



Business failure prediction model using corporate governance index

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Abstract:

Objective: Most studies that attempt to predict business failure assume that accounts provide a true and fair view of a firm's financial position, without considering that managers can apply accounting rules arbitrarily or even commit accounting fraud, the purpose of this research is to predict business failure and use its index in corporate accounting management. Methodology: In this article, it is shown how to convert the exponential utility function of an asset allocation problem into the SLP stochastic linear programming form, which is widely used in financial problems. Therefore, determining the effect of different parameters that are determined before solving a SLP is used to generate detailed structures of the scenario tree. In this article, an artificial portfolio management problem, whose theoretical optimal solution has been determined using the Markowitz asset portfolio selection model, has been investigated. Findings: The value of R-squared coefficient equals 0.714 is significant at the 0.05 level. In addition, Durbin Watson's statistic with a value of 1.864 indicates the absence of autocorrelation in the error components or disturbances in the model. The lower the value of Akaike's statistic, the better. Based on the findings of the table, it can be concluded that the accounting corporate governance variable has a direct effect on business failure. On the other hand, the value of F statistic is equal to 4.092 and according to the significance level of the regression of accounting corporate governance on business failure, it is significant.

Keywords: research objectives, business failure, corporate governance, stochastic planning, scenario tree

I. Introduction:

Audit quality is necessary to ensure the reliability of financial information provided to stakeholders in decision-making. In this sense, auditors are required to disclose in their report any material uncertainty related to conditions that may cause substantial doubt about the company's ability

to continue as a going concern for the foreseeable future. If the probability of failure within one year after the publication of the report is high, the auditors may provide their opinion in a conditional manner. Theoretical research points to the ability of auditing professionals to warn investors about the failure of the company's business in the future and shows that investors consider audit reports as an informative source (Nora et al., 2019:10). The existence of risk related to the possibility of business failure is a positive stimulus for companies to have a higher motivation for efficiency in production. On the other hand, it should be noted that issues such as employment and the potential of a company with a business failure in its reconstruction justify the design of a mechanism to restructure the debts of a company with a financial crisis, because business failure has high transaction costs. Brings to the parties. Therefore, since the existence of healthy economic competition leads to the removal of inefficient companies from the cycle of economic activity and improves the average efficiency of the remaining companies, therefore the process of business failure plays an important role in boosting the economy of any country. And in addition, it increases the welfare of consumers, because efficient companies produce goods and services at a lower cost and sell them at a lower price. As a result, the legislators, aware of this issue, proceed to establish rules to give a systematic form to the process of business failure (Ghorthi, 2019: 15). Sometimes business failure is a sign that the managers of a company do not have the competence to manage resources in the right direction, and therefore changing managers can save the company from the risk of business failure. During the past decades, researchers from social sciences, including accounting, finance, strategy and organizational studies, investigated the issue of business failure and its causes and results. Despite the number of studies on the causes of business failure, the integrity of this stream of research in social sciences should be



improved. Therefore, in the current research, it examines the information disclosed in the auditor's report on the possibility of business failure. Considering the importance of the issue on the future decisions of users of financial statements, especially investors and lenders, no research has been done in this field so far. Refers to procedures, rules, and factors that affect the way a company is run, or supervised under separation of ownership from management. The main argument is this. Since the company is nothing more than a legal entity, then its values should originate from the preferences or values of its stakeholders. In other words, the company's values are created when the stakeholders' values become salient, key, and internalized (Bowen et al., 2016). The high quality of financial reporting (disclosure) through the reduction of information asymmetry, has reduced the possibility of incorrect selection and moral hazard, due to the increase in the ability of shareholders and lenders to control and monitor the activities of managers, leading to a reduction in the costs of monitoring managers and in the result is forcing managers to choose suitable and efficient projects and reduce the risk and financing costs of the company, and ultimately increase the value of the company and the efficiency of investment (Thaqafi and Arab Mazarizdi, 2019). Three important aspects of corporate governance in accounting have been studied and paid attention to in this research: the size of the board of directors, the independence of the board of directors and the duality of the CEO. Since previous literature considers the board of directors to be the core of corporate governance in accounting (Gilan, 2016), board independence requires more effective monitoring and is often beneficial to firms (e.g., helping firms make better decisions). During a crisis and avoiding bankruptcy) (Erkens et al., 2012). However, larger board size (meaning more directors and better advice but less effective communication) and the presence of CEO duality (meaning more effective leadership but less effective monitoring) have both advantages and disadvantages for firms (e.g. negative effects). And it is positive. The quality of financial reporting determines the value of financial reporting, and for this purpose, providing a clear and complete definition of the quality of financial reporting is a global demand. In general, providing high quality financial reports is effective in users' investment decisions and increasing efficiency. Therefore, providing ideal methods to evaluate the quality of financial reporting is another need in the field of financial reporting, and the higher the quality of

financial reporting, the more beneficial it is, that investors and users of financial reports will get more. In addition, the quality of financial reporting is a broad concept that refers not only to financial information but also other non-financial information that is useful in users' decisions. Bankruptcy is a situation in which the company is unable to obtain sufficient financial resources to continue its operations. The research conducted in the field of bankruptcy prediction shows that most researchers consider bankruptcy criteria as helplessness and predict it by showing different models. However, in the financial literature, it is emphasized that companies enter the bankruptcy cycle years before bankruptcy and various economic events occur in the pre-bankruptcy period. Companies may experience losses and a decrease in the value of bonds a year or years before bankruptcy; Therefore, bankruptcy prediction may not be timely and useful for evaluating the company's performance, especially for investors. In addition, using the word bankruptcy as a measure of bankruptcy may not be valid; Because companies that are not financially helpless can declare bankruptcy for strategic and optional reasons. Even if the company does not go bankrupt, still not paying the debts when due will cause the company to contract

¹ Bonn et al

¹ Gilan

¹ Erkens et al

Reconsider the loan and shareholders' claims, as a result of which both shareholders and creditors will suffer losses. In bankruptcy, company managers are willing to give good information and news to the capital market in order to prevent the company's value from decreasing; Therefore, the manipulation of financial statements harms the purpose of its existential philosophy (Yazdini et al., 2014 26). On the other hand, in recent years, Iran's business and economic environment has seen significant changes and developments in the capital market and the expansion of joint-stock companies and, accordingly, the number of companies admitted to the stock exchange, with the emergence of agency theory and the inevitable separation of ownership from management, the necessity of paying attention to corporate governance mechanisms in accounting to prevent fraud and deterrent factors from the risk of its occurrence with the aim of selecting companies in accordance with corporate governance indicators in accounting and general economic policies of the country, i.e. clarifying the



economy and making it healthy and preventing actions, has provided corrupt activities and fields in the capital market, etc. One of the goals of financial reporting is to provide information that is useful for investors, lenders and other current and potential users in making decisions related to investment and crediting and other decisions. (Sepasi and Hosni, 2015). According to the accounting standard, the responsibility for preparing and presenting financial statements lies with the board of directors or other management members of the business unit (Accounting Standard No. 1, Clause 7). On the other hand, the main responsibility for preventing and detecting fraud lies with the executive directors and the management elements of the business unit. With this increase in authority in the management structure of the company, managers may engage in opportunistic behavior and make decisions that are in their personal interests and the opposite of the interests of the shareholders. Or vice versa, it is for the interests of the shareholders or to maintain the company's reputation and not be removed from the stock exchange board. Part of the emphasis of research and scientific sources is related to corporate scandals and the collapse of large companies in the United States, such as Enron, Worldcom, as well as the scandal of several companies in Europe, including Vivendi in France, etc., due to frauds in financial reporting due to the weak role of corporate governance. Shoud (Mashaikhi, 2013) investigating the causes and pathology of the collapse of some large companies that had large losses, especially for the shareholders, it was determined that it was caused by the weakness of the corporate management systems in their accounting, due to these weak or underdeveloped management mechanisms. A company in accounting in Iran, especially during the corona epidemic, it is important to research the role of these mechanisms, whose effectiveness has been realized in solving agency problems, like many developed countries, so it was decided to establish the necessity to protect the interests of investors. An appropriate and effective corporate governance system to prevent corporate governance in potential accounting and improve accounting norms as a result of increasing shareholders' trust will examine this issue, i.e. the relationship between the business failure prediction model and the use of corporate governance indicators in accounting in stock exchange companies.

II. Theoretical foundations and research background

The concept of failure

Elyasi and Notash (2013), by examining the background of business failure and based on the definitions of failure, researchers have introduced three perspectives on this concept. The first view considers failure to be equivalent to the dissolution of a business, and the second view defines failure as failure to achieve entrepreneurial goals. The third point of view does not consider failure necessarily as the dissolution of the business, but defines it as failure to achieve entrepreneurial goals or failure to achieve management goals. On the other hand, a new approach has been presented to clarify the concept of failure and it has been divided into four objective and subjective states at the company and individual levels (McKelvie & Jenkins, 2016). This failure occurs when the decrease in income or the increase in costs is such that the company is bankrupt and unable to attract new capital, so it cannot continue to operate under the current ownership and management (Shepherd, 2003). Objective failure at the individual level, this failure relies on evaluating the relative efficiency of human capital in comparison to alternative employment options, which was first proposed as "threshold performance theory" (Gimeno, et al., 1997) in this type of worker failure. Afarin considered an objective minimum expectation of return for himself, which depends on the level of individual capital. Therefore, entrepreneurs with high personal capital consider a high threshold level for themselves and consider their company a failure even if it succeeds. Mental failure at the individual level This level of failure refers to the individual hardships that failure may cause on entrepreneurs, so it conceptualizes failure based on its impact (2011, Singh, et al., 2007; Cope). Small business failure: In Webster's dictionary, it is defined as the state of having a deficit or being insufficient, while in all business activities, planning, there is success, but not all of them reach their goals. Find in the financial literature, there are non-differentiating words for business failure. Some of these words are unfavorable financial situation, failure, failure of business unit, deterioration, failure and bankruptcy, inability to pay debts (Rezaei Menesh, 2017). Research on business failure has a long history and since the 1960s, researchers have begun to study this topic (Kocher and Feldbauer-Dorstmüller 2019). Researchers in the field of business failure have different approaches to this subject, so that



from the point of view of the definition of failure Jenkins and McKelvey (2016), the level of analysis, the basic theories used in the subject area (Khalil 2016). Focusing on pre-failure (Jalali et al., 2022, Raisi et al., 2018) focusing on the failure process (Amankwah-Amwah, 2016) and focusing on the post-failure (Amankwah-Amwah- et al., 2016, Shepherd et al., 2016) They show clear differences with each other.

Consequences of failure;

In a category, the total cost of failure on the entrepreneur is classified into three groups: financial, social and psychological (Ucbasaran, et al., 2013).

financial costs;

In the most optimistic scenario, failure imposes financial costs on the entrepreneur in the form of a reduction in personal income. For some entrepreneurs, financial costs may be in the form of long-term personal debts (Cope, 2011).

Social costs ;

Failure can lead to social costs by affecting personal and professional relationships. For example, the collapse of marriage and relationships is one of the results of failure. McGrath can also cause a loss of self-confidence, a decrease in social status, and a decrease in one's standing in the eyes of oneself and others (Shepherd, 2003). Psychological costs These costs appear in emotional and motivational form. Negative emotions such as pain, regret, shame, humiliation, anger, guilt, blame, and fear of the unknown (Cope, 2011, sadness, anxiety, panic attacks, fear and anger, which in some cases are accompanied by physiological symptoms such as fatigue, high blood pressure, insomnia and weight loss are associated. The experience of failure can have adverse motivational effects due to the feeling of helplessness and reduce people's beliefs about their ability to successfully perform certain tasks in the future and prevent them from performing properly. Handijani Fard et al. (1402) conducted a research called business failure: a scientometric study and content analysis. This research was first conducted using the method of co-occurrence analysis on the concepts of business failure and entrepreneurial failure (studies published in the Web-Oscience database from 2016 to 2021) and then using the qualitative content analysis of the key concepts extracted from the co-occurrence analysis, the conceptual model of the studies was developed. This research, in terms of data

collection method, is mixed in such a way that after quantitative analysis of researches using co-occurrence analysis, it analyzed the qualitative content of the key concepts extracted from this analysis. The findings showed that the word "business failure" has more occurrences with the words "performance", "strategy", "innovation", "failure", "growth" and "behavior". Also, the word "entrepreneurial failure" has more co-occurrences with the words "decision making", "self-confidence", "perspective", "learning from failure", "persistence" and "self". Based on the results of content analysis, the studies were divided into 6 general categories: 1) typologies of business failure 2) processes after business failure 3) bankruptcy prediction models and ratios 4) determinants of business survival and growth 5) individual factors affecting failure Entrepreneur 6) environmental and institutional factors affecting business failure. In the end, practical suggestions and suggestions for future researches have been proposed. Elka et al. (2021) carried out a research on the selection of the most appropriate tool for accounting and it is focused on 13 criteria: accuracy, interpretability of results, sample size or presence of multicollinearity, among others. Overall, they found that no single tool is primarily better than the others because it depends on the choice of criterion. The study of Amani et al. (2017) conducted a research on the applications of data mining in accounting, and the information shows that 14% of the applications of data mining in accounting use decision trees. Several studies compare data mining methods for bankruptcy prediction by obtaining different evidence.

III. Research hypothesis:

There is a significant relationship between business failure and corporate management indicators in accounting

IV. Research method:

This research is practical in terms of purpose and is in the field of descriptive regression research, and the required data was collected from real information of companies in Tehran Stock Exchange. In this research, to determine the statistical sample, no special relationship or model was used to estimate the sample size and sampling, but the systematic elimination method, which is common in most financial management researches, was used. In this method, the following limitations and conditions have been applied by the researcher in order to achieve the desired research sample:



The statistical population of this research is all the companies admitted to the stock exchange and non-stock exchange of Iran. The existence of some heterogeneity among the companies admitted to the stock exchange caused some special conditions to be considered for the selection of the tested companies, which are as follows:

- 1- The definite profit of the company during the years 1396 to 1402 should be known.
- 2- Companies that have been admitted to the stock market and non-stock market before the beginning of 2016 and have not been withdrawn from the stock market by the end of 2016.
- 3- Companies that have not changed their financial period during the research period and their financial year ends at the end of March.
- 4- Management information and their requirements (especially explanatory notes with the company's financial statements) should be available for the study period.

The test used in this research is divided into two parts: descriptive statistics and inferential statistics.

In the descriptive statistics part, indicators such as average are used. In the inferential statistics section, linear multivariate regression analysis has been used to express the presence or absence of a relationship between the independent variable and the dependent variable.

¹. Alka et al

¹. Amani et al

In order to test the hypotheses and finally analyze the data, Excel software and Eviews statistical software were used.

V. Findings:

Considering that the cross-sectional data method (panel data) is used to test hypotheses, therefore, the number of company-year observations based on combined data is 20 companies in the range of 2016 to 2016. The number of observations in the panel data was 350.

(Table 1) Descriptive statistics

Corporate management in accounting	Business failure	Description
350	350	Number
5/8704	3/28	Average
0/32521	0/01045	Deviation from the mean
8/13930	3/82	The standard deviation
66/249	14/02	Variance
87/03	4/99	maximum
1/31	1/2	minimum
4/32	2/8	fashion

First of all, it should be seen whether it is better to use the pooled model or the fixed effects model, which is measured using F-Limer. If the pooled model was better, the work will be terminated, and if the fixed effects model was preferable, it is necessary to test it against the random effects model in order to determine the preferable model among these two models. This is done using the Hausman test. Using the F test, it is determined whether the test is a fixed effects or a pooled model. The F test statistic for the hypotheses of this research is shown in Table 2-4.

(Table 2) F test for research variables

confidencelevel	Degre of freedom	The effect of test statistics F	The names of the variables
0/0001	91/621	1/672152	Social responsibility over financial performance

Based on the statistic obtained from the f test and also the significance level is less than 0.05, it is concluded that the fixed effects model should be

tested against the random effects model in order to determine the appropriate model for estimation. The



following is the Hausman test for all research hypotheses.

Based on the F statistic obtained for this hypothesis, which is equal to 1.672 and the significance level is less than 0.05, it can be said

that the fixed effects model should be tested against the random effects model in order to determine the appropriate model for estimation. This is done with the Hausman test.

(Table 3) Hausman's test of corporate governance in accounting on business failure

confidence level	Q2 degree of freedom	Chi-square test	Model
0/1245	2	11/441899	Random effects model

Based on the Hausman test, it can be seen that the value of F statistic is equal to 11.442 and the confidence level is 0.1245. Therefore, the model with random effects is accepted. In the following, data fitting is discussed. In this model, corporate governance in accounting is considered as an independent variable and business failure as a dependent variable.

(Table 4) regression test of corporate governance in accounting on business failure

The significance level	t-Statistic	The standard deviation	The correlation coefficient	independent variable
0/000	7/917	0/042	0/663	Constant
0/001	0/652	0/014	0/542	size of the company
0/002	-3/568	0/102	-0/651	Book value to market value
0/001	-2/274	0/098	-0/415	profitability
0/005	4/238	0/082	0/442	Asset growth
0/001	1/568	0/104	0/524	accrual items of working capital
0/002	2/187	0/214	0/674	Investments
0/001	1/888	0/475	0/682	Number of shares issued
0/000	4/253	0/143	0/258	External financing
Fixed effects model				
0/154	The mean of the dependent variable		0/714	The coefficient of determination
0/582	standard deviation of the dependent variable		0/235	Adjusted coefficient of determination
1/591	Akaike statistics		0/512	Deviation from regression
2/091	Schwartz criterion		216/184	Sum to the power of two
1/7854	Hutton-Kevin test		-641/353	Like Like Hood test
1/864	Watson camera		4/092	F test
			0/005	Significant level F

Based on Table 4, it can be seen that the value of R-squared coefficient equals 0.714 is significant at the 0.05 level. In addition, Durbin Watson's statistic with a value of 1.864 indicates the absence of autocorrelation in the error components or disturbances in the model. The lower the value of Akaike's statistic, the better. Based on

the findings of the table, it can be concluded that the variable of corporate governance in accounting has a direct effect on the failure of the acquisition. On the other hand, the value of F statistic is equal to 4.092 and according to the significance level of the regression of corporate governance in accounting, it is significant.



VI. Discussion and conclusion

In the present research, it was found that the variable of corporate governance in accounting has a direct effect on the failure of the acquisition. On the other hand, the value of F statistic is equal to 4.092 and according to the significance level of the regression of accounting corporate governance on acquisition failure, it is significant. Generally, corporate governance in accounting is identified using a portfolio-based approach. Bloom provided an argument in favor of using portfolios instead of stocks. Bloom stated that the use of stocks causes the estimation of betas to be associated with error, which is eliminated if the portfolio is used. Based on this, many researchers, including Black and his colleagues, Fama and Macbeth, and Fama and French, used the portfolio approach in testing factor models. In the portfolio approach to understand corporate governance in accounting, stocks are sorted based on a characteristic, and then the first and last deciles of stocks are selected and a security portfolio is created. If the obtained portfolio obtains an abnormal return compared to the examined model, the examined characteristic is known as corporate governance in accounting for the examined model. The most important advantage of this approach is the image that the portfolio creates for the analyst. In this way, the portfolio simply shows how the average return fluctuates from the lowest to the highest level of corporate management in accounting. Despite this, there are detailed discussions about the correctness or incorrectness of this approach. The general criticisms of the portfolio approach are a) the loss of the pricing error pattern at the company level if portfolio is used; b) reducing the efficiency of the tests if portfolio is used instead of stocks; c) the extreme sensitivity of the asset pricing test to the way portfolios are selected and d) the non-optimal use of information. In this regard, Miller and Schulz, in a research using simulated data, announced that the pricing error pattern at the company level disappears if the portfolio is used, and this error is not detectable at the portfolio level. In a research called "Criticism of Asset Pricing Theory Tests", Ral stated that the portfolio process can confirm an asset pricing theory or model; While the mentioned model is basically incorrect. This error occurs because the behavior of stock returns can be distorted in the process of forming portfolios, and despite observing a completely linear relationship in portfolios, the said relationship is not the same at the level of each share. LitzNeberg and Ramasavai also reported the decrease in the efficiency of tests

if the portfolio approach is used instead of companies. Gruyer and Janmet empirically showed that the pricing error at the firm level disappears at the portfolio level; In such a way that even when the capital asset pricing model does not have explanatory power for individual companies, it can fully explain the expected returns of portfolios. Using a portfolio can justify a bad asset pricing model, and conversely using a portfolio can make a good asset pricing model look bad. Lowe and McKinally also stated that the portfolio approach is correlated with past pricing error, and this causes over-rejection of the model; If the model may be correct. Regardless of whether a pricing model is good or bad at the firm level, it can be good or downright bad at the portfolio level. Kandel and Stumbag also stated that pricing error patterns at the firm level are distorted in the portfolio approach. Burke also showed that increasing the number of portfolios decreases the explanatory power of an asset pricing model within each portfolio. Kahn also concluded that the explanatory power of an asset pricing model within and between portfolios does not provide useful information about the explanatory power of the said model at the firm level. This implicitly means that empirical studies using portfolio modeling are worthless and nothing can be learned from them. Also, Fama and French concluded that in the portfolio approach, returns using equal weights may be affected by small and not even small stocks, although this problem can be solved by using value-based weighted returns; However, even if the problem of small stocks is solved, the newly formed hedge portfolio may be heavily influenced by large stocks and give an inaccurate picture of the importance of corporate governance in audited accounting. In another criticism, Fama and French stated that pricing error patterns at the company level are distorted in the portfolio approach, and thus the corporate governance test in accounting at the portfolio level does not necessarily indicate the corporate governance in accounting for each portfolio member's securities. Campbell also stated that the conclusions made in the asset pricing test are heavily influenced by the choice of the test portfolio. Siderberg also raised the issue that the grouping of companies and the integration of returns lead to the loss of information. According to his opinion, the portfolio process can distort the facts about the accuracy of asset pricing models and consequently the cross-sectional pattern of abnormal returns and the detection of the corporate governance test in the accounting of asset pricing models. Fama and French continued to suggest that



using the portfolio approach in diagnosing corporate governance in accounting causes only 20% of the data to be used and 80% of the data not to be used.

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