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Evolution of Financial, Non-Financial, and Macroeconomic Predictors in Corporate Bankruptcy: A Comprehensive Review

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Abstract

This paper analyzes the evolving interplay over the decades between financial, non-financial and macroeconomic indicators as predictors of corporate insolvency. A key goal is identifying the most frequently employed and validated models incorporating financial metrics, non-variables, and economic factors to gauge bankruptcy risk. This study conducts a rigorous review of 204 scholarly articles published from 1960 to 2024 accessed through databases, i.e. Scopus and Web of Science, using the PRISMA framework. Analysis categorizes predictors into financial, non-financial and macroeconomic variables, examining their relevance over time. Traditional financial ratios such as Debt-to-Equity and Return on Total Assets remain influential. However, management quality, governance, and economic aspects, including growth and interest rates, now complement standard finance models, enabling more nuanced predictions. The research underscores the value of internally and externally focused management systems for averting insolvencies and augmenting standard advice. Results suggest that separately weighing a firm's financial position against non-financial health, political environment, and location allows for more robust forecasting. Looking beyond solely numeric data to incorporate qualitative aspects also forms a more holistic view that benefits managers and policymakers seeking to support economic stability.

Keywords: *Corporate Bankruptcy, Predictive Models, Financial Variables, Non-Financial Variables and Macroeconomic Variables.*

1. Introduction

In the last three decades, the prediction of corporate bankruptcy has formed the focal point of interest for financial analysts, corporate managers, and academic researchers. The historical development of the bankruptcy prediction models could be traced back to the mid-1960s with the seminal works (Beaver, 1966; Altman,1968) where the technique of financial ratios, the marks of financial distress emerged. These early models formed an interesting background for developing a methodology to select companies likely to fall under the 'zone of resolution' to receive necessary attention before they become beyond redemption. The occurrence of global financial crises and the complexity of financial markets have emerged as major catalysts for enhancing the effectiveness of the models and making the necessary adjustments for differing economic conditions and circumstances within specific industries (Ohlson,1980; Zmijewski, 1984).

In subsequent studies, scholars have also broadened the use of bankruptcy prediction models to embrace other than financial ones, non-organismal variables and macro-economic ones. It has been empirically and

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statistically confirmed that financial ratios like liquidity, profitability, and leverage effectively predict corporate bankruptcy across different industries and settings (Usman, 2013). On the same note, other factors such as corporate governance systems, management competency, and organizational behaviour have been deemed key drivers to the probability of firms' survival during worst-case financial situations (Alaka et al., 2018; Li & Sun, 2012). Furthermore, macroeconomic factors, including GDP, interest rate, and inflation, have begun to be incorporated into these models, giving a more external view of the causes of financial problems (Sousa et al., 2022; Zhou et al., 2010).

However, as the literature review displays vast research activity in this area, there still needs to be a research gap in synthesizing the most used and validated variables under the financial, non-financial, and macro metrics. These important factors have been recognized as crucial for creating better and more widely applicable models for predicting bankruptcy. This research aims to determine which financial ratios, non-financial variables, and macroeconomic indicators are most commonly used in bankruptcy prediction models. This study will offer useful information on how these factors have changed. Specifically, this study wants to answer these questions:

RQ1. Which financial factors have consistently been the most dependable indicators of company bankruptcy?

RQ2. Which non-financial factors have consistently been the most dependable indicators of company bankruptcy?

RQ3. Which macroeconomic factors have consistently been the most dependable indicators of company bankruptcy?

This study answers these questions by improving our understanding of predicting bankruptcy. It provides a detailed review of the factors used in bankruptcy prediction models. It focuses specifically on these factors and summarizes their effectiveness in different contexts. The findings of this study will help create better models in the future. They will improve the accuracy of bankruptcy prediction models across different industries and economic situations in various countries.

2. Research Methodology

Search Strategy

To ensure a comprehensive and robust analysis, this study employed a systematic literature search strategy rooted in the guidelines provided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. This method facilitated a structured and transparent approach to identifying, screening, and selecting relevant studies. The search was conducted across major scientific databases, including Scopus, Web of Science, Google Scholar, and JSTOR, to encompass a wide range of peer-reviewed journals, conference proceedings, and seminal papers.

The key search terms used were “Predicting Company Bankruptcy,” combined with additional keywords such as “Financial Factors,” “Non-Financial Factors,” “Macro-Economic Variables,” and “Bankruptcy Prediction Models.” Boolean operators were utilized to refine the search and ensure the inclusion of relevant articles. To avoid bias and ensure the relevancy of sources, both backward and forward citation tracking was applied, allowing for the identification of key studies referenced in the literature as well as those that cited pivotal works. Given the significance of quantitative bankruptcy prediction models, the timeline for the search was set from 1960 to 2024. The 1960s marked a turning point in bankruptcy prediction, with the introduction of models such as Altman’s Z-score, which laid the foundation for subsequent quantitative methodologies modelling.

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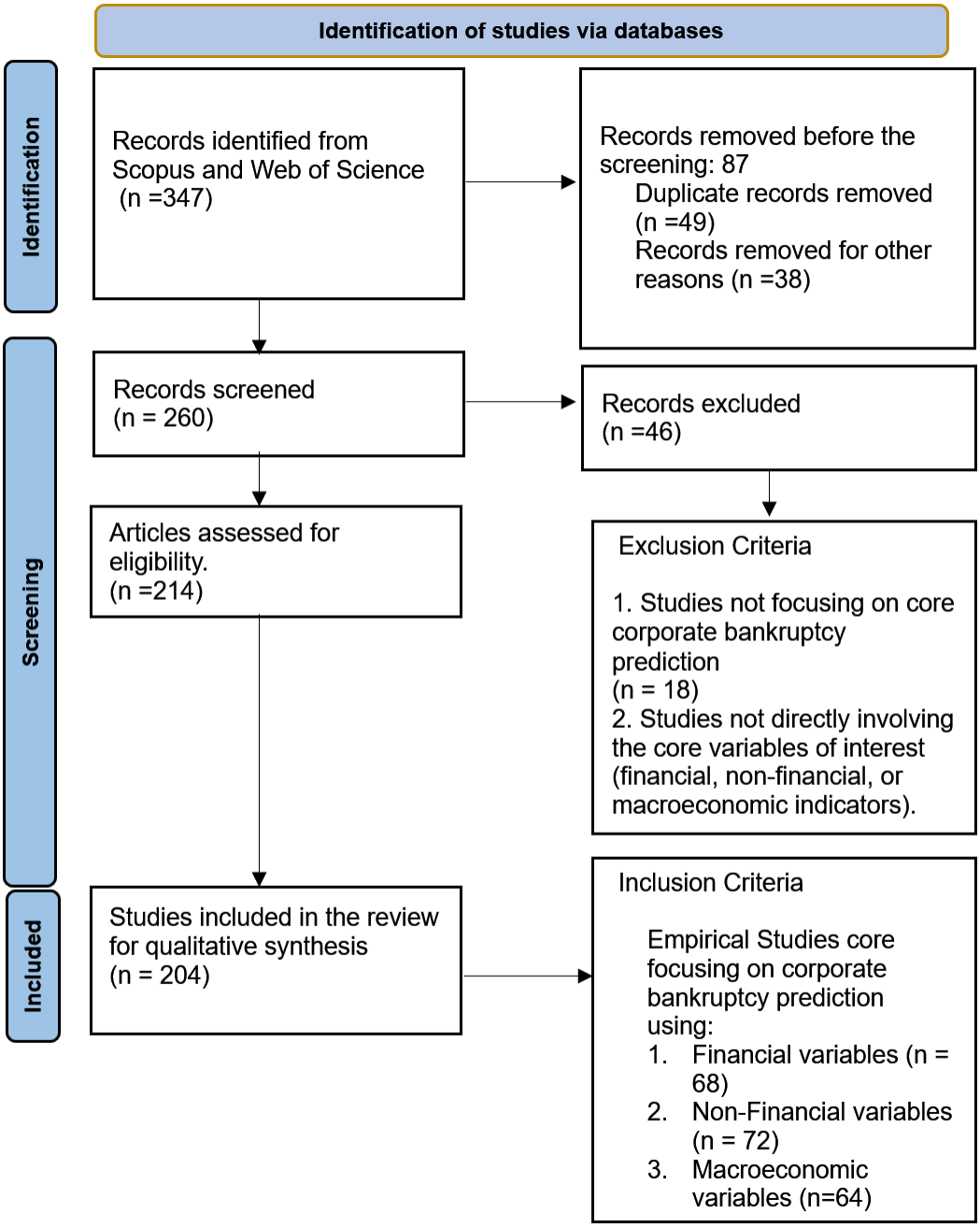

Source: Authors Compilation using PRISMA Framework

3. Synthesis of Literature

Research predicting when companies will go bankrupt has been developing for many years. Experts have found different factors, including financial, non-financial, and broader economic factors, that greatly affect the chances of a company failing. This review looks at how these factors have changed over time and

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groups them into three main areas: financial, non-financial, and broader economic indicators. By studying these areas, we want to determine which factors are the most dependable and commonly used in each group.

I. Financial Variables

Liquidity ratios are believed to influence the probability of bankruptcy and, for this reason, were derived based on the efficiency with which a company can meet its short-term obligation. Hence, The Current Ratio assessment tools are used to measure a company's ability to pay its current or outstanding short-term liabilities using short-term resources; a low value indicates these firms may have solvency issues, as postulated in earlier studies (Altman, 1968; Sudaryo et al., 2021; Rosyadah, 2013). This measure, known as the Quick Ratio, offers a stricter look at liquidity, especially for businesses with relatively less liquid inventory (Beaver, 1966; Mbanwie, 2009). A low quick ratio results in a high probability of bankruptcy because the organization needs to have the ability to meet short-term obligations. Further, when the cash ratio is low, the firm's financial resilience to shocks is nearly nonexistent (Wilcox, 2011; Islam, 2014). Current Assets obtain Net Working Capital: Current Liabilities working capital reflects the ability of the firm to manage its current assets; negative or declining Working Capital is an indication that a firm is struggling to meet the Solvency of its current assets (Altman, 1968; Liao & Melo (2022). The Operating Cash Flow Ratio indicates the level up to which current liabilities may be met by cash from the operation are significant for operating cash flow, especially when there is no external funding (Rodríguez-Masero et al., 2020; Ahmad et al., 2010). In banking, an important ratio is the Loan Deposit Ratio (LDR), a high LDR may cause a liquidity crisis and increase the extent of financial pressure (Islam, 2014; Priyetno, 2020).

As the name suggests, solvency ratios give information about the long-run ability of the firm to pay its debts, which is important while assessing the risk of bankruptcy. From total liabilities to shareholder equity, the Debt-to-Equity Ratio demonstrates financial leverage; higher leverage means higher bankruptcy risk during the recession (Ohlson, 1980; Ka, 2019); Khatri, 2016). Moreover, total liabilities/ total assets give a more generalized view of the debt faced by the firms with higher value, showing higher firm financial pressure and, thereby, higher bankruptcy risk (Zmijewski, 1984; Siekelova et al., 2017). The Debt Service Coverage Ratio (DSCR) aims to identify a firm's capacity to meet its fixed debts through operational income; a DSCR <1 is widely seen as problematic (Ibrahim, 2009; Jayadev, 2006). Thus, the Equity mentioned above Multiplier evaluating financial leverage by the ratio of total assets to Equity demonstrates a higher degree of financial risk when it rises, which may result in, among other things, bankruptcy, based on the data provided by research (Mears & Shier, 1991; Abbasov, 2017). The Proprietary Ratio shows the shareholders' Equity about total assets, referring to a firm's dependence on borrowed funds; lower values suggest the firm's higher financial risk as identified by early research (Wilcox, 2011; Bahiraie et al., 2011). The Capital Adequacy Ratio is important to financial institutions where low ratios show insufficient amounts to add to the loss, posing a high risk of bankruptcy (Yudadibrata et al., 2016; Yahya et al., 2023).

In the analysis of the chosen company, profitability ratios play a significant role in measuring the ability of the company to generate profits from its revenues, assets or Equity, which are significant in determining the sustainable financial health of the company. Return on capital employed (ROCE) also shows the profit generation efficiency from capital; a declining ROCE is inefficient financial performance and an indication of possible bankruptcy (Mears & Shier, 1991; Akbar, 2018). Return on Total Assets (ROA) measures the efficacy of assets for generating a profit, and lower ROA implies inefficiency leading to distress (Ohlson, 1980; ReillyFrank, 2009; Siregar et al., 2020). The Net Profit Margin enables profitability to be measured by the percentage of revenue, which is feasible as profit; decreasing Net profit Margin implies that an organization’s financial stability has worsened

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(Li & Sun, 2012; Dewi et al., 2023). The operating Profit Turnover Ratio can be defined as the trend of operating profit to turnover. As the ratio decreases, it shows that the business venture is generating lesser profit from sales and is thus exposed to a higher risk of bankruptcy (Dimitras et al., 1996; Ka, 2019). Another important item is the Retention Ratio, which shows the proportion of earnings that have been retained and not distributed as dividends; a low retention ratio may pose a problem (Wilcox, 2011; Muscettola, 2015) since it implies inadequate reinvestment, which turn leads to increased financial distress risk.

The Debtor's Turnover Ratio checks how well a company collects money from sales made on credit. A lower ratio shows that the company is not efficient in collecting this money, which can cause problems with cash flow and make it harder for the company to pay its debts (Altman, 1968; Antwi et al., 2022; Sudaryo et al., 2021). If this ratio goes down, it can make it more likely that the company will run out of money and fail (Ohlson, 1980; Rosyadah, 2013). The Asset Turnover Ratio (ATR) examines how well a company uses its assets to make sales. A lower ATR means the company is not using its assets efficiently, which could lead to less profit and more financial trouble (Dimitras et al., 1996; Abbasov, 2017). The Creditor's Turnover Ratio measures how quickly a company pays its suppliers. A smaller ratio might mean a company takes longer to pay its suppliers, which can hurt relationships and worsen financial problems, increasing the chance of going bankrupt (Zmijewski, 1984; Purnomo, 2018; Candrawati, 2008).

II. Non-Financial Variables

Corporate governance and management practices have become important non-financial determinants in bankruptcy prediction models. As seen from some of the initial studies, board composition, especially having independent directors, helps enhance oversight and decrease financial distress risk, and as supported by (Daily & Dalton, 1994; Shetty & Bapat, 2021), good governance practices such as effective audit committees, and high managerial ownership are key to reducing risk. Another underlying factor is that the CEO power concentration will result in high-power destructiveness, which negatively impacts decision-making and the associated financial risks (Graham et al., 2024; Daily & Dalton, 1995). It is also important for the leadership to be consistent because leadership changes often lead to strategic ambiguity that, in turn, affects investors (Gissel et al., 2006; Hüttemann, 2019). Management quality has become a key factor in predicting financial difficulties (Barboza et al., 2017; Mears & Shier, 1991). Often, underperforming management teams struggle to adjust to shifts in the market. Regarding market and economic conditions, studies have identified trends in the market and how consumers behave as essential signs of a company's health (Parnes, 2012; Tinoco, 2013). Maybe there was an alternative. Many researchers claim that companies failing to maintain market competitiveness and keep pace with changes will likely encounter financial trouble (Singh et al., 2016; Shirata, 2000). There are various uncertainties in the market, besides supply and demand considerations, which are becoming more important with globalization, making supply chains increasingly complex (Daubie & Meskens, 2004; Fiksel, 2015). Other factors, like regional influences and cultural diversity, as well as dealing with regulations and legal processes, also complicate the problem of bankruptcy (Peel et al., 1986; Barr et al., 1994; Hernandez Tinoco, 2013; Bahiraie, 2010). The importance of innovation and strategic management is more than apparent, given that a heavy emphasis on research and development (R&D) is key to the financial health of businesses right now, especially in industries that are changing rapidly (Nuraini et al., 2020; Nosheen et al., 2016).

The importance of preparedness for managing disasters (Küçükaltan, 2013; Mamhoori, 2023). They argue that sound emergency plans and effective communications can mitigate the impact of financial pressures. Using new technologies in this way is very important for reducing the risk of financial problems (Barboza et al., 2017; Gissel et al., 2006). Corporate social responsibility (CSR) and ethical business conduct are linked with financial well-being (Brooks

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& Oikonomou, 2022; Galant & Galant, 2023). Research shows that CSR can strengthen links with stakeholders and help to cope with financial stress, particularly in companies with weak corporate governance (Zheng et al., 2019). Corporate culture, ethics, brand value, and reputation affect financial stability (Sonjaya, 2024; Vecchio, 1985; Singh et al., 2016). The impact of corporate culture and ethics, along with brand equity and reputation, on financial resilience (Sonjaya, 2024; Vecchio, 1985; Singh et al., 2016; Shirata, 2000).

Another point that needs to be considered is how relationships among employees, organizational behaviour, and social connections can influence the likelihood of bankruptcy. High levels of staff turnover, often indicative of poor management or an unsatisfactory working environment, bring about financial problems (Stea et al., 2017; Oh & Han, 2021). Enterprises that work on raising employee morale and provide training packages (Zehra, 2016; Fiksel, 2015) are more likely to avoid financial difficulty. The importance of having strong social networks and good external relationships, along with shrewd market entry and exit strategies, in mitigating the risk of bankruptcy (Sricharoenchit et al., 2021; Bayona Soto et al., 2024; Heaton & Klarman, 2014).

III. Macroeconomic Variables

Interest rates are very important when predicting financial problems in companies. They affect how much companies pay to borrow money and how likely they are to go bankrupt (Jakubik, 2007; Sousa et al., 2022), especially in industries that depend heavily on loans. Inflation can make things more expensive and increase the chances of companies going bankrupt because it costs more to run their businesses (Levy, 1991; Amendola et. al., 2012). The growth of the economy, measured by the Gross Domestic Product (GDP), is also important. It has been found that when the economy grows less, more companies go bankrupt because people and other businesses spend less money (Tanaka et al., 2019; Zhou et al., 2010). Researchers have looked at unemployment rates, which usually show when the economy is struggling (Mukeri et al., 2020; Yamanaka & Suguru, 2023). This often results in more businesses failing because people need more money to spend. Changes in currency values are important for companies that trade internationally (Zhou et al., 2010; McKee, 2000) as having a big effect on financial health and how much profit a company makes. Market ups and downs (Valentinyi-Endrész & Lovas, 2008); Barboza et al., 2017) affect how confident investors are and how much it costs to borrow money, which is important for predicting financial problems. The availability of credit is also very important (Schmidt & Henning, 2010; Giriūnienė et al., 2019). When it is harder to get credit, financial troubles worsen and the chance of going bankrupt increases. Rules and regulations undoubtedly impact how businesses must operate. The costs of adherence and risks of noncompliance can burden enterprises (Tinoco & Mario, 2013; Sienly Veronica et al., 2014). Commodity fluctuation, especially for industries reliant on natural resources, can produce economic hardship (Zizi et al., 2022; Pociecha et al., 2018). Moreover, considering worldwide economic conditions, international trade relations, and geopolitical risks, it has become increasingly important to anticipate corporate insolvency (Veronica et al., 2013; Brédart, 2014). Various interconnected global forces must be evaluated to forecast whether a company can endure in the modern global marketplace or if troubles may soon emerge.

4. Findings

This section explores the array of financial, non-financial and macroeconomic signs determined through an exhaustive assessment of the literary works on corporate bankruptcy prediction. The conclusions accentuate a wide spectrum of factors considered across diverse studies, mirroring the developing comprehension of what elements add to corporate hardship. These indicators, organized systematically represent the alternative ways researchers have taken to seize the complexity of anticipating corporate failure. This study recognized each class's most frequently employed variables as prognosticators of corporate bankruptcy. To visually portray these

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findings, we have constructed vertical bar graphs demonstrating the positions of the most commonly applied fiscal, non-monetary and macroeconomic variables as prognosticators. These visualizations furnish a transparent overview of the key indicators emphasized in the literature, offering a foundation upon which robust bankruptcy prediction models can be advanced. The findings are as follows:

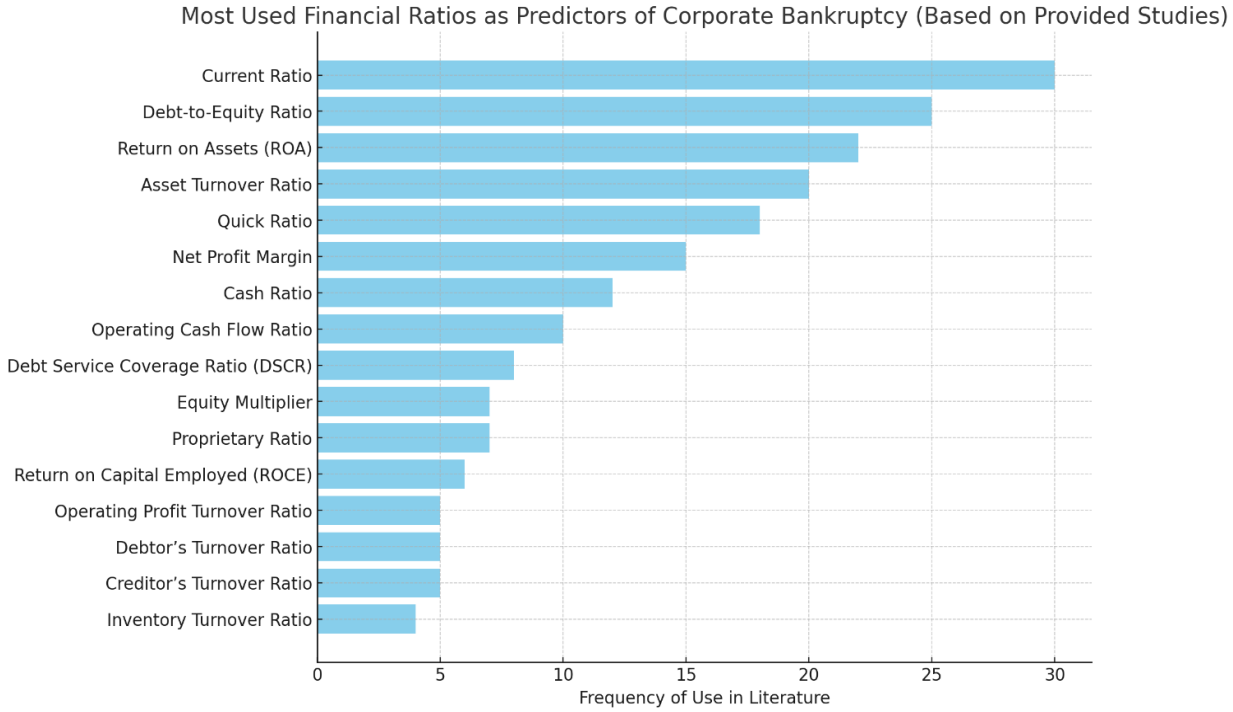

Figure 1. Frequency of Financial Variables in Bankruptcy Prediction in Previous Studies

This study highlights the importance of specific financial ratios in finance. The Current Ratio is the most commonly used liquidity ratio, showing its role in evaluating a company's ability to meet its short-term debts. The Debt-to-Equity Ratio is also important, as it measures a company's financial leverage and long-term stability. The Return on Assets (ROA), which shows profitability, and the Asset Turnover Ratio, which indicates efficiency, are also significant, emphasizing their importance in predicting how well a company operates and uses its assets. Other financial measures, like the Quick Ratio, Net Profit Margin, and Cash Ratio, are mentioned less often but are still very important in certain situations, especially in industries where keeping enough cash on hand is very important. These measures are often discussed in financial discussions because they help experts and investors check how well a company is doing financially and predict if it has money problems.

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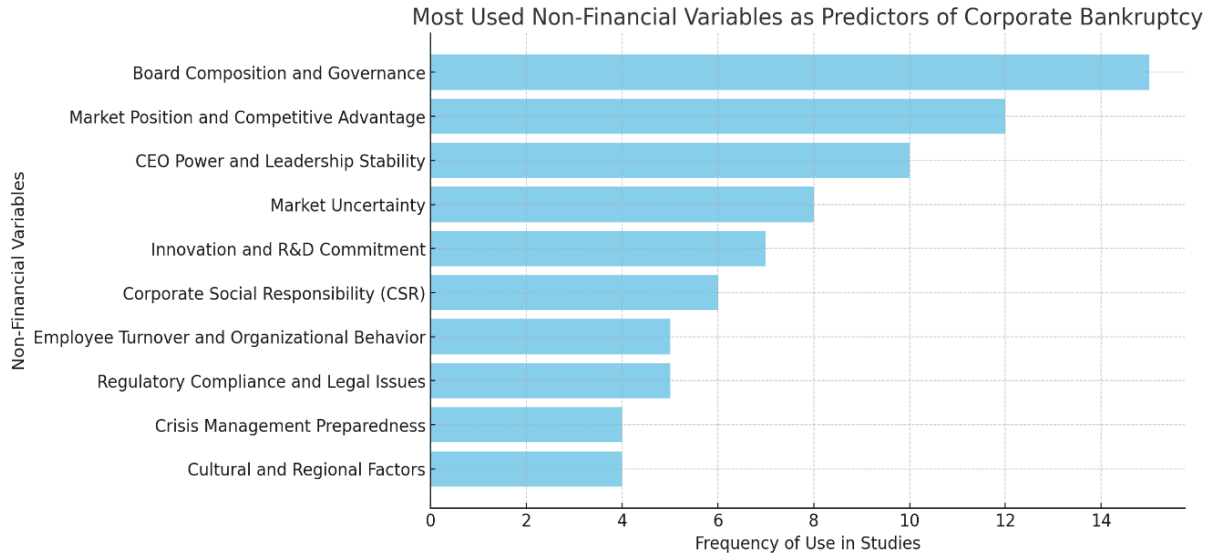

Figure 2. Frequency of Non-Financial Variables in Bankruptcy Prediction in Previous Studies

According to the researchers, "Board Composition and Governance" is the most important factor. It deserves such status because appointing people to the board assures closer supervision for companies by those same people and a correspondingly lower chance that they will burst. From almost the same angle, the researchers also take a look at "Market Position and Competitive Advantage" and "CEO Power and Leadership Stability." Therefore, a company's market standing and leadership stability are crucial to avoid financial issues. Other important factors include "Market Uncertainty" and "Innovation and R&D Commitment." These underscore the need for companies to manage external risks and innovate continuously to forestall financial catastrophes. Eventually, once the relevant data are unearthed, it can be confirmed that non-financial factors also matter when forecasting a company's bankruptcy risk.

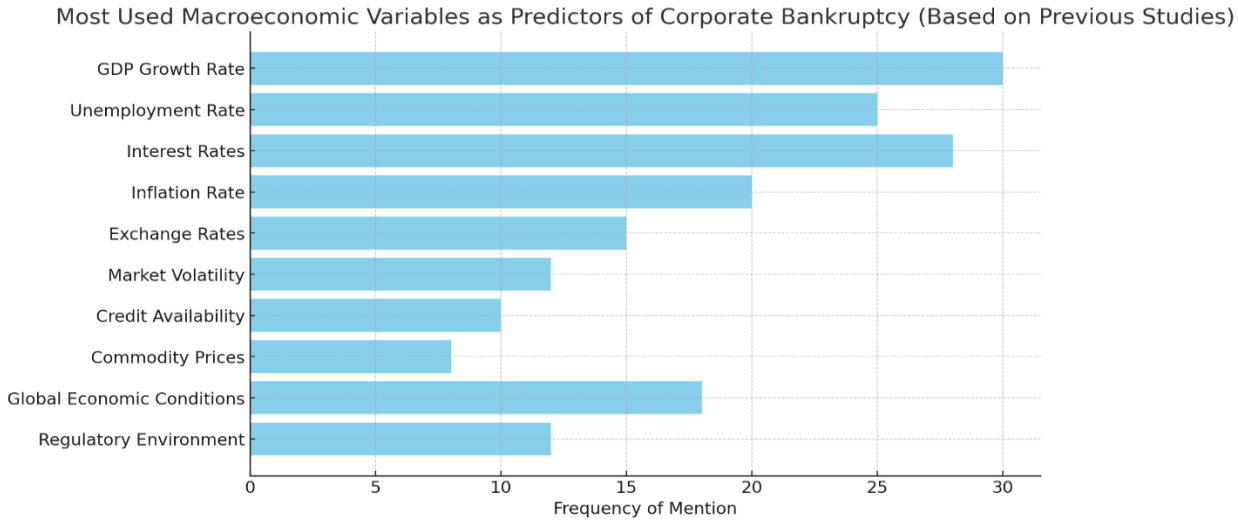

Figure 3. Frequency of Macro-Economic Variables in Previous Studies

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The analysis reveals the GDP Growth Rate, Unemployment Rate, and Interest Rates as the macroeconomic variables predominantly used for corporate bankruptcy forecasts. Such variables are important since they can directly account for the economic environment's effect on the company's running and financial position. Inflation Rate and Exchange Rates are also important; however, these variables are less prevalent and may depend more on the industry in focus. Market Volatility and Credit Availability are crucial variables but arise in lesser studies, seemingly due to specific contextual usage.

5. Discussion and Conclusion

This comprehensive analysis explores the predictive power of financial, non-financial and macroeconomic factors in forecasting corporate bankruptcy. It synthesizes a wide body of evidence accumulated through many years of scholarly work. The findings reveal that traditional metrics, like current ratio, debt-to-equity ratio and return on assets, represent the most dependable early-warning signs. Financial signals are critical as they gauge a firm's liquidity, stability and effective resource use. However, the study also underscores that non-financial elements, including management quality, culture, stakeholder engagement, and technology adoption, carry growing importance. Such intangibles provide deeper insight into internal operations and external perception, sometimes heralding troubles in advance of red flags through routine financial statements. Moreover, incorporating key economic indicators such as GDP, interest rates and price changes into predictive models enhances understanding of how macro conditions influence stability.

This research synthesizes established knowledge on commonly utilized financial, non-financial and macro variables for anticipating corporate insolvency. It affirms their ongoing relevance and potency. The findings suggest combining all factors yields stronger, more adaptable predictive instruments. As enterprises and economies evolve rapidly, future work should employ sophisticated techniques to refine model accuracy. Researchers and practitioners can precisely forecast failures, aiding prudent risk management and preventative actions.

6. Limitations of the Study

Limitations of the analysis include its emphasis on reviewing indicator prevalence and past application rather than validating predictive power using modern statistical and machine learning methods. Advanced approaches can illuminate variable interrelations, augment precision and determine the most reliable signals across settings and sectors. Further research applying such techniques can validate and enhance the identified predictors for robust insolvency anticipation.

Originality/Value: This paper adds to the existing literature by offering a well-rounded perspective on organizational patterns to existing studies on selected bankruptcy predictors over time. It highlights a progressive movement towards placing non-financial and macroeconomic facets alongside financial ones as approaches to providing corporate failure forecasts.

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