THE IMPACT OF FUNDAMENTAL FIRM CHARACTERISTICS ON THE TAIL RISK OF ITALIAN AND SWEDISH STOCKS

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TAIL RISK IN ITALIAN STOCKS:
AN EMPIRICAL ANALYSIS[*]

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ABSTRACT

This paper investigates whether differences in Tail Risk across Italian companies can be explained by their fundamental characteristics.

To this end, data on stock returns, financial performance, corporate governance, gender diversity and ownership were either obtained through financial databases or hand collected from over 1,000 company filings to build a longitudinal panel dataset comprising the 152 largest Italian non-financial firms over the 2000-2018 period. A Fixed Effects panel model was used to investigate the issue, using a measure of historical Expected Shortfall as a proxy for Tail Risk and controlling for both firm-level omitted variable bias stemming from unobserved heterogeneity as well as market-wide shocks over time.

The main finding of this paper is that fundamental variables have a significant relationship with Tail Risk, and such relationship changes depending on the size of the company. As a matter of fact, at the full panel level Tail Risk seems to be mainly negatively related to ROA and the presence of institutional investors in the shareholder base. Nevertheless, when companies are divided based on their size and the analysis

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is repeated for each group, more interesting results emerge. On the one hand, for large firms only financial variables show significant coefficients (leverage and ROA), along with the presence of a large shareholder. On the other hand, the results are diametrically opposite for small companies, for which Tail Risk is significantly related only to ownership and corporate governance variables, and in particular to the presence of institutional and activist investors in the shareholder base, the presence of a large shareholder and the percentage of members of the board of directors that are independent.

The results seem driven by the specific characteristics of the Italian market, where families, financial institutions and the public administration may have different levels of influence on firms depending on their industry and size.

Interestingly, apart from the share of independent directors on the board of smaller companies, corporate governance and gender diversity variables never have a significant relationship with Tail Risk. This is consistent with the high heterogeneity and uncertainty of results found in previous research linking these characteristics to company performance and risk, as well as the perceived delays in Italy in developing these topics vis-à-vis other countries.

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SECTION I: Introduction

A. Summary

This paper investigates whether differences in Tail Risk across Italian companies listed on the Milan Stock Exchange can be explained by their fundamental characteristics, focusing on firm performance, corporate governance and ownership.

To this end, corporate governance, gender diversity and ownership variables were hand-collected from over 1,000 company filings, and were merged to financial and return data to create a longitudinal panel dataset comprising the 152 largest Italian non-financial firms over the 2000-2018 period. The definition of Tail Risk adopted borrows from the financial risk management literature, and, in particular, corresponds to the historical daily average return over the 5% lowest returns of a given year (hence, based on the concept of Expected Shortfall).

A Fixed Effects panel model was used in order to investigate the issue, after running the appropriate diagnostic statistical tests and ascertaining that the result matched with the expected theoretical background, controlling for both possible firm-level omitted variable bias stemming from unobserved heterogeneity and macroeconomic and market-wide shocks over time.

The main hypothesis made ex-ante, on which this paper is based, is that the variables considered do have a significant relationship with corporate Tail Risk, but that such relationship varies depending on the size of the firm. This reasoning is driven by the specific characteristics of the Italian market environment, where families, financial institutions and the government may have differing levels of influence on firms depending on their industry and size.

The main finding of this paper, in fact, is that fundamental features have a significant relationship with corporate Tail Risk, and that such relationship indeed changes with

the size of the firm. Remarkably, the downside risk in the stock of smaller firms is exclusively correlated with ownership and governance variables, while the risk in the stock of large firms is mainly related to their financial performance.

This paper contributes in several innovative ways to the existing literature.

First, it is the first paper in the literature in which the relationship between firm fundamentals and Tail Risk is examined to such a degree. Most previous studies, in fact, focus primarily on a single specific company characteristic, and look at overall risk – defined as the variance of stock returns or some firm performance measure – instead of Tail Risk specifically. The only previous paper looking precisely at Tail Risk (Ellul and Yerramilli, 2013) does so in a completely different context, as it focuses on financial firms in the US, and focuses purely on the risk management qualities of its sample. Second, this is the first paper analysing the issue in the Italian context with the aid of recent data, as the surveyed works that touch, even tangentially, on the matter are based on data from different jurisdictions and mostly looked at samples that are, by now, outdated.

Third, the dataset used is unique to the extent to which the key variables were hand-collected by the author and are not available to the general public in detailed form, as the regulators in Italy only publish aggregated statistics on the matter.

The rest of the paper is organized as follows. In <u>paragraph B of this section</u> a detailed review of the literature is conducted, looking at all branches of research from which this paper draws. During such review, a summary of the relevant theoretical findings on which this analysis is based will also be presented in order to provide the underlying context. Specifically, relevant sources will be mentioned justifying the choice of both the Tail Risk variable as well as the various corporate governance, gender diversity and ownership variables. In <u>section II</u>, a short summary of the Italian market environment will be offered, since its specific aspects are likely to have a relevant impact on characterizing the results of this study. Particular reference will be made to the role of families and the government in Italian listed firms. <u>Section III</u> provides the

essence of the paper, as it describes the empirical analysis that has been conducted. In particular, in paragraph (i) the detailed research question will be presented. Paragraph (ii) will provide precise definitions for the variables used, while paragraph (iii) summarizes the data collection process. In paragraph (iv) both descriptive statistics and preliminary results are presented. Paragraph (v) will finally contain the actual empirical results, first looking at the data aggregated for the full panel and then at the subsets constructed based on company size. The results are then analysed and discussed in detail in paragraph (vi). Lastly, section IV concludes, providing a summary of the results as well as presenting possible limitations and a series of suggestions for related subjects that could be tackled by future research.

B. Literature review and theoretical background

A review of the literature on which this paper builds upon is carried out here, by also touching on the underlying theoretical background in order to provide the context on which this analysis is based. Since this work does not fit in a defined branch of research, but rather is at the cross-section of various subjects which are needed to correctly understand its results, a paragraph is dedicated to each.

In particular, the paper builds upon (i) the concept of Value at Risk and Expected Shortfall as a measure of Tail Risk, (ii) the impact of institutional and family ownership on listed companies' risk and performance, (iii) the relationship between different characteristics of corporate governance and firms performance and risk, and (iv) the body of research investigating the Italian stock market and governance environment.

   i.   *Expected Shortfall as a measure of Tail Risk*

The measurement of Tail Risk has been debated extensively in the last 3 decades. Such debate was particularly supported by various tail events that spurred the development of banking and prudential regulation over time.

Dionne (2013) provides an historical study of risk management techniques in the twentieth century, where he argues that, even though Value at Risk was used by financial institutions and trading desks already before the 1990s, the concept was first popularized in 1994 when JP Morgan published information on its own internal market risk measurement system – RiskMetrics.

Subsequent research in the 1990s and 2000s focused on the problems of Value at Risk from the risk manager's point of view.

Artzner et al. defined a set of "four desirable properties for the measurement of risk, and call the measures satisfying those properties coherent". Notably, they show that Value at Risk fails to satisfy one of such properties: subadditivity (Artzner et al., 1999). The search for a subadditive risk measure will lead to the development and use of Expected Shortfall. In fact, Acerbi et al. (2002) show that Expected Shortfall is indeed a coherent measure of risk, and it satisfies subadditivity. What is most important to the application in this paper, however, is the fact that they show that Value at Risk may be unable to distinguish between securities with different levels of risk when the loss distribution is different below the quantile that is taken into consideration, and that Expected Shortfall can be used to solve such flaws (Acerbi et al., 2002).

Following this, Expected Shortfall has been increasingly used as an alternative to Value at Risk for measuring Tail Risk, to the point that the Basel Committee on Banking Supervision replaced it to Value at Risk as the risk measure to be used in the context of market risk by financial institutions.

As a response to this, Du and Escanciano (2017) confirmed that Expected Shortfall is able to account better than Value at Risk for extreme events using unconditional and conditional backtests as well as a set of Monte Carlo experiments on 3 stock indices: the DAX, the S&P 500 and the HS.

Finally, Expected Shortfall has notably been used in a context similar to the one of this paper by Ellul and Yerramilli (2013) to measure the Tail Risk of the stock of bank holding companies (BHC) during the 2009 financial crisis. They calculate the measure as the "average return of the BHC's stock over the 5% worst return days for the BHC

stock." By developing a risk management index as the first principal component of bank risk management variables, they show that those banks that have a stronger risk management functions showed lower Tail Risk and better performance during the crisis. They also find that their risk management index is driven by better corporate governance.

ii. *Corporate governance and corporate performance*

A large body of research has developed in corporate finance around the relation of corporate governance and firm performance, with mixed results. There is a very high level of heterogeneity with regards to which corporate governance variables are taken into consideration and how they are defined and calculated, which research methods are used and what the relationship between different measures should be, to the point that an extensive review of the research on the topic would need a whole standalone analysis. Therefore, this paragraph will focus on the research that is most related to the investigation conducted here and on which this paper is based.

The composition and the size of the board of directors as well as their effect on the performance of the firm have been broadly studied over time, with results pointing to both a positive and a negative relationship. Such research, studying the effect of corporate governance on firm performance, is interesting in the context of this paper since it could be argued that a firm that is more likely to show good performance in the future is less likely to be risky – hence corporate governance that is generally associated to better firm performance may also be associated with lower Tail Risk. Regrettably, a large number of papers (for example Coles et al., 2008) focus on Tobin's Q as a measure of performance instead of relying on more operating and less market-based variables, such as Return on Assets (ROA) or Return on Invested Capital (ROIC). It seems reasonable to pay more attention, instead, on those focusing on more tangible performance measures. In fact, Wintoki et al. (2012) argue that "Tobin's Q is

a proxy for growth opportunities, and […] growth opportunities are a cause, rather than a consequence, of governance structures".

Among the papers investigating the drivers behind the composition of the board of directors, Boone et al. (2007) track board development for US industrial firms that went public between 1988 and 1992 for 10 years, and find, among other results, that board size and independence increase as firms grow and diversify, but that a large portion of the cross-sectional differences in their composition seem to be individual to the specific firm. Coles et al. (2008) obtain results along the same lines: they use data on companies available on *Execucomp* and find that more complicated company structures are positively associated to the size of the board of directors as well as to the presence of outside directors.

With regards to the effects of corporate governance variables on firm performance, results seem to be quite mixed, which prevents the drawing of conclusions on the matter.

On the one hand, several papers find a negative relationship between size and performance, spanning different industries and geographies.

Eisenberg et al. (1998) study small firms in Finland and find a "negative correlation between board size and profitability," but are unable to determine the source of such relationship. Among different possible explanations they include the presence of less problems in information transmission. Yermack (1996) investigates data on industrial companies based in the US between 1984 and 1992 using both Ordinary Least Squares (OLS) and Fixed Effects panel models and find a negative relationship between board size and firm performance with, as a dependent variable, both Tobin's Q and standard Return on Assets and Return on Sales measures. Guest (2009) looks at an extensive sample of over 2,500 British firms in the period between 1981 and 2002, and, using both standard OLS and a panel fixed effects methodology, as well as a GMM dynamic panel methodology to account for possible endogeneity of the variables, he also finds a negative association between board size and both profitability and market returns.

These results fit with the recommendations of Lipton and Lorsch (1992), according to whom boards do not spend enough time in meetings during the fiscal year and may be too large to communicate information effectively if they are composed of more than 10 people. Jensen (1993) also suggests a similar concept, arguing that larger boards are less functional than smaller ones and may be influenced and manipulated more easily by the Chief Executive Officer.

On the other hand, various results point in the opposite direction and find that board size may be related to better performance. For example, Rashid (2018) analyses 135 firms on the Dhaka Stock Exchange in the period between 2006 and 2011, excluding companies in the financial sector, and finds that board size is generally correlated with better firm performance.

Adams and Mehran (2012) use data on a random sample of 35 of the largest 200 banks in the US between 1986 and 1999 and find that board size is positively related with bank performance, but suggest that this may be the case only if increased board size is also followed by an increased number of members sitting as directors of subsidiaries of the bank holding company. Indeed, as they argue, the presence of specific regulation and high complexity in the banking sector may imply that these results only hold for companies operating in the financial sector. Nevertheless, these conclusions seem to be in line with the body of research that finds a positive correlation between the size of the board and the size of the firm, as a larger firm is generally more complex than a smaller one, but is also likely to show better performance. For example, Ilaboya et al. (2016) find a positive relationship between board size and firm size using a sample of Nigerian and Malaysian firms. Boone et al. (2007) also find such positive relationship between firm size and board size. In this context, a notable paper is the one by Linck, Netter and Yang (2008), who use a sample of almost seven thousand US firms (excluding firms active in the utilities and the financial sector) with observations spanning the period between 1990 and 2004. Among other results, they use a panel Fixed Effects model with year fixed effects and industry dummies and find that "larger firms have larger and more independent boards".

Coles et al. (2008) have results along the same lines, as they argue that their finding of larger firms having larger boards is driven by the fact that larger firms are more likely to be complex, which in turn leads to the need for additional directors. Interestingly, they add a level of nuance to the discussion, as their research seem to indicate that performance (as proxied by Tobin's Q) is positively related to the size of the board of directors if the firm is complex and larger, while the opposite is true for simpler companies.

Just like the research relating board size to performance seems to be weak and inconclusive due to its high heterogeneity of results, there seems to be somewhat of the same situation in the one relating board structure to profitability, even though the overall consensus seems to point towards the existence of a very weak relationship (if any). As argued by Nicholson and Kiel (2007), these analyses fall in the theoretical concepts that build the cornerstone of principal-agent relationships. On the one side, agency theory would point towards a larger amount of insider or non-independent members of the board leading to poorer results for the firm, as managers would be more easily able to act in their own self-interest. On the other side, stewardship theory would lead to the opposite conclusion, as it is based on the idea that company insiders are better equipped to steer the company in a positive direction given that they are commonly thought to act in the interests of the shareholders.

On a preliminary level of analysis, as showed by Boone et al. (2007), independence of the board of directors seems to be somewhat correlated to both firm size and age as well as complexity. Agrawal and Knoeber (1996), relying on data on approximately 387 US firms in 1987, use both a standard OLS and a Two-Stage Least Squares methodology (to account for possible endogeneity in their variables) and find a negative relationship between the independence of the board of directors and performance (measures using Tobin's Q). The same conclusion is reached by Bhagat et al. (2002), who also find weak evidence pointing in the direction of a negative correlation between the independence of the board of directors and the performance of the largest US firms between 1985 and 1995, but their results change based on the

specification of performance measure used as dependent variable in the empirical models. Indeed, most of their results seem to be more consistent with a non-significant relationship between the variables. In fact, various researchers obtain similar results and argue that there is little to no relationship between the composition of the board of directors and company profitability. For instance, Hermalin and Weisbach (1991) find no correlation between board independence and company performance. As mentioned before, Bhagat and Black (2002) also find little evidence of any relationship between the share of independent directors on the board and the future performance of the firm. Remarkably, however, they seem to find that companies that experienced negative performance in the recent past were more likely to increase the independence of their board, following the general idea that a higher degree of independency should allow for better control of insiders and as a consequence improve company conduct. Adams and Mehran (2012) also find little evidence of correlation between board structure and firm performance in their sample of financial firms, and the same results is obtained by Rashid (2018) with a completely different sample of non-financial firms.

Overall, it seems likely that there is value in the conclusion of Nicholson and Kiel (2007), who argue that different principal-agent theories can explain different specific situations, but there is no unifying empirical regularity that holds true for all the cases taken into consideration. In fact, Harris and Raviv (2008) developed a theoretical model in which shareholders may obtain more benefit either by an outsider- or by an insider-controlled board depending on the situation. Moreover, by suggesting the plausibility of an endogenous relationship between the performance of the firm and the structure of the board, they cast doubts on some of the previous research that does not take into account for such a possibility.

Indeed, in a very influential paper, Wintoki et al. (2012) argue that the relationship between profitability and board composition is endogenous in nature, and that such endogeneity should be dealt with using a suitable model, such as a dynamic Generalized Method of Moments (GMM) estimator. By applying such a methodology to a panel including more than 6,000 companies between 1991 and 2003, they find no relationship between board composition, board size and firm performance.

iii. <u>*Corporate governance and corporate risk*</u>

The research conducted on the connection between corporate governance and risk is less extensive than the one that looks directly at the governance-performance relation analysed above. Nevertheless, this body of knowledge is more interesting for the purpose of this paper due to its direct relevance for the subject matter at hand.
In recent research, corporate governance has been related to either equity prices (or returns) or to firm specific risk, mainly taking into consideration profitability.

First, various authors argue that differences in the governance of firms can influence the distribution of their stock returns.
Gompers et al. (2003) used a sample of more than 1,000 firms between 1990 and 2000 and built a "governance index" for each based on a set of 24 variables, finding a significant relationship with stock returns from both a statistical and an effect size point of view. They analyse a long-shot portfolio that is long the stocks with supposedly better governance (in terms of providing higher rights to shareholders as opposed to management) while being short the stocks of firms showing opposite characteristics. This portfolio seems to be able to obtain relevant and consistent abnormal returns over the decade taken into consideration. Unfortunately, the analysis conducted in the paper does not allow to tell whether such results are a consequence of the differences in governance and the related shareholder rights heterogeneity among the firms or whether there is some kind of unobservable latent firm characteristic driving them.
Cremers and Nair (2005) build upon the work of Gompers and conduct a similar study looking at both internal as well as external governance mechanisms in firms during the last decade of the 1900s. Their work is very relevant with respect to the research question asked in this paper as, in addition to "pure" governance variables, as done by Gompers et al., they also take into consideration ownership characteristics, such as the presence of large institutional (public pension fund) blockholders. Using this information, they build a portfolio that is long companies with high takeover vulnerability

and institutional ownership and short symmetric companies, and show that it is able to obtain sizeable annualized abnormal returns.

Ferreira et al. (2007) further develop this stream of research, and find that firms showing more significant anti-takeover measures (as defined by the index developed by Gompers et al.) also show less firm-specific information contained in their share prices (i.e. lower idiosyncratic volatility). Therefore, they argue that governance can be related to firm-specific risk through trading – implying that firms that show certain corporate governance characteristics will show certain associated risk characteristics that can be verified in their stock returns behaviour. An interesting result obtained in their paper is that such a relationship between governance and risk is generally amplified by the presence of institutional investors. Ferreira et al. (2011) look at the possible interactions between the structure of the board and price informativeness. In their work, they argue that stock market monitoring can substitute the monitoring task of the board, and find evidence according to which higher board independence (as measured by the share of independent members on the board of directors) is related to lower stock price informativeness.

The second branch of research studying the ties between corporate governance and risk looks more specifically at corporate risk taking and the stability of the firm's operating performance instead of the variability and informativeness of its share price. John et al. (2008) look at the relation between the investor protection generated by the firm's corporate governance and the level of corporate risk taking. In general, higher investor protection is thought to decrease the amount of risk undertaken by management, as executives would find it more difficult to expropriate shareholders of the value created by the firm. This may especially be the case when strong corporate governance is accompanied by a large block shareholder. The analysis makes use of both cross-country and intra-country (US specific) firm-level data referring to the 1990s and beginning 2000s. In the context of this paper, it is more interesting to look at the results obtained in the US specific model developed, as the cross-country model focuses more on country variables rather than on company-specific ones. Moreover,

the main proxy for corporate risk taking taken into consideration that is relevant for the purpose of this study is the standard deviation of the ratio between the EBITDA and the total assets of the company. The empirical model developed by John is based on both an Ordinary Least Squares regression as well as a 2-Stage Least Squares regression to account for possible endogeneity, since an income statement variable appears as the regressand. In both cases there appears to be a significant relationship between the proxy for corporate risk-taking and a governance index as well as firm size, while the opposite is true for "large shareholder ownership".

Nguyen (2011) also looks at the relationship between corporate governance and firm risk-taking, with a focus on Japan, through data on firms listed on the Tokyo Stock Exchange between the year of 1996 and 2003, but excluding banks and other types of financial companies due to different measures of profitability commonly used in the industry. He opts to use, as a proxy for risk-taking, a measure of idiosyncratic risk of the stock obtained by first calculating the standard deviation of the stock returns over a monthly time period, and then extracting a systematic and idiosyncratic portion through the use of the classic Fama-French 3-factor model. The main result from the analysis is that firms with a large family shareholder are more likely to show higher idiosyncratic risk, while firms controlled by financial institutions are more likely to show lower idiosyncratic risk. Moreover, ownership concentration is also more likely to be associated with higher idiosyncratic risk. Finally, Nguyen also finds an amplifying effect of ownership concentration on the effects of family and bank ownership.

Recently, in one of the most interesting papers on which this one builds, Pearce and Patel (2018) argued that the effectiveness of the task conducted by the board of directors in the context of the firm should not only be measured by its capacity of increasing performance – on which, as has been seen in the previous paragraph, there is little consensus in research – but also by its effectiveness in stabilising such performance. In doing so, they recognize that investigations on this topic are essentially absent in the current body of research. Their data consists of a sample of observations on over 3,000 firms in the period of time between 2005 and 2013,

including both governance and financial performance information. As a measure of risk they opt to use variability in Return on Assets (ROA), defined as its standard deviation over a period of 3 years. Their methodological setting is relatively similar to the one used in this paper, as, after running a Hausman test to determine whether a Random or Fixed Effects model would suit better their data, they use a Fixed Effects panel data regression specification. Their results are somewhat in line with the ones of this analysis to the extent to which they find that firm size and blockholder ownership have a significant inverse relationship with operating risk. Nevertheless, they recognize that their analysis may be spurious due to a possible endogeneity of governance and financial variables with the variability in ROA, a problem that is tackled here by using a different variable to measure risk.

Cheng (2008) was a precursor in this context as he had already conducted a similar analysis, but in a more specific fashion: he looked at whether the size of the board of directors is correlated with the variability of corporate performance. As a measure of corporate performance variability, he uses the standard deviation of the monthly stock returns, the ROA and Tobin's Q. He includes industry fixed effects in the model specification, but no year nor individual firm fixed effects. He concludes that board size and firm performance and value variability are negatively related, and interprets it as implying that extreme corporate actions are less likely to be taken by large boards.

Overall, empirical research that relates corporate governance to risk seems to be still in its early stages. There is high heterogeneity in the variables taken into account by researches as well as in the interpretation of their results, however there seem to be some tentative regularities in results. On the one hand, firm size often seems to be significantly related to idiosyncratic risk. On the other hands, ownership characteristics, such as the presence of large shareholders and their identity as well as takeover sensitivity, seem to shape firm risk in a more compelling and frequent manner than "proper" corporate governance characteristics, such as the share of independent directors on the board or its size.

iv. *Board gender diversity and corporate risk*

In the last decade research in a variety of sectors has been following public opinion in increasingly focusing on gender diversity and its effects. Corporate Finance followed the same path, and the pressure on shareholders and firms alike to choose female directors has grown exponentially. In addition, and presumably as a consequence, various countries have enacted laws requiring companies to increase the number of female directors sitting on their executive and monitoring bodies, including Italy with Law 120/2011 – according to which at least one third of board seats should be occupied by the under-represented gender.

In this context, a number of academics started investigating how board diversity relates to various firm characteristics at both the cross-country and intra-country level, but very few focused on corporate risk and performance at this point.

First, the relationship between gender diversity and performance as well as performance variability is analysed.

One the first papers dealing with the subject in the current, modern sense was written by Adams et al. (2009). They base their research on an unbalanced panel spanning the period between 1996 and 2003, including data on companies from the S&P500, the S&P MidCaps and the S&P SmallCaps, which they use to investigate the relationship between gender diversity and both corporate governance and performance. Even though they find statistically significant positive relations between board diversity and some governance variables, such as CEO accountability and board members attendance at meetings, their results point to an inverse correlation with firm performance once they account for possible omitted variable bias and reverse causality. Khan and Vieito (2013), relying on a panel of US firms spanning the twelve years between 1992 and 2004, investigate whether the gender of the CEO has any effect on firm performance (proxied by Return on Assets) and riskiness (proxied by share price volatility). They find that the presence of female CEOs is generally associated with better firm performance and, more interestingly from the point of view

of this paper, lower share price volatility. Huang et al. (2013) use a hand-collected dataset of changes in executives, and find a series of empirical regularities that lead them to believe that male executive directors are more likely to be overconfident than their female counterpart. Among these empirical regularities, it seems worth to mention that companies led by females are less likely to issue debt, are less likely to grow faster and are also less likely to make acquisitions. These results may be consistent with the result of Khan and Vieito (2013) that female CEOs are related to lower risk in the stock of the company. In this context, Levi et al. (2014) also analyse the relationship between director gender and M&A activity and find results in line with the previously mentioned research, concluding that female-led companies are less likely to make acquisitions and, when they do, are still less likely to pay a high bid premium. This further fits with the narrative according to which gender diversity should be negatively associated with corporate risk.

Nevertheless, Gul et al. (2011), who are the first looking at the effect of boardroom diversity on the company's stock price idiosyncratic risk, find evidence that somewhat contradicts the research previously mentioned on the topic. In fact, using a methodology similar to the one applied by Ferreira et al. (2007, 2011), discussed above, they conclude that the share of female directors is generally positively related to share price specific volatility, which they intend as share price informativeness.

In addition to these, many other works have looked at the relation between boardroom diversity and firm characteristics by focusing their analysis on specific European countries and developing markets, but their results are all somewhat in line with the evidence provided above. Among these, however, it is worth mentioning a few that are both relatively recent and, even though they are more concerned with firm performance rather than risk, are still very relevant to this paper due to their focus on Italy.

Gordini and Rancati (2017) use a relatively short panel data set on Italian listed companies spanning the 2011-2014 period to investigate the effect of gender diversity on firm performance, as proxied by Tobin's Q. They measure diversity using different methodologies drawn from previous research, and, using both a Fixed Effects panel

model and a 2-Stage Least Square model, they reach the conclusion that the right balance of men and women on the board, rather than the mere presence of women, has a positive significant relationship with firm performance. Bianco et al. (2015), instead, use a short sample of data on Italian companies between 2008 and 2010 and find that the number of yearly meetings of the board of directors seems to be negatively correlated with female representation, and, furthermore, women seem to have a lower participation rate than males in board meetings. This may point towards a lower disciplining role of the board, that, in the context of this paper, may suggest a positive relationship between female board representation and firm risk. However, it seems to be better to take such results with caution given that the sample of data only spans 2 years and the authors recognize the lack of controls for possible firm-specific omitted variables in their specifications.

Finally, Bruno, Ciavarella and Linciano (2018), from CONSOB, argue that the validity of a large part of the previous research on the relationship between gender diversity and firm performance may be plagued by reverse causality. They try to perform an analysis free from such a problem by using data on Italian listed companies between 2008 and 2016, part of which is only available to them in aggregate form, as they believe that the exogenous shock to boardroom composition introduced by Law 120/2011 may allow them to solve such issue. They use a dynamic panel model to avoid possible endogeneity issues, and find a non-linear relationship between the percentage of women on the board of directors and the firm performance (as proxied by ROA, ROIC, ROE and ROS). In particular, their results point towards an initial negative effect, which then becomes positive when the percentage of women rises above approximately 20% of the board. The authors suggest that such results may support the critical mass theory, according to which a minimum presence ratio needs to be reached before the positive effects of gender diversity can be achieved. This may, indeed, be related to various reasons, including the fact that a single woman could face discrimination in a board dominate by men or may not have sufficient confidence to assert effectively her ideas or concerns.

Overall, even though general wisdom indicates that gender diversity could be positively associated with lower firm risk, there is little research directly investigating the subject. Essentially, most of the research up to this point examined the relationship between women boardroom and executive representation and corporate performance, with only a handful of papers concentrating directly on some measure of risk using sound empirical methods, such as the ones by Khan and Vieito (2013) and Gul et al. (2011). Moreover, most of the literature analysed seems to use relatively outdated data, mainly relating to the end of the '90s or the beginning of the 2000s, and the empirical results may no longer be valid in the current corporate environment. Furthermore, there is a lack of literature investigating directly the correlation between executive and boardroom diversity and risk in the Italian market. Hopefully, the analysis presented in this paper will somewhat contribute to filling such hole.

v. _Ownership and corporate risk_

A very extensive body of research has investigated the effects of the presence of large, influential shareholders in listed companies and the relation between ownership, corporate governance, firm and stock performance and risk.

In general, ownership structure and corporate governance are commonly thought to be related factors influencing each other, as can be understood from Shleifer and Vishny (1997). In this context, works like the one provided by Chung and Zhang (2011) show that the fraction of shares held by institutional investors is generally positively correlated to the quality of the corporate governance of the firm. Nevertheless, there is little consensus in the literature on the effect of dispersed or concentrated blockholders on firm performance and value. For example, Becht et al. (2002) provide an overview where they suggest that if, from the one side, restricting influential shareholders may provide better protection for minorities, at the same time this may increase executive power in a fashion that is detrimental to the owners of the firm. Gompers and Metrick (2001) argue that institutional preferences in their equity holdings have a sizeable

effect on securities' demand, and this can, in turn, influence the distribution of asset prices and returns. Therefore, this can lead to believe that institutional behaviour can affect downside risk in stock prices. Indeed, various authors, including Jiambalvo et al. (2002) find that stocks showing a high degree of institutional ownership reflect more updated information, which should incorporate better predictions on future firm performance and price behaviour.

The topic has also been tackled symmetrically – i.e. by looking at the share of the institutional portfolio occupied by a single firm instead of the weight of the investor in the firm's shareholders. Fich et al. (2015), for example, find that when the firm has a high weight in the portfolio, the investor is more likely to monitor it.

Nevertheless, Ruiz-Mallorquí and Santana-Martín (2011) argue that since much of the research on the subject has been conducted using data from Anglo-Saxon countries (in particular, the US and the UK) it may not be directly applicable to different contexts. In countries like Italy, in fact, there are some key differences: among the most important, concentrated and stable company ownership is extremely common. The authors argue that such owners could, therefore, be incentivized to steer the company in a positive direction. Using data from quoted Spanish firms between 1996 and 2009, they show that when the influential shareholder is a banking institution, generally firm value decreases, while the opposite is true when the influential shareholder is an investment fund. In this context, Burns et al. (2010) provide evidence supporting the fact that long-term blockholders are more likely to monitor the firm and avoid myopic decision-making, while the opposite is true for short-term investors, who generally sell their holdings at the sign of financial misreporting. Górriz and Fumás (1996) also look at a sample of Spanish firms and suggest that agency and contractual costs are lower if there is a restricted number of influential owners in the shareholding of the firm, as decision-making can be streamlined and simplified. Croci et al. (2012) rely on a panel of companies for 14 countries in Continental Europe and find that family control is generally associated to lower CEO pay, which may be consistent with the concept of higher shareholder monitoring decreasing the level to which executive can expropriate

value from the firm. Moreover, they also show that the presence of influential institutional investors is commonly correlated with lower CEO pay, but also with a larger share of compensation based on equity instruments, which may better align the interests of owners and managers.

Turning instead to the body of research that looks at the relationship between institutional ownership and risk, sophisticated investors are generally expected to steer away from highly risky stocks that present a possible option-like payoff behaviour (see, for example, Schleifer and Vishny, 1997). Therefore, a negative relationship between institutional ownership and company riskiness would be expected. Moreover, various works, such as the one by Yan and Zhang (2009), point towards the fact that institutional investors seem to be better informed than other market participant, and especially so when dealing with small and growth stocks – which are on average more likely to be volatile and uncertain. This can lead to the belief that the presence of institutional investors in the shareholding of small companies may signal lower risk in such companies – a hypothesis that will indeed be analysed in this paper.

A recent and very relevant study in this context was conducted by Barinov (2017), where he shows that institutional investors tend to avoid stocks with very low and very high idiosyncratic risk. They choose an in-between level of risk as to exploit their sophistication and ability to obtain superior information.

A particular set of cases in which these results may not hold true is when the institutional investor is also an activist. This particular class of investors is often considered hostile to the firm and as having short-term objectives. Indeed, Greenwood and Schor (2009) show that activists are generally able to obtain positive abnormal returns thanks to the fact that they often force the target firm into a takeover. Many scholars have looked at the implications of activist involvement in chapter 11 cases and on firm performance (for example, see Harner et al., 2014, and Ellias, 2016), but most of the research is concentrated in the US, also due to lower activist activity in Europe.

In the branch of research looking at activists, it is interesting for the purpose of this paper that Coffee et al. (2016) note that volatility goes up after this type of investors file their positions.

Overall, research covering ownership seems to point in the direction of lower risk associated to the presence of large blockholders, as they are commonly thought to have a controlling role on firm activities, as well as the presence financial institutions in the shareholder base, due to their dislike for risk and their superior information. This may not hold true when the institutional party follows an activist approach though, which is likely to be related to the intrinsic riskiness of such a strategy.

vi.   *Considerations*

A few considerations can be drawn after the extensive review of the literature that has been carried out above on the intersection of different subjects.

First, firm riskiness as a topic has been studied much less than other firm characteristics, with most of the research focusing on relating company fundamentals to performance. Moreover, riskiness is generally measured either from the point of view of performance or the point of view of returns, but the vast majority of researchers use some variant of volatility or standard deviation to measure it. Needless to say, the measure of riskiness provided by these variables is very different from the one provided by a quantile measure such as Expected Shortfall. It seems like the only paper relating firm fundamental variables to Tail Risk is the one by Ellul and Yerramilli (2013), however it does so on a dataset (bank holding companies before and during the 2009 financial crisis) that is completely different and unrelated from the one this paper studies.

Second, there seems to be some consensus on the fact that statistical analyses conducted using some measure based on firm performance (such as ROA) as the regressand may suffer from endogeneity, while this seems to be definitely less likely if some measure derived from returns is used as the dependent variable.

Third, the vast majority of the literature focuses on relatively outdated data, mostly from the 1990s or the early 2000s.

Fourth, even though there is a body of research available to looks at dynamics in the Italian market, only a small portion of it looks directly at research questions that are tackled in this paper.

Finally, most studies focus on a single dimension of firm characteristics (e.g. board size, number of independent directors, a specific type of institutional investor, etc.), and such specificity may confuse the relationship among some of the existing pieces of research.

Nevertheless, some empirical regularities that seem to stand out are:

1. There is little consensus on the relationship between most corporate governance variables and firm performance and risk, and many results seem to be specific to certain geographies or situations;

2. Institutional ownership seems to be correlated, on average, to companies presenting lower risk,

3. The presence of activists may be positively correlated with increased firm risk, probably due to their aggressive investment style.

SECTION II: The Italian market environment

Since this paper looks the relationship of certain key variables and Tail Risk in Italian stocks, it seems important to provide a brief summary of the current and past Italian environment from the economic and governance point of view.

First of all, it is worth mentioning that, following the Financial Crisis of 2009, Italy has been experiencing an unstable financial and political environment, the analysis of which is out of the scope of this paper, but that mainly translated to a low level of growth – with GDP fundamentally unchanged between 2018 and 2019, for example.

A. Ownership

In this context, the listed firms in the country keep showing some typical corporate governance and ownership patterns commonly associated to the Italian business environment. First of all, for what concerns control models, most of the listed Italian companies are controlled by either a single party or by multiple parties through shareholder agreements. In fact, listed companies keep being controlled mostly by families, and there has been little change with respect to the past from this point of view. Since controlling shareholders tend to remain entrenched in Italian firms, especially due to the strong role played by families, the literature on the matter could lead us to expect that Italian companies are, on average, monitored better than foreign companies, but analysing such a cross-country matter is out of the scope of the paper and left for further investigation to future research.

Another very peculiar characteristic with regards to control is that the Italian government is the main shareholder of a conspicuous number of the largest companies listed on the Milan Stock Exchange (which, according to CONSOB, represented approximately 34% of the market capitalization in 2018).

Moreover, with regards to control it is worthwhile to mention that approximately one fifth of the companies show some kind of pyramidal or mixed governance structure,

that may drive a wedge between ownership and control. This has always been a characteristic of Italian companies (see, for example, Bianchi et al., 1999).

For what regards institutional investors, in the past 10 years the holdings of Italian institutions have declined slightly, while the ones of foreign institutions have increased.

B. Governance

Almost 100% of the companies adopt a traditional governance model (instead of a dualistic or monistic system), where the general assembly of shareholders appoints both the board of directors as well as the board of auditors; and the proper control function is carried on by an external audit firm.

On average, the amount of directors on the board independent by the definition provided by Italian law (TUF – "Testo Unico della Finanza") has been increasing in the last decade, and the same is true for directors elected from a minority slate.

According to CONSOB most directors hold a university degree, but the percentage of foreign members on boards keeps being relatively low, especially in medium and small companies. Interestingly, companies owned by the government have the highest share of directors with a university degree, while the opposite is true for family-owned ones.

C. Gender diversity

In the last decade there have been strong improvements also from the point of view of gender diversity and female representation on the board of directors and in executive functions. This has been the consequence of increasing widespread pressure on firms and shareholders alike, in both an informal and formal way. In particular, a relevant role was played by Law 120/2011 ("Legge Golfo-Mosca"), following which most listed companies show a composition of the board that already includes at least one third of directors from the underrepresented gender. Nevertheless, the share of female CEOs remains very low, as more than 90% of listed companies present a male chief executive officer. Public firms show the highest average share of female directors.

SECTION III: Empirical analysis

A. Introduction and research question

This paper sets to investigate the relation between firm fundamental characteristics from the financial, corporate governance and ownership point of view and the Tail Risk observed in stock returns. In particular, the research question that the paper aims to study can be outlined as follows:

> "Controlling for the financial performance shown by Italian non-financial firms, does heterogeneity in key corporate governance and ownership variables impact Tail Risk in the common stock of such firms? If this is the case, does the impact differ between small and large firms?"

By analysing this topic, the paper wants to fill a research gap that has not been investigated deeply in the literature, if at all. In fact, as has been seen while carrying out the literature review, there is a relative paucity of works looking at the relation between core non-financial firm characteristics and risk. Moreover, most studies define risk as the standard deviation of either some measure of company performance or stock returns, and it was impossible to find any work looking specifically at Tail Risk apart from one, that, however, looked at a completely different dataset (financial bank holding companies in the US during the 2009 Global Financial Crisis).

Not only does this paper analyse an issue that has never been looked at in detail, but it also uses a combination of several determinants that were analysed in separated branches of literature, but never together. Moreover, it gives a material and original contribution to the debate present at the worldwide level about the impact of corporate governance and ownership characteristics on listed firms' results. Finally, no work of this kind has ever been conducted at the Italian country level. Part of this issue is due to the very scarce availability of relevant data, which is for the most part available only to regulatory bodies. The results will, therefore, have the limitation of being strongly

related to the peculiar Italian market environment, but could shed some light on the interaction between the variables at a more general level as well.

B. Relevant variables

i. *Tail Risk*

As has been mentioned before, this paper is mainly interested in analysing the drivers of Tail Risk in the common stock of Italian firms. For this purpose, the chosen dependent variable for the analysis is the historical Expected Shortfall in the daily returns of the common stock at a yearly level (also commonly known as Average Shortfall, Conditional Value at Risk or Extreme Value at Risk).

It is common to look at downside risk in the return of financial securities using a quantile measure of risk. In general, especially from a risk-management perspective, the choice falls on the Value at Risk, which measures the maximum loss that such security can suffer, given a certain confidence level, over a pre-determined time horizon. It is therefore a probabilistic measure that can be mathematically defined as:

$$VaR_c = \inf\{l \in \mathcal{R} : \mathbb{P}(L > l) \leq 1 - c\}$$

Where c is the selected confidence level, l is the size of the loss associated to such confidence level, and L is the actual loss experienced. This implies that:

$$\mathbb{P}(L > VaR) = 1 - c$$

However, in the context of this paper the Value at Risk presents a critical problem, stemming from the fact that it does not consider the size of the losses over the predefined confidence level. This implies, to present an extreme example, that a stock that is likely to lose all its value and "go to zero" in the tail of the return distribution

would be considered as having the same Tail Risk as one that is likely to only lose, say, 10% of its value over the predefined confidence level c. In order to solve this significant drawback of the Value at Risk, this paper makes use of Expected Shortfall, an alternative measure specifically designed to take into account of the size of the extreme losses (as well as to solve the subadditivity problem of the VaR measure, an issue that goes, however, out of the scope of this paper). Expected Shortfall can be defined as the **expected value of the losses in excess of the Value at Risk**, and can be written in mathematical form, with P denoting the price, as:

$$ES_c = \mathbb{E}\big[-\big(\Delta P - \mathbb{E}(\Delta P)\big)\big|-\big(\Delta P - \mathbb{E}(\Delta P)\big) > VaR_c\big]$$

Apart from what mentioned above, the choice of Expected Shortfall as a dependent variable has been driven by various other reasons, including:

- The willingness to investigate the effect of fundamental firm characteristics only on the extreme tail of the return distribution of the stock,
- The fact that measures of risk relying on the standard deviation of the returns of the stock would not allow us to provide an answer to the research question, that specifically focuses on Tail Risk,
- The issue of possible endogeneity documented in previous research when the variability of a measure of firm performance is taken as the dependent variable in standard OLS and panel regression models,
- The significance of Tail Risk in the context of investors' portfolios, as a large, sudden drawdown in a stock position may cause psychological and technical problems to both retail and institutional investors alike.

In this analysis, Expected Shortfall is calculated as the mean of the return of the stock over the 5% worst days in a given year, multiplied by negative 100 in order to express it as positive values. The approach adopted here is consistent with the one adopted by Ellul and Yerramilli (2013), who, as mentioned above, answer a different request question using, however, a similar methodology.

ii. <u>*Financial variables*</u>

Financial variables, and, in general, the financial performance of the firm, are clearly expected to have a strong effect on the Tail Risk of its stock. Investors, on average, will perceive as less risky the stock of a company that generally shows positive fundamental performance, while they will perceive as more risky the stock of firms showing the opposite. This means that they are more likely to panic sell and give rise to a high reduction in price (contributing to Tail Risk) the stock of companies showing poor financial performance. In order to control for this, a set of financial statement measures has been selected.

In particular, given the evidence that has been encountered in previous research and through the use of very constrained individual reasoning, the following variables have been selected as financial performance control variables:

- *Leverage*: leverage is a continuous variable defined as the net financial position of the company scaled by its shareholder's equity. The variable has been chosen since extremely levered firms are often considered more risky due to the increased probability of bankruptcy as well as the increased probability of a downgrade of its debt, and the consequent effects on the cost of debt of the company, that could, then, impact the bottom line. Leverage may also have an amplifying effect on the returns of the company, in both a positive and negative fashion, and could therefore be a driver of downside risk.

- *Return on Assets*: ROA is a continuous variable defined as the operating income of the company divided by its asset base. Given the possibility of decomposing the ROA as the margin times the asset turnover, such measures was chosen because of its ability of summarizing the financial performance of the non-financial firms over two different levels: on the one hand, the ability of the company of transforming one unit of the asset base into one unit of revenues (asset turnover), and, on the other hand, the cost structure of the company, intended as its ability of transforming one unit of revenues into one unit of operating income.

iii. _Size_

Size is used as a control variable in nearly the totality of the research looking at the relationship connecting corporate governance and ownership variables to firm performance and risk.

This paper follows the common methodology and includes it in the analysis since it is expected to have a significant effect on the variable of interest – Tail Risk – both directly and through its effect on the other independent variables taken into consideration.

There are at least three reasons why this is considered a fundamental variable to account for. In the first place, as has been conveyed in the section describing the Italian market environment, the vast majority of very large listed companies on the Milan Stock Exchange appear to be controlled either by the government or by some kind of municipal entity linked to the government. On the other hand, during the analysis it was found that most of the small companies seem to be symmetrically controlled by families. To the extent that these two ultimate controlling parties could be perceived to behave differently by the market in their monitoring and strategic interests, controlling for size allows to account for a significant level of heterogeneity in Tail Risk that could be difficult to explain through other variables.

Second, Italian law places different disclosure requirements on small and large firms. For example, among other differences, firms classified as small or medium enterprises (SMEs) are required to report the name of significant shareholders in their filings only if those hold an amount of shares over the threshold of 5% of the share capital of the company, while the relevant threshold for large firms is 3%. These differences in disclosure requirements imply that accounting for the size of the firm may allow to account for some of the missed information.

Finally, it is common wisdom as well as an empirical regularity that large companies are generally more complex and may require different governance characteristics (for example, a larger board, as has been touched upon in the literature review) for being properly managed. At the same time, they are also likely to have different interactions

with institutional and activist shareholders. For example, it is less likely for activist shareholders to be able to obtain a stake large enough to steer the strategy of the company.

Given these key considerations, this paper allows for the possibility that completely different relationship and results may hold between Tail Risk and the explanatory variables taken into consideration depending on the size of the company analysed. In order to understand whether this is indeed the case or not, it seems useful to control for size at two different stages of the analysis: on a first level, the specification of the model that is being developed here will be considered on different groups of companies sorted by size, while on a second level, size will also be used as a control variable in each empirical model.

In order to make the results of the paper comparable to most of the previous research on corporate governance analysed in the literature review, the common practice of defining it as the natural logarithm of the book value of the asset base of the company has been followed. This definition not only leads to continuity with previous studies, but it also allows to avoid any kind of potential endogeneity in the variables that could have arose by using the market capitalization of the company.

iv.   *Corporate governance and gender diversity*

The choice of the corporate governance and gender diversity variables to take into consideration has not been easy, mainly due to the lack of clean and complete data for Italian companies on the databases available. This implied that most of the data considered in this section was to be hand-collected from the annual reports and the corporate governance reports of the companies. Given the extremely time-consuming nature of the task and the difficulty in validating much of the data, it has been necessary to restrict the number of measures taken into consideration. Again, this paper follows what was done by much of the previous research on corporate governance and firm

risk and looks at the following variables of interest for what concerns "pure" corporate governance:

- *Board size*: board size is a discrete variable obtained by counting the number of directors on the board of the company on the 31st December of relevant year. It represented the clearest corporate governance characteristic to include in the analysis since the literature review revealed it to be by far the most analysed in the past. Nevertheless, results have been mixed in previous research with regards to the correlation between board size and firm performance and risk.

- *Independents*: independents is a continuous variable defined as the ratio between the number of members of the board of directors considered to be independent according to the rules provided by Italian law (specifically, by the TUF – "Testo Unico della Finanza") and the total members of the board on the 31st December of the relevant year. Companies report whether a member of the board is independent both based on the rules provided by the code as well as by their own corporate governance code, however the definition provided by the TUF has been chosen in order to avoid differences in definitions between the internal corporate governance codes. The variable has been chosen to reflect corporate governance quality, since it is commonly thought that a larger number of independent directors should guarantee better monitoring on the executive members. Nevertheless, as has been seen in the literature review section, evidence from different countries and different time periods has been relatively heterogeneous, but there seems to be some evidence pointing in the direction of an inverse relationship between board independence and risk (see, for example, Ferreira et al., 2011).

Gender diversity variables are considered, for the scope of this paper, a subset of corporate governance variables. In fact, apart from a myriad of common sense arguments that could be made, it has generally been showed in a multitude of contexts that additional diversity in groups improves decision-making tasks and group outcomes. Most importantly, however, past literature points to weak evidence that may

substantiate an inverse correlation between diversity and risk taking, implying that more diverse board may play an important role in lowering firm Tail Risk. Due to the constraints mentioned above, this paper makes use of the following variables to capture the effect of diversity:

- *Gender diversity*: gender diversity is a continuous variable defined as the ratio between the number of female members of the board of directors and the total members of the board on the 31st December of the relevant year. It has been included for two reasons. First, as mentioned above, a more diverse board may contribute to curbing firm risk-taking and overconfident directors. Second, the share of women on boards of directors keeps being a highly debated issue in the media as well as in research, which drives the curiosity to find out whether any significant relationship to Tail Risk can be found.

- *CEO Female*: CEO Female is a dummy variable defined to take the value of 1 if the CEO of the company is a woman on the 31st December of the year taken in consideration, and 0 otherwise. Given the evidence provided by Khan and Vieito (2013), pointing towards lower share price volatility associated to women CEOs, and the one provided by Huang et al. (2013) pointing towards lower overconfidence of women CEOs with respect to male, the presence of a woman as Chief Executive Offices is expected to have a negative relationship with Tail Risk.

v. Ownership

Given the specific characteristics of Italian listed companies on which the analysis touched upon earlier, ownership variables may have a significant relationship with Tail Risk. This perception seems to be substantiated by a body of research finding more tangible results than the one dealing with corporate governance as well. In order to explore this relevant subject, the following 3 variables have been chosen:

- *Large shareholder*: large shareholder is a dummy variable defined to take the value 1 if one of the following occurs on the 31st December of the relevant year:

- A shareholder in the company has more than 50% of the voting power, and can thus be considered to control the company;
- A shareholder in the company has more than 33% of the voting power and no other shareholder alone has more than 5% of the voting power. It can be argued that this grants *de facto* control to the large shareholder (in many cases, it has been found that the companies mention such *de facto* control in their corporate governance reports as well);
- The government has *de facto* legal control over the company due to it being involved in a sector considered critical for the country (e.g. particular companies in the defence sector) or for any other legal or factual reasons, independently from the two criteria above.

Otherwise, the variable takes value zero. Given the evidence presented from authors such as Burns et al. (2010) and Croci et al. (2012) mentioned before, it is expected that the presence of a controlling party or an influential shareholder should, on average, be associated to lower Tail Risk.

- *Institutions*: institutions is a dummy variable taking value 1 if the shareholder base of the company, as reported in the corporate governance report, on the 31st December of the relevant year presents one or more of the following:
  - An investment or pension fund manager following a value or similar active but non-activist investment strategy;
  - A custodian passively holding shares in the company ultimately owned by third parties;
  - A bank or other financial institution pooling retail or indexed investments on behalf of third parties.

Otherwise, the variable takes value zero. According to most of the research that was surveyed, institutional and sophisticated investors are generally believed to avoid overly risky firms in their investment strategies. Therefore, a negative relationship between institutional ownership and Tail Risk would be expected. Unfortunately, the design of the variable presents the unsolvable flaw of including institutions following indexing strategies as well (hence, not acting on

any kind of "superior" information). Apart from some special cases, it is impossible to distinguish between an institution performing an active strategy and one following an indexing one. Moreover, some institutions may follow both strategies through different funds, but only the name of the ultimate company owning the share is reported in corporate governance reports. The problem is probably exacerbated in more recent data due to the widespread rise of the popularity of such strategies. It should be noted that since most of the indexing strategies follow some form of market weights, this distortion should be less present in small firms than in large firms. This will be relevant in the interpretation of the results of the analysis.

- *Activists*: activists is a dummy variable taking value 1 if the shareholder base of the company, as reported in the corporate governance report on the 31st December of the relevant year, presents one or more of the following:
  - o An investment fund following an activist investment strategy, hence actively trying to steer company management towards taking selected actions; or generally being dissident towards company management;
  - o A family, company or other entity not associated with the *large shareholder* (if present) actively trying to steer company management towards taking selected actions; or generally being dissident towards company management – hence, following the same type of strategies and using the same type of techniques generally employed by activist investment managers.

The effect that the presence of activists may have on Tail Risk is unclear, and may depend on previous firm characteristics. It seems to be thought that the presence of activists in the shareholder base increases stock price volatility, nevertheless when the company is badly managed, common sense would suggest that risk should decrease following the involvement of an experienced activist investor.

<u>C. Data collection</u>

In order to complete a thorough analysis of the problem at hand, panel data on Italian companies has been collected in the following steps:

1. The first problem to be tackled in the construction of the panel was to choose a relevant time period from which to collect data. There is a trade-off between choosing a time period that is too long, which may lead to results that are no longer relevant in the current state of the world, and one that is too short, which may be more relevant to the current environment but present low variability in some measures, such as the ones related to ownership and control. In order to find a balance between the two dimensions, a time period going from the year 2000 to 2018 was chosen. This represents one of the longest samples studied in the papers that have been examined in the literature review.

2. Among the set of Italian companies whose stock was traded on the Milan Stock Exchange in the relevant time period, the following exclusion criteria were applied:

    a. Financial firms were excluded due to the specific nature of their business and consequent difference in the performance measures commonly used to judge their operating quality;

    b. Firms with an average market capitalization lower than EUR 100 million during the period in which their stock was traded on the Milan Stock Exchange were excluded due to the limited availability of data, especially for non-recent year, which may have biased the results, and also in order to somewhat limit the extension of the database, given that, as will be seen later, many variables have been hand-collected.

3. At this point, the relevant variables have been collected and a longitudinal panel data set has been constructed as described below:

    a. The daily prices and returns of the companies' common stock were obtained via the Bloomberg Terminal. From these, the historical

Expected Shortfall has been calculated through the use of the *R* statistical software.

b. The relevant financial variables necessary to construct the *margin*, *leverage* and *ROA* at a yearly frequency, including operating income, revenues, total assets, financial debt, cash and cash equivalents, shareholders' equity as well as additional ones, were obtained via the Thomson Reuters Eikon database. For the firms presenting fiscal years not ending with the calendar year, the relevant variables were calendarized in order to render the sample homogeneous.

c. Due to the lack of quality aggregate data on all the available databases, corporate governance, gender diversity and ownership independent variables were hand-collected from each company's annual report or corporate governance report[1], paying attention to matching the dates to the calendarization performed above.

4. Data presenting the following problems has been excluded from the panel constructed up to this point:

a. Firms presenting less than 2 observations without the lack of primary data fundamental for the analysis;

b. Observations presenting non-realistic data (e.g. negative assets, extreme outliers, etc.);

Once this exercise is completed, what is left is an unbalanced longitudinal panel data set that is composed of 1,287 unique observations for a total of 152 Italian listed companies over the period 2000-2018 (of which 1,044 observations are complete). Summary statistics and preliminary results regarding it are presented in the following section.

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[1] Notice: this means that approximately 1,500 reports were downloaded and searched for the relevant information, including variables that were in a second moment excluded from the analysis due to lower relevance and/or correlation with the included variables.

D. Descriptive statistics and preliminary results

Summary statistics covering the key financial, governance and ownership variables used in the analysis for the full panel are calculated and presented in table 1.

Table 1 – Summary Statistics

	Mean	Median	SD	p25	p75	N
Tail Risk	4.375	4.037	1.915	3.126	5.204	1,287
Leverage	1.397	0.708	11.783	0.300	1.356	1,287
ROA	0.061	0.057	0.098	0.021	0.100	1,287
Size	6.873	6.575	1.961	5.461	8.124	1,287
Board size	9.944	9.000	2.934	8.000	12.000	1,285
Independents	0.421	0.400	0.178	0.290	0.550	1,277
Gender Diversity	0.169	0.170	0.142	0.000	0.291	1,281
CEO Female	0.044	0.000	0.205	0.000	0.000	1,281
Large shareholder	0.740	1.000	0.286	0.000	1.000	1,287
Activists	0.149	0.000	0.349	0.000	0.000	1,044
Institutionals	0.543	1.000	0.498	0.000	1.000	1,244

As can be seen, the average Expected Shortfall for the panel was 4.375, which implies that the average return on the 5% worst return days during the year was -4.375%. Nevertheless, this shows sizeable variability, as the 25th percentile of the measure is 3.126, while the 75th percentile is 5.204.

Since the original size distribution of the panel was relatively skewed, with total assets ranging from EUR 14m to almost EUR 1bn, the natural logarithm was used. The mean and median size of the companies in the panel are relatively close, but there is still relatively high variability in the values.

Common financial wisdom would suggest that, *ceteris paribus* and making a generalization, smaller firms should present higher risk than larger, more affirmed and stable firms. In order to get a preliminary and rough idea of whether this holds true in the panel, the companies were split by quartiles based on their size, and the mean and median Expected Shortfall was calculated for each group aggregating over time. The results can be observed in figure 1. As it is possible to see, the pattern in the data follows the general intuition that smaller firm should present higher risk, as the average and median Tail Risk is highest for the lowest quarter (i.e. for small companies). Moreover, the opposite also holds true: the largest companies in the panel dataset symmetrically show the lowest Tail Risk. This information will be useful in the empirical analysis that follows, as it suggests that size plays an influential role in the determination of a stock's Tail Risk, implying that it would make sense to analyse its drivers separately for each separate class of companies.

Figure 1

Mean and median Expected Shortfall by quartile
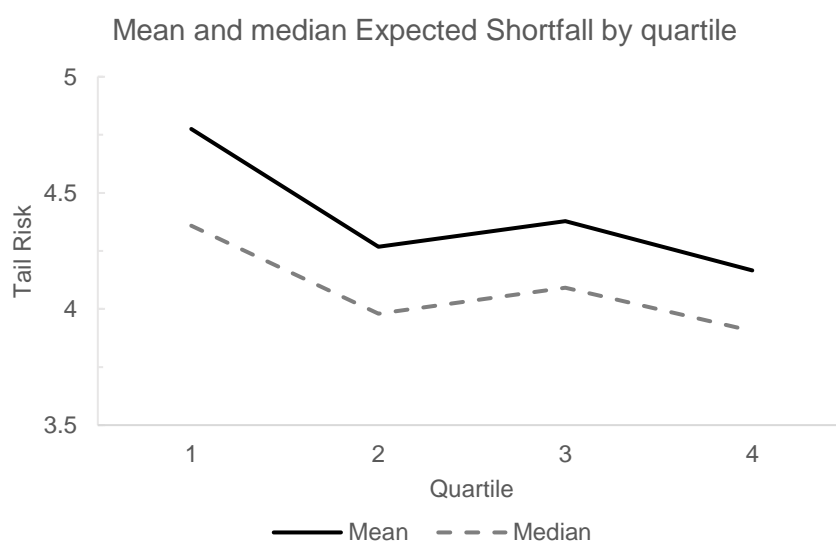
Moving on with the summary statistics of the financial variables, it can be seen that there is sizeable variability, as was expected, for all the financial variables taken into consideration. Average margin, ROA and leverage are respectively 6.1%, 140% and 4.8%, but all the variables show high standard deviation with respect to the size of their

mean. While leverage may seem high, it is in line with what would be expected for Italian companies, also given the relatively high representation of companies operating in the industrial and infrastructure industries in the sample, that tend to be able to sustain more leverage than firms operating in other sectors. The figure is also quite in line with summary figures published in the yearly CONSOB report, which gives confidence in the quality of the data used.

Regarding corporate governance measures, the median board of directors is composed of 9 members, which follows closely the general consensus pointing towards such a board size being optimal. In the bulk of the observations board size falls in-between 8 and 12. Nevertheless, the average size of almost 10 suggests that more companies have larger boards with respect to those that have smaller ones. The average and median percentage of independents fall very close at approximately 40%, with a variability that does not seem too high, suggesting that good practices with respect to board independence are generally followed by Italian listed companies.

Average and median shares of women on boards also come in very close at approximately 17%, but a 75th percentile of 29% still points towards Italian boards being largely dominated by men. Nevertheless, during the data collection process it was possible to see a steady increase in the percentage of women over time, especially after the introduction of Law 120/2011. What did not change noticeably over time, however, was the number of Female Chief Executive Officers. In fact, the mean seemed to be relatively stationary over time at approximately 5%, and only a handful companies showed female CEOs, generally with the CEO being part of the controlling family.

Having looked at some key facts about the data collected, an analysis of the correlation between the variables has also been conducted in order to verify that the information they provide is relatively orthogonal and does not impact on the quality of the analysis.

First, table 2 shows the Pearson's Correlation Index for the whole data in the whole panel, computed with the aid of the Stata statistical program. As easily seen from the table, there is no strong correlation between any of the variables when looking at the full data set – i.e., all the correlations are below the 0.7 threshold assumed to imply strong correlation between two variables. More specifically, all the correlations are below the 0.3 threshold (hence, showing low correlation) apart from two out of the 66 taken into consideration (only 3% of cases): the one between board size and the size of the company and the one between the number of independents and the size of the company, which are still below 0.5 and imply only a moderate correlation. Indeed, these results are not surprising, since previous empirical research suggests that hat larger firms are generally more complex and require a larger board in order to process the increased amount of information and cover a larger area of expertise.

Since the preliminary results as well as judgment suggest that the panel dataset should be analysed after slicing it by size, as argued before, it seems also worthwhile to look at the correlations between the variables for each of the four quarters created earlier separately. Given that by dividing the panel in this way each set is expected to have more common characteristics, somewhat higher correlation coefficients should be expected. Correlation matrices for the four size quarters are shown in tables from 3 to 6. Interestingly, correlations seem to be, on average, higher for the largest and the smallest quantile with respect to the others. Nevertheless, even though some correlation coefficients can be considered moderate as their absolute value falls above 0.3, no strong correlation is present even when each group is analysed separately. Moreover, all the absolute values are below 0.5, pointing towards the validity of the final set of variables that was chosen in order to perform the analysis.

Table 2 – Correlation matrix
(full panel)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Leverage	1.0000									
(2) ROA	-0.022	1.0000								
(3) Size	0.009	-0.051	1.0000							
(4) Board Size	-0.046	-0.079	0.462	1.0000						
(5) Gender Diversity (%)	0.052	-0.064	-0.002	-0.007	1.0000					
(6) Independents (%)	-0.002	-0.116	0.379	0.155	0.152	1.0000				
(7) CEO Female (d)	-0.016	0.004	-0.050	0.032	0.110	0.023	1.0000			
(8) Large shareholder (d)	0.020	0.119	0.091	-0.055	-0.020	0.065	0.074	1.0000		
(9) Activists (d)	-0.027	-0.210	-0.153	0.013	0.070	0.031	-0.055	-0.294	1.0000	
(10) Institutions (d)	-0.052	0.098	0.056	0.131	-0.014	0.043	0.100	-0.203	0.208	1.0000

Table 3 – Correlation matrix
(small companies)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Leverage	1.000									
(2) ROA	-0.042	1.000								
(3) Size	-0.009	0.001	1.000							
(4) Board Size	-0.344	-0.300	0.251	1.000						
(5) Gender Diversity (%)	-0.091	-0.131	-0.039	0.163	1.000					
(6) Independents (%)	-0.218	-0.138	0.005	0.222	0.268	1.000				
(7) CEO Female (d)	0.020	-0.028	0.061	0.083	0.146	0.141	1.000			
(8) Large shareholder (d)	0.124	0.116	-0.295	-0.073	-0.148	-0.186	0.101	1.000		
(9) Activists (d)	-0.068	-0.313	-0.040	0.095	0.100	0.339	-0.061	-0.354	1.000	
(10) Institutions (d)	-0.172	0.157	0.111	0.094	0.089	0.370	0.054	-0.267	0.300	1.0000

Table 4 – Correlation matrix
(medium-small companies)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Leverage	1.000									
(2) ROA	-0.043	1.000								
(3) Size	0.033	0.072	1.000							
(4) Board Size	-0.086	0.053	0.099	1.000						
(5) Gender Diversity (%)	0.108	-0.145	-0.054	-0.036	1.000					
(6) Independents (%)	0.009	-0.101	0.044	-0.062	-0.022	1.000				
(7) CEO Female (d)	-0.024	0.091	-0.089	0.087	0.064	-0.045	1.000			
(8) Large shareholder (d)	0.029	0.082	0.060	-0.140	0.031	0.102	0.072	1.000		
(9) Activists (d)	-0.043	-0.235	-0.073	0.014	0.070	0.061	-0.030	-0.218	1.000	
(10) Institutions (d)	-0.087	0.192	-0.252	0.284	-0.047	-0.251	0.163	-0.245	0.017	1.0000

Table 5 – Correlation matrix
(medium-large companies)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Leverage	1.000									
(2) ROA	-0.117	1.000								
(3) Size	0.023	-0.159	1.000							
(4) Board Size	-0.056	0.111	0.141	1.000						
(5) Gender Diversity (%)	0.075	0.177	-0.050	0.036	1.000					
(6) Independents (%)	-0.200	-0.087	0.076	-0.178	0.180	1.000				
(7) CEO Female (d)	-0.067	-0.030	-0.091	0.024	0.122	0.014	1.000			
(8) Large shareholder (d)	-0.049	0.208	0.135	-0.087	0.053	0.213	0.073	1.000		
(9) Activists (d)	-0.012	-0.147	0.024	0.072	0.081	0.068	-0.096	-0.074	1.000	
(10) Institutions (d)	-0.087	-0.032	-0.050	-0.105	0.020	0.196	0.062	-0.113	0.352	1.0000

Table 6 – Correlation matrix
(large companies)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Leverage	1.000									
(2) ROA	0.024	1.000								
(3) Size	0.150	-0.035	1.000							
(4) Board Size	-0.002	0.032	0.025	1.000						
(5) Gender Diversity (%)	0.001	-0.165	0.103	-0.172	1.000					
(6) Independents (%)	-0.045	-0.218	0.236	-0.004	0.243	1.000				
(7) CEO Female (d)	-0.018	-0.071	-0.146	0.016	0.112	0.056	1.000			
(8) Large shareholder (d)	0.027	0.075	0.137	-0.186	0.058	0.025	0.043	1.000		
(9) Activists (d)	-0.029	-0.030	-0.162	0.182	0.007	-0.122	-0.055	-0.489	1.000	
(10) Institutions (d)	0.037	0.038	-0.003	0.155	-0.135	-0.150	0.142	-0.203	0.219	1.0000

E. Econometric analysis and empirical results

Having performed a preliminary analysis of the variables collected, it is now possible to move on to the core of the paper, where, after formulating a series of hypotheses, an econometric model will be developed in order to answer the research question.

i.   Hypotheses development

Given the empirical evidence that was surveyed in the literature review section, the following hypotheses have been formulated with regards to the relationship between the variables of interest and Tail Risk. The first three hypotheses are expected to hold independently from the size of the companies, while the following three hypotheses make a distinction with respect to such dimension.

- *Hypothesis 1*: given the empirical regularities observed in the literature, higher gender diversity on the board of directors and the presence of a Female CEO should have a dampening effect on Tail Risk.

- *Hypothesis 2*: the presence of large shareholders in the Italian context, as analysed earlier, should imply lower Tail Risk, since long-term blockholders are more likely to monitor the firm and avoid myopic decision-making (for example, see Burns et al., 2010).

- *Hypothesis 3*: due to their adversity to risk and the presumed additional information that institutional investors possess, their presence among the shareholders of the company should be correlated with lower Tail Risk.

- *Hypothesis 4*: the size of the board of directors may have a significant effect on Tail Risk if the company is larger, as this would imply higher complexity and thus increased need of a broader board.

- *Hypothesis 5*: the presence of a larger share of independent directors should decrease Tail Risk in smaller companies, since these are on average more controlled by families with respect to larger ones, and may thus require additional control for minority shareholders.

- *Hypothesis 6*: the presence of activist investors should have a more significant effect on smaller companies, where they should be better able to exercise their influence, with respect to larger ones, where it is more difficult to build up to a sizeable stake and the presence of the government is, on average, stronger.

ii. *Empirical model*

A suitable model is needed in order to answer the research question and control the validity of the hypotheses presented above.

Since the data has the form of a longitudinal, unbalanced panel, the choice naturally falls on one of the main panel regression models:
- Pooled OLS: this model would be preferred if no entity individual effect is expected. In such case, a standard OLS regression model could be applied, since its estimators would be both efficient and consistent.
- Fixed Effects model: a Fixed Effect model would be preferred when time-invariant individual-specific characteristics are expected in the panel. This is the case because it allows to control for omitted variable bias that could stem from unobserved heterogeneity that does not change over the time period taken into consideration.
- Random Effects model: a Random Effects model would be preferred when unobserved individual heterogeneity that is uncorrelated with the chosen specification regressors is expected in the data.

Given the nature of the panel, it seems reasonable to exclude a pooled OLS model to be the most fitting one to use in order to investigate the research question. In fact, firms

are generally thought to show unobserved heterogeneity on multiple levels, and this may make a standard OLS panel regression invalid. A common example of this is the fact that something as intangible as the firm "culture" (which may, for example, represent aversion to risk – to make it relatable to the specific case analysed here – or some other latent variable affecting its aversion to risk) may represent an omitted variable that remains fixed over time for each entity. Therefore, fixed and random effects models seem to be more appropriate. In particular, intuition suggests that unobserved heterogeneity may be correlated with the independent variables that have been chosen in this study – as, for example, a more "aggressive" firm culture may be correlated with higher leverage or a lower number of women on the board of directors. Therefore, this would exclude the Random Effects model and would point towards the Fixed Effects model as being the most suitable. In particular, it seems reasonable to estimate a panel model having the following form:

$$Tail\ Risk_{j,t} = \alpha + \beta X_{j,t-1} + \gamma_j + \delta_t + \varepsilon_{j,t}$$

Where $Tail\ Risk_{j,t}$ is the Tail Risk calculated for firm j in year t, $X_{j,t-1}$ is the vector of independent variables for firm j observed at time $t-1$, γ_j denotes the firm fixed effects and δ_t denotes year fixed effects. The inclusion of year fixed effects, in fact, allows to take into consideration "aggregate" macroeconomic trends affecting firms over time, which appear to be relevant in the case analysed, especially given the fact that the data go through both the 2009 Global Financial Crisis and the European Sovereign Debt Crisis.

In all specifications run below, the F-test is statistically significant with a P-value of zero, which confirms the fact that a Pooled OLS model would not be suitable due to the presence of entity individual effects significantly different from zero. In order to allow for possible cross-sectional heteroskedasticity and serial correlation in the panel, in all specifications the standard errors are both robust as well as clustered at the firm level. Unfortunately, this implies that it is not possible to run the standard Hausman

test for model misspecification available in Stata, since now the Hausman statistic does not follow a $\mathcal{X}^2$ distribution anymore. Nevertheless, since by design the orthogonality condition assumed in a Random Effects model – i.e. that the individual fixed effect are uncorrelated with the independent variables – is dropped in a Fixed Effects model, a test of overidentifying restrictions can be used for the same purpose, in the form of a Sargan-Hansen test[2], which has the benefit of being robust to clustered standard errors. In every case, the null hypothesis of the Random Effects orthogonality condition holding in the panel can be rejected, hence pointing towards the Fixed Effects model.

iii. *Empirical results: full panel*

With the purpose of testing the first three hypotheses that were made earlier, a regression including both entity and time fixed effects, as described above, was run with the aid of Stata on the full panel available. The results are reported in table 7.

Table 7 – Full Panel

Tail Risk	Coef.	Cl. St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Leverage	0.001	0.001	0.56	0.577	-0.002	0.003	
ROA	-2.477	0.623	-3.97	0.000	-3.701	-1.253	***
Size	-0.057	0.167	-0.34	0.735	-0.387	0.274	
Board size	-0.065	0.046	-1.40	0.164	-0.156	0.027	
Independent	-0.155	0.440	-0.35	0.726	-1.027	0.717	
Gender diversity	0.711	0.704	1.01	0.315	-0.684	2.105	
CEO Female	0.056	0.362	0.15	0.878	-0.662	0.774	
Large shareholder	0.170	0.304	0.56	0.577	-0.432	0.772	
Activists	-0.147	0.404	-0.36	0.716	-0.948	0.654	
Institutions	-0.331	0.123	-2.69	0.007	-0.572	-0.090	***
Constant	6.329	1.178	5.37	0.000	3.995	8.664	***

R-squared		0.429	Number of obs			1044
F-test		32.528	Firm FE			Yes
Prob > F		0.000	Year FE			Yes

*** p<0.01, ** p<0.05, * p<0.1

---

[2] See Schaffer, M.E., Stillman, S. 2010. "xtoverid: Stata module to calculate tests of overidentifying restrictions after xtreg, xtivreg, xtivreg2 and xthtaylor"

The regression F-test is significant with a p-value of 0.000, indicating that it is possible to reject the hypothesis that the coefficients are jointly zero.

As could have been expected, financial performance – in the form of ROA, originally included as a control variable – has a sizeable and significant impact on Tail Risk, reducing it by almost 2.5%. The coefficient is significant at the 0.01 level, with an associated p-value of 0.000.

The analysis of these results at the full panel level seems to suggest the following regarding the hypotheses and research question:

- The presence of large shareholders in Italian listed companies does not seem to lower Tail Risk, going against previous literature that suggested that long-term owners would be more inclined to monitor the firm and reduce management risk-taking behaviour.

- Gender diversity and corporate governance variables seem to have little relation with Tail Risk, as the coefficients of both *Gender diversity* and *CEO Female* are not statistically different from zero. This suggests that, overall, the presence of females on the board of directors does not curb risk-taking and possible overconfidence in the company – as was suggested by previous literature.

- The presence of institutional investors has a statistically significant effect on Tail Risk at the 0.01 level, and the coefficient has the expected negative sign – this implies that the presence of institutional investors among the shareholders of the company is associated to lowered Tail Risk in the stock.

Before moving on with the analysis, however, it seems apt to conduct some diagnostic tests on the specification above. First, in order to test whether the fixed-effect specification was more suitable to the data than a Pooled OLS specification, a F-test testing the hypothesis that all the individual fixed effects γ_j are different from zero was run and reports an F-statistic of 5.68, with a related p-value of 0.000, indicating that the hypothesis of the individual effects being jointly equal to zero can be rejected and the Fixed Effects model fits the data better than a Pooled OLS model.

A Sargan-Hansen test for comparing a Random against a Fixed Effects specification was also conducted, as specified above, and produced the following output:

```
Test of overidentifying restrictions: fixed vs random effects
Cross-section time-series model: xtreg re  robust cluster(ID)
Sargan-Hansen statistic  32.703  Chi-sq(10)   P-value = 0.0003
```

Since the statistic is significant with a p-value of 0.0003, the null hypothesis of the Random Effects orthogonality condition holding can be rejected, pointing towards the Fixed Effects specification.

In order to check for possible multicollinearity, unfortunately it is not possible to look at the Variance Inflation Factor (VIF) in a Fixed Effects regression in Stata. However, Allison (1999) suggests observing the correlation matrix of the coefficients of the model. Therefore, such correlation matrix was computed and is reported in table 8. Allison recommends a correlation threshold of 0.6 for evaluating whether the model is affected by multicollinearity. As can be seen, no correlation coefficient goes above such value. Nevertheless, size seems to show non-worrying but still relevant figures with respect to leverage, which, along with the considerations expressed before regarding the importance of the size of the company in the Italian context, leads me to follow on with the analysis by splitting the sample by quartiles based on company size, as described earlier.

Table 8 – Correlation matrix of coefficients

e(V)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Leverage	1.0000									
(2) ROA	-0.0591	1.0000								
(3) Size	-0.5889	-0.2945	1.0000							
(4) Board Size	-0.0342	0.4988	-0.3514	1.0000						
(5) Gender Diversity (%)	-0.0158	0.1584	0.1127	0.0352	1.0000					
(6) Independents (%)	-0.0142	-0.0546	0.0485	0.0474	0.1775	1.0000				
(7) CEO Female (d)	0.0611	-0.0150	0.0103	0.0117	0.0734	0.0430	1.0000			
(8) Large shareholder (d)	0.4699	0.2120	-0.3689	0.3296	-0.0542	-0.1045	0.1102	1.0000		
(9) Activists (d)	0.5891	-0.0537	-0.3377	-0.1847	-0.1353	0.0393	0.0720	0.5838	1.0000	
(10) Institutions (d)	0.2923	-0.2105	0.0274	0.0345	-0.2513	-0.1992	0.1211	0.3821	0.1215	1.0000

iv. *Empirical results: small companies*

Given the structural differences expected between small and large companies in the Italian market, which have been described earlier in the paper, as well as the results in the correlation matrix of coefficients just shown, the data was split by quartiles based on size and the empirical model was estimated again for each of the groups separately. This is also important in order to answer to the hypothesis 4, 5 and 6 tested in this paper.

The results for the first (smallest) group of companies can be seen in table 9 below:

Table 9 – Small companies

Tail Risk	Coef.	Cl. St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Leverage	0.180	0.120	1.50	0.143	-0.064	0.425	
ROA	-0.102	1.174	-0.09	0.931	-2.485	2.281	
Size	-0.335	0.353	-0.95	0.349	-1.053	0.382	
Board size	-0.062	0.074	-0.83	0.411	-0.213	0.089	
Independent	-1.835	0.675	-2.72	0.010	-3.207	-0.462	***
Gender diversity	-0.169	1.114	-0.15	0.880	-2.431	2.093	
CEO Female	-0.014	0.319	-0.04	0.965	-0.661	0.633	
Large shareholder	-0.877	0.355	-2.47	0.018	-1.597	-0.157	**
Activists	1.505	0.555	2.71	0.007	0.411	2.599	***
Institutions	-1.782	0.365	-4.88	0.000	-2.524	-1.040	***
Constant	9.460	1.542	6.14	0.000	6.330	12.590	***

R-squared		0.515	Number of obs			258	
F-test		8.134	Firm FE			Yes	
Prob > F		0.000	Year FE			Yes	

*** p<0.01, ** p<0.05, * p<0.1

All the diagnostics that were run in the full model have been run for the 1st quantile model, pointing to similar (positive) results with respect to its quality. Standard errors are, again, clustered at the firm level. The F-test for the individual fixed effects points toward the better fit of the Fixed Effects model with respect to a Pooled OLS, and the Sargan-Hansen test indicates that the Fixed Effects model is preferable to the Random Effects model as well.

The model is significant as the F-test for the coefficients is associated to a p-value of 0.000, and the R-squared improved to 0.515.

Looking at the results, it is clear that the picture painted by this subset of the panel is completely different from the one that could be observed by looking at the full dataset. First, the coefficients associated to financial variables (Leverage and ROA) are not statistically different from zero, and seem to play an irrelevant role in determining the firm's Tail Risk.

Second, while size and board size keep having non-significant estimates, the share of independent members of the board of directors has a coefficient of -1.835 with an associated p-value of 0.010. The interpretation is that, for small companies, an increase in the percentage of independent directors on the board of 1% is associated to a decrease in Tail Risk of 0.01835. This strongly confirms the 5th hypothesis, according to which the presence of a larger share of independent directors should decrease Tail Risk in smaller companies. Nevertheless, the relationship in the other groups remains to be seen.

Third, for this subset of companies all the ownership variables are significant at least at the 0.05 level:

- The presence of a large shareholder is inversely related to Tail Risk with statistical significance. The estimated coefficient is -0.877 and it is associated to a p-value of 0.018. This confirms hypothesis 2 in the context of small Italian listed firms, and is consistent with the findings of the previous literature – implying that a long-term owner is more likely to monitor the firm and avoid undue risks. This seems recognized by the market.
- The presence of activists among the shareholders of the firm is positively related to Tail Risk and is significant at the 0.01 level. This is in line with hypothesis 6, according to which activist investors should be able to exert a higher influence on smaller firms.

- The presence of institutional investors among the shareholders of the firm is negatively related to Tail Risk. The coefficient is sizeable, at -1.782, and has an associated p-value of 0.000. This confirms my hypothesis as well as the vast majority of previous research on the matter, as well as the full panel results that were obtained earlier.

v.   *Empirical results: medium-small companies*

The results of the empirical model applied to the second group can be seen in table 10:

Table 10 – Medium-small companies

Tail Risk	Coef.	Rob. St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Leverage	0.002	0.001	1.75	0.087	0.000	0.003	*
ROA	-0.205	0.766	-0.27	0.790	-1.746	1.336	
Size	1.319	0.526	2.51	0.016	0.261	2.377	**
Board size	-0.073	0.049	-1.50	0.140	-0.171	0.025	
Independent	0.648	0.607	1.07	0.291	-0.573	1.869	
Gender diversity	0.678	0.915	0.74	0.462	-1.163	2.519	
CEO Female	.	.	.	.	.	.	
Large shareholder	-1.546	0.651	-2.38	0.022	-2.855	-0.236	**
Activists	-1.293	0.590	-2.19	0.029	-2.456	-0.131	**
Institutions	-0.894	0.291	-3.07	0.002	-1.468	0.320	***
Constant	-1.030	3.253	-0.32	0.753	-7.578	5.519	

R-squared		0.491	Number of obs		283
F-test		8.134	Firm FE		Yes
Prob > F		0.000	Year FE		Yes

*** p<0.01, ** p<0.05, * p<0.1

As before, all the relevant diagnostics have been performed and point towards the validity of the chosen specification.

The results for the second group of companies are relatively similar to the ones obtained for the first group, with a few differences:

- Financial variables still seem to have no effect on Tail Risk. Leverage is statistically significant at the 0.1 level, but its coefficient is very close to zero, while the coefficient for ROA is not statistically different from zero.

- The size control variable seems to be relevant for this group, as its estimated coefficient of 1.319 is quite different from zero, and it is associated to a p-value of 0.016.

- Stata omitted the estimate for CEO Female. Upon further investigation, this was due to the fact that there was no variance in the variable for this particular group. In particular, it took the value zero for all the observations, implying that, in the panel, there was no female CEO in this particular size group.

- The presence of a large shareholder is still significantly associated to lower Tail Risk, with a sizeable coefficient of -1.546.

- Interestingly, the coefficient estimated for the variable activists changed sign, and is again significant at the 0.1 level. The magnitude of the effect is also relatively sizeable, with an estimated coefficient of -1.293. This is still consistent with the hypothesis that the presence of activists should matter for smaller companies, however it poses the question of why the sign changes when going from small to medium-small listed firms. Indeed, there is no research guiding on this matter that could be found. Nevertheless, a tentative interpretation is that for smaller firms activists are more likely to pursue an aggressive, option-like strategy embedding high risk, while for slightly larger firms they may generally interact with a more constructive approach.

- The estimate for institutions confirms the general hypothesis that the presence of institutions in the shareholder base is associated to lower Tail Risk. The coefficient is significant at the 0.01 level.

vi.   *Empirical results: medium-large companies*

Analysing the third quarter implies moving to the medium-large section of companies available in the panel. At this point some of the relationships should change, and in particular the ones that are expected to hold only for smaller companies. The relationship between the presence of institutional investors and the share of independent directors with Tail Risk should be less relevant. On the other side, the size of the board of directors should start to matter more, as larger companies are likely to be more complex and such complexity may require additional members on the board.

The results of the Fixed Effects regression are shown below in table 11:

Table 11 – Medium-large companies

Tail Risk	Coef.	Rob. St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Leverage	0.069	0.060	1.15	0.258	-0.053	0.191	
ROA	-3.146	1.556	-2.02	0.045	-6.214	0.078	**
Size	0.299	0.417	0.72	0.477	-0.543	1.141	
Board size	-0.100	0.102	-0.98	0.331	-0.306	0.105	
Independent	0.949	1.053	0.90	0.372	-1.175	3.074	
Gender diversity	0.936	1.432	0.65	0.517	-1.955	3.827	
CEO Female	0.624	0.780	0.80	0.428	-0.950	2.198	
Large shareholder	-1.226	0.695	-1.76	0.085	-2.628	0.176	*
Activists	0.112	0.636	0.18	0.861	-1.172	1.395	
Institutions	-0.212	0.262	-0.81	0.423	-0.742	0.317	
Constant	2.244	3.317	0.68	0.502	-4.450	8.939	
R-squared		0.511	Number of obs			265	
F-test		8.365	Firm FE			Yes	
Prob > F		0.000	Year FE			Yes	

*** p<0.01, ** p<0.05, * p<0.1

All relevant diagnostics, as described in paragraph (ii) and (iii) of this section, have been computed and, again, point towards the validity of the specification adopted.

The relationships are, overall, less significant in this case, with two notable items.

ROA has a very large estimated coefficient for this group, of -3.146, and is statistically significant at the 5% level. This seems to indicate an important discontinuity between medium-large and smaller firms, as financial performance was never significant for the groups previously analysed.

As financial performance gained in importance, however, ownership variables lost it, as neither the coefficients estimated for the presence of institutions nor the presence of activists are statistically different from zero. However, the presence of a large shareholder is still negatively related to Tail Risk, and its coefficient of -1.226 has an associated p-value of 0.085.

vii. *Empirical results: large companies*

This paragraph turns to the set of largest Italian companies. The estimates for the model are shown in table 12 below:

Table 12 – Large companies

Tail Risk	Coef.	Rob. St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Leverage	-0.057	0.011	-5.22	0.000	-0.079	-0.034	***
ROA	-11.564	3.607	-3.21	0.003	-18.965	-4.163	***
Size	0.281	0.455	0.62	0.542	-0.653	1.215	
Board size	0.022	0.057	0.38	0.708	-0.096	0.139	
Independent	0.798	0.953	0.84	0.410	-1.157	2.752	
Gender diversity	-1.322	0.923	-1.43	0.164	-3.216	0.573	
CEO Female	-0.266	0.342	-0.78	0.444	-0.967	0.436	
Large shareholder	1.036	0.564	1.84	0.077	-0.122	2.195	*
Activists	0.391	0.434	0.90	0.376	-0.500	1.282	
Institutions	-0.199	0.351	-0.57	0.575	-0.919	0.521	
Constant	1.826	4.534	0.40	0.690	-7.477	11.129	
R-squared		0.620	Number of obs			238	
F-test		12.648	Firm FE			Yes	
Prob > F		0.000	Year FE			Yes	

*** p<0.01, ** p<0.05, * p<0.1

All the relevant diagnostics have been conducted on this specification as well, pointing towards the same results as for the other groups.

In this case, some striking differences can be observed with respect to the groups of smaller companies. This relates especially to the financial variables, that are now both significant at the 0.01 level, and to the fact that ownership variables are no longer significant, apart from the presence of a large shareholder. What is most surprising, however, is that the following statistically significant variables have changed sign for this group: (1) leverage switched sign from positive to negative, even though the size of the effect is still small (the estimated coefficient is -0.057), and (2) large shareholder switched sign from positive to negative as well, and it keeps showing a quite sizeable effect (the estimated coefficient is 1.036), even if at only the 10% significance level.

viii.   *Discussion of the results*

Before proceeding with the discussion, table 13 summarizes the main results obtained for the model estimated on each group of companies, split by size:

Table 13 – Comparative results

Group	Tail Risk			
	(1)	(2)	(3)	(4)
	Coef.	Coef.	Coef.	Coef.
Leverage	0.180	0.002*	0.069	-0.057***
ROA	-0.102	-0.205	-3.146**	-11.564***
Size	-0.335	1.319**	0.299	0.281
Board size	-0.062	-0.073	-0.100	0.022
Independent	-1.835***	0.648	0.949	0.798
Gender diversity	-0.169	0.678	0.936	-1.322
CEO Female	-0.014	.	0.624	-0.266
Large shareholder	-0.877**	-1.546**	-1.226*	1.036*
Activists	1.505***	-1.293**	0.112	0.391
Institutions	-1.782***	-0.894***	-0.212	-0.199
Constant	9.460***	-1.030	2.244	1.826
Observations	258	283	265	238
R-squared	0.515	0.491	0.511	0.620
Prob > F	0.000	0.000	0.000	0.000
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

The most striking feature of this comparison is the difference in results between the first and the fourth group. On the one hand, in fact, the drivers of Tail Risk for small companies seem to mainly be ownership, with the exception of one governance variable – the share of independent directors. On the other end, only the presence of a large shareholder seems to matter among the ownership variables for the group of the largest companies, with Tail Risk being mostly associated to financial variables – Leverage and ROA – while governance does not have any statistical relationship to Tail Risk. Interestingly, gender diversity variables seem to have no relationship with Tail Risk, suggesting that, at least in the Italian market, the supposed more conservative approach that some academic suggested women could bring to boards of directors do not materialize. With these results in mind, an in-depth discussion of the hypotheses presented in paragraph (i) of this section can thus be conducted.

Hypothesis 1 cannot be accepted. In fact, looking at both the results of the full panel and the single quartile groups, the two variables related to gender diversity are never significant. This deviates from some of the results reported in previous studies on other countries and time periods. For example, Khan and Vieito (2013) reported that in US firms the gender of the CEO is generally related to lower riskiness in the share price, intended as share price volatility. Nevertheless, previous research on the specific matter analysed here is relatively limited, and the results from only a few past papers on specific geographies do not make a rule. Moreover, the fact that gender diversity regulations as well as development in Italy is still recent and immature must be taken into account. As can be seen from the preliminary statistics on the full panel, the mean percentage of women across all observations in the panel is only 17%. It is possible that an analysis splitting the periods before and after the introduction of Law 120/2011 could lead to different results, especially if more complete and additional data was available. Unfortunately, the fact that data for this paper had to be collected limited somewhat the depth of the analysis that could be conducted, as, especially for the period before 2011, some variables lacked the necessary variance to make the

estimation reliable (for example, CEO Female had few observations and was sometimes collinear with firm fixed effects).

Regarding hypothesis 2, it can be seen from the results of the full panel that the coefficient associated to the presence of a large shareholder is not statistically significant. However, the full story can only be understood by looking at the specifications run on the four size groups. In fact, hypothesis 2 can be accepted for all groups apart from the largest one. As can be seen from table 13 the variable *large shareholder* has a negative and significant coefficient for quartiles 1, 2 and 3, but has a positive and significant coefficient for the 4th quartile. This result is indeed plausible, and its interpretation is tightly connected to the nature of the ownership of Italian listed companies. As explained before, in fact, companies controlled by the government are over-represented in the 4th group of the dataset, while companies controlled by families are over-represented in the first 3 group. The natural interpretation that follows is that a family with a large ownership stake is more likely to monitor the firm, decrease excessive risk-taking behaviour and streamline decision making, as argued in the literature surveyed (see, for example, Burns et al., 2010; Górriz and Fumás, 1996; Croci et al., 2012). On the other hand, it is likely that the government is less efficient at monitoring the firm. Another interpretation is that the government, in its role as a shareholder in a listed company, may have different objectives from the ones than the average shareholder, and as such may increase the risk faced by the firm and minorities by taking inefficient decisions from a business perspective. These specific hypotheses regarding public administration as a shareholder would need an additional paper to be analysed and proved, but they provide a possible explanation to the results of the empirical analysis conducted here.

Hypothesis 3 is indeed confirmed by the results on the full panel, where the coefficient associated with the presence of institutional investors is negative and highly significant. This result is in line with the vast majority of research on the matter, that suggests that such institutional investors are more likely to avoid companies that present an option-

like payoff profile, which would, indeed, imply a high amount of Tail Risk. However, additional information is provided, again, from the results on the different groups. In fact, in this case the coefficient associated to the presence of institutional investors is highly significant and has the expected sign for small and medium-small companies, however it loses significant for medium-large and large companies. A possible interpretation of such a result is that smaller companies are more likely to be risky with respect to larger companies, hence institutional investors will avoid such risky companies. However, since larger companies are, on average, less risky, institutions are less likely to find risky companies among them, so that the relationship ceases being significant.

Hypothesis 4 can be discarded without any doubt, as the coefficient associated to board size is not significant in both the full panel regression and in all the size groups. This goes against evidence conducted in other geographies and time-periods, in which a larger board was generally associated to lower risk. It needs to be stressed, however, that past research was not specifically looking at Tail Risk, but rather at the volatility of the share price or some performance measure such as ROA or Tobin's Q. Moreover, the characteristics of the Italian ownership and corporate governance environment are very different from the ones of the United States, where most past research whose conducted, so that generalizing results obtained between the two geographies can be misleading, and it is difficult to expect that the same results would apply to the Italian environment.

It must be noted, however, that having collected corporate governance data by hand allows to provide some anecdotal evidence of the fact that board size dynamics in the panel analysed seem to be driven primarily by the entity and the quantity of shareholders, rather than the complexity of the operations of the company, which was the premise provided by consensus in the literature surveyed and that formed the basis of the hypothesis formulated earlier.

Moving forward, it is possible to see that the empirical evidence is consistent with hypothesis 5, according to which the share of independent directors on the board of smaller companies is negatively associated to Tail Risk. As can be seen, the coefficient related to such variable is negative and highly significant only for the set of small companies, while it is not significantly different from zero for the others. This is in line with the fact that, as smaller companies are more likely to be controlled by a single shareholder that is probably a family, the presence of independent directors can increase monitoring and curb potential risk-taking incentives presented by the directors associated to the owners. This is also in line with some previous research, such as the paper by Ferreira et al. (2011), where the authors find that a more independent board seems to be associated to lower share price volatility.

Finally, the results are also consistent with hypothesis 6, according to which the presence of activist investors should have a more significant impact on the Tail Risk of smaller companies than on the one of larger companies. In fact, the coefficient associated with the presence of activists is statistically significant for both the small and medium-small groups, while it is not statistically different from zero for the groups of medium-large and large companies. Surprisingly, however, the coefficient changes sign between the two groups: it is positive for small companies, and negative for medium-small ones. A plausible interpretation, that is also consistent with anecdotal evidence, is that parties pursuing an activist investment strategy are more likely and better able to make a "risky bet" and pursue a very aggressive strategy with smaller companies, which thus leads to higher Tail Risk. This is consistent with the little empirical evidence available on the matter, that points to the volatility of the share price to increase when activists reveal their positions. On the other hand, activists are less likely to possess such an influence on larger companies, for which it may be more difficult to obtain a very relevant stake and that may count on more experienced managers. In such cases, then, the activist is more likely to follow a constructive approach, that may indeed be associated to lower Tail Risk.

Apart from these detailed analyses, what most attracts the attention in the results is, again, the fact that Tail Risk in small companies seems to be mostly driven by the entity of its ownership – and in particular by the presence of institutional and activist investors. On the other hand, this does not hold at all for large firms, for which, instead, financial performance matters the most.

SECTION IV: Conclusion

A. Main results

This paper analysed the corporate governance and ownership characteristics of Italian listed non-financial companies, and examined whether heterogeneity in their Tail Risk could be explained by differences in selected financial, corporate governance and ownership variables. In order to do so, data on the corporate governance and ownership of the 152 largest Italian listed firms was hand-collected from their filings (annual reports, corporate governance reports) for the period 2000-2018, and merged with financial data obtained through the Thomson Reuters Eikon database. Tail Risk was calculated as the average stock return (obtained from the Bloomberg Terminal) over the 5% worst days in each year, multiplied by negative 100 in order to express it as positive values. The final dataset took the form of an unbalanced longitudinal panel comprising 1,044 complete unique observations.

At the full panel level, Tail Risk seems to mainly be negatively related to ROA (financial performance) and the presence of institutional investors in the shareholder base. Nevertheless, the main finding of this paper is revealed when the companies are split in four groups based on their size. In such case, in fact, it turns out that Tail Risk in different size groups is driven by different fundamental variables. Tail Risk in small firms is mainly correlated with ownership and governance variables, such as the presence of institutional and activist investors and the proportion of independent directors on the board. On the other hand, Tail Risk in large firms is purely driven by financial variables – leverage and ROA to the extent of this analysis. The presence of a large shareholder is always significant, but has the effect of increasing Tail Risk in larger companies, opposite to what occurs in the remaining three groups. This is likely to be related to the overrepresentation of the public administration as a significant shareholder in large companies, and the symmetric over-representation of families as a significant shareholder in smaller companies.

Notably, the following specific results immediately draw attention. First, the presence of institutional investors is significantly related to lower Tail Risk in small and medium-small companies. This could be explained in two ways: on the one hand, past research points to institutional investors avoiding companies with higher Tail Risk; on the other hand the result may be due to the increased ability of institutional investors to shape the strategy of smaller firms towards less risky behaviours. This would also be confirmed by the fact that the presence of activist investors also has a significant effect for small and medium-small companies, but ceases being relevant for medium-large and large ones.

Second, another result that holds only at the level of small companies is that board independence is also inversely related to Tail Risk. This is consistent with the idea that the additional monitoring and expertise provided by independent directors in small companies can be beneficial in curbing Tail Risk.

Third, all these effects cease being relevant for large companies, whose Tail Risk is mainly shaped by financial performance.

Finally, apart from the share of independent directors in the set of smallest companies, corporate governance and gender diversity variable never have a significant relationship to Tail Risk. This is consistent with the high heterogeneity and uncertainty of results linking corporate governance and gender diversity to firm performance in previous research.

B. Implications

Given the results of the analysis, it is possible to summarise some key implications.

First, corporate governance and gender diversity seem to play a minor role in driving Tail Risk in Italian companies. This entails that companies trying to curb Tail Risk, while still adopting optimal governance practices, should focus on different measures to obtain tangible and fast results. In particular, large companies can obtain such a result by improving their financial performance (which, of course, is easier said than done).

Smaller companies can increase the amount of independent directors, if not already high, in order to boost monitoring and decrease unnecessary risk-taking. Nevertheless, high Tail Risk seems to be a problematic issue to treat given that it seems not to be driven by any variable that is easy to modify.

Second, investors pursuing stock picking strategies that want to limit downside risk in their portfolio can concentrate on smaller firms with sounder corporate governance practices, as what was conveyed in the analysis by higher board independence is likely to be correlated with better overall corporate governance. On the other hand, when looking at larger and more affirmed companies they should be less interested in governance characteristics, and instead critically evaluate the financial performance of the firm. Moreover, investing in companies with a significant controlling shareholder is more likely to decrease Tail Risk when the company is small, while the opposite is true when the company is large. To the extent that the hypothesis made about this being related to the identity of the significant shareholder is true, they would possibly be better off by avoiding large, government-controlled companies. Nevertheless, finding out whether this relationship effectively holds true is left to future research and out of the scope of this paper, also given the paucity of data available on the matter.

Finally, the results found can also be useful to regulators. In particular, to the extent that the public administration is overrepresented as a large shareholder in the 4th quartile, it seems that its effect of accentuating Tail Risk may be due either to lower monitoring or to incentives and decisions that are not aligned to the rest of the shareholders, also given the fact that the public administration is unlikely to directly affect Tail Risk by trading on the market. Researching the nature of such an effect could shed light on the underlying mechanisms and point regulators towards possible paths of action.

C. Limitations

While analysing the results of this paper, a number of limitations need to be taken into account in order to properly contextualize its results.

First, the results hold for the subset of the 152 largest companies listed on the Italian stock exchange trading between 2000 and 2018. Since Italy represents a very peculiar market with specific ownership, governance and performance characteristics (among the others, it is worth mentioning the very high percentage of companies controlled by families and the sizeable amount of large companies controlled by the public administration), it is likely that the results obtained in this paper do not extend to other market environments. For example, La Porta et al. (1997) find that capital markets are most developed in Common Law countries, (such as the UK and the US), while they are less developed in Civil Law countries, including Italy. As this still holds true to this day, it is likely for ownership characteristics to be less relevant in determining Tail Risk in market-based intermediation systems.

Second, the dataset used may somewhat be biased to the extent that some older corporate governance reports are not available anymore, and hence data for some companies over the earlier part of the panel may be missing. This may affect the ability of the model to represent the accurate characteristics of the relationships.

Third, due to the demanding amount of information that had to be collected by hand, only a few key variables per category were available for the analysis. This means that some potentially relevant firm characteristics may have been excluded, or that the variables collected may not be representative of the whole financial, governance or ownership structure of some firms.

D. Directions for future research

Due to the limitations that were mentioned in the previous paragraph, it is possible to suggest some areas in which additional research could improve and build upon the research conducted here.

The need to hand-collect data limited the availability of figures and the possible investigations that could be conducted in this study. An author having available additional, regulator-level data could not only provide a more complete picture of the environment and the drivers of Tail Risk, but could also look at differences in the relationships over time. In this paper, in fact, it was not possible to split the dataset over time periods due to the fact that some of the variables did not have enough variance over shorter lengths to give rise to a meaningful analysis (for instance, in the panel some ownership and governance variables were unlikely to change over a shorter period of time). Another relationship that would be interesting to further analyse would be the one between Tail Risk and the identity of the significant shareholders. Due to a lack of data it was only possible to speculate that some of the results were driven by over-representation of the public administration or families in certain size groups, but this should be further investigated in a dedicated piece of research. Along the same line, it would also be interesting to see if there was any significant structural change in the relationship after the introduction of Law 120/2011 on gender diversity.

Future research could also investigate whether the relationships that were found in this paper hold also at the cross-country level, and in particular whether there is any trend shaping them across the civil- and common-law country level distinction.

Finally, there seems to be a scarcity of studies covering the interrelationship of performance, governance, ownership and risk. This paper aims at contributing to such body of research, but both theoretical as well as empirical advancements would be precious in this regard.

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TAIL RISK IN SWEDISH STOCKS:
AN EMPIRICAL ANALYSIS[*]

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ABSTRACT

This paper investigates whether differences in Tail Risk across Swedish listed companies can be explained by their fundamental characteristics, and compares the results to a similar panel of Italian firms.

To this end, data on financial performance, corporate governance, gender diversity and ownership were obtained from over 1,000 company filings to build a longitudinal panel dataset comprising the 108 largest Swedish non-financial firms over the 2000-2019 period, and a Fixed Effects panel model was used to investigate the issue, using a measure of Expected Shortfall as proxy for Tail Risk.

Just like for Italy, we find that fundamental firm characteristics have a significant relationship with Tail Risk, which changes with firm size. However in Italy, due to its specific corporate ownership characteristic, governance and ownership variables are only correlated with the Tail Risk of small firms, while in Sweden these variables have an impact across the size distribution, which partially differs for small and large firms. Furthermore, gender diversity variables are relevant in determining Tail Risk in Swedish firms, while the opposite is true for Italian firms.

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SECTION I: Introduction

A. Summary

This paper investigates whether differences in Tail Risk across Swedish companies listed on the Stockholm Stock Exchange can be explained by their fundamental characteristics, focusing on firm performance, corporate governance and ownership. Furthermore, results are compared to our previous analysis of Italian listed companies to understand whether relationships are maintained across the two countries, or whether there are any differences that can be explained by underlying theoretical frameworks.

To this end, corporate governance, gender diversity and ownership variables were hand-collected from over 1,000 company filings, and were merged to financial and return data to create a longitudinal panel dataset comprising the 108 largest Swedish non-financial firms over the 2000-2019 period. The definition of Tail Risk adopted borrows from the financial risk management literature, and, in particular, corresponds to the historical daily average return over the 5% lowest returns of a given year (hence, based on the concept of Expected Shortfall).

A Fixed Effects panel model was used in order to investigate the issue, after running the appropriate diagnostic statistical tests and ascertaining that the result matched with the expected theoretical background, controlling for both possible firm-level omitted variable bias stemming from unobserved heterogeneity and macroeconomic and market-wide shocks over time.

The main hypothesis made ex-ante, on which this paper is based, is that the variables considered do have a significant relationship with corporate Tail Risk, but that such relationship varies depending on the size of the firm. This is consistent with what was found in our analysis on Italian listed companies, however we expect significant

differences to be driven by the different ownership and governance frameworks in the two countries.

This paper finds that, just like was the case for Italy, fundamental features have a significant relationship with corporate Tail Risk, and that such relationship indeed changes with the size of the firm.

The main finding, however, is comparative with respect to Italy. In Italy, due to its specific ownership characteristics, where small firms are mainly controlled by families and large firms by the government, we found that the downside risk in the stock of smaller firms is exclusively correlated with ownership and governance variables, while the risk in the stock of large firms is mainly related to their financial performance. Since this ownership dynamic is not present in Sweden, we would expect governance and ownership variables to have an impact on Tail Risk across the size distribution. This is indeed what we find in the data: the Tail Risk of both small and large firms is impacted by such variables, and interesting effects arise at different sizes. In particular, we observe a difference between the largest group of companies and the others. For example, the share of independent directors moves from curbing Tail Risk in smaller companies to increasing it for large companies, driven by the fact that larger firms are generally more complex and thus more difficult to monitor from an outside-in perspective, while smaller firms benefit from outside monitoring since they are more likely to be controlled by a single shareholder. The presence of institutional investors in the shareholder base also switches sign in a similar way, likely driven by lower institutional monitoring on the right side of the distribution as larger firms are more likely to have as shareholders institutions following passive strategies (e.g. custodians). This confirms that large companies have a specific set of features which differentiate them from smaller companies, from a risk perspective, across different metrics.

Furthermore, we find that gender diversity variables are very relevant in determining tail risk in Swedish firms, while they have no impact at all on Italian firms. This is

consistent with the perception of Sweden as much more advanced in terms of gender diversity across society, and in particular in terms of women participation in boardrooms.

This paper contributes in several innovative ways to the existing literature.

First, it follows the footsteps of our previous analysis in being among the first papers in the literature in which the relationship between firm fundamentals and Tail Risk is examined to such a degree. Most previous studies, in fact, focus primarily on a single specific company characteristic, and look at overall risk – defined as the variance of stock returns or some firm performance measure – instead of Tail Risk specifically. The only previous paper looking precisely at Tail Risk (Ellul and Yerramilli, 2013) does so in a completely different context, as it focuses on financial firms in the US, and focuses purely on the risk management qualities of its sample. Secondly, the dataset used is unique to the extent to which the key variables were hand-collected by the author and are not available to the general public in detailed form, as the regulators do not publish relevant data on the matter.

B. Literature review and theoretical background

As per our original paper, a review of the literature on which this research builds upon is carried out here, by also touching on the underlying theoretical background in order to provide the context on which this analysis is based. This work does not fit in a defined branch of research, but rather is at the cross-section of various subjects which are needed to correctly understand its results, hence a paragraph is dedicated to each.

In particular, the paper builds upon (i) the concept of Value at Risk and Expected Shortfall as a measure of Tail Risk, (ii) the impact of institutional and family ownership on listed companies' risk and performance, (iii) the relationship between different characteristics of corporate governance and firms performance and risk, and (iv) the body of research investigating the Swedish stock market and governance environment.

iii. <u>*Expected Shortfall as a measure of Tail Risk*</u>

Risk management has been at the centre of financial debate in the last decades, on the back of drivers inside and outside (financial) firms. Firms, and especially financial institutions, were driven by the search for optimal returns on risk-based capital; clients, typically risk averse, and regulators, whose purpose is to protect investors and promote competition, on the other hand, drove research in the area with the ultimate concern of financial stability. Furthermore, market volatility has been rising over time as trading focuses on increasingly complex instruments, the risks of which are relatively difficult to assess, and on the back of innovative monetary policy, with consequences that are not yet fully understood by market participants.

Given this premise, a reliable measure of risk became more and more necessary and near the middle of the 1990s, the *Value at Risk* (VaR) was established as the benchmark for both regulators and financial institutions, especially after 1994 when JP Morgan published information of its internal market risk measurement system - RiskMetrics. The VaR describes the potential for deviations from a target or expected value. The widespread adoption of VaR spurred a heated debate about its usefulness, or better – its ability to describe the real risk underlying a certain situation.

Artzner et al (1999) proposed a set of properties that an "ideal risk measure" should have: monotonicity, translation invariance, homogeneity and subadditivity. The first three sum up to the fact that the risk measure is the amount needed to the portfolio to make the risk reasonable. The fourth condition (subadditivity) states that diversification generally reduces the risk (or at least does not increase it).

VAR satisfies the first three properties but not the fourth. In financial jargon, we say that it is not a coherent risk measure. This naturally led to consider a coherent risk measure associated with the VaR: the conditional VaR, commonly named Expected Shortfall or Expected tail Loss (Acerbi et al., 2002). The Expected Shortfall is the expected return in the worst percentage cases, and is more sensitive to the shape of the tail of the loss distribution.

Given its better capabilities in capturing the overall risk, Expected Shortfall has been increasingly used as an alternative to Value at Risk, to the point that the Basel Committee on Banking Supervision replaced it to Value at Risk as the risk measure to be used in the context of market risk by financial institutions.

Du and Escanciano (2017) confirmed that Expected Shortfall is able to account better than Value at Risk for extreme events using unconditional and conditional backtests as well as a set of Monte Carlo experiments on 3 stock indices: the DAX, the S&P 500 and the HS.

Finally, and most important, Expected Shortfall has notably been used in a context similar to the one of this paper by Ellul and Yerramilli (2013) to measure the Tail Risk of the stock of Bank Holding Companies (BHC) during the 2009 financial crisis. They show that those banks that have a stronger risk management functions showed lower Tail Risk and better performance during the crisis. They also find that better corporate governance drives their risk management index.

iv.   *Corporate governance and corporate performance*

Corporate governance is generally understood as the way and practice of directing, organizing and controlling the firm. The main predicaments are generally based on following good practices in terms of transparency, responsibility, transparency and fairness. Good corporate governance is expected to improve firm performance and optimize the value for shareholders and stakeholders in the long term. A large body of research has developed relating corporate governance and firm performance, and there is heterogeneity both with regard the variables taken into account and the methods used to establish casual relationships.

Results are not unambiguously in favour of a positive relationship between governance practices that generally considered "good" and corporate performance.

Governance variables generally taken into account are board size, board composition and ownership, while performance variables are Tobin's Q, Return on Assets (ROA)

and Return on Investments (ROI), with the last two being more representative of tangible performance.

Bone et al (2007), tracking for 10 years the board development of a sample of US Industrial firms that went public between 1988 and 1992, find that board size and independence increase as a consequence of the increasing complexity and size of firms, so that the causal relationship is somewhat reverse.

Eisenberg et al. (1998) study small firms in the Nordics, in Finland in particular, and find a "negative correlation between board size and profitability," however are unable to determine the source of such relationship. Among different possible explanations, they include the presence of less problems in information transmission with a smaller board. Yermack (1996) and Guest (2009) investigates data on industrial companies based in the US and UK using both Ordinary Least Squares (OLS) and panel data models and find a negative relationship between board size and firm performance with, as a dependent variable, both Tobin's Q and standard Return on Assets and Return on Sales measures.

These results fit with the recommendations of Lipton and Lorsch (1992), according to whom large boards (more than 10 members) do not spend enough time in meetings during the fiscal year and may lack effective communication. Jensen (1993) also suggests a similar concept, arguing that larger boards may be influenced and manipulated by the Chief Executive Officer more than smaller ones.

On the other hand, various results point in the opposite direction and find that board size may be related to better performance. For example, Rashid (2018) analyses 135 firms on the Dhaka Stock Exchange in the period between 2006 and 2011, excluding companies in the financial sector, and finds that board size is generally correlated with better firm performance.

Linck, Netter and Yang (2008) and Adams and Mehran (2012) using data on US financial and non-financial firms across the 80s and 90s find that board size is positively related with company performance. This seems to be especially the case in the banking sector, however specific regulation and high complexity may imply that these

results only hold for financial services firms. These conclusions seem to be in line with the body of research that finds a positive correlation between the size of the board and the size of the firm, as a larger firm is generally more complex than a smaller one, but is also likely to show better performance. Coles et al. (2008) have similar results along, but add a level of nuance to the discussion, as their research seem to indicate that performance (as proxied by Tobin's Q) is positively related to the size of the board of directors if the firm is complex and larger, while the opposite is true for simpler companies. Clearly, the endogeneity issue is just around the corner and casual relationships are not clear-cut.

The same heterogeneity of results is observed when profitability is related to board composition, and the consensus seems to point towards the existence of a very weak relationship (if any). As argued by Nicholson and Kiel (2007), these analyses fall in the theoretical concepts that build the cornerstone of principal-agent relationships. On the one side, agency theory would point towards independence of board members, as a larger number of insiders, who could easily act in their own self-interest, could lead to poorer results for the firm. On the other side, stewardship theory would lead to the opposite conclusion, based on the idea that insiders are better equipped to steer the company in a positive direction given that they are commonly thought to act in the interests of the shareholders.

Harris and Raviv (2008) developed a theoretical model in which shareholders may obtain more benefit either by an outsider- or by an insider-controlled board depending on the situation. Indeed, there seems to be no unifying empirical regularity that holds true for all cases taken into consideration.

On a preliminary level of analysis, as showed by Boone et al. (2007), the independence of the board of directors seems to be somewhat correlated to both firm size and age as well as complexity.

Bhagat et al. (2002), Agrawal and Knoeber (1996), relying on data of US firms use both a standard OLS and a Two-Stage Least Squares methodology (to account for possible endogeneity in their variables) and find a negative relationship between the

independence of the board of directors and performance (measures using Tobin's Q). However, results change based on the specification of performance measure used as dependent variable in the empirical models. Indeed, most of their results seem to be more consistent with a non-significant relationship between the variables. As mentioned before.

Remarkably, companies that experienced negative performance in the recent past were more likely to increase the independence of their board, following the general idea that a higher degree of independency should allow for better control of insiders and therefore improve company conduct.

In a very influential paper, Wintoki et al. (2012) argue that the relationship between profitability and board composition is endogenous in nature, and that such endogeneity should be dealt with using a suitable model, such as a dynamic Generalized Method of Moments (GMM) estimator. By applying such a methodology to a large panel between 1991 and 2003, they find no relationship between board composition, board size and firm performance.

iv.   *Corporate governance and corporate risk*

The research conducted on the connection between corporate governance and risk is less extensive than the one that looks directly at the governance-performance relationship analysed above. Nevertheless, this body of knowledge is more interesting for the purpose of this paper due to its direct relevance for the subject matter at hand. In recent research, corporate governance has been related to either equity prices (or returns) or to firm specific risk, mainly taking into consideration profitability.

First, various authors argue that differences in the governance of firms can influence the distribution of their stock returns.

Gompers et al. (2003) used a sample of more than 1,000 firms between 1990 and 2000 and built a "governance index" based on a set of 24 variables, finding a significant relationship with stock returns. They analyse a long-short portfolio that is long the

stocks with supposedly better governance (in terms of providing higher rights to shareholders as opposed to management) while being short the stocks of firms showing opposite characteristics. This portfolio seems to be able to obtain relevant and consistent abnormal returns over the decade taken into consideration. Unfortunately, the analysis conducted in the paper does not allow to tell whether such results are a consequence of the differences in governance among the firms or whether there is some kind of unobservable latent firm characteristic driving them.

Starting from the work of Gompers, Cremers and Nair (2005) conduct a similar study looking at both internal as well as external governance mechanisms in firms during the last decade of the 1900s. Their work is very relevant with respect to the research question asked in this paper as they also take into consideration ownership characteristics, such as the presence of large institutional blockholders (e.g. public pension funds). Using this information, they build a portfolio that is long companies with high takeover vulnerability and institutional ownership and short symmetric companies, and show that it is able to obtain sizeable annualized abnormal returns.

Ferreira et al. (2007) further develop this stream of research, and find that firms showing more significant anti-takeover measures (as defined by the index developed by Gompers et al.) also show less firm-specific information contained in their share prices (i.e. lower idiosyncratic volatility). Therefore, they argue that governance can be related to firm-specific risk through trading. An interesting result obtained in their paper is that such a relationship between governance and risk is generally amplified by the presence of institutional investors.

The second branch of research studying the ties between corporate governance and risk looks more specifically at corporate risk taking and the stability of the firm operating performance instead of the variability and informativeness of its share price.

John et al. (2008) look at the relation between the investor protection generated by the firm's corporate governance and the level of corporate risk taking. In general, higher investor protection is thought to decrease the amount of risk undertaken by management, as executives would find it more difficult to expropriate shareholders of

the value created by the firm. This may especially be the case when strong corporate governance is accompanied by a large block shareholder. The analysis makes use of both cross-country and intra-country (US specific) firm-level data referring to the 1990s and beginning 2000s. The main proxy for corporate risk taking taken into consideration that is relevant for the purpose of this study is the standard deviation of the ratio between the EBITDA and the total assets of the company. The empirical model developed by John is based on both an Ordinary Least Squares regression as well as a 2-Stage Least Squares regression to account for possible endogeneity, since an income statement variable appears as the regressand. In both cases there appears to be a significant relationship between the proxy for corporate risk-taking and a governance index as well as firm size, while the opposite is true for "large shareholder ownership".

Nguyen (2011) also looks at the relationship between corporate governance and firm risk-taking, with a focus on Japan, through data on firms listed on the Tokyo Stock Exchange between the year of 1996 and 2003, but excluding banks and other types of financial companies due to different measures of profitability commonly used in the industry. He opts to use, as a proxy for risk-taking, a measure of idiosyncratic risk of the stock obtained by first calculating the standard deviation of the stock returns over a monthly time period, and then extracting a systematic and idiosyncratic portion through the use of the classic Fama-French 3-factor model. The main result from the analysis is that firms with a large family shareholder are more likely to show higher idiosyncratic risk, while firms controlled by financial institutions are more likely to show lower idiosyncratic risk. Moreover, ownership concentration is also more likely to be associated with higher idiosyncratic risk. Finally, Nguyen also finds an amplifying effect of ownership concentration on the effects of family and bank ownership.

Boubaker et al (2012) investigate the role of multiple large shareholders in corporate risk taking on a sample of publicly listed French family firms over the period 2003-2012. Their main hypothesis is that multiple large shareholders are more propense to risk taking behaviour than single one, especially if single families. Risk is measured in terms of deviation from performance measures such as ROA and Tobin's Q

They adopt a regression approach controlling for other factors such as size, leverage and firm age; concluding that the presence of multiple large shareholders is associated with higher risk-taking, restraining the propensity of family owners to undertake low-risk investments. This effect is much stronger in firms that are more susceptible to agency conflicts.

Recently, in one of the most interesting papers on which this one builds, Pearce and Patel (2018) argued that the effectiveness of the task conducted by the board of directors in the context of the firm should not only be measured by its capacity of increasing performance – on which, as has been seen in the previous paragraph, there is little consensus in research – but also by its effectiveness in stabilizing such performance. Their data consists of a sample of observations on over 3,000 firms in the period of time between 2005 and 2013, including both governance and financial performance information. As a measure of risk they opt to use variability in Return on Assets (ROA), defined as its standard deviation over a period of 3 years. Their methodological setting is relatively similar to the one used in this paper, as, they use a Fixed Effects panel data regression specification. Their results are somewhat in line with the ones of this analysis to the extent to which they find that firm size and blockholder ownership have a significant inverse relationship with operating risk. Nevertheless, they recognize that their analysis may be spurious due to a possible endogeneity of governance and financial variables with the variability in ROA, a problem that is, possibly, tackled here by using a different variable to measure risk.

Cheng (2008) was a precursor in this context as he had already conducted a similar analysis, but in a more specific fashion: he looked at whether the size of the board of directors is correlated with the variability of corporate performance. As a measure of corporate performance variability, he uses the standard deviation of the monthly stock returns, the ROA and Tobin's Q. He includes industry fixed effects in the model specification, but no year nor individual firm fixed effects. He concludes that board size and firm performance and value variability are negatively related, and interprets it as implying that extreme corporate actions are less likely to be taken by large boards.

In a very recent paper, Loof et al (2021) study the relationship between corporate social responsibility and tail risk during the recent pandemic crises. In particular, their research question is if stocks with better ESG scores showed a more stable behaviour in a context of significant market uncertainty. They sample stocks worldwide from 2018 to the end of 2020 and apply a correlated random effects panel model. Findings are encouraging since, as expected, companies with superior CSR (i.e. better ESG scores) show less downside risk, with a more pronounced relationship during the pandemic. However, better CSR implies also less upside potential corroborating the traditional risk-return trade-off. The novelty of the paper lies in the risk measures the authors choose: VaR and Expected Shortfall, which are the same chosen in the present work. Overall, empirical research that relates corporate governance to risk seems to be still in its early stages. There is high heterogeneity in the variables taken into account by research as well as in the interpretation of their results, however there seem to be some tentative regularities in results. On the one hand, firm size often seems to be significantly related to idiosyncratic risk. On the other hands, ownership characteristics, such as the presence of large shareholders and their identity as well as takeover sensitivity, seem to shape firm risk in a more compelling and frequent manner than "proper" corporate governance characteristics, such as the share of independent directors on the board or its size.

v. *Board gender diversity and corporate risk*

In the last decade there has been a lively debate focused on gender diversity and its implications. In Corporate Finance, this debate translated in pressure on governments to implement regulation aimed at increasing female participation on boards of directors. Consequently, various countries have enacted laws requiring companies to increase the number of female directors sitting on their executive and monitoring bodies. In 2006, for example, the Norwegian government imposed a law according to which, starting from 2008, the share of each gender in the board of directors should be at

least 40%. Following the Norwegian example, other European countries such as Spain, Iceland, France and Italy adopted similar laws.

In this context, academics started investigating how board diversity affects firm performance both at the cross-country and intra-country level.

Findings are mainly inconclusive to this date: according to some studies, gender diversity positively affects firm performance and risk; while other research finds negative relationships.

Adams et al. (2009) wrote one of the first papers dealing with the subject in the current, modern sense. They base their research on an unbalanced panel spanning the period between 1996 and 2003, including data on companies from the S&P500, the S&P MidCaps and the S&P SmallCaps, and their results point to an inverse correlation with firm performance once they account for possible omitted variable bias and reverse causality. Khan and Vieito (2013), relying on a panel of US firms spanning the twelve years between 1992 and 2004, investigate whether the gender of the CEO has any effect on firm performance (proxied by Return on Assets) and riskiness (proxied by share price volatility). They find that the presence of female CEOs is generally associated with better firm performance and, more interestingly from the point of view of this paper, lower share price volatility. Probably, as stated by Huang et al. (2013), male executive directors are more likely to be overconfident than their female counterparts. Among their findings, it seems worth mentioning that companies led by females are less likely to issue debt, are less likely to grow faster and are also less likely to make acquisitions.

Nevertheless, Gul et al. (2011), who are the first looking at the effect of boardroom diversity on the company's stock price idiosyncratic risk, find evidence that somewhat contradicts the research previously mentioned. In fact, they conclude that the share of female directors is generally positively related to share price specific volatility, which they intend as share price informativeness.

Many other works have looked at the relation between boardroom diversity and firm characteristics by focusing their analysis on specific European countries and developing markets, but their results are all somewhat in line with the evidence provided above. Among these, however, it is worth mentioning a few that, even if more concerned with firm performance rather than risk, are still very relevant to this paper due to their focus on Sweden and Italy.

Gordini and Rancati (2017) analyse a short panel of Italian listed companies spanning the 2011-2014 period, using both Fixed Effects and 2-Stage Least Squares; they reach the conclusion that the right balance of men and women on the board, rather than the mere presence of women, has a positive significant relationship with firm performance measured as proxied by Tobin's Q.

Bruno, Ciavarella and Linciano (2018), from CONSOB, argue that the validity of a large part of the previous research on the relationship between gender diversity and firm performance may be plagued by reverse causality. They try to solve the endogeneity issues implementing a dynamic panel model on Italian listed companies between 2008 and 2016, as they believe that the exogenous shock to boardroom composition introduced by Law 120/2011 may allow them to solve such issue. Their results point to a non-linear relationship between the percentage of women on the board of directors and firm performance (as proxied by ROA, ROIC, ROE and ROS). In particular, there is an initial negative effect, which becomes positive when the percentage of women rises above approximately 20% of the board. Therefore, the authors suggest that such results may support the critical mass theory, according to which a minimum presence ratio needs to be reached before the positive effects of gender diversity can be achieved.

Daundfeldt and Rudholm (2012) analyse a large panel of Swedish companies from 1997 to 2005 using a random effects random coefficient model to account for individual heterogeneity. Their starting point are the theoretical arguments according to which a higher share of women should improve firm performance: a better understanding of diversified markets, increased firm creativity and innovativeness and improved decision making as more alternatives are evaluated; however their results point

unambiguously toward a negative relationship between gender diversity and firm performance, measured with ROA.

Nasution and Jonnegard (2017) develop a multivariate regression model on a sample of Swedish firms covering the 2008-2013 period to study the effect of the gender of the auditors and the CFO on companies' earnings. According to them, the gender of the auditors and the CFOs should influence earnings quality because of gender-based differences (e.g. conservatism, ethical sensitivity, and risk-taking attitude) and the glass-ceiling phenomenon. Gender may affect how individuals behave differently in particular situation. Earnings' quality is measured in terms of abnormal accruals (i.e. the extent to which current accruals are associated with previous, current, and subsequent year cash flow) and "meet or beat" benchmarks. The result is that CEO and Audit gender are not statistically significant in all specifications presented. It seems like gender differences will be overridden once people enter into a particular profession in which individuals' behaviour or decisions are, in the end, determined by common practice in the industry.

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Overall, even though general wisdom indicates that gender diversity could be positively associated with lower firm risk, there is little research directly investigating the subject. As seen, most of the research examined the relationship between women boardroom and corporate performance. Furthermore, there is a lack of literature investigating directly the correlation between executive and boardroom diversity and risk in the Italian and Swedish market. The analysis presented in this paper will somewhat try to contribute to filling such hole.

vi.   *Ownership and corporate risk*

An extensive body of research has investigated the effects of the presence of large, influential shareholders in listed companies and the relation between ownership, corporate governance, firm performance and risk.

In general, ownership structure and corporate governance are thought to be interrelated factors, as can be understood from Shleifer and Vishny (1997). In this context, works like the one provided by Chung and Zhang (2011) show that the fraction of shares held by institutional investors is generally positively correlated to the quality of the corporate governance of the firm. Nevertheless, there is little consensus in the literature about the effect of dispersed or concentrated blockholders on firm performance and value.

Most of the research (e.g. Becht et al. (2002) Jimbalvo et al. (2002) and Gompers and Metrick (2001)) is based on US and UK data. Findings suggest on one side that restricting influential shareholders may provide better protection for minorities and, on the other side, that this may increase executive power in a fashion that is detrimental to the owners of the firm.

With respect to firm performance, the presence of institutional investors in their equity holdings have a sizeable effect on securities' demand, which can, in turn, influence the distribution of asset prices and returns. Indeed, various authors find that stocks showing a high degree of institutional ownership reflect more updated information, which should incorporate better predictions on future firm performance and price behaviour.

Nevertheless, Ruiz-Mallorquí and Santana-Martín (2011) argue that results from Anglo-Saxon countries may not be directly applicable to different contexts. In countries like Sweden in fact, there are some key differences: the most important is that concentrated and stable company ownership is extremely common (2/3 of all listed companies have at least one shareholder controlling more than 20% of the total number of votes, and about 1/5th are under the absolute control of a single majority shareholder).The authors, using data from quoted Spanish firms between 1996 and 2009, argue that such owners could be incentivized to steer the company in a positive direction.

Górriz and Fumás (1996) also look at a sample of Spanish firms and suggest that agency and contractual costs are lower if there is a restricted number of influential

owners in the shareholding of the firm, as decision-making can be streamlined and simplified.

Turning instead to the body of research that looks at the relationship between institutional ownership and risk, sophisticated investors, maybe because better informed than other market participants, are generally expected to steer away from highly risky stocks that present a possible option-like payoff behaviour (see, for example, Schleifer and Vishny, 1997, Yan and Zhang (2009). This can lead to the belief that the presence of institutional investors in the shareholding of small companies may signal lower risk in such companies – a hypothesis that will indeed be analysed in this paper. Still reverse causality represents an issue.

A recent and very relevant study in this context was conducted by Barinov (2017), where he shows that institutional investors tend to avoid stocks with very low and very high idiosyncratic risk. They choose an in-between level of risk as to exploit their ability to obtain superior information.

vii.   *Considerations*

A few considerations can be drawn after the extensive review of the literature that has been carried out above on the intersection of different subjects.

First, firm riskiness as a topic has been studied much less than other firm characteristics, with most of the research focusing on relating company fundamentals to performance. Moreover, riskiness is generally measured either from the point of view of performance or the point of view of returns, but the vast majority of researchers use some variant of volatility or standard deviation to measure it. Needless to say, the measure of riskiness provided by these variables is very different from the one provided by a quantile measure such as Expected Shortfall. It seems like the only paper relating firm fundamental variables to Tail Risk like we do is the one by Ellul and Yerramilli (2013), however it does so on a dataset (bank holding companies before and during the 2009 financial crisis) that is completely different and unrelated from the one this paper studies.

Second, there seems to be some consensus on the fact that statistical analyses conducted using some measure based on firm performance (such as ROA) as the regressand may suffer from endogeneity, while this seems to be definitely less likely if some measure derived from returns is used as the dependent variable.

Third, the vast majority of the literature focuses on relatively outdated data, mostly from the 1990s or the early 2000s.

Fourth, even though there is a body of research available that looks at dynamics in the Italian market, only a small portion of it looks directly at the research questions that are tackled in this paper.

Finally, most studies focus on a single dimension of firm characteristics (e.g. board size, number of independent directors, a specific type of institutional investor, etc.), and such specificity may confuse the relationship among some of the existing pieces of research.

Nevertheless, some empirical regularities that seem to stand out are:
4. There is little consensus on the relationship between most corporate governance variables and firm performance and risk, and many results seem to be specific to certain geographies or situations;
5. Institutional ownership seems to be correlated, on average, to companies presenting lower risk.

SECTION II: The Swedish market environment

This paper is focused on the relationship between some key corporate variables and tail risk in the Swedish companies' environment; it is therefore essential to provide a brief summary of the current and past Swedish context from an economic and governance point of view.

Sweden is part of the so-called Nordic SuperModel (The Economist, 2013), which is a term generally referring to the fact that Nordic countries are top ranked in many aspects of corporate and social life, from competitiveness to social health.

Sweden is a highly developed export-oriented economy, fairly stable and constantly growing since the 1970s. In the early 90s, the economy suffered low growth and high inflation, the Swedish krona was devaluated, and the financial system became unstable to the point that two banks were nationalized and unemployment started to rise. The Social Democrat Government then undertook a reform package that spurred robust growth in the face of global economic uncertainty. Reforms mainly aimed at curbing public spending and favouring market competition. Today Sweden is ranked second in the IMD World Competitiveness Ranking, which "analyses and ranks countries according to how they manage their competencies to achieve long-term value creation".

Beside a strong manufacturing sector, growth in service sectors, such as ICT, has been impetuous to the point that in the last decade many unicorns – start-up companies valued at more than USD 1 billion – were established in Sweden (just to cite a notable example, the music streaming service *Spotify)*.

The economy is very open to both inward and outward direct investments. By the end of 2019, more than one third of the market value of the Stockholm Stock Exchange was under foreign ownership. Corporate Governance in Sweden in regulated by a mix of written rules and accepted practices.

Written rules include the Swedish companies Act and the Swedish Annual Account Act supported by the Swedish Code of Corporate Governance and the rules of the regulated trading markets; recommendations come from the Swedish Financial Reporting board and statements by the Swedish Securities Council on what constitutes good practice in the Swedish securities market.

A. Ownership

As previously mentioned, Sweden is part of the Nordic model, and its market significantly differs from the UK and USA, where the majority of listed companies has a very scattered ownership structure. Swedish companies, on the other hand, are characterized by a high degree of ownership concentration, with the landscape having radically changed from the 1950s to today. About two-thirds of listed companies have at least one shareholder controlling more than 20% of the total votes and one in five companies are under the control of a single majority shareholder.

According to Gilson (2014) this concentrated ownership structure is the basis for some recent entrepreneurial success stories – unicorns – because an active owner will be a "more efficient and less costly monitor of management than the techniques generally associated with dispersed-ownership models".

Majority shareholders in Sweden usually have an active role in company management, for example by sitting on the board of directors. On the other hand, in order to protect the other shareholders, the Companies act contains a set of rules to limit major shareholders powers, such as requiring qualified majorities for a range of decisions at shareholders' meetings.

Individual ownership is mainly channelled through different forms of institutional investors, such as life insurance companies or pension funds. Direct ownership by private households decreased over time and now only 15% of listed companies are family controlled (this was up to 75% in the 1950s). State ownership reduced to just approximately 5%.

The share of foreign investors was small up to the 1990s, when Sweden entered the EU and removed all restrictions on acquisition of shares in Swedish companies. Foreign investors today hold around 40% of the total capitalization of listed companies.

B. Governance

Historically the Swedish corporate governance framework evolved from an Anglo-Saxon System, based on a unique board, accountable to the general shareholders' meeting. However, over time it was recognized that there is a fundamental difference between the strategic function of outside directors and the executive functions placed in act by the directors engaged in day-by-day management. Following the example from Denmark, which revised its companies' act introducing a new body separate from but subordinate to the board, Sweden introduced a new executive figure – the CEO. The new governance structure is somewhat different from the classical one, or the two-tiers model largely used in Europe and in the US. The Sweden or Nordic model differs in three ways:

1. The general meeting is at the top of the hierarchy;
2. The board manages the company during its term office. The general meeting at any time can dismiss the entire board, as well each director;
3. There is a clear distinction of duties and responsibilities between the non-executive board and the executive CEO.

What most distinguishes the Nordic governance model is the possibility to have a shareholder majority controlling the company. In order to prevent strong owners from abusing their powers, there is a developed system of minority protection, such as the principle of Equal treatment of shareholders, qualified majority vote requirements and the principle of transparency.

As already mentioned, corporate governance in Sweden is regulated by a combination of written and custom rules. Main sources are the:

- The Swedish companies Act, containing general rules about companies' organization such as which governance bodies should exist within the company, their tasks and the responsibilities of their members. Moreover, it stipulates that companies must have three decision-making bodies in hierarchical relationship: the shareholders' meeting, the board of directors and the chief executive officer. There must also be a control body, the statutory auditor, which is appointed by the shareholders' meeting;

- The Swedish Code of Corporate Governance, which complements the companies Act prescribing special requirements to companies regarding certain matters, while allowing the same companies to deviate general rules in particular circumstances if this will lead to a better governance.

C. Gender diversity

Sweden represents a success in terms of equality between men and women.
Swedish women have a higher labour market participation rate compared to women in most other countries (Jaumotte, 2003), and the wage gap between men and women is among the lowest from an international perspective (Blau and Kahn, 2003; Waldfogel, 1998).

In the last few years, gender distribution on the board has become a central topic in the Swedish public debate. Different proposals have been made; however the government has never undertaken any legislative intervention, but it has only limited itself to recommendations or threats if firms do not choose to include more women in their boards.

According to the Corporate Governance Code, companies are to 'strive for equal gender distribution on the board". Currently, women's share in listed companies' boards is approximately at 35%, which is a substantial increase from about 6% of two

decades ago. Nevertheless, the growth has stagnated in the last few years, which inflated the public debate.

The proportion of women CEOs has reached 10% in 2020 and women in top executive positions are now 24%. Finally, the proportion of women directors is now at 38%. These numbers are among the best in an international perspective and compare very positively from what we could see in our previous research on Italy, with a handful of female CEOs and the share of women on corporate boards reaching 36% only thanks to the introduction of specific legislation (the "Golfo-Mosca" law).

SECTION III: Empirical analysis

A. Introduction and research question

This paper sets to investigate the relation between firm fundamental characteristics from the financial, corporate governance and ownership point of view and the Tail Risk observed in stock returns. In particular, the research question that the paper aims to study can be outlined as follows:

> "Controlling for the financial performance shown by Swedish non-financial firms, does heterogeneity in key corporate governance and ownership variables impact Tail Risk in the common stock of such firms? If this is the case, does the impact differ between small and large firms?"

By analysing this topic, the paper wants to fill a research gap that has not been investigated deeply in the literature, if at all. In fact, as has been seen while carrying out the literature review, there is a relative paucity of works looking at the relation between core non-financial firm characteristics and risk. Moreover, most studies define risk as the standard deviation of either some measure of company performance or stock returns, and it was impossible to find any work looking specifically at Tail Risk apart from one, that, however, looked at a completely different dataset (financial bank holding companies in the US during the 2009 Global Financial Crisis).

Just like our previous paper focus on Italy, this paper analyses an issue that has never been looked at in detail, and it uses a combination of several determinants that were analysed in separated branches of literature, but not together. Moreover, it gives a material and original contribution to the debate about the impact of corporate governance and ownership characteristics on listed firms' results. Part of this issue is due to the very scarce availability of relevant data, which is for the most part available in aggregate or easily accessible form only to regulatory bodies. The results will, therefore, have the limitation of being strongly related to the peculiar Swedish market

environment, but could shed some light on the interaction between the variables at a more general level as well.

B. Relevant variables

ii. *Tail Risk*

As previously mentioned, this paper is interested in analysing whether corporate governance variables somehow affect the tail risk of stock returns of Swedish firms. Downside risk in returns is commonly quantified using a quantile measure: the Value at risk. VaR is sufficient if stocks behaviour is stable over time; however, the high volatility recorded in financial markets in the recent years makes the VaR not the best measure to give a full picture of risk, since its value remains the same whenever the threshold is passed.

This is why the chosen response variable in this analysis is the historical Expected Shortfall of stock returns computed yearly. Both VaR and CVaR are statistical measures.

The VaR measures the maximum loss a security can suffer given a certain confidence level over a pre-determined time horizon, or the loss we are reasonably sure will not be exceeded, formally:

$$VaR_c = \inf\{l \in \mathcal{R} : \mathbb{P}(L > l) \leq 1 - c\}$$

Where *c* is the selected confidence level, *l* is the size of the loss associated to such confidence level, and *L* is the actual loss experienced. This implies that:

$$\mathbb{P}(L > VaR) = 1 - c$$

As anticipated, the main limitation of this measure is that once the threshold is passed risk evaluation is on the same level, for example, for both a stock that goes to zero value and for a stock whose value is just a small percentage down the VaR.

Expected Shortfall overcomes this limit: it is the expected loss once the VaR overcomes a certain threshold, formally:

$$ES_c = \mathbb{E}\big[-\big(\Delta P - \mathbb{E}(\Delta P)\big)\big|-\big(\Delta P - \mathbb{E}(\Delta P)\big) > VaR_c\big]$$

In our analysis, the Expected Shortfall is computed as the mean of the return over the 5% worst days in a given year.

Apart for technical reason, as for our previous analysis on Italian stocks, the choice of Expected Shortfall as dependent variable is due to various other aspects:
- The willingness to investigate the effect only on the extreme tail of the stock returns distribution;
- The fact that the standard risk measure in terms of volatility would not allow us to provide an answer to the research question, specifically focused on tail risk, and could be endogenous in a regression setting;
- The significance of Tail Risk in the context of investors' portfolios, as a large, sudden drawdown in a stock position may cause psychological and technical problems to both retail and institutional investors alike.

iii. *Financial variables*

Financial variables are expected to be closely related to Tail Risk. Better performing companies in the eyes of investors will be more reliable in terms of risk than poor performing ones, implying that they will more likely panic sell their stocks, that will take a high price reduction, inevitably affecting tail risk.
In order to control for this, consistently with previous research, a set of financial statement variables has been selected:
- *Leverage*: Leverage expresses the degree to which a company uses debt. Formally, it is a quantitative variable defined as the net financial position of the company scaled by its shareholders' equity. If debt is invested in highly profitable projects, in the long run the financial performance of the firm will

benefit; however debt accumulation generates a constant stream of payments which the firm has to bear whether it generates profits or not. Consequently, extremely levered firms are considered at risk of bankruptcy and of debt downgrading thus affecting the tail risk

- *Return on Assets*: ROA defines the profitability of a company with respect to the assets employed to carry on its activity.
  Formally, ROA is a continuous variable defined as the operating income of the company divided by its asset base. Such variable has been chosen for its ability to summarize financial performances on two different levels: on the one hand, the ability of the company of transforming one unit of the asset base into one unit of revenues (asset turnover), and, on the other hand, the cost structure of the company, intended as its ability of transforming one unit of revenues into one unit of operating income (operating margin).

iv. *Size*

Size, namely the total assets of a company, is commonly used in the research relating corporate governance to firm performance and risk.

It is common wisdom as well as an empirical regularity that large companies are generally more complex and may require different governance characteristics (for example, a larger board, as has been touched upon in the literature review) for being properly managed. At the same time, they are also likely to have different interactions with institutional and activist shareholder.

In view of these considerations, this paper assumes that completely different relationship and results may hold between Tail Risk and the explanatory variables taken into consideration depending on the size of the company.

In order to make the results of the paper comparable to most of the previous research on corporate governance analysed in the literature review, the common practice of defining it as the natural logarithm of the book value of the asset base of the company

has been followed. This definition not only leads to continuity with previous studies, but it also allows to avoid any kind of potential endogeneity in the variables that could have arisen by using the market capitalization of the company.

<u>v.   Corporate governance and gender diversity</u>

The choice of corporate and gender diversity variables was largely limited by the availability of complete data. Again, the choice is guided by previous corporate finance research relating performance and governance:

- *Board Size:* Board size is a discrete variable counting the number of directors on the board of the company on the 31st of December of relevant year. Board size is probably the most inquired variable in the body of research relating corporate governance and firm performance.

- *Independents:* Independents is a continuous variable defined as the ratio between the number of board members considered independent and board size. According to the Swedish Corporate Governance Code, the majority of board members must be independent of company and its management. A larger number of independent directors should guarantee better monitoring on the executive members. Nevertheless, as has been seen in the literature review section, evidence from different countries and different time periods has been relatively heterogeneous, but there seems to be some evidence pointing in the direction of an inverse relationship between board independence and risk (see, for example, Ferreira et al., 2011).

In the present context, gender diversity variables are considered a subset of corporate governance variables. The key argument in favour of a more diverse board is that this could lead to better decision making and group outcomes. On the other hand, a more diverse board might also lead to more conflicts and a slower decision-making. As mentioned before, there is no empirical consensus about the effect of gender diversity on firm performance, however there is weak evidence that may substantiate an inverse

correlation between diversity and risk taking, implying that more diverse board may play an important role in lowering firm Tail Risk. This paper makes use of two variables which should capture the effect of gender diversity:

- *Gender Diversity:* Gender Diversity is a continuous variable defined as the ratio between the number of female members of the board of directors and the size of the board on the 31st of December of the relevant year. It has been included for two reasons. First, as mentioned above, a more diverse board may contribute to curbing firm risk-taking and overconfident directors. Second, the share of women on boards of directors keeps being a highly debated issue in the media as well as in research, which drives the curiosity to find out whether any significant relationship to Tail Risk can be found.

- *CEO Female:* CEO Female is a dummy variable defined to take the value of 1 if the CEO of the company is a woman on the 31st of December of the year taken in consideration, and 0 otherwise. The theoretical reason to include this variable is that women typically present a substantially higher risk aversion profile and put more effort in monitoring firm activities than men (Parrotta, 2013; Huang et al 2013).

vi. *Ownership*

Given the specific characteristics of Swedish listed companies, we might not expect ownership variables to be particularly relevant on tail risk. In order to explore this subject, the following 2 variables have been chosen:

- *Large shareholder:* large shareholder is a dummy variable defined to take the value 1 if on the 31st of December of the relevant year a shareholder in the company holds directly or indirectly at least 25% of the total number of shares or voting rights. As already seen, this is the case for a sizeable share of Swedish listed companies. Otherwise, the variable takes value zero.

  Given the evidence presented from authors such as Burns et al. (2010), Croci et al. (2012) and Boubaker et al. (2012), and the set of rules that compels strong

owners to invest time and money in the governance of the company for the purpose of promoting their own interest while simultaneously creating value for the company and all its shareholders, it is expected that the presence of an influential shareholder should, on average, be associated to lower Tail Risk, particularly in the case of family owners, because the shareholder tends to be under-diversified. It may also gain more from diverting corporate resources than from pursuing risky investments.

- *Institutions*: dummy variable taking value 1 if the shareholder base of the company, as reported in the corporate governance report, on the 31st of December of the relevant year presents one or more of the following:
  - An investment or pension fund manager following a value or similar active investment strategy;
  - A custodian passively holding shares in the company ultimately owned by third parties;
  - A bank or other financial institution pooling retail or indexed investments on behalf of third parties.

Otherwise, the variable takes value zero.

According to most of the research that was surveyed, institutional and sophisticated investors are generally believed to avoid overly risky firms in their investment strategies. Therefore, a negative relationship between institutional ownership and Tail Risk would be expected. Unfortunately, the design of the variable presents the unsolvable flaw of including institutions following indexing strategies as well (hence, not acting on any kind of "superior" information). Apart from some special cases, it is impossible to distinguish between an institution performing an active strategy and one following an indexing one, given the information we have available.

<u>C. Data collection</u>

Panel data on Swedish listed companies has been collected in the following steps:

5. The first problem to be tackled in the construction of the panel was to choose a relevant time period from which to collect data. There is a trade-off between choosing a time period that is too long, which may lead to results that are no longer relevant in the current state of the world, and one that is too short, which may be more relevant to the current environment but present low variability in some measures, such as the ones related to ownership and control. In order to find a balance between the two dimensions, a time period going from the year 2000 to 2019 was chosen. This represents one of the longest samples studied in the papers that have been examined in the literature review and follows the same approach we took in our previous paper analysing Italian listed stocks in the same way.

6. Among the set of Swedish companies whose stock was traded on the Swedish Stock Exchange, the following exclusion criteria were applied:

    a. Financial firms were excluded due to the specific nature of their business and consequent difference in the performance measures commonly used to judge their operating quality;

    b. Only the 108 largest companies on NASDAQ Stockholm were retained in the database, mainly in order to somewhat limit the extension of the panel, given that many variables had to be hand-collected. This also helps with the analysis, as many smaller firms have unavailable data for past periods which might have biased the results.

7. At this point, the relevant variables have been collected and a longitudinal panel data set has been constructed as described below:

    a. The daily prices and returns of the companies' common stock were obtained via FactSet. From these, the historical Expected Shortfall has been calculated through the use of Stata.

b. The relevant financial variables necessary to construct the *margin*, *leverage* and *ROA* at a yearly frequency, including operating income, revenues, total assets, financial debt, cash and cash equivalents, shareholders' equity as well as additional ones, were obtained via the FactSet database. For the firms presenting fiscal years not ending with the calendar year, the relevant variables were calendarized in order to render the sample homogeneous.

c. Due to the lack of quality aggregate data on all the available databases, corporate governance, gender diversity and ownership independent variables were hand-collected from each company's annual report or corporate governance report[1], paying attention to matching the dates to the calendarization performed above.

8. Data presenting the following problems has been excluded from the panel constructed up to this point:

a. Firms presenting less than 2 observations without the lack of primary data fundamental for the analysis;

b. Observations presenting non-realistic data (e.g. negative assets, extreme outliers, etc.);

Once this exercise is completed, what is left is an unbalanced longitudinal panel data set that is composed of 1,572 unique observations for a total of 108 Swedish listed companies over the period 2000-2019 (of which 986 observations are complete). Summary statistics and preliminary results regarding it are presented in the following section.

D. Descriptive statistics and preliminary results

Summary statistics covering the key financial, governance and ownership variables used in the analysis for the full panel are presented in table 1.

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[1] Over 1,500 reports were downloaded and searched for the relevant information.

Table1 -
Summary statistics

	Mean	Median	Std. Dev.	p25	p75	N
(1) Tail_Risk	4.214	3.801	1.839	3.047	4.894	1572
(2) Leverage	.578	.422	1.359	.111	.861	1415
(3) ROA	.093	.077	0.097	.044	.12	1430
(4) Size	9.948	10.089	1.341	9.042	10.817	1460
(5) Board_Size	9.983	10	2.890	8	12	1139
(6) Independents (%)	.659	.636	0.196	.5	.809	1088
(7) Gender_Div. (%)	.265	.25	0.144	.167	.364	1139
(8) CEO_Female (d)	.047	0	0.213	0	0	1138
(9) Large_Shareh. (d)	.251	0	0.434	0	1	1322
(10) Institutionals (d)	.593	1	0.492	0	1	1421

The variable under investigation in this analysis is Tail risk, or Expected Shortfall, which has a mean of 4.21 – that is, on average, the expected loss once the 95% VAR is overcome, is 4.21%.

We note that the distribution is right skewed, as we have a median (3.80) smaller than the mean. The latter, as a consequence, is closer to the 3rd than to the 1st quartile.

Size of companies is measured in terms of total assets. Given the significant variability of this measure with a large concentration of firms in the left side of the distribution and a long right tail, we take into account the log transformation of it which reduces the variance, centres and normalizes the distribution.

The association between firm size and profitability is a topic of interest in financial economics. Generally, there is a strong agreement that smaller firms are likely to grow much faster than larger ones; however smaller firms tend to face higher relative costs and are more likely to go bankrupt. This translates into higher risk which is clearly showed in the following figure: we split the companies into quartile by size and we plot the mean and median Expected Shortfall as a function of the quartile. We observe a clear decreasing trend, especially when we move from the first to the second quartile. Based on this stylized fact, we thought appropriate to support the overall analysis with an analysis by quartiles.

The results of this analysis are remarkably similar to what was obtained when analysing the panel of Italian firms. In particular, tail risk seems to be higher for

medium-large companies than for medium-small companies, while it reaches the lowest for the largest companies.
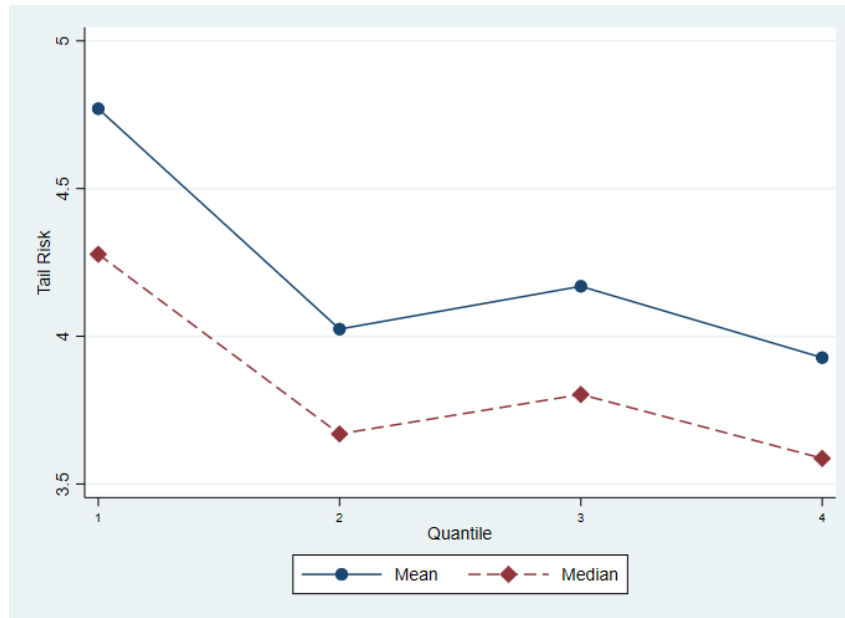
Financial variables, namely Leverage and ROA, are also right skewed (mean higher than median) with ROA being not particularly spread since the standard deviation is close to the mean, respectively 9.3% and 7.7%; and the third quartile is less than three times bigger than the first one. Leverage, which has a mean of 58%, is more spread since the standard deviation is almost three times the mean (136%) and the third quartile is almost eight times bigger than the first one.

As regard with the corporate governance variables, board size looks symmetric as the median and the mean are very close, respectively 10 and 9.98 members, while the first and third quartile are 8 and 12.

The same goes for the share of independents, with a median of about 64% and a mean of 66%; again, first and third quantile are equally close to the centrality measures and are respectively 50% and 80%. We can observe that good practices with respect to board independence are generally followed by Sweden listed companies. The share of women on the board is quite symmetric as the mean and the median are close (26.5% and 25%) and the first and third quartile are equally close (16.7% and 36.4%).

Majority of Board Members are therefore men and the fact that only a small group of companies across time has a CEO woman (average 4.7%) confirms the lack of women at the higher levels – even though there seems to have been an improving trend over time.

The presence of large shareholder is not common across Swedish companies since the mean is about 25% and the median is 0. Notice that when we talk of mean for a dummy variable, we are just giving the share of subjects that present the feature under consideration.

On the contrary Institutional investors are quite common across Swedish firms since the share presenting the feature in time is almost 60% and the median is one.

We can now move on to look at correlation matrices. The lack or presence of correlation is just a statistical fact, i.e. no causality is implied by correlation; however correlation gives important insights concerning any eventual relationship between variables. In addition, there is also a technical issue linked with correlation; when we include in an econometric model two (or more) highly correlated variables, with highly meaning something close to 0.8 in absolute terms, we are redundant in the information provided and coefficients will not be identified accurately. This translates in wrong standard errors, variance gets inflated, and the inference done on the model will be flawed. We do not observe this issue for any of our variables, since the maximum observed correlation is -0.588 between Independents and Board Size.

Tail risk is negatively correlated with almost all the other variables except Board Size and Institutionals. We will go further into this in the subsequent analysis.

Given the different risk exposure we talked previously, we also present the correlation matrices for the companies by quartile. Correlations seem quite stable across quartiles in terms of magnitude but change sign in some cases. For instance, Leverage is positively correlated with tail Risk for medium large and large companies.

Table 2 – Correlation matrix (Full Sample)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Tail_Risk	1.000									
(2) Leverage	-0.018	1.000								
(3) ROA	-0.059	-0.129	1.000							
(4) Size	-0.180	0.029	-0.260	1.000						
(5) Board_Size	0.067	-0.088	-0.011	0.399	1.000					
(6) Independents (%)	-0.118	0.101	-0.024	-0.133	-0.588	1.000				
(7) Gender_Diversity (%)	-0.166	-0.026	0.091	0.104	-0.102	0.042	1.000			
(8) CEO_Female(d)	-0.014	0.026	0.046	-0.073	-0.159	0.178	0.118	1.000		
(9) Large_Shareholder (d)	-0.158	-0.064	0.018	-0.140	-0.094	0.018	0.086	0.101	1.000	
(10) Institutionals (d)	0.025	0.034	0.035	-0.119	-0.107	0.129	0.053	-0.045	-0.065	1.000

Table 3 – Correlation matrix (Small Companies)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Tail_Risk	1.000									
(2) Leverage	-0.035	1.000								
(3) ROA	-0.146	-0.239	1.000							
(4) Size	-0.204	0.325	-0.385	1.000						
(5) Board_Size	-0.148	-0.115	-0.212	0.311	1.000					
(6) Independents (%)	-0.037	0.136	0.211	-0.158	-0.628	1.000				
(7) Gender_Diversity (%)	-0.108	-0.116	-0.014	0.361	0.419	-0.482	1.000			
(8) CEO_Female(d)	0.249	-0.176	0.456	-0.266	-0.075	0.131	0.052	1.000		
(9) Large_Shareholder (d)	-0.185	-0.129	0.010	-0.006	0.247	-0.299	0.143	0.046	1.000	
(10) Institutionals (d)	-0.112	-0.021	0.151	0.162	-0.046	0.061	0.099	-0.061	-0.056	1.000

Table 4 – Correlation matrix (Medium - Small Companies)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Tail_Risk	1.000									
(2) Leverage	-0.026	1.000								
(3) ROA	-0.066	-0.045	1.000							
(4) Size	-0.118	0.085	-0.044	1.000						
(5) Board_Size	0.038	0.010	0.192	-0.106	1.000					
(6) Independents (%)	-0.094	0.072	0.001	0.160	-0.548	1.000				
(7) Gender_Diversity (%)	-0.051	-0.036	0.283	0.082	-0.131	-0.016	1.000			
(8) CEO_Female(d)	0.022	0.018	-0.074	0.203	-0.064	0.089	0.145	1.000		
(9) Large_Shareholder (d)	-0.134	-0.072	-0.189	-0.027	0.092	-0.226	-0.071	0.087	1.000	
(10) Institutionals (d)	0.066	0.051	0.030	-0.070	-0.165	0.195	0.179	-0.009	-0.135	1.000

Table 5 – Correlation matrix (Medium - Large Companies)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Tail_Risk	1.000									
(2) Leverage	0.061	1.000								
(3) ROA	-0.037	-0.221	1.000							
(4) Size	-0.044	0.000	-0.026	1.000						
(5) Board_Size	0.100	-0.437	0.182	-0.027	1.000					
(6) Independents (%)	-0.081	0.275	-0.247	-0.015	-0.688	1.000				
(7) Gender_Diversity (%)	-0.218	0.117	0.067	-0.065	-0.353	0.269	1.000			
(8) CEO_Female(d)	-0.137	0.222	-0.102	-0.039	-0.323	0.311	0.216	1.000		
(9) Large_Shareholder (d)	-0.228	-0.163	-0.005	-0.002	-0.254	0.342	0.004	0.083	1.000	
(10) Institutionals (d)	0.050	0.069	-0.056	0.045	0.030	0.030	-0.015	-0.087	0.012	1.000

Table 6 – Correlation matrix (Large Companies)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Tail_Risk	1.000									
(2) Leverage	0.005	1.000								
(3) ROA	-0.138	-0.252	1.000							
(4) Size	0.088	-0.046	-0.108	1.000						
(5) Board_Size	0.255	-0.191	0.059	0.313	1.000					
(6) Independents (%)	-0.240	0.145	-0.107	-0.127	-0.509	1.000				
(7) Gender_Diversity (%)	-0.227	-0.179	0.208	-0.022	-0.232	0.300	1.000			
(8) CEO_Female(d)	-0.100	0.002	-0.058	-0.071	-0.026	0.110	0.006	1.000		
(9) Large_Shareholder (d)	-0.164	0.057	0.121	0.020	-0.108	0.114	0.322	0.295	1.000	
(10) Institutionals (d)	0.081	0.037	-0.112	-0.042	-0.047	0.181	0.021	-0.086	-0.194	1.000

E. Econometric analysis and empirical results

Having performed a preliminary analysis of the variables collected, it is now possible to move on to the core of the paper, where, after formulating a series of hypotheses, an econometric model will be developed in order to answer the research question.

i. *Hypotheses development*

Given the empirical evidence that was surveyed in the literature review section, the following hypotheses have been formulated with regards to the relationship between the variables of interest and Tail Risk. The first three hypotheses are expected to hold independently from the size of the companies, while the following three hypotheses make a distinction with respect to such dimension.

- *Hypothesis 1*: given the empirical regularities observed in the literature, higher gender diversity on the board of directors and the presence of a Female CEO should have a dampening effect on Tail Risk.

- *Hypothesis 2*: the presence of large shareholders, as analysed earlier, should imply lower Tail Risk, since long-term blockholders are more likely to monitor the firm and avoid myopic decision-making (for example, see Burns et al., 2010).

- *Hypothesis 3*: due to their adversity to risk and the presumed additional information that institutional investors possess, their presence among the shareholders of the company should be correlated with lower Tail Risk.

- *Hypothesis 4*: the size of the board of directors may have a significant effect on Tail Risk if the company is larger, as this would imply higher complexity and thus increased need of a larger board.

- *Hypothesis 5:* the presence of a larger share of independent directors should decrease Tail Risk in larger companies, since these are on average more complex, and may thus require additional independent controls for minority shareholders that are not involved in day-to-day operations.

ii.   *Empirical model*

Given the longitudinal structure of our data, the suitable class of models is the panel (linear) regression; we have three potential choices: Pooled OLS, a Fixed Effects model or a Random Effects model.

The reference unit in our panel data are firms, which for sure present unobserved heterogeneity likely correlated with regressors. Suppose, for example, that larger companies have better managers than smaller ones, thus making them more profitable than the latter. In practice, we are unable to measure these management skills, and we face an omitted variable problem – making the use of the OLS estimator inconsistent. Assuming this skills constant over time, the use of a Fixed Effects model seems to be more reasonable. A Fixed Effects models, in fact, removes time-invariant individual-specific characteristics which could bias predictors, allowing to control for omitted variable bias that could stem from unobserved heterogeneity that does not change over the time. In particular, this type of models is the ideal candidate when we are interested in the impact of variables that varies over time and, in particular, when we are interested in the variability within and not between subjects. On the other hand, a side effect of fixed effect model is that it cannot be used to check for the time invariant characteristics of individuals.

A Random Effects model could be an alternative in case the regressors are not correlated with the source of heterogeneity, however this is unlikely to be the case for our panel, and after taking the appropriate tests it turns out that the Fixed Effects model better fits our data.

The equation we estimate has the following form:

$$Tail\ Risk_{j,t} = \alpha + \beta X_{j,t-1} + \gamma_j + \delta_t + \varepsilon_{j,t}$$

Where $Tail\ Risk_{j,t}$ is the Tail Risk calculated for firm j in year t, $X_{j,t-1}$ is the vector of independent variables for firm j observed at time $t-1$, γ_j denotes the firm fixed effects and δ_t denotes year fixed effects or time dummies; the inclusion of these dummies allows to control for any natural dynamic in the variable we are studying; for instance, macroeconomic trends could affect Tail Risk across time, especially given the fact that the data go through both the 2009 Global Financial Crisis and the European Sovereign Debt Crisis.

In order to investigate the hypotheses made earlier and consistently with the methodological approach we described, we ran fixed effect regressions for the whole sample and for the quartile subsamples. Results are reported in table 7.

Table 7 – Panel FE Regression Results

VARIABLES	(1) FE Overall	(2) FE Small	(3) FE M-Small	(4) FE M-Large	(5) FE Large
Leverage	-0.00433	-0.0888	-0.00988	0.157	-0.0360
	(0.0215)	(0.283)	(0.0223)	(0.214)	(0.204)
ROA	-1.550***	-7.443***	-0.525	-0.315	-2.410**
	(0.573)	(2.055)	(1.941)	(0.827)	(0.987)
Size	0.221**	-0.324	0.170	-1.186***	0.541**
	(0.0911)	(0.283)	(0.394)	(0.379)	(0.256)
Board_Size	-0.0316	-0.0253	0.0451	-0.0222	-0.0838***
	(0.0251)	(0.0864)	(0.0677)	(0.0664)	(0.0319)
Independents	-0.186	-1.241	-1.332*	-1.770**	1.369**
	(0.308)	(1.081)	(0.760)	(0.739)	(0.555)
Gender_Diversity	-0.648*	-0.0812	-0.149	-0.785	-1.451**
	(0.381)	(1.117)	(0.855)	(0.855)	(0.690)
CEO_Female	0.465**	1.949***	1.658***	-0.285	-1.030
	(0.204)	(0.555)	(0.583)	(0.318)	(0.839)
Large_Shareholder	-0.156	-0.696	-0.435	-0.444	0.848*
	(0.157)	(0.438)	(0.411)	(0.282)	(0.492)
Institutionals	0.295***	-0.438	-0.429*	0.353**	0.747***
	(0.0834)	(0.298)	(0.227)	(0.144)	(0.130)
Constant	2.382**	10.02***	2.837	19.15***	-1.497
	(1.054)	(2.476)	(3.934)	(4.097)	(2.911)
Observations	986	154	238	295	299
R-squared (within)	0.611	0.687	0.616	0.735	0.735
Number of id	85	28	46	43	36
Year FE	YES	YES	YES	YES	YES
F-Test	47.15***	9.03***	9.81***	22.14***	32.37***

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For every model, the F-test is significant with a p-value of 0.000, indicating that it is possible to reject the hypothesis that all coefficients are jointly zero.

Reported R-Squared are the Within R-Squared since, as mentioned above, in this setting we are interested in the within variability of our data; that is, we are interested in how variables move together across time within the different entities (companies).

In order to confirm the appropriateness of fixed effects with respect to pooled OLS and to Random Effects, we conducted two tests:

- F test: the null hypothesis of the test is that both unobserved and observed individual fixed effects, γ_j in our specification, are equal to zero, i.e. fixed effects are the same across panel entities. Rejecting the null implies that fixed effects specification must be preferred over the Pooled OLS.

  In case of the full panel, the reported F-Statistic is equal to 6.60 with a p-value equal to zero leading to a clear rejection of the null hypothesis.

- A Sargan-Hansen Test of fixed vs. random effects, which can also be seen as a test of overidentifying restrictions since the fixed effect estimator assumes that the predictors are uncorrelated with the idiosyncratic error. The random effects estimator uses the additional orthogonality conditions that the regressors are uncorrelated with the group-specific error. Asymptotically this test is equivalent to the usual Hausman test of fixed vs. random effects. The rejection of null hypothesis goes in favour of Fixed Effects.

```
Test of overidentifying restrictions: fixed vs random effects
Cross-section time-series model: xtreg re
Sargan-Hansen statistic  46.797  Chi-sq(9)    P-value = 0.0000
```

All the diagnostics that we ran for the full model have been ran for every quartile specification with the same conclusion: fixed effects is the most suitable model to capture the relationships under exam.

iii. *Empirical results: full panel*

Results for the full sample give us important insights both for control and for variables under investigation. Starting from financial variables, ROA has a significant effect on Tail risk: an increase of ROA implies a reduction of Expected shortfall of almost 1.5% On the contrary, and far from economic intuition, there seems to be positive correlation between tail risk and size at the statistically significant level: since it's a log transformed variable the interpretation is that the increase of one point of total assets (in million of euros) increase the tail risk by the coefficient divided by one hundred, which is 0.002%.

Board Size, Independent directors and Large Shareholder have the expected sign but are not significant so we cannot generalize results.

We get interesting outcomes from the other governance and ownership variables. Gender Diversity is correlated to lower tail risk of 0.65% for a one percent increase in the share of women in the board. This seems to confirm what is stated in the literature, according to which a more diverse board should curb risk taking behaviour.

In contrast with the previous results and with the literature, the presence of a woman CEO significantly increase the risk of companies. On average, the risk increase by 0.46% when the CEO is a woman (keeping in mind this is a dummy variable).

Still in contrast with the literature, the presence of institutional investors is correlated to average Tail Risk higher by 0.3%.

The model as a whole explains more than 60% of the within risk variability which is a more than satisfactory result.

We now move on analysis by quartile given the structural differences between small and large companies and the observed behaviour of tail risk, which decreases with firms' size.

iv.   *Empirical results: small companies*

When we deal with small companies only, things are a bit different: ROA is still significant at the maximum level. An increase of ROA of one point implies a decrease of the tail risk of 7.43% points which is quite high, even though we have to keep in mind that the baseline risk of smaller companies is higher than other firms: the constant is equal to 10 and is significant. Size is now negative but not significant.

Again, board size and independent directors impact negatively on the response variable but are not significant; unfortunately, also Gender diversity and institutional investors even if with the expected sign, are not significant.

Female CEO represents an exception both in terms of significance (p-value < 0.01) and direction which is now stronger than the global case since, on average, smaller firms have a higher tail risk of almost 2%.
The Within R squared is quite high: almost 69% of the within variation is explained by the model.

v. *Empirical results: medium-small companies*

In the case of medium-small companies, financial variables are not significant at all: Leverage and ROA still keep the negative sign while size is positively related to tail risk but also not significant.
Board size and Large Shareholders are still not significant but the first is now positively related, while the latter is still negatively related to Tail Risk.
Again, CEO Female has a positive and unexpected coefficient for the presence of a CEO woman increases the risk by 1.65%. Also, the institutional investors variable is significant and at the opposite of the full sample model – it has the expected sign and Tail Risk is thus lower if institutional investors are present at this level (-0.43%), confirming the general hypothesis that the presence of institutions in the shareholder base lower tail risk.
Something new is now represented by the significant coefficient of the *independents* variable, which decreases Tail Risk by 1.332%, thus confirming the fifth hypothesis according to which, especially for smaller firms, a higher share of independent directors should dampen Tail Risk.
The within variability is explained at 62% in this specification.

vi.   *Empirical results: medium-large companies*

Analysing the third quarter implies moving to the medium-large section of companies available in the panel. At this point some of the relationships should change, and in particular the ones that are expected to hold only for smaller companies. The relationship between the presence of institutional investors and the share of independent directors with Tail Risk should be less relevant. On the other side, the size of the board of directors should start to matter more, as larger companies are likely to be more complex and such complexity may require additional members on the board.

Medium large companies have a significant control variable: firm size. Since it is log transformed, the interpretation is not straightforward; actually, an increase of one point in total assets (in thousands) implies a reduction of Tail Risk of 1.19/100 percentage points.

This result is in contrast with what we saw for the full panel specification where we have a global positive effect; but it is consistent with the theoretical relationship between firm size and risk: the larger the company, the less risky it should be, especially as it approaches a critical magnitude threshold.

Other control variables are not significant with still a negative ROA and a positive Leverage

Going into our hypotheses, the share of Independents is significant and consistently with our hypothesis implies lower tail risk (-1.77%) for a one percent increase in the proportion of independent directors. We also still observe no sign differences with smaller companies.

The institutional ownership variable is significant, but the sign is unexpected (0.35%). The within variability of Tail Risk is explained at a 73% level which is an excellent result.

vii. <u>*Empirical results: large companies*</u>

Large companies have most variables significant. Starting with the financial ones, leverage is confirmed to be negative and not significant; ROA is still negative (-2.4%) and significant at the 1% level. Size is significant and positive: an increase of total assets leads to an increase of the risk of 0.0054%. This is counterintuitive, but likely related to the fact that after a certain threshold the relationship size-risk is reversed.

Concerning the corporate governance variables object of our research, we have interesting results.

Board size is significant and negative, confirming that larger boards can tackle complexity better and thus reduce risk (-0.08%).

The share of independent directors is significant and positive; the sign is therefore reversed with respect to the one for smaller companies (1.37% for one additional percentage point of in the share of independent directors).

Gender Diversity is significant and negative (-1.45%) confirming the relevant literature. CEO Female is negative but not significant.

Differently from other cases the presence of Large Shareholder is significant, but the impact is positive (0.85%).

Finally, the presence of institutional investors is significant and positive which is consistent with what we saw for medium large companies and is reversed with respect to smaller firms. On average the presence of Institutional investors increase the risk of 0.75%.

The within variability of Tail Risk is explained for more than 73%, which is an excellent result.

viii. _Discussion of the results_

The comparison between groups reveals some interesting facts.

Starting from control variables, we have Leverage which is never significant and thus, interestingly, seems not to have an impact on tail risk. This is somewhat counterintuitive with general financial theory; however this is relatively consistent with the results we obtain in our panel of Italian companies.

ROA has a consistent negative sign whatever is the size of the company, but it is significant only for small and large companies, with magnitude for smaller companies almost three times the one for larger companies. We interpret this to mean that small firms with a solid business model and already generating healthy returns are perceived as less risky by investors.

The size effect is significant and positive for the full sample, however when we split our panel in quartiles, it remains significant only for companies of the larger quartile, with a negative effect for medium large companies and switching sign for large companies.

Moving to corporate governance variables, the sharpest differences both in terms of significance and sign of the effect can be found between the large companies and the rest of the sample.

Board Size has a negative and significant impact only in large firms. This is consistent with the literature, according to which larger, more complex firms benefit from a larger board of directors, which is better able to tend to its operations.

Share of independent directors is significant in all groups except the small one but while it has a negative sign for medium small and medium-large companies, it impacts tail risk positively for large ones. This is consistent with our hypothesis that independent directors are more useful at monitoring small firms with respect to large ones.

Gender Diversity has a consistent impact in terms of sign (negative) for every group, but it is significant and with relevant magnitude only for the larger group.

A female CEO impacts significantly only on smaller firms; apparently being correlated to larger tail risk. When we consider the third and fourth quartile the sign switches, however coefficients are not significant.

For what regards the ownership variables, the presence of a large shareholder has a significant and positive impact only for the group of largest companies; for all other groups it has the expected sign, but the relationship is never significant.
For Institutional Investor we have, on one side, smaller and medium smaller firms where the sign is the expected one and is significant only for medium-small firms; on the other side, medium large and large companies have a significant but positive relationship refuting the stated hypothesis of negative relationship.
In view of what we have just stated we go on commenting the hypothesis presented in paragraph one of this section.

Hypothesis 1 can be partially accepted: the coefficient for gender diversity is always negative and is significant only for larger companies; however it is significant at the full sample level even if the size of the coefficient is smaller than his counterpart for larger companies. On the other hand, CEO woman has a global positive effect on tail risk which becomes more pronounced for smaller firms. The expected negative sign for larger firms is not significant at all.
Results are therefore mixed: in line with part of the previous studies concerning gender diversity on boards, but not aligned to studies like, Khan and Vieito (2013) which report that in US firms the gender of the CEO is generally related to lower riskiness in the share price, intended as share price volatility. These results are quite striking if compared to our analysis of Italian listed companies, as we will see later, and show the difference between the two corporate environments in terms of gender diversity.

Hypothesis 2 cannot be accepted. Starting from the full sample, we have a coefficient which is negative and not significant. The same holds for all the subsamples up to the

third quartile (included). The coefficient only becomes positive and significant for the larger companies.

This result is indeed plausible, and its interpretation is tightly connected to the nature of the ownership of the analysed companies. As explained before, in fact, we would expect companies that are either government owned or with more fragmented ownership in the 4th group of the data set, while companies controlled by single active shareholders are likely to be smaller and thus over-represented in the first 3 group. The natural interpretation that follows is that a single active shareholder with a large ownership stake is unlikely to curb Tail Risk in large companies, given the current ownership structure in Sweden.

Hypothesis 3 cannot be accepted: the presence of institutional investors has an opposite effect for larger and smaller firms; the first see a decrease in the risk which is significant only for medium smaller firms, while the larger have a significant increase. In the full panel specification the sign is positive and significant. This result partly conflicts with previous theoretical research: there is consistency within smaller firms, but divergence for larger ones.

A possible explanation is that since smaller firms are by definition less solid and more at risk, institutional investors tend to be more conservative when entering in the shareholder base, and generally do so when they have a stronger conviction on firm quality. On the other hand, the presence of institutional investors in larger firms is likely to be mainly driven by passive (indexing) strategies, as firms with larger size tend to be comparatively overrepresented in market indices. In fact, our panel captures among institutional investors a large share of custodians and financial institutions following passive strategies.

Hypothesis 4 can be accepted. Board size is significant for larger firms and has the expected sign; while in all other specifications it is not significant but have an expected negative sign (except for medium large firms). We are therefore aligned with much of

the previous literature: larger firm are likely in need of a large board due to firm complexity, and thus in those instances a larger board is beneficial in curbing tail risk.

Hypothesis 5 cannot be accepted. The presence of independent directors is consistent with the stated hypothesis (negative sign) for all but for large companies for which it is significantly positive. At the full panel level, the sign is negative but the coefficient is not significant.

This is in line with the fact that, as smaller companies are more likely to be controlled by a single shareholder, the presence of independent directors can increase monitoring and curb potential risk-taking incentives presented by the directors associated to the owners. Furthermore, the reversal in sign is also aligned to previous findings in the literature, according to which since larger firms are generally more complex, a larger share of insiders on the board becomes more relevant, as it is more difficult for independents to understand the firm's operations and mechanics, therefore making their monitoring role less effective.

SECTION IV: Comparison to the Italian market

We start our comparison with Italian companies with the descriptive statistics.

The response variable, tail risk, is on average a bit lower for Swedish companies: all centrality measures, mean median and percentiles are, on average, 0.2% points lower.

The ratio of Leverage (mean) is almost 1:3 in favour of the Swedish firms and the third percentile is almost 70% higher for Italian companies which clearly are more prone to use debt as a financing instrument. This is fully consistent with what we would expect ex-ante, as the Italian corporate environment is very bank-centric, and firms tend to fund their operations mainly through debt rather than equity.

ROA is almost 50% (both mean and median) higher for Swedish firms than for Italian ones making the first more profitable. The gap is larger in the left part of the distribution (first quartile) where the Swedish firms have a ROA which is twice the one of Italian companies. This gap is reduced in the right part of the distribution (third quartile) where the difference thins out to almost 20%.

Swedish companies are also larger in terms of total assets than Italian ones.

Regarding corporate governance measure, we have a board size that is very close for both countries; almost 10 individuals on average.

Independent directors are more common in the Swedish context. This is likely to be driven by the fact that in Sweden less publicly listed firms are family or government controlled with respect to Italy, where those forms of ownership are very common.

Gender diversity is significantly higher in Swedish companies, 26% against the 17% of Italian ones reflecting the fact that the gender gap is lower in northern European countries. The share of women CEOs is low in both countries; nevertheless, the situation seems much more advanced in Sweden with respect to Italy, given that in parts of the distribution it was not possible to find a single female CEO there.

The presence of large shareholders in the companies' shareholders base, as expected, is more typical of the Italian market, since the ratio of averages is 3:1 with respect to the Swedish average.

Finally, the presence of institutional investors is similar in the two realities (59% for Swedish Firms and 54% for Italian).

The immediate picture we get from the descriptive statistics is that Swedish firms are on the whole bigger and healthier, less unequal in terms of gender gap and with a similar presence of institutional investors in their board.

When it comes to compare results of the empirical study we made, we start with the full panel.

Leverage is not significant in each panel while ROA is negative and significant in both cases; given the consistency of sign and the fact that in most specifications ROA impacts significantly tail risk, we can firmly state that company performance impacts on its risk profile. Unsurprisingly, in both geographies sound businesses generating solid returns through their operations are less risky than less sustainable businesses.

Size is not significant for Italian firms while impacts positively on Swedish ones: this is counterintuitive because as previously stated, in accordance with literature, the bigger the firm the less risky it should be. Probably, since in the single quartile specification size has a positive and significant effect for large firms, with a larger magnitude than the one of the overall panel, this effect dominates on all other and can be interpreted as a switch: when we reach a certain threshold the relationship risk-size reverses.

Moving to corporate governance variables, we have similar results with regards to board size and independents which are both negative but not significant.

Gender diversity respects our hypothesis of curbing risk for Swedish companies but has no impact in the Italian context. We interpret this result to be probably due to the higher average share of women on board in the Scandinavian country and to a higher variability of this variable. Due to the limited variability in the Italian panel, driven by the lack of diversity on boards, it was not possible to conclude relevant inference.

On the other hand, it appears that the presence of a female CEO increases the risk profile of Scandinavian firms offsetting the gender effect, however this has no significant effect in the Italian Market. We need to note again the low variability in the

Italian panel for this variable (one of the quartiles even shows no observations of female CEOs).

The presence of Large Shareholder is not significant for both countries, while the dummy institutional investors is significant both in Italy and Sweden but while the effect is consistent with the relevant literature (negative) in Italy, in Sweden the effect seems reverse, being correlated to riskier (large) firms. Unfortunately, due to lack of data it was not possible to distinguish between activist investors and institutional investors in Sweden – and most likely decomposing the effect we would have obtained similar results to Italy. The presence of activist investors, in fact, should generally be correlated with riskier businesses and investments, and vice-versa for the presence of institutional investors. Moreover, the fact that it is not possible to distinguish between institutional and passive / index investors clouds the interpretation of the coefficient of this variable in this analysis. This should be further investigated in future research, however this will not be possible unless specific disclosure regulation distinguishing between passive investors and institutional investors is introduced.

When we move to the analysis by quantiles we have many differences: with regards to financial variables, while leverage is never significant in Sweden, for Italian firms we observe a significant and negative coefficient for medium small companies and a negative effect for the large ones, but while the first is almost negligible (0.002), the latter is more relevant (-0.057).

ROA is always negative; there is consistency and linearity of impact for Italian firms where we observe the highest coefficient for medium large and large companies; we cannot state the same for Swedish companies where the highest effect is for small companies, followed by larger firms: the effect is therefore similar to a reverse parabola where we have the lowest points to the left (smaller firms) and to the right (larger companies).

The size effect is positive and significant only for medium small Italian companies; in Sweden the effect is negative and significant for medium large companies and positive for large ones.

We can now move to the relevant comparison when looking at our ex-ante hypotheses. Our first hypothesis about gender diversity is accepted in Sweden, especially for larger firms; while the opposite is true in Italy; a Female CEO still has no effect in Italy but has an unexpected positive and significant effect in Swedish companies, thus partially offsetting the effect of gender diversity. As anticipated the difference is probably due to a higher variability of Gender diversity in the Scandinavian country. This confirms a key difference between the two corporate environments: in Sweden, gender equality is much more advanced than Italy, and this clearly shows in the results of our panel as well.

With regards to the second hypothesis – the fact that the presence of a large shareholder should imply lower tail risk – we have a close behaviour in terms of sign between the two countries but while the effect is significant in all specifications for Italy, it is only significant and positive in Sweden for large companies. Differences in the significance level are probably due to the different structure of firms between countries in the first three quartiles: in Italy the majority of firms in those size segments are controlled by families; and this is not the case (at least to the same extent) in Sweden. For the third hypothesis, we have a similar result for the two countries as the presence of institutional shareholders has a negative and significant impact for smaller firms, but while it loses significance in Italy when we move to the higher quartiles, in Sweden it moves to a positive and significant coefficient.

Results about the fourth hypothesis are similar in both contexts with the exception of large firms in Sweden where the effect is the expected one and is significant; so, while in Italy the board size doesn't impact at all Tail Risk, Swedish large firms see decreasing risk when board size grows.

Results concerning the fifth hypothesis are similar in the left part of the distribution: the share of independent directors has a negative and significant impact on tail risk for small Italian firms and for medium small Swedish firms but while it loses effect for larger firms in Italy, the impact is still negative for medium large Swedish firms and becomes positive and significant for the large group; the support to this hypothesis come stronger from Sweden but not from Italy.

Overall, notwithstanding the detailed comparison above, the key finding of this paper is the following. In Italy, corporate governance variables are only correlated to tail risk for smaller companies. The larger the companies, the less corporate governance plays a role in determining tail risk, which is then mainly driven by leverage and financial performance, as well as the presence of a large shareholder in the ownership structure (which is most likely driven by the strong role of the government and families in the country). Moreover, in Italy gender diversity variables seem to have no impact on tail risk. On the other hand, in Sweden corporate governance and gender diversity variables are correlated to tail risk throughout the distribution of companies – from small to large – showing how the corporate environment in the country is more reflective of heterogeneity in boards and diversity, as one would expect in a market that developed to be based more on markets and distributed ownership with respect to Italy, that is instead very much bank based and with few controlling parties.

SECTION V: Conclusion

A. Main results

This paper analysed the corporate governance and ownership characteristics of Swedish listed non-financial companies, and examined whether heterogeneity in their Tail Risk could be explained by differences in selected financial, corporate governance and ownership variables. In order to do so, data on the corporate governance and ownership of the 108 largest Swedish listed firms was hand-collected from their filings (annual reports, corporate governance reports) for the period 2000-2019, and merged with financial data obtained through FactSet. Tail Risk was calculated as the average stock return (obtained from FactSet) over the 5% worst days in each year, multiplied by negative 100 in order to express it as positive values. The final dataset took the form of an unbalanced longitudinal panel comprising 986 complete unique observations.

Finally, we compared the results and related the interpretation with results of the same research we performed on Italian listed companies.

The main result we obtained highlights the stark difference in corporate environments between Sweden and Italy. Italy is a bank-centric system, where ownership of listed companies is mostly dominated by a few families and the government, and not very advanced in terms of gender diversity policies. On the other hand, Swedish developed to be a more market-based system with distributed ownership, framed in a cultural backdrop in which gender diversity is significantly more relevant. Accordingly, governance and diversity variables are correlated to and impact Tail Risk on Swedish firms throughout the size distribution. On the other hand, in Italy gender diversity seems not to be correlated with Tail Risk at all, even though this might be driven by the low variability of relevant metrics in the panel. Moreover, governance characteristics impact tail risk only for the smallest companies.

When we look at the full Swedish sample, the main drivers of tail risk between financial variables are the ROA, which has a negative and expected sign - better performing firms are also less risky - and size, which increase the firm risk profile, in contradiction with financial theory. When we consider corporate governance variables, the share of women on the board and the presence of a female CEO significantly impact tail risk in opposite directions; finally, the presence of institutional investors seems to increase the risk of firms.

However, similarly as in our analysis of Italian firms, it turns out that tail risk in different size groups is driven by different fundamental variables behaviour.

ROA and Gender Diversity have an effect for all groups; however the effect of the latter is dampened by the female CEO variable, whose sign is positive and significant for smaller companies. Board Size is significant only for the large group but has a negative sign in all quartiles, partially confirming our hypothesis that the size of the board should have a significant correlation with tail risk if the company is larger, as this would imply higher complexity which should increase the need for a larger board.

The behaviour of independent directors and large shareholders variables is quite similar in terms of sign, which is globally negative with the exception of large firms.

Similarly, the presence of institutional investors has a positive effect for the larger quartiles of the distribution while the opposite is true for smaller firms. Overall, what is evident is that large companies have a specific set of features which differentiate them from smaller companies, from a risk perspective.

When it comes to a comparison among countries, full sample results see a common ROA effect on tail risk which is significant and negative, but results diverge for institutional investors. Swedish firms also have a gender effect, which manifests with both significant Gender Diversity and CEO Female variables, the first negative, the latter positive. Our gender diversity hypothesis can thus be accepted for Swedish firms but not for any Italian group.

The presence of large shareholders has different effects in Sweden and Italy, and our hypothesis that the presence of large shareholders should dampen tail risk is partially accepted in Italy but rejected in Sweden. This is not surprising, as the shareholder dynamics in the Italian corporate environment – driven by few families and the government – are very different from Sweden.

Our hypothesis about independent directors is partially accepted in both countries: only small firms have the expected negative effect; for larger firms the effect is not significant in Italy and is positive in Sweden. As explained, this is likely to be driven by (a) the fact that independent directors can curb risk in small firms, which are more likely to be controlled by a single shareholder, and (b) the fact that larger firms are generally more complex and thus more difficult to monitor for outside, independent directors, while they benefit from the presence of insider directors that are more familiar with their operations.

The impact of board size must be rejected in Italy, while it is significant and has a negative sign for larger Sweden Firms. Again, as large Italian firms are more likely to be controlled by the government, the size of the board matters less for their tail risk, while our result for Sweden follows previous research, according to which more complex firms benefit from a larger board.

Finally, the presence of institutional investors has close results with regard to (medium-)small firms, with a negative and significant effect on tail risk, however it loses significance in Italy as the size increase; while in Sweden the sign is reverted when it comes to large firms. As previously stated, the reason of this switch in sign could lie in the fact that the institutional investors which are usually present in larger firms are more likely to follow an indexing strategy and are thus less prone to efficient monitoring, leading to inefficient decisions from a business perspective.

B. Implications

Given the results of the analysis, it is possible to summarize some key implications.
A larger board size is a good practice for large firms and don't produce relevant effects in all other cases. Larger, more complex firms should therefore consider adding members to their board in order to better divide tasks among board members and guarantee better monitoring and management.

There is sharp contrast between small and large companies with regard to the presence of independent directors in the board; the effect is the expected one when we deal firms which are not large in size. This seems to suggest that smaller firms are likely to need more monitoring, and thus the presence of a larger share of independent directors is beneficial.

A mix of women and men in the board helps in reducing tail risk, while the fact that the CEO is a woman is of no help apparently; and it actually increases tail risk for smaller companies. This result is surprising and is not aligned to previous research (even though no study as specific as ours was previously conducted on the matter, as far as we are aware).

Investors acting in the Swedish market and pursuing stock picking strategies that want to limit downside risk in their portfolio can concentrate on firms with sounder corporate governance practices, as what was conveyed in the analysis by higher board independence is likely to be correlated with better overall corporate governance (at least when not looking at the largest firms).

On a cross-country level, the difference between the two markets, even to this day, still shows in the results of our analysis. Nevertheless, something that we believe can be taken from our results is that Italy should continue in pursuing its efforts of improving the gender balance on boards of directors, as a higher percentage of women on the board – as one would expect from the relevant literature – conduces to less risky firms.

A limitation of the present paper that is worth mentioning is related to data availability: the panel is unbalanced and we have missing values within the same entity and between firms. There is an attrition issue: the full panel should count 1,572 observations (as can be observed from returns availability), however panel models consider at most 986 observations.

The second limitation is that the sample we consider is limited to Swedish firms and we cannot say it is representative of the universe of all companies. Nordic economies have their peculiarities, and this is confirmed by some stark differences we find with our previous analysis of Italian listed firms.

Final and maybe most relevant, there might be an endogeneity issue. We took all possible measures to limit this as much as possible in the variables we are taking in consideration (e.g. limiting our use of market-based metrics in our model as explanatory variables), however reverse causality might arise: risk can be both a consequence and a cause of certain corporate decision and of certain observed financial performances. The use of some more advanced econometric instruments such as dynamic panel models (e.g. Arellano-Bond) could help in avoiding such issues.

D. Directions for future research

Similar directions for future research we mentioned in our paper analysing Italian listed firms apply here as well.

Due to the fact that data is hand-collected, availability of information is limited, and this limits the range of possible investigations that could be conducted in this paper. For example, one would ideally split institutional investors between passive, mutual funds and activists to obtain more relevant results with respect to the variable. Moreover, it was not possible to split the data set over time periods due to some variables lacking enough variance over shorter intervals of time.

It would be interesting to see an extensive analysis conducted at the cross-country level including the main global markets, in particular to see whether any trend shaping the relationship between fundamental variables and tail risk can be observed across civil and common law countries.

This paper tries to fill the gap in research of studies covering the interrelationship of performance, governance, ownership and risk, but both theoretical as well as empirical advancements in this regard would be precious.

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