BI Norwegian Business School - campus Oslo

# GRA 19502

Master Thesis

Component of continuous assessment: Thesis Master of Science

Norwegian Family Firms and Risk-Taking


| Navn: | Adam Balog, Eivind Berg Lundby |
|---|---|


| | |
|---|---|
| Start: | 02.03.2018 09.00 |
| Finish: | 03.09.2018 12.00 |

BI NORWEGIAN BUSINESS SCHOOL

GRA 19502 MASTER THESIS

# NORWEGIAN FAMILY FIRMS AND RISK-TAKING

SUPERVISOR:

Leon Bogdan Stacescu

SUBMISSION DATE:

03.09.2018

CAMPUS:

Oslo

PROGRAMME:

Master of Science in Business, Major in Finance

Authors:

Adam Balog

Eivind Berg Lundby

# Acknowledgements

We are grateful to Leon Bogdan Stacescu for his guidance throughout the process of writing this master thesis. His insight and extensive knowledge on the Norwegian SMB market has proven invaluable and enabled us to not only expand on existing research within the field, but also to explore previously uncharted aspects of family firms and their risk-taking behaviour in Norway. Further, we would like to express our gratitude to the Centre for Corporate Governance Research for providing us with the necessary data to conduct our analysis. Lastly, we would like to thank our families, friends and employers for their support and encouragement during the entire MSc programme at BI.

# TABLE OF CONTENTS

**Acknowledgements** ..... **2**

**Abstract** ..... **5**

**Motivation** ..... **5**

**Introduction** ..... **6**

**Literature Review** ..... **9**
Family firms – Definition and Importance ..... 9
Risk-taking behaviour in Family Firms ..... 9
CEO composition ..... 12
Agency Theory ..... 14
Capital structure ..... 15

**Hypothesis** ..... **16**
Financial risk ..... 17
Net Leverage ..... 17
Operational risk ..... 17
CV Revenue ..... 18
Degree of operating leverage ..... 18
Self-selection ..... 18
Net Leverage ..... 19
Degree of operating leverage ..... 19
Coefficient of variation – Revenue ..... 19

**Data and variables** ..... **20**
CCGR ..... 20
Data filters ..... 20

**Regressions** ..... **22**
Financial Risk ..... 22
Operational Risk ..... 22
Heckman TS estimation ..... 23

**Variables** ..... **23**
Risk measures ..... 23
Net Leverage ..... 23
Coefficient of variation of Revenue ..... 24
Degree of Operating Leverage ..... 24

**Dummy Variables** ..... **25**
Year ..... 25
Industry ..... 26

**Control variables** ..... **26**
Tangibility ..... 26
Firm Size ..... 27
Growth Opportunities ..... 27
Profitability ..... 28
Company Age ..... 28

**Methodology** ..... **29**
Descriptive statistics ..... 29
Multicollinearity ..... 29
Heteroskedasticity ..... 30
Fixed effects (FE) or Random effects (RE) ..... 31
Pooled OLS (POLS) ..... 31
Cross-sectional regression ..... 32
Fama-MacBeth ..... 33
Heckman – two step estimation ..... 33

**Descriptive statistics** ..... **34**
Summary statistics ..... 34
T - tests on the descriptive statistics ..... 37
Correlation matrix ..... 38
Graphical depiction of the sample ..... 39
The Tax Reform ..... 39
Financial risk ..... 40
Operational risk ..... 41
Distribution ..... 41
CEO Age ..... 42

**Empirical Results** ..... **42**
Financial Risk ..... 42
Net leverage ..... 43
Operational Risk ..... 46
Coefficient of variation in revenue ..... 46
Degree of Operating Leverage ..... 48
Fama-MacBeth ..... 50
Heckman two-step estimation ..... 51
Financial risk ..... 51
Operational risk ..... 53

**Conclusions** ..... **55**

**Reference list** ..... **57**

**1 Appendix** ..... **62**
1.1 Variables ..... 62
1.2 T-test – Descriptive statistics ..... 62
1.2.1 Fam 50 vs. Non_Fam ..... 62
1.2.2 Fam50_CEO vs. Non_Fam ..... 63
1.2.3 Fam5090 vs. Fam90 ..... 63
1.3 Robustness check of the regressions ..... 64
1.3.1 Financial risk ..... 64
1.3.2 Operational risk ..... 64
1.4 Variance Inflation Factor ..... 66
1.5 Cross-sectional regression ..... 67
1.5.1 Financial risk – Net Leverage ..... 67
1.5.2 Operational risk – Coefficient of Variation (Revenue) ..... 68
1.5.3 Operational risk – Degree of Operating Leverage ..... 69

# Abstract

This study examines the effect of family firms, CEO and ownership composition on financial and operational risk-taking for 11,157 Norwegian private firms between 2006 and 2015. **First,** this study finds clear indications that family firms take on lower levels of financial risk compared to non-family firms. Furthermore, the study finds evidence that supports the notion that family firms operate with lower revenue volatility and hence a lower degree of operational risk. However, we do not find any evidence indicating that family firms are less risk averse with respect to their degree of operating leverage. **Second,** the study finds that the presence of a family CEO has a negative effect on financial risk and the volatility of revenues. The composition of fixed and variable costs observed for the companies in the study is however, not affected by the management of the company. **Third**, the study reveals that family firms, where the ultimate ownership exceeds 90 percent, tend to take on less financial risk and have a lower degree of operating leverage compared to other family firms. We find no evidence that the concentration of ownership, within family firms, affect the volatility of revenues. **Finally**, the study finds that family firms with different ownership structures self-select in terms of risk-taking behaviour. Family firms with more concentrated ownership self-select towards lower risk. In conclusion, our study finds that family firms take on less risk than non-family firms in Norway.


# Motivation

It is widely acknowledged that family firms are the backbone of most countries economy and account for a substantial part of all firms worldwide. Because of the family firm's importance and impact on a countries economy, there has been an increasing focus and a growing body of research on family firms and their risk-taking behaviour in the past two decades. The research provides conflicting views on whether family firms are less risk willing compared to non-family firms. Furthermore, the research shows no consistent results on the impact a family CEO has on the riskiness of the company compared to a professional CEO. (Anderson & Reeb, 2003; González, Guzmán, Pombo, Trujillo, 2013)

This paper looks for evidence that could answer these questions. To our knowledge, no similar studies on this topic have been conducted for Norwegian firms. Hvide and Panos (2014) explored the risk-taking behavior for Norwegian investors but

they do not explore the topic of family firms. The risk-taking behavior of Norwegian family firms is largely unexplored, which makes the topic highly interesting and rewarding. Previous studies have mainly focused on data available for publicly traded companies or on small-scale survey analysis. Our study is based on a unique dataset, which includes all accounting measure for 11,157 private Norwegian companies. The dataset enables us to look at a more substantial part of the Norwegian economy rather than a small subsection in comparison to previous studies. We believe that our paper adds valuable insights about the risk-taking behaviour of Norwegian family firms, which can be used by investors considering adding family firms to their portfolios. As family firms stand for around 2/3 of the companies world-wide, their risk-taking behaviour becomes highly interesting from a macroeconomic perspective. Only through a thorough understanding of the building blocks that make up a countries economy, can one hope to gain a complete understanding of the powers that move the overall economy. The holistic approach to risk-taking in this paper, aims to shed light on the survivability and stability of family firms operating in the private sector. Our goal is to provide a valuable contribution to the growing body of knowledge on family firms concerning their risk-taking behaviour and how ultimate ownership and management composition impacts the corporate strategies of companies.

# Introduction

Family firms account for roughly 70-90 percent of the global GDP, hence these companies are an essential and integrated part of the world economy. The impact these firms have on the global economy is undisputed and it becomes evident that a deeper understanding of how these firms manage their business operations is required. In the past decades, research on family firms have mainly focused on the family firms' profitability, financial performance and capital structure compared to non-family firms. The research on family firms and risk-taking has been somewhat limited in the past decades, however, the literature on risk-taking with respect to ultimate ownership has gained traction in the last two decades. To the owner, the family firm is often the only source of income and economic security. Therefore, researchers suggest that owners of family firms are especially exposed to, and dependent on the income generated by the company.

Most of the published research on family firms and their risk-taking behaviour find that family firms usually engages in less risky activities (González et al., 2013; Mishra & McConaughy, 1999; Hiebl, 2012). When measuring risk, prior research has mostly focused on the family firms' debt ratios and the proportion of capital investments compared to non-family firms. Only a small percentage of researchers have considered the presence of family CEO and increased ownership concentration and the effect these measures may have on the firms' risk-taking behaviour.

This paper investigates the existence of any unique characteristics that can distinguish family firms from non-family firms regarding their risk-taking behaviour. Owners of family firms are assumed to have most, if not all, of their wealth invested in the family business. They are therefore relatively less diversified than owners of non-family firms (Anderson & Reeb, 2003). This paper further investigates whether the involvement of a family CEO changes the risk-taking behaviour in the family firm. If a family, in addition to investing their financial capital, also invest their human capital, then the family would be increasingly dependent on the survival and income from the company. Family firms that also hold the CEO position should, therefore engage in less risk-taking, due to their relatively lower degree of diversification.

The primary hypothesis in this paper, is that family firms engage in less risk-taking behaviour, both regarding financial and operational risks. Furthermore, we expect that the risk-taking will be reduced proportionally as owner concentration increases. This is supported by Anderson & Reeb (2003), who argues that families that invest a high proportion of their private wealth in one firm will become more exposed to firm-specific risk. This further implies that family firms where the owners have a high degree of ultimate ownership should behave in a more careful manner regarding risky investments. In addition to the main hypothesis, we expect that family firms that also holds the CEO position, will in comparison to other family and non-family firms, have lower level of risk-taking.

To measure the risk-taking behaviour in our sample we apply three measures of risk. The financial risk is measured through **net leverage** (total debt minus cash and cash equivalents divided by total assets). This paper uses two different measures of operational risk. **First**, the **coefficient of variation** (CV(Rev)), which measures the

revenue volatility (std. revenue divided by the mean revenue). **Second**, the **degree of operating leverage** (DOL) measures the relationship between fixed and variable costs (correlation between revenue and EBIT). By measuring both the financial and operational risk in the firms, we aim to get a more complete understanding of the whole risk aspect of the companies. Most of the previous research on family firms and risk-taking investigate only one risk factor, mainly, their financial leverage. Instead of using leverage as a proxy for the financial risk, this paper applies net leverage. The added value of applying net leverage is that we can control for cash holdings, which in some cases is used to compensate for higher levels of debt. By introducing CV revenue and DOL as operational risk factors, we can detect the risk related to revenue volatility, as well as, how fixed costs impact the overall riskiness of the company and thereby the behaviour of and preferences of family firms.

The results indicate that family firms tend to have lower net leverage and less volatile revenues compared to non-family firms. We are however, not able to detect that family firms have a lower level of operating leverage compared to non-family firms. Furthermore, we find that as ultimate ownership increases, the level of fixed costs is reduced. In our sample family CEOs have a significant influence on the financial risk profile, as well as, the volatility of revenues of the company. This result contradicts some of the previous research on the impact of the family CEO. We are, however, not able to provide any evidence that family CEOs influence the degree of operating leverage.

The findings in this paper give added value and supplement the somewhat limited research about family firms concerning their risk-taking behaviour. **First**, we find evidence against the trade-off theory regarding the risk-taking behaviour. The results indicate that family firms keep both financial and operational risk at a lower level than their peers. **Second**, we find evidence that family firms take on less financial and operational risk. These findings are further supported by the notion that family owners are less diversified and hence more exposed to the performance of the company. **Third**, the empirical results show consistency with the pecking order theory where family firms appear to finance new investments with retained earnings before exploring other options such as debt and issuing equity. **Finally**, we provide new evidence that confirms that the presence of a family CEO affects risk taking of companies negatively.

# Literature Review

## Family firms – Definition and Importance

In the literature, there exist several different ways to define family firms dependent on what the researchers aim to uncover in their studies. A common and acknowledged definition can be formulated as: *A situation when the family holds a simple majority stake in the company, which implies that they hold more than a 50 percent equity stake in the company.* (Berzins & Bøhren, 2013). The majority rights following such an equity stake enable the controlling family to choose the board composition, as well as, the CEO. These exclusive rights grant the controlling family significant power regarding the companies' operational activities, as well as, the overall strategy of the company. (Berzins & Bøhren, 2013). An alternative definition of a family firm can be defined as: *A situation when the family holds 90 percent of the shares in the company.* This alternative definition follows the argumentation of Jarrell, Brickley and Netter (1988) on supermajority amendments. They argue that the controlling shareholders may need up to 9/10 of the voting power to maintain control of the company in a M&A or takeover situation.

## Risk-taking behaviour in Family Firms

Family firms and their capital structures have for past decades been a hot topic within the corporate finance literature. Globally, family firms account for 2/3 of all businesses and are estimated to account for between 70-90% of the annual global GDP. Hence, from a macroeconomic point of view, family firms play a critical and essential role in the world economy (Hiebl, 2012). Nevertheless, previous research on family firms has mainly focused on the financial aspects related to the capital structure and profitability of these companies. It is only in the past couple of decades that researchers started to shed light on their risk-taking behaviour and how the families' actions impact the company.

Most papers published on the topic of family firms regarding their risk-taking indicate that they engage in less risky behaviour compared to non-family firms (Hiebl, 2012). Furthermore, research indicates that family firms tend to invest in less risky projects and hold lower levels of debt. Hiebl (2012) identified a relationship between the overall risk level of a company and their debt structure. More specifically, as family firms tend to have lower debt levels, compared to non-family firms this leads to lower overall risk levels because higher debt increases the

likelihood and the deadweight cost of financial distress. Anderson et al. (2012) argue that the controlling family mitigate risk by influencing the level and type of long-term, corporate investments. They further argue that family firms avoid risk by allocating fewer resources to long-term and risky R&D projects in comparison to non-family firms, and instead allocate more resources to capital projects. Furthermore, young family firms tend to have lower levels of debt than non-family firms. González et al. (2013) further argue that as family firms age, the level of debt increases, and their capital structure becomes more like non-family firms.

For family firms, there are opposing concerns regarding leverage. On one hand, family firms tend to take on less risk, which indicates that they should have lower levels of debt (González et al., 2013). On the other hand, the controlling family may be concerned with diluting their equity stake in the company, which could threaten the family's power to control and influence the operation of the firm directly. Consequently, owners of family firms will prefer to finance new investments with debt instead of with equity, which would imply higher levels of risk. (González et al., 2013).

Anderson et al. (2003) found that compared to non-family firms, the corporate yield spread in family firms is consistently 30-40 basis points lower. Anderson et al. (2003) argues that these findings provide evidence that lenders give lower borrowing rates to family firms because they tend to invest in less risky projects and have a longer time horizon on their investments. This leads to the conclusion that family firm owners tend to commit more easily to long-term investments, which reduces the probability of default, which further reduces the risk-premiums paid on their loans.

The literature offers multiple explanations for why family firms are less risk willing compared to non-family firms. **Firstly**, the family owners' wealth is highly exposed to firm-specific risk because of their lower level of diversification in comparison to other investors (Anderson & Reeb, 2003). The family's wealth is often concentrated in one single firm, which makes the family more dependent and vulnerable to the performance and survival of that firm compared to other investors (Anderson & Reeb, 2004). **Secondly**, concentrated undiversified shareholders such as owners of family firms, have strong incentives to distribute most of their capital investments in low-risk projects and thus less capital to investments in high-risk projects

(Anderson et al., 2012). **Finally**, Anderson et al. (2012) further argue that R&D projects could expose companies for more unsystematic risk, which family firms strive to minimise. Family firms therefore devote fewer resources, on average, to R&D compared to non-family firms. Paradoxically, the lack of investments in R&D for family firms could potentially reduce the long-term survival of the company (Anderson et al., 2012).

In contrast to the more common perception that family firms are less risk-taking, some researchers argue that family firms are in fact more risk-willing. Gómez-Mejía et al. (2007) argue that family firms often are willing to accept more uncertainty and undertake more debt than non-family firms, if they are in a financially distressed situation or if they fear losing control of the firm. Further, Gomez-Mejia et al. (2007) find that when family firms have the choice between a low-risk option that includes the loss of their majority share and a high-risk option that lets the family keep control over the company, most family firms choose the high-risk option. These results are supported by Hiebl (2012), who argues that family firm owners often prioritise the level of controlling power over other lower risk alternatives. This makes them more likely to finance investments with debt instead of issuing new equity. The behaviour elaborated by Gomez-Mejia (2007) potentially implicates that family firms are more exposed to financial distress situations in the long run, due to their risk-taking behaviour. The reasoning behind this seemingly reckless behaviour, from an economic perspective, could be that the controlling family attempts to minimise the loss of socioemotional wealth that might occur in the event they are forced to a sell off a part of their company to avoid becoming financially distressed (Gomez-Mejia et al., 2007).

Using the socioemotional view as our reference point, high degrees of ultimate ownership leads the family to prioritise maintaining control of the company, even though this might impact the overall risk level and performance. However, the family also must keep the company from failing. This seemingly contradictory approach to corporate governance may lead the owners to act more conservatively and avoid business decisions that could have increased the performance variability for the company over time. (Gómez-Mejía et al., 2007)

## CEO composition

Previous research on CEOs in family firms has mainly focused on how the management of a company will affect the financial performance of family firms over time. The following section will elaborate on the different aspects and results identified in the previous literature concerning management and risk-taking behaviour.

Anderson & Reeb (2003) found that 44.5 percent of family firms had a family member as the CEO. Furthermore, family firms tend to be overly dependent on a single decision maker (Feltham et al., 2005). Consequently, senior executives play a crucial role when it comes to promoting a firm's commitment and support of R&D over time (Zahra et al., 2000). Sirmon & Hitt (2003) found that the firm-level entrepreneurship is critical to family firms, as this type of behaviour aims at identifying and taking advantage of potential business opportunities.

Previous research points out that many family leaders become strategically conservative over time, which in turn minimises the entrepreneurial activities and incentives of the company. The actions of the management have a direct effect on the overall risk-taking of the company. As Zahra et al. (2004) pointed out, most family firms prefer long-term planning, because it is necessary for the firms' long-term survival across multiple generations. Chua, Chrisman & Sharma (1999) summarized the priorities of family firms in the following way in relation to survivability over time: (1) be governed/ managed by family, (2) vision for the firm, consistent with the strategic direction held by the family, and (3) be potentially sustainable across multiple generations.

Research by Gersick et al. (1997) further highlights the importance of the personal characteristics of the CEO as one of the critical factors when it comes to predicting entrepreneurial behaviour. The results show that family CEOs remain in power much longer than their counterparts in non-family firms, which further increases the potential impact the CEO has on the long-term performance of the company.

The age of the CEO is considered a key variable to determine the level of entrepreneurial behaviour (Levesque & Minniti, 2006). Based on time allocation theory by Becker (1965) and Levesque & Minniti (2006), CEOs entrepreneurial efforts tend to decline over time. As CEOs grow older, they may limit decision

making to commonly held norms of industry behaviour, rather than seeking unique, yet risky, strategic directions (Hambrick & Finkelstein, 1987). Younger entrepreneurs have been found to adjust their expectations faster in response to new information than older entrepreneurs do, supporting the notion that older entrepreneurs are more satisfied with status quo (Parker, S. C., 2006). Stewart et al. (1999) identified the age of the CEO to be significantly negatively correlated with innovation and risk-taking. Moreover, the goal of the family CEO is to build a lasting legacy for their children. This behaviour may often lead to decreasing risk-taking and innovation as the CEO becomes older (Sharma et al.,1997).

Sraer & Tesmar (2007) identified several differences between family CEOs and professional CEOs. **Firstly**, professional CEOs tend to be better at the financial aspects of the business operations, pay on average lower interest rates on their debt and also enter into acquisitions, which turn out to be more profitable for the company in the long run. **Secondly**, professional CEOs tend to hire less skilled employees, which in turn leads to lower overall wages. However, Sraer & Tesmar (2007) also found that family firms tend to outperform their counterparties in the non-family owned companies. Their research showed that; (1) the founding family has on average higher productivity of their labour (2) however, there exists differences between hired and family CEOs. Research has shown that the productivity of labour in professionally run family companies tends to be lower than in the case where the CEO is part of the family. (3) CEOs in family firms tend to pay lower wages than non-family CEOs, (4) lastly, professional CEOs tend to compensate somewhat by having higher labour to capital ratios.

However, previous literature within the field of management implies that the concept of risk is not straightforward regarding the management of the company. March and Shapira (1987) suggest that managers do not necessarily consider risk to be a probability concept, nor do they attempt to confine risk to a single quantifiable measure. Hollenbeck et al. (1994) found further support for this by identifying that individuals tend to treat risk as a dynamic factor rather than a static one. Due to this seemingly dynamic approach to risk, managers may use approximate time frames rather than accurate forecasts called for in standard financial models. (Simon, 1993)

In contrast to most research discussed above, some researchers find that a family CEOs, have at best, limited impact on the risk-taking behaviour for a company. Anderson & Reeb (2003) looked at the different risk aspects of family firms. **Firstly**, their research focused on investment strategies and the method of financing for family firms and family CEOs. They found that family CEOs and family ownership has a negative effect on diversifying investment decisions. Anderson & Reeb (2003) argue that family firms invest less in diversifying lines of businesses, which could reduce the overall risk in the company in the long-run. They further argue that when comparing family ownership to family CEO, the results are not significantly different from each other and that family ownership is a more important factor in the investment strategy. **Secondly**, they investigated the relationship between family CEO and leverage. They did not find any evidence that family CEOs have an impact on the leverage. In fact, they argue that they could not find any significant differences between family firms and non-family firms regarding their level of debt. In contrast to this, Mishra & McConaughy (1999) argue that family ownership has a significantly negative impact on leverage, but they agree that family CEOs have limited or no effect on the levels of debt. Furthermore, as family CEOs are more secure in their positions compared to outside CEOs, they can resist the pressure to enter risky short-term investments for the sole purpose of impressing the board with their quarterly results (Miller & Breton-Miller, 2006).

## Agency Theory

Agency theory is a central topic in the corporate finance literature and several researchers have used it to explain the differences in riskiness between family and non-family firms (widely held firms). Agency cost occur in any situation where the principal must use resources to monitor the behaviour of the agent (Jensen & Meckling, 1976). Agency theorist argues that the risk-taking behaviour of a company could be affected by the principal-agent relationship (Jensen & Meckling, 1976). One way the relationship could impact the company is when ownership is less concentrated. The other possibility is when the company employs a professional CEO. Jensen and Meckling (1976) argue that agency costs arise when the manager owns less than 100 percent of the firm. Furthermore, as the CEO ownership becomes smaller, agency costs increase. They argue that agency cost is closely linked to risk-taking behaviour of the company through the ownership

structure and the management of the company (Jensen & Meckling, 1976). The separation of decision control and risk bearing (ownership) creates an agency problem (Fama & Jensen, 1983). By giving management an equity stake, the company could mitigate the agency costs through limiting the outside CEOs ability to adopt opportunistic behaviour and risk-taking (Jensen & Meckling, 1976).

## Capital structure

Capital structure decisions have the power to affect the risk of a company and thereby also the risk the management and owners are exposed to. In previous literature capital structure, has traditionally been viewed as the proportion of debt to equity. Decision makers must consider the risks related to different financing options (McConaughy, Matthews, & Fialko, 2001). More specifically, the financial risks related to business decisions can be described as the probability that the actual return on an investment will deviate from the expected return. Hence, in general, a company's riskiness is dependent on its capital structure (Van Horne 1980). To summarise the discussion above, one can say that the conventional decisions theory considers the choice of financing to be a trade-off between risk and expected return. (March and Shapira, 1987).

There exist numerous alternatives available for a company's management to finance new investments. The management of a company needs to consider all the consequences before choosing what kind financing they should choose. Different financing methods could impose varying risks on the company. The **pecking order theory** suggests a hierarchical system based on the level of adverse selection present in each financing option. **First**, a company should use retained earnings, **next** they should use debt and **finally** issue new equity to finance new investments (Frank & Goyal, 2009). There are both positive and negative effects of financing investments with debt. The **trade-off theory** suggests that the capital structure of a company is determined by a trade-off between the benefits of debt and the cost of debt. The tax-bankruptcy trade-off explains the relationship between the tax benefits of debt against the deadweight cost of bankruptcy (Frank & Goyal, 2009). A company is assumed to be riskier if the debt levels are higher compared to their peers, hence if a company chooses to finance their investments mainly with debt they become riskier. The **agency perspective** applied to the trade-off theory argue that higher debt levels can contribute to discipline managers and mitigate agency

costs. The theory suggests that the availability of free cash flow under management control will induce them to invest in potentially unprofitable project and thereby create an overinvestment problem, which could increase the cost incurred by the shareholders (founding family). Family owners can impose discipline on the professional CEOs through increased debt levels because this restricts the free cash flow available to managers (Frank & Goyal, 2009). The implications of these theories are that family firms may have an incentive to take on more debt to mitigate their exposure to the overinvestment problem that may occur in the presence of a professional CEO.

# Hypothesis

In this section, we will present and elaborate on our hypotheses. The hypotheses presented follows the argumentation applied in established research, discussed in the previous section. Previous research on family firms indicates that owners of family firms take on less risk due to their relatively lower levels of diversification. Family-firms tend to invest in less risky R&D projects and aim for lower levels of debt (Anderson et al., (2012). However, some researchers argue that family firms take on more financial risk since they are unwilling to dilute their equity stake in the company (Gomez-Mejia et al., 2007). Another aspect that impacts risk-taking, within family firms, is their management composition. Aldrich & Cliff (2003) suggest that family-CEOs tend to be more conservative in their investment choices and that they become increasingly more conservative with age to protect the families' wealth and to ensure the long-term survival of the company.

The primary objective of this paper is to uncover whether there exist any differences between family-controlled firms and non-family-controlled firms regarding their financial and operational risk-taking behaviour. Based on different measures of risk, we will test and aim to answer how the concentration of ownership affects decision making regarding risk-taking. This paper further aims to discover differences regarding risk-taking within family firms. The degree to which a controlling family has invested its wealth in the family business will vary between firms. The more the family have invested, the less diversified the families' wealth will be. When a family chooses not only to invest their financial capital but also their human capital in the company, the family becomes even less diversified and becomes more vulnerable to shocks and changes that affects the firms' business.

Family firms where a family member holds the position as CEO are therefore expected to be even less risk-taking than other family firms and then also non-family firms. This is further supported by agency theorist, who suggest that a hired, non-family CEO, as an agent, could have incentives that deviates from the family's (principal) objectives. The agent may have incentives to make decisions that affect the risk in the firms, such as engaging in more volatile lines business.

## Financial risk

### Net Leverage

Anderson & Reeb (2003) suggest that owners of family firms are less diversified compared to owners of non-family firms. This follows that for owners of family firms most of the family´s wealth is invested in the family firm and hence are dependent on the survival of the firm (Anderson & Reeb, 2004). Therefore, family firms need to be more careful regarding risk-taking. One way of reducing the likelihood of bankruptcy is to obtain less debt. A common way firms go bankrupt are when they fail to make the necessary interest payments and become forced to default. Firms could therefore, reduce their financial risk and possible bankruptcy costs by taking on less debt. Following this argumentation, net leverage, which represents financial risk, is expected to be lower in family firms compared to non-family firms.

**H1a:** *Norwegian family firms take on less financial risk than non-family firms.*

**H1b:** *Norwegian family firms with a family CEO take on less financial risk than non-family firms and other family firms that do not hold the CEO position.*

**H1c:** *Norwegian family firms with a family ownership that exceeds 90 percent take on less financial risk than other family firms.*

## Operational risk

Following Anderson & Reeb´s (2003) argumentation that owners of family firms are less diversified and therefore needs to be more careful regarding risk-taking decisions. Another way family firms could reduce their risk, is within the operations of the firm. Family owners are dependent not only on the survival of the firm but also vulnerable to the firm's ability to generate a steady stream of cash.

**CV Revenue**

Volatile cash flows indicate high operational risk. The operational risk can be measured by the coefficient of variation in revenue (CV(Rev)), which is the volatility in revenues. If the revenue of the company varies a lot on a year to year basis, then it brings more uncertainty to the owners' cash flow. Due to this relationship, we expected that the family firm chooses a business model with less volatile revenues, implicating that family firms have a negative effect on the coefficient of variation of revenue.

**H2a:** *Norwegian family firms have lower revenue volatility compared to non-family firms.*

**H2b:** *Norwegian family firms with a family CEO have lower revenue volatility than non-family firms and other family firms that do not hold the CEO position.*

**H2c:** *Norwegian family firms with a family ownership that exceeds 90 percent have lower revenue volatility compared other family firms.*

**Degree of operating leverage**

One way operational risk can be measured is through the Degree of Operating Leverage (DOL). Higher fixed costs compared to variable costs make the firm more exposed to changes in revenue. Firms with a high Degree of Operating Leverage are more vulnerable to shocks that effects revenue and are therefore riskier. We therefore expect that family firms have a lower degree of operating leverage, hence a negative effect on the dependent variable DOL.

**H3a:** *Norwegian family have lower degree of operating leverage compared to non-family firms.*

**H3b:** *Norwegian family firms with a family CEO have lower degree of operating leverage compared to non-family firms and other family firms that do not hold the CEO position.*

**H3c:** *Norwegian family firms with a family ownership that exceeds 90% have lower degree of operating leverage than other family firms.*

## Self-selection

As discussed in the literature review, most researchers agree that family firms tend to take on less risk both concerning financial and operational risk. In this paper, we investigate whether the companies and families' relative tolerance towards risk

impacts the distribution of ultimate ownership. Our expectation is that we will find some form of self-selection for family firms in Norway.

**Net Leverage**
**H4a**: *Norwegian companies self-select into becoming family firm based on the companies' relative tolerance towards net leverage.*

**Degree of operating leverage**
**H4b**: *Norwegian companies self-select into becoming family firm based on the companies' relative tolerance towards DOL.*

**Coefficient of variation – Revenue**
**H4C**: *Norwegian companies self-select into becoming family firm based on the companies' relative tolerance towards CV(Rev).*

# Data and variables

## CCGR

The data extraction inquiry was facilitated by the Department of Financial Economics at the BI Norwegian Business School (BI). The Centre for Corporate Governance Research (CCGR) provided the data used in this study. This is a unique dataset which contains both corporate governance and accounting data for Norwegian private firms including the years 2000-2015.

| Item number | Variable name | Proxy |
|---|---|---|
| item_4 | CEO birth year | CEO_birth_year |
| item_9 | Revenue | Revenue |
| item_14 | Payroll expense | Payroll_expense |
| item_15 | Depreciation | Depreciation |
| item_30 | Other interest expenses | Other_interest_expenses |
| item_35 | Income before extraordinary items | Income_before_extra_items |
| item_63 | Total fixed assets | Total_fixed_assets |
| item_76 | Cash and cash equivalents | Cash_and_cash_Equivalents |
| item_78 | Total current assets | Total_current_assets |
| item_87 | Total equity | Total_Equity |
| item_98 | Total other long-term liabilities | Tot_other_longterm_liabilities |
| item_105 | Dividends payable | Dividens_payable |
| item_504 | District number | District_number |
| item_11102 | Industry codes | Industry_codes |
| item_13420 | Company age | Company_age |
| item_13601 | Shares owned by CEO (direct ownership) | Share_owned_by_CEO |
| item_14002 | Number Of Owners (ultimate ownership) | Number_of_Owners |
| item_15302 | Largest family sum ult ownership | Largest_family_sum_ult_ownership |
| item_15304 | Largest family has CEO | Largest_family_has_CEO |
| item_50109 | Number of employees | Number_of_Employees |

* Including only firms that have the dummy varibale: 14507 = 1, indicating that they are not part of a business group

Table 1 – CCGR data set

## Data filters

The CCGR database includes yearly accounting data for all the public and private firms in Norway between the years of 2000 and 2015. The filters applied in this paper aim to generate a representable sample of companies within the SMB segment in Norway. By applying the relevant filters, the aim is further to identify comparable firms through matching, which will increase the robustness of our analysis. Furthermore, we impose an upper- and lower-limit of 100 million and 5 million, respectively, on the 15-year average revenue. An additional restriction to

ensure that the study captures the dynamics of leadership and CEO composition on risk-taking, is that every company must have at least five employees. These filters are in place to ensure that our sample consists of comparable companies.

In this paper, we are interested in analysing firms that are not part of a business group because of the impact internal capital markets might have on how the firms undertake risk and obtain or generate financing. Firms that are registered as part of a larger business group is not included in the study (Dummy variable: 14507 = 0).

The table below illustrates all the filters applied to the original dataset to obtain the dataset for our study. The final sample consist of 162,167 observations.

| Filter | Description | Number of observation |
|---|---|---|
| 0 | Original dataset | 3,461,962 |
| 1 | Drop all data before the year 2000 | 3,461,962 |
| 2 | Drop all data after the year 2015 | 3,461,962 |
| 3 | Drop company if Mean_Revenue < 5,000,000 | 836,234 |
| 4 | Drop company if Mean_Revenue > 100,000,000 | 767,838 |
| 5 | Drop company if Number of Employees < 5 | 564,148 |
| 6 | Drop company if item_15302 > 100 % | 450,141 |
| 7 | Drop company if item_9 <= 0 | 430,956 |
| 8 | Drop company if item_87 < 0 | 391,782 |
| 9 | Drop company if # of observations < 10 | 225,228 |
| 10 | Drop company if Finance & insurance | 225,228 |
| 11 | Drop company if Real-estate | 222,918 |
| 12 | Drop company if Short_term_debt < 0 | 222,898 |
| 13 | Drop Family_Firm if not Family_Firm for all years | 162,302 |
| 14 | Drop company if D/E > 10 | 160,167 |

Table 2 – Data filters

For our regression analysis, we further restrict the data to only include data for the years 2006 - 2015. This is because of the 2006 tax reform, which had a significant impact on the marginal tax rates on salaries, dividends and capital. This leads to a dramatic decrease in dividends payable for many the companies in the sample. In turn, the tax reform had a significant impact on the capital structure of the Norwegian firms and can be interpreted as a shock in our dataset, which could have an impact on the regression results. However, as several of our independent and dependent variables are calculated by rolling standard deviation and correlations, we allow for (t – 4) years in our calculations of the variables.

# Regressions

*The specified regressions below apply for both the POLS and cross-sectional regressions. However, the dummy variable for year is not included in the cross-sectional regressions as these are estimated year by year.*

## Financial Risk

**Fam50 versus Non_Fam**

$$Net\ Leverage = \alpha_{it} + \beta_{1,1}D_{Fam50} + \beta_{2,1}FirmSize_{it} + \beta_{3,1}Tangibility_{it} + \beta_{4,1}ROA_{it} + \beta_{5,1}GrowthOpportunities_{it} + \beta_{6,1}CompanyAge_{it} + \beta_{7,1}PayoutRatio_{it} + \beta_{8,1}D_{year} + \beta_{9,1}D_{Industry} + \varepsilon_{it}$$

**Fam50_CEO versus Non_Fam**

$$Net\ Leverage = \alpha_{it} + \beta_{1,2}D_{Fam50\_CEO} + \beta_{2,2}FirmSize_{it} + \beta_{3,2}Tangibility_{it} + \beta_{4,2}ROA_{it} + \beta_{5,2}GrowthOpportunities_{it} + \beta_{6,2}CompanyAge_{it} + \beta_{7,2}PayoutRatio_{it} + \beta_{8,2}D_{year} + \beta_{9,2}D_{Industry} + \varepsilon_{it}$$

**Fam5090 versus Fam90**

$$Net\ Leverage = \alpha_{it} + \beta_{1,3}D_{Fam90} + \beta_{2,3}FirmSize_{it} + \beta_{3,3}Tangibility_{it} + \beta_{4,3}ROA_{it} + \beta_{5,3}GrowthOpportunities_{it} + \beta_{6,3}CompanyAge_{it} + \beta_{7,3}PayoutRatio_{it} + \beta_{8,3}D_{year} + \beta_{9,3}D_{Industry} + \varepsilon_{it}$$

## Operational Risk

*In this paper, operational risk is measured by the coefficient of variation (CV(Rev)) and the Degree of Operating Leverage (DOL). $Y_{it}$ in the specified regressions below represent both CV(Rev) and DOL.*

**Fam50 versus Non_Fam**

$$Y_{it} = \alpha_{it} + \beta_{1,1}D_{Fam50} + \beta_{2,1}FirmSize_{it} + \beta_{3,1}Tangibility_{it} + \beta_{4,1}ROA_{it} + \beta_{5,1}GrowthOpportunities_{it} + \beta_{6,1}CompanyAge_{it} + \beta_{7,1}PayoutRatio_{it} + \beta_{8,1}NetLeverage_{it} + \beta_{9,1}D_{year} + \beta_{10,1}D_{Industry} + \varepsilon_{it}$$

**Fam50_CEO versus Non_Fam**

$$Y_{it} = \alpha_{it} + \beta_{1,2}D_{Fam50\_CEO} + \beta_{2,2}FirmSize_{it} + \beta_{3,2}Tangibility_{it} + \beta_{4,2}ROA_{it} + \beta_{5,2}GrowthOpportunities_{it} + \beta_{6,2}CompanyAge_{it} + \beta_{7,2}PayoutRatio_{it} + \beta_{8,2}NetLeverage_{it} + \beta_{9,2}D_{year} + \beta_{10,2}D_{Industry} + \varepsilon_{it}$$

**Fam5090 versus Fam90**

$$Y_{it} = \alpha_{it} + \beta_{1,3}D_{Fam90} + \beta_{2,3}FirmSize_{it} + \beta_{3,3}Tangibility_{it} + \beta_{4,3}ROA_{it} + \beta_{5,3}GrowthOpportunities_{it} + \beta_{6,3}CompanyAge_{it} + \beta_{7,3}PayoutRatio_{it} + \beta_{8,3}NetLeverage_{it} + \beta_{9,3}D_{year} + \beta_{10,3}D_{Industry} + \varepsilon_{it}$$

## Heckman TS estimation

**Financial risk – Net leverage**

**Primary Equation:**

$$Net\ Leverage = \alpha_{it} + \beta_{1,1}FirmSize_{it} + \beta_{2,1}Tangibility_{it} + \beta_{3,1}ROA_{it} + \beta_{4,1}GrowthOpportunities_{it} + \beta_{5,1}CompanyAge_{it} + \beta_{6,1}PayoutRatio_{it} + \beta_{7,1}D_{year} + \beta_{8,1}D_{Industry} + \varepsilon_{it}$$

**Selection Equation:**

$$Fam50 = \alpha_{it} + \beta_{1,1}City_i + \beta_{2,1}FirmSize_{it} + \beta_{3,1}Tangibility_{it} + \beta_{4,1}ROA_{it} + \beta_{5,1}GrowthOpportunities_{it} + \beta_{6,1}CompanyAge_{it} + \beta_{7,1}PayoutRatio_{it} + \beta_{8,1}D_{year} + \beta_{9,1}D_{Industry} + \eta_i$$

**Operational risk – CV(Rev) & DOL**

*$Y_{it}$ in the specified regressions below represent both CV(Rev) and DOL.*

**Primary Equation:**

$$Y_{it} = \alpha_{it} + +\beta_{1,1}FirmSize_{it} + \beta_{2,1}Tangibility_{it} + \beta_{3,1}ROA_{it} + \beta_{4,1}GrowthOpportunities_{it} + \beta_{5,1}CompanyAge_{it} + \beta_{6,1}PayoutRatio_{it} + \beta_{7,1}NetLeverage_{it} + \beta_{8,1}D_{year} + \beta_{9,1}D_{Industry} + \varepsilon_{it}$$

**Selection Equation:**

$$Fam50 = \alpha_{it} + \beta_{1,1}City_i + \beta_{2,1}FirmSize_{it} + \beta_{3,1}Tangibility_{it} + \beta_{4,1}ROA_{it} + \beta_{5,1}GrowthOpportunities_{it} + \beta_{6,1}CompanyAge_{it} + \beta_{7,1}PayoutRatio_{it} + \beta_{8,1}NetLeverage_{it} + \beta_{8,1}D_{year} + \beta_{10,1}D_{Industry} + \eta_i$$

# Variables

## Risk measures

In our analysis, we aim to discover the differences in risk-taking behaviour between family and non-family-controlled firms. To obtain substantial knowledge of a firm's risk-taking behaviour we have used three different measures of risk for each company, including measures for both financial and operational risk.

### Net Leverage

As one of our dependent variables, we use ***net leverage*** **to proxy for risk**. This follows the argument that as the level of debt increases in a firm the financial risk and bankruptcy risk increases (Mishra & McConaughy, 1999). Debt is a necessary part of a company´s capital structure and could help generate higher returns and be used to facilitate growth. On the other hand, too high levels of financial leverage could be harmful to the investors and the company's well-being. Net leverage is the ratio of total debt minus Cash and Cash equivalents divided by the total assets. When **adjusting for cash and cash equivalents,** we remove the possible

neutralising effect high cash levels could have on debt levels and get a more accurate picture of the financial risk in the firms. All data from the CCGR database are accounting measures, so all our measures are book-values.

$$Net\ Leverage = \frac{Total\ Debt - Cash\ and\ Cash\ Equivalents}{Total\ Assets}$$

**Coefficient of variation of Revenue**

In our analysis, we use the revenue volatility, **CV(Rev)**, as a measure of the operational risk in the firm. CV(Rev) display the volatility of revenues, where higher positive values of CV(Rev) indicates higher risk-taking. The coefficient of variation of revenue is calculated from a four-year rolling standard deviation of revenue divided by the mean revenue. Gahlon and Gentry (1982) find in their research that CV(Rev) can be used as a measure of systematic risk of a firm and together with other financial and operational measures is a good **proxy for a firm's Beta**. The coefficient of variation is a statistical measure used to capture the variability of a series of numbers (Abdi, 2010). In the financial literature, CV(Rev) it is used to measure the volatility and risk of a company or a stock (Gahlon & Gentry, 1982). Higher levels of CV(Rev) indicates higher volatility of a company's revenue and hence higher risk.

$$CV(Rev) = \frac{Std.of\ Revenue}{Mean\ Revenue}$$

**Degree of Operating Leverage**

Griffin & Dugan (2003) defined operational risk as the relation between EBIT and sales. Furthermore, operating leverage can be defined as a firms' compositions and the relationship between **fixed and variable cost** or as the ratio of fixed operating cost to variable operating cost (Lev, 1974). In the study, Lev finds that the degree of operating leverage (DOL) is highly linked to the degree of operating risk in a company. On a firm level, large capital expenditures and increases in fixed cost increases the degree of operating leverage, which further increases the overall risk of the firm (Lev, 1974). One way of measuring the degree of operating leverage is to look at the **correlation between EBIT and Revenue**. When EBIT and revenue are highly correlated, it indicates that a larger part of company´s costs are fixed cost, and thereby have higher operating leverage and higher operational risk.

Similarly, low correlation between EBIT and Revenue indicates a lower degree of fixed cost and lower operating leverage, and hence lower operational risk.

$$DOL = Correlation\ (Revenue, EBIT)$$

# Dummy Variables

In this paper, we define four different categories of family firms to capture the differences in risk-taking between non-family firms and family firms, as well as, in between the different groups of family firms.

1. **Fam50** = 1, if the ultimate ownership is greater than 50%, 0 otherwise.
2. **Fam50_CEO** = 1, if the company is a Family_firm50 and has a family CEO, 0 otherwise.
3. **Fam5090** = 1, if the ultimate ownership is between 50% < X < 90%, 0 otherwise.
4. **Fam90** = 1, if the ultimate ownership is greater than or equal to 90%, 0 otherwise.
5. **City =** 1, if the company is registered with district codes: 2, 3, 11, 12, 16 and 0 otherwise.

## Year

To capture the year specific fluctuations in our dataset, we introduce one dummy variable for each year in our sample. Although we have inflation-adjusted our variables, there are most likely other unobserved effects present in our dataset. Hence, by introducing year dummies, we attempt to neutralise in part some of the omitted variable biases present in our dataset.

### Industry

To account for industry-specific characteristics, we include dummy variables for all the industries included in the study. However, due to the high degree of collinearity between some industries, we exclude some of the dummy variables using the Variance Inflation Factor.

| Dummy varibales | SIC (2009-2015) | SIC (2002 -2009) |
|---|---|---|
| Agriculture | 999 - 4 000 | 999 - 6000 |
| Mining | 3999 - 10 000 | 9 999 - 15 000 |
| Industry | 9 999 - 34 000 | 14 999 - 38 000 |
| Education | 84 999 - 86 000 | 79 999 - 81 000 |
| Culture | 89 999 - 94 000 | 91 999 - 93 000 |
| Private Households | 96 999 - 98 000 | 94 999 - 96 000 |
| Services (other) | 93 999 - 97 000 | 90 999 - 92 000 & 92 999 - 94 000 |
| Health & Social | 85 999 - 89 000 | 84 999 - 86 000 |
| Energy | 34 999 - 36 000 | 39 999 - 41 000 |
| Water Sanitation | 35 999 - 40 000 | 40 999 - 42 000 & 89 999 - 91 000 |
| Construction | 40 999 - 44 000 | 40 999 - 42 000 |
| Retail | 44 999 - 48 000 | 49 999 - 53 000 |
| Transportation | 48 999 - 54 000 | 59 999 - 64 200 |
| Hotels | 54 999 - 57 000 | 54 999 - 56 000 |
| Information & communication | 57 999 - 64 000 | 64 199 - 65 000 & 71 999 - 73 000 |
| Services (scientiffic) | 68 999 - 76 000 | 72 999 - 74 000 |
| Services (business) | 76 999 - 83 000 | 70 999 - 72 000 & 73 999 - 75 000 |

* Excluding: Public, International organisation, Realestate, Finance and insurance

Table 3 – Industry dummies

## Control variables

### Tangibility

According to Harris & Raviv (1991), fixed assets and other nondebt tax shields can be regarded as proxies for tangibility or liquidation value of assets. Therefore, a company with low tangibility is subject to higher degrees of information asymmetry regarding its value. Tangibility influences the firm's credit ratings and according to theoretical explanations: companies with high tangibility will be less financially constrained. Furthermore, Almeida, H., & Campello, M. (2007) identified that asset tangibility increases investment–cash flow sensitivities for financially constrained firms. A direct effect of tangibility is that it will impact the firm's ability to obtain external financing through debt, where more financially constrained companies will be forced to accept higher borrowing rates or insufficient funding compared to unconstrained firms. This research paper interprets tangibility as a firm's ability to assume additional risk through debt financing.

$$Tangibility = \frac{Total\ fixed\ assets}{Total\ assets}$$

**Firm Size**

The firm size is measured by the natural logarithm of total assets (Ozkan, 2002). Previous research on firm size has illustrated the positive relationship between firm size and long-term debt, as larger firms have easier access to the capital markets (Titman and Wessels, 1988). While smaller firms tend to be somewhat precluded from accessing the capital markets due to their lower levels of collateralizable assets. (Whited, 1992). This is further confirmed by Dang and Li (2015), where they find that small firms have financial constraints and limited access to external financing and higher marginal probability of bankruptcy. Research by Rajan and Zingales (1995), shows that the negative influence of profitability on leverage will become stronger as firm size increases.

Research by Dang & Li (2015) shows that large firms have high levels of diversification, which is consistent with the theory that larger firms have increased capability to diversify their revenue concentration across different business segments. Furthermore, small firms tend to invest in riskier projects, where more mature firms tend to be less involved in risky investments. Mehran (1995) found that smaller firms have higher growth opportunities compared to large firms. This relationship only occurs to a certain point which would indicate that the true relationship between firm size and growth opportunities could be quadratic.

$$Firm\ Size\ = \ln\ (Revenue)$$

**Growth Opportunities**

We measure growth opportunities as the ratio of revenue to total assets, this approximation for growth opportunities intends to capture the productivity of the assets in place and have been used by several researchers in the past. Growth and financial risk his highly connected (Brito and John, 2002). Myers (1977) argues that the value of a firm is highly dependent on growth opportunities and assets already in place that can generate future cash flows (Myers, 1977). Myers further argue that growth opportunities can have a negative effect on a company's leverage. This is supported by Harris and Raviv´s (1991) argumentation, that to reduce agency cost, companies in mature industries with few growth opportunities chooses higher levels of debt. Growth by investments is also connected to the riskiness of a firm. Zahra (2005) argues that exercising growth options is associated with

expensive investments, which often introduce new financial risks to the firm. We expect a positive relationship between growth opportunities and our risk measures.

$$Growth\ Opportunity = \frac{Revenue}{Total\ Assets}$$

**Profitability**

There exist several measures of profitability, which are analysed in comparison to assets to see how effectively a company is utilising their assets to generate sales and thereafter profits. A rule of thumb is that the more assets a company has amassed, the more sales and potential profits the firm may generate. Bromiley, (1991) found that low business performance results in more risk-taking. The research also pointed out that past performance is a good proxy for future performance, in other words, firms that have performed well in the past will most likely perform well in the future - this holds for low performing firms as well in the short run. This conclusion further confirms that firms that perform poorly indeed undertake more risky investments which result in low-payoff strategies. Bromiley, (1991) further found that there exists a negative relationship between performance and debt ratios. However, Naldi, Nordqvist, Sjöberg & Wiklund (2007) identified that risk-taking in family firms is negatively related to performance measures, which would indicate that family firms abstain from investing in riskier strategies even if their past performance was poor.

Several studies have looked at family firms' performance compared to non-family firms. First, Burkart, Panunzi, & Shleifer (2003) found that having a family CEO reduces the long-term profitability of firm relative to hiring a professional CEO due to the differences in risk-taking behaviour. Second, Zahra (1991) reported a positive relationship between corporate entrepreneurship and profitability, growth and risk-related measures for a firms' performance.

$$Profitability = \frac{EBIT}{Total\ Assets}$$

**Company Age**

Several articles which have studied the topic of family firms have used company age as a control variable (Villalonga & Amit, 2006; Bennedsen et al., 2007). We measure age as the number of operating years since the company was founded. González et al. (2013) suggest that the risk behaviour of a company

changes as the firm ages. Further, they argue that the capital structure and composition of debt in family firms converge to more similar to non-family firms a family firm grow older (González, Guzmán, Pombo, & Trujillo, 2013). In addition, it is reasonable that younger firms are more likely to be family firm that older firms since it is harder to obtain outside financing in the founding years. Therefore, we believe that it is important to control for the company age.

# Methodology

In the following section, we are going to present the methodology used in this paper, which will further elaborate on the different statistics, tests and regression models used in this paper.

## Descriptive statistics

This paper includes descriptive statistics to gain an initial overview and insight into the characteristics of the independent, dependent and dummy variables used in the regression analysis. **Firstly**, we will present our findings with respect to important statistical measures such as mean, median, standard deviation, skewness, kurtosis and the number of observations for all samples (Family dummy variables) included in our regression analysis. **Secondly**, utilising the output produced in step one, the differences in means are tested against each other using t-test (mean comparison test). All the tests are built on our hypothesis and aim at uncovering statistically significant differences between different "populations" in the dataset. **Next**, the paper gives a brief overview of the correlation between all the dependent and independent variables, excluding dummy variables, because they are in fact binary variables. Hence, any direct interpretation of the correlation between them, excluding other descriptive variables, would give incorrect estimations. We will, however, apply the variance inflation factor estimation on all our regressions to control for possible collinearity issues that may be present in the dataset. **Finally**, we will present a graphical representation of some key variables, which serves to further illustrate differences between the different groups in the sample.

## Multicollinearity

The presence of multicollinearity in multiple regression models poses a potentially serious problem. If not dealt with, models including a high degree of correlation between predictor variables can lead to **skewed or misleading results**. However, as O'Brien (2007) showed there exist potential pitfalls of extensive focus on

multicollinearity. **Firstly**, there might be situations where the null hypothesis is rejected and treated in the same way as in situations where the null hypothesis is not rejected. **Secondly**, where the researchers only focus on reducing the multicollinearity within the model and excluding alternative remedies. To deal with this issue, we apply the **Variance Inflation Factor (VIF)** critically to all the regressions presented in this paper. Through this, we make sure that the specified models do not suffer from severe collinearity and at the same time avoid dropping the *wrong* variable based only on the VIF statistic.

**VIF** a measure of how much the estimated standard error of the regression coefficient is "inflated" due to the presence of collinearity between predictor variables in the model. We follow, O'Briens (2007) interpretation of the VIF factor, where a VIF less or equal to **1** indicates that there is no correlation between the $i^{th}$ predictor and the remaining predictor variables. This indicates that the variance of the coefficient is not inflated. If we observe a VIF equal to or higher than **4**, this indicates that the standard error of the coefficient is inflated by the $\sqrt{VIF}$, which implicates the presence of collinearity in the specified model. Hence, if a coefficient exhibits such values, it requires added attention and the possibility of excluding the variable from the model. VIFs exceeding **10** indicates serious multicollinearity issues in the specified model and result in the exclusion of some variables from the specified model.

The Variance Inflation Factor applied in the research can be specified as:

$$VIF = \frac{1}{1 - R_i^2}$$

## Heteroskedasticity

An obvious concern regarding our data sample is the presence of heteroskedasticity. Heteroskedasticity is potentially present in any model where one can observe that the standard deviations of the error terms are non-constant over time and/or depend on one or more independent variables. If not controlled for heteroskedasticity can lead to biased estimates. A typical textbook example of a situation where homoscedasticity fails is when the variance of the unobserved factors changes across different segments of the population, where the segments are determined by the different values of the explanatory variables. (Introductory Econometrics. A

modern approach. Jeffrey M. Wooldridge) We apply the **Cook-Weisberg** test to our model and due to the low p-value confirm that our sample indeed contains non-constant variance across time. Hence, we can conclude that heteroscedastic robust standard errors are appropriate for our sample. To solve this issue, we apply **heteroskedasticity-robust standard errors (clustered standard errors)** in our models.

## Fixed effects (FE) or Random effects (RE)

We chose to include a section regarding alternative estimation methods due to the popularity of these models when it comes to estimating panel-data regressions.

A rule of thumb is that one should use RE unless the Hausman test rejects it. This means that one should use the RE estimation unless the **Hausman test** rejects, i.e. if the unobserved effects are uncorrelated with the independent variables present in the model. One cannot treat the sample as a random sample for a large population. To identify which method to use we ran a Hausman test to determine whether to use FE or RE. The results showed that we had to reject the Ho, which states that RE is appropriate. However, as FE generates **dummy variables** for all time-invariant variation in the sample, this method is not suitable with respect to our hypothesis. The only effect the FE regression would allow us to capture is the effect driven by changes in the dummy variables, i.e. if the dummy variables are not constant over time. As our dummy variables are relatively constant over time the only effect we would be able to capture by applying FE is the effect generated by a company moving from one sub-sample to another.

## Pooled OLS (POLS)

In this paper, we opted to use POLS for the years 2006-2015, after we had excluded RE and FE methodologies. However, there are some drawbacks to POLS compared to FE. POLS assume that the corr $(\boldsymbol{u_i}, \mathbf{x}) = \mathbf{0}$, which could prove problematic when working with "real-world" data. The interpretation of this assumption is that if $\boldsymbol{x_{ij}}$ is uncorrelated with $\boldsymbol{\eta_i}$ (unobserved, time-invariant heterogeneity), OLS is consistent but inefficient due to the presence of serial correlation. One can correct for this by applying clustered standard errors in the calculation of the model. The clustered standard errors correctly account for the dependence in the data common in a panel data set and produce unbiased estimates. (Petersen, M. A. 2009). However, by applying clustered standard errors, the standard errors could get

inflated compared to FE or non-clustered models. The "worst-case" outcome of using POLS occurs in a situation where if $\boldsymbol{x_{ij}}$ is correlated with $\boldsymbol{\eta_i}$ , in which case, POLS is inconsistent. Furthermore, as POLS do not control for unobserved time-invariant effects such as FE, the specified model can be subject to omitted variable bias. One can mitigate at least in part the omitted variable bias through the application of instrumental variables methods. We include **time-period dummy variables** to allow for aggregate time effects for all but one year. These dummy variables are exogenous – because the passage of time is exogenous – and so they act as their own instrument. (Introductory Econometrics – A Modern Approach. Jeffrey M. Wooldridge, p. 487) In addition to year dummies, we also include **industry-specific dummies** to mitigate in part the omitted variable bias issues within POLS.

## Cross-sectional regression

To control for the results generated by the POLS, we include cross-sectional regression estimations. As with the POLS, cross-sectional regressions are vulnerable to the presence of heteroscedasticity. **Heteroscedasticity** is expected to arise whenever cross-sectional methods are used to estimate a model where the parameters vary across firms and/or across time. A failure to correct for heteroscedasticity, if present in the model, leads to inefficient parameter estimates, which could prove problematic when one attempts to make correct inferences on statistical significance (Bowen, & Wiersema 1999). To solve this issue, we use **heteroskedasticity-robust** statistics. (Introductory Econometrics – A Modern Approach. Jeffrey M. Wooldridge, p. 487) Several researchers have pointed the obvious weaknesses by applying the cross-sectional model to panel data. First, Lubatkin and Chatterjee (1991) discuss that the reliance on single period data prevents researchers from correction for any trends present in the selected sample. Second, Lubatkin & Chatterjee (1991) point out that this methodology may result in the failure to detect the true nature and the relationships existing between the dependent and independent variables. Despite the weaknesses mentioned above, cross-sectional methods remain the predominant mode of analysis in empirical strategy research (Bowen & Wiersema, 1999).

## Fama-MacBeth

As discussed in the section above the cross-sectional approach fails to detect the true relationships between the independent variable and the dependent variables across time. This relationship makes the cross-sectional model inefficient considering our research questions. Hence, we introduce the **two-step Fama-MacBeth procedure (**Fama & MacBeth 1973) to ensure that we capture the true time variant relationships within our models. The first step revolves around estimating (n) cross-sectional regressions, while the second step involves (t) time-series averages for the coefficients of the (n) cross-sectional regression output. This procedure works best when the panel data set has large cross-sectional units and relatively few years. Our data set contains a large number of companies for the years 2006-2015, hence the procedure fits the above-mentioned requirements.

Fama-MacBeth (t-stat):

$$T = \frac{\bar{\beta} - 0}{SD(\beta_t)}$$

## Heckman – two step estimation

To supplement our regression analysis, we include the Heckman Selection two-step model (TS) (Heckman, 1979) to uncover if some form for self-selection exists within our sub-samples. The advantage of using TS methodology rather than the **Maximum Likelihood estimation** (MLE), is that no distributional assumption (normality assumption) is required for the error term in the second stage considering the consistency of the estimator (Yulia, Marchenko & Marc Genton 2012). However, we should keep in mind that both models perform poorly in the presence of high degrees of collinearity and correlation within both the selection and primary equations. In this study, we specify our primary and selection equation where **w = x**. Because of this, model specification problems may arise due to the linearity of the inverse **Mills ratio** ($\boldsymbol{\lambda}(\cdot)$**).** One possible solution to this problem is to introduce an instrument variable (IV) which is a good predictor of $u_i^*$ in the selection equation. However, the difficulty lies in identifying a strong IV because a strong predictor for $u_i^*$ is most often a strong predictor of the primary equation, and hence, should be included in the primary regression as well (Marchenko & Genton, 2012). In this paper, we introduce an IV to the TS estimations. **The instrument variable (IV) "City"** is constructed by separating the companies into two groups. The dummy

variable "City" will take the value 1 if the company is registered in the proximity of a large city in Norway, 0 otherwise.

The Heckman Selection Model (Two-step):

$$\text{Primary equation: } y_i^* = x_i^T\beta + \epsilon_i, \quad i = 1, \dots, N.$$

$$\text{Selection equation: } u_i^* = w_i^T\gamma + \eta_i, \quad i = 1, \dots, N,$$

Conditional expectation of the observed data:

$$\mathrm{E}\,(\mathrm{Y}|\mathrm{U} * > 0, \mathrm{x}, \mathrm{w}) = x^T\beta + \rho\sigma\lambda(w^T\gamma)^1$$

Heckman (1979) proposed the TS method, which is more robust to the normality assumption compared to the MLE estimation.

# Descriptive statistics

In this section, we will discuss and elaborate on some important descriptive statistic used in this study. The following tables display the **mean, median, maximum and minimum values, standard deviation, skewness and kurtosis and the number of observations** for our dependent and independent variables. Each table represents descriptive statistics for the five subsamples used in the study. The tables display the main statistics for the variables used in the study after our initial filtering. Furthermore, the remaining sample is divided into groups based on the dummy variables specifies in the section above.

## Summary statistics

**Table 4: Summary statistics of non-family firms**

This table presents data for which Fam50 = 0. Observations related to non-family firms account for 49,512 of the 160,167 observations in total.

[1] In the specified equation (ρ) governs the selection bias and (λ) denotes the inverse Mills ratio.

| Non-family firms | Mean | Median | Maximum | Minimum | Std. Dev. | Skewness | Kurtosis | Obs. |
|---|---|---|---|---|---|---|---|---|
| Revenue | 2.71E+07 | 1.81E+07 | 3.83E+08 | 2,541.30 | 2.58E+07 | 2.5797 | 14.6679 | 49,512 |
| Company Age | 15.5813 | 13.0000 | 132.0000 | 0.0000 | 11.8581 | 2.6589 | 15.0935 | 48,559 |
| Ult. Own | 33.1161 | 33.3300 | 50.0000 | 0.0164 | 13.7678 | -0.2865 | 2.0055 | 49,512 |
| Leverage | 0.6851 | 0.7189 | 0.9999 | 0.0000 | 0.1861 | -0.7496 | 2.9606 | 49,512 |
| Net Leverage | 0.4194 | 0.4553 | 6.5111 | -1.0000 | 0.2998 | -0.4405 | 6.4617 | 49,512 |
| CV(Rev) | 0.1659 | 0.1236 | 3.4714 | 0.0000 | 0.1610 | 4.2617 | 42.66 | 45,521 |
| DOL | 0.4464 | 0.7098 | 1.0000 | -1.0000 | 0.6085 | -1.0796 | 2.9242 | 45,514 |
| Debt to Equity | 0.6569 | 0.0555 | -0.2309 | 9.9704 | 1.2652 | 3.2110 | 15.7114 | 49,512 |
| ROA | 0.1146 | 0.1033 | 1.6368 | -2.1299 | 0.1379 | -0.9169 | 16.0414 | 49,512 |
| Growth Opp. | 2.4226 | 2.2245 | 76.9070 | 0.0005 | 1.4626 | 6.9659 | 212.4388 | 49,512 |
| Firm Size | 16.0358 | 15.9800 | 21.9567 | 7.7658 | 0.9871 | 0.4088 | 3.9293 | 49,512 |
| Tangibility | 0.2299 | 0.1538 | 3.9778 | -0.3451 | 0.2165 | 1.2473 | 5.3425 | 49,512 |

Table 4 – Non_Fam

## Table 5: Descriptive statistics family firms

This table presents data for which Fam50 = 1. Observations related to family firms account for 110,655 of the 160,167 observations in total.

| Fam50 | Mean | Median | Maximum | Minimum | Std. Dev. | Skewness | Kurtosis | Obs. |
|---|---|---|---|---|---|---|---|---|
| Revenue | 2.52E+07 | 1.69E+07 | 3.33E+08 | 1,215.067 | 2.31E+07 | 2.2015 | 10.2240 | 110,655 |
| Company Age | 18.2191 | 16.0000 | 142.0000 | 0.0000 | 12.3316 | 2.3666 | 14.3062 | 108,157 |
| Ult. Own | 91.1111 | 100.0000 | 100.0000 | 50.0028 | 15.0064 | -1.4422 | 3.5716 | 110,655 |
| Leverage | 0.6931 | 0.7329 | 0.9996 | 0.0000 | 0.1881 | -0.7946 | 2.9002 | 110,655 |
| Net Leverage | 0.4499 | 0.4960 | 1.1746 | -1.0526 | 0.3032 | -0.7321 | 3.1940 | 110,655 |
| CV(Rev) | 0.1374 | 0.0992 | 5.7737 | 0.0000 | 0.1400 | 5.8483 | 106.56 | 102,760 |
| DOL | 0.4051 | 0.6535 | 1.0000 | -1.0000 | 0.6207 | -0.9651 | 2.6616 | 102,757 |
| Debt to Equity | 0.8535 | 0.2195 | 10.0000 | -0.9434 | 1.4372 | 2.6716 | 11.4301 | 110,655 |
| ROA | 0.1051 | 0.0946 | 1.2169 | -1.4619 | 0.1109 | 0.1508 | 8.1562 | 110,655 |
| Growth Opp. | 2.8148 | 2.3177 | 58.4390 | 3.27E-06 | 2.1386 | 3.3450 | 23.9190 | 110,655 |
| Firm Size | 15.8779 | 15.8173 | 11.6927 | 22.3595 | 0.9013 | 0.4041 | 3.5881 | 110,655 |
| Tangibility | 0.2568 | 0.1912 | 1.0069 | -0.5523 | 0.2156 | 0.9716 | 3.1552 | 110,655 |

Table 5 – Fam50

## Table 6: Descriptive statistics family firms with family CEO

This table presents data for which Fam50 = 1 and Fam_CEO = 1. Observations related to family firms with family CEO account for 90,094 of the 160,167 observations in total.

| Fam50 | Mean | Median | Maximum | Minimum | Std. Dev. | Skewness | Kurtosis | Obs. |
|---|---|---|---|---|---|---|---|---|
| Revenue | 2.52E+07 | 1.69E+07 | 3.33E+08 | 1,215.067 | 2.31E+07 | 2.2015 | 10.2240 | 110,655 |
| Company Age | 18.2191 | 16.0000 | 142.0000 | 0.0000 | 12.3316 | 2.3666 | 14.3062 | 108,157 |
| Ult. Own | 91.1111 | 100.0000 | 100.0000 | 50.0028 | 15.0064 | -1.4422 | 3.5716 | 110,655 |
| Leverage | 0.6931 | 0.7329 | 0.9996 | 0.0000 | 0.1881 | -0.7946 | 2.9002 | 110,655 |
| Net Leverage | 0.4499 | 0.4960 | 1.1746 | -1.0526 | 0.3032 | -0.7321 | 3.1940 | 110,655 |
| CV(Rev) | 0.1374 | 0.0992 | 5.7737 | 0.0000 | 0.1400 | 5.8483 | 106.56 | 102,760 |
| DOL | 0.4051 | 0.6535 | 1.0000 | -1.0000 | 0.6207 | -0.9651 | 2.6616 | 102,757 |
| Debt to Equity | 0.8535 | 0.2195 | 10.0000 | -0.9434 | 1.4372 | 2.6716 | 11.4301 | 110,655 |
| ROA | 0.1051 | 0.0946 | 1.2169 | -1.4619 | 0.1109 | 0.1508 | 8.1562 | 110,655 |
| Growth Opp. | 2.8148 | 2.3177 | 58.4390 | 3.27E-06 | 2.1386 | 3.3450 | 23.9190 | 110,655 |
| Firm Size | 15.8779 | 15.8173 | 11.6927 | 22.3595 | 0.9013 | 0.4041 | 3.5881 | 110,655 |
| Tangibility | 0.2568 | 0.1912 | 1.0069 | -0.5523 | 0.2156 | 0.9716 | 3.1552 | 110,655 |

Table 6 – Fam 50_CEO

## Table 7: Descriptive statistics family firms with ownership between 50% and 90%

This table presents data for which Fam5090 = 1. Observations related to family firms with 50% to 90% ownership stake account for 29,154 of the 160,167 observations in total.

| Fam5090 | Mean | Median | Maximum | Minimum | Std. Dev. | Skewness | Kurtosis | Obs. |
|---|---|---|---|---|---|---|---|---|
| Revenue | 2.69E+07 | 1.86E+07 | 3.33E+08 | 1,215.067 | 2.40E+07 | 2.2414 | 11.4890 | 29,154 |
| Company Age | 18.2796 | 16.0000 | 135.0000 | 0.0000 | 12.4918 | 2.2663 | 12.2601 | 28,538 |
| Ult. Own | 68.0152 | 66.6600 | 89.9999 | 50.0028 | 10.8585 | 0.1542 | 2.0097 | 29,154 |
| Leverage | 0.6916 | 0.7258 | 0.9990 | 0.0000 | 0.1829 | -0.7567 | 2.9138 | 29,154 |
| Net Leverage | 0.4533 | 0.4958 | 1.1746 | -1.0000 | 0.2962 | -0.7035 | 3.1564 | 29,154 |
| CV(Rev) | 0.1442 | 0.1073 | 5.7737 | 6.16E-05 | 0.1397 | 6.1535 | 141.43 | 27,079 |
| DOL | 0.4268 | 0.6741 | 1.0000 | -1.0000 | 0.6098 | -1.0346 | 2.8324 | 27,078 |
| Debt to Equity | 0.7657 | 0.1919 | 9.9979 | -0.2476 | 1.3294 | 2.9302 | 13.6076 | 29,154 |
| ROA | 0.1092 | 0.0965 | 1.1367 | -1.4255 | 0.1168 | 0.1015 | 8.4212 | 29,154 |
| Growth Opp. | 2.6399 | 2.3192 | 58.4390 | 1.79E-04 | 1.7542 | 4.3753 | 58.6400 | 29,154 |
| Firm Size | 15.9708 | 15.9277 | 22.3595 | 11.6927 | 0.9180 | 0.3374 | 3.7078 | 29,154 |
| Tangibility | 0.2446 | 0.1810 | 1.0000 | -0.0764 | 0.2105 | 1.0611 | 3.4472 | 29,154 |

Table 7 – Fam5090

## Table 8: Descriptive statistics family firms with ownership over 90%

This table presents data for which Fam90 = 1. Observations related to family firms with above 90% ownership stake account for 81,501 of the 160,167 observations in total.

| Fam90 | Mean | Median | Maximum | Minimum | Std. Dev. | Skewness | Kurtosis | Obs. |
|---|---|---|---|---|---|---|---|---|
| Revenue | 2.46E+07 | 1.63E+07 | 3.26E+08 | 2,143.622 | 2.27E+07 | 2.1803 | 9.6010 | 81,501 |
| Company Age | 18.1974 | 16.0000 | 142.0000 | 0.0000 | 12.2737 | 2.4040 | 15.0886 | 79,619 |
| Ult. Own | 99.3728 | 100.0000 | 100.0000 | 90.0000 | 2.1217 | -3.5587 | 14.5808 | 81,501 |
| Leverage | 0.6936 | 0.7356 | 0.9996 | 0.0010 | 0.1899 | -0.8070 | 2.8934 | 81,501 |
| Net Leverage | 0.4486 | 0.4960 | 1.1204 | -1.0526 | 0.3056 | -0.7405 | 3.2012 | 81,501 |
| CV(Rev) | 0.1350 | 0.0964 | 5.0893 | 6.33E-06 | 0.1401 | 5.7504 | 94.44 | 75,681 |
| DOL | 0.3973 | 0.6447 | 1.0000 | -1.0000 | 0.6244 | -0.9409 | 2.6054 | 75,679 |
| Debt to Equity | 0.8849 | 0.2306 | 10.0000 | -0.9434 | 1.4726 | 2.5891 | 10.8014 | 81,501 |
| ROA | 0.1037 | 0.0939 | 1.2169 | -1.4619 | 0.1086 | 0.1663 | 7.9864 | 81,501 |
| Growth Opp. | 2.8774 | 2.3171 | 37.7914 | 3.27E-06 | 2.2570 | 3.0961 | 18.3962 | 81,501 |
| Firm Size | 15.8447 | 15.7806 | 20.9828 | 11.8675 | 0.8929 | 0.4263 | 3.5516 | 81,501 |
| Tangibility | 0.2612 | 0.1951 | 1.0069 | -0.5523 | 0.2172 | 0.9407 | 3.0627 | 81,501 |

Table 8 – Fam90

In general, the **mean** and **median** for the variables should not be substantially different from each other, and for most of the variables there are only small and acceptable deviations. However, for the variables Debt/Equity, Revenue and Ultimate ownership some extreme outliers were observed. To deal with extreme outliers and incorrectly reported observations**, the variables have been winsorized**. The maximum and minimum values display of the 99$^{th}$ and 1$^{st}$ percentiles for each variable. Regarding skewness and kurtosis, the statistics show that all the variables deviate to some degree from the standard normal distribution. The number of observations are varied across the subsamples, but relatively stable within each subsample for all variables. In general, the missing values for CV(Rev) and DOL can be attributed to the rolling estimation of standard deviations and correlation used to obtain the variables. Other missing values are accepted, as we are working with an unbalanced sample.

## T - tests on the descriptive statistics

When comparing the different subsamples for differences, see appendix 1.2.1 - 1.2.3, T-statistics were applied for the period between the years of 2000 to 2015. The t-statistics in appendix 1.2.1, comparing Fam50 to non-family firms, shows that all variables are significantly different from each other at all conventional levels of significance. These results could indicate some differences between the two groups. Similarly, appendix 1.2.1, tests the differences between Fam50_CEO and non-family firms. The test results show that the values presented in the table are statistically different from each other at all conventional significance levels.

Perhaps the most interesting takeaway from these tests is regarding the risk-taking behaviour in the firms. The t-tests indicate that family firms in general, have somewhat higher leverage and net leverage. However, the tests on CV(Rev) and DOL indicate significantly lower levels of operational risk for family firms compared to non-family firms.

Appendix 1.2.3 compares Fam5090 against Fam90. The test results state that most of the variables are statistically significantly different from each other. However, company age, leverage and net leverage are no longer significant in contrast to the test in appendix 1.2.1 and 1.2.2. These results could imply that the differences between Fam5090 and Fam90 regarding their financial risk-taking may be due to some unobservable factors, which differentiate the two groups from each other.

## Correlation matrix

Table 9 shows the correlation matrix of the all the main variables used in this study. *Dummy variables have been excluded from the matrix.*

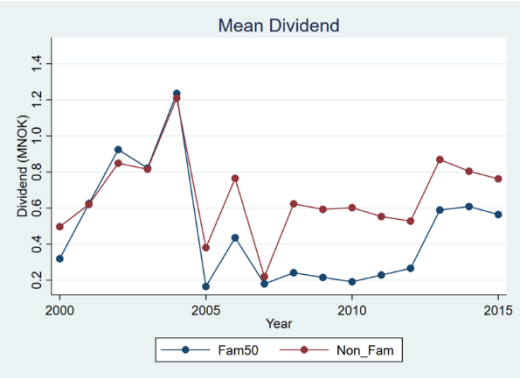
| Correlation | | v1 | v2 | v3 | v4 | v5 | v6 | v7 | v8 | v9 | v10 | v11 | v12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Revenue | v1 | 1.0000 | | | | | | | | | | | |
| Company Age | v2 | 0.0781 | 1.0000 | | | | | | | | | | |
| Ult. Own | v3 | -0.0685 | 0.0856 | 1.0000 | | | | | | | | | |
| Leverage | v4 | 0.0398 | -0.2030 | 0.0271 | 1.0000 | | | | | | | | |
| Net Leverage | v5 | 0.1112 | -0.1033 | 0.0455 | 0.7421 | 1.0000 | | | | | | | |
| CV(Rev) | v6 | 0.1673 | -0.0441 | -0.0895 | -0.0334 | -0.0093 | 1.0000 | | | | | | |
| DOL | v7 | 0.0081 | -0.0081 | -0.0309 | -0.0518 | -0.0951 | 0.1412 | 1.0000 | | | | | |
| Debt to Equity | v8 | -0.0601 | -0.0524 | 0.0815 | 0.4110 | 0.4522 | -0.0403 | -0.0794 | 1.0000 | | | | |
| ROA | v9 | 0.0185 | -0.1083 | -0.0341 | 0.0614 | -0.1904 | -0.0101 | 0.1593 | -0.1847 | 1.0000 | | | |
| Growth Opp. | v10 | 0.1844 | -0.1295 | 0.1079 | 0.2365 | 0.1040 | -0.0953 | -0.0774 | -0.1237 | 0.0121 | 1.0000 | | |
| Firm Size | v11 | 0.6701 | 0.1821 | -0.1242 | -0.1595 | 0.0282 | 0.2004 | 0.0431 | 0.0583 | -0.0137 | -0.3884 | 1.0000 | |
| Tangibility | v12 | -0.0494 | 0.0331 | 0.0579 | -0.0082 | 0.2413 | 0.0028 | -0.0621 | 0.4070 | -0.1681 | -0.2524 | 0.2143 | 1.0000 |

Table 9 – Correlation matrix

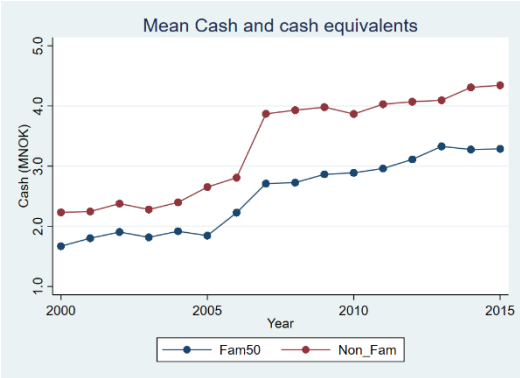
**Table 9** displays the correlation of the variables used in the different regressions. There are no variables that are perfectly positively or negatively correlated. However, there are some variables that are highly correlated and demands extra attention due to possible collinearity issues. As expected, Leverage and Net Leverage have the highest measured correlation between variables in our sample, but these variables are not used in the same regression. The variables Firm Size and Revenue have a positive correlation of 0.6701 and hence will not be used in the same models. The variables Debt to Equity and Net Leverage, and Debt to Equity and Leverage have a relatively high correlation.

# Graphical depiction of the sample

## The Tax Reform




(Figure 1)

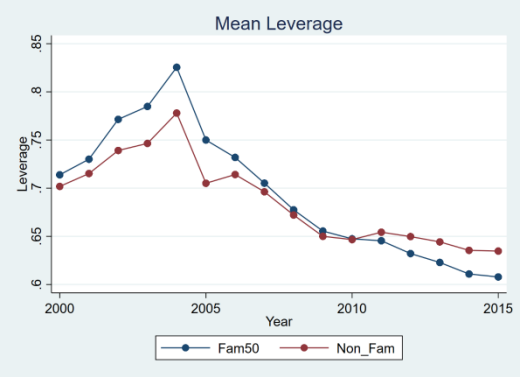



(Figure 2)

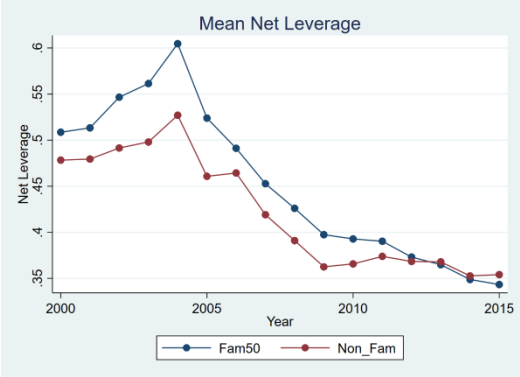
**Figure 1** shows that the mean dividends payable was substantially reduced in 2005. In the years leading up to 2005 dividends had experienced steady growth, but in 2005 the dividend pay-outs seemingly stopped. In the aftermath of the sudden change in pay-out policy, the dividends in family firms have had a modest recovery, while non-family firms display somewhat higher recovery of dividends payable. However, neither groups recovered to the levels experienced before 2005. As **figure 2** illustrates, a direct consequence of the new dividend policy was that cash holdings increased after 2005. Both family firms and non-family firms maintained a constant level of cash and cash equivalents ranging between 1.5 to 2.5 million NOK before 2005. However, after the new dividend policy, the cash holding started to increase and continued to increase in the years leading up to 2015. In 2015 both family and non-family firms had increased their cash holding to between 3.5 to 4.5 million NOK. From **figure 2** we can also see that non-family firms kept higher levels of cash than family firms in the years leading up to 2015.

The tax reform was active from January 2006. As this study uses accounting data, dividends payable for the year 2005 refer to the dividends that are to be paid out in 2006. These findings further support the decision to limit the data sample to the years 2006 - 2015. By limiting the analysis in this manner, we exclude an exogenous shock present in the data sample; thus, our test results become more robust.

## Financial risk




(Figure 3)

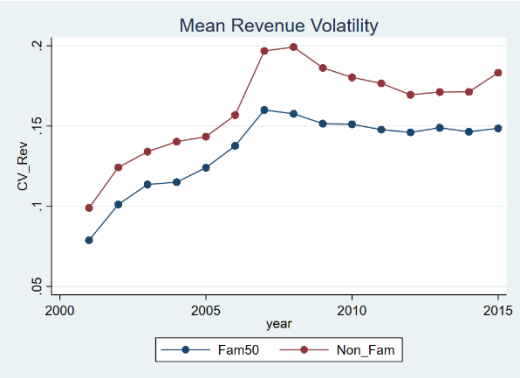



(Figure 4)

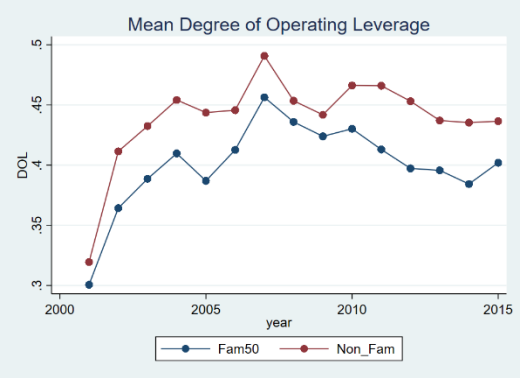
**Figure 3** shows the mean leverage for both family and non-family firms. As discussed above, the 2006 tax reform has a visible impact on the companies mean leverage. We can observe a clear shift after 2005 in the levering of the companies included in this study. In the following years, the dividend policies changed and the data indicates that both family and non-family firms reduce their leverage dramatically. Before 2005, companies held around 0.7 to 0.85 mean leverage ratios, however, after 2005 we can see a steady decline in mean leverage for both groups towards 0.6 to 0.65 in 2015. The interesting notion that we can observe is that the relative difference between the two groups is small and highly correlated throughout the sample. **Figure 4** explains how the mean net leverage of the two groups changes across time. The main trends in this figure follow the results identified from **figure 3**. However, there are some indications in **figure 4** compared to **figure 3** when it comes to the overall level of net leverage between the two groups. Following the intuition gained from **figure 2**, we see that family firms tend to have relatively higher net leverage compared to non-family firms because they hold less cash than non-family firms.

Furthermore, we can observe that both the mean leverage and net leverage display switching characteristics. In both **figure 3 and 4** there are clear indications that the leverage of the companies changes over time relative to each other. The mean leverage graphs cross each other in 2010, while mean net leverage graphs crossed in 2013. This indicates that there might be some unobserved characteristics present within the two groups, which makes them react to changes in their environment at different rates. However, as we do not control for any other variables, we cannot infer any conclusions with respect to our hypothesis at this stage.

## Operational risk




(Figure 5)




(Figure 6)

**Figure 5 & 6** is a graphical visualisation of the operational risk factors used in the study. Both figures appear to show the same results. The measures for operational risk indicate that non-family firms operate with relatively higher degrees of Operating Leverage compared to family firms. **Figure 5 & 6** display the same trends regarding the years 2007 and 2008, which can be interpreted as the overall market's reaction to the forthcoming financial crisis. Furthermore, both CV-Revenue and DOL seems to be highly correlated for the two groups throughout the data sample, which implies that both groups get affected by the overall market situation in similar fashion.

## Distribution

The table below illustrates the distribution of the firms included in the study based on the Largest family sum ultimate ownership. We can observe two distinct peaks in the distribution of our data points around 50 % and 100% ownership. Hence, the family firms in the sample strategically choose their ownership structure to obtain the desired level of control within their companies.

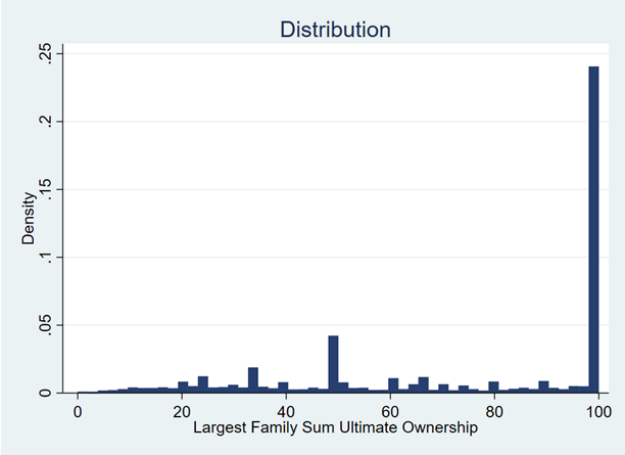



Figure 7 – Density plot with respect to ultimate ownership.

### CEO Age

As mentioned in the literature review, the age of the CEO is considered a key variable to determine the level of entrepreneurial behaviour (Levesque & Minniti, 2006). However, a closer look at our data sample reveals that there are no differences between the two sub-samples included in this study. Therefore we are pleased that there is no significant differences between the samples included in the study based on CEO age.

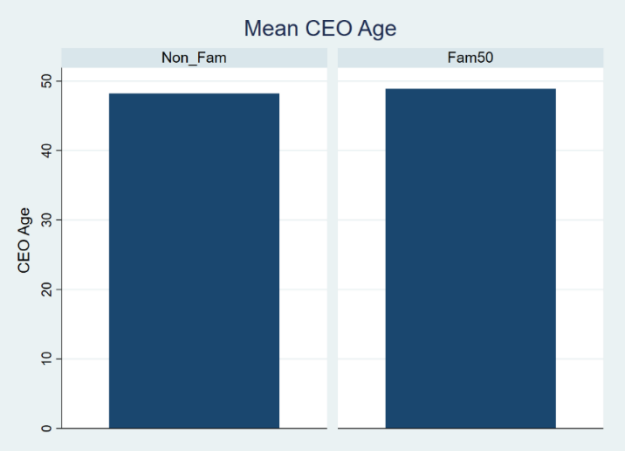



Figure 8 – Mean CEO Age

## Empirical Results

The following section is devoted to the presentation and discussion of the test results with respect to our hypotheses. The result is presented in the **tables 10-13**. The results from the POLS regression are presented in three different tables, one for each dependent variable. The regressions have been checked for robustness and collinearity; the result is shown in Appendix 1.3.1 - 1.3.3 and 1.4.

### Financial Risk

Net Leverage is used to measure the financial risk of the firms in our data sample. The regression results show that we reject the null hypothesis for all three hypotheses. The coefficients of the variables Fam50, Fam50_CEO and Fam90 all have a statistically significant and negative effect on Net leverage at a 5%, 1% and 1% level, respectively. These results indicate that family firms with and without holding the CEO position take on relatively lower levels of financial risk compared to non-family firms. The result also indicates that as family ownership increases and eventually exceeds 90 percent, the companies become increasingly risk averse towards financial risk compared to the family firms in the fam5090 category.

## Net leverage

**Table 10** contains coefficient and standard error estimates for **Net Leverage** derived with POLS regression. The dependent variable is Net Leverage (Total Debt minus Cash and cash equivalents divided by Total Assets). The data set is based on annual observations between 2006 and 2015. **Dummy variables for year and industry are included in the calculations, but not reported in the table.** The following models are tested: (I) family firms with (x > 50%) ownership versus non-family firms, (II) family firms with (x >50%) ownership and a (family CEO) versus non-family firms and (III) family firms with (x > 90%) ownership versus family firms with (50% < x < 90%) ownership. The SEs are obtained by using clustered standard errors and are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels are denoted by ***, **, *, respectively.

| Net Leverage | (I) | (II) | (III) |
|---|---|---|---|
| Firm Size | 0.0338*** | 0.0316*** | 0.0299*** |
| | (-0.0028) | (-0.0028) | (-0.0034) |
| Tangibility | 0.3839*** | 0.3900*** | 0.3827*** |
| | (-0.0107) | (-0.0107) | (-0.0129) |
| ROA | -0.4408*** | -0.4371*** | -0.5532*** |
| | (-0.0168) | (-0.0168) | (-0.0197) |
| Growth Opportunity | 0.0311*** | 0.0311*** | 0.0278*** |
| | (-0.0016) | (-0.0016) | (-0.0017) |
| Fam50 | -0.0114** | | |
| | (-0.0049) | | |
| Fam50_CEO | | -0.0373*** | |
| | | (-0.0045) | |
| Fam90 | | | -0.0319*** |
| | | | (-0.0056) |
| Company Age | -0.0017*** | -0.0016*** | -0.0014*** |
| | (-0.0002) | (-0.0002) | (-0.0002) |
| Payout Ratio | -0.0104** | -0.0111*** | -0.0208*** |
| | (-0.0041) | (-0.0041) | (-0.0052) |
| Cons. | -0.1120** | -0.0677 | -0.0241 |
| | (-0.0455) | (-0.0456) | (-0.055) |
| N | 103,785 | 103,785 | 70,758 |
| Adj. R-squared | 0.163 | 0.166 | 0.165 |

Table 10 – Net Leverage

The regression result in columns (I) and (II) show that family firms with more than 50 percent ownership, without and with a family CEO, affect net leverage negatively. This **confirms H1a and H1b**. The results are consistent with González et al. (2013) who finds that family firms are more careful regarding their financial risk-taking behaviour compared to non-family firms. These results can be explained by the relatively lower financial diversification in family firms, which make them less risk willing. Owners of family firms seem to be more concerned with the impact higher leverage can have on the family's wealth and long-term prosperity. An implication of this behaviour can, however, also affect the company's ability to utilize the full potential of the interest tax shield, which potentially could increase the total value of the company.

The results in column (II) show that the presence of a Family CEO makes the company even more conservative regarding their choice of financing. These results **confirm H1b.** The variable Fam50_CEO, show an increased negative relationship (a lower coefficient estimate), to net leverage compared to column (I). The results in column (II) also show a higher level of significance, which indicates that the family CEO influences the financial risk-taking within family firms. This relationship indicates that family firms with a family CEO, indeed act more conservatively regarding the financial leverage of the company. This result is contradictory to the findings of Anderson & Reeb (2003) and Mishra & McConaughy (1999), who did not find any significant relationship between the presence of a family CEO in a family firm with respect to their financial risk-taking behaviour. However, the findings are consistent with research conducted by González et al.´s (2013), who found that family firms are more conservative regarding financial risk when the founder is present in the company. These finding are further supported by the agency theory through the free cash flow hypothesis, which argues that the owners can reduce the agency costs that occur in the presence of a professional CEO by removing cash and cash equivalents from the company. An interpretation of this is that family firms with lower levels of cash compared to other companies are expected to have higher net leverage. However, our results indicate an even stronger aversion to debt as we observe a distinct negative effect of Fam50_CEO on net leverage.

The results in column (III) show family firms with ownership concentration exceeding 90 percent compared to family firms with ownership concentration between 50 and 90 percent. The test results indicate that family firms with a higher concentration of ownership have significantly less net leverage compared to other family firms. We can therefore **confirm H1c**. Anderson & Reeb (2003) argue that family firm owners are less diversified than other investors and therefore wish to reduce their exposure to financial risk and consequently take on less risk. Following this augmentation, the results indicate that owners of a family firms with a high degree of ultimate ownership are less diversified than other family firms. Thus, one can conclude that family firms with ultimate ownership exceeding 90 percent are indeed more careful regarding their financial risk-taking than other family firms.

As discussed above, the variable Fam90 is highly correlated with the dummy variable for fam50_CEO. Fam90 could therefore also be used as a proxy for the effect of a family CEO. Fam90 shows a statistically significantly negative effect on net leverage, which indicates that family CEOs have a negative impact on financial leverage, also compared to other family firms. Our findings are supported by agency theory, and further enhance the notion that higher degrees of debt restrict professional CEOs by reducing the free cash flow available for investment in alternative projects (Stulz 1990). The higher levels of leverage in family firms compared to non-family firms indicated by the descriptive statistics, can therefore be explained by the family owners desire to reduce agency cost.

## Operational Risk

The Coefficient of Variation of Revenue (CV(Rev)) and Degree of operating leverage (DOL) is used to measure the operational risk of the companies in our data sample. The regression results for **CV Revenue** confirm **H2a & H2b but reject H2c**. The coefficient estimates of the variables Fam50, Fam50_CEO have a statistically significant and negative effect on CV Revenue at a 1 percent significance levels. This indicates that family firms without and with a family CEO have relatively lower operational risk compared to non-family firms. The regression results for **DOL** show that we can confirm **H3c**. The coefficient estimates of the variable Fam90 have a significant and negative effect at a 5 percent level. This indicates that we can observe differences regarding risk-taking only when a family's ultimate ownership exceeds 90 percent.

### Coefficient of variation in revenue

Table 11 contains coefficient and standard error estimates for the **Coefficient of Variation of Revenue (CV(Rev))** derived with POLS regression. The dependent variable is CV Revenue (The standard deviation of Revenue divided by the mean Revenue). The data set is based on annual observations between 2006 and 2015. **Dummy variables for year and industry are included in the calculations, but not reported in the table.** The following models are tested: (I) family firms with (x > 50%) ownership versus non-family firms, (II) family firms with (x >50%) ownership and a (family CEO) versus non-family firms and (III) family firms with (x > 90%) ownership versus family firms with (50% < x < 90%) ownership. The SEs are obtained by using clustered standard errors and are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels are denoted by ***, **, *, respectively.

| CV Revenue | I | II | III |
|---|---|---|---|
| Firm Size | 0.0329*** | 0.0329*** | 0.0281*** |
| | (-0.0015) | (-0.0015) | (-0.0018) |
| Tangibility | -0.0280*** | -0.0281*** | -0.0231*** |
| | (-0.0047) | (-0.0047) | (-0.0051) |
| ROA | -0.0278*** | -0.0279*** | -0.0099 |
| | (-0.007) | (-0.007) | (-0.0082) |
| Growth Opportunity | 0.0014*** | 0.0013*** | 0.0005 |
| | (-0.0005) | (-0.0005) | (-0.0005) |
| Company Age | -0.0010*** | -0.0010*** | -0.0008*** |
| | (-0.0001) | (-0.0001) | (-0.0001) |
| Fam50 | -0.0124*** | | |
| | (-0.002) | | |
| Fam50_CEO | | -0.0081*** | |
| | | (-0.0017) | |
| Fam 90 | | | -0.0007 |
| | | | (-0.0021) |
| Payout Ratio | -0.0133*** | -0.0129*** | -0.0118*** |
| | (-0.0018) | (-0.0018) | (-0.002) |
| Net Leverage | 0.0072** | 0.0067** | 0.0101*** |
| | (-0.0028) | (-0.0028) | (-0.0032) |
| Cons. | -0.3008*** | -0.3031*** | -0.2404*** |
| | (-0.0242) | (-0.0244) | (-0.0299) |
| N | 102,912 | 102,912 | 70,312 |
| Adj. R-squared | 0.108 | 0.107 | 0.109 |

Table 11: Coefficient of Variation of Revenue

The regression results in column (I) show that family firms have a significant negative effect on the dependent variable CV Revenue. The results **confirm hypothesis H2a** and indicate that family firms have less volatile revenues compared to non-family firms. These findings further imply that family firms have lower degrees of operational risk. This finding is also supported by support Bonilla et al. (2010), who found that family firms in Chile had less volatile stock returns in comparison to non-family firms. Owner of family firms are dependent on the income generated by their company. Therefore, family firm owner chooses lines of business and new investments with lower degrees of revenue volatility. Anderson et al. (2012) argue that family firms invest less of their capital in R&D compared to non-family firms. Companies that are highly dependent on revenues from their R&D are characterised by higher risk levels and higher volatility in revenues. Our results are also consistent with Anderson et al. (2012) where they indicate that family-controlled companies indeed take on less operational risk due to their reservations towards R&D driven business strategies.

The results presented in column (II) further support our hypothesis that family firms have significantly lower volatility in their revenues compared to non-family firms. This result also holds when the controlling family hold the position as CEO. The result **confirms H2b** and indicates that family CEOs negatively affect the volatility of revenues in family firms, compared to professional CEOs. Owners of family firms are as mentioned, assumed to be less diversified. This finding shows that the presence of a family CEO leads the company to avoid business strategies that could lead to more volatile revenues. One explanation for this could be that families with a family CEO invest their human capital in the company, as well as their financial capital, which leaves them more exposed to poor business performance. Therefore, these families have an incentive to be more careful regarding the operational risk-taking of the company.

Based on the regression results in column (III) we **reject H2c.** We are not able to detect any significant difference between the variable Fam90 and Fam5090. This implies that the concentration of ownership, within family firms, do not affect the family firms' revenue volatility.

## Degree of Operating Leverage

Table 12 contains coefficient and standard error estimates for the **Degree of Operating Leverage (DOL)** derived with POLS regression. The dependent variable is DOL (The correlation between Revenue and EBIT). The data set is based on annual observations between 2006 and 2015. **Dummy variables for year and industry are included in the calculations, but not reported in the table.** The following models are tested: (I) family firms with (x > 50%) ownership versus non-family firms, (II) family firms with (x >50%) ownership and a (family CEO) versus non-family firms and (III) family firms with (x > 90%) ownership versus family firms with (50% < x < 90%) ownership. The SEs are obtained by using clustered standard errors and are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels are denoted by ***, **, *, respectively.

| DOL | I | II | III |
|---|---|---|---|
| Firm Size | 0.0136*** | 0.0136*** | 0.0155*** |
| | (-0.0034) | (-0.0034) | (-0.0042) |
| Tangibility | -0.1361*** | -0.1361*** | -0.1183*** |
| | (-0.0146) | (-0.0146) | (-0.0175) |
| ROA | 0.6409*** | 0.6409*** | 0.5964*** |
| | (-0.0225) | (-0.0224) | (-0.0287) |
| Growth Opportunity | -0.0234*** | -0.0234*** | -0.0215*** |
| | (-0.0016) | (-0.0016) | (-0.0018) |
| Company Age | -0.0006** | -0.0006** | -0.0006** |
| | (-0.0002) | (-0.0002) | (-0.0003) |
| Fam50 | -0.0094 | | |
| | (-0.0061) | | |
| Fam50_CEO | | -0.0066 | |
| | | (-0.0056) | |
| Fam90 | | | -0.0171** |
| | | | (-0.0071) |
| Payout Ratio | 0.0266*** | 0.0269*** | 0.0235*** |
| | (-0.0062) | (-0.0062) | (-0.0079) |
| Net Leverage | -0.1060*** | -0.1065*** | -0.1093*** |
| | (-0.0092) | (-0.0093) | (-0.0111) |
| Cons. | 0.3220*** | 0.3209*** | 0.2971*** |
| | (-0.0557) | (-0.0557) | (-0.0683) |
| N | 102,912 | 102,912 | 70,312 |
| Adj. R-squared | 0.045 | 0.045 | 0.04 |

Table 12 – Degree of Operating Leverage

The results in column (I) and (II) shows that we **reject H3a and H3b**. This indicates that there are no significant differences between Fam50 and non-family firms regarding the composition of fixed and variable cost. Similarly, it seems to be no difference in composition of fixed and variable cost between Fam50_CEO and non-family firms. Therefore, we can conclude that family firms and non-family firms are not different regarding their degree of operating leverage.

In contrast to the findings in column (I) and (II), the result for Fam90 in column (III) is statistically significant at the 5% level, and we **confirm H3c.** The variable Fam90 has a negative coefficient estimate, which implies that Fam90 impacts the degree of operating leverage negatively. These findings indicate that family firms tend to have a higher proportion of variable cost compared to other family firms,

which enables them to descale their business operations more efficiently than other companies. A consequence of this behaviour is that the Fam90 companies are better equipped to overcome negative shocks to their business operations. Therefore, we can conclude that Fam90 companies indeed have lower operating risk. This result is partially consistent with the findings of Sraer & Thesmar (2007). They found that family firms paid on average lower wages compared to non-family firms, which implies lower fixed costs. In contrast to Sraer D. & Thesmar D. (2007), our results show that the effect of family firms having less variable costs is only true when the ultimate ownership exceeds 90 percent. These findings indicate a change in the risk-taking behaviour of companies around a 90 percent threshold. As discussed earlier, families with an ownership stake above 90 percent are more dependent on the companies' profitability and long-term survival.

## Fama-MacBeth

To improve the robustness of our test results, we introduced the cross-sectional regression model and further applied the Fama-MacBeth procedure to test for the consistency and significance of the coefficient estimates over time. By applying this method in addition to the POLS, we aim to further control the consistency of our results across different estimation methods. The tables for the cross-sectional data are shown in full in Appendix 1.5.1 – 1.5.3. **Table 13** display the results of the Fama-MacBeth procedure for hypothesis **H1a – H3c**.

| | (Net Leverage) | | | (CV Revenue) | | | (DOL) | | |
|---|---|---|---|---|---|---|---|---|---|
| **Fama-MacBeth Standard Errors** | **(I)** | **(II)** | **(III)** | **(I)** | **(II)** | **(III)** | **(I)** | **(II)** | **(III)** |
| Fam50 | -0.0118** | | | -0.0121*** | | | -0.0098 | | |
| | -(0.0051) | | | -(0.0017) | | | -(0.0055) | | |
| Fam50_CEO | | -0.0375*** | | | -0.0078*** | | | -0.0064 | |
| | | -(0.0065) | | | -(0.0015) | | | -(0.0040) | |
| Fam90 | | | -0.0313*** | | | -0.0009 | | | -0.0168** |
| | | | -(0.0040) | | | -(0.0014) | | | -(0.0062) |
| Firm Size | 0.0339*** | 0.0316*** | 0.0303*** | 0.0328*** | 0.0328*** | 0.0281*** | 0.0149* | 0.0149* | 0.0170** |
| | -(0.0014) | -(0.0014) | -(0.0018) | -(0.0024) | -(0.0024) | -(0.0018) | -(0.0074) | -(0.0074) | -(0.0069) |
| Tangibility | 0.3824*** | 0.3886*** | 0.3787*** | -0.0267*** | -0.0269*** | -0.0219*** | -0.1284*** | -0.1283*** | -0.1088*** |
| | -(0.0126) | -(0.0129) | -(0.0140) | -(0.0043) | -(0.0044) | -(0.0051) | -(0.0127) | -(0.0128) | -(0.0106) |
| ROA | -0.4507*** | -0.4463*** | -0.5769*** | -0.022 | -0.0223 | -0.0018 | 0.6723*** | 0.6722*** | 0.6464*** |
| | -(0.0337) | -(0.0345) | -(0.0453) | -(0.0265) | -(0.0265) | -(0.0285) | -(0.1844) | -(0.1845) | -(0.1909) |
| Growth Opportunity | 0.0317*** | 0.0317*** | 0.0280*** | 0.0016 | 0.0015 | 0.0007 | -0.0219*** | -0.0219*** | -0.0198*** |
| | -(0.0036) | -(0.0036) | -(0.0038) | -(0.0010) | -(0.0010) | -(0.0007) | -(0.0024) | -(0.0024) | -(0.0021) |
| Company Age | -0.0017*** | -0.0016*** | -0.0014*** | -0.0010*** | -0.0010*** | -0.0008*** | -0.0006*** | -0.0006*** | -0.0005** |
| | -(0.0001) | -(0.0001) | -(0.0001) | (0.00005) | (0.00004) | (0.00005) | -(0.0001) | -(0.0001) | -(0.0002) |
| Payout Ratio | -0.0093 | -0.0099 | -0.018 | -0.0132*** | -0.0127*** | -0.0122*** | 0.0249*** | 0.0252*** | 0.0222*** |
| | -(0.0127) | -(0.0128) | -(0.0139) | -(0.0013) | -(0.0014) | -(0.0014) | -(0.0052) | -(0.0053) | -(0.0063) |
| Net Leverage | | | | 0.0088** | 0.0083** | 0.0122** | -0.0959*** | -0.0962*** | -0.0969*** |
| | | | | -(0.0031) | -(0.0032) | -(0.0040) | -(0.0177) | -(0.0178) | -(0.0179) |
| Cons. | -0.2021*** | -0.1542*** | -0.1224*** | -0.2903*** | -0.2937*** | -0.2321*** | 0.2846* | 0.2823* | 0.2486 |
| | -(0.0314) | -(0.0293) | -(0.0280) | -(0.0420) | -(0.0425) | -(0.0331) | -(0.1517) | -(0.1508) | -(0.1433) |
| N | 103,785 | 103,785 | 70,758 | 102,912 | 102,912 | 70,312 | 102,912 | 102,912 | 70,312 |
| Avg. R-squared | 0.1585 | 0.1618 | 0.1625 | 0.1155 | 0.1149 | 0.1177 | 0.057 | 0.0569 | 0.0527 |

Table 13 – Cross sectional regression with Fama-MacBeth standard errors

View up against the results generated by the POLS regression, the Fama-MacBeth method provides similar results. Looking at the three dummy variables used to test our hypotheses against the dependent variables we can see that both methods provide the same level of significance. The results also confirm that the coefficient estimates change little between the two methods which further confirms the robustness and consistency of our test results.

# Heckman two-step estimation

## Financial risk

| Heckman two-step | (Net Leverage) | |
|---|---|---|
| **Primary Equation** | **(I)** | **(II)** |
| Firm Size | 0.0283*** | 0.0311*** |
| | -(0.0025) | -(0.0031) |
| Tangibilty | 0.3444*** | 0.3788*** |
| | -(0.0096) | -(0.0112) |
| ROA | -0.5572*** | -0.5535*** |
| | -(0.0086) | -(0.0109) |
| Growth Opportunity | 0.0207*** | 0.0278*** |
| | -(0.0006) | -(0.0008) |
| Company Age | -0.0022*** | -0.0014*** |
| | -(0.0002) | -(0.0002) |
| Payout Ratio | -0.0126*** | -0.0192*** |
| | -(0.0023) | -(0.0046) |
| Cons. | 0.0546** | -0.0619*** |
| | -0.0227 | -(0.0235) |
| **Selection Equation Fam50** | | |
| City | -0.0682*** | -0.0611*** |
| | -(0.0071) | -(0.0087) |
| Firm Size | -0.1449*** | -0.1435*** |
| | -(0.0043) | -(0.0052) |
| Tangibilty | 0.5548*** | 0.5114*** |
| | -(0.0185) | -(0.0227) |
| ROA | 0.2057*** | 0.2498*** |
| | -(0.0313) | -(0.0375) |
| Growth Opportunity | 0.0351*** | 0.0340*** |
| | -(0.0023) | -(0.0029) |
| Company Age | 0.0125*** | 0.0139*** |
| | -(0.0003) | -(0.0004) |
| Payout Ratio | -0.0405*** | -0.1680*** |
| | -(0.0090) | -(0.0123) |
| Cons. | 2.4656*** | 1.9930*** |
| | -(0.0707) | -(0.0854) |
| **/mills - lambda** | **-0.0813**** | **-0.0005** |
| | **-(0.0320)** | **-(0.0393)** |
| N | 153,551 | 103,785 |
| Selected | 105,774 | 70,758 |

Table 14 – Heckman TS test results for Financial Risk

**Table 14** contains coefficient and standard error estimates for **Net Leverage** derived with Heckman TS estimation. The dependent variable in the **primary equation** is Net Leverage, whilst the dependent variable in the **selection equation** is Fam50. The data set is based on annual observations column (I) between 2000-2015 and column (II) between 2006 and 2015. **Dummy variables for year and industry are included in the calculations, but not reported in the table.** The SEs are obtained by using clustered standard errors and are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels are denoted by ***, **, *, respectively.

The results from the Heckman TS estimation regarding the financial risk gives us some valuable insights:

**Firstly,** we can observe that the coefficient of the dummy variable "City" has a negative effect on family firms and is statistically significant at all conventional levels. This result indicates that the likelihood of a company being a family firm decreases if the company is registered in a district, which has one of the major cities in Norway. There are several possible explanations for why companies would exhibit this type of behaviour. One might be that the accessibility of external financing is assumed to be greater, due to the number of corporations and investors doing business in major cities is higher than the rest of the country. **Secondly,** we can observe that the inverse mills ratio is significant only if we include the entire data sample from 2000-2015, while it is not significant for the years 2006-2015. On one hand, the coefficient of inverse mills ratio in column (I) is negative statistically significant, which states that companies actively self-select into either the family firm or non-family firm category. On the other hand, if we look at column (II) the inverse mills ratio is not significant at any conventional levels. These seemingly contradictory results lead us to believe that there are some unobserved characteristics in the model which makes companies and families self-select more in the years 2000-2005 than after 2005. One possible explanation could be the impact of the 2006 tax reform, which acts as an exogenous shock in the model. As discussed in the descriptive statistics we observe some extreme values prior to the tax reform for dividends, cash and cash equivalents, leverage and net leverage. These observations could be the reason why we observe significant values for the inverse mill ratio. This leads us to the conclusion that companies in "normal times", without exogenous shocks, do not self-select into becoming a family or non-family firm based on their net leverage. Hence, we reject **H4a.**

# Operational risk

| Heckman two-step | (CV Revenue) | | (DOL) | |
|---|---|---|---|---|
| **Primary Equation** | **(I)** | **(II)** | **(III)** | **(IV)** |
| Firm Size | 0.0119*** | 0.0111*** | 0.0184*** | 0.0116* |
| | -(0.0017) | -(0.0022) | -(0.0055) | -(0.0060) |
| Tangibilty | 0.0351*** | 0.0425*** | -0.1196*** | -0.1034*** |
| | -(0.0065) | -(0.0086) | -(0.0216) | -(0.0237) |
| ROA | 0.0107* | 0.0115 | 0.6914*** | 0.6026*** |
| | -(0.0063) | -(0.0084) | -(0.0197) | -(0.0218) |
| Growth Opportunity | 0.0040*** | 0.0041*** | -0.0205*** | -0.0206*** |
| | -(0.0005) | -(0.0006) | -(0.0015) | -(0.0017) |
| Company Age | 0.0004*** | 0.0006*** | -0.0008* | -0.0002 |
| | -(0.0001) | -(0.0002) | -(0.0004) | -(0.0005) |
| Payout Ratio | -0.0151*** | -0.0325*** | 0.0147*** | 0.0188** |
| | -(0.0017) | -(0.0034) | -(0.0051) | -(0.0093) |
| Net Leverage | 0.0079*** | -0.0007 | -0.1050*** | -0.1110*** |
| | -(0.0023) | -(0.0032) | -(0.0071) | -(0.0083) |
| Cons. | -0.1950*** | -0.1931*** | 0.1552*** | 0.2898*** |
| | -(0.0156) | -(0.0183) | -(0.0492) | -(0.0469) |
| **Selection Equation** | | | | |
| **Fam50** | | | | |
| City | -0.0702*** | -0.0612*** | -0.0702*** | -0.0612*** |
| | -(0.0073) | -(0.0087) | -(0.0073) | -(0.0087) |
| Firm Size | -0.1402*** | -0.1387*** | -0.1402*** | -0.1387*** |
| | -(0.0045) | -(0.0052) | -(0.0045) | -(0.0052) |
| Tangibilty | 0.5473*** | 0.5421*** | 0.5473*** | 0.5421*** |
| | -(0.0198) | -(0.0235) | -(0.0198) | -(0.0235) |
| ROA | 0.1734*** | 0.2026*** | 0.1734*** | 0.2026*** |
| | -(0.0326) | -(0.0382) | -(0.0326) | -(0.0382) |
| Growth Opportunity | 0.0370*** | 0.0378*** | 0.0370*** | 0.0378*** |
| | -(0.0024) | -(0.0030) | -(0.0024) | -(0.0030) |
| Company Age | 0.0133*** | 0.0137*** | 0.0133*** | 0.0137*** |
| | -(0.0003) | -(0.0004) | -(0.0003) | -(0.0004) |
| Payout Ratio | -0.0249*** | -0.1661*** | -0.0249*** | -0.1661*** |
| | -(0.0092) | -(0.0123) | -(0.0092) | -(0.0123) |
| Net Leverage | -0.0084 | -0.0904*** | -0.0084 | -0.0904*** |
| | -(0.0132) | -(0.0151) | -(0.0132) | -(0.0151) |
| Cons. | 2.3311*** | 1.9477*** | 2.3311*** | 1.9477*** |
| | -(0.0734) | -(0.0857) | -(0.0734) | -(0.0857) |
| **/mills - lambda** | **0.2208*** ** | **0.2519*** ** | **-0.0263** | **0.0665** |
| | **-(0.0208)** | **-(0.0273)** | **-(0.0710)** | **-(0.0788)** |
| N | 143,783 | 103,339 | 143,783 | 103,339 |
| Selected | 98,177 | 70,312 | 98,177 | 70,312 |

Table 15 – Heckman TS test results for Operational Risk

**Table 15** contains coefficient and standard error estimates for the **Degree of Operating Leverage (DOL)** and the **Coefficient of Variation in Revenue (CV(Rev))** derived with Heckman TS estimation. The dependent variable in column **(I) & (II) is CV Revenue** and the dependent variable in column **(III) & (IV) is DOL.** The dependent variable in the selection equation is Fam50. The data set is based on annual observations. Columns (I) & (III) include date between 2001-2015. (The estimation of CV Revenue and DOL is achieved through rolling estimation of standard deviation and correlation and is hence there are no observations in year 2000) Columns (II) & (IV) include data between 2006 and 2015. **Dummy variables for year and industry are included in the calculations, but not reported in the table.** The SEs are obtained by using clustered standard errors and are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels are denoted by ***, **, *, respectively.

The results from the Heckman TS estimation regarding the operational risk gives us some valuable insights:

**Firstly,** as discussed in the previous section we can observe that the coefficient of the IV "City" has a small negative, but statistically significant impact on Fam50 both for CV Revenue and DOL. One possible interpretation of these results is that family firms included in our dataset tend to do their business operations outside the districts with the major cities in them. A direct consequence of this behaviour could be that companies doing business outside the major cities expect and aim at lower levels of operational risk. Hence, there might be some unobserved characteristics between districts that influence the operational risk-taking behaviour of the companies registered within them. An alternative explanation for CV Revenue can be assigned to the higher competition for customers in major cities. This leads to higher volatility in sales and therefore also the return, thus increasing the operational risk of the company. To explain the effect on DOL one possibility is that the fixed costs related to office rentals are higher in major cities compared to other districts in Norway. This relationship increases the amount of fixed cost incurred by companies operating in major cities and hence increases their level of operational risk. **Secondly,** when we look at the inverse mills ratio for DOL in column (III) & (IV) the results indicate that there is no form of self-selection with respect to becoming a family firm versus non-family firm when it comes to the level of fixed costs companies pursue. However, the inverse mills ratio for CV Revenue is positive and statistically significant at all conventional levels both in columns (I) & (II). This relationship leads us to conclude that the decision of becoming a family firm is dependent on their operational risk preferences. Companies that prefer lower degrees of operational risk with respect to CV Revenue are hence considered more likely to be a family firm than non-family firms. Hence, we confirm hypothesis **H4b, but reject H4c.**

# Conclusions

This paper is based on data from Norwegian private firms over the period 2006-2015 and analyses the impact of family involvement on a company's risk-taking behaviour. The study distinguishes between family involvement through ultimate ownership and the CEO composition. To get an accurate and complete understanding of a firms` risk-taking behaviour, the study controls for both financial and operational risk. The holistic approach of measuring risk taking in family firms, have to the best of our knowledge, never been conducted for the Norwegian market.

The results reveal that family firms have on average lower net leverage, hence lower financial risk than non-family firms. The empirical results further confirm that the presence of a family CEO has an increasingly negative effect on financial risk. An interesting result is that when ultimate ownership is above 90 percent the firms exhibit an increasing aversion to net leverage compared to other family firms.

To test for differences in operational risk-taking, this study controls for both the volatility in revenues and degree of operating leverage. The results reveal that family firms engage in business operations involving lower revenue volatility. Furthermore, we found support for our hypothesis that family CEOs affect the firms' revenue volatility negatively. We are however not able to find evidence that the level of ultimate ownership affects the revenue volatility within family firms. This indicates a possible threshold around 50 percent ownership. Regarding DOL our results show no significant differences between family firms and non-family firms regardless of CEO composition. Interestingly, the results reveal a negative relationship between increasing ownership and DOL. These results indicate that as family ownership passes the threshold of 90 percent, the companies become more inclined to increase variable costs relative to fixed cost in their day to day operations and thereby become less risky.

Furthermore, the empirical results point to some interesting implications regarding the trade-off between financial and operational risk. The trade-off theory suggests that companies with higher degrees of financial risk should hold lower levels of operational risk compared to their peers. However, the results show that family firms tend to have both lower financial and operational risk. This relationship indicates that the trade-off theory, at least in part, does not hold for Norwegian

family firms. One explanation for the results is that the owners of family firms are less diversified from a financial perspective. In addition, family firms tend to use more retained earnings to finance new investments compared to non-family firms, which gives support for the pecking order theory.

This study adds to the existing body of research and enhances the notion that owners of family firms are less diversified. Consequently, they generally take on less risk than their peers. The results are further consistent with previous research, that owners of family firms are more dependent on the income generated from their companies. This relationship leads to a more conservative corporate policy regarding both financial and operational risk. Furthermore, the study provides new evidence regarding the impact a family CEO has on the risk-taking behavior of the company. The results show that the presence of a family CEO reduces the company's exposure to both financial risk and the volatility of revenues. This implies that family CEOs who are also owners of the company consequently attempt to reduce their exposure towards risk compared to professional CEOs.

# Reference list

Abdi, H. (2010). Coefficient of variation. *Encyclopedia of research design*, *1*, 169-171.

Aldrich, H. E., & Cliff, J. E. (2003). The pervasive effects of family on entrepreneurship: Toward a family embeddedness perspective. *Journal of business venturing*, *18*(5), 573-596.

Almeida, H., & Campello, M. (2007). Financial constraints, asset tangibility, and corporate investment. *The Review of Financial Studies*, *20*(5), 1429-1460.

Anderson R.C., Mansi S.A. & Reeb D.M (2003) Founding family ownership and agency cost of debt. Journal of Financial Economics 68, 263 – 285

Anderson, R. C., & Reeb, D. M. (2003). Founding-family ownership, corporate diversification, and firm leverage. *The Journal of Law and Economics*, *46*(2), 653-684.

Anderson, R. C., & Reeb, D. M. (2004). Board composition: Balancing family influence in S&P 500 firms. *Administrative science quarterly*, *49*(2), 209-237.

Anderson, R. C., Duru, A., & Reeb, D. M. (2012). Investment policy in family controlled firms. *Journal of Banking & Finance*, *36*(6), 1744-1758.

Becker, G. (1965). A theory of the allocation of time. Economic Journal, 75, 493–517.

Bennedsen, M., Nielsen, K. M., Pérez-González, F., & Wolfenzon, D. (2007). Inside the family firm: The role of families in succession decisions and performance. The Quarterly Journal of Economics, 122(2), 647-691.

Berger, A.N., and Udell, G.F. 1998. The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle. Journal of Banking & Finance 22:613–673

Berzins, J., & Bøhren, Ø. (2013). Norske familiebedrifter–omfang, eierstyring og lønnsomhet. *Praktisk økonomi & finans*, *30*(03), 57-73.

Bowen, H. P., & Wiersema, M. F. (1999). Matching method to paradigm in strategy research: Limitations of cross-sectional analysis and some methodological alternatives. Strategic management journal, 625-636.

Bromiley P. (1991) Testing a casual model of corporate risk-taking and performance. Academy of Management journal, 34(1), 37-59.

Burkart, M., Panunzi, F., & Shleifer, A. (2003). Family firms. The Journal of Finance, 58(5), 2167-2201.

Chua, J. H., Chrisman, J. J., & Sharma, P. (1999). Defining the family business by behavior. Entrepreneurship Theory and Practice, 23(4), 19–39.

Dang C. & Li F. (2015) Measuring Firm Size in Empirical Corporate Finance. Richard Ivey School of Business & University of Western Ontario

De Jong A., Verbeek M. & Verwijmeren (2011) Firms' debt-equity decisions when the static tradeoff theory and the pecking order theory disagree. Journal of Banking & Finance. 35, 1303-1314.

Eisenhardt, K. M. (1989). Agency theory: An assessment and review. Academy of management review, 14(1), 57-74.

Faccio M. & Lang H.P.L (2002). "The Ultimate Ownership of Western European Corporations." Journal of Financial Economics, 65, 365–395.

Fama, E. F., & MacBeth, J. D. (1973). Risk, return, and equilibrium: Empirical tests. Journal of political economy, 81(3), 607-636.

Feltham, T. S., Feltham, F., & Barnett, J. J. (2005). The dependence of family businesses on a single decision-maker. Journal of Small Business Management, 17, 258–270.

Frank, M. Z., & Goyal, V. K. (2009). Capital structure decisions: which factors are reliably important?. *Financial management*, *38*(1), 1-37.

Gahlon, J. M., & Gentry, J. A. (1982). On the relationship between systematic risk and the degrees of operating and financial leverage. *Financial Management*, 15-23.

George, G., Wiklund, J., & Zahra, S. A. (2005). Ownership and the internationalization of small firms. *Journal of Management*, *31*(2), 210-233.

Gersick, K. E., Davis, J. A., Hampton, M. M., & Lansberg, I. (1997). Generation to generation: Life cycles of the family business. Cambridge, MA: Harvard Business School Press.

Gómez-Mejía, L. R., Haynes, K. T., Núñez-Nickel, M., Jacobson, K. J., & Moyano-Fuentes, J. (2007). Socioemotional wealth and business risks in family-controlled firms: Evidence from Spanish olive oil mills. *Administrative science quarterly*, *52*(1), 106-137.

González, M., Guzmán, A., Pombo, C., & Trujillo, M. A. (2013). Family firms and debt: Risk aversion versus risk of losing control. *Journal of Business Research*, *66*(11), 2308-2320.

Griffin, H. F., & Dugan, M. T. (2003). Systematic risk and revenue volatility. *Journal of Financial Research*, *26*(2), 179-189.

Hambrick, D. C., & Finkelstein, S. (1987). Managerial discretion: A bridge between polar views on organizations. In L. L. Cummings & B. M. Staw (Eds.), Research in organizational behavior (Vol. 9, pp. 369–406). Greenwich, CT: JAI Press.

Harris, M., & Raviv, A. (1991). The theory of capital structure. *the Journal of Finance*, *46*(1), 297-355.

Heckman, J. J. (1979). Sample Selection Bias as a Specification Error. Econometrica, 47(1), 153-161.

Hiebl, M. R. (2012). Risk aversion in family firms: what do we really know?. *The Journal of Risk Finance*, *14*(1), 49-70.

Hollenbeck, J. R, Ilgen D.R, Phillips J.M. and Hedlund J. (1994). "Decision Risk in Dynamic Two-Stage Contexts: Beyond the Status Quo," Journal of Applied Psychology 79(4), 592-598.

Jarrell, G. A., Brickley, J. A., & Netter, J. M. (1988). The market for corporate control: The empirical evidence since 1980. Journal of Economic perspectives, 2(1), 49-68.

Kellermanns, F. W., & Eddleston, K. A. (2004). Feuding families: When conflict does a family firm good. *Entrepreneurship theory and Practice*, *28*(3), 209-228.

Lev, B. (1974). On the association between operating leverage and risk. *Journal of financial and quantitative analysis*, *9*(4), 627-641.

Levesque, M., & Minniti, M. (2006). The effect of aging on entrepreneurial behavior. Journal of Business Venturing, 21, 177–194.

Lins, K. V., Volpin, P., & Wagner, H. F. (2013). Does family control matter? International evidence from the 2008–2009 financial crisis. *The Review of Financial Studies*, *26*(10), 2583-2619.

Lubatkin, M. H. and S. Chatterjee (1991). The strategy-shareholder value relationship: Testing temporal stability across market cycles. Strategic Management Journal, 12(4), pp. 251-270.

March, J. G., & Shapira, Z. (1987). Managerial perspectives on risk and risk-taking. *Management science*, *33*(11), 1404-1418.

Marchenko, Y. V., & Genton, M. G. (2012). A Heckman selection-t model. Journal of the American Statistical Association, 107(497), 304-317.

McConaughy, D. L., Matthews, C. H., & Fialko, A. S. (2001). Founding family controlled firms: Performance, risk, and value. *Journal of small business management*, *39*(1), 31-49.

Mehran, H. (1995*)* Executive compensation structure, ownership, and firm performance. *Journal of Financial Economics*, 38, 163–184.

Miller, D., & Breton-Miller, L. (2006). Family governance and firm performance: Agency, stewardship, and capabilities. *Family business review*, *19*(1), 73-87.

Mishra, C. S., & McConaughy, D. L. (1999). Founding family control and capital structure: The risk of loss of control and the aversion to debt. Entrepreneurship theory and practice, 23(4), 53-64.

Morris, M. H. (1998). Entrepreneurial intensity. West-port, CT: Quorum Books.

Mukherjee, T.K. (1992). Financing the three stages of the small business life cycle: A survey. Journal of Business and Entrepreneurship 4:33–42

Murray Z.F. & Vidhan K.G. (2001) Testing the pecking order theory of capital structure. Journal of Financial Economics 67. 217-248

Myers, S.C. (1984) The capital structure puzzle. Journal of Finance 39(3): 575–592.

Myers, S.C., and Majluf, N.S. 1984. Corporate financing and investment decisions when firms have information that investors do not have. Journal of Financial Economics 13:187–221.

Naldi, L., Nordqvist, M., Sjöberg, K., & Wiklund, J. (2007). Entrepreneurial orientation, risk-taking, and performance in family firms. Family business review, 20(1), 33-47.

O'brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity*, *41*(5), 673-690.

Ozkan, A. (2002). The determinants of corporate debt maturity: evidence from UK firms. Applied Financial Economics, 12(1), 19-24.

Parker, S. C. (2006). Learning about the unknown: How fast do entrepreneurs adjust their beliefs? Journal of Business Venturing, 21, 1–26.

Petersen, M. A. (2009). Estimating standard errors in finance panel data sets: Comparing approaches. The Review of Financial Studies, 22(1), 435-480.

Rajan, R. G., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. The journal of Finance, 50(5), 1421-1460.

Romano C.A., Tanewski G.A. & Smyrnios K.X. Capital structure decision making: A model for family business. Journal of Business Venturing, 16, 285-310.

Rumelt, R. P. (1991). How much does industry matter? Strategic Management Journal, 12(3), pp. 167-185.

Schulze, W. S., Lubatkin, M. H., Dino, R. N., & Buchholtz, A. K. (2001). Agency relationship in family firms: Theory and evidence. Organization Science, 12(9), 99–116.

Sharma, P., Chrisman, J. J., & Chua, J. H. (1997). Strategic management of the family business: Past research and future challenges. Family Business Review, 10(1), 1–36.

Simon, H.A. (1993). "Strategy and Organizational Evolution," Strategic Management Journal 14, 131-142.

Sirmon, D. G., & Hitt, M. A. (2003). Managing resources: Linking unique resources, management and wealth creation in family firms. Entrepreneurship Theory and Practice, 27(4), 339–358

Sraer D. & Thesmar D. (2007) Performance and behavior of family firms: Evidence from the French stock market. Journal of the European Economic Association 5(4): 709-751

Stewart, W. H., Watson, W. E., Carland, J.A., & Carland, J.W. (1999). A proclivity for entrepreneurship: A comparison of entrepreneurs, small business owners, and corporate managers. Journal of Business Venturing, 14, 189–214.

Storey, D.J. (1994). Understanding the Small Business Sector. London: Routledg

Stulz, R. (1990). Managerial discretion and optimal financing policies. Journal of financial Economics, 26(1), 3-27.

Titman, S. and Wessels, R. (1988) The determinants of capital structure choice, Journal of Finance, 43, 1-19

Van Horne, J.C. (1980). Financial Management and Policy, fifth edition. Englewood Cliffs, N.J.: Prentice-Hall.

Villalonga, B., & Amit, R. (2006). How do family ownership, control and management affect firm value?. Journal of financial Economics, 80(2), 385-417.

Whited, T. M. (1992) Debt, liquidity Constraints, and corporate investment: evidence from panel data, Journal of Finance, 47, 1425-60.

Yulia V. Marchenko & Marc G. Genton (2012) A Heckman Selection-t Model, Journal of the American Statistical Association,107:497, 304-317.

Zahra, S. A., & Covin, J. G. (1995). Contextual influences on the corporate entrepreneurship-performance relationship: A longitudinal analysis. Journal of business venturing, 10(1), 43-58.

Zahra, S. A., Hayton, J. C., & Salvato, C. (2004). Entrepreneurship in family vs. non-family firms: A resource-based analysis of the effect of organizational culture. Entrepreneurship Theory and Practice,28(4),363–381.

Zahra, S. A., Neubaum, D. O., & Huse, M. (2000). Entrepreneurship in medium-size companies: Exploring the effects of ownership and governance systems. Journal of Management, 26(5), 947–976.

# 1 APPENDIX

## 1.1 VARIABLES

| Proxy | Formula used to obtain the variables |
|---|---|
| Short_term_debt | item_78+ item_63 -item_98 - item_87 |
| Leverage | (item_98 + Short_term_debt) / (item_78 + item_63) |
| Net_Leverage | (item_98 + Short_term_debt - item_76) / (item_78 + item_63) |
| Cash_to_Assets | item_76 / item_87 |
| Debt_to_Equity | item_98 / item_87 |
| Profitability | item_35 / (item_63 + item_78) |
| Growth | item_9 / (item_63 + item_78) |
| Debt_Structure | item_98 / (item_98 + Short_term_debt) |
| Firm_Size | ln (item_63 + item_78) |
| Margin | item_35 / item_9 |
| Net_Liabilities | Short_term_debt + item_98 - item_76 |
| Tangibility | item 63 / (item 63 + item 78) |
| EBIT | item 35 - item 30 |
| ROA | EBIT / (item 63 + item 78) |
| Payout_Ratio | item 105 / EBIT |
| CV_REV | Std. item 9 / mean item 9 |
| DOL | Correlation (Item 9, EBIT) |

## 1.2 T-TEST – DESCRIPTIVE STATISTICS

### 1.2.1 Fam 50 vs. Non_Fam

| | Non_Fam | | Fam50 | | | |
|---|---|---|---|---|---|---|
| Fam50 vs. Non_Fam | Mean | Obs. | Mean | Obs. | Diff. | P-Value |
| Revenue | 27110125 | 49512 | 25194088 | 110655 | 1916037 | 0 |
| Company Age | 15.5813 | 48559 | 18.2191 | 108157 | -2.6378 | 0 |
| Ult. Own | 33.1161 | 49512 | 91.1111 | 110655 | -57.9950 | 0 |
| Leverage | 0.6851 | 49512 | 0.6931 | 110655 | -0.0080 | 0 |
| Net Leverage | 0.4194 | 49512 | 0.4499 | 110655 | -0.0305 | 0 |
| CV(Rev) | 0.1659 | 45521 | 0.1374 | 102760 | 0.0285 | 0 |
| DOL | 0.4464 | 45514 | 0.4051 | 102757 | 0.0413 | 0 |
| Debt to Equity | 0.6569 | 49512 | 0.8535 | 110655 | -0.1966 | 0 |
| ROA | 0.1146 | 49512 | 0.1051 | 110655 | 0.0094 | 0 |
| Growth Opp. | 2.4226 | 49512 | 2.8148 | 110655 | -0.3922 | 0 |
| Firm Size | 16.0358 | 49512 | 15.8779 | 110655 | 0.1579 | 0 |
| Tangibility | 0.2299 | 49512 | 0.2568 | 110655 | -0.0269 | 0 |

### 1.2.2 Fam50_CEO vs. Non_Fam

| Fam50CEO vs. Non_Fam | Non_Fam | | Fam50CEO | | | |
|---|---|---|---|---|---|---|
| | Mean | Obs. | Mean | Obs. | Diff. | P-Value |
| Revenue | 27110125 | 49512 | 24085184 | 90094 | 3024942 | 0 |
| Company Age | 15.5813 | 48559 | 18.2919 | 87974 | -0.7106 | 0 |
| Ult. Own | 33.1161 | 49512 | 92.3066 | 90094 | -59.1905 | 0 |
| Leverage | 0.6851 | 49512 | 0.6898 | 90094 | -0.0048 | 0 |
| Net Leverage | 0.4194 | 49512 | 0.4428 | 90094 | -0.0234 | 0 |
| CV(Rev) | 0.1659 | 45521 | 0.1364 | 83627 | 0.0295 | 0 |
| DOL | 0.4464 | 45514 | 0.4042 | 83624 | 0.0422 | 0 |
| Debt to Equity | 0.6569 | 49512 | 0.8706 | 90094 | -0.2138 | 0 |
| ROA | 0.1146 | 49512 | 0.1054 | 90094 | 0.0092 | 0 |
| Growth Opp. | 2.4226 | 49512 | 2.8129 | 90094 | -0.3902 | 0 |
| Firm Size | 16.0358 | 49512 | 15.8436 | 90094 | 0.1922 | 0 |
| Tangibility | 0.2299 | 49512 | 0.2602 | 90094 | -0.0303 | 0 |

### 1.2.3 Fam5090 vs. Fam90

| Fam90 vs. Fam5090 | Fam90 | | Fam5090 | | | |
|---|---|---|---|---|---|---|
| | Mean | Obs. | Mean | Obs. | Diff. | P-Value |
| Revenue | 24601528 | 81501 | 26850610 | 29154 | -2249082 | 0 |
| Company Age | 18.1974 | 79619 | 18.2796 | 28538 | -0.0822 | 0.334 |
| Ult. Own | 99.3728 | 51501 | 68.0152 | 29154 | 31.3576 | 0 |
| Leverage | 0.6936 | 51501 | 0.6916 | 29154 | 0.0019 | 0.133 |
| Net Leverage | 0.4486 | 51501 | 0.4533 | 29154 | -0.0047 | 0.023 |
| CV(Rev) | 0.1347 | 75376 | 0.1439 | 26971 | -0.0092 | 0 |
| DOL | 0.3955 | 75374 | 0.4250 | 26970 | -0.0295 | 0 |
| Debt to Equity | 0.8849 | 81501 | 0.7657 | 29154 | 0.1192 | 0 |
| ROA | 0.1037 | 81501 | 0.1092 | 29154 | -0.0055 | 0 |
| Growth Opp. | 2.8774 | 81501 | 2.6399 | 29154 | 0.2375 | 0 |
| Firm Size | 15.8447 | 81501 | 15.9708 | 29154 | -0.1261 | 0 |
| Tangibility | 0.2612 | 81501 | 0.2446 | 29154 | 0.0166 | 0 |

## 1.3 ROBUSTNESS CHECK OF THE REGRESSIONS

### 1.3.1 Financial risk

| Net Leverage | I | II | III | IV |
|---|---|---|---|---|
| Firm Size | 0.0326*** | 0.0319*** | 0.0339*** | 0.0338*** |
| | (-0.0028) | (-0.0028) | (-0.0028) | (-0.0028) |
| Tangibility | 0.3830*** | 0.3857*** | 0.3855*** | 0.3839*** |
| | (-0.0107) | (-0.0107) | (-0.0106) | (-0.0107) |
| ROA | -0.4314*** | -0.4314*** | -0.4424*** | -0.4408*** |
| | (-0.0164) | (-0.0164) | (-0.0166) | (-0.0168) |
| Growth Opportunity | 0.0324*** | 0.0325*** | 0.0311*** | 0.0311*** |
| | (-0.0016) | (-0.0016) | (-0.0016) | (-0.0016) |
| Fam50 | | -0.0160*** | -0.0112** | -0.0114** |
| | | (-0.0049) | (-0.0049) | (-0.0049) |
| Company Age | | | -0.0017*** | -0.0017*** |
| | | | (-0.0002) | (-0.0002) |
| W_Payout Ratio | | | | -0.0104** |
| | | | | (-0.0041) |
| Cons. | -0.1294*** | -0.1106** | -0.1155** | -0.1120** |
| | (-0.0454) | (-0.0457) | (-0.0455) | (-0.0455) |
| N | 104 826 | 104 826 | 104 822 | 103 785 |
| Adj. R-squared | 0.157 | 0.158 | 0.162 | 0.163 |

### 1.3.2 Operational risk

| CV Revenue | I | II | III | IV |
|---|---|---|---|---|
| Firm Size | 0.0334*** | 0.0328*** | 0.0331*** | 0.0329*** |
| | (-0.0015) | (-0.0015) | (-0.0015) | (-0.0015) |
| Tangibility | -0.0257*** | -0.0237*** | -0.0252*** | -0.0280*** |
| | (-0.0046) | (-0.0046) | (-0.0046) | (-0.0047) |
| ROA | -0.0436*** | -0.0432*** | -0.0310*** | -0.0278*** |
| | (-0.0067) | (-0.0067) | (-0.0069) | (-0.007) |
| Growth Opportunity | 0.0012*** | 0.0013*** | 0.0016*** | 0.0014*** |
| | (-0.0005) | (-0.0005) | (-0.0005) | (-0.0005) |
| Company Age | -0.0011*** | -0.0010*** | -0.0010*** | -0.0010*** |
| | -0.0001 | -0.0001 | -0.0001 | -0.0001 |
| Fam50 | | -0.0119*** | -0.0125*** | -0.0124*** |
| | | -0.002 | -0.002 | -0.002 |
| Payout Ratio | | | -0.0134*** | -0.0133*** |
| | | | -0.0018 | -0.0018 |
| Net Leverage | | | | 0.0072** |
| | | | | -0.0028 |
| Cons. | -0.3136*** | -0.2994*** | -0.3016*** | -0.3008*** |
| | -0.0243 | -0.0244 | -0.0242 | -0.0242 |
| N | 103945 | 103945 | 102912 | 102912 |
| Adj. R-squared | 0.105 | 0.106 | 0.108 | 0.108 |

| DOL | I | II | III | IV |
|---|---|---|---|---|
| Firm Size | 0.0101*** | 0.0096*** | 0.0100*** | 0.0136*** |
| | (-0.0034) | (-0.0034) | (-0.0034) | (-0.0034) |
| Tangibility | -0.1807*** | -0.1791*** | -0.1767*** | -0.1361*** |
| | (-0.0142) | (-0.0142) | (-0.0143) | (-0.0146) |
| ROA | 0.7087*** | 0.7090*** | 0.6881*** | 0.6409*** |
| | (-0.022) | (-0.0219) | (-0.0224) | (-0.0225) |
| Growth Opportunity | -0.0267*** | -0.0267*** | -0.0267*** | -0.0234*** |
| | (-0.0016) | (-0.0016) | (-0.0016) | (-0.0016) |
| Company Age | -0.0004* | -0.0004 | -0.0004* | -0.0006** |
| | (-0.0002) | (-0.0002) | (-0.0002) | (-0.0002) |
| Fam50 | | -0.0093 | -0.0082 | -0.0094 |
| | | (-0.0061) | (-0.0061) | (-0.0061) |
| Payout Ratio | | | 0.0277*** | 0.0266*** |
| | | | (-0.0063) | (-0.0062) |
| Net Leverage | | | | -0.1060*** |
| | | | | (-0.0092) |
| Cons. | 0.3353*** | 0.3464*** | 0.3343*** | 0.3220*** |
| | (-0.055) | (-0.0555) | (-0.0558) | (-0.0557) |
| N | 103939 | 103939 | 102912 | 102912 |
| Adj. R-squared | 0.042 | 0.042 | 0.042 | 0.045 |

## 1.4 VARIANCE INFLATION FACTOR

| | Financial risk | | Operational Risk | |
|---|---|---|---|---|
| **Variable** | **VIF** | **1 / VIF** | **VIF** | **1 / VIF** |
| Fam50 | 1.14 | 0.8781 | 1.14 | 0.8790 |
| Firm Size | 1.29 | 0.7722 | 1.31 | 0.7645 |
| Tangibility | 1.29 | 0.7733 | 1.38 | 0.7262 |
| ROA | 1.18 | 0.8492 | 1.22 | 0.8224 |
| Growth Opportunity | 1.36 | 0.7361 | 1.4 | 0.7125 |
| Company Age | 1.13 | 0.8826 | 1.14 | 0.8799 |
| Payout Ratio | 1.13 | 0.8832 | 1.13 | 0.8821 |
| Net Leverage | - | - | 1.19 | 0.8374 |
| 2007 | 1.98 | 0.5047 | 2 | 0.5003 |
| 2008 | 1.97 | 0.5087 | 1.99 | 0.5025 |
| 2009 | 2 | 0.5005 | 2.03 | 0.4933 |
| 2010 | 2 | 0.4997 | 2.03 | 0.4915 |
| 2011 | 1.99 | 0.5025 | 2.02 | 0.4945 |
| 2012 | 1.96 | 0.5094 | 2 | 0.5009 |
| 2013 | 1.92 | 0.5195 | 1.96 | 0.5108 |
| 2014 | 1.87 | 0.5336 | 1.91 | 0.5240 |
| 2015 | 1.87 | 0.5334 | 1.91 | 0.5246 |
| Agriculture | 1.07 | 0.9338 | 1.07 | 0.9338 |
| Industry | 1.44 | 0.6961 | 1.44 | 0.6951 |
| Education | 1.03 | 0.9749 | 1.03 | 0.9740 |
| Culture | 1.03 | 0.9698 | 1.03 | 0.9687 |
| Services other | 1.06 | 0.9430 | 1.06 | 0.9419 |
| Health & social | 1.08 | 0.9286 | 1.08 | 0.9252 |
| Water & sanitation | 1.02 | 0.9806 | 1.02 | 0.9796 |
| Retail | 1.81 | 0.5515 | 1.81 | 0.5516 |
| Transportation | 1.22 | 0.8200 | 1.22 | 0.8190 |
| Hotels | 1.18 | 0.8480 | 1.19 | 0.8426 |
| Information & communications | 1.16 | 0.8625 | 1.17 | 0.8558 |
| Services scientiffic | 1.23 | 0.8157 | 1.23 | 0.8147 |
| Services business | 1.19 | 0.8417 | 1.19 | 0.8412 |
| **Mean VIF** | **1.43** | | **1.44** | |

## 1.5 CROSS-SECTIONAL REGRESSION

### 1.5.1 Financial risk – Net Leverage

| Net Leverage | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| Fam50 | 0.0078 | 0.0082 | 0.0011 | 0.0005 | -0.0066 | -0.0141** | -0.0225*** | -0.0288*** | -0.0318*** | -0.0323*** |
| | -(0.0053) | -(0.0057) | -(0.0059) | -(0.0062) | -(0.0064) | -(0.0066) | -(0.0067) | -(0.0068) | -(0.0070) | -(0.0070) |
| Firm Size | 0.0345*** | 0.0385*** | 0.0379*** | 0.0286*** | 0.0269*** | 0.0293*** | 0.0331*** | 0.0354*** | 0.0367*** | 0.0383*** |
| | -(0.0032) | -(0.0031) | -(0.0032) | -(0.0034) | -(0.0034) | -(0.0034) | -(0.0035) | -(0.0035) | -(0.0036) | -(0.0036) |
| Tangibility | 0.3142*** | 0.3197*** | 0.3722*** | 0.4372*** | 0.4226*** | 0.3851*** | 0.3828*** | 0.3841*** | 0.4024*** | 0.4040*** |
| | -(0.0138) | -(0.0134) | -(0.0136) | -(0.0141) | -(0.0144) | -(0.0148) | -(0.0153) | -(0.0156) | -(0.0160) | -(0.0162) |
| ROA | -0.6956*** | -0.5344*** | -0.5219*** | -0.4254*** | -0.3743*** | -0.4238*** | -0.4308*** | -0.3984*** | -0.3480*** | -0.3543*** |
| | -(0.0250) | -(0.0222) | -(0.0214) | -(0.0237) | -(0.0241) | -(0.0248) | -(0.0262) | -(0.0266) | -(0.0276) | -(0.0258) |
| Growth Opportunity | 0.0136*** | 0.0169*** | 0.0231*** | 0.0328*** | 0.0364*** | 0.0303*** | 0.0305*** | 0.0395*** | 0.0454*** | 0.0489*** |
| | -(0.0015) | -(0.0015) | -(0.0015) | -(0.0017) | -(0.0017) | -(0.0016) | -(0.0016) | -(0.0018) | -(0.0020) | -(0.0021) |
| Company Age | -0.0018*** | -0.0020*** | -0.0022*** | -0.0018*** | -0.0019*** | -0.0020*** | -0.0019*** | -0.0013*** | -0.0012*** | -0.0012*** |
| | -(0.0002) | -(0.0002) | -(0.0002) | -(0.0002) | -(0.0002) | -(0.0002) | -(0.0003) | -(0.0003) | -(0.0003) | -(0.0003) |
| Payout Ratio | 0.0774*** | 0.0351*** | 0.0181** | -0.0193** | -0.0437*** | -0.0429*** | -0.0208** | -0.0220*** | -0.0445*** | -0.0300*** |
| | -(0.0067) | -(0.0096) | -(0.0084) | -(0.0084) | -(0.0084) | -(0.0086) | -(0.0090) | -(0.0076) | -(0.0081) | -(0.0083) |
| Cons. | -0.0425 | -0.1581*** | -0.2263*** | -0.1624*** | -0.1363** | -0.1240** | -0.2008*** | -0.2740*** | -0.3286*** | -0.3682*** |
| | -(0.0523) | -(0.0513) | -(0.0532) | -(0.0553) | -(0.0559) | -(0.0566) | -(0.0584) | -(0.0588) | -(0.0606) | -(0.0603) |
| N | 9494 | 11101 | 11102 | 11157 | 11087 | 10875 | 10493 | 9982 | 9301 | 9193 |
| Adj. R-squared | 0.189 | 0.157 | 0.175 | 0.164 | 0.16 | 0.148 | 0.139 | 0.141 | 0.148 | 0.147 |

| Net Leverage | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| Fam50_CEO | 0.001 | -0.0150*** | -0.0242*** | -0.0279*** | -0.0355*** | -0.0501*** | -0.0555*** | -0.0576*** | -0.0548*** | -0.0559*** |
| | -(0.0053) | -(0.0052) | -(0.0054) | -(0.0057) | -(0.0058) | -(0.0059) | -(0.0061) | -(0.0063) | -(0.0064) | -(0.0065) |
| Firm Size | 0.0343*** | 0.0369*** | 0.0360*** | 0.0264*** | 0.0245*** | 0.0262*** | 0.0298*** | 0.0324*** | 0.0341*** | 0.0356*** |
| | -(0.0032) | -(0.0031) | -(0.0032) | -(0.0034) | -(0.0034) | -(0.0034) | -(0.0035) | -(0.0035) | -(0.0036) | -(0.0036) |
| Tangibility | 0.3153*** | 0.3250*** | 0.3780*** | 0.4433*** | 0.4289*** | 0.3932*** | 0.3908*** | 0.3927*** | 0.4090*** | 0.4102*** |
| | -(0.0138) | -(0.0134) | -(0.0136) | -(0.0141) | -(0.0144) | -(0.0148) | -(0.0153) | -(0.0156) | -(0.0160) | -(0.0162) |
| ROA | -0.6954*** | -0.5335*** | -0.5211*** | -0.4197*** | -0.3703*** | -0.4178*** | -0.4262*** | -0.3884*** | -0.3413*** | -0.3490*** |
| | -(0.0250) | -(0.0222) | -(0.0214) | -(0.0237) | -(0.0241) | -(0.0248) | -(0.0261) | -(0.0265) | -(0.0276) | -(0.0257) |
| Growth Opportunity | 0.0137*** | 0.0170*** | 0.0232*** | 0.0330*** | 0.0365*** | 0.0302*** | 0.0304*** | 0.0392*** | 0.0452*** | 0.0485*** |
| | -(0.0015) | -(0.0015) | -(0.0015) | -(0.0017) | -(0.0017) | -(0.0016) | -(0.0016) | -(0.0018) | -(0.0020) | -(0.0021) |
| Company Age | -0.0018*** | -0.0019*** | -0.0021*** | -0.0017*** | -0.0018*** | -0.0018*** | -0.0017*** | -0.0012*** | -0.0011*** | -0.0011*** |
| | -(0.0002) | -(0.0002) | -(0.0002) | -(0.0002) | -(0.0002) | -(0.0002) | -(0.0003) | -(0.0003) | -(0.0003) | -(0.0003) |
| Payout Ratio | 0.0771*** | 0.0356*** | 0.0172** | -0.0212** | -0.0446*** | -0.0440*** | -0.0217** | -0.0223*** | -0.0452*** | -0.0302*** |
| | -(0.0067) | -(0.0096) | -(0.0084) | -(0.0084) | -(0.0084) | -(0.0086) | -(0.0090) | -(0.0076) | -(0.0081) | -(0.0082) |
| Cons. | -0.0351 | -0.1211** | -0.1836*** | -0.1148** | -0.0855 | -0.0581 | -0.1352** | -0.2146*** | -0.2788*** | -0.3153*** |
| | -(0.0524) | -(0.0515) | -(0.0532) | -(0.0554) | -(0.0560) | -(0.0567) | -(0.0585) | -(0.0589) | -(0.0607) | -(0.0604) |
| N | 9494 | 11101 | 11102 | 11157 | 11087 | 10875 | 10493 | 9982 | 9301 | 9193 |
| Adj. R-squared | 0.189 | 0.158 | 0.177 | 0.166 | 0.163 | 0.153 | 0.145 | 0.147 | 0.153 | 0.152 |

| Net Leverage | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| Fam90 | -0.0024 | -0.0207*** | -0.0237*** | -0.0380*** | -0.0406*** | -0.0412*** | -0.0325*** | -0.0409*** | -0.0404*** | -0.0332*** |
| | -(0.0071) | -(0.0068) | -(0.0071) | -(0.0075) | -(0.0077) | -(0.0080) | -(0.0081) | -(0.0083) | -(0.0086) | -(0.0087) |
| Firm Size | 0.0328*** | 0.0392*** | 0.0388*** | 0.0257*** | 0.0212*** | 0.0260*** | 0.0289*** | 0.0312*** | 0.0293*** | 0.0298*** |
| | -(0.0044) | -(0.0038) | -(0.0039) | -(0.0041) | -(0.0042) | -(0.0042) | -(0.0044) | -(0.0044) | -(0.0045) | -(0.0045) |
| Tangibility | 0.3027*** | 0.3098*** | 0.3604*** | 0.4372*** | 0.4285*** | 0.3922*** | 0.3779*** | 0.3912*** | 0.3962*** | 0.3912*** |
| | -(0.0183) | -(0.0157) | -(0.0162) | -(0.0168) | -(0.0172) | -(0.0178) | -(0.0187) | -(0.0192) | -(0.0196) | -(0.0201) |
| ROA | -0.9220*** | -0.6805*** | -0.6463*** | -0.5616*** | -0.5103*** | -0.5220*** | -0.5316*** | -0.5043*** | -0.4356*** | -0.4552*** |
| | -(0.0364) | -(0.0278) | -(0.0272) | -(0.0301) | -(0.0307) | -(0.0316) | -(0.0335) | -(0.0342) | -(0.0353) | -(0.0335) |
| Growth Opportunity | 0.0063*** | 0.0129*** | 0.0198*** | 0.0302*** | 0.0335*** | 0.0275*** | 0.0272*** | 0.0369*** | 0.0414*** | 0.0443*** |
| | -(0.0019) | -(0.0017) | -(0.0017) | -(0.0018) | -(0.0018) | -(0.0017) | -(0.0018) | -(0.0020) | -(0.0022) | -(0.0024) |
| Company Age | -0.0016*** | -0.0018*** | -0.0020*** | -0.0015*** | -0.0013*** | -0.0014*** | -0.0013*** | -0.0010*** | -0.0009*** | -0.0008** |
| | -(0.0003) | -(0.0003) | -(0.0003) | -(0.0003) | -(0.0003) | -(0.0003) | -(0.0003) | -(0.0003) | -(0.0003) | -(0.0003) |
| Payout Ratio | 0.0795*** | 0.0248** | 0.0074 | -0.0401*** | -0.0601*** | -0.0612*** | -0.0204* | -0.0285*** | -0.0468*** | -0.0348*** |
| | -(0.0090) | -(0.0114) | -(0.0103) | -(0.0107) | -(0.0107) | -(0.0108) | -(0.0116) | -(0.0095) | -(0.0101) | -(0.0104) |
| Cons. | 0.0367 | -0.1236** | -0.2070*** | -0.0853 | -0.0271 | -0.0586 | -0.1290* | -0.1956*** | -0.2052*** | -0.2287*** |
| | -(0.0715) | -(0.0618) | -(0.0646) | -(0.0674) | -(0.0679) | -(0.0687) | -(0.0721) | -(0.0731) | -(0.0755) | -(0.0751) |
| N | 5101 | 7743 | 7778 | 7829 | 7845 | 7716 | 7263 | 6861 | 6360 | 6262 |
| Adj. R-squared | 0.208 | 0.167 | 0.178 | 0.173 | 0.166 | 0.148 | 0.134 | 0.146 | 0.143 | 0.14 |

### 1.5.2 Operational risk – Coefficient of Variation (Revenue)

| CV Revenue | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| Fam50 | -0.0078*** | -0.0154*** | -0.0177*** | -0.0171*** | -0.0157*** | -0.0140*** | -0.0060* | -0.0037 | -0.0070** | -0.0165*** |
| | -(0.0027) | -(0.0031) | -(0.0032) | -(0.0031) | -(0.0032) | -(0.0032) | -(0.0031) | -(0.0033) | -(0.0035) | -(0.0039) |
| Firm Size | 0.0337*** | 0.0418*** | 0.0413*** | 0.0299*** | 0.0178*** | 0.0253*** | 0.0317*** | 0.0350*** | 0.0310*** | 0.0406*** |
| | -(0.0017) | -(0.0017) | -(0.0018) | -(0.0017) | -(0.0017) | -(0.0017) | -(0.0016) | -(0.0017) | -(0.0019) | -(0.0020) |
| Tangibility | -0.0217*** | -0.0402*** | -0.0495*** | -0.0391*** | -0.0197*** | -0.0122 | -0.0156** | -0.0375*** | -0.0154* | -0.0156* |
| | -(0.0073) | -(0.0075) | -(0.0077) | -(0.0074) | -(0.0075) | -(0.0075) | -(0.0072) | -(0.0077) | -(0.0084) | -(0.0092) |
| ROA | 0.0949*** | 0.0941*** | 0.0355*** | -0.1162*** | -0.1526*** | -0.0977*** | -0.0115 | -0.0108 | -0.0081 | -0.0479*** |
| | -(0.0137) | -(0.0124) | -(0.0120) | -(0.0121) | -(0.0122) | -(0.0123) | -(0.0122) | -(0.0129) | -(0.0142) | -(0.0144) |
| Growth Opportunity | 0.0042*** | 0.0036*** | 0.0045*** | -0.0008 | -0.0056*** | -0.0008 | 0.0020*** | 0.0021** | 0.0019* | 0.0049*** |
| | -(0.0008) | -(0.0008) | -(0.0008) | -(0.0009) | -(0.0008) | -(0.0008) | -(0.0008) | -(0.0009) | -(0.0010) | -(0.0012) |
| Company Age | -0.0011*** | -0.0010*** | -0.0010*** | -0.0008*** | -0.0008*** | -0.0009*** | -0.0012*** | -0.0012*** | -0.0011*** | -0.0012*** |
| | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0002) |
| Payout Ratio | -0.0216*** | -0.008 | -0.0145*** | -0.0102** | -0.0092** | -0.0096** | -0.0131*** | -0.0132*** | -0.0176*** | -0.0146*** |
| | -(0.0035) | -(0.0052) | -(0.0046) | -(0.0042) | -(0.0042) | -(0.0042) | -(0.0041) | -(0.0037) | -(0.0041) | -(0.0046) |
| Net Leverage | 0.0142*** | 0.0166*** | 0.005 | -0.0079* | -0.0056 | 0.0012 | 0.0153*** | 0.0188*** | 0.0162*** | 0.0143** |
| | -(0.0053) | -(0.0052) | -(0.0052) | -(0.0048) | -(0.0048) | -(0.0047) | -(0.0045) | -(0.0048) | -(0.0053) | -(0.0058) |
| Cons. | -0.3530*** | -0.4507*** | -0.4225*** | -0.2171*** | -0.0202 | -0.1595*** | -0.2780*** | -0.3258*** | -0.2673*** | -0.4084*** |
| | -(0.0272) | -(0.0280) | -(0.0290) | -(0.0279) | -(0.0281) | -(0.0277) | -(0.0268) | -(0.0283) | -(0.0309) | -(0.0334) |
| N | 9243 | 10975 | 11017 | 11053 | 11031 | 10832 | 10438 | 9935 | 9267 | 9121 |
| Adj. R-Squared | 0.098 | 0.124 | 0.12 | 0.108 | 0.1 | 0.106 | 0.126 | 0.127 | 0.109 | 0.12 |

| CV Revenue | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| Fam50_CEO | -0.0058** | -0.0101*** | -0.0089*** | -0.0125*** | -0.0124*** | -0.0099*** | -0.0038 | 0.0007 | -0.003 | -0.0122*** |
| | -(0.0027) | -(0.0028) | -(0.0029) | -(0.0029) | -(0.0029) | -(0.0029) | -(0.0028) | -(0.0030) | -(0.0033) | -(0.0036) |
| Firm Size | 0.0337*** | 0.0419*** | 0.0416*** | 0.0298*** | 0.0177*** | 0.0253*** | 0.0317*** | 0.0352*** | 0.0311*** | 0.0405*** |
| | -(0.0017) | -(0.0017) | -(0.0018) | -(0.0017) | -(0.0017) | -(0.0017) | -(0.0016) | -(0.0017) | -(0.0019) | -(0.0020) |
| Tangibility | -0.0218*** | -0.0408*** | -0.0507*** | -0.0389*** | -0.0193** | -0.0118 | -0.0156** | -0.0383*** | -0.0160* | -0.0153* |
| | -(0.0073) | -(0.0075) | -(0.0077) | -(0.0075) | -(0.0075) | -(0.0075) | -(0.0072) | -(0.0078) | -(0.0084) | -(0.0093) |
| ROA | 0.0948*** | 0.0939*** | 0.0353*** | -0.1167*** | -0.1531*** | -0.0980*** | -0.0115 | -0.0114 | -0.0082 | -0.0479*** |
| | -(0.0137) | -(0.0124) | -(0.0120) | -(0.0121) | -(0.0122) | -(0.0123) | -(0.0122) | -(0.0129) | -(0.0142) | -(0.0144) |
| Growth Opportunity | 0.0041*** | 0.0035*** | 0.0044*** | -0.0009 | -0.0057*** | -0.0009 | 0.0020*** | 0.0020** | 0.0018* | 0.0049*** |
| | -(0.0008) | -(0.0008) | -(0.0008) | -(0.0009) | -(0.0008) | -(0.0008) | -(0.0008) | -(0.0009) | -(0.0010) | -(0.0012) |
| Company Age | -0.0011*** | -0.0011*** | -0.0010*** | -0.0009*** | -0.0008*** | -0.0009*** | -0.0012*** | -0.0012*** | -0.0011*** | -0.0012*** |
| | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0002) |
| Payout Ratio | -0.0215*** | -0.0077 | -0.0137*** | -0.0095** | -0.0087** | -0.0091** | -0.0129*** | -0.0130*** | -0.0173*** | -0.0141*** |
| | -(0.0035) | -(0.0052) | -(0.0046) | -(0.0042) | -(0.0042) | -(0.0042) | -(0.0041) | -(0.0037) | -(0.0041) | -(0.0046) |
| Net Leverage | 0.0140*** | 0.0157*** | 0.0043 | -0.0089* | -0.0066 | 0.0003 | 0.0151*** | 0.0191*** | 0.0163*** | 0.0137** |
| | -(0.0053) | -(0.0052) | -(0.0052) | -(0.0048) | -(0.0048) | -(0.0047) | -(0.0045) | -(0.0048) | -(0.0053) | -(0.0058) |
| Cons. | -0.3543*** | -0.4545*** | -0.4329*** | -0.2194*** | -0.0209 | -0.1611*** | -0.2797*** | -0.3318*** | -0.2719*** | -0.4107*** |
| | -(0.0273) | -(0.0281) | -(0.0291) | -(0.0280) | -(0.0281) | -(0.0279) | -(0.0269) | -(0.0284) | -(0.0310) | -(0.0335) |
| N | 9243 | 10975 | 11017 | 11053 | 11031 | 10832 | 10438 | 9935 | 9267 | 9121 |
| Adj. R-Squared | 0.098 | 0.123 | 0.118 | 0.107 | 0.099 | 0.105 | 0.125 | 0.127 | 0.108 | 0.119 |

| CV Revenue | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| Fam90 | 0.0018 | 0.0001 | -0.0046 | -0.0067* | -0.0002 | 0.0013 | 0.0017 | 0.0046 | 0.0021 | -0.0091* |
| | -(0.0035) | -(0.0036) | -(0.0037) | -(0.0035) | -(0.0035) | -(0.0036) | -(0.0035) | -(0.0037) | -(0.0039) | -(0.0055) |
| Firm Size | 0.0291*** | 0.0376*** | 0.0354*** | 0.0270*** | 0.0186*** | 0.0229*** | 0.0274*** | 0.0294*** | 0.0233*** | 0.0301*** |
| | -(0.0025) | -(0.0024) | -(0.0025) | -(0.0024) | -(0.0022) | -(0.0032) | -(0.0031) | -(0.0034) | -(0.0037) | -(0.0060) |
| Tangibility | -0.0228** | -0.0432*** | -0.0414*** | -0.0398*** | -0.0243** | -0.0105 | -0.0033 | -0.0256*** | -0.0015 | -0.006 |
| | -(0.0096) | -(0.0087) | -(0.0090) | -(0.0086) | -(0.0096) | -(0.0097) | -(0.0101) | -(0.0091) | -(0.0102) | -(0.0111) |
| ROA | 0.1075*** | 0.1158*** | 0.0694*** | -0.1100*** | -0.1507*** | -0.0817*** | 0.0026 | 0.0317 | 0.0192 | -0.0215 |
| | -(0.0266) | -(0.0182) | -(0.0173) | -(0.0186) | -(0.0179) | -(0.0175) | -(0.0210) | -(0.0217) | -(0.0204) | -(0.0201) |
| Growth Opportunity | 0.0020** | 0.0023*** | 0.0030*** | -0.0009 | -0.0043*** | -0.0009 | 0.0015** | 0.001 | -0.0002 | 0.0036 |
| | -(0.0009) | -(0.0008) | -(0.0009) | -(0.0008) | -(0.0008) | -(0.0007) | -(0.0008) | -(0.0008) | -(0.0008) | -(0.0033) |
| Company Age | -0.0008*** | -0.0008*** | -0.0007*** | -0.0006*** | -0.0006*** | -0.0007*** | -0.0010*** | -0.0010*** | -0.0009*** | -0.0009*** |
| | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0001) | -(0.0002) | -(0.0002) |
| Payout Ratio | -0.0194*** | -0.0048 | -0.0165*** | -0.0135*** | -0.0121*** | -0.0082 | -0.0148*** | -0.0112*** | -0.0139*** | -0.008 |
| | -(0.0045) | -(0.0074) | -(0.0049) | -(0.0044) | -(0.0040) | -(0.0053) | -(0.0047) | -(0.0039) | -(0.0046) | -(0.0055) |
| Net Leverage | 0.0253*** | 0.0280*** | 0.0102 | -0.0066 | -0.0028 | -0.0018 | 0.0148*** | 0.0244*** | 0.0197*** | 0.0111 |
| | -(0.0073) | -(0.0065) | -(0.0063) | -(0.0054) | -(0.0054) | -(0.0062) | -(0.0056) | -(0.0052) | -(0.0055) | -(0.0080) |
| Cons. | -0.2933*** | -0.4073*** | -0.3508*** | -0.1861*** | -0.0525 | -0.1357** | -0.2228*** | -0.2538*** | -0.1596** | -0.2587*** |
| | -(0.0398) | -(0.0378) | -(0.0413) | -(0.0378) | -(0.0357) | -(0.0527) | -(0.0503) | -(0.0558) | -(0.0621) | -(0.0961) |
| N | 5042 | 7665 | 7719 | 7773 | 7808 | 7686 | 7240 | 6829 | 6335 | 6215 |
| Adj. R-Squared | 0.101 | 0.129 | 0.125 | 0.119 | 0.118 | 0.114 | 0.121 | 0.122 | 0.101 | 0.101 |

### 1.5.3 Operational risk – Degree of Operating Leverage

| DOL | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| Fam50 | 0.0004 | -0.002 | 0.0240* | 0.0066 | -0.0108 | -0.0218* | -0.0295** | -0.013 | -0.0317** | -0.0201 |
| | -(0.0124) | -(0.0126) | -(0.0128) | -(0.0126) | -(0.0124) | -(0.0127) | -(0.0126) | -(0.0131) | -(0.0135) | -(0.0136) |
| Firm Size | 0.0439*** | 0.0588*** | 0.0350*** | 0.0139** | -0.0024 | -0.0138** | -0.0066 | 0.0065 | 0.0094 | 0.0043 |
| | -(0.0076) | -(0.0069) | -(0.0070) | -(0.0068) | -(0.0066) | -(0.0066) | -(0.0066) | -(0.0068) | -(0.0070) | -(0.0070) |
| Tangiility | -0.1482*** | -0.1055*** | -0.1582*** | -0.1753*** | -0.1885*** | -0.1001*** | -0.0866*** | -0.1482*** | -0.1019*** | -0.0713** |
| | -(0.0335) | -(0.0305) | -(0.0303) | -(0.0298) | -(0.0289) | -(0.0294) | -(0.0295) | -(0.0309) | -(0.0319) | -(0.0325) |
| ROA | 1.5619*** | 1.6459*** | 1.1119*** | 0.2632*** | -0.0115 | 0.4283*** | 0.7725*** | 0.3990*** | 0.4081*** | 0.1437*** |
| | -(0.0622) | -(0.0507) | -(0.0475) | -(0.0484) | -(0.0470) | -(0.0485) | -(0.0497) | -(0.0516) | -(0.0537) | -(0.0507) |
| Growth Opportunity | -0.0104*** | -0.0095*** | -0.0204*** | -0.0243*** | -0.0320*** | -0.0311*** | -0.0274*** | -0.0215*** | -0.0230*** | -0.0190*** |
| | -(0.0036) | -(0.0034) | -(0.0034) | -(0.0035) | -(0.0033) | -(0.0031) | -(0.0031) | -(0.0035) | -(0.0039) | -(0.0042) |
| Company Age | -0.0003 | -0.0010** | -0.0007 | -0.0009* | -0.0002 | -0.0005 | -0.0007 | -0.0008* | -0.0006 | -0.0005 |
| | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) |
| Payout Ratio | 0.0273* | 0.0209 | -0.0154 | 0.0195 | 0.0440*** | 0.0296* | 0.019 | 0.0355** | 0.0366** | 0.0322** |
| | -(0.0158) | -(0.0212) | -(0.0181) | -(0.0169) | -(0.0164) | -(0.0166) | -(0.0169) | -(0.0146) | -(0.0156) | -(0.0160) |
| Net Leverage | 0.0085 | -0.0238 | -0.0461** | -0.1543*** | -0.1507*** | -0.1078*** | -0.1115*** | -0.1118*** | -0.1373*** | -0.1243*** |
| | -(0.0243) | -(0.0211) | -(0.0205) | -(0.0191) | -(0.0184) | -(0.0184) | -(0.0183) | -(0.0192) | -(0.0200) | -(0.0203) |
| Cons. | -0.3613*** | -0.6057*** | -0.1201 | 0.3893*** | 0.7051*** | 0.8155*** | 0.6502*** | 0.4588*** | 0.4090*** | 0.5052*** |
| | -(0.1241) | -(0.1140) | -(0.1149) | -(0.1118) | -(0.1082) | -(0.1089) | -(0.1097) | -(0.1132) | -(0.1170) | -(0.1173) |
| N | 9243 | 10975 | 11017 | 11053 | 11031 | 10832 | 10438 | 9935 | 9267 | 9121 |
| Adj. R-squared | 0.102 | 0.119 | 0.077 | 0.035 | 0.036 | 0.039 | 0.055 | 0.035 | 0.034 | 0.019 |

| DOL | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| Fam50_CEO | -0.005 | -0.003 | 0.0193* | 0.0084 | -0.0081 | -0.0198* | -0.0195* | -0.0036 | -0.0186 | -0.0144 |
| | -(0.0124) | -(0.0115) | -(0.0117) | -(0.0114) | -(0.0112) | -(0.0114) | -(0.0116) | -(0.0121) | -(0.0125) | -(0.0126) |
| Firm Size | 0.0435*** | 0.0587*** | 0.0352*** | 0.0142** | -0.0024 | -0.0143** | -0.0066 | 0.0068 | 0.0096 | 0.0043 |
| | -(0.0077) | -(0.0070) | -(0.0070) | -(0.0068) | -(0.0066) | -(0.0066) | -(0.0067) | -(0.0069) | -(0.0071) | -(0.0070) |
| Tangiility | -0.1472*** | -0.1051*** | -0.1585*** | -0.1763*** | -0.1884*** | -0.0985*** | -0.0862*** | -0.1493*** | -0.1029*** | -0.0710** |
| | -(0.0335) | -(0.0305) | -(0.0303) | -(0.0298) | -(0.0289) | -(0.0294) | -(0.0296) | -(0.0310) | -(0.0319) | -(0.0326) |
| ROA | 1.5621*** | 1.6459*** | 1.1121*** | 0.2628*** | -0.0118 | 0.4282*** | 0.7729*** | 0.3981*** | 0.4082*** | 0.1437*** |
| | -(0.0622) | -(0.0507) | -(0.0475) | -(0.0484) | -(0.0470) | -(0.0485) | -(0.0498) | -(0.0516) | -(0.0537) | -(0.0507) |
| Growth Opportunity | -0.0104*** | -0.0095*** | -0.0203*** | -0.0243*** | -0.0321*** | -0.0312*** | -0.0275*** | -0.0216*** | -0.0231*** | -0.0190*** |
| | -(0.0036) | -(0.0034) | -(0.0033) | -(0.0034) | -(0.0033) | -(0.0031) | -(0.0031) | -(0.0035) | -(0.0039) | -(0.0042) |
| Company Age | -0.0003 | -0.0010** | -0.0007 | -0.0009* | -0.0002 | -0.0006 | -0.0007 | -0.0009* | -0.0006 | -0.0005 |
| | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) | -(0.0005) |
| Payout Ratio | 0.0271* | 0.021 | -0.0163 | 0.0194 | 0.0444*** | 0.0302* | 0.02 | 0.0360** | 0.0373** | 0.0328** |
| | -(0.0158) | -(0.0212) | -(0.0180) | -(0.0169) | -(0.0164) | -(0.0166) | -(0.0169) | -(0.0146) | -(0.0156) | -(0.0160) |
| Net Leverage | 0.0085 | -0.024 | -0.0445** | -0.1537*** | -0.1514*** | -0.1098*** | -0.1128*** | -0.1115*** | -0.1377*** | -0.1250*** |
| | -(0.0243) | -(0.0211) | -(0.0205) | -(0.0191) | -(0.0184) | -(0.0185) | -(0.0184) | -(0.0193) | -(0.0201) | -(0.0203) |
| Cons. | -0.3536*** | -0.6034*** | -0.1183 | 0.3842*** | 0.7038*** | 0.8202*** | 0.6435*** | 0.4479*** | 0.3969*** | 0.5017*** |
| | -(0.1244) | -(0.1144) | -(0.1151) | -(0.1121) | -(0.1085) | -(0.1094) | -(0.1101) | -(0.1136) | -(0.1174) | -(0.1178) |
| N | 9243 | 10975 | 11017 | 11053 | 11031 | 10832 | 10438 | 9935 | 9267 | 9121 |
| Adj. R-squared | 0.102 | 0.119 | 0.077 | 0.035 | 0.036 | 0.039 | 0.055 | 0.035 | 0.034 | 0.019 |

| DOL | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|
| Fam90 | 0.0276 | -0.0207 | -0.0151 | 0.0003 | -0.0159 | -0.0308** | -0.0453*** | -0.0255 | -0.0235 | -0.0196 |
| | -(0.0173) | -(0.0153) | -(0.0155) | -(0.0152) | -(0.0148) | -(0.0153) | -(0.0152) | -(0.0159) | -(0.0163) | -(0.0166) |
| Firm Size | 0.0428*** | 0.0580*** | 0.0354*** | 0.0169** | -0.001 | -0.0123 | -0.0012 | 0.0083 | 0.0134 | 0.0096 |
| | -(0.0108) | -(0.0086) | -(0.0086) | -(0.0084) | -(0.0080) | -(0.0080) | -(0.0082) | -(0.0085) | -(0.0087) | -(0.0087) |
| Tangiility | -0.0802* | -0.0858** | -0.1250*** | -0.1421*** | -0.1811*** | -0.0872** | -0.0734** | -0.1204*** | -0.0991*** | -0.0934** |
| | -(0.0458) | -(0.0363) | -(0.0364) | -(0.0357) | -(0.0344) | -(0.0352) | -(0.0359) | -(0.0376) | -(0.0385) | -(0.0396) |
| ROA | 1.5502*** | 1.6386*** | 1.1042*** | 0.1561** | -0.0688 | 0.4668*** | 0.7713*** | 0.3856*** | 0.3961*** | 0.0637 |
| | -(0.0941) | -(0.0651) | -(0.0617) | -(0.0626) | -(0.0599) | -(0.0617) | -(0.0638) | -(0.0663) | -(0.0679) | -(0.0653) |
| Growth Opportunity | -0.0101** | -0.0085** | -0.0187*** | -0.0179*** | -0.0269*** | -0.0279*** | -0.0259*** | -0.0216*** | -0.0230*** | -0.0176*** |
| | -(0.0045) | -(0.0037) | -(0.0037) | -(0.0038) | -(0.0035) | -(0.0034) | -(0.0034) | -(0.0039) | -(0.0043) | -(0.0047) |
| Company Age | 0.0003 | -0.0017*** | -0.0009 | -0.0014** | -0.0003 | -0.0005 | -0.0002 | -0.0004 | -0.0003 | 0.0001 |
| | -(0.0007) | -(0.0006) | -(0.0006) | -(0.0006) | -(0.0005) | -(0.0006) | -(0.0006) | -(0.0006) | -(0.0006) | -(0.0006) |
| Payout Ratio | 0.0366* | 0.0367 | -0.0156 | 0.0103 | 0.0049 | 0.0125 | 0.0366* | 0.0467*** | 0.0390** | 0.0138 |
| | -(0.0220) | -(0.0256) | -(0.0223) | -(0.0217) | -(0.0205) | -(0.0206) | -(0.0216) | -(0.0180) | -(0.0192) | -(0.0199) |
| Net Leverage | -0.0042 | -0.0236 | -0.034 | -0.1651*** | -0.1573*** | -0.1189*** | -0.1272*** | -0.0959*** | -0.1253*** | -0.1179*** |
| | -(0.0342) | -(0.0257) | -(0.0248) | -(0.0230) | -(0.0217) | -(0.0218) | -(0.0220) | -(0.0230) | -(0.0239) | -(0.0243) |
| Cons. | -0.3758** | -0.5754*** | -0.1009 | 0.3525** | 0.6894*** | 0.7886*** | 0.5699*** | 0.4131*** | 0.3182** | 0.4063*** |
| | -(0.1745) | -(0.1397) | -(0.1410) | -(0.1373) | -(0.1305) | -(0.1315) | -(0.1349) | -(0.1392) | -(0.1436) | -(0.1443) |
| N | 5042 | 7665 | 7719 | 7773 | 7808 | 7686 | 7240 | 6829 | 6335 | 6215 |
| Adj. R-squared | 0.086 | 0.107 | 0.066 | 0.031 | 0.036 | 0.039 | 0.056 | 0.03 | 0.031 | 0.017 |