



A Survey of Research on Efficiency of Insolvency/Bankruptcy Institutions and Financial Distress

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Abstract. This paper is a survey on the efficiency and financial distress of bankrupt institutions. This paper is divided into three parts: theoretical summary, empirical literature summary and discussion. A total of 11 papers on bankruptcy and financial distress are extracted and summarized, and the most important papers for this paper are discussed and selected. The theoretical summary part covers most of the professional terms needed in this paper and their meanings. The Multiple Discriminant Analysis part mainly uses the Z model. The Z score model is a technology based on multivariate statistical methods. It uses a sample of bankrupt companies to analyze and distinguish the operating status of each company and whether it is bankrupt. In this paper, it is mainly to analyze the two models of Model A and Model B to come up with a mathematical range to determine whether the company can file for bankruptcy, the probability of bankruptcy and whether the value is beneficial to the company.

Keywords: bankruptcy · financial distress · debt

1 Introduction

Bankruptcy means to the legal system in which the creditor or debtor applies to the court to declare bankruptcy when the debtor has no right to pay off or is insolvent, and clears the debt through bankruptcy procedures. In some cases, bankruptcy is an action about corporate and economic. And people sometimes use the term bankruptcy when a person or company goes out of business. Bankruptcy is a legal proceeding in which you are declared unable to pay your debts. It gets you out of most of your debt, essentially providing relief. In bankruptcy, excess income non-essential assets (property and possessions) are used to pay off creditors. At the end of the bankruptcy, most of the debt is canceled.

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Bankruptcy can be a legal concept or a non-legal concept. Legal bankruptcy refers to the liquidation or reorganization of the debtor by the procedures prescribed by the Bankruptcy Law. In law, bankruptcy refers to a procedure in which the total property of the debtor is distributed by the court to protect most creditors and give consideration to the debtor's interests when the debtor is unable to pay off the debts due [1]. The bankruptcy procedure, also known as summary execution or general execution, aims at solving the debt repayment relationship between debtors and all creditors in one stroke, so it has the nature of a liquidation procedure. The characteristics of bankruptcy can probably be summed up in four points (1) The debtor is unable to pay off the debts due.

“Maturing debt” refers to the debt whose time limit has been reached; “Discharge” means full repayment; The term “insolvent” refers to the possibility of not being repaid on schedule. The debtor's insolvency is not automatically regarded as “insolvent”. (2) There is a majority of creditors. If there is only one creditor, ordinary civil enforcement procedures are all that are required, when creditors are in the majority is like taking civil enforcement procedure because creditors compete to request the assets of the debtor for compulsory enforcement, which may cause some creditors not to repay or only a small amount of pay, showing the results of unfair, so need a special program, the bankruptcy procedure, to ensure that all the profits and losses of the creditor fair. (3) Creditors shall be compensated fairly.

The debtor's entire property is insufficient to repay the debt all the debts, which determines that the creditor cannot realize all the debts. According to the requirement of “homogeneous creditor's rights and equal status”, the debtor's property must be distributed among all creditors by the legal order and in the same proportion, to ensure fairness among creditors. (4) Cancellation of unpaid debts. Many factors lead to bankruptcy. For example, (1) Difficult market conditions: poor overall economic conditions and the specific markets in which the enterprise operates are one of the common causes of bankruptcy [2]. Economies tend to follow cycles of boom and bust with rapid expansion, followed by calm or recession. In a depression, consumer confidence and spending tend to fall, which can lead to depressed incomes. Companies involved in specific niches may also be vulnerable to changes in consumer preferences. For example, as more and more consumers turn to online shopping instead of physical consumption, the convenience and convenience of online shopping makes people more and more like online shopping instead of physical consumption, so more and more people choose to open online shops with low or zero cost. As a result, the customer flow of physical stores becomes less and less, and the income decreases, leading to the closure of many physical stores. (2) Poor cash flow: A key issue facing many small businesses is poor cash flow. Cash flow is how long it takes to get money and pay bills. For example, if an order for £200,000 costs £80,000 to make and fulfill, you will receive £120,000. However, if your material supplier demands payment within 10 days and your customer pays you £200,00 within 30 days, you will not be able to pay your bills and wages. This happens all the time, especially in seasonal businesses. (3) Major Difficulties: Bankruptcy Many Business Owners Creditors CharHub says finding a money carrier is through the difficulties small businesses face as one of the borrowers. Willingness to provide additional funding, so this could create bankruptcy. Even if the owners have access to more financing to keep the company afloat in the short term, high indebtedness may make it harder for the

company to turn a profit because it must regularly pay interest on the debt [3]. Without thorough planning and careful thinking, a rash decision may be made and the business may fail. For example, a business owner might prefer to spend time and money developing a product in an area she is relatively good at or knows about, because then there is no need to re-study customer needs and the viability of the product without investigating and measuring whether the product is profitable. Suppose a product is useful, but from a business perspective, the product may not be viable or profitable. Lack of financial and management experience at the same time can lead companies to make bad decisions, and no company is immune to mistakes [4]. (5) Financial distress A financial problem is a situation in which a company cannot generate revenue or be able to perform its functions. This can lead to under-budgeting, spending, excess debt, unemployment, etc. Whether a failure to monitor a company's finances before it gets out of control could be a catastrophic factor, the occurrence of a financial crisis could lead directly to investor choice. The above is the concept of bankruptcy, characteristics, some of the leading factors, and a summary of the relationship between bankruptcy and financial distress. This article is A survey of research on the efficiency of bankruptcy institutions and financial distress.

2 Theory Summary

When a person files for bankruptcy, it means that the creditor has the right to receive all of the debtor's assets for an average payback through the appropriate channels, allowing the debtor to avoid further obligations that cannot be met. And the court will formally dissolve and declare bankruptcy. The company's bankruptcy must first be filed and accepted, followed by reconciliation and correction, bankruptcy declaration, bankruptcy liquidation, and finally the termination of bankruptcy. The financial distress of a company is the root of all bankruptcy. Brownbridge links financial distress to lending to high-risk borrowers, internal lending, macroeconomic instability, prudential regulation, and liquidity assistance, while Babalola links bank distress to possible observational, exogenous adverse changes to internal weakening of bank conditions, and non-panic correlations from bank economic conditions combine to draw conclusions that eventually lead to bank failures [5]. According to Aasen, management incompetence is the most common reason for companies to get into trouble, and the actual cause of failure is often simply a depletion of cash and other available resources due to mismanagement of the allocation [5]. Helen Njeri Kariuki thinks companies in financial distress are unable or have difficulty repaying their financial obligations, particularly to creditors [5]. This way of thinking is related to the previously mentioned financial difficulties. It implies that if difficult financial conditions persist, they may lead to bankruptcy or liquidation.

However, in terms of the larger environment, the banking sector's stability is essential for economic growth. An essential condition for economic stability and growth is the banking sector's financial stability. As a result, determining the financial health of banks is a crucial objective for many parties. Due to the enormous costs associated with bank failure, regulatory authorities must act quickly to save failing banks before they fail [5].

In Helen Njeri Kariuki's example of commercial banks in Kenya. According to Ogilo, When compared to other forms of risks, credit risk is the most expensive risk

in financial institutions due to the amount and severity of the loss [5]. This is due to the fact that its intensity could result in significant loan losses or perhaps bank failure. As a result, he emphasises that loans are the primary source of credit risk for Kenyan commercial banks. He goes on to say that banks must be aware of the need to assess, monitor, and manage credit risk. As a result, risk administration standards and the risk-based supervisory strategy for regulating financial firms were developed. Since banks constitute the foundation of numerous economies worldwide, the costs associated with financial turmoil can be enormous and devastating to the economy as a whole. Kenya is experiencing severe financial hardship, and while most banks there are reporting profits, a few are also reporting losses. Commercial banks dominate Kenya's financial sector, and any failure in that sector would have a significant impact on the country's economic development by causing bank runs, crises, and a wider financial and economic disaster [5].

According to Hotchkiss, Edith S, it is critical to consider a number of factors when developing bankruptcy systems, such as the structure of capital decisions, investment incentives, and risk decisions resulting from legislation and its application [6]. For obvious reasons, the majority of research has focused on the ex-post effectiveness of default resolution methods, that is, on events that occur after the onset of financial difficulties. However, in order to assess the efficacy of various procedures for resolving default, we must also consider their ex ante efficiency. Global evidence is critical in the pursuit of the best bankruptcy system.

The economic system benefits from having a strong bankruptcy system. Similar to the American personal bankruptcy system, which went through three stages—creditor-based, debtor-based, and equal emphasis on both parties—from the first federal bankruptcy law passed by the US Congress in 1800 to the law on preventing abuse of bankruptcy and consumer protection passed by the US in 2005. In more than 200 years, it has changed.

The United Kingdom progressively developed a contemporary system of personal bankruptcy that includes fundamental components including proportional distribution, collective liquidation, and bankruptcy exemption as early as 400 years ago. It places a strong emphasis on striking a balance between the needs of borrowers, creditors, and society. It also establishes an automatic exemption mechanism to give honest but unfortunate debtors a fresh start. Pay close attention to developing a market for bankruptcy services that is fiercely competitive and regulated. It has also undergone a long period of evolution and integration from the proclamation of an act against such persons as do bankruptcy during the reign of Henry VIII of England in 1542 to the continual improvement of the bankruptcy law in 1986.

Enterprise operation leads to bankruptcy, and the steps necessary to get there are clear-cut: stable operation, unstable operation, financial distress, and bankruptcy. Financial trouble occurs when there is not enough cash flow to pay off existing debts. From many perspectives, financial suffering has radically different meanings. Financial distress, for instance, or an imbalance between the company's present assets and current liabilities are examples of situations where this can happen. Financial challenges, according to Platt, Harlan D. Platt, Platt, and Marjorie B, occur in businesses with low operating costs and lower-than-expected decision implementation [7]. Contrarily, bankruptcy

appears to be the outcome of a choice made by the business to address the issue of excessive debt levels. This supports the notion that bankruptcy is predicted and that financial strain and bankruptcy are related.

3 Multiple Discriminant Analysis

3.1 Introduction

The effect of Z-score on finances and insolvency is covered in this module. Using 22 financial ratios and mathematical statistical screening, Altman (1968) investigated bankrupt and non-bankrupt manufacturing enterprises in the United States and developed the well-known 5-variable Z-score Model [8]. The Z-score Model is a technique based on multivariable statistical approaches that uses samples of bankrupt companies to analyze and distinguish between the operation condition of each company and whether or not it is in bankruptcy. The US, Australia, Brazil, Canada, Britain, France, Germany, Ireland, Japan, and the Netherlands have all made extensive use of the Z-score model.

3.2 Z-Score

Based on significant empirical study and analysis, the Z-score model derives a set of financial ratios measuring the severity of a company's financial crisis from financial reports of publicly traded corporations, and based on these ratios, various weights are then given to the financial crisis's warning effect. A corporation's overall risk score (value z) is generated at the conclusion, and its financial crisis level is assessed by contrasting it with the important value. It has two models in total: Model A is a modified bankruptcy model for unlisted companies, while Model B is a bankruptcy index model for publicly traded industrial organisations.

Model A

Model of bankruptcy for publicly traded manufacturing companies:

$$Z = 1.2 * 1 + 3.3 * 3 + 1.4 * 2 + 0.999 * 5 + 0.6 * 4$$

$$X1 = \text{total assets/net working capital}$$

This indicator captures the features of scale and liquidity. Working capital can indicate short-term solvency and reduce the danger of insolvency.

$$X2 = \text{total assets/retained earnings}$$

This statistic tracks the total earnings made by businesses and illustrates how long those businesses have been in operation.

$$X3 = \text{EBIT/total assets}$$

Without taking into account the effects of tax and financing, this indicator assesses the output capability of an enterprise's assets. Using the total amount of creditors' debt

and owners' equity, it serves as a gauge for determining how profitable a firm was. The better the enterprise's asset utilization impact and management level, the higher the ratio.

$X4 = \text{preferred stock's value and common stock/all liabilities}$

This indicator indicates how far a company's value can fall before it becomes insolvent, depicts the proportion between shareholder and creditor capital contributions, and determines whether a company's fundamental financial structure is stable. A financial structure with a high ratio has minimal risk and little reward. This statistic also shows how well the capital invested by creditors is safeguarded by the capital of shareholders.

$X5 = \text{sales/all assets}$

This indicator gauges a company's capacity to create revenue. Shows the impact of business asset use. The indicator's value increases with asset utilization, demonstrating the enterprise's positive impact on revenue growth.

The Z-score Model promotes the expansion of the financial early warning system by giving a comprehensive depiction of the enterprise's financial situation from the perspectives of asset scale, liquidity, profitability, financial structure, solvency, and asset utilisation efficiency. According to Altman's research and analysis of the Z-score model, the lower the Z number, the less probable the organisation will face financial calamity. The possibility of a financial crisis is inversely proportional to its probability. When $Z < 1.8$, the firm is in the risky zone of dry bankruptcy; when $Z = 1.8$ and $Z = 2.675$, the enterprise is in the "grey area," and determining whether the enterprise is in bankruptcy is difficult. When $Z > 2.675$, the company is doing well financially and there is little possibility of bankruptcy. However, because each country's economic condition varies, so do the standards used to assess its worth. As a result, each country has a unique important value for its businesses.

According to Edward Altman's interpretation of the concept, the lower the Z-score, the greater the risk of business failure. Businesses with less than a 1.8 Z-score are more likely to fail.

Model B

For unlisted enterprises, Altman provides the following modified bankruptcy model:

$$Z = 1.0 * 3 + 6.56 * 1 + 3.26 * 2 + 0.72 * 4$$

$Z < 1.81$ is the insolvency threshold; $1.81 \leq Z < 2.67$ is the grey zone; and $2.67 < Z$ is the safety zone.

3.3 Overall

If the original Z score is greater than or equal to 30 (for public manufacturing businesses), the business cannot file for bankruptcy. The company is likely to fail if the Z score is less than or equal to 18. The score is in the gray area (18–30), which is a range. Enterprise the likelihood of bankruptcy within one year is 95% and the likelihood within two years is 70% if the Z score falls within this range. Of course, the lower the Z score, the less likely it is that the business will fail. Model A's Z score (for private manufacturing enterprises):

This model can only be used for private manufacturing enterprises and cannot be used for other sorts of businesses. The business cannot file for bankruptcy if the Z score is more than or equal to 290. The company is likely to fail if the Z score is less than 1.23. For businesses with a Z score of 123–2.90, the likelihood of bankruptcy within one year is 95%, while the likelihood within two years is 70%. Naturally, the lower the Z score, the less likely the business will fail. Because the main purpose of this version of the Z-score is to forecast the likelihood of bankruptcy of private non-manufacturing enterprises within 1–2 years, the Z-score of model B [for private general companies] is only used for private general companies and cannot be applied to other types of businesses. The enterprise cannot file for bankruptcy if the Z score is greater than or equal to 2.60; if the Z score is less than or equal to 110, the enterprise is likely to file for bankruptcy. For businesses with a Z score of 123–2.90, the likelihood of bankruptcy within a year is 95%, and the likelihood within two years is 70%. The range of 110–260 is a gray region. Additionally, Model B demonstrates that for businesses, a higher Z score is beneficial.

4 Financial Distress

One of the significant papers surveyed is “Corporate Financial Distress: An Empirical Analysis of Distress Risk” by Natalia Outcheva in 2007. In this paper, Outcheva offers different definitions of financial distress - she groups the definitions into three groups: event-oriented definition, process-oriented definition, and technical definition [9]. According to the first definition, financial distress is when a firm is not able to pay its financial obligations. Many other authors, including Andrade and Kaplan, follow the second definition. They identified financial distress as “a critical and important event that distinguishes a company’s period of financial health from a period of financial illness and requires appropriate actions to overcome a difficult situation”. They divide financial distress into two forms: default on a debt payment and trying to restructure the debt to prevent default. Purnanandam, on the other hand, defines financial distress in terms of solvency. Financial distress is seen as the intermediate state between solvency and insolvency. Therefore, this definition separates financial distress from default and bankruptcy. The last group of classifications identifies financial distress through main indicators, which are utilized in empirical studies in order to predict financial distress. It also analyzes the performance of distressed companies and distressed restructuring. Different researchers choose different indicators. For example, Denis and Denis identify financial distress as a company having negative pre-tax operating income or net income over at least three years; Asquith et al. choose the interest coverage ratio in order to define financial distress.

According to Outcheva, Financial distress can be subdivided into four parts: bankruptcy, reduced performance, default and insolvency. Reduced performance and bankruptcies affect profitability, while defaults and insolvency are affected by liquidity. In the investigation of the financial situation in Kenya, insider lending is considered as the cause: Bad loans are a consequence of insider lending, which leads to liquidity problems resulting in failure of banks [5]. The investigation of Kenya includes many theories which are divided into three groups: intelligent expert system models, statistical models and theoretic models. Kariuki focuses mainly on statistical models with multiple

discriminant analysis to detect financial distress due to its high accuracy. Kariuki samples 22 banks (11 listed banks and 11 non listed banks) and uses the Altman's Z score model to measure financial distress. On the other hand, banks' financial performance is measured with the return on asset ratio. According to Altman's Z model, any score below 1.75 means the bank is financially distressed. Among the listed banks, 7 of them are financially distressed using the five year Z score average. Among the non listed banks, 10 banks are financially distressed. Only five out of the twenty two banks in the study are not under financial distress, while others are either under financial distress or in the gray area (score between 1.75 and 3.75). As Kariuki notes: The study finds that financial distress is not uncommon. Significantly, only 1 out of the 11 does not have financial distress in the non listed banks. In contrast, 4 out of the 11 banks do not have financial distress in the listed banks.

Some papers use regression analysis. Regression analysis is a method to see if a variable has an impact on a topic of interest, in this case the efficiency of financial distress. After implementing the regression analysis, the intercept coefficient is -0.017 and coefficient of financial distress is 0.039 . Therefore, the formula can be written as:

$$\text{Financial Performance} = -0.017 + 0.039 \text{ Financial Distress}$$

According to the result, with the X coefficient being positive (0.039), when the unit of financial distress is increased by one, the unit of financial performance will increase by 0.039 . However, in real world, an increasing of financial distress will lead to a decreasing of financial performance. With the intercept being negative (-0.017), when financial distress is 0, the financial performance is negative. The observation of this model is supported by Balcaen and Ooghe (2004).

The hypothesis tested most often is how financial distress has an effect on bankruptcy. And most papers conclude with a positive correlation. The difference between financial distress and bankruptcy can be explained by a set of variables including cash flow over sales, net fixed assets over total assets, short-term debt over total debt. Those variables can have different coefficient signs if they are considered as percentage changes in industry output. By inspecting those variables, the model can arrive at a reasonable perspective. According to Platt and Platt, financial distress is affected by variables including times interest earned (TIE) and an EBITDA ratio (factors from the firm's income statement). On the other hand, the bankruptcy prediction model includes three key ratios from the firm's balance sheet, including short term debt, total debt and net fixed asset ratios. The difference of balance sheet ratios reveals that Bankruptcy is related to the debt burden itself, while financial distress is affected by the action of the firm.

5 The Most Important Papers

One of the most important papers in the survey was "Corporate Financial Distress: An Empirical Analysis of Distress Risk" by Natalia Outecheva in 2007. The role of idiosyncratic volatility was explained by the empirical analysis, especially in pricing financially distressed stocks. For the first time, Outecheva measured financial distress directly based on capital market information (BSM). If the variation of BSM was low, the solvency position of the firm stayed unchanged. If the variation of BSM was high, the

solvency position gradually shifted to insolvency. Outecheva concluded that financial distress was very common, as “About 20% of non-financial companies listed on the three major U.S. stock exchanges (NYSE/NASDAQ/AMEX) run into financial distress each year.” But financial distress did not guarantee default: only 1% of non-financial companies were recorded in the U.S. file for protection. Outecheva also mentioned that the distress risk premium varied with time and was dependent on the market’s situation. Rising markets are high, falling markets are low. Therefore, the conditional model achieves more accurate results in realizing the correlation between the forecast of excess returns and the risk factor of distress. Moreover, the risk of financial distress is not perfectly symmetric, as it was more important during down markets. During up markets, investors took more risks, resulting in high returns. In contrast, during down markets, investors took less risks, shifting their portfolios toward safer financial instruments.

Overall, the study collected 1250433 firm-months observations representing 14345 non-financial solvent and distressed companies listed at the NASDAQ/NYSE/AMEX during the period 1980–2004. Using regression analysis, Outecheva verified that all information was able to be incorporated in a single distress measure. The importance of distress risk was different between up state and down state. The study provided a number of benefits to the financial world, such as learning more about the value of the company in financial distress and the relationship between risk and deteriorating performance.

Another article was an analysis of financial distress, and Ahmet K. Karagozulu and Diana Naples Layish wrote a “Insolvency and Outcome article, a critical analysis of another part of the process and outcome”. It can be used as a simple concept internationally. It is available as an international standard from the United States. The most important of these is Sect. 8: Sect. 8, which also focuses on sequential review on the U.S. approach. Reorganization is reported in Sect. 3. The study of external debt restructuring (adjustment and exchange issue offers) is in Sect. 4. Sect. 5 Company-Related Review and Financial Management Restructuring with Sects. 6 and 7. In Sect. 8, the article investigates the bankruptcy procedure. Section 9 presents some results for future research’s suggestions. This article is a major study of financial management and foreign debt in areas such as debt and asset default procedures in the United States and abroad, corporate governance issues associated with adverse restructuring, scale and as a result, the cost of bankruptcy reorganization, and the relative efficiency of different national bankruptcy law studies, the first is to distinguish the two kinds of solution to the default system: one is the enterprise sale to third parties, maybe through the auction; In the other case, the company reorganizes under existing claimants. Although the two ideas for resolving default, liquidation, and reorganization, are quite different, creditors in the United States rely more on the market to mimic the solutions offered by the auction system. However, most of the research on corporate restructuring under US bankruptcy laws began in the 1980s and early 1990s. Peak default rates in 2002, quiet changes in bankruptcy proceedings, and escalating enforcement of creditor rights have created a growing need for new research. But one view is that the direct cost of bankruptcy is not enough to justify the relatively low leverage commonly observed in the data. In response to this perception, leverage and financial distress may also require consideration of other indirect costs. While the nature and magnitude of the indirect costs are not fully understood, it is well known that the indirect costs of bankruptcy arise from the lost value of

the investment (opportunity cost). Rather, these costs, which should have been incurred in the best-case scenario, were not. Therefore, when considering bankruptcy, consider the impact of bankruptcy on a variety of issues, including the choice of capital structure, investment incentives, the law, and the risks arising from its implementation.

6 Conclusion

The relationship between bankruptcy and financial difficulties is mostly examined and discussed throughout this entire article. Research has shown that financial trouble occurs frequently, but that there is a perfect way for predicting bankruptcy's important value or how to avoid bankruptcy in the event of financial distress. Z-score, which Altman discovered, can assist many different types of businesses in alerting. Risks are frequently present in times of financial difficulty, and these risks will impact both individual and group interests, suggesting that the choices a firm makes once it has established itself in the market may have an impact on the macro environment.

From the results of the study, most banks did suffer financial distress. This could lead to bank failures. Banks should ensure that the root causes of their particular bank's financial distress are identified and that measures are taken to combat or reduce financial distress. Some remedies include merging with other banks, selling key assets, issuing new securities, debt-for-equity swaps, and reducing capital expenditures [9]. A large number of banks are experiencing financial distress, which may lead to a loss of stakeholder confidence in commercial banks and even escalation of financial distress. Contingencies such as a recession can temporarily make financial ratios redundant. In the normal course of a company's operations, stakeholders communicate important information about the company by observing or using financial ratios. It is recommended to redefine the practical applicability of the financial distress model as the economy changes to avoid this problem [10]. One of the main factors in financial distress is poor management. Therefore, a more experienced and qualified management team may yield better results. For those struggling companies or banks, it is important to have a proper exit plan that will lead to more profits.

In terms of future research, researchers can try to obtain data both from the U.S. market and continental Europe. Putting data gathered from different locations on the same table will better test if the model is universally true. Moreover, if researchers can agree on certain definitions, there will be less confounding variables. For example, different papers follow different definitions of financial distress [11]. Also, one can infer systematic risk, indicating the sensitivity of a portfolio of stocks or individual stocks to broad market movements. However, another explanation might consider the overall economy and the sensitivity to macroeconomic shocks. Therefore, the different standards of explanation can make a significant difference.

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