number of original groups can be two or more.In Our case 2.

The Z- model that the values of each company is applied is as follows:

$$Z = 0.012X1 + 0.014X2 + 0.033X3 + 0.006X4 + 0.999X5$$

Where

X1 = working capital/total assets,

X2 = retained earnings/total assets,

X3 = earnings before interest and taxes/total assets,

X4 = market value equity/book value of total liabilities,

X5 = sales/total assets, and

Z = overall index.

CHAPTER 6

1. Analysis and Results

For an institution to know approximately what happens in the future is very important. I will mention a quotation written by B.LEV, Financial Statement Analysis, (New Jersey: Prentice Hall, Inc.1974):

> *" An Early warning signal of probable failure will enable both management and investors to take preventative measures; Operating policy change, reorganization of financial structure, and even voluntary liquidation will usually shorten the length of the time losses are incurred and thereby improve both privateand social resource allocation."*

According to the limits Altman has invented in the model, we are going to separate the companies in three different groups. Very Successful Companies, Successful, Grey area (the area where the alarm starts to ring slowly) and the risky area, and the last one, nearly no chance of being saved. where the companies must be very careful and must change their strategies to keep the firm upstanding.

3.0 and up = very successful companies
2.7- 3.00 = successful companies
1.8- 2.7 = risky area
1.8 and low = nearly no chance of not taken any immediate decision

Note: But generally in this group are not the holdings taken part fully because their ratio always keeps on being low.

According to the results that will be faced in the next page, its is viewed that the ratios are less than the ones of year 2007. And an important reason here is because of the good economy in this period. 2006 has been a year when the Turkish economy, experienced relatively the best macroeconomic indicators in a long time, inflation not included. Taking into consideration all the elements included in the ratios are affected by the general state of economy and the general stability of it.

In table 6.1 are given Z-scores of the firms in both year 2006 and 2007. There are some facts that affect the ratio to be very low or very high. For example if a companies asset value is less than the value of the liabilities this means we a negative value inserted in the formula, and directly it lowers down the score, or the same effect is also when we have to do with an accumulated loss not a retained earning, or EBIT value is negative, so the company has no earnings. On the other hand the MV of equity is something that affects very positive the increasement of the score, the price the shares gain in the market and the number of those shares that are outstanding makes o big difference in the result MV of equity / BV of total debt.

Table 6.1

Final z-Score results		
Firm	**2006**	**2007**
Turkish Airlines	0.83831	1.18206
Turkcell	2.62682	2.58504
Eczaci basi	1.95842	1.89756
Arcelik	1.57823	1.3874
Hurriyet	1.43784	1.28279
Eregli Demir Celik	1.45847	1.41922
Koc Holding	0.95324	1.10266
Migros	3.04861	2.86086
Petkim	0.97832	1.0158
Petrol Ofisi	3.02957	3.21294
Sabanci Holding	0.25716	0.33655
Sise Cam	1.62345	1.41135
Tupras	3.33183	3.30104
Ak Enerji	0.87119	0.4171
Alarko	1.60489	1.69026
Dogus Oto	2.87256	2.98486
Enka	1.80579	1.56404
Ford OTO	3.86261	3.59544
GSD Holding	0.67836	0.61678
Karsan	2.48448	1.77427
Vestel	1.60971	1.25295
Tofas	1.89881	1.61226
Selcuk	2.59981	2.60438

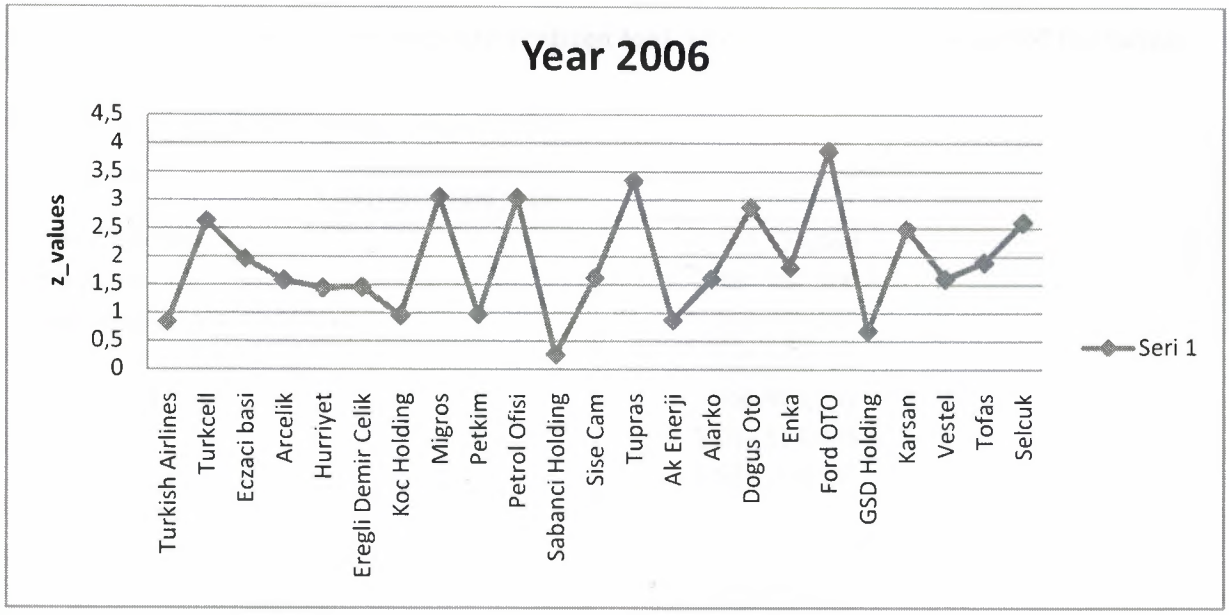
Table 6.2

Very Successful Firms	Succesfull firms	grey area	nearly failed
Petrol Ofisi	Migross	Turkcell	Turkish Airlines
Tupras	Dogus OTO	Eczaci Basi	Arcelik
Ford OTO	Selcuk	A. EFES	Hurriyet
		ENKA	Eregli Demir Celik
		Karsan	Koc Holding
		Todas	Petkim
			Sabanci Holding
			SISE cam
			Ak Enerji
			Alarko
			GSD Holding
			Vestel

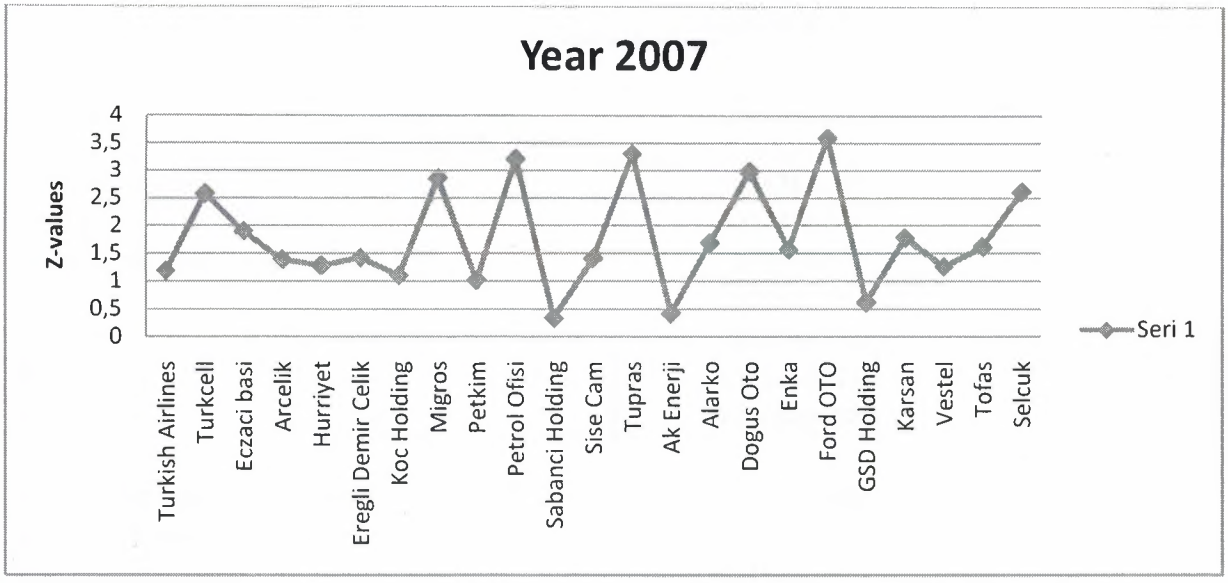
In this table is realized the classification of the companies in the four groups mentioned above according to their Z-Values

The difference of the Z- values between the two years 2006 and 2007 can be understood even by the graphs that show the movement of the all the companies during these two years:

Graph 6.1 The scores of year 2006



Graph 6.2 The scores of year 2007



The companies go nearly with the same slope but in 2006 they reach higher values near to 4.But in 2007 because of the general economy it decreases from a small amount.

To Show the way the calculations are realized took to examples from the list of the firms:

The firm with the highest value: FORD OTO

FORD OTOSAN 2006	
working capital	1,302,714,068
total assets	2,824,297,300
retained earnings(or acc loss)	169,889,063
EBIT	621,206,799
MV of eqiuity	350,918,252
BV of debt	1,094,514,444
sales	6,521,299,345
x1=working capital/total assets	0.461252457
x2=Retained E/total assets	0.060152684
x3=EBIT/total assets	0.219950923
x4=MV of equity/Bv of debt	0.32061546
x5=sales/total assets	2.308998895
Z score	3.862613925

FORD OTOSAN 2007	
working capital	674764487
total assets	3037876731
retained earnings(or acc loss)	169889063
EBIT	656891710
MV of eqiuity	350918252
BV of debt	1322059127
sales	7230630088
x1=working capital/total assets	0.222117139
x2=Retained E/total assets	0.05592362
x3=EBIT/total assets	0.216233827
x4=MV of equity/Bv of debt	0.2654331
x5=sales/total assets	2.380159147
Z score	3.595444109

The firm with the lowest value is: SABANCI HOLDING

SABANCI HOLDING 2006	
working capital	-2,659,885
total assets	67,216,450
retained earnings(or acc loss)	369,433
EBIT	2,092,934
MV of eqiuity	1,821,670
BV of debt	50,368,024
sales	16,947,973
x1=working capital/total assets	-0.039571935
x2=Retained E/total assets	0.005496169
x3=EBIT/total assets	0.031137229
x4=MV of equity/Bv of debt	0.036167192
x5=sales/total assets	0.252140257
Z score	0.336549603

SABANCI HOLDING (2007)	
working capital	-9229427
total assets	79330180
retained earnings(or acc loss)	1217376
EBIT	2701489
MV of eqiuity	1800000
BV of debt	55798715
sales	19340547
x1=working capital/total assets	-0.116341939
x2=Retained E/total assets	0.015345686
x3=EBIT/total assets	0.034053736
x4=MV of equity/Bv of debt	0.032258807
x5=sales/total assets	0.243798098
Z score	0.257160545

The values that are put in the application of the financial ratios are found in this way:

X1= is the working capital/total asset. W.C found by the difference of current assets and current liabilities.

X2= R E/ Total Assets, retained earnings is found in the equity part

X3= EBIT/ Total Assets, EBIT (earning before interest and taxes) we obtain it from the consolidated financial statement

X4= MV of equity/BV of total debt, MV of equity we find it by multiplying the number of outstanding shares with the market price of the share. And BV of debt is the total value of liabilities exceeding the interest paid for them.

X5= sales revenue/ total asset, this value also we can find it as the first element in the consolidated income statement of the company.

CHAPTER 7.

7.Conclusion

In the beginning of the paper was mentioned that is aimed to see how practical was this method to be used in Turkish Companies, and how helpful can this be for making a decision while checking these values.

I would prefer to write on the bankers point of view, exactly from a credit managers point of view. I would give credit freely to a bank that has a score 2.7 and up. But for a company with a score in the grey area, 2.7-3.0, I would analyze the elements that decreased the value, and the strategies they plan to follow in the next two years to overcome the score, and according to the result of each ratio in the z-table I would make the decision. But as successful bank manager I would not advice to give credit to company with a rate around 1.8 and lower. Even if it may be seen it has nice plans for the future it can not overcome to increase the ratio up to 2,7 or 3 in one or two years.

Predicting the bankruptcy for the next two years with an average of 80 %, shows that this model is a good source for the banks to make credit analysis and decisions.

CHAPTER 8

RECOMMENDATIONS:

An area for future research can be, by extending the analysis to relatively smaller asset sized firms and unincorporated entities, where the incidence of business failure is greater than with larger corporations.

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11. www.**sisecam**.com.tr
12. www.**tupras**.com.tr
13. www.thy.com
14. www.**akenerji**.com.tr
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16. www.**dogusotomotiv**.com.tr
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APENDIX

Stock Market

Piyasa Değeri En Yüksek 25 Şirket
Top 25 Market Values

Şirket *Company*	Bin YTL *'000 YTL*	*%*	Sıra No *Rank*: 2008/03	2007/03
TURKCELL	24,420	9.94	1	3
AKBANK	16,800	6.84	2	1
ENKA İNŞAAT	14,760	6.01	3	5
İŞ BANKASI (B)	13,663	5.56	4	2
GARANTİ BANKASI	12,600	5.13	5	4
T. HALK BANKASI	9,250	3.77	6	---
YAPI VE KREDİ BANK.	8,842	3.60	7	7
EREĞLİ DEMİR CELİK	7,892	3.21	8	12
SABANCI HOLDİNG	7,488	3.05	9	6
TÜPRAŞ	7,387	3.01	10	10
FINANSBANK	7,000	2.85	11	11
KOÇ HOLDİNG	6,494	2.64	12	9
VAKIFLAR BANKASI	6,075	2.47	13	8
ANADOLU EFES	5,355	2.18	14	13
FORD OTOSAN	3,649	1.49	15	14
MIGROS	3,489	1.42	16	18
COCA COLA İÇECEK	2,696	1.10	17	20
PETROL OFİSİ	2,681	1.09	18	23
BIM MAĞAZALAR	2,657	1.08	19	27
DENİZBANK	2,624	1.07	20	15
ASYA KATILIM BANKASI	2,505	1.02	21	24
OFAŞ OTO. FAB.	2,150	0.88	22	22
KÇELİK	2,120	0.86	23	16
DOĞAN HOLDİNG	2,010	0.82	24	17
EKFEN HOLDİNG	1,959	0.80	25	---

İşlem Hacmi En Yüksek 25 Hisse Senedi
Top 25 Trading Values

Hisse Senedi *Stock*	Bin YTL *'000 YTL*	*%*	Sıra No 2008/03
GARANTİ BANKASI	15,864,291	16.43	
İŞ BANKASI (C)	15,839,035	16.40	
YAPI VE KREDİ BANK.	5,766,877	5.97	
AKBANK	4,186,436	4.34	
VAKIFLAR BANKASI	3,618,788	3.75	
TURKCELL	3,237,233	3.35	
T. HALK BANKASI	2,856,379	2.96	
KOÇ HOLDİNG	2,721,607	2.82	
İHLAS EV ALETLERİ	2,246,152	2.33	
DOĞAN HOLDİNG	2,118,808	2.19	
TÜPRAŞ	1,690,611	1.75	
İHLAS HOLDİNG	1,646,311	1.71	
SABANCI HOLDİNG	1,168,446	1.21	
MİGROS	1,118,202	1.16	
FTSE İST. BONO B TİPİ BYF	1,070,529	1.11	
DJ İSTANBUL 20 BYF	992,298	1.03	
KARDEMİR (D)	989,015	1.02	
KARSAN OTOMOTİV	883,233	0.91	
PETKİM	852,609	0.88	
EREĞLİ DEMİR CELİK	801,282	0.83	
İŞ FİN.KİR.	786,025	0.81	
KOZA DAVETİYE	719,429	0.75	
GOLDAS KUYUMCULUK	710,789	0.74	
NET HOLDİNG	641,053	0.66	
ASYA KATILIM BANKASI	610,784	0.63	

Toplam *Total*	176,566	71.88	**Toplam** *Total*	73,136,223	75.75

Not:Toptan Satışlar, Birincil Piyasa, Resmi Müzayede, Rüçhan Hakkı Kupon Pazarı işlem hacimleri dahil edilmemiştir.
Note: Wholesales Market, Primary Market, Official Auction, Rights Coupon Market transactions were not included .

Some of the Calculations of Z-Score

Turkish Airlines financial ratios	
working capital	-7,191,523
total assets	4,434,830,817
retained earnings(or acc loss)	-622,430,270
EBIT	189,339,281
MV of eqiuity	175,181,185
BV of debt	2,825,112,365
sales	3,811,798,033
x1=working capital/total assets	-0.0016216
x2=Retained E/total assets	-0.140350398
x3=EBIT/total assets	0.042693687
x4=MV of equity/Bv of debt	0.062008573
x5=sales/total assets	0.859513743
Z score	0.838312064

DOGUS	
working capital	116,570
total assets	1,133,823
retained earnings(or acc loss)	162,484
EBIT	65,266
MV of eqiuity	140,282
BV of debt	640,929
sales	2,527,865
x1=working capital/total assets	0.102811462
x2=Retained E/total assets	0.143306319
x3=EBIT/total assets	0.057562777
x4=MV of equity/Bv of debt	0.218872917
x5=sales/total assets	2.22950584
Z score	2.872559847

ENKA	
working capital	1,025,224
total assets	5,536,878
retained earnings(or acc loss)	1,646,333
EBIT	600,483
MV of eqiuity	437,951
BV of debt	3,190,653
sales	4,029,757
x1=working capital/total assets	0.18516283
x2=Retained E/total assets	0.297339584
x3=EBIT/total assets	0.10845155
x4=MV of equity/Bv of debt	0.137260617
x5=sales/total assets	0.727803105
Z score	1.8057926

Anadolu EFES	
working capital	306,900
total assets	3,961,100
retained earnings(or acc loss)	238,000
EBIT	341,300
MV of eqiuity	821,600
BV of debt	1,605,300
sales	2,594,000
x1=working capital/total assets	0.077478478
x2=Retained E/total assets	0.06008432
x3=EBIT/total assets	0.086162935
x4=MV of equity/Bv of debt	0.511804647
x5=sales/total assets	0.654868597
Z score	1.422726423

FORD	
working capital	1,302,714,068
total assets	2,824,297,300
retained earnings(or acc loss)	169,889,063
EBIT	621,206,799
MV of eqiuity	350,918,252
BV of debt	1,094,514,444
sales	6,521,299,345
x1=working capital/total assets	0.461252457
x2=Retained E/total assets	0.060152684
x3=EBIT/total assets	0.219950923
x4=MV of equity/Bv of debt	0.32061546
x5=sales/total assets	2.308998895
Z score	3.862613925

VESTEL	
working capital	453,095
total assets	4,708,109
retained earnings(or acc loss)	229,921
EBIT	210,234
MV of eqiuity	967,640
BV of debt	3,445,173
sales	5,231,124
x1=working capital/total assets	0.096237152
x2=Retained E/total assets	0.048835106
x3=EBIT/total assets	0.044653597
x4=MV of equity/Bv of debt	0.280868334
x5=sales/total assets	1.111088125
Z score	1.609708635

TOFAS	
working capital	312,273
total assets	2,418,837
retained earnings(or acc loss)	42,625
EBIT	178,606
MV of eqiuity	500,000
BV of debt	1,400,841
sales	3,054,160
x1=working capital/total assets	0.129100473
x2=Retained E/total assets	0.017622105
x3=EBIT/total assets	0.073839618
x4=MV of equity/Bv of debt	0.356928445
x5=sales/total assets	1.262656392
Z score	1.898813057

KARSAN	
working capital	19,090,556
total assets	143,050,660
retained earnings(or acc loss)	-63,536,776
EBIT	31,852,368
MV of eqiuity	46,885,877
BV of debt	96,193,783
sales	274,777,248
x1=working capital/total assets	0.133453114
x2=Retained E/total assets	-0.44415577
x3=EBIT/total assets	0.22266495
x4=MV of equity/Bv of debt	0.487410678
x5=sales/total assets	1.920838729
Z score	2.48448429

GSD HOLD	
working capital	209,862
total assets	2,354,321
retained earnings(or acc loss)	8,309
EBIT	30,538
MV of eqiuity	215,020
BV of debt	2,766,623
sales	1,124,173
x1=working capital/total assets	0.089139077
x2=Retained E/total assets	0.003529255
x3=EBIT/total assets	0.012971043
x4=MV of equity/Bv of debt	0.077719299
x5=sales/total assets	0.477493511
Z score	0.67835989

SELCUK	
working capital	286,974,250
total assets	1,446,311,962
retained earnings(or acc loss)	25,243,274
EBIT	142,136,513
MV of eqiuity	200,000,000
BV of debt	1,099,580,358
sales	2,756,287,238
x1=working capital/total assets	0.198417947
x2=Retained E/total assets	0.017453547
x3=EBIT/total assets	0.098275142
x4=MV of equity/Bv of debt	0.181887571
x5=sales/total assets	1.905734939
Z score	2.599806216

Turkcell	
working capital	546,444
total assets	6,089,735
retained earnings(or acc loss)	2,394,838
EBIT	1,246,160
MV of eqiuity	1,636,638
BV of debt	1,880,393
sales	4,700,307
x1=working capital/total assets	0.089731983
x2=Retained E/total assets	0.393258163
x3=EBIT/total assets	0.204632878
x4=MV of equity/Bv of debt	0.870370183
x5=sales/total assets	0.771840975
Z score	2.62681955

ALARKO	
working capital	345,200,084
total assets	847,918,810
retained earnings(or acc loss)	114,778,991
EBIT	40,221,964
MV of eqiuity	125,839,499
BV of debt	316,782,137
sales	451,506,707
x1=working capital/total assets	0.407114549
x2=Retained E/total assets	0.135365544
x3=EBIT/total assets	0.047436103
x4=MV of equity/Bv of debt	0.39724304
x5=sales/total assets	0.532488136
Z score	1.604889833

AK ENERJI	
working capital	156,815,070
total assets	627,894,032
retained earnings(or acc loss)	-57,868,956
EBIT	-83,459,061
MV of eqiuity	114,209,596
BV of debt	137,439,857
sales	402,609,212
x1=working capital/total assets	0.249747668
x2=Retained E/total assets	-0.092163571
x3=EBIT/total assets	-0.132919023
x4=MV of equity/Bv of debt	0.830978717
x5=sales/total assets	0.641205668
Z score	0.87118712

sabanci	
working capital	-2,659,885
total assets	67,216,450
retained earnings(or acc loss)	369,433
EBIT	2,092,934
MV of eqiuity	1,821,670
BV of debt	50,368,024
sales	16,947,973
x1=working capital/total assets	-0.039571935
x2=Retained E/total assets	0.005496169
x3=EBIT/total assets	0.031137229
x4=MV of equity/Bv of debt	0.036167192
x5=sales/total assets	0.252140257
Z score	0.336549603

LEM SIRASI KAPANAN ŞİRKETLER (*) (2000 YILINDAN İTİBAREN)

MPANIES WITH STOCKS DE-LISTED FROM THE ISE MARKETS PERMANENTLY (*) (AS FROM YEAR 2000)

SE KODU DE	HİSSE ADI *STOCK*	KAPANMA TARİHİ *DE-LISTING DATE*
ANA	ABANA ELEKTROMEKANİK	01.05.2008
KSE	RAKS ELEKTRONİK	15.06.2007
SEV	RAKS EV ALETLERİ	15.06.2007
TAR	ÜNAL TARIM	07.02.2007
TKS	KONİTEKS	07.02.2007
RBN	GORBON IŞIL	22.12.2004
FN	İKTİSAT FİNANSAL KİRALAMA	13.05.2004
CF	FACTO FİNANS	13.05.2004
TAS	METAŞ	08.10.2003
KEL	ÇUKUROVA ELEKTRİK	18.06.2003
PEZ	KEPEZ ELEKTRİK	18.06.2003
ZGD	SEZGİNLER GIDA	18.11.2002
TAS	AKTAŞ ELEKTRİK	16.08.2002
DIS	EGS DIŞ TİCARET	16.08.2002
MUS	GÜMÜŞSUYU HALI	16.08.2002
YTS	KÖYTAŞ TEKSTİL	16.08.2002
KSA	SÖKSA	16.08.2002
RNU	MUDURNU TAVUKÇULUK	07.05.2002
BNK	TOPRAKBANK	31.01.2002
EK	EMEK SİGORTA	30.01.2002
EKS	APEKS DIŞ TİCARET	15.01.2002
DY	INTERMEDYA	15.01.2002
FN	İHLAS FİNANS	07.11.2001
MIR	DEMİRBANK	20.09.2001
GSH	SEVGİ SAĞLIK HİZM.	09.07.2001
BNK	ESBANK	03.04.2001
BNK	YAŞARBANK	03.04.2001
SAN	EMSAN BEŞYILDIZ	18.10.2000
PAS	EMSAN PAS.ÇELİK	18.10.2000

) Birleşme ve devralma nedeniyle sırası kapananlar dahil değildir.
) Stocks delisted because of acquisitions are not included.

LEM SIRASI KAPANAN ŞİRKETLER (*) (2000 YILINDAN İTİBAREN)

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