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Staying alive

On the composition of corporate boards and financial distress risk

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Abstract

This study investigates the relationship between corporate governance and financial distress, considering a sample of 237 publicly listed Swedish firms between 2011 and 2021. The two phenomena have been frequently discussed in academia, and in line with prior literature, an agency theory perspective permeates the analysis. Using a financial definition of distress, we employ logistic regressions to determine which board features that have a mitigating effect on distress risk. In addition, we develop two corporate governance indices to assess the combined impact of having stronger or weaker governance. Moreover, our results indicate that a larger, more diverse board is associated with lower distress risk. In contrast, we do not find robust associations between distress and board independence and ownership. We further conclude that Swedish corporate boards of listed firms differ in terms of gender diversity, size, independence, and ownership. We believe this study contributes to the discussion of the two phenomena and provide additional evidence from a new context characterized by different corporate governance standards, which is of value for decision-makers in the development of regulations and codes.

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1. Introduction

1.1 Background

Corporate governance, a term that scarcely existed before the 1990s, is now universally invoked wherever business and finance are discussed (Keasey et al., 2005). A firm's corporate governance is conducted by the board of directors, who represents a crucial role in the company's strategic decision-making and are responsible for various tasks. By all these, solvency might be the most critical to control and govern (Platt & Platt, 2012). The importance of a well-functioned board becomes especially evident in a financial crisis, where several companies lack stable corporate governance structures, which in many cases leads to financial distress or bankruptcy (van Essen et al., 2013). Despite the importance of good corporate governance, researchers struggle to find conclusive answers to how it affects a firm's financial situation.

More recently, gender diversity has been increasingly perceived as a determinant of a firm's corporate governance. Continuous discussions have proposed to include more women on boards, increasing researchers' interest in gender-diversity effects on firm financial performance. This has been most notable in Norway, where a gender quota has been enacted for over a decade (Nielsen & Huse, 2010). Studies have further proved that there are many positive aspects to an increase of women on corporate boards. One of them is that a high proportion of women in board positions operating in complex environments have shown more positive results because of characteristics like transparency and risk aversion that differ between the genders (Francoeur et al., 2008). Large organizations have further implemented regulations to improve female presence on boards. For example, in August 2021, Nasdaq approved the requirement to disclose diversity data about companies' boards of directors. *Those companies without at least two 'diverse' directors—one who self-identifies as a woman and one who self-identifies as an underrepresented minority or LGBTQ+—would have to explain their lack of diversity* (Semuels, 2022).

The agency theory further explains the importance of well-functioning top management. The theory highlights the importance of proper monitoring, which reduces conflicts and aligns interests with shareholders. Strong monitoring has repeatedly been proven to successfully mitigate risks and distress-likelihood among firms (Daily & Dalton, 1994; García & Herrero, 2021). In previous research, CEO/chairperson duality has played a central part in the theory (Platt & Platt, 2012; Garcia & Herrero, 2022). However, in 2005, Sweden implemented a law that prohibits chairpersons from holding a CEO position in the

same company. Nonetheless, the link between proper monitoring and financial distress is obviously crucial for a company, considering that poorly monitored firms lead to financial distress, resulting in extensive costs for the firm and the market. Conclusively, shareholders, corporations, and creditors are all interested in models that can predict these types of issues (Ohlson, 1980). The phenomenon aims to see if certain companies can meet their financial obligations, where economists have developed models throughout the years that look at these types of issues. This can further be seen as an expression of a desire to understand which factors determine financial distress risk.

1.2 Purpose

The purpose of this study is to further advance the understanding of corporate governance and financial distress by studying board composition and characteristics, and their effect on distress risk. Our aim is to conduct a quantitative study on Swedish publicly listed companies, experimenting with the relationship between corporate governance and financial distress during the years 2011-2021. Through our study, we expect to determine which board constellations are most beneficial to avoid distress and whether board ownership may play a role. This leads us to our research question: *Is there a relationship between corporate governance and financial distress in Swedish publicly listed firms?*

1.3 Contribution

Our study aims to contribute to previous literature and research by looking further into the relationship between corporate governance and financial distress. The study contributes in three main ways. Firstly, we look to further extend the knowledge of the subject as we try to define the effects of strong corporate governance in distressed versus non-distressed firms. Much prior research has been unambiguous regarding the effect of specific components of corporate governance. With our study, we aim to further provide evidence that may complete the understanding of the topic. In addition, it is only recently that gender diversity has been included in similar studies, which further suggests a need for more empirics. Secondly, the study aims to mediate a deeper understanding of monitoring in a context where CEO/chairperson duality is prohibited. Earlier studies have determined that such a characteristic of corporate boards is detrimental to the monitoring ability, and it has repeatedly been emphasized in the discussion. However, no study has been conducted in samples where CEO/chairperson duality is missing. Finally, to the best of our knowledge, no

previous research has examined the relationship between corporate governance and financial distress in Swedish publicly listed firms. This is why we aspire to investigate the topic further and contribute to the knowledge in the area.

1.4 Delimitations

Three main delimitations have been constructed for this study. First and foremost, the research is delimited to Swedish companies. This geographical constraint is mainly due to the different laws and regulations that differ in corporate governance between countries, and because there has not been a similar study using only Swedish data before. Secondly, the study is delimited to publicly listed firms. The focus on publicly listed firms is mainly due to data availability for our corporate governance variables. Choosing a data set of privately listed firms would entail obstacles since private firms do not consistently provide the same governance information crucial for the study. Lastly, the data is delimited to eleven years between 2011-2021. Given time and data constraints, a broader range of years would not be feasible because it would require a lot of manually collected data.

1.5 Disposition

The study is divided into eight sections in total. The second section describes the foundation of the thesis, where we discuss previous authors' work investigating corporate governance, financial distress, and the relationship between the two. This gives an overview of previous conclusions on the subject and further leads us to the hypothesis and research question of the paper. In section three, we start by explaining our data collection and sample construction, followed by our variables and the development of indices. After that, we look at the robustness and extreme outliers before finishing the section with our regressions. Section four explains the descriptive statistics of the data set. Since we include many variables related to corporate governance, section four also looks at multicollinearity and correlations. Section five presents the results and analysis of our regressions, followed by a lag analysis and endogeneity concerns. Section six presents a discussion of our results and in section seven, we summarize the conclusions of our findings. Lastly, in section eight, we characterize our limitations and further propose suggestions for future research.

2. Literature review and hypothesis development

2.1 Literature review

2.1.1 Corporate governance

Corporate governance is frequently discussed in academic research. Several studies have investigated the relationship between a firm's corporate governance and performance (Core et al., 1999; Hillman & Dalziel, 2003), while others have studied the composition of the board of directors (Gales & Kesner, 1994; Boone et al., 2007). A recurring theoretical framework is agency theory, which has been used to link corporate governance to financial distress and firm performance (Hillman & Dalziel, 2003; De Maere et al., 2014; Daily & Dalton, 1994). According to agency theory, there is a conflict of interest between the shareholders and management. The shareholders, who take on the role of principals, wish to maximize shareholder value while the managers, who act as agents, may pursue other targets and act out of self-interest (Jensen & Meckling, 1976). Applying agency theory, the board of directors takes on a monitoring role to reduce the agency problem (Fama & Jensen, 1983). By monitoring management, the board of directors helps reduce costs generated by management pursuing other ambitions rather than maximizing shareholder value (Hillman & Dalziel, 2003). Hence, the question becomes: what constitutes good monitoring?

Core et al. (1999) investigate how CEO compensation relates to the board of directors. They suggest that a higher excess compensation, cleared for other determinants, is due to a larger agency problem. In the study, the authors consider board characteristics and find that a smaller, younger board with a separate CEO from the chairman sees fewer agency problems. Jensen, one of the front figures in agency theory, also suggests that a small, equity-compensated board without CEO/chairperson duality offers better monitoring (Jensen, 1993). The notion that board size is detrimental to the monitoring ability can be traced back to Lipton & Lorsch (1992), who posits that when there are too many directors on a board, the likelihood that every member is allowed to express their concerns and ideas is lower, thus restricting them from fulfilling their roles. Jensen (1993) further argues that board ownership gives the board incentives which they otherwise would lack to conduct effective monitoring. Furthermore, board independence is also related to proper monitoring (Hillman & Dalziel, 2003; Baysinger & Butler, 1985). Jensen (1993) proposes that a director who reports directly to the CEO will be less inclined to criticize the officer. Therefore, it is suggested that the only insider of a board ought to be the CEO. Likewise - a board with a joint CEO and chairperson structure will likely be less efficient in criticizing the CEO.

In more recent years, the role of gender diversity within corporate governance has become an increasingly prevalent research topic (Bernile et al., 2018). This shift has moreover been reflected in the corporate world, with the most evident example in Norway, which instituted a gender quota to further the representation of women on corporate boards. Post-enactment, Nielsen & Huse (2010) investigated the boards of Norwegian firms and identified that boards have separate sets of tasks that require different skills. The study concludes that female directors are beneficial for what the authors refer to as strategic control tasks, which entail discussions, environmental monitoring, benchmarking, and relations with stakeholders. Previous studies, which support the findings of Nielsen & Huse (2010), have argued that female leaders are better at information disclosure and transparency (Armstrong et al., 2014; Gul et al., 2011). Harris et al. (2019) further prove that skills in leadership positions, i.e., risk aversion, are affected by gender.

In addition to studying how gender affects traits and behaviors, academics have conducted studies that investigate the implications for firm performance. Francoeur et al., (2008) conclude that firms operating in complex environments that have a high proportion of women witness more positive results, which is supported by the results of Armstrong et al., (2014) and Gul et al., (2011). Adams & Ferreira (2009) contribute to the knowledge in the area by looking at how gender affects board behavior. They found that the presence of female directors positively impacted the presence of male directors at board meetings and concluded that diverse boards affect firm performance positively in companies with weaker governance. In contrast, they found that in firms with strong governance, board diversity can result in worse performance, which they argue could be a result of over-monitoring. Hence, gender diversity could improve the board's monitoring role, resulting in fewer agency problems. Moreover, previous research also states that diverse boards are correlated to lower stock volatility, which can be used as a proxy for risk (Francoeur et al., 2008; Adams & Ferreira, 2009). It is therefore evident that diversity affects the corporate governance of firms, and thus we argue that it should be considered as a component of governance just like board independence, size, and ownership.

2.1.2 Financial distress

Financial distress can be defined as the inability of a firm to pay its financial obligations as they mature (Beaver, 1966; Wruck, 1990). Once a firm has become financially distressed, the ultimate stage is failure or default, which is also known as bankruptcy (Beaver, 1966). Without sufficient liquidity, firms will struggle to continue operations as they cannot acquire

the necessary resources (Campbell et al., 2008). This may also restrict firms from pursuing investments that could be value-creating. As such, we argue that financial distress is a value-destroying occurrence.

Financial distress, and especially financial distress prediction, has attracted the interest of academics for decades. In 1968, Altman developed an initial discriminant analysis model using financial ratios, which became known as Altman's Z-score (Altman, 1968). This was followed and further developed by Ohlson's O-score, which applies a probabilistic model rather than a multiple discriminant analysis model as developed by Altman (Ohlson, 1980). However, academics suggest that the explanatory power of these early models for financial distress prediction has decreased (Hillegeist et al., 2004; Campbell et al., 2008). Grice & Ingram (2001) argue that this could be because the relationship between distress and financial ratios may change over time. More contemporary approaches have also been made, such as the model developed by Pindado et al. (2008), which is better suited to measure the risk of financial distress in today's society. Contrary to prior models, this model uses a financial definition of financial distress because a failure to pay obligations does not naturally result in legal bankruptcy (Pindado et al., 2008).

Such definitions have also been used by other scholars, which direct their attention toward understanding the reasons behind, and implications of financial distress (Andrade & Kaplan, 1998; Wruck, 1990; Dittmar & Duchin, 2016). Dittmar & Duchin (2016) apply a wider scope when defining distress to not only include accounting-specific indicators. By considering stock returns and credit ratings shocks, Dittmar & Duchin (2016) attempt to assess the market's reaction to financial distress. Similarly, Pindado et al. (2008) capture the market's reaction by investigating drops in a firm's market value. This approximation of market reactions has empirical support in other studies, which show that financially distressed stocks have lower returns and are more volatile than shares of non-distressed firms (Campbell et al., 2008).

2.1.3 Financial Distress & Corporate Governance

Scholars have for long directed their attention to the relationship between financial distress and corporate governance, which has also influenced modern prediction models. For example, Liang et al. (2020) use a stacking ensemble to construct a model using both financial ratios and governance indices variables. However, attempts to construct predictive models only account for a small share of the research committed to the subject. Instead,

determining the links between corporate governance and financial distress has been more popular.

Much of prior research applies an agency theory perspective (Platt & Platt, 2012; García & Herrero, 2021). The theory proposes that appropriate governance and monitoring reduce conflicts and improve interest alignment with stakeholders, which in turn decreases the risk of default. Daily & Dalton (1994) suggest that firms without proper monitoring may take on excessive risk and thus are more likely to fail. In addition, deficiencies in top management are a factor for distress (Hambrick & D'Aveni, 1992). Therefore, a board that does not monitor appropriately will also increase the likelihood of distress because they are less likely to remove executives (Daily et al., 2003).

One of the earlier studies by Daily & Dalton (1994) investigated the link between corporate governance and financial distress. Three separate governance indicators, CEO/chairperson duality, independence/interdependency of board members, and the absolute number of independent board members, were combined with several financial indicators as control variables. Daily & Dalton (1994) conclude that the variables do not show any significant correlations to distress risk when treated individually. However, they note that the joint effect of CEO duality, independence/interdependence, and the number of independent board members has a statistically significant correlation. Aligned with Baysinger & Butler's (1985) and Fich & Slezak's (2008) findings, Daily & Dalton (1994) find that firms with joint CEO/board chair structures and boards with a lower percentage of independent directors have an increased likelihood of becoming bankrupt.

Most studies determining the link between corporate governance and distress risk include CEO/chairperson duality in the models (De Maere et al., 2014; Platt & Platt, 2012). Agency theory further argues that this phenomenon impairs the monitoring ability of the board of directors (Jensen, 1993). Unlike in other legislations, such as the US, this notion has influenced Swedish law. Following chapter 8, paragraph 49 of the Swedish Company Act (SFS 2005:551), CEO/chairperson-duality is forbidden in Sweden. Hence, investigating the implications of CEO/chairperson duality is not feasible in a Swedish context, and other indicators need to be considered.

More recently, Platt & Platt (2012) compare the differences in corporate governance variables between bankrupt firms and survivor firms. In addition to the variables used by Daily & Dalton (1994), Platt & Platt (2012) include average age, board size, interlocked directors, stock ownership, board tenure, directors' involvement in other companies, and committee composition. They conclude that solvent firms have more independent directors,

an older board, more CEOs on the board, and independent directors owning less stock. Both of these studies use a sample of publicly listed US firms, which further applies to most literature on the subject.

. Elsayed et al. (2022) review the board composition and characteristics of surviving and bankrupt firms in the United Kingdom. In contrast to the prior studies conducted by Platt & Platt (2012) and Daily & Dalton (1994), they further include gender diversity in their analysis. As elaborated on in Section 2.1.1, board gender diversity may be considered as a component of corporate governance. Through a dynamic logit model, Elsayed et al. (2022) conclude that gender diversity does not explain corporate failure. The authors' findings are moreover not fully coherent with agency theory. For example, whether the audit and remuneration committees are independent or not has no statistically significant effect on the likelihood of failure. Hence, they suggest that the monitoring value of these two functions is doubtable. Instead, non-independent nomination committees are, according to their regression, associated with a reduced risk of financial failure (Elsayed et al., 2022).

García & Herrero (2021) consider a wider cross-country sample, namely 21 European countries. Applying an agency theory perspective, the authors investigate how gender diversity affects corporate governance and financial distress. Contrary to Elsayed et al. (2022), they find that smaller, independent, and diverse boards reduce the risk of bankruptcy. García & Herrero (2021) advocate that a more diverse board improves the monitoring ability, which is in line with the suggestions of Adams & Ferreira (2009). In addition, they argue that female directors may be more risk-averse and thus hinder firms from taking on excessive risk, which could increase the probability of distress. This suggests that board gender diversity may be beneficial in multiple ways for avoiding financial distress.

2.2 Hypothesis development

After reviewing prior literature on the topic, it is apparent that there is no unanimous answer to how corporate governance impacts financial distress risk. Most studies have had a US-centric focus, and a restricted few have used European samples. However, we note that no studies on the topic have been conducted using Swedish data. Given the conflicting findings from Elsayed et al. (2022) and García & Herrero (2021), we argue that there could be different results depending on the region from which the sample is retrieved. In addition, there are arguably differences in corporate governance across legislations and time, proved by the fact that CEO/chairperson duality, which is one of the most prevalent proxies used, is

prohibited in Sweden. As such, it would be of interest to determine what possible linked that can be found between corporate governance and financial distress risk among Swedish publicly listed companies.

In previous research, an array of different proxies for, or components of, corporate governance have been used to determine whether there is a link between corporate governance and financial distress. These include the extent to which the directors are independent, board ownership, board size, and board gender diversity. Across studies, the significance of these indicators varies, but a majority of papers suggest that at least one or more of these factors do matter for the risk of financial distress. This suggests that there may be some kind of link, but that the link to each specific proxy hardly can be defined. Hence, in addition to investigating the proxies individually, we also treat corporate governance as a composite phenomenon consisting of the above-mentioned components. Because the results of prior research are ambiguous, we hypothesize that:

H: There is no relationship between corporate governance and financial distress risk

3. Method

3.1 Data collection

This study combines three different datasets from three different sources. All datasets contain data from Swedish publicly listed companies with their specific variables. Firstly, our study requires data regarding the firms' corporate governance. This data is taken from Holdings by Modular Finance and contains data for 298 companies between 2011-2021. This further sets the scope of our study in terms of years. Secondly, opening and closing prices for 669 unique stocks for the years 2010-2021 are extracted from the Swedish House of Science (SHoF) database. Finally, Retriever Business is used to extract accounting-based variables. This sample includes 357 companies and covers the years 2010-2021. Due to the fact that some of our variables required lagging data, our sample covers years not included in the regression.

Because all data sets provide different types of firm IDs, a linking file is created manually. Here, the company name appearing in our corporate governance data set is matched with the organizational number and ISIN code for the same firm which is found in the accounting data set and stock return data set respectively. In addition, because some firms offer multiple series of stocks, the linking file also includes an indicator for which series the security belongs to.

3.2 Sample construction

We start our sample construction by compiling our control variable data from *Retriever Business* in STATA. For each year, a separate file is generated. First, a variable denoting the year of the observation is created. Thereafter, the different files are appended to create a panel data set. Next, annual stock opening and closing prices are extracted from SHoF. The opening price is matched with the closing price of each stock and the annual stock return is computed.

For each year, the stock returns are sorted into deciles, and then the yearly files are appended. According to one of our definitions of financial distress, a firm is distressed if the stock return is negative and belongs to the worst-performing 10% of the stocks of the year. However, this becomes problematic when firms have multiple stock series outstanding. In order to get a single indicator for whether the firm is distressed or not, a dummy variable is created that indicates if all series show signs of distress or not. The stocks are matched with an organizational number identifying what firm they belong to using the manually computed linking file. Then, observations with the same organizational number and year are deleted. As the dummy variable indicates if both stocks were considered distressed, no information is lost in this process. Finally, the three datasets are merged, where the file with board data serves as the base.

We remove duplicates before adding stock price data and control data. It is a common practice to drop observations of financial firms in studies because of the high leverage that is normal for firms in this sector. In comparison to non-financial firms, the high leverage of financial firms is generally not considered a sign of distress, which Fama & French (1992) suggest. Therefore, we create an industry index in our data and exclude firms in the "bank, finance, and insurance" sector, leaving us with the final sample consisting of 237 firms and 1343 firm-year observations. The selection process is further illustrated in Table I.

Table I. Selection criteria

Criterion	*Number of Firms*	*Number of Observations*
Full sample of corporate governance data	**298**	**1847**
Clearing for duplicates	*298*	*(-23) 1824*
Stock price data	*(-27) 271*	*(-276) 1548*
Control data	*(-3) 268*	*(-7) 1541*
Non-financial firms	*(-31) 237*	*(-198) 1343*
Final sample	**237**	**1343**

Note: *Table I present the selection process of the data set.*

3.3 Variables

3.3.1 Dependent variable

This section determines the definition of our dependent variable *financial distress*. We construct three different measures where the first one is if a firm has less EBITDA than its interest expense for two consecutive years (Andrade & Kaplan, 1998). A similar approach is used by Pindado et al. (2008), although they restrict their definition to only covering one year. In other words, we define the company as distressed if EBITDA/interest expense is less than one in the current year and the year before. If the company fulfills our definition, it receives a "1" in our table, whereas the other firms receive a "0".

Our two other measures are based on adverse shocks to firms' stock returns and operating cashflows, as outlined by Dittmar & Duchin (2016). Firstly, stock return is used as a proxy to capture the reaction of the market to financial distress. Using our data on stock return from the *Swedish House of Finance*, we sort all firm-year observations into annual deciles based on the change in the stock return. For each year, we categorize the companies in the lowest decile as financially distressed. To ensure that these stocks actually are subject to adverse development, a stock must also show a negative return to be designated as distressed.

Secondly, we use an accounting-based measure which Dittmar & Duchin (2016) refer to as "operating cash flow". We define a company's operating cash flow as *Earnings before Interest, Taxes, Depreciation & Amortization* (EBITDA) divided by total book assets. Resembling the procedure for stock return, we categorize the companies in the lowest decile as financially distressed which is based on the change in the total operating cash flow annually. Likewise, we also ensure that the change is negative. Dittmar & Dutchin (2016) also include credit ratings in their definition, but since the relevant data for Swedish companies' credit ratings is not available, we omit this from our analysis. We finally define a variable labeled distress, which is equal to 0 in most cases, but assumes 1 if the firm either shows negative shocks in share price or fulfills both definitions of accounting distress, that is, a negative shock to total operating cash flow and a negative interest-coverage ratio based on EBITDA.

3.3.2 Independent variables related to corporate governance

We use four separate indicators for corporate governance, which are extracted from Modular Finance's Holdings. It is suggested by a number of scholars, such as Jensen (1993) and Hillman & Dalziel (2003), that board independence improves monitoring, because a

non-independent board may struggle to criticize and take measures against executive management. Furthermore, this has empirical support as noted by previous scholars such as García & Herrero (2021), Platt & Platt (2012), and Daily & Dalton (1994). Our first variable of interest is thus board independence *(board_ind)*, which we define as the share of directors who are reported as independent towards the company.

In turn, Nielsen & Huse (2010) conclude that gender diversity affects the board's behavior. This is further supported by Adams & Ferreira (2009), who argue that more diverse boards are better monitors. In addition, García & Herrero (2021) suggest that female directors are more risk-aversive and demonstrate that diversity reduces the likelihood of bankruptcy. We, therefore, choose to include board gender diversity (*board_gd*) as one of our explanatory variables. In defining our two first variables, we choose to use the share of independent and female directors rather than the headcount to remove the effect of different board sizes across firms. This is also a common approach in research in the field (Garcia & Herrero, 2021; Daily & Dalton, 1994; Adams & Ferreira, 2009).

Our last indicator related to board composition is the size of the board. As first suggested by Lipton & Lorsch (1992), and emphasized by Jensen (1993), too large boards may constitute ineffective monitoring functions as the opinions and thoughts of the directors are less likely to be expressed. Core et al. (1999) further attest that smaller boards reduce agency costs, and results in favor of the negative association between board size and distress have been provided by multiple studies (García & Herrero, 2021; Platt & Platt, 2012). Hence, we define board size (*board_size*) as the number of directors on the board.

In addition to considering board composition, we further investigate the role of board ownership. According to Jensen (1993), stock ownership aligns the interests of the directors with the interests of shareholders, resulting in an improved monitoring ability. This hypothesis is further supported by the findings of Core et al. (1999). In contrast, Platt & Platt (2012) propose another perspective, in which they argue that a directors' willingness to incur excessive risk is augmented by stock ownership, as risky projects may yield a higher return which increases their personal wealth. They further find that independent directors owning less stock may be better suited to steer away the firm from distress. However, both perspectives suggest that stock ownership should affect distress risk. As a consequence, we introduce board ownership (*board_capital*) to the regression, which we in accordance with Platt & Platt (2012) define as the share of total capital owned by the board. A list of detailed definitions of the variables is found in Appendix III.

3.3.3 Control variables

In addition to our independent variables, which measure corporate governance, we include a number of accounting-based control variables that distinguishes the impact of corporate governance from other factors. In distress research, prior literature use in consensus the following types of indicators as controls: profitability, leverage, liquidity, and firm size (Elsayed et al., 2022; Daily & Dalton, 1994; García & Herrero, 2021). These variables are extracted from Retriever Business for each firm year and later included in our regressions. Our first control variable is profitability, which for our study is measured using return on total assets (*ROA*) in line with Boone et al. (2007). Profitability is intrinsically linked to distress risk, as proven by Campbell et al. (2008). We argue that this further is intuitively appealing: firms which are not able to generate adequate returns are more likely to fail to pay obligations, which per definition posits the firm in distress. Another of Campbell et al. (2008) findings is that distressed firms suffer from worse liquidity, which also can be traced to the definition of distress. A firm with higher liquidity may be better equipped to avoid financial distress because it is not forced to rely on current cash flows to pay its obligations. In line with prior research, we use the firm's current ratio (*current_ratio)* as a measurement of liquidity and include it as a control variable (Elsayed et al., 2022).

A different, but related measure, is leverage. Campbell et al. (2008) conclude that distressed firms have higher leverage which, just like liquidity, is logically related to distress. Theoretically, a fully equity-financed firm cannot become distressed because there are no obligations to pay. However, as debt is added, interest payments and installments must be addressed in future periods. If a firm cannot settle these payments, the firm enters distress. A highly leveraged firm must pay more interest and installments than a firm with low leverage. We, therefore, account for different debt levels across our observations, measured through the firm's debt-to-equity ratio (*debtequity_ratio)*, in accordance with Elsayed et al. (2022). Finally, smaller firms are at a higher risk of distress as attested by Campbell et al. (2008), which could be explained by the fact that larger firms may be more diversified and will thus have lower default risk (Frank & Goyal, 2009). To consider firm size, we include the logarithm of sales (*firm_size)* as our final control variable in line with Daily & Dalton (1994).

In addition to the accounting-based control variables, we also adjust for time-fixed effects and industry-fixed effects. This is achieved through the creation of dummy variables indicating the year and industry of the observation. All our control variables' specific definitions can be found in Appendix III.

3.3.4 Corporate Governance Index

As a complement to our first regression, a second model was developed where the variables were combined in order to capture the joint effects of corporate governance components. This is motivated by the fact that Daily & Dalton (1994) do not find any statistically significant results for the variables on an individual level, although they conclude that worse corporate governance as a composite phenomenon was associated with bankruptcies. Hence, our second model, which we describe further in 3.5.2, uses a combined measure of the indicators through an index that we refer to as our "corporate governance index" (*corpgov_index)*. Previously, an analogous index was developed by Gompers et al. (2003), which included numerous indicators for shareholder rights. In the index construction, "points" are distributed according to the existence of corporate governance-related provisions. Then, the points are added together to form a standardized index. Bebchuk et al. (2009) use a similar approach when constructing their related entrenchment index. The major disadvantage of this approach is that the relative importance of each factor is not considered. However, it makes the index more transparent and easier to grasp. Furthermore, given that the relative importance of corporate governance indicators is unknown, an appropriate distribution of relative weights becomes complicated or almost impossible (Bernile et al., 2018; Daily & Dalton, 1994).

However, none of these indices consider board composition. In studying stock return and corporate governance, Chen et al. (2007) introduce another index, which takes board composition into account. Because board size is not binary, a threshold has to be determined to distribute scores. Chen et al. (2007) therefore define a dummy variable that indicates if the board exceeds the average board size by two standard deviations, as they argue that this signals an oversized board.

In constructing our own index, we include all our independent variables. For each adverse characteristic, we add one point to the composite "score". As such, a high value of the index indicates weak governance, whereas a lower score indicates stronger corporate governance. Because all our independent variables are continuous, we use the threshold technique proposed by Chen et al. (2007).

The first variable included is board independence, which according to Daily & Dalton (1994), Platt & Platt (2012), and García & Herrero (2021), is negatively associated with financial distress. Hence, we construct a dummy variable named *ind_index,* which is equal to 1 if the independence is lower than the mean board independence minus two standard deviations. To account for differences across years, the mean and standard deviation are calculated annually. By applying this method, a board is designated as having a low degree of

independence if they have substantially lower independence than the other firms in the same year.

A negative association between gender diversity and distress likelihood is demonstrated by García & Herrero (2021). Furthermore, as suggested by Adams & Ferreira (2009), female directors may serve a role similar to independent directors, which in turn contributes to independence. We, therefore, expect that more diverse boards have better governance. As such, we add a variable called *gd_index* to the index, which adds a point if the diversity is lower than the annual mean minus two standard deviations.

Board capital is argued to improve the alignment of interest between the owners and the board of directors by agency theory and more specifically Jensen (1993). Although Platt & Platt (2012) find that board ownership is positively associated with financial distress, we apply an agency theory perspective, where stock ownership is perceived as something that reduces distress risk. To include this in the index, we create a new dummy variable *(capital_index)*, which equals "1" if the board ownership is smaller than the mean minus two standard deviations, and "0" otherwise.

Finally, agency theory posits that smaller boards are more efficient. The positive relationship between board size and distress risk is furthermore supported by the findings of Platt & Platt (2012) and García & Herrero (2021). Hence, we compute *size_index.* In contrast to the previous components, a larger value suggests weaker governance. Thus, for a board that is larger than the annual mean plus two standard deviations, an additional point is added to the index. By summing up all the index components, as expressed in Equation 1, we get a composite measure of the governance in the firm which may better measure the board's effectiveness. Let *f* and *t* indicate the firm and year of the observation respectively.

$$corpgov\_index_{f,t} = ind\_index_{f,t} + gd\_index_{f,t} + capital\_index_{f,t} + size\_index_{f,t} \quad \textbf{(1)}$$

3.3.5 Secondary corporate governance index

The corporate governance index described in previous sections has the advantage of being intuitive and simple to use. It also provides information on whether the corporate governance of a firm is significantly worse than average. However, we argue that it lacks precision and detail. A firm that may be close to the threshold of receiving a "point" on all indicators will receive an index-value corresponding to "0". Another firm, which has a significantly "better" corporate governance, would then receive the same value. Thus, in addition to creating an

index based on standard deviations, we also develop a secondary score, which we label corpgov_index2. In this variant, we assign an observation a score depending on relative performance, closely resembling the process of creating the primary index. We sort all observations of the independent variables into annual percentiles, which then are used to measure the indicators. This entails creating additional variables, which we label *ind_pctile*, *size_pctile*, *capital_pctile,* and *gd_pctile* respectively. We choose to create annual percentiles rather than percentiles based on the whole sample in order to take into account that the aggregate "performance" of these indicators may vary across years. For example, boards may become more diverse over time and therefore the scores may reflect overall trends rather than the firm's level of corporate governance.

In order for our index to signal what we refer to as "bad corporate governance", we need to make some adjustments. For those variables where a low score may signal bad corporate governance, we change the deciles so that a lower value yields a higher percentile, and a higher value yields a lower percentile. The variables that were treated as such are board independence, board gender diversity, and board ownership. The final variable in our regressions, board size, differs from the rest as a higher value signals worse governance. Therefore, we do not make any adjustments to the percentiles of board size. Finally, we add the components to form a final score, where each indicator is equally weighted. We further scale the score to a range from 0 to 1, where 1 is the maximum value that the index can take on. As there are 4 components, which each has a maximum value of 100, we scale the index by dividing the sum by 400. Although this score may be less intuitive, it provides a continuous scale that we argue forms an appropriate complement to the primary index. This definition is illustrated in Equation (2).

$$corpgov\_index2_{f,t} = \frac{\left(ind\_pctile_{f,t} + gd\_pctile_{f,t} + capital\_pctile_{f,t} + size\_pctile_{f,t}\right)}{400} \quad \textbf{(2)}$$

3.4 Robustness and extreme outliers

In our analysis, we choose to make adjustments to the data and the regressions to achieve higher robustness. A common problem in statistical research is data outliers, which are extreme values that affect the regression. Because these observations are not representative of the full sample, they may be alternated in a process known as winsorization. By replacing the extreme outliers with less extreme values, this issue is treated. In our dataset, we, therefore, replace the values exceeding the 99th percentile with the same value as the observation of the

threshold and the values below the 1st percentile with that same value. This procedure is applied to all non-binary variables used in our regressions.

In our main regressions, we also use clusters to get robust standard errors. Because observations may vary based on firm and year, the standard errors in the regression may be understated. By then applying clusters based on firm and year, we get more robust standard errors, which makes us less prone to a false rejection of the null hypothesis.

3.5 Regressions

3.5.1 Regression I

Due to the fact that financial distress, according to our definition, is a binary phenomenon, applying a logistic regression model is appropriate. Our dependent variable, *distress*, is a dummy variable that equals 1 if the firm is deemed distressed and 0 otherwise. The regression allows us to determine what factors affect the likelihood of a firm becoming distressed. This approach has also been used in previous research (García & Herrero, 2021). The logistic regression follows the standard logit model described in Equation 3 below.

$$Logit\Big(P\Big(Distress_{f,t} = 1\Big)\Big) = ln\left(\frac{P\Big(Distress_{f,t}=1\Big)}{1-P\Big(Distress_{f,t}=1\Big)}\right) \quad \textbf{(3)}$$

To test our hypothesis, we develop our main model which includes all our board-related independent variables. In addition, we further include the control variables and fixed effects based on year and industry. Let *f* denote the firm of the observation, *t* the year of the observation, and *j* the industry of the observation. Let further epsilon (ε) be the error term, and β_0 the constant. This gives us the main regression, which is expressed in Equation 4.

$$\begin{aligned} Logit\Big(P\Big(Distress_{f,t} = 1\Big)\Big) = {} & \beta_0 + \beta_1 * board\_ind_{f,t} + \beta_2 * board\_capital_{f,t} + \\ & + \beta_3 * board\_gd_{f,t} + \beta_4 * board\_size_{f,t} + \beta_5 * roa_{f,t} + \beta_6 * debtequity\_ratio_{f,t} \\ & + \beta_7 * current\_ratio_{f,t} + \beta_8 * firm\_size_{f,t} + Year_t + Industry_j + \varepsilon_{f,t} \end{aligned} \quad \textbf{(4)}$$

3.5.2 Regression II & III

As described in 3.3.5, we develop a secondary model to test if the combined effect of corporate governance components may provide more explanatory power. As in the main

regression, a logistic regression model is applied, with the same dependent variable, distress. However, instead of using multiple independent variables, we now only investigate one, namely the corporate governance index, together with controls and fixed effects. This second regression is expressed in Equation 5**.** Finally, we develop a third model, which uses the secondary corporate governance index as the independent variable, as shown in Equation 6.

$$Logit\left(P\left(Distress_{f,t} = 1\right)\right) = \beta_0 + \beta_1 * corpgov\_index_{f,t} + \beta_2 * roa_{f,t} + \beta_3 * debtequity\_ratio_{f,t} + \beta_4 * current\_ratio_{f,t} + \beta_5 * firm\_size_{f.t} + Year_t + Industry_j + \varepsilon_{f,t} \quad \textbf{(5)}$$

$$Logit\left(P\left(Distress_{f,t} = 1\right)\right) = \beta_0 + \beta_1 * corpgov\_index2_{f,t} + \beta_2 * roa_{f,t} + \beta_3 * debtequity\_ratio_{f,t} + \beta_4 * current\_ratio_{f,t} + \beta_5 * firm\_size_{f.t} + Year_t + Industry_j + \varepsilon_{f,t} \quad \textbf{(6)}$$

4. Empirical findings

4.1 Descriptive statistics

In Table II, the descriptive statistics are presented for our full sample of publicly listed Swedish firms. Our dependent variable, *distress*, is a binary variable either assuming "1" if the firm is deemed to be distressed according to our definition in a specific year and "0" otherwise. Hence, the mean can be interpreted as the share of firm-year observations that display distress. As can be seen in Table II, the share of observations in distress is 6,9%, which corresponds to 92 observations. The size of the group of distressed firm-years is deemed to be appropriate, as it is neither too big, which would indicate a too "generous" definition of distress, nor too small, as 92 observations permit us to determine a statistically significant result.

The average size of the board is 6.952, indicating that Swedish firms tend to have smaller boards. Both Platt & Platt (2012) and García & Herrero (2021) find that the average size in their samples corresponded to values closer to nine. Board capital, defined as the share of total outstanding capital owned by the board of directors, is on average 20.4% for our sample. However, the standard deviation is fairly high and the median is slightly lower at

16.5%, indicating that a majority of boards own relatively less capital than the minority who owns a larger share. Furthermore, we can conclude that boards in distressed years own less capital in comparison to non-distressed observations, supporting the hypothesis that higher ownership improves monitoring and interest alignment.

Based on previous literature, high board independence means better monitoring (Hillman & Dalziel, 2003; Baysinger & Butler, 1985). The result in Table II is therefore rather unanticipated since we identify a higher mean for board independence in distressed firms compared to non-distressed firms. In addition, we note that the average board independence is notably higher than the findings of other studies. The boards in our sample consist of 83.8% independent directors, in contrast with García & Herrero (2021), which see 54.8% and 51% independent directors on average for non-distressed and distressed observations respectively. The corresponding values for Platt & Platt (2012) are 66% and 60% for non-bankrupt and bankrupt firms. Furthermore, we can see that the gender diversity variable has a mean of 34.3%, significantly higher than in previous studies. García & Herrero (2021) have 17.4% and Bernile et al. (2018) have 10%. The considerable difference could be explained by how much further Sweden has come in this area compared to other countries, such as the US. By comparing distressed and non-distressed observations, we notice that the difference in diversity is not substantial, although firms in distress years on average have less diverse boards.

Turning to our primary corporate governance index, we can see that the maximum value in the sample is 1. Note that the maximum value that the index can take on is 4. Turning to our secondary index, we see that the highest value is 0.965 on a scale from 0 to 1. This confirms the hypothesis that the first index may be less effective when identifying “bad” corporate governance, which was elaborated on further in section 3.4.

Continuing to the financial firm-level variables, prior literature has established that the most substantial difference between distressed and non-distressed firms is naturally profitability. This is also true for our sample, where the firms in distress years on average have negative profitability in contrast to firms in non-distressed years, with an average return-on-assets of approximately 8.1%. When it comes to leverage, the firms in distress have lower debt, and in addition, better liquidity. Although this might seem counter-intuitive, a possible explanation would be that firms in distress are more restricted when it comes to acquiring capital from debtors, due to higher costs of debt and worse credit ratings. Dittmar & Duchin (2016) use adverse shocks to a firm's credit rating as an indicator of distress, which further supports this theory. Hence, the firms must use their own assets to cover costs and

maintain better liquidity. Finally, firm size differs across the groups, where a smaller size is more associated with distress. As suggested by Frank & Goyal (2009), smaller firms have higher default risk, which is consistent with our findings.

Table II. Descriptive statistics

							Distressed		*Non-distressed*	
Variable	***Obs***	***Mean***	***Std. dev***	***Median***	***Min***	***Max***	***Mean***	***Median***	***Mean***	***Median***
board size	1343	6.952	1.407	7	4	11	6.435	6	6.993	7
board capital	1241	.204	0.179	.165	0	.677	.179	.126	.206	.166
board ind	1343	.838	0.181	.875	.222	1	.854	.875	.837	.875
board gd	1343	.343	0.118	.333	0	.625	.31	.333	.345	.333
corpgov index	1241	.077	0.266	0	0	1	.049	0	.079	0
corpgov index2	1241	.507	0.130	.512	.065	.965	.526	.525	.506	.51
roa (%)	1313	6.97	11.087	7.2	-46.6	41.1	-8.59	-1.2	8.099	7.4
debtequity_ratio	1306	1.469	2.106	1.23	.01	34.6	1.406	1.02	1.475	1.25
distress	1341	.069	0.253	0	0	1	1	1	0	0
current ratio	1315	2.174	4.238	1.353	.02	44.947	3.188	1.794	2.1	1.339
firm size	1292	15.243	2.246	15.465	8.039	19.264	13.454	13.8	15.38	15.529

Note: *Table II presents the descriptive statistics for our sample, including the number of observations, standard deviations as well as mean, median, minimum and maximum values per variable. In addition, the differences in mean and median values across the distressed and non-distressed firms are presented. Return-on-assets are expressed as a percentage (%).*

4.2 Multicollinearity and correlations

Because we include a multitude of independent variables that all measure corporate governance, we are at risk of multicollinearity across our variables. This is a common issue that many studies encounter, and in order to determine whether this problem significantly impairs our regressions' explanatory power, we run tests for correlations. A common way of identifying correlation is to use Pearson's correlation, which also enables us to determine whether the estimated correlations are significant or not. We also conduct a variance inflation factors (VIF) test to further deepen our analysis. The results can be found below in Table III.

There are two significant correlations between our dependent variable (distress) and the independent variables. Board size and board gender diversity are significantly negatively correlated to distress at a significance level of 1%. In turn, board independence and board capital fail to show a statistically significant correlation with distress. Moving on to the control variables, size and profitability show a negative correlation as expected, while the

current ratio is significantly positively correlated. This is similar to the findings in our descriptive statistics, suggesting that distressed firms have higher liquidity.

In addition, board size and firm size show a positive correlation of 0.448 at a 1% significance level. We further note that the strongest correlations exist between our secondary corporate index and our independent variables, with the strongest being -0.494 between the secondary index and board gender diversity at 1% significance. This is in line with our expectations since the index measures the variables. After performing a VIF test, we conclude that there seem to be no signs of multicollinearity, as no VIF values exceed the threshold of 10 which would signal significant multicollinearity (Kalnins, 2018).

Table III. Pearson Correlation Matrix & VIF

Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*VIF*
distress	1.000											
board_size	-0.100***	1.000										2.095
board_gd	-0.074***	-0.043	1.000									1.723
board_ind	0.024	-0.031	0.307***	1.000								1.18
board_capital	-0.037	0.016	-0.021	-0.008	1.000							1.665
roa	-0.379***	0.063**	0.046*	-0.045*	0.003	1.000						1.181
debtequity_ratio	-0.008	0.070**	0.044	0.032	-0.038	0.008	1.000					1.044
current_ratio	0.065**	-0.087***	-0.070**	-0.020	-0.065**	-0.138***	-0.149***	1.000				1.165
firm_size	-0.215***	0.448***	0.067**	0.023	-0.028	0.324***	0.171***	-0.312***	1.000			1.675
corpgov_index	-0.027	0.273***	-0.168***	-0.234***	0.023	-0.056**	-0.011	-0.018	0.043	1.000		1.185
corpgov_index2	0.038	0.489***	-0.494***	-0.252***	-0.435***	-0.050*	0.021	0.026	0.150***	0.288***	1.000	3.191

Notes: *This table presents the Pearson Correlation Matrix and VIF values for the dependent and independent variables. *, **, and *** represent a p-value of the coefficient of 0.1, 0.05, and 0.01 respectively.*

5. Results and analysis

5.1 Regressions

5.1.1 Initial regressions

We first run an initial regression for each and every independent variable; that is, board independence, board size, board capital, and gender diversity. These initial tests do only consider the independent variable in relation to distress. In the next series of regressions, we add the control variables. The results can be found below in Table IV.

Table IV. Regressions on Individual Variables Excluding Control Variables & Fixed Effects

	(1)	*(2)*	*(3)*	*(4)*
Variables	***distress***	***distress***	***distress***	***distress***
board_ind	0.553			
	(0.631)			
board_capital		-0.893		
		(0.682)		
board_gd			-2.458***	
			(0.910)	
board_size				-0.312***
				(0.0854)
Constant	-3.076***	-2.489***	-1.803***	-0.520
	(0.549)	(0.168)	(0.305)	(0.563)
Industry FE	No	No	No	No
Year FE	No	No	No	No
Clusters	No	No	No	No
N	1341	1239	1341	1341
Log likelihood	-334.87279	-298.33647	-331.62142	-328.08777
Pseudo-R^2	0.0012	0.0030	0.0109	0.0214

Note: *Table IV presents the results from regressions ran without control variables, fixed effects, and clusters. Standard errors are presented in parentheses under the coefficients. *, **, and *** represent a p-value of the coefficient of 0.1, 0.05, and 0.01, respectively.*

Table IV presents the results from 4 separate regressions, where each independent variable is tested against the financial distress dummy indicator in a logistic regression. Two out of four variables, board size, and gender diversity have significant negative coefficients at the 1% level. In contrast, board independence shows a positive, although insignificant, effect on distress risk. Likewise, board ownership fails to be significant. The results from these regressions do not support our null hypothesis, as board composition seems to influence distress risk. Additionally, it is a common notion in agency theory and prior literature that smaller boards should be more efficient and thus better monitors. This is not true in our case,

as a larger board reduces the risk of distress. However, excluding control variables impedes our ability to determine whether the increased risk is caused by board composition or omitted factors. We further note that the pseudo-R^2, an assessment that Hillegeist et al. (2004) use as a measure of the predictive model's explanatory power, is relatively low. In the next series of regressions, for which the results are presented in Table V, we, therefore, include control variables, fixed effects, and clusters.

Table V. Regressions on Individual Variables Including Control Variables & Fixed Effects

	(1)	*(2)*	*(3)*	*(4)*
Variables	***distress***	***distress***	***distress***	***distress***
board_ind	0.747			
	[1.209]			
board_capital		0.589		
		[1.234]		
board_gd			-1.631	
			[1.214]	
board_size				-0.220*
				[0.127]
roa	-0.0898***	-0.0941***	-0.0885***	-0.0935***
	[0.0187]	[0.0182]	[0.0196]	[0.0196]
debtequity_ratio	0.0196	0.0171	0.0233	0.0216
	[0.0403]	[0.0372]	[0.0391]	[0.0382]
current_ratio	-0.0454	-0.0369	-0.0520	-0.0436
	[0.0554]	[0.0760]	[0.0451]	[0.0525]
firm_size	-0.114	-0.104	-0.112	-0.0478
	[0.0777]	[0.109]	[0.0855]	[0.0894]
Constant	-1.056	-0.809	0.199	0.148
	[1.750]	[1.503]	[1.349]	[1.294]
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Clusters	Yes	Yes	Yes	Yes
N	1260	1161	1260	1260
Log likelihood	-229.77358	-198.03323	-228.98595	-228.18625
Pseudo-R^2	0.2679	0.2876	0.2704	0.2730

Note: *Table V displays the results from the regression including control variables, fixed effects, and clusters. Robust standard errors are presented in brackets below the coefficients. *, **, and *** represent a p-value of the coefficient of 0.1, 0.05, and 0.01, respectively.*

When including the control variables, it is evident that the predictive power of the regressions is significantly improved as the pseudo-R^2 has increased. Now, the only significant variable is board size at the 10% level. With controls, the coefficient of board capital also changes from

negative to positive. All other signs of the coefficients remain unchanged. Looking at the control variables, we can see that ROA strongly correlates with distress, with a negative coefficient significant at the 1% level in all regressions. This strong link could partially be explained by the fact that we include EBITDA in our two measures of accounting distress. Furthermore, previous scholars, such as García & Herrero (2021), also find a strong link between the two variables.

5.1.2 Main regression

Because our independent variables are indicators of what we argue is the same phenomenon, corporate governance, it is appropriate to run a regression with all variables. We first test all independent variables and subsequently, we add control variables, and finally, fixed effects and clusters. The final regression, (7), is expressed in Equation (4), and the results are displayed below in Table VI.

As more variables are gradually added to the regression, the coefficients and the significance of the coefficients change. Moreover, the pseudo-R^2 increases across the regressions and exceeds 0.30 in our final and main regression. Initially, board independence is positive, although not significantly, related to distress risk. This changes when board capital is considered, and the coefficient becomes significant at the 10% level. The p-value drops to 0.05 when our final independent variable, board size, is included, which in turn is negatively associated with distress at the 1% level. Gender diversity maintains a significance of 1% throughout the regression where control measures are not taken.

When including control variables and clusters, the significance levels drop. Now, board diversity and board size have a negative coefficient at a significance of 10% and 5% respectively. However, they demonstrate higher p-values than when tested individually together with control variables, which we describe in section 5.1.1. Furthermore, ROA remains strongly negatively associated with distress, at a significance of 1%. Finally, we include time- and industry-fixed effects, which changes the picture. Board size becomes significant at 10% and board gender diversity has a higher p-value of 0.05. In addition, board independence is positively related to distress at 10% significance. These findings do not support our null hypotheses.

Table VI. Regression on all Variables

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Variables	***distress***	***distress***	***distress***	***distress***	***distress***	***distress***	***distress***
board_ind	0.553	1.279*	2.121***	2.076***	1.716	1.610	2.116*
	(0.631)	(0.764)	(0.806)	(0.802)	[1.140]	[1.031]	[1.180]
board_capital		-0.874	-0.954	-0.862	-0.570	0.0863	0.772
		(0.685)	(0.692)	(0.693)	[0.882]	[0.949]	[1.063]
board_gd			-3.862***	-3.673***	-3.429**	-2.017*	-2.626**
			(1.085)	(1.053)	[1.345]	[1.121]	[1.276]
board_size				-0.342***	-0.251**	-0.261**	-0.255*
				(0.0950)	[0.110]	[0.126]	[0.150]
roa						-0.0909***	-0.0972***
						[0.0170]	[0.0192]
debtequity_ratio						0.0442	0.0141
						[0.0339]	[0.0396]
current_ratio						0.000824	-0.0389
						[0.0329]	[0.0788]
firm_size						-0.0421	-0.0391
						[0.0834]	[0.121]
Constant	-3.076***	-3.598***	-3.035***	-0.787	1.034	-0.906	-1.094
	(0.549)	(0.696)	(0.706)	(0.919)	[1.190]	[1.550]	[2.252]
Industry FE	No	No	No	No	Yes	No	Yes
Year FE	No	No	No	No	Yes	No	Yes
Clusters	No	No	No	No	Yes	Yes	Yes
N	1341	1239	1239	1239	1223	1175	1161
Log likelihood	-334.87279	-296.80567	-290.36501	-283.27129	-240.63893	-209.14256	-192.91013
Pseudo-R^2	0.0012	0.0081	0.0296	0.0533	0.1929	0.2502	0.3061

Note: *Table VI presents the results from the regressions including all our variables. In regressions 5-7, clusters are considered. In regressions 5 & 7, fixed effects are accounted for. Standard errors are presented in parentheses under the coefficients. Robust standard errors are presented in brackets below the coefficients. *, **, and *** represent a p-value of the coefficient of 0.1, 0.05, and 0.01, respectively.*

5.1.3 Regressions on the corporate governance index

We argue that corporate governance is a composite phenomenon and that in order to capture it, a composite measure needs to be developed. As elaborated on in 3.3.4, we design a corporate governance index encompassing all independent variables. We then run this variable against our dependent variable, financial distress, to determine whether there is a link between weak corporate governance and distress risk. The results can be found in Table VII below.

Table VII. Regressions on our primary corporate governance index

	(1)	*(2)*	*(3)*
Variables	***distress***	***distress***	***distress***
corpgov_index	-0.496	-1.099***	-1.178***
	[0.519]	[0.321]	[0.306]
roa		-0.0943***	-0.0943***
		[0.0170]	[0.0190]
debtequity_ratio		0.0413	0.0139
		[0.0329]	[0.0346]
current_ratio		-0.00628	-0.0418
		[0.0372]	[0.0883]
firm_size		-0.0873	-0.108
		[0.0745]	[0.111]
Constant	-2.629***	-1.174	-0.434
	[0.204]	[1.053]	[1.506]
Industry FE	No	No	Yes
Year FE	No	No	Yes
Clusters	Yes	Yes	Yes
N	1239	1175	1161
Log likelihood	-298.71641	-212.29390	-196.43037
Pseudo-R^2	0.0017	0.2389	0.2934

Notes: *Table VII presents the regressions performed on the primary corporate governance index. Robust standard errors are presented in brackets. *, **, and *** indicate a significance of 0.1, 0.05, and 0.01 respectively.*

In the first regression, the index is tested against distress without any controls or fixed effects, in line with the procedure for the individual variables in section 5.1.1. The results indicate that the index is negatively associated with financial distress risk. Recall that, according to the definition of the index, a lower score signals better governance. Given this, the results are interpreted as signaling that firms with worse governance are less likely to end up distressed. This contradicts agency theory and the findings of other scholars such as Daily & Dalton (1994). In the first regression, without controls, the coefficient of the index is insignificant. However, when we add control measures, the results become more robust and the negative coefficient becomes significant at the 1% level throughout the two final regressions. We further note that return on assets has a negative coefficient at 1% significance, like in all previous regressions.

5.1.4 Regressions on the secondary corporate governance index

As stated in section 3.3.5, as a supplement to our primary index, we develop a secondary measure with a different definition, yielding a continuous measure, which also measures the relative performance, similar to the first index. In section 4.1, we note that the two indices manage to capture corporate governance performance differently. We, therefore, run a final set of regressions to determine whether the secondary index is associated with distress risk. The results are presented in Table VII.

Table VIII. Regressions on our secondary corporate governance index

	(1)	*(2)*	*(3)*
Variables	***distress***	***distress***	***distress***
corpgov_index2	1.188	0.183	-0.342
	[0.805]	[1.024]	[1.050]
roa		-0.0903***	-0.0932***
		[0.0178]	[0.0200]
debtequity_ratio		0.0445	0.0161
		[0.0328]	[0.0361]
current_ratio		-0.00415	-0.0385
		[0.0328]	[0.0771]
firm_size		-0.0890	-0.103
		[0.0816]	[0.117]
Constant	-3.273***	-1.333	-0.492
	[0.385]	[0.942]	[1.346]
Industry FE	No	No	Yes
Year FE	No	No	Yes
Clusters	Yes	Yes	Yes
N	1239	1175	1161
Log likelihood	-298.33964	-214.20524	-198.23790
Pseudo R2	0.0030	0.2320	0.2869

Notes: *Table VIII presents regressions performed on the secondary index. Robust standard errors are presented in brackets. *, **, and *** indicate a significance of 0.1, 0.05, and 0.01 respectively.*

The coefficient of our secondary index remains insignificant in all regressions. Initially, we see that the index has a positive coefficient, but when control variables, fixed effects, and clusters are considered, the sign changes to negative. ROA still records a significant relationship to distress risk. Unlike the findings in section 5.1.3, the results suggest that there

is no relationship between corporate governance and distress risk. A possible explanation for the differing implications could be traced to the argumentation in section 3.3.5, where we advocate the need for a complementary index. Recall that our primary index uses a certain threshold, which, when trespassed, signals significantly worse governance than the average firm. A problem that can arise is that a firm that scores low on all components, but not enough to pass the threshold, would have the same score as the best-performing firm. Our secondary index is more detailed and is not at risk of such issues. We argue that the difference in results could be because of the first index's shortcomings when measuring governance performance.

5.2 Endogeneity concerns

5.2.1 Endogeneity in corporate governance

Endogeneity is a problem in econometrics where the independent variables correlate with the error term in a regression. This might cause biased estimates of the coefficients which might result in the wrong conclusions. Ultimately, how a firm composes its board is a choice rather than an exogenous decision, given that no sudden legislative changes or shocks occur. Larcker et al. (2007) were some of the first to elaborate on endogeneity in statistical studies of corporate governance and influenced later research to cope with such issues. Elsayed et al. (2022) state that most previous papers have neglected the effects of endogenous variables. The authors identify two types of endogeneity problems that may influence their study.

Firstly, omitted variables may cause problems. To reject the hypothesis that any potential endogeneity affects their results, Elsayed et al. (2022) employ instrumental variables (IV) based on the lagged unconventional variables used in their study. Adams & Ferreira (2009) also use IV to deal with the problem. To successfully apply instrumental variables, careful consideration is required. The instruments need to be correlated with the independent variable which will be instrumented. Hence, an IV approach becomes unfeasible given time and data constraints. We, therefore, acknowledge that omitted variables may affect our results and we suggest that future research should, given that time and data availability permits, determine and use appropriate instruments.

Secondly, Elsayed et al. (2022) propose that the sample may be subject to self-selection bias, which also may affect this sample. Because firms are not obligated to report on their board characteristics, and because not all observations are included in the database, there is a risk that the results are affected. One well-known remedy, which also is

proposed by the authors, is the Heckman two-step estimation, developed by Heckman (1979). However, just like omitted variables, time constraints limit our ability to conduct proper testing. It should be said that Elsayed et al. (2022) find no issues with sample-selection biases, which suggests that our sample further could be unaffected.

Finally, Elsayed et al. (2022) further note that reverse causality can affect the regression results. It is plausible reasoning that distress, and poor performance, may affect the choice of governance. To treat such problems, the author replaced the variables with their lagged counterparts, in line with Hoitash et al. (2009). In this case, distress in year t cannot affect the independent variables in year t-1, which would justify the use of lagged values.

5.2.2 Lag analysis

We construct a subsample of firms that excludes observations from 2011, as we do not have the data for 2010 (i.e., the lagged values). We further exclude observations that have missing data for both contemporaneous and lagged variables. As such, we end up with a sample of 945 firm-year observations, with 59 observations of firms in distress years. In line with Hoitash et al. (2009), we first determine the validity of our subsample. Our subsample may not be representative of the full sample, which then would make our conclusions from the lag analysis difficult to apply to the previous regressions. We, therefore, run the regressions described in Equation 4-6 using contemporaneous variables on the new sample and compare the results to prior regressions. Then, we run regressions based on lagged variables. The results are displayed in Table IX, which can be found in Appendix II.

We note that there are no significant differences other than the p-value for the coefficient for board size. In our subsample, the regression made using contemporaneous variables showed that board size was insignificant. However, because board size only demonstrated a weak significance of 10%, we are not concerned that the subsample is invalid. We also run the regressions with our corporate governance indices as independent variables. Both indices are insignificant, in contrast to prior tests when our primary index was negatively correlated with distress at 1% significance, but because the measuring ability of the primary index is doubtable, we choose to disregard this fact. We, therefore, argue that the subsample is valid.

When we replace the contemporaneous variables with lagged variables, gender diversity maintains a significantly negative association with distress, and board ownership continues to demonstrate insignificance. We, therefore, argue that these variables are not significantly affected by reverse causality. However, we note that board independence

becomes insignificant, which suggests that board independence might be subject to reverse causality. Moreover, the lag analysis gave further insights when it comes to board size. When using lagged variables, the significance of board size increases and is negatively associated with distress at a p-value of 0.01.

6. Discussion

Our initial regressions, where the variables were tested in isolation, first showed that board size and board gender diversity were significant factors when it comes to avoiding financial distress. However, when we accounted for control variables, fixed effects, and clusters, we note that these associations become insignificant. As Daily & Dalton (1994) suggest in their paper, corporate governance indicators may not be able to explain distress individually, but rather that a combination of factors has a meaningful impact. This is seen in our main regression (see Table VI), where board gender diversity, size, and independence have significant coefficients even when our control measures are included.

Another finding was that board independence is positively associated with distress, which is in contrast with both agency theory and prior findings. According to agency theory, an independent board performs better monitoring than a non-independent board (Baysinger & Butler, 1985). Further, Daily & Dalton (1994) argue that a firm that is not properly monitored may take on excessive risk, thus being more prone to financial distress.

One aspect that could play a role is the notion of over-monitoring, which Adams & Ferreira (2009) propose. The authors find that gender diversity and firm performance had a negative association in most cases. However, in firms with weaker governance structures, diversity improved performance, which they trace to a positive impact on monitoring stemming from a more diverse board. Likewise, as board independence is argued to improve the monitoring of firms, similar dynamics may exist. Excessive independence may result in extreme monitoring, reducing the CEO's interest in sharing information with the board. Adams & Ferreira (2009) suggest that over-monitoring breaks down the communication between the chief executive and the directors, which may be detrimental to firm value. This could also apply to distress: if a CEO refuses to communicate with the board of directors, the appropriate measures may not be taken in time. When the board later notices that the firm is approaching a crisis, it could already be too late. Furthermore, this over-monitoring hypothesis is supported by the fact that our sample showed a higher degree of independence among directors compared to the samples used in prior literature.

Gender diversity, on the other hand, demonstrated a negative relationship with distress in most regressions. García & Herrero (2021) report similar findings, which they attribute to female directors' positive impact on monitoring, in line with Adams & Ferreira (2009). Thus, we identify a complexity. Board independence is also a factor that supposedly improves the monitoring of firms. This factor showed a positive link to distress risk, which could be explained by over-monitoring, as mentioned. Then, why is this not reflected in board diversity?

In addition to the monitoring argument, García & Herrero (2021) also suggest that a higher risk-aversion among women could reduce the likelihood of distress. Recall that Daily & Dalton (1994) argue that monitoring reduces the risk of distress because it can prevent firms from taking on excessive risk. Based on this, we suggest that gender diversity is beneficial in two ways. Firstly, by being more risk-averse, female directors may influence their boards to make different decisions than a male-dominated board would have. Such decisions could reduce the fundamental risk profile of the firm. In addition, they improve the monitoring of the executives, which further hedges the firm from distress. This could explain the different implications of board independence and diversity, as independent directors do not tend to be more risk-averse than non-independent directors per se.

While considering reverse causality, we conclude that the coefficient of lagged boards is insignificant, suggesting that reverse causality may be causing the identified association between higher independence and distress risk. This could be interpreted as a sign that more independent directors are appointed when a firm becomes distressed, a hypothesis that is supported by Hermalin & Weisbach (1988). In their study, they found that board composition is affected by prior past performance. Hermalin & Weisbach (1988) suggest that insider directors are replaced by outsider directors because (a) insider directors may be serving as executives and responsible for bad performance and are thus fired, and (b) poor performance signals inadequate monitoring, and outsider directors are appointed to improve monitoring. However, this argument assumes that firms would see signs of distress prior to the year of distress, as directors are not appointed immediately. Daily & Dalton (1994) find that bankruptcy, the final stage of financial distress, can be likened to a downward spiral, where performance is notably impaired years before the bankruptcy. We suggest that this also holds for financial distress. When firms notice that their performance is worsening, measures may be taken in an attempt to save the firm retroactively. Such a measure could be replacing insider directors with outsider directors. This would be a feasible explanation for why board independence is positively associated with distress risk.

Board ownership failed to show any meaningful correlations with distress risk. It is the only dependent variable that lacks a significant coefficient across all regressions. This conflicts with agency theory, which states that directors owning more stock would be better monitors (Jensen & Meckling, 1976; Daily & Dalton, 1994). However, in the literature, no empirical support for this notion is provided (Elsayed et al., 2022). In fact, Platt & Platt (2012) find that ownership among independent directors actually increases the likelihood of bankruptcy. As mentioned in section 3.3.2, they propose an alternative perspective. Ownership may increase the directors' propensity to take on risks to earn higher returns rather than improving monitoring ability. Therefore, a plausible explanation could be that board ownership has an unambiguous effect. On the one hand, it aligns the interests of the board of directors with the shareholders' interests, while on the other hand, making the directors more prone to taking risks. Therefore, neither a clear positive nor a clear negative link can be determined.

Our final corporate governance factor, board size, demonstrates a negative coefficient in all our regressions. Many scholars, such as Platt & Platt (2012) and García & Herrero (2021), propose that size should reduce the risk of distress because a smaller board is more effective, in line with agency theory. However, even when considering a potential reverse causality, board size demonstrates a negative association with distress, which is in conflict with the proposed theory. Therefore, we turn to other literature to see if there could be more to board size rather than impairing monitoring ability. Resource dependence theory is, just like agency theory, often applied to corporate governance studies (Hillman & Dalziel, 2003; Zahra & Pearce, 1989). According to the theory, the board of directors provides information and resources to the firm, which might improve the firm's performance. Dalton et al. (1999) further suggest that a larger board is beneficial because the information and resource-provision ability of the board increases. Therefore, a large board should be better fitted to avoid financial distress. We thus suggest that future research incorporate resource dependence theory in the study design to capture the many aspects of corporate governance.

In addition to the corporate governance factors, we defined two composite variables: our primary and secondary corporate governance indices. The results from the regression on the primary index suggest that weak corporate governance reduces the risk of distress. Such a conclusion conflicts with both agency theory and prior research, which, even though its unambiguity, favors a hypothesis that strong monitoring would reduce distress risk. However, as we describe in sections 3.3.5, 4.1, and 5.1.4, the measuring ability of the index is questionable. Our secondary index failed to demonstrate any significant relationship with

distress, although they are constructed similarly. Therefore, we argue that the explanatory power of the primary index is doubtable.

Another factor, which adds to the doubt of the usefulness of our indices, is that the construction required predicted impacts of each factor, which later were proven to be incorrect. Board size was, for example, predicted to increase distress risk, as suggested by agency theory. However, if other theoretical frameworks, such as resource dependence theory, were to be consulted, the prediction would have been that a large board reduces distress risk. Hence, determining an index that truly reflects "good governance" becomes complex as the theoretical suggestions are many, and assumptions must be made.

Finally, when considering reverse causality in the lag analysis, no index has a significant association with distress risk. This suggests that the primary index's negative association can be attributed to the reverse causality of board independence, which becomes insignificant in the lag analysis. Therefore, we argue that the negative association between the index and distress does not reflect the true impact that corporate governance has on distress risk.

In this study, an attempt to take reverse causality into account is made by conducting a lag analysis. However, other endogeneity issues are not explicitly considered. As suggested by Larcker et al. (2007), studies on corporate governance are at risk of endogeneity stemming from omitted variables. There may be other characteristics that affect both the dependent variable and the independent variables, which are not taken into account, thus resulting in biased conclusions. Similarly, Elsayed et al. (2022) further point to the risk of selection biases because firms are not obliged to report governance statistics. Furthermore, due to the significantly limited available data, this concern is aggravated. We acknowledge that these issues might have impacted our results. However, other scholars studying corporate governance have found that their results are consistent even when considering omitted variables (Larcket al., 2007; Elsayed et al., 2022; Hoitash et al., 2009). In addition, the Heckman correction performed by Elsayed et al. (2022) implied that their sample is unaffected by self-selection bias, which suggests that the effect on our results likewise is limited.

7. Conclusions

Through this study, we contribute to the understanding of the impact of board composition and board characteristics on distress risk through an agency theory perspective. The presented findings may be considered by regulators and other decision-makers in the development of corporate governance codes, or by firms, that wish to strengthen their governance. Furthermore, our results may contribute to the discussion on the importance of adequate governance mechanisms and the construction of boards.

The study covers a sample of 237 Swedish-listed firms with observations from the last decade, spanning 2011-2021. We find that our sample differs from prior findings, suggesting that the Swedish firms in the 2010s had different board composition and ownership compared to firms in other countries and time periods. This conclusion is further supported by the fact that CEO/chairperson duality, which has had a central role in research in the field, is forbidden by law in Sweden since 2005. We argue that our findings further deepen the understanding of corporate governance by providing results from a study conducted in a different context.

Similarly to previous research, our results are ambiguous from an agency theory perspective. The different corporate governance indicators either suggest that strong governance reduces, increases, or does not affect distress risk. When combining the proxies into one factor through the creation of indices, we fail to demonstrate a significant composite effect after controlling for reverse causality. Hence, and due to concerns regarding the measuring ability of the indices, we turn to individual proxies to understand the impact of governance.

Board independence has long been designated as an important factor for conducting effective monitoring, and in conjunction with an agency perspective on financial distress, it is surprising that we find a positive relationship to distress. This could be interpreted as support for the over-monitoring hypothesis, which suggests that the communication between directors and executives may break down due to excessive monitoring. However, when conducting a lag analysis, we conclude that board independence might be subject to reverse causality, suggesting that firms appoint more independent directors in times of crisis.

We conclude that a more diverse board is associated with a lower distress risk, which could be explained by the fact that female directors tend to be more risk-averse and improve the monitoring of firms, which is in line with agency theory. However, this perspective is not coherent with our second finding, namely that board size also reduces distress likelihood.

Instead, other theoretical frameworks, such as the resource dependence theory, may be applied to understand the dynamics behind our results. We further fail to establish a clear relationship to board ownership, which we suggest may be due to two conflicting forces which in turn can be explained by two conflicting perspectives. This calls for the application of multiple theories in studies on corporate governance, which should be considered in future research.

Even though our study fails to provide evidence that all corporate governance indicators impact distress risk, we propose that the two phenomena are interlinked. This is based on our findings that higher board gender diversity and a larger board reduces the risk of distress.

8. Limitations and further research

This study was conducted on a sample containing Swedish listed companies. Furthermore, as elaborated on in section 3.2, the sample is further constrained by the availability of data on Swedish boards. Additional data would have been beneficial in multiple ways. Firstly, a larger sample would have been more representative, which could add more weight to the conclusions drawn. Secondly, a large sample would have allowed for more robustness checks. Because of our limited data, altering the definition of distress to be more strict using the variables included would have yielded a statistically insignificant number of distressed firms. Because of time constraints, complementary data could not be collected for the firms with missing observations, and for future studies, it is recommended to use a wider sample. We acknowledge that our relatively small sample could affect the generalizability of our results, and one proposal would be to investigate the Nordic region instead of constraining the sample to Swedish firms. Because the Nordic countries unarguably have much in common, this would facilitate a wider sample collection without having the effect of drastically different cultures.

As proposed in the conclusion, we suggest that future research should apply multiple theories in interpreting the results. This study applied an agency theory perspective, which is widely used in research directed to the subject. Another increasingly popular theory is the resource dependency theory (Daily & Dalton, 1994). Hillman & Dalziel (2003) further advocate the importance of the theory, which broadens the scope of the board composition. Instead of focusing solely on the monitoring ability of a board, as agency theory does, resource dependency theory suggests that outside directors may provide appropriate resources

to the firm. A similar theoretical framework was applied in conjunction with agency theory by Elsayed et al. (2022), who looked into the boards' social and managerial networks. Such iterations could possibly deepen the understanding of the association between corporate governance and distress.

Finally, this study does not consider the effects of omitted variables or sample-selection biases. An attempt to correct reverse causality is made through the use of a lag analysis. However, we acknowledge that endogeneity may have affected our research. Future attempts to investigate the topic should reserve time and resources to identify appropriate instruments and equations for IV analyses and Heckman corrections respectively, as proposed by Elsayed et al. (2022). By the inclusion of additional variables which describe more detailed characteristics of the board, the risk of omitted variables may further decrease. A suggestion could be to follow Fich & Shivdasani (2006), who include data on directorships per director in their study.

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Appendices

Appendix I: Descriptive statistics for our subsample

Table IX. Descriptive statistics for the subsample

Variable	*Obs*	*Mean*	*Std. dev*	*Median*	*Min*	*Max*
board size	945	7.046	1.423	7	4	11
board capital	945	.209	0.177	.169	0	.677
board ind	945	.869	0.150	.875	.222	1
board gd	945	.356	0.108	.375	0	.625
corpgov index	945	.078	0.269	0	0	1
corpgov index2	945	.508	0.127	.512	.065	.92
roa	921	6.762	10.917	7	-46.6	41.1
debtequity ratio	914	1.518	2.187	1.26	.01	34.6
distress	944	.062	0.242	0	0	1
current ratio	922	1.837	3.008	1.321	.02	44.947
firm size	912	15.378	2.230	15.605	8.039	19.264

Note: *Table IX presents the descriptive statistics for our subsample, including the number of observations, standard deviations as well as mean, median, minimum and maximum values per variable.*

Appendix II: Lag analysis results

Table X. Regression on all variables with contemporaneous and lagged variables

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Variables	***distress***	***distress***	***distress***	***distress***	***distress***	***distress***
board_ind	3.829**			2.220		
	[1.521]			[1.451]		
board_capital	0.594			0.277		
	[1.496]			[1.311]		
board_gd	-3.491**			-3.559*		
	[1.668]			[1.845]		
board_size	-0.365			-0.386***		
	[0.223]			[0.141]		
corpgov_index		-1.731			-0.342	
		[1.208]			[0.942]	
corpgov_index2			-0.600			-0.715
			[0.958]			[0.997]
roa	-0.112***	-0.112***	-0.108***	-0.118***	-0.106***	-0.108***
	[0.0321]	[0.0324]	[0.0302]	[0.0344]	[0.0297]	[0.0310]
debtequity_ratio	0.0588	0.0510	0.0526	0.0176	0.0511	0.0522
	[0.0787]	[0.0512]	[0.0555]	[0.0709]	[0.0544]	[0.0557]
current_ratio	-0.225*	-0.218	-0.226	-0.232*	-0.224	-0.225
	[0.118]	[0.143]	[0.138]	[0.129]	[0.141]	[0.138]
firm_size	-0.0505	-0.103	-0.114	-0.00357	-0.122	-0.111
	[0.167]	[0.134]	[0.135]	[0.155]	[0.143]	[0.145]
Constant	-0.497	0.384	0.845	0.645	0.708	0.865
	[2.993]	[2.080]	[2.215]	[3.010]	[2.195]	[2.159]
Lagged board	No	No	No	Yes	Yes	Yes
Industry FE	No	No	No	No	Yes	No
Year FE	No	No	No	No	Yes	No
Clusters	No	No	No	No	Yes	Yes
N	886	886	886	886	886	886
Log likelihood	-127.82473	-132.93221	-134.61978	-128.90855	-134.58321	-134.58002
Pseudo R2	0.3353	0.3087	0.2999	0.3296	0.3001	0.3001

Note: *Table X presents the results from regressions made on a subsample of data consisting of observations from years 2012-2021. Regressions 1-3 are made using contemporaneous variables, whereas regressions 4-6 instead include lagged variables. Robust standard errors are presented in brackets. *, **, and *** indicate p-values of 0.1, 0.05, and 0.01 respectively.*

Appendix III: Variable definitions

Table XI. Variable definition and sources

Variable	*Definition*	*Source*
Distress	Dummy variable equal to one if the firm is distressed according to our definition, zero otherwise.	Retriever Business & Finbas provided by SHoF
Board size	Number of directors on the board	Modular Finance's Holdings
Board independence	Directors independent to firm / Board size	Modular Finance's Holdings
Board gender diversity	Number of female directors / Board size	Modular Finance's Holdings
Board capital	Capital owned by the board / Total capital	Modular Finance's Holdings
Return on assets (ROA)	(EBIT/Total Assets)*100	Retriever Business
Debt-to-equity ratio	(Total Current Debt + Total Non-Current Debt+t*Untaxed reserves)/(Total Equity + (1-t) * Untaxed reserves)	Retriever Business
Current ratio	Current assets/Current liabilities	Retriever Business
Firm size	The logarithm of sales	Retriever Business
t	t=0.263 in years 2011-2012 and t=0.22 in years 2013-2021.	Retriever Business

Note: *ROA and debt-to-equity ratio were imported immediately from Retriever Business without any further adjustments and therefore follow their definitions. Untaxed reserves are split between 22% debt and 78% equity following Retriever's estimation of Swedish tax rates for years 2013-2021 and 26.3% debt and 73.7% equity for years 2011-2012.*