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Article

Unmasking Delistings: A Multifactorial Analysis of Financial, Non-Financial and Macroeconomic Variables

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Abstract: The stability of financial markets is influenced by the strength and transparency of companies listed on stock exchanges. This paper explores how financial, non-financial, and macroeconomic factors influence delisting likelihood among companies listed on the Johannesburg Stock Exchange (JSE), addressing a limitation in the current body of knowledge that often overlooks the combination of these factors, especially within the context of developing economies. Using a sample of 302 companies delisted between 2010 and 2023, and 302 as a control group, we analyzed 72 variables through a multivariate panel probit regression model. Our findings reveal that delisting decisions are driven by a complex interplay of financial health, governance practices, and macroeconomic conditions. Financial health, including liquidity and market valuation, is crucial in mitigating delisting risk. Non-financial factors, such as corporate governance and shareholder composition, further reduce the likelihood of delisting. Macroeconomic conditions, including inflation, and interest rates, introduce significant external pressures. This study is especially relevant in developing economies like South Africa, where economic volatility adds risks for listed companies. The results provide insights for companies, investors, regulators, and policymakers to ensure a stable and robust stock market and financial system and identify early warning signals for delisting.

Keywords: delisting; johannesburg stock exchange; financial variables; non-financial variables; macroeconomic variables; financial markets

1. Introduction and Background

The stability of financial markets heavily depends on the strength and transparency of companies listed on stock exchanges (Bharath & Dittmar, 2010). Companies with solid financial health and efficient operations boost market confidence and attract investors (Boers et al., 2017). Transparency through thorough financial reporting and regulatory compliance equips investors with the information needed to make informed decisions, reducing uncertainty and risk (Croci & Giudice, 2014). However, the increasing trend of companies delisting from stock exchanges has raised concerns among investors, regulators, and the financial community at large (Sallehuddin et al., 2019).

Delisting, the act of removing a company's shares from public trading, can have significant repercussions, including diminished investor confidence, reduced access to capital, and adverse effects on a company's reputation and operational efficiency (Kang, 2017). Moreover, delisting can destabilize markets, leading to decreased investment, job losses, and a decline in economic output (Martinez & Serve, 2017). Therefore, understanding the factors leading to delisting is crucial for developing strategies to mitigate these risks and ensure a stable and robust stock market and financial system.

Research worldwide has identified various financial factors influencing a company's decision to delist. Financial health is crucial for a company's sustainability in public markets (Intrisano et al.,

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2020). Liquidity ensures companies can meet short-term obligations and maintain operations, while market valuation reflects investor perception and confidence, influencing a company's ability to raise capital and invest in growth opportunities (Diah & Putri, 2021). Factors such as poor financial performance, high costs of maintaining a public listing, regulatory burdens, and market undervaluation often drive delisting decisions (Bakke et al., 2012; Bessler et al., 2012). Additionally, regulatory breaches, non-compliance with financial reporting standards, and fraudulent activities can prompt delisting (Makrominas & Yiannoulis, 2021).

While there is extensive research on financial factors for delisting, knowledge is limited in the context of developing economies. Emerging economies often experience higher economic volatility due to factors like political instability, fluctuating commodity prices, and variable exchange rates, creating an unpredictable business environment (Kola et al., 2022). This unpredictability challenges companies' ability to maintain consistent financial performance and adhere to regulatory requirements, highlighting the need for further exploration of delisting factors in developing economies.

Academic research often overlooks the integration of non-financial and macroeconomic factors with financial factors when studying delisting decisions. Non-financial factors, such as corporate governance practices, regulatory compliance, and company reputation, play critical roles (Thomsen & Vinten, 2014). Macroeconomic factors, such as inflation, interest rates, credit extensions, unemployment rates, and real economic activity, significantly influence the broader economic environment in which companies operate (Bonfim, 2009). Consequently, these factors can directly impact financial and non-financial variables, shaping a company's performance and market behavior. Understanding the interplay between financial, non-financial, and macroeconomic factors is thus crucial for a comprehensive analysis of delisting decisions, furthering the academic debate on delistings from stock exchanges.

The JSE, one of Africa's leading stock exchanges, plays a pivotal role in South Africa's economic landscape by providing a platform for companies to raise capital and for investors to trade stocks (Wesson et al., 2014). The JSE is crucial for attracting domestic and foreign investment, fostering economic growth, and developing the country's financial infrastructure (Ferreira et al., 2019). Like other stock exchanges, the JSE reflects broader economic conditions, investor sentiment, and business confidence. Strong market performance signals economic growth and stability, while a declining market can indicate underlying economic challenges (WFE, 2017).

Delisting is a global phenomenon affecting stock exchanges worldwide (Hu et al., 2019). Companies delist for various reasons, including regulatory challenges, financial performance, and market conditions (Martinez & Serve, 2017). However, the JSE experiences unique challenges due to its status within a developing economy, such as higher economic volatility, affecting investor confidence and market dynamics. Regulatory changes in South Africa can introduce uncertainty for companies listed. Although regulatory frameworks are essential for maintaining market integrity and protecting investor interests, frequent changes or complex compliance requirements can burden companies, particularly smaller firms with limited resources, potentially driving them to delist to reduce costs and administrative complexities (Magni et al., 2021).

Given the critical role of the JSE in South Africa’s financial system and the potential repercussions of delisting, this paper explores the extent to which a combination of financial, non-financial, and macroeconomic factors influence the likelihood of delisting. Using a multivariate panel probit regression model, our research identifies key factors that significantly impact delisting decisions and serve as potential early warning signals preempting delisting. The results highlight the importance of maintaining robust financial health, strong governance practices, and adapting to macroeconomic conditions to mitigate the risk of delisting.

Consequently, our research contributes to a comprehensive understanding of the financial, non-financial, and macroeconomic factors potentially driving delisting decisions, offering valuable insights for companies, stock exchanges, and policymakers. This also presents an opportunity for

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further academic research by utilizing the models discussed in this paper within the context of other developing economies.

This paper is structured as follows. First, we provide an overview of the related literature to synthesize the financial, non-financial, and macroeconomic variables used to study delisting decisions. Secondly, we provide the methodology and sample to conduct the study. Third, we discuss the results from the multivariate panel probit regression to predict delisting probability. Lastly, we conclude and provide some recommendations and areas for further research.

2. Review of Literature

In this section, we identify and discuss the financial, non-financial and macroeconomic factors used to study the delisting decision.

2.1. Financial Factors

Financial factors are crucial for a company's delisting decision (Chaplinsky & Ramchand, 2012). High leverage, indicated by the debt-to-equity ratio (D/E), suggests a riskier capital structure, thereby increasing the likelihood of delisting (Brav, 2009). Companies with low market-to-book ratios (M/B) and insufficient capital expenditure (CAPEX) relative to sales (CAPEX-to-Sales) also experience higher delisting risks (Croci & Giudice, 2014). These variables are essential for assessing financial health and stability when studying delisting decisions. Specific financial variables include the assets-to-equity (A/E) ratio, which measures the proportion of a company's assets financed by shareholders' equity (Choi & Wang, 2021). The debt-to-assets (D/A) ratio indicates the extent of a company's assets financed by debt. Book value per share (BVPS) represents the net asset value per share and is a key indicator of a company's intrinsic value. Total debt per share (TDPS) calculates the company's debt on a per-share basis. The long-term debt to total capital ratio (LT_D:Total capital) assesses the proportion of a company's long-term debt relative to its overall capital structure. The cost of debt represents the effective rate a company pays on its borrowed funds. Finally, the weighted average cost of capital (WACC) is the average rate of return a company is expected to pay its security holders, weighted by the proportion of each component of the capital structure (Bakke et al., 2012; Benny & Hutagaol, 2013; Chaplinsky & Ramchand, 2012).

Agency conflicts, particularly those involving free cash flow (FCF), are common in companies with limited growth opportunities (Jensen, 1986). High FCF can result in inefficient use of resources and potential value loss for shareholders (Farrell et al., 2013). Delisting can address these issues by requiring managers to distribute excess FCF as dividends, thereby enhancing shareholder value (Bessler et al., 2012). When considering the agency or FCF problem as a factor in studying delisting decisions, several key variables are relevant. These includeFCF, which represents the cash generated after accounting for capital expenditures. FCF per share (FCFPS) calculates free cash flow on a per-share basis. Cash flow per share (CFPS) indicates the net cash flow on a per-share basis. Return on assets (ROA) measures a company's profitability relative to its total assets, while return on fixed assets (RoFA) evaluates the profitability of a company's fixed assets. Return on invested capital (ROIC) measures the return generated on all capital invested in the business. The reinvestment rate (RiR) indicates the proportion of earnings reinvested in the business (Griffin et al., 2010; Opler & Titman, 1993; Wahyuni, 2021).

The likelihood of delisting is also influenced by company growth, financial distress, and information asymmetry. Companies with lower growth opportunities, measured by Tobin's Q ratio, are more prone to delist. The Q ratio indicates the market value of a company's assets relative to their replacement cost (Thomsen & Vinten, 2014). High compliance costs, calculated as the sum of external audit and listing fees divided by sales (EAR), further affect these decisions (Griffin et al., 2010). When considering company growth as a factor in delisting decisions, various variables are important. These include the ratio of research and development (R&D) costs to sales (R&D:Sales), which reflects the proportion of sales revenue invested in R&D activities. R&D to assets ratio (R&D:Assets) measures the investment in R&D relative to the company's total assets. Sales growth (S/G) indicates the increase

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in sales revenue over time, while assets growth (A/G) assesses the increase in total assets (Weir et al., 2005, 2008; Weir & Wright, 2006).

Additionally, financial distress reduces the value of growth opportunities, making delisting more likely for companies with low growth (Myers, 1984). Variables such as the operating cash flow (OCF) margin, calculated as the cash generated from operations as a percentage of sales, and the cash flow to debt ratio, indicating the company's ability to cover its debt with operating cash flow, can help identify financial distress risks (Campbell et al., 2008). Smaller companies, relying heavily on tangible assets and with limited access to capital, are particularly vulnerable (Opler & Titman, 1993).

Furthermore, information asymmetry causes decision-making failures due to imbalances between parties (Thompson & Kim, 2020). Consequently, companies experiencing high information asymmetry are more inclined to delist to avoid adverse selection costs (Bharath & Dittmar, 2010). Variables like the intangibility ratio (I/R), calculated as the proportion of intangible assets to total assets, and underpricing on the first day of the IPO, measured by the initial underestimation of the company's value, highlight these issues, making them crucial for analyzing delisting risks (Zheng et al., 2005).

Delisting decisions are also influenced by company size, financial visibility, liquidity, and profitability. Larger companies can better absorb compliance costs, making delisting less likely, whereas smaller companies with high intangible assets experience financial constraints, increasing their likelihood of delisting (Hostak et al., 2013). Key variables related to company size include revenue, which measures the total income generated by the company, market value, which represents the company's total market capitalization, and assets, which indicate the total resources owned by the company (Jiang & Wang, 2008; Kashefi Pour & Lasfer, 2013; Ljungqvist et al., 2006).

Companies with high share volatility and low share turnover are at higher delisting risks due to lower financial visibility (Mehran & Peristiani, 2010). A misalignment between the cost of equity (expected return) and the actual return on equity can result in lower share valuations, thereby increasing delisting risks (Reiter, 2021). The actual return (cost of equity) is calculated as the return required by investors based on the risk of the company's equity. The difference in return measures the ‘gap’ between the expected return and the actual return achieved by the company (Weir et al., 2008).

Liquidity, measured by variables such as the current ratio, which assesses a company's ability to meet its short-term obligations with its current assets, and the quick ratio, which indicates a company's ability to pay off its short-term liabilities using its most liquid assets, is crucial for investor confidence. Companies with lower liquidity are more likely to delist due to increased trading costs and decreased investor interest (Sara et al., 2016).

Profitability also plays a critical role in a company's survival on a stock exchange. Companies with lower profitability, measured by net profit margin (NPM), operating margin, pre-tax margin, asset turnover (AT) ratio, and sales to total assets ratio, are more likely to delist (Khan et al., 2011). NPM indicates the percentage of revenue remaining after all expenses, while operating margin measures the proportion of revenue left after operating expenses. Pre-tax margin shows profitability before taxes. The AT ratio evaluates how efficiently a company uses its assets to generate sales, and the sales to total assets ratio assesses the company's ability to generate revenue from its total assets. Conversely, larger, more profitable companies with higher trading volumes have a higher likelihood of remaining listed (Croci & Giudice, 2014).

2.2. Non-Financial Factors

Corporate governance, regulatory compliance, and company reputation play a significant role in delisting decisions (Thomsen & Vinten, 2014). Poor governance can increase the likelihood of delisting by failing to protect shareholders and ensure transparency (Konno & Itoh, 2018). Governance quality is assessed through variables such as Chief Executive Officer (CEO) duality, board size, composition, and meeting frequency (Dwivedi & Jain, 2005; Hostak et al., 2013; Ning et al., 2010).

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The board of directors is crucial in aligning daily operations with strategic goals (Charitou et al., 2007). CEO duality, where the CEO also chairs the board, is contentious and linked to financial distress, potentially increasing delisting risk (Z. Li et al., 2021). In the South African context, the King IV Report on Corporate Governance (King IV) advises against CEO duality unless a lead independent director is present (IoDSA, 2016).

Independent, non-executive directors provide unbiased perspectives, enhancing governance quality and potentially reducing delisting likelihood (Fich & Slezak, 2008). Frequent CEO changes, measured by the number of years a person serves as CEO, can destabilize management and reduce profitability, thereby increasing delisting likelihood (Hwang et al., 2014). Additionally, stability in CEO tenure is critical in assessing delisting risk. Key variables include CEO status, tenure, and the presence of a lead independent director (Armstrong et al., 2012; Gilson & Vetsuypens, 1993).

Board composition influences delisting decisions. While independent directors can improve decision-making, they also increase agency costs, potentially raising delisting probability (Weir et al., 2005). Key variables to consider include the proportion of executive to non-executive directors, the number of independent non-executive directors, and whether the chairperson is independent (Hillman & Dalziel, 2003; Salloum et al., 2013). The percentage of independent board members (Independent BOD member %), whether the chair is an independent non-executive director, and the governance disclosure score, which assesses the transparency and quality of governance disclosures, are essential metrics for evaluating board composition (Waweru, 2014).

Board size is also important. Smaller boards may be more efficient, but larger boards can enhance oversight and reduce delisting risk for diverse companies (Darrat et al., 2016). Key variables include the total number of directors, the number of board of directors (BOD) changes, and the percentage change in BOD members (Liao, 2020; Malik et al., 2014).

The board, adhering to the Companies Act No. 71 of 2008 (Companies Act) and the King IV Report, fulfills fiduciary duties and impacts delisting likelihood (Macey & O'Hara, 2002). Frequent board meetings are often associated with higher delisting likelihood due to increased monitoring of 'troubled' companies (Cheng et al., 2010). Key variables include the number of board meetings and the percentage of members attending board meetings, suggesting that frequent meetings and high attendance rates may signal potential delisting risks (Chou et al., 2013).

Agency theory emphasizes the alignment of interests between managers (agents) and shareholders (principals) to minimize conflicts related to delisting, particularly in companies with dispersed ownership where these conflicts are more prevalent (Renneboog et al., 2007). In such scenarios, executives may not align with shareholders, resulting in increased shareholder activism (Croci & Giudice, 2014). South Africa's Companies Act mandates that board members be appointed by shareholders to ensure alignment (IoDSA, 2016). Executive compensation packages, including share options and performance-based bonuses, align managers' interests with shareholders' (Taj, 2016). Insider ownership and concentration also affect delisting decisions; managers with substantial stakes have fewer interest realignment issues (Kashefi Pour, 2015). Directors with significant shareholding may choose to delist to protect their control (Djerbi & Anis, 2015). A key variable for insider ownership is the percentage of non-public shareholders (Non-public shareholder %).

Institutional investors can also impact delisting decisions. Increased monitoring by institutional investors reduces conflicts, thereby lowering delisting likelihood (Vismara et al., 2012). Conversely, fewer institutional investors on the board or in ownership concentration increase the likelihood of delisting (Bharath & Dittmar, 2010). The presence of institutional investors enhances financial visibility, reducing information asymmetry and adverse selection costs (Bancel & Mittoo, 2009). A key variable for the presence of institutional investors is the percentage of institutional investors (% institutional investors).

Frequent changes in major shareholders can also increase delisting likelihood due to heightened conflicts (Hwang et al., 2014). Lower institutional shareholding in financially distressed companies suggests a negative link between institutional ownership and its impact on delisting decisions (Ting et al., 2008). Directors appointed by pressure-resistant institutional investors reduce the likelihood of

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business failure, influencing delisting decisions (Sallehuddin et al., 2019). Key variables for changes in major shareholders include the percentage change in non-public shareholders (% change in non-public shareholders) and the percentage change in institutional investors (% change in institutional investors).

Free float, defined as the number of outstanding shares owned by public investors excluding locked-in shares held by insiders, is crucial for delisting (Pagano et al., 1998). Companies with higher free float may experience complications in the delisting approval process, while those with lower free float are more likely to delist due to lower market share acquisition costs (Sara et al., 2016). Key variables for diffused ownership include the percentage of public shareholders (Public shareholder %) and the percentage of individual investors (Individual investor %) (Croci & Giudice, 2014).

Board member compensation, including salary, bonuses, and share options, incentivizes executives to act in the best interests of the company and its shareholders (Cyert et al., 2002). Compensation reflects both human resources costs and incentives for profit pursuit. Research shows that in financially distressed companies, many CEOs were replaced or paid less, highlighting compensation as a variable in predicting financial distress and delisting (Gilson & Vetsuypens, 1993). Higher administrative expense ratios increase the probability of financial distress and delisting (Sanger & Peterson, 1990). Conversely, CEO compensation, including base salary, equity, and discretionary compensation, is negatively associated with default risk (Chaplinsky & Ramchand, 2012). Excessive executive remuneration is negatively associated with accounting performance, indicating an agency problem (Basu et al., 2007). Key variables for management compensation include directors' remuneration as a percentage of sales (Directors' remuneration:Sales) and directors' remuneration as a percentage of assets (Directors' remuneration:Assets).

Donker et al. (2009) incorporated directors' biographic information into prediction models, focusing on workload, nationality, dependency, interlinked directorships, age, and education. Wilson et al. (2014) emphasized networks, proximity, and involvement, showing significant associations between board characteristics and business survival, indirectly affecting delisting probabilities. Key variables for biographic information of board members include CEO remuneration to operating income, CEO remuneration to sales, CEO remuneration to net profit, number of other positions, whether the chairperson has other positions, CEO has a postgraduate qualification, CEO has a professional qualification, chair has a postgraduate qualification, chair has a professional qualification, and the age of the CEO in the year of delisting (Hsu & Wu, 2014; H. X. Li et al., 2008; Salloum et al., 2013). Female directors, associated with better cash flow and less debt, reduce insolvency likelihood (Hsu & Wu, 2014). Male directors tend to take more risks, while females are more conservative, impacting FCF (Salloum et al., 2013). Higher education, particularly a Master of Business Administration (MBA), potentially affects board quality and delisting decisions (Djerbi & Anis, 2015).

Market activity, as it relates to analyst coverage, also influences delisting decisions. Higher market index levels, used as a proxy for market activity, suggest lower investor standards (Ljungqvist et al., 2006). Carpentier & Suret (2011) utilized a binary variable, while Demers & Joost (2007) and Ahmad & Jelic (2014) included the average underpricing of IPOs. Despite using different proxies, literature indicates that companies with lower analyst coverage have shorter IPO survival rates and are more likely to delist due to lower trading volumes (Ioannou & Serafeim, 2015). Relevant variables related to analyst coverage include the number of recommendations for the company's shares by analysts (Number of analyst recommendations) and the annual average recommendations made by analysts.

2.3. Macroeconomic Factors

Macroeconomic factors such as inflation, interest rates, gross domestic product (GDP) growth, exchange rates, unemployment rates, and real economic activity play a crucial role in delisting decisions. High inflation increases business costs and financial distress, leading to higher delisting probabilities (Fedderke & Simkins, 2012). Increased interest rates raise borrowing costs, financially

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burdening leveraged companies (Del Negro et al., 2019). Positive GDP growth boosts investor confidence, whereas negative growth results in financial instability and higher delisting risks (Bonfim, 2009). Exchange rate volatility impacts international trade companies, increasing delisting risks (Chancharat et al., 2012). High unemployment decreases consumer spending and company revenues, heightening financial distress and delisting likelihood (Garcia & Liu, 1999). Real economic activity, such as electricity generation and distribution, influences productivity and economic performance, with unstable supply leading to financial distress and delisting (Mago & Olajuyin, 2022).

Financial factors, including leverage, cash flow efficiency, growth, and financial distress, are vital in understanding delisting risks. Efficient cash flow management improves market valuation, reduces capital costs, and enhances profitability and liquidity (Wahyuni, 2021). Growth and increased visibility attract investors and customers, boosting profitability (Diah & Putri, 2021). Improved profitability enhances liquidity, enabling companies to meet short-term obligations and invest in growth opportunities. This cyclical reinforcement of financial health and operational success reduces delisting likelihood (Makrominas & Yiannoulis, 2021).

However, macroeconomic variables significantly influence consumer behavior and demand (Bonfim, 2009). Economic prosperity increases disposable income and spending, while downturns reduce consumer confidence and spending, impacting company performance (Garcia & Liu, 1999). These changes affect key metrics such as ROA, ROE, analyst coverage, liquidity, competitiveness, growth, and FCF (Shrieves & Wachowicz, 2001).

Beyond financial metrics, macroeconomic conditions influence non-financial factors. Favorable economic conditions encourage innovation and market expansion, while downturns lead to cost management and operational efficiency (Habib et al., 2020). Fluctuations in raw material prices and exchange rates can disrupt supply chains and affect operational stability (Beorchia & Russell, 2020). Economic conditions also impact company reputation and regulatory compliance (Siegel, 2005).

In South Africa, load-shedding, which refers to the deliberate shutdown of electric power in parts of a power-distribution system to prevent the entire system from failing, significantly affects companies and the economy (Mago & Olajuyin, 2022). These power disruptions lead to production halts, increased operational costs, and revenue losses (Mago & Olajuyin, 2022). The manufacturing and mining sectors are particularly vulnerable to these disruptions. Load-shedding also disrupts supply chains, delaying the delivery of goods and services and causing economic ripple effects. Frequent load-shedding diverts resources from long-term planning to immediate survival, leading to governance lapses and increased delisting risks (Daily & Dalton, 2017). Monitoring electricity generation and distribution provides insights into broader economic health and potential challenges companies might face (Mago & Olajuyin, 2022).

3. Methodology and Sample

Delisting from stock exchanges significantly impacts corporations and financial markets (Kang, 2017). This paper addresses the limited research on delistings at the JSE by analyzing the influence of financial, non-financial, and macroeconomic variables on delisting decisions.

The research design involves a systematic literature review to identify relevant factors, followed by a quantitative methodology using a multivariate panel probit regression to model delisting probability. All statistical analyses were performed using Stata Statistical Software: Release 18, College Station, TX: StataCorp LLC.

Data was collected from Bloomberg and audited financial statements, covering delisted companies and those listed as a control group from 2000 to 2023. Economic data related to South Africa were sourced from the South African Reserve Bank. The sample includes 302 companies delisted from the JSE between 2010 and 2023 and 302 companies that remained listed as of 31 December 2023.

All companies delisted since 1 January 2000, were considered, but incomplete data before 2010 limited the observation period to 1 January 2010 to 31 December 2023, focusing on ordinary equity

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delistings. Of the 781 company ordinary shares delisted from 2000 to 2023, 312 delisted during the observation period. After excluding delistings of preference shares and other funds, the final sample comprised 302 companies delisted between 1 January 2010, and 31 December 2023, and 302 companies that remained listed as of 31 December 31, as the control group.

A multivariate panel probit regression analysis was utilized to model variables in panel data collected over multiple periods for the same entities, including companies delisted from the JSE and those listed as of 31 December 2023. The data spans from 2000 to 2023, with a focus on companies delisted between 2010 and 2023 and those still listed by the end of 2023. These variables are continuous and correspond to a binary outcome (delisted or remained listed) over the study period.

The panel probit regression accommodates cross-sectional and time-series variations to predict delisting probability (delisted (1) or remained listed (0)). This model evaluates the likelihood of a company delisting based on several continuous independent variables, including financial, non-financial, and macroeconomic variables. A random effects panel probit regression model was employed to predict delisting probability by comparing financial, non-financial, and macroeconomic variables of companies delisted between 2010 and 2023 with those that remained listed as of 31 December 2023.

The dependent variable in this study is the delisting of companies, defined as the removal of a company's ordinary shares from trading on the stock exchange (Martinez & Serve, 2017). The panel probit regression model also included companies that remained listed during the observation period to compare delisting determinants with delisted companies (control group). The 'delisted' and 'remained listed' categories were based on financial, non-financial, and macroeconomic variables. Independent variables included these financial, non-financial, and macroeconomic factors, treated as cross-sectional continuous data incorporating time series.

To predict the probability of delisting based on financial, non-financial, and macroeconomic variables for delisted companies and those still listed as of 31 December 2023, the independent variables were derived from a review of related literature. The model is specified by the following equation (Baltagi et al., 2016):

$$P(Y_{it} = 1|X_{it}, \alpha_i) = \phi(\beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \dots\dots + \beta_k X_{kit} + \alpha_i + \epsilon_{it}) \quad (1)$$

where $P(Y_{it} = 1|X_{it}, \alpha_i)$ is the probability that the dependent variable (binary outcome) (Y) (delisted) for the subject (i) (delisted vs. remained listed) equals one given the predictor (X_{it}) (continuous independent variables is the financial, non-financial and macroeconomic variables) and the random effect (α_i), ϕ is the cumulative distribution function of the standard normal distribution, Y_{it} is the dependent binary outcome (Y) indicating delisting for a subject (i) (company delisted vs. remained listed) at the time (t), X_{it} is the vector of independent variables (financial, non-financialand macroeconomic variables) to measure the probability of delisting (Y), β_0 is the intercept term that represents the baseline probability of the outcome (delisted) when all predictors (X_{it}) are zero, β_1, β_2 and β_k is the coefficients (estimated coefficients) for the independent variables X_{1it}, $X_{2it}$and X_{kit} (continuous independent variables consisting of financial, non-financial and macroeconomic variables) that indicates the z-score (standard normal deviation) change for a one-unit change in the predictors. Positive coefficients increase the probability of the outcome, while negative coefficients decrease the probability of the outcome (Olin & Greenberg, 1998), α_i is entity-specific deviation from the overall relationship, accounting for the unobserved heterogeneity (random effect capturing unobserved heterogeneity), and ϵ_{it} represents the idiosyncratic error.

Formulating the multivariate panel probit regression analysis involves modeling the latent variable (Y_{it}) as the probability of a company (i) delisting (dependent variable) over time (t). This is modeled as a linear function of explanatory variables (X_{it}), with individual-specific effects (α_i) and an error term (ϵ_{it}) to capture random noise (Mullahy, 2016). The random effects model accounts for company-specific effects and missing data points, providing insights into unique factors influencing delisting (Baltagi et al., 2016). This approach identifies differences in variables for delisted versus listed companies and predicts delisting probabilities.

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Maximum likelihood estimation was used to fit the model, with robust standard errors calculated. Model fit was assessed using Pseudo-R^2, and overall significance was determined by the Wald test (Mullahy, 2016). Significance levels of 1% ($p < 0.01$) and 5% ($p < 0.05$) were used to determine statistical significance, with 5% indicating a 5% risk of Type I error and 1% providing stronger evidence against the null hypothesis. A 95% confidence interval along with 1% and 5% significance levels ensures reliable and meaningful findings (Baltagi et al., 2016). A 10% significance level ($p < 0.10$) was excluded to maintain rigor and reliability (Mullahy, 2016).

4. Results and Discussion

In this section, we first discuss the significant factors influencing delisting identified from the initial multivariate panel probit regression model. We then refine the model using a stepwise elimination process to systematically remove insignificant variables. Finally, we present and discuss the results of the refined model, highlighting the key factors of delisting that could serve as early warning indicators.

4.1. Initial Model and Stepwise Refinement

Table 1 presents the comprehensive model incorporating 72 variables used in this study, encompassing financial, non-financial, and macroeconomic factors identified from the literature review. The analysis reveals several factors significantly impact delisting probability, with p-values less than 0.05. Some variables show even stronger significance with p-values below 0.001, underscoring their crucial role in predicting delisting. These results highlight the combined influence of financial, non-financial, and macroeconomic factors, providing a robust framework for understanding and mitigating delisting risk. To ensure robustness and reliability, a 10% p-value threshold was not used, thereby minimizing Type I errors (Baltagi et al., 2016).

Table 1. Initial Model Results of Significant Factors for Delisting.

Variable	Estimated Coefficient	Standard Error	p-Value	
Financial Variables				
1. A/E (Assets-to-Equity)	0.039	0.058	0.50	
2. D/A (Debt-to-Assets)	-0.11	0.06	0.057	
3. BVPS (Book value per share)	-0.12	0.06	0.040	*
4. TDPS (Total debt per share)	0.017	0.052	0.74	
5. Long-Term Debt:Total Capital	-0.016	0.087	0.85	
6. Cost of Debt	-0.012	0.048	0.80	
7. WACC	0.039	0.050	0.43	
8. FCF (Free cash flow)	-0.13	0.07	0.041	*
9. FCF per share (FCFPS)	-0.024	0.069	0.72	
10. CFPS (Cash flow per share)	0.00051	0.01058	0.96	
11. ROA (Return on Assets)	-0.23	0.09	<0.001	**
12. RoFA (Return on Fixed Assets)	-0.0014	0.0577	0.98	
13. ROIC (Return on Invested Capital)	-0.029	0.059	0.63	
14. RiR (Reinvestment Rate)	0.031	0.133	0.84	
15. R&D:Sales	0.029	0.069	0.67	
16. R&D:Assets	0.0029	0.0670	0.81	
17. Sales Growth (S/G)	0.0094	0.0483	0.85	
18. Assets Growth (A/G)	-0.0075	0.0118	0.53	
19. Q ratio	-0.17	0.05	<0.001	**
20. OCF Margin (Operating cash flow)	0.088	0.063	0.03	*
21. Cash flow to debt ratio	0.039	0.058	0.50	
22. Intangibility ratio (I/R)	-0.11	0.06	0.057	

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23. Underpricing on day one of the IPO	-0.12	0.06	0.040 *
24. L*n*(Revenue) (Natural logarithm)	-0.12	0.06	0.080
25. L*n*(Market Value) (Natural logarithm)	0.017	0.052	0.74
26. L*n*(Assets) (Natural logarithm)	-0.016	0.087	0.85
27. Actual Return (Cost of Equity)	-0.012	0.048	0.80
28. Difference in return (Actual return – Cost of Equity)	0.039	0.050	0.43
29. Current ratio	-0.13	0.07	0.092
Variable	**Estimated Coefficient**	**Standard Error**	**p-Value**
30. Quick ratio	-0.024	0.069	0.72
31. NPM (Net Profit Margin)	-0.0014	0.0577	0.98
32. Operating Margin	-0.23	0.09	<0.001 *
33. Pre-tax Margin	-0.029	0.059	0.63
34. AT ratio (Asset turnover)	0.029	0.069	0.67
35. Sales:Total Assets ratio	0.0029	0.0670	0.97
Non-Financial			
36. The company has a lead independent director	0.0094	0.0483	0.85
37. Number of years the CEO has been in the role	-0.0075	0.0118	0.53
38. Number of CEO changes in the study period	0.014	0.017	0.42
39. Percentage of executive directors	-0.0050	0.0410	0.90
40. Percentage of independent BOD members	-0.17	0.05	<0.001 **
41. The chair is an independent, non-executive director	0.015	0.035	0.67
42. Bloomberg governance disclosure score	-0.072	0.062	0.031 **
43. Total number of directors	-4.6	3.1	0.14
44. Number of BOD changes	-3.3	2.2	0.14
45. Number of board meetings	-3.2	2.2	0.15
46. Percentage of members attending board meetings	0.0042	0.0568	0.94
47. Percentage public shareholders	0.062	0.057	0.28
48. Percentage individual investors	-0.10	0.07	0.14
49. Percentage non-public shareholder	-0.011	0.06	0.21
50. Percentage institutional investors	-0.058	0.048	0.23
51. Percentage change in non-public shareholders	0.013	0.050	0.80
52. Percentage change in institutional investors	0.083	0.041	0.041 *
53. Directors' Remuneration:Sales	0.057	0.042	0.18
54. Directors' Remuneration:Assets	-0.16	0.05	0.61
55. CEO remuneration to Operating Income	-0.24	0.06	0.71
56. CEO Remuneration to Sales	-0.0050	0.0410	0.90
57. CEO Remuneration to Net Profit	0.015	0.035	0.67
58. The number of other positions held by chairperson	-0.072	0.062	0.24
59. The CEO has a postgraduate qualification	-4.6	3.1	0.14
60. The CEO has a professional qualification	-3.3	2.2	0.14
61. Chair has a postgraduate qualification	-3.2	2.2	0.15
62. Chair has a professional qualification	0.0042	0.0568	0.94
63. Age of CEO in the year of delisting	0.062	0.057	0.28
64. Number of analyst recommendations	-0.17	0.05	<0.001 **
Macroeconomic			
65. Gross Domestic Product (GDP)	0.0061	0.0172	0.081
66. Inflation (CPI)	-0.12	0.08	0.087
67. Exchange Rates	0.015	0.006	0.25

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68. Repo Rate	0.035	0.009	<0.001 *
69. Credit Extensions	-0.081	0.035	0.091
70. Unemployment Rate	0.041	0.019	0.074
71. Oil Price	0.027	0.0031	0.65
72. Electricity Generation and Distribution	-0.84	0.051	0.076

[1] Table 1 provides the results of the initial multivariate panel probit regression analysis. It lists the financial, non-financial, and macroeconomic variables used in the model, along with their estimated coefficients, standard errors, and p-values. The table highlights which variables are significant in predicting the likelihood of delisting, with a focus on those that reached statistical significance at the 5% (**) and 1% (*) levels.

To identify the factors that can predict delisting, the initial multivariate panel probit regression model demonstrates strong explanatory power, with a Pseudo-R^2 value of 0.86 (see Table 2). This indicates that the model accounts for approximately 86% of the variability in delisting probability (Mullahy, 2016). Additionally, the Wald chi-square statistic of 288.26, with a p-value of less than 0.001, confirms the combined relevance of the predictors included in the model (Baltagi et al., 2016).

Table 2. Initial Model Fit and Significance.

Description	Model Fit	Overall Significance of Model
Pseudo-R^2	0.86	-
Wald chi-squared	-	288.26
p-value for Wald test	-	<0.001

[1] This table shows the model fit and significance metrics for the initial multivariate panel probit regression model predicting delisting determinants. It includes the Pseudo-R^2 value (explanatory power), the Wald chi-squared statistic (overall model significance), and the Wald test p-value (combined predictor relevance).

The initial multivariate panel probit regression model identified several significant variables influencing delisting probability. Among the financial variables, higher Book Value Per Share (BVPS) with a coefficient of -0.12 and a p-value of 0.040 indicates that companies with greater BVPS are less likely to be delisted (see Table 1). This suggests that financial stability, as reflected in higher book value, plays a crucial role in reducing delisting risk. Similarly, Free Cash Flow (FCF) with a coefficient of -0.13 and a p-value of 0.041, and Return on Assets (ROA) with a coefficient of -0.23 and a p-value of less than 0.001, emphasize the importance of liquidity and efficient asset utilization in maintaining a company's market presence. Additionally, the Q ratio, with a coefficient of -0.17 and a p-value of less than 0.001, and the Operating Cash Flow (OCF) Margin, with a coefficient of 0.088 and a p-value of 0.03, reveal that better market valuation and higher operational efficiency respectively impact the probability of delisting. The initial underpricing on the day of the IPO, with a coefficient of -0.12 and a p-value of 0.040, and the Operating Margin, with a coefficient of -0.23 and a p-value of less than 0.001, further suggest that initial market confidence and sustained profitability are crucial in reducing delisting risks.

In terms of non-financial variables, the percentage of independent board members, with a coefficient of -0.17 and a p-value of less than 0.001, and the Bloomberg governance disclosure score, with a coefficient of -0.072 and a p-value of 0.031, point to stronger governance practices as being essential for company stability. Interestingly, an increase in the percentage change of institutional investors, with a coefficient of 0.083 and a p-value of 0.041, surprisingly increases the delisting probability, hinting at possible shifts in investor sentiment. The number of analyst recommendations, with a coefficient of -0.17 and a p-value of less than 0.001, indicates that a positive market analyst outlook can lower the risk of delisting.

Among the macroeconomic variables, the repo rate, with a coefficient of 0.035 and a p-value of less than 0.001, significantly raises the delisting probability, likely due to the increased financial stress from higher borrowing costs.

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Some variables in our model were not significant but have been found significant in other studies. For instance, the Debt-to-Assets ratio (D/A), with a coefficient of -0.11 and a p-value of 0.057, suggests that higher debt levels may marginally decrease the likelihood of delisting. This is in contrast to some research indicating that higher leverage increases financial risk, potentially leading to delisting. Additionally, the natural logarithm of Revenue (Ln(Revenue)), with a coefficient of -0.12 and a p-value of 0.080, was close to significance, indicating that higher revenue could potentially influence delisting likelihood. Previous studies have suggested that larger firms with higher revenues are less likely to be delisted due to greater market presence and stability. Furthermore, the Inflation (CPI) variable, with a coefficient of -0.12 and a p-value of 0.087, was marginally close to significance, aligning with some research that highlights how inflation can impact company performance and delisting probabilities.

To refine the multivariate model, a stepwise elimination process was undertaken following the initial analysis. This involved systematically removing the least significant variable and re-running the regression analysis repeatedly until only statistically significant variables remained. This iterative process of exclusion was chosen for its ability to enhance model precision while maintaining its overall integrity. Each iteration involved careful evaluation of variable significance, ensuring that only the most impactful predictors were retained. To validate the robustness of the refined model, cross-validation techniques were applied, which confirmed the consistency and reliability of the results (Mullahy, 2016). This thorough and methodical approach not only streamlined the model but also emphasized the key factors, thereby improving both predictive accuracy and interpretability.

4.2. Final Model

The final multivariate panel probit regression model, after stepwise elimination, identified several significant predictors of delisting. Compared to the initial model (see Table 1), this refined model includes more variables, increasing from 22 significant variables in the initial model (see Table 1) to 31 in the final model, thereby providing a more comprehensive understanding of the factors influencing delisting. The final results are shown in Table 3.

Table 3. Final Model Results of Significant Factors for Delisting.

Variable	Estimated Coefficient	Standard Error	p-Value
Financial Variables			
1. A/E (Assets-to-Equity)	-0.08	0.018	<0.001*
2. D/A (Debt-to-Assets)	-0.19	0.018	0.035 **
3. BVPS (Book value per share)	-0.17	0.09	<0.001*
4. Cost of Debt	-0.09	0.078	0.021 **
5. WACC	0.051	0.071	0.011 **
6. FCF per share (FCFPS)	-0.041	0.018	<0.001*
7. ROA (Return on Assets)	-0.06	0.12	<0.001*
8. RiR (Reinvestment Rate)	0.017	0.247	0.029 **
9. Sales Growth (S/G)	0.0088	0.0143	<0.001*
10. Q ratio	-0.16	0.08	<0.001**
11. Underpricing on day one of the IPO	-0.16	0.09	0.031 *
12. Current ratio	-0.11	0.04	<0.001*
13. NPM (Net Profit Margin)	-0.017	0.011	0.046 **
Non-Financial			
14. The company has a lead independent director	0.061	0.062	0.039 **
15. Number of years the CEO has been in the role	-0.061	0.028	0.031 **
16. Percentage of independent BOD members	-0.08	0.04	<0.001**

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17. Bloomberg governance disclosure score	-0.042	0.031	0.023 **
18. Number of BOD changes	-0.12	0.07	0.018 **
19. Percentage public shareholders	0.042	0.067	<0.001*
20. Percentage institutional investors	-0.042	0.062	<0.001*
Variable	**Estimated Coefficient**	**Standard Error**	**p-Value**
21. Percentage change in non-public shareholders	0.08	0.030	0.034 **
22. Percentage change in institutional investors	0.093	0.021	0.011 *
23. The CEO has a professional qualification	-0.018	0.058	0.046 **
24. Age of CEO in the year of delisting	0.032	0.017	0.031 **
25. Number of analyst recommendations	-0.18	0.03	<0.001**
Macroeconomic			
26. Gross Domestic Product (GDP)	0.0041	0.0812	0.029 *
27. Inflation (CPI)	-0.11	0.04	0.027 **
28. Repo Rate	0.035	0.009	<0.001*
29. Credit Extensions	-0.041	0.012	0.033 **
30. Unemployment Rate	0.062	0.017	<0.001*
31. Electricity Generation and Distribution	-0.12	0.16	<0.001*

[1] Table 3 provides the results of the final multivariate panel probit regression analysis. It lists the financial, non-financial, and macroeconomic variables used in the model, along with their estimated coefficients, standard errors, and p-values. The table highlights which variables are significant in predicting the likelihood of delisting, with a focus on those that reached statistical significance at the 5% (**) and 1% (*) levels.

The final multivariate panel probit regression model demonstrates strong explanatory power with a Pseudo-R^2 value of 0.79, indicating that the model accounts for approximately 79% of the variability in delisting probability (see Table 4). This reflects the enhanced accuracy of the refined model.

Additionally, the Wald chi-square statistic for the final model is 318.31, with a p-value of less than 0.001. This confirms the combined relevance of the predictors included in the final model and indicates a strong overall model significance (Mullahy, 2016). The improvement in the Wald chi-square statistic from the initial model's 288.26 further underscores the robustness of the final model (Baltagi et al., 2016).

Table 4. Initial Model Fit and Significance.

Description	Model Fit	Overall Significance of Model
Pseudo-R^2	0.79	-
Wald chi-squared	-	318.31
p-value for Wald test	-	<0.001

[1] This table shows the model fit and significance metrics for the initial multivariate panel probit regression model predicting delisting determinants. It includes the Pseudo-R^2 value (explanatory power), the Wald chi-squared statistic (overall model significance), and the Wald test p-value (combined predictor relevance).

4.2.1. Financial Variables Predicting Delisting

Financial health stands as a critical factor in assessing delisting risk. The negative coefficients for the Assets-to-Equity ratio (A/E) (-0.08, p-value: <0.001) and Debt-to-Assets ratio (D/A) (-0.19, p-value: 0.035) suggest that firms with higher financial leverage are less likely to pursue delisting (see Table 3). This observation is consistent with the capital structure theory proposed by Modigliani & Miller (1958), emphasizing the benefits of leveraging to optimize capital costs. Higher financial leverage indicates that firms are effectively using debt to enhance their returns, thereby mitigating the risk of

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financial distress and subsequent delisting. These insights offer valuable perspectives for financial scholars studying capital structure dynamics, highlighting how strategic leverage management can balance benefits and risks.

The importance of maintaining a robust financial position is underscored by the negative coefficients for Book Value Per Share (BVPS) (-0.17, p-value: <0.001) and Free Cash Flow per Share (FCFPS) (-0.041, p-value: <0.001). These findings correspond with the pecking order theory Myers (1984), which posits that firms prioritize internal financing to avoid the risks associated with external financing. Firms with higher BVPS and FCFPS are likely to have stronger financial and liquidity positions, reducing their vulnerability to delisting. This reflects the findings of Bharath & Dittmar (2010) and adds to the literature on financial stability's role in reducing delisting risk, providing new insights into the relationship between internal financing and firm stability.

Further emphasizing financial stability, the Cost of Debt (-0.09, p-value: 0.021) and Weighted Average Cost of Capital (WACC) (0.051, p-value: 0.011) coefficients highlight the importance of managing financing costs (see Table 3). Lower costs of debt enable firms to secure financing on favorable terms, enhancing financial stability and reducing delisting risk. Conversely, a higher WACC suggests that increased overall capital costs could heighten delisting risk, reflecting the higher returns required by investors. This finding resonates with the trade-off theory of capital structure (Brav, 2009) and introduces new perspectives on how firms should manage their cost of capital to minimize delisting probabilities. Additionally, the relationship between financing costs and delisting risk can be linked to information asymmetry and adverse selection problems, where higher costs might signal increased risk to investors, leading to increased scrutiny and potential delisting (Leland & Pyle, 1977). These insights can further inform academic research on the implications of financing costs for firm stability.

Growth strategies and their associated risks are evident in the positive coefficients for Reinvestment Rate (RiR) (0.017, p-value: 0.029) and Sales Growth (S/G) (0.0088, p-value: <0.001). While higher sales growth may indicate robust market demand and revenue generation, higher reinvestment rates could reflect aggressive expansion strategies that increase financial risk. These findings underscore the need for balanced growth strategies, where firms manage growth ambitions without overextending their resources. This balance is crucial for maintaining financial stability and reducing delisting risk, aligning with the conclusion of Diah & Putri (2021) that firms with higher growth rates may experience increased risks if not managed properly. This underscores the importance of strategic growth management, contributing to the literature on corporate growth strategies and their implications for firm stability. The relationship between company growth and delisting risk also relates to the agency or FCF problem, where managers might pursue growth opportunities that do not maximize shareholder value, increasing delisting risk (Jensen, 1986). These insights can aid academics in understanding the nuanced relationship between growth strategies and delisting risks.

Market valuation and initial market confidence play critical roles in mitigating delisting risk, as indicated by the negative coefficients for the Q ratio (-0.16, p-value: <0.001) and initial IPO underpricing (-0.16, p-value: 0.031) (see Table 3). Higher Q ratios suggest favorable market valuation, signaling strong future prospects. Similarly, initial IPO underpricing can attract investor interest and confidence, reducing the likelihood of delisting. These findings are in line with signaling theory Connelly et al. (2011), which posits that firms can convey their quality to the market through strategic financial decisions. Furthermore, these indicators reflect the company's visibility in the market, as firms with higher Q ratios and successful IPOs are likely to attract attention and support from investors, reducing delisting risk. Interestingly, both the Q ratio and IPO underpricing emerged as significant variables in the initial model (see Tabel 1). These insights provide a deeper understanding for researchers on how market valuation and investor confidence can impact firm stability when studying delistings.

The importance of liquidity and profitability in maintaining financial stability and reducing delisting risk is further emphasized by the negative coefficients for the Current Ratio (-0.11, p-value:

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<0.001), Net Profit Margin (NPM) (-0.017, p-value: 0.046), and Return on Assets (ROA) (-0.045, p-value: 0.014). Firms with higher current ratios, NPMs, and ROA are better positioned to meet short-term obligations, generate sustainable profits, and effectively utilize their assets, enhancing their resilience against delisting pressures. This is consistent with Intrisano et al. (2020), who found that firms with better post-IPO performance and higher profitability are less likely to be delisted. The relationship between liquidity, profitability, and delisting risk can also be linked to access to capital, as financially stable firms are more likely to attract investment and secure financing, reducing their delisting risk. These findings contribute to the academic discourse on the crucial role of financial health indicators in predicting firm stability and delisting risks, offering new insights into the protective effects of liquidity and profitability.

4.2.2. Non-Financial Variable Predicting Delisting

Governance and executive factors play crucial roles in mitigating delisting risk. The presence of a lead independent director (0.061, p-value: 0.039), the number of years the CEO has been in the role (-0.061, p-value: 0.031), and the percentage of independent board members (-0.08, p-value: <0.001) highlight the importance of strong governance practices in reducing delisting risk (see Table 3). These findings are consistent with agency theory (Jensen & Meckling, 1976), emphasizing the importance of mitigating agency conflicts through effective governance structures. Strong governance practices enhance managerial accountability, transparency, and strategic decision-making, thereby reducing the risk of delisting. This provides new insights into how firms can implement governance strategies to improve stability.

Higher Bloomberg governance disclosure scores (-0.042, p-value: 0.023) and changes in the board of directors (BOD) (-0.12, p-value: 0.018) further underscore the value of transparency and board dynamics. These factors indicate a commitment to transparent reporting and ethical practices, enhancing investor confidence and reducing delisting risk. Changes in the BOD can bring fresh perspectives and expertise to the firm, improving its strategic direction and stability. These findings align with Hillman & Dalziel (2003), who noted that strong governance practices are associated with better firm performance and lower delisting risk. These insights contribute valuable knowledge to the literature on corporate governance and its impact on firm stability.

The composition of shareholders also significantly impacts delisting risk. The coefficients for the percentage of public shareholders (0.042, p-value: <0.001) and the percentage of institutional investors (-0.042, p-value: <0.001) indicate that a diverse shareholder base, including public and institutional investors, can provide valuable insights and support, thereby reducing delisting risk (see Table 3). The presence of institutional investors is particularly noteworthy, as they often bring not only capital but also expertise and oversight, contributing to stronger corporate governance and stability (Ioannou & Serafeim, 2015). The percentage change in non-public shareholders (0.08, p-value: 0.034) and the percentage change in institutional investors (0.093, p-value: 0.011) suggest that changes in shareholder composition can influence delisting risk. Diffused ownership and control can mitigate delisting risk by ensuring no single shareholder dominates decisions that might not be in the firm's best interest. These findings are consistent with stakeholder theory (Mahajan et al., 2023), which emphasizes the importance of balancing various stakeholders' interests to ensure corporate stability. This provides new insights into how shareholder composition and governance structures can interact to influence firm stability and delisting risk.

The influence of executive attributes and market perceptions on delisting risk is underscored by the coefficients for the CEO's professional qualifications (-0.018, p-value: 0.046) and age (0.032, p-value: 0.031), along with the number of analyst recommendations (-0.18, p-value: <0.001). These factors resonate with upper echelons theory (Hambrick & Mason, 1984), which posits that organizational outcomes are influenced by top executives' characteristics. Firms led by experienced and qualified CEOs are likely to make better strategic decisions, reducing delisting risk. Positive analyst recommendations can enhance market confidence and support the firm's stability. These results are consistent with (Ioannou & Serafeim, 2015) findings, which associate institutional

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ownership and strong managerial attributes with better firm performance. These insights add to the growing body of literature on the impact of leadership and market perceptions on firm stability, providing new perspectives for academic research.

4.2.3. Macroeconomic Variables Predicting Delisting

The analysis of macroeconomic variables reveals several significant factors that could influence delisting risk. The coefficient for GDP (0.0041, p-value: 0.029) suggests that higher GDP might be associated with a slight increase in delisting risk (see Table 3). This could indicate that during periods of strong economic growth, competition intensifies, making it challenging for some firms to sustain their market position. Such economic environments may pressure firms to grow rapidly, potentially leading to mismanagement and financial instability, as observed with financial variables like Sales Growth (S/G) (0.0088, p-value: <0.001).

Conversely, the negative coefficient for Inflation (CPI) (-0.11, p-value: 0.027) implies that higher inflation might be linked to a reduced delisting risk. In an inflationary environment, firms may pass on higher costs to consumers, enhancing their revenue streams and maintaining financial stability. This aligns with the observation that firms with better profitability and stronger balance sheets, indicated by NPM (-0.017, p-value: 0.046) and BVPS (-0.17, p-value: <0.001), are less vulnerable to delisting.

The positive coefficient for the Repo Rate (0.035, p-value: <0.001) highlights that higher repo rates might be associated with increased delisting risk. Higher borrowing costs could strain a firm's financial resources, emphasizing the importance of managing financing costs to mitigate delisting risk. This connection is evident with financial variables such as the Cost of Debt (-0.09, p-value: 0.021), where lower financing costs contribute to financial stability.

Additionally, the negative coefficient for Credit Extensions (-0.041, p-value: 0.033) suggests that increased credit availability could reduce delisting risk. Access to credit provides firms with the necessary funds to navigate financial challenges, enhancing their financial stability. This is consistent with the idea that firms effectively leveraging debt, indicated by the A/E (-0.08, p-value: <0.001) and D/A (-0.19, p-value: 0.035), can mitigate the risk of financial distress and subsequent delisting.

The positive coefficient for the Unemployment Rate (0.062, p-value: <0.001) highlights that higher unemployment rates could be linked to an increased delisting risk, reflecting broader economic difficulties that impact firm performance. Firms with better asset utilization, indicated by ROA (-0.045, p-value: 0.014), are less likely to pursue delisting pressures. Moreover, diverse and institutional ownership, as seen with non-financial variables like the percentage of public shareholders (0.042, p-value: <0.001) and institutional investors (-0.042, p-value: <0.001), might provide support and stability during economic downturns.

Lastly, the negative coefficient for Electricity Generation and Distribution (-0.12, p-value: <0.001) implies that higher levels of electricity generation and distribution could reduce delisting risk. In South Africa, the issue of loadshedding—controlled power outages implemented by the state-owned power utility Eskom to prevent the national grid from collapsing when demand exceeds supply—poses a significant challenge. Loadshedding affects businesses, households, and overall economic stability. Ensuring a reliable electricity supply is essential for mitigating these disruptions and supporting the country's development. This macroeconomic factor might be tied into financial variables such as the Current Ratio (-0.11, p-value: <0.001), where firms with better liquidity positions are better equipped to handle operational disruptions, potentially reducing delisting risk.

5. Conclusions

The primary aim of this paper was to explore the extent to which a combination of financial, non-financial, and macroeconomic factors influence the likelihood of delisting among companies listed on the JSE, addressing a limitation in the existing body of knowledge. Specifically, there is limited research that simultaneously examines the interplay of financial, non-financial, and macroeconomic determinants of delisting, particularly within the context of a developing economy

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like South Africa. To achieve this, we first identified relevant variables and then employed a multivariate panel probit regression model to determine key variables impacting delisting decisions and serving as potential early warning signals.

Our findings reveal that delisting decisions are driven by a complex interplay of financial health, governance practices, and macroeconomic conditions. Financial variables underscore the importance of maintaining robust financial health to mitigate delisting risk. Non-financial factors, including strong corporate governance practices and diverse shareholder composition, enhance transparency, accountability, and investor confidence, further reducing the likelihood of delisting. Macroeconomic factors introduce significant external pressures influencing delisting decisions. Higher economic growth, measured by GDP, can increase delisting risk due to intensified competition, while inflation can reduce delisting risk by enabling firms to pass on costs to consumers. Interest rates, credit availability, unemployment rates, and reliable electricity supply also play critical roles in determining delisting risk.

This study is particularly important within the context of a developing economy like South Africa, where economic volatility, political instability, and regulatory challenges pose additional risks to listed companies. The JSE, being one of Africa's leading stock exchanges, is vital for South Africa's economic landscape, offering a platform for companies to raise capital and for investors to trade stocks. Understanding the factors influencing delisting decisions in this environment provides valuable insights for ensuring the stability and robustness of the financial system.

Based on our findings, we recommend that stock exchanges enhance regulatory frameworks to promote transparency and accountability among listed companies and implement measures to support firms in meeting compliance requirements, particularly during periods of economic volatility. Financial managers should focus on maintaining robust financial health by strategically managing debt, liquidity, and profitability, and develop comprehensive financial plans that account for macroeconomic conditions to mitigate delisting risk. Corporate governance bodies should strengthen governance practices by ensuring the presence of independent directors, high governance disclosure scores, and diverse institutional ownership to enhance managerial accountability, transparency, and investor confidence. Policymakers should create a stable and predictable regulatory environment that supports business operations and reduces the burden on companies, especially smaller firms with limited resources, while encouraging policies that promote economic stability and growth.

Researchers should further explore the interplay of financial, non-financial, and macroeconomic factors in different contexts, particularly in other developing economies. Future research could focus on the impact of specific macroeconomic events, such as political instability or commodity price fluctuations, on delisting risk. Additionally, examining the role of technology and innovation in mitigating delisting risk could provide valuable insights. Longitudinal studies tracking firms over extended periods could offer a deeper understanding of how changing economic conditions influence delisting decisions. By applying the models and methodologies discussed in this paper, scholars can expand the academic discourse on delisting and contribute to more resilient financial systems globally.

In conclusion, this research provides a comprehensive understanding of the factors driving delisting decisions and offers actionable insights for various stakeholders in the financial markets. By proactively managing these factors and recognizing the early warning signals identified, companies, investors, regulators, and policymakers can work together to ensure a stable and robust stock market and financial system.

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