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MSc Thesis in Finance

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The Effect of Founding Family Ownership on Financial Constraints*

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Abstract:

This paper studies the effect of founding family ownership on financial constraints. We hypothesize that capital markets frictions arising from informational asymmetries and agency conflicts are mitigated by the presence of founding family shareholders, thus rendering lower financial constraints. The underlying reason behind this hypothesis stems from the nature of family owners as being committed, long-term and undiversified shareholders. This in turn induces monitoring incentives and less proneness to promote risk shifting activities. We test our hypothesis using traditional measures (indices) of financial constraints by performing regressions on a US panel dataset containing 16,230 firm-years with observations ranging from 2001 to 2010. A second test is conducted studying corporate actions with regards to liquidity management and investment policies over the 2008 Financial Crisis. Our results indicate that family firms on average may face lower financial constraints than non-family firms. This is true when electing to place more weight on two proxies, which arguably have more solid theoretical and empirical foundations than other proxies. We, furthermore, find that family firms deploying supervoting share class systems see lower benefits of family ownership. This may be due to the risk of family private benefit extraction, through for instance excessive risk aversion, being exacerbated. Also, family CEOs appear to be more efficient than outside (professional) CEOs in lowering financial constraints. This may be due to private creditors valuing the long-term nature of their relationship to the families as well as the unique idiosyncratic knowledge of especially founders. Finally, we raise the possibility that our results are not due to family ownership mitigating information asymmetries and net agency costs, but that they rather stem from excessive risk aversion.

Keywords: Family Firms, Financial Constraints, Information Asymmetries, Agency Costs

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1. Introduction

With the majority of all firms being controlled by founding families, founding family ownership is the most prevalent organizational form in the world (Lagaras and Tsoutsoura, 2015). Although not quite as common among publicly traded firms, one third of all firms listed on the S&P 500 have founding family ownership presence (Anderson and Reeb, 2003). A firm is commonly referred to as a so-called family firm if the founder, or his or her descendants[1], holds a block of the firm's outstanding common stock of shares and/or votes[2]. Founding family owners are not only common, but have historically attracted the interest from researchers due primarily to the implications of their presence to agency conflicts and information asymmetries[3]. Agency conflicts often arise in information asymmetric settings involving more than one party, where the different parties have different interests as well as where one or more parties have decision-making authority affecting the wealth of one or more other parties (Jensen and Meckling, 1976; Jensen, 1986). Information asymmetries and agency conflicts give rise to agency costs and constitute frictions that hamper firms' abilities to freely raise capital in the capital markets (Bernanke and Gertler, 1989; Lamont et al, 2001). Accordingly, financial constraints can be described as frictions in the supply of capital to a firm, which may prevent a firm from funding attractive investments and business opportunities (Lamont et al, 2001). A firm that is unable to raise external capital, even if it is willing to pay a higher cost of capital, is facing an inelastic external capital supply curve and is considered to be constrained financially (Almeida and Campello, 2002; Stiglitz and Weiss, 1981; Whited and Wu, 2006). Such a firm naturally also faces a greater wedge between the internal cost of capital, as reflected in the actual risk of the firm's assets, and the cost at which the firm may raise capital externally (Fazzari et al, 1988; Kaplan and Zingales, 1997).

When discussing information asymmetries and agency theory in presence of founding family ownership, academics commonly point out a few key characteristics. Quite different from, for instance, institutional blockholders, founding families are undiversified and prone to favor long-term business continuity of the firm – a firm which may be seen as an asset to be passed on to future generations (Anderson and Reeb, 2003; Casson, 1999; Chami, 1998). The potential effects of these characteristics with respect to agency conflicts are two-fold. On the one hand, founding families may use their control

[1] Anyone related, by blood or marriage, to the founder (Villalonga and Amit, 2006).
[2] In this paper a family firm is one where the founding family holds 5% or more of the outstanding shares or voting rights. This follows the definition used by Anderson et al (2012) and Anderson et al (2009), but cutoffs with regards to holding of common equity and/or outstanding voting rights differ between different papers.
[3] One party has better and/or more information than another party.

to extract family private benefits by, for instance, promoting excessively risk averse corporate investment policies or by paying excessive compensations to family CEOs (Audretsch et al, 2013; Burkart et al, 2003). The risk of such actions may give rise to agency costs related to the conflict between family and non-family shareholders. On the other hand, being committed to the long-term and having a large concentration of family wealth and reputation invested in the family firm, founding families may be more keen to assume the position as monitors of firm management as well as be less prone to engage in risk shifting[4] activities (Anderson and Reeb, 2003; Audretsch et al, 2010; Jensen and Meckling, 1976; Mansi and Reeb, 2002). This does not only decrease potential agency costs to creditors, but monitoring of management certainly also decreases agency costs related to the owner-manager relationship.

This paper hypothesizes that founding family owners contribute to lowering agency costs stemming from information asymmetries and agency conflicts, implying that family firms on average face lower financial constraints than non-family firms. Our hypothesis is supported by previous empirical studies, including findings that family firms on average enjoy lower (agency) costs of debt than non-family firms (Anderson et al, 2003) and that the increase in credit spreads during the 2008 Financial Crisis was lower for family firms (Lagaras and Tsoutsoura, 2015). Family firms have also been found to be more information transparent and supply higher-quality accounting information (Ali et al, 2007; Chen et al, 2007). Finally, family firms appear to perform better operationally and enjoy an equity valuation premium (Anderson and Reeb, 2003; Audretsch et al, 2010; Villalonga and Amit, 2006).

The observation of firms' internal and external capital supply curves is not directly possible. Therefore, for our analysis we need to rely on proxies as indicators of financial constraints. Such measures usually look to company characteristics or actions and academics debate on which measures are appropriate to use. First, we refer to four indices previously used in research measuring firm characteristics. We study the differences between family and non-family firms in a regression analysis of a panel dataset of 16,230 firm-years ranging from 2001 to 2010. Second, we study real actions of firms over the 2008 Financial Crisis and compute average treatment effects on the treated (ATT) by matching family firms to non-family firms using the Abadie and Imbens (2003) estimator. Given that

[4] An activity where shareholders promote more risky investments, increasing firm value volatility. This increases the value of the equity option, but also increases the bankruptcy risk, decreasing the expected payments to creditors (Jensen and Meckling, 1976).

the various proxies have limited overlap, we consider the debate in previous research on the theoretical and empirical validity of each measure when analyzing our results.

We complement the main study on the effects of family ownership on financial constraints with a handful additional sub-studies. Previous studies have indicated that family firms do best when the control and monitoring functions are separated and when control rights do not exceed cash flow rights. Else, the risk of family private benefit extraction is exacerbated and agency costs may exceed or diminish any potential agency benefits of family ownership. Control-enhancing mechanisms, such as supervoting share class systems[5], have been found to be negative to family firm value (Villalonga and Amit, 2006; Pérez-González, 2006). Thus, we hypothesize that the presence of a supervoting share class systems lowers any potential benefits stemming from family ownership with respect to access to financing. Family CEOs may, one the one hand, for the above reasons, increase the likelihood of family private benefit extraction. On the other hand, they have been found to contribute to even lower costs of (private) debt, potentially due to their long-term relationships with private creditors (Lagaras and Tsoutsoura, 2015). Founding families also possess unique firm-specific skills (Audretsch et al, 2013); possibly more so the founders rather than their descendant who are not necessarily hired for skill (Anderson et al, 2003; Cheng, 2014). Thus, although we hypothesize founder CEOs are more efficient in lowering financial constraints than descendant CEOs, the expected net effect on financial constraints with regards to family CEOs as a group is not completely clear from studying the existing literature. We gather data on who is the CEO of each family firm for each year in our sample; the founder, a descendant to the founder or an outside (hired) CEO.

This paper finds support for the hypothesis that family firms on average possess characteristics and take actions that indicate they are less financially constrained than other firms. Support is found when using two of the proxies, which both arguably find better support in theory and empirical studies than the other proxies. Furthermore, the findings of this paper indicate that supervoting share class systems reduce the benefits of family ownership. Also, we find support for family CEOs being more successful in lowering financial constraints. The results are not unanimous with respect to descendant versus founder CEOs, however. This paper complements earlier studies on US family firms and their relationships with the capital markets. Rather than focusing on costs of financing, we add to this research by studying the effects of family ownership on access to financing. Although the two fields

[5] Share class systems in which one class of common shares merits greater voting rights than another class of common shares.

are closely related, firms being perfectly constrained financially are unable to raise financing in the capital markets. In that case, the cost of capital this firm is willing to pay has no or little relevance.

Although we have reasons to believe the results are related to family owners mitigating information asymmetries and agency costs in general, an alternative explanation could be that founding family owners are excessively risk averse. Thus, if total agency costs of family ownership exceed total agency benefits of the same, our hypothesis does not hold. This possible explanation also highlights the potentially different agency consequences of family ownership with respect to relationships with equity and debt investors. Being beyond the scope of this paper, an interesting area for future research would be to study the effect of family ownership on financing constraints related to the equity and debt capital markets separately.

2. Previous Research and Theoretical Framework

Whenever firms approach the capital markets to raise financing, they will typically face frictions stemming from informational asymmetries and agency costs (Bernanke and Gertler, 1989). Information asymmetries exist when one party has better and/or more information than another party. In corporate finance, this may be due to managers of a firm having information superior to external funders with regards to the value of a project to be financed (Myers, 1984). Agency costs arise in situations involving more than one party, different interests among the parties and where one or more parties are awarded some sort of decision-making power influencing the wealth of one or more of the other parties. In other words, the party awarded decision-making authority (the agent) may not always act in the best interest of the party delegating decision-making authority (the principal). These agency costs are exacerbated by the existence of asymmetric information. Jensen and Meckling (1976) and Jensen (1986) defined agency costs incurred to the principal as costs of monitoring the activities of the agent plus direct interest-aligning payments to the agent plus any residual loss to the principal from non-welfare maximizing activities conducted by the agent. In the context of corporate finance, agency costs may arise in the relationships between for instance shareholders and managers, shareholders and debtholders and between shareholders.

2.1. Financial Constraints

2.1.1. Defining Financial Constraints

The above-described capital markets frictions may give rise to financial constraints. Simply defined, financial constraints exist when a firm's ability to fund all desired investments is fully or partially

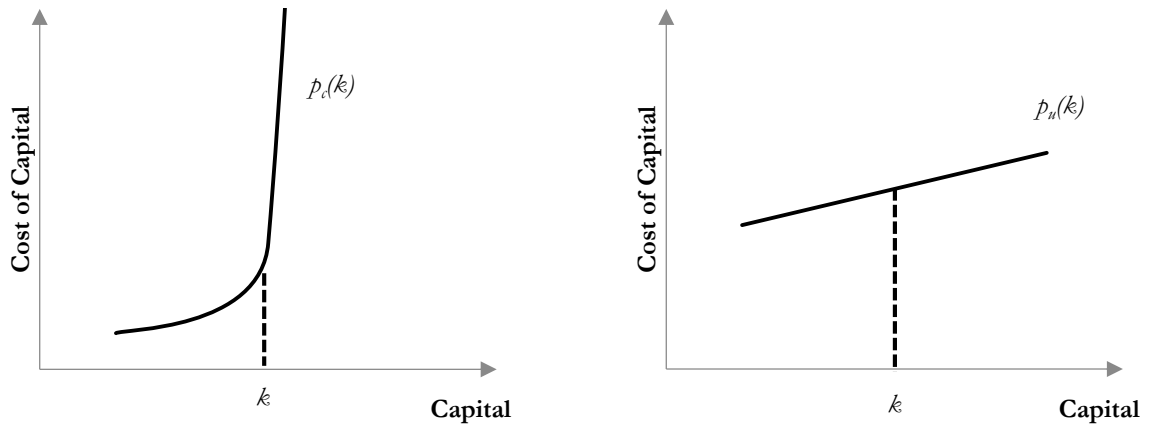
restricted, due to an inability to raise debt or equity securities or from the illiquidity of assets (Lamont et al, 2001).

More technically, one common definition of financial constraint (see for example Almeida and Campello, 2002; Stiglitz and Weiss, 1981; Whited and Wu, 2006) regards the curvature of the (external) capital supply curve. At its very extreme, a financially constrained firm faces a perfectly inelastic supply curve of capital, implying it will be unable to raise more external capital even though it would pay a higher cost of capital.

Another definition commonly mentioned in previous literature refers to the wedge between the costs of internal and external funding (see for example Fazzari et al, 1988; Kaplan and Zingales, 1997). The internal capital supply curve is equal to the external capital supply curve in a world of no frictions (Farre-Mensa and Ljungqvist, 2013). Thus, the internal capital supply curve reflects the firm's and its assets' actual risk. Almost all firms face some frictions, but the larger the wedge, the greater the financial constraint.

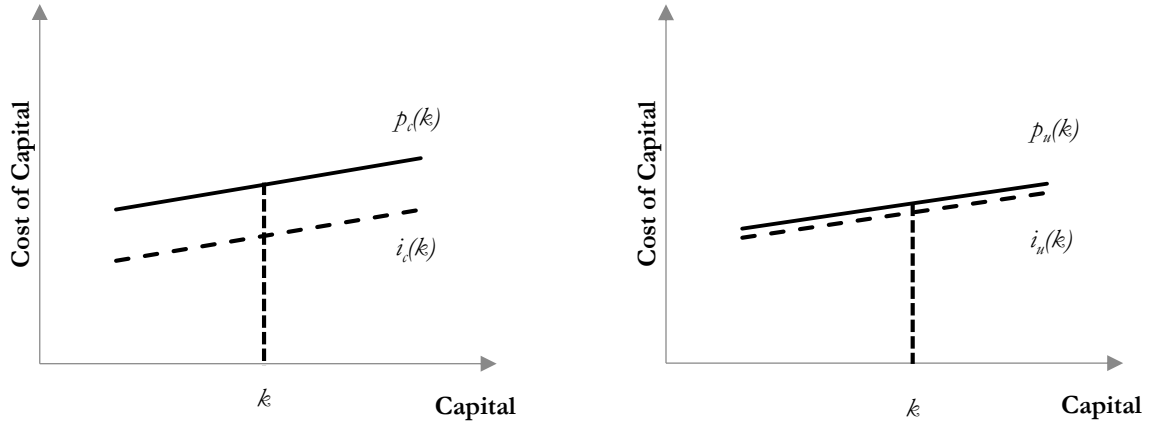
The two commonly used definitions referred to above intuitively overlap. Along the reasoning of Farre-Mensa and Ljungqvist (2013), a firm facing an increasingly inelastic capital supply curve probably also faces a greater wedge between internal and external financing costs. For a graphical illustration of the differences between constrained and unconstrained firms according to the two technical definitions, please refer to Exhibits 1 and 2.

Exhibit 1. Curvature Definition of Financial Constraints



The exhibit illustrates the external capital supply curves, $p(k)$, for one constrained and one unconstrained firm, both holding k units of capital. The unconstrained firm faces an inelsatic supply curve and is unable to raise more capital, regardless of the cost of capital it is willing to pay.
Source: Farre-Mensa and Ljungqvist (2013)

Exhibit 2. Wedge Definition of Financial Constraints



The exhibit illustrates the external, *p(k)*, as well as internal, *i(k)*, capital supply curves for one constrained and one unconstrained firm. The unconstrained firm faces a greater wedge between the cost of internal financing (i.e. the actual risk of firm assets) and external financing.
Source: Farre-Mensa and Ljungqvist (2013)

2.1.2. Measuring Financial Constraints – by Firm Characteristics

Since direct observation of the shape of a firm's external and internal capital supply curves is not entirely possible, researchers traditionally use various proxies to measure financial constraints. The suggested proxies often refer to some set of firm characteristics or actions that firms take. There has been an academic evolution and debate with regards to which proxies to actually use. Earlier proxies include defining financially constrained simply as not paying any dividends (see for example Fazzari et al, 1988) or as not having a credit rating (see for example Kashyap et al, 1994).

Based on Kaplan and Zingales's (1997), Lamont et al (2001) constructed a classification index, the KZ Index, using five accounting and market variables[6]. As alternatives to the KZ Index, two other popular alternative indices have subsequently been suggested. Hadlock and Pierce (2010) presented the SA Index[7] based on just size and age. Whited and Wu (2006) constructed the WW Index which essentially is a modified combination of the KZ and SA Indices, but with growth as an addition[8].

Farre-Mensa and Ljungqvist (2013) test traditional proxies of financial constraints, including all proxies presented above. They find that firms classified as financially constrained, do not appear to be constrained with respect to the ability to raise external financing. Instead they propose Distance to

[6] Cash flow, Tobin's Q, leverage, dividends and cash holdings.
[7] Commonly referred to either as the HP Index or the SA Index.
[8] Cash flow, dividend payment status, leverage, size, firm sales growth and industry sales growth.

Default (DtD) as a measure of financial constraints. The definition follows Bharath and Shumway (2008), in turn built on Merton's (1974) work, and includes measures on market leverage, equity returns and variation in total firm market value.

2.1.3. Measuring Financial Constraints – by Firm Actions

Several earlier studies state that, due to limited ability to raise external capital, the investment spend of financially constrained firms is more sensitive to the availability of internal cash flow generation (Fazzari et al, 1988). Investment-cash flow sensitivity has been argued for investments in, for instance, capital (Fazzari et al, 1988), inventories (Carpenter et al, 1993) and R&D (Hall, 2004).

As a response to the above, Kaplan and Zingales (1997) state that investment-cash flow sensitivity is not a good measure of financial constraints. Rather, they find that firms that appear less financially constrained experience higher investment-cash flow sensitivity. They also claim that the monotonic relationship but forward by Fazzari et al (1988) should not be taken for granted. Almeida and Campello (2002) and Pal and Kozhan (2009) present non-monotonic models of investment-cash flow sensitivity in relation to financing constraints. Almeida and Campello (2002) describe non-monotonicity with amplification effects – within the group of constrained firms, a cash flow shock will render a higher sensitivity of investments for those firms that are less constrained due to having a higher borrowing capacity. In a recent study, Chen and Chen (2012) claim that investment-cash flow sensitivity has declined over time and has completely disappeared in recent years, leaving the reason behind this open for future debate.

Another potential criticism to the theories of Fazzari et al (1988) relates to that a cut in investment might be the effect of current lack of NPV[9] positive projects rather than financing constraints (Almeida et al, 2004). Firms that have overinvested in historical periods may cut back on investments in the present. Almeida et al (2004) sidestep the disagreements on investment-cash flow sensitivities by studying the cash flow sensitivity of cash. They find that financially unconstrained firms experience little sensitivity of cash holdings to current cash flows and macroeconomic environment. Conversely, financially constrained firms build financial slack in times of high cash flows, in anticipation of credit shocks. Thus, constrained firms forego NPV positive investments in good times in order to be able to invest in bad times, when they are unable to raise external capital. Unconstrained firms, being able to freely raise capital externally, see no need to hoard cash. Hence the insensitivity of cash holdings to cash flows of financially unconstrained firms.

[9] Net present value.

2.2. Information Asymmetries, Agency Conflicts and Family Firms

The nature of founding families' shareholdings is largely undiversified and, as such, family owners arguably have strong incentives to limit firm risk (Anderson and Reeb, 2003). Founding families may also be seen as long-term owners who have a preference towards business continuity and the firm is an important family asset to be passed on to future generation (Casson, 1999; Chami, 1998).

The agency consequences, as commonly discussed in previous literature, stemming from family ownership is two-fold. Firstly, there are potential adverse effects on the conflict between controlling (family) and non-controlling (non-family) shareholders from family ownership. If the family possesses the control to do so, they may engage in extraction of private benefits at the expense of non-family shareholders (Audretsch et al, 2013; Burkart et al, 2003). Agency costs to non-family shareholders may for instance occur as risk aversion, avoiding riskier NPV positive investments, or as excessive compensation packages to family CEOs (Audretsch et al, 2013).

Secondly, family ownership has a potential mitigating effect on manager-owner and shareholder-creditor conflicts. Manager-owner conflicts may be limited by monitoring of the manager (Jensen and Meckling, 1976). However, assuming the role as monitor of a firm's managers may be both costly and, since monitoring produces public information, subject to the free-rider problem. It has been argued that founding families have substantial incentives to exert monitoring of managers, stemming from being an undiversified blockholder with a long-term commitment to the firm and its survival (Anderson and Reeb, 2003; Audretsch et al, 2010; Mansi and Reeb, 2002). More specifically, Audretsch et al (2013) claim that families make superior and willing monitors for four reasons. Firstly, since monitoring is costly, the incentive to monitor increases with the risk borne and the reward extracted from doing so. Even if families hold relatively small stakes, they are willing to bear the costs due to being undiversified shareholders who hold a substantial portion of their wealth in the family firm. Secondly, although the information produced from monitoring becomes public, family owners see monitoring as an investment in firm survival. Thirdly, family owners make credible monitors through their long-term commitment to the firm. Finally, founding family owners have special skills and knowledge of the firm-specific resources, which other investors cannot easily acquire. Adding to this discussion, Jensen (1986) claims that agency costs of free cash flow[10] may be reduced by concentrated ownership. Also, founding families are concerned with their reputation and often build relationships with other stakeholders, such as banks, for long periods of time (Cheng, 2014; Lagaras

[10] Cash flow in excess of that required to fund all projects that have a positive net present value (Jensen, 1986).

and Tsoutsoura, 2015). Finally, Jensen and Meckling (1976) state that in firms with a less diversified shareholder base, risk shifting may to a more limited extent be encouraged by shareholders. Risk shifting occurs when equity holders support higher-risk business activities, increasing the expected volatility of firm value. As a result the value of the equity option increases, but so does bankruptcy risk and the expected payments to creditors decrease as a result.

2.3. Empirical Evidence of the Effects of Family Ownership

2.3.1. Firm Value and Performance

Most prior papers point towards family firms on average enjoying a valuation premium to non-family firms as well as performing better operationally (Anderson and Reeb, 2003; Audretsch et al, 2010; Villalonga and Amit, 2006). Anderson and Reeb (2003) claim that the results are consistent with reduced manager-owner agency costs and that the results indicate no wealth is expropriated from minority shareholders. Furthermore, Anderson and Reeb (2003) claim that, quite opposite to the common conception of founding family owners as risk averse, family firms do not engage in more corporate diversification than non-family firms. The same authors, however, later find that family firms devote less capital to long-term investments and prefer capital expenditures to riskier research & development investments (Anderson et al, 2012).

In order to nuance the above-presented findings on firm value and performance, Audretsch et al (2013) claim that family firms do best when decision control is separated from the monitoring function and when founding families possess the monitoring function only. If control and monitoring functions are not separated, the suitable monitors (the family) are the managers as well and the likelihood of private benefit extraction increases. Family firms run by family CEOs have been found to render a discount on firm value (Morck et al, 1988). However, this is not necessarily true when the CEO also is the founder, since founders may be value-enhancing through innovation and firm-specific expertise (Anderson and Reeb, 2003; Villalonga and Amit, 2006). Family firms with descendant CEOs have been found to underperform and destroy value (Villalonga and Amit, 2006; Pérez-González, 2006). Choosing a CEO from the limited human capital pool of descendants may result in a CEO with skills inferior to professional CEOs (Cheng, 2014).

In line with the reasoning on separation of monitoring and control functions; when control-enhancing mechanisms such as supervoting rights exists, family ownership appears to have a negative effect on firm value (Faccio et al, 2001; Villalonga and Amit, 2006). Such control-enhancing mechanisms may increase agency costs due to the potentially higher risk of family private benefit extraction at the expense of non-family shareholders.

2.3.2. Financing Costs and Capital Structure

Anderson et al (2003) find that family firms, on average, face lower (agency) costs of debt than non-family firms, attributing the findings to family owners' long-term focus on business continuation. The same authors find, consistent with the picture described above, that family firms run by descendant CEOs face higher agency costs of debt.

With regards to capital structure decisions in family firms, using a German sample, Ampenberger et al (2013) find that family firms on average deploy lower financial leverage. However, and in line with the findings of Anderson and Reeb (2003), Ampenberger et al (2013) also find that US family firms are not more conservatively financed than non-family firms. The geographic difference is suggested to stem from Germany being a largely bank-based economy and banks may potentially exert greater control over firms than bondholders may, inducing incentives to limit leverage in Germany (Ampenberger et al, 2013).

2.3.3. Accounting and Information Transparency

Family firms have been found to on average provide higher-quality accounting information (Cascino et al, 2010), provide more voluntary disclosure of information (Ali et al, 2007; Chen et al, 2007) as well as engage in earnings management to a more limited extent (Yang, 2010). This provides evidence of families as good monitors of management, lowering information asymmetries and agency costs.

Bagnoli et al (2007) find that debt covenants of family firms are more likely to include accounting-based covenants which limit potential wealth expropriation. In presence of supervoting shares, this likelihood is amplified. They also relate their findings to the higher-quality accounting information of family firms. Adding to this, Lagaras and Tsoutsoura (2015) find that it is relatively common that family firms have debt covenants that require the family to retain a certain minimum percentage of ownership or control rights. This, they suggest, indicates that creditors value the presence of the founding family as owners.

2.4. Related Studies on the Impact of Financial Crises

Previous literature has shown that the severity of financial constraints varies over time and is more severe during recessions (Bernanke et al, 1996; Gertler and Gilchrist, 1994; Gertler and Hubbard, 2004; Kashyap et al, 1994). Low (market) net worth is related with higher agency costs and, thus, recessions are typically times of high agency costs (Bernanke and Gertler, 1989)[11].

[11] The lower the firm net worth, the weaker the signal that the firm is able to repay to investors.

Campello et al (2010), taking a survey-based approach asking the companies directly whether or not they consider themselves financially constrained, find that, as a result of the financial crisis of 2008, financially constrained firms reduced planned capital investment, marketing and technology expenditures, employment as well as dividend payments more than unconstrained firms. In line with the model of Almeida et al (2004), constrained firms also burned through more of their liquid assets during the crisis. As a pre-emptive liquidity measure in anticipation of difficulties raising new debt further on, and along the findings of Ivashina and Scharfstein (2010), drawdowns of existing credit lines increased and was more extensive at constrained firms.

Lins et al (2011) study family firms in 35 countries (excluding the US) during the financial crisis of 2008. The authors claim that during credit crises, the costs (to shareholders) outweigh the benefits of family ownership. This is due to founding family risk aversion, as reflected in for instance more extensive investment cuts. To contrast these claims, Lagaras and Tsoutsoura (2015) find that the importance of founding-family ownership appears to have increased during the financial crisis of 2008. The increase in private loan spreads was significantly lower for family firms and even lower if family CEOs run the firms. The positive effect from having a family CEO may be due to the relationship-based nature of private debt.

To finish off Section 2 of the paper, it is worth mentioning that there have not been a lot of studies on the effects of various explanatory variables on financial constraints. The studies tend to run the other way around – that is, what the effects of financial constraints are. In a study theoretically related to this paper, Cheng et al (2014) find that superior CSR[12] performance is related with better access to financing. They identify better transparency (lowering information asymmetries) and stakeholder engagement (lowering agency costs) as the chief reasons behind their results.

3. Hypothesis Generation

As we have learnt from prior studies presented in Section 2, capital markets frictions such as information asymmetries and agency costs hamper firms' abilities to fund all desired projects. Thus, firms that are more transparent and face less severe agency conflicts should find it easier to access financing. In Section 2, we also learnt that family shareholders are often undiversified blockholders who are committed to the long-term survival of the family firm. On the one hand, this may make them more risk averse and the risk of private benefit extraction at the expense of non-family shareholders

[12] Corporate social responsibility.

may be larger. On the other hand, this has been argued to make them more willing to assume the role as credible and committed monitors of the firm management and performance. Previous research has suggested to us that family firms tend to produce better accounting information, perform better operationally, enjoy a stock market valuation premium, have lower costs of debt as well as not over-diversify or be less levered financially than other firms. Thus, there is empirical evidence of family owners contributing to reducing informational asymmetries and agency costs. From an equity capital markets view, better monitoring and transparency reduce agency conflicts with non-family equity investors. Add to this that family owners have been suggested to be less likely to promote creditor wealth-expropriating activities, such as risk shifting, and we have reason to believe also shareholder-debtholder conflicts are mitigated by family owners. Everything added together, we hypothesize that:

Founding family owners mitigate frictions in the capital markets related to information asymmetries and agency costs, rendering lower financial constraints

To nuance our general hypothesis, and again in accordance with prior research, we believe that any mitigating effect on financial constraints from family ownership may be limited when the founding family has more control over the firm than granted by their cash-flow rights. This is the case when families hold supervoting shares. In this case, the agency conflict related in particular to the one between family and non-family shareholders may be exacerbated as the likelihood of private benefit extraction increases.

The similar way of reasoning could be true for cases when family firms are run by family CEOs. In this case, the suitable monitor is also the manager and conflicts with regards to differing risk attitudes may arise with diversified non-family shareholders. However, risk aversion may also reduce bankruptcy risks to creditors. It has also been shown that private creditors may actually value the presence of family CEOs, to whom they often have a long-term relationship. In addition to relationships with creditors, it has been suggested that in particular founders possess unique firm-specific knowledge, which is not easily acquired by an outsider. Furthermore, it has been argued that any negative agency effects from having a family CEO running the firm are limited to descendant CEOs, due to the latter not necessarily being hired for skill. Following the above discussion, it is not entirely possible to hypothesize a clear direction of the net agency effects from having a family CEO run the firm, as opposed to an outside CEO. Rather, we believe that when splitting family CEOs into founders and

descendants, the seemingly unanimous empirical evidence makes it reasonable to expect lower financial constraints at firms run by founders relative to those run by descendants.

4. Methodology

Since directly observing firms' internal and external capital supply curves is not possible, we analyze our dataset using several methods and proxies. These methods and proxies are all derived from studying a range of previous related papers, as presented in Section 2. This way, we aim to provide an analysis that is as complete and robust as possible. We divide the methodology of this paper into two main parts. The first part analyses panel data of 16,230 firm-years ranging from 2001 to 2010, applying four different indices as proxies of financial constraints. Such proxies are constructed based on a certain set of firm characteristics. The second part studies the real actions of family firms over the 2008 Financial Crisis and we compute average treatment effects on the treated (ATT) by matching family firms to non-family firms. In the analysis that follows, we consider the debate in previous research both with respect to the validity of the various proxies and with respect to alternative implications of the results.

4.1. Family Firm Definition and Geographic Delimitation

We define family firms as those companies in which the founding family holds 5% or more of the outstanding shares or voting rights. This is the precise definition used by the authors behind the dataset that serves as foundation to this paper (Anderson et al, 2012; Anderson et al, 2009).

As mentioned previously, and along the definitions used in previous research (see for example Villalonga and Amit, 2006), we define a descendant CEO as any CEO related, by blood or marriage, to the founder of the firm. A family CEO is thus either the founder or a descendant to the founder. An outside CEO is any other CEO.

Our study is delimited geographically to the United States. We have access to a comprehensive database on US firms and, since much of the previous research on family firms is focused on the US, our study is to gain from complementing such earlier studies. There are important differences between studying the US versus for instance Europe. As presented in Section 2, European family firms have been found to on average be more conservatively financed than their US peers, potentially due to Europe being more of a bank-based economy. It has also been suggested that private creditors may value the existence of a family CEO more than public creditors. Such differences may have impact on the results we obtain and, thus, any inferences made from this study may not necessarily have external validity on non-US samples.

4.2. Panel Data Regression Analysis

4.2.1. Selection of Characteristics-Based Proxies of Financial Constraints

As previously discussed, one kind of proxy used for financial constraints is using various combinations of firm characteristics. The research on which proxy best to use has evolved over the years. From the earliest and simplest proxies, such as paying no or low dividends and not having a credit rating, through the KZ Index to the more recent SA and WW Indices as well as Distance to Default. Disregarding the very earliest and simplest categorical proxies, we choose for completeness as dependent variables in our regressions all four indices mentioned. We provide an overview of each of the indices below, with a more detailed outline of all variables that go into the indices presented in Appendix B. For all indices, except for Distance to Default, firms with higher scores are more financially constrained than those with lower scores. Thus, if our hypothesis is true and the proxy at hand may be considered a valid proxy, we would expect family firms to on average have lower KZ, SA and WW Index scores than non-family firms. Similarly, we would expect to, on average, see relatively higher Distance to Default scores for family firms.

KZ Index

The KZ Index has its roots in the above-mentioned debate on investment-cash flow sensitivities between Kaplan and Zingales (1997) and Fazzari et al (1988). Based on the sample of 49 manufacturing firms considered financially constrained by Fazzari et al (1988) (those that paid low or no dividend), Kaplan and Zingales (1997), using a text-based approach, found only 15% of those financially constrained. Thus, using dividend payer status as chief indicator of financial constraint was dismissed. Based on this research paper, Lamont et al (2001) were the ones who constructed the actual KZ Index from an ordered logit model on the same sample of 49 manufacturing firms. This index, which contains five readily available accounting variables, has since been the most popular one to use among researchers (Farre-Mensa and Ljungqvist, 2013):

$$\begin{aligned} KZ\ Index = {} & -1.002 \times Cash\ Flows - 39.368 \times Dividends \\ & - 1.315 \times Cash\ Balance + 3.139 \times Leverage + 0.283 \times Tobin's\ Q \end{aligned} \tag{1}$$

SA Index

By scanning the 10-Ks of 356 US firms between 1995 and 2004 and searching for evidence of financial constraint in the wording of the reports, Hadlock and Pierce (2010) cast serious doubt on the external validity of the KZ Index at the same time as they constructed an alternative index solely based on firm age and asset size:

$$SA\ Index = -0.737 \times Size + 0.043 \times Size^2 - 0.040 \times Age \quad (2)$$

WW Index

Whited and Wu (2006) base their model on the idea that financial constraints affect the intertemporal substitution decision of investment today versus tomorrow. The authors criticize the KZ Index, being based on just 49 manufacturing firms, for being subject to sample selection bias and parameter instability across both firms and over time. Also, Tobin's Q, they claim, is subject to measurement error in its proxy for investment opportunities. Using a large dataset (the sample period runs from 1975 to 2001, with 131 to 1390 firms per quarter), Whited and Wu (2006) construct their index as follows:

$$\begin{aligned} WW\ Index = &-0.091 \times Cash\ Flows - 0.062 \times Dividend\ Payer\ Status + 0.021 \times Leverage \\ &- 0.044 \times Size + 0.102 \times Industry\ Sales\ Growth - 0.035 \times Firm\ Sales\ Growth \end{aligned} \quad (3)$$

Distance to Default

Farre-Mensa and Ljungqvist (2013) claim that firms classified as financially constrained according to any of the above indices do not actually behave as if they are. They go back to the basics of what financial constraints actually imply and conduct two tests. The first test examines the responsiveness of firms' debt levels to an exogenous shock in the form of a marginal corporate tax rate increase. Financially constrained firms should raise less debt than unconstrained firms. The second test refers to equity recycling[13]; constrained firms should engage less in equity recycling than unconstrained firms. The only proxy for financial constraint that passes both tests is a measure on Distance to Default (DtD), based on the work of Bharath and Shumway (2008) and Merton (1974):

$$Distance\ to\ Default = \frac{Inverse\ Leverage + Stock\ Return - Firm\ Value\ Volatility}{Firm\ Value\ Standard\ Deviation} \quad (4)$$

In assessing the extent to which the all four measures overlap, Farre-Mensa and Ljungqvist (2013) perform cross-tabulations using 91,487 firm-years and find that of the firms classified as constrained according to the SA Index, almost all of them are also classified as constrained according

[13] The concept of simultaneously raising and paying out equity capital.

to the WW Index. Around half of the constrained firms according to the SA and WW Indices are constrained according to the KZ Index. Approximately 60% of the firms classified as constrained by DtD are also constrained according to the SA and WW Indices. The corresponding figure for the KZ Index is approximately 80%. Thus, the cross-tabulations highlighted the limited overlap with regards to which firms the various proxies classify as financially constrained.

Both the WW and SA Indices tend to identify smaller, younger and faster-growing firms as financially constrained. The empirical evidence put forward by Farre-Mensa and Ljungqvist (2013) stipulates that these firms not necessarily face an inelastic capital supply curve nor a greater wedge between the internal and external costs of capital. Being closer to default, they claim, is a more intuitive proxy for financially constrained behavior.

4.2.2. Multivariate Model Design

We analyze a panel dataset of 16,230 US firm-years over the period 2001 to 2010. To do this, we deploy a two-way fixed effects multivariate regression model, which in its general form for each firm, *i*, industry, *j*, and year, *t*, follows:

$$\begin{aligned} y_{i,j,t} = & \beta_0 + \beta_1 Family\ Firm_{i,j,t} + \beta_2 Control\ Variables_{i,j,t} \\ & + \beta_{10\text{-}99} Two\text{-}Digit\ SIC\ Code_j + \beta_{2001\text{-}2010} Year_t + \varepsilon_{i,j,t} \end{aligned} \quad (5)$$

where

$y_{i,j,t}$ = proxy for financial constraint (that is, Distance to Default, the KZ Index, the SA Index and the WW Index)

$Family\ Firm_{i,j,t}$ = binary dummy variable that equals one for family firms and zero otherwise

$Control\ Variables_{i,j,t}$ = a vector of additional control variables

$Two\text{-}Digit\ SIC\ Code_j$ = binary dummy variable that equals one for each industry in the sample (10 to 99)

$Year_t$ = binary dummy variable that equals to one for each year in the sample (2001 to 2010)

$\varepsilon_{i,j,t}$ = error term

Previous studies on family ownership impact on firm performance and agency costs use similar fixed-effects models (Anderson et al, 2003; Anderson and Reeb, 2003). Our two fixed effects enter the regression as binary least squares dummy variables for each year (time dummies) and for each two-

digit SIC[14] code (industry dummies)[15]. Including these two dummies is useful to bringing our model closer to causality since it controls for fixed, and also unobserved, confounding variables. In our case, we first want to control for the common component arising from the difficult-to-measure and numerous macroeconomic shocks that occur in separate time periods. Secondly, since each industry has its own characteristics, such as business cycle volatility and profitability, we want to control for the common component that may be fixed for each industry over time. We control for heteroscedasticity and serial correlation by using Huber-White standard errors clustered on the firm level.

The dependent variables of the model are calculated for each firm and year using the definitions of each proxy as outlined above and in Appendix B. As we have seen, financial constraints are most commonly used as explanatory variables, as opposed to outcome variables. There are, consequently, only a limited number of precedent studies using financial constraints as outcome variables. Cheng et al (2014) in their study on the effect of CSR on financial constraints use all the above indices except Distance to Default. While it, when using financial constraint as explanatory variable, is common to divide firms into buckets based on the index value for each year, Cheng et al (2014) let the outcome variables assume continuous values. Similarly, we do not arbitrarily divide firms into buckets, but let the indices take continuous values.

The next step of our regression analysis involves studying the effects of control-enhancing mechanisms as well as the impact of who holds the position as CEO. Control-enhancing mechanisms are, in line with previous studies, proxied using the presence of a supervoting share class system (see for instance Anderson et al, 2009; Anderson et al, 2012; Villalonga and Amit, 2006). Consequently, we adjust equation (5) by including only those family firms that deploy supervoting share class systems, replacing the variable $Family\ Firm_{i,j,t}$:

$$y_{i,j,t} = \beta_0 + \beta_1 Family\ Firm^{Supervoting}_{i,j,t} + \beta_2 Control\ Variables_{i,j,t} + \beta_{10\text{-}99} Two\text{-}Digit\ SIC\ Code_j + \beta_{2001\text{-}2010} Year_t + \varepsilon_{i,j,t} \quad (6)$$

where

$Family\ Firm^{Supervoting}_{i,j,t}$ = binary dummy variable that equals one for family firms with supervoting share systems and zero otherwise

[14] SIC (Standard Industrial Classification) is a hierarchical top-down industry classification system that begins with general industry characteristics and narrows down to specifics as more digits are added.

[15] In fact, since these are binary variables, for each regression we will have one less dummy variable than there are industries and years, respectively. Accordingly, our statistical data program omits one industry and one year dummy per regression.

In analyzing the effects of who holds the CEO position in a family firm, we follow precedents (including Anderson and Reeb, 2003) and adjust equation 5 in two steps. In the first step we analyze family CEO-run family firms versus outside CEO-run family firms and in the second step we split family firms with family CEOs into firms with descendant and founder CEOs:

$$y_{i,j,t} = \beta_0 + \beta_1 Outside\ CEO_{i,j,t} + \beta_2 Family\ CEO_{i,j,t} + \beta_3 Control\ Variables_{i,j,t} + \beta_{10\text{-}99} Two\text{-}Digit\ SIC\ Code_j + \beta_{2001\text{-}2010} Year_t + \varepsilon_{i,j,t} \quad (7)$$

$$y_{i,j,t} = \beta_0 + \beta_1 Outside\ CEO_{i,j,t} + \beta_2 Founder\ CEO_{i,j,t} + \beta_3 Descendant\ CEO_{i,j,t} + \beta_4 Control\ Variables_{i,j,t} + \beta_{10\text{-}99} Two\text{-}Digit\ SIC\ Code_j + \beta_{2001\text{-}2010} Year_t + \varepsilon_{i,j,t} \quad (8)$$

where

$Outside\ CEO_{i,j,t}$ = binary dummy variable that equals one for family firms with an outside CEO and zero otherwise

$Family\ CEO_{i,j,t}$ = binary dummy variable that equals one for family firms with a family CEO and zero otherwise

$Founder\ CEO_{i,j,t}$ = binary dummy variable that equals one for family firms with a founder CEO and zero otherwise

$Descendant\ CEO_{i,j,t}$ = binary dummy variable that equals one for family firms with a descendant CEO and zero otherwise

4.2.3. Additional Control Variables

Confounding variables are those that are associated both with the family's decision to maintain ownership in the family firm and with the degree to which the firm is financially constrained. By controlling for confounding variables we aim to avoid omitted variable bias and improve the likelihood that the coefficients on the variables of interest are causal.

Previous, and in particular the earlier, studies use dividend payer status (Fazzari et al, 1988) and whether the company is credit rated or not (Kashyap et al, 1994) as indicators of financial constraint. Arguably, and in line with the logic behind the equity recycling test conducted by Farre-Mensa and Ljungqvist (2013), a firm that is able to pay out dividends (or repurchase shares) is more likely financially unconstrained than a company that is not paying out dividends[16]. Also, rated firms are more likely to be able to raise external capital, from a broader range of investors and at better (cheaper) terms, than non-rated firms (Faulkender and Petersen, 2006). Consequently, firms with better credit

[16] If a firm is not paying out dividends, this means the firm neither is engaging in equity recycling.

ratings should be more able to raise external capital than those with lower credit ratings. We believe that credit rating is a good control variable since it should account for factors which determine repayment ability. Such factors include operational risk, firm performance and financial risk (leverage). Although refuted as chief and key indicator by Farre-Mensa and Ljungqvist (2013), both the SA Index and WW Index make the case for firm size as a determinant of financial constraint.

Anderson et al's (2003) study on the agency costs of debt and family firms is relatively closely related to this study. Their study uses control variables including size, firm performance, credit rating, financial leverage and risk measures. Villalonga and Amit's (2006) paper on the effect of family ownership on firm value studies the agency consequences of family ownership with regards to conflicts between owners and managers as well as between family and non-family shareholders. They use similar control variables to Anderson et al (2003), but include dividends as well.

With the above discussion in mind, we choose to include dividend, size and credit rating in our set of additional control variables. In case any of the three variables already is accounted for in the outcome, it is naturally excluded as control. For a given year and firm, and referring to Appendix C, the credit rating variable takes on a value between one (AAA) and 22 (D). The dividend variable takes on a value of one if a firm pays a dividend in a given year and zero otherwise. Size is the natural logarithm of book assets at fiscal year-end for any given firm-year. It is capped at the natural logarithm of $4.5 billion. This is in line with the reasoning of the SA Index creators, Hadlock and Pierce (2010), who claim that the marginal benefits (with respect to financial constraints) of firm size are diminishing and limited beyond $4.5 billion.

At the same time as we want to avoid omitting confounding variables, we also want to avoid including bad controls. In our case, bad controls are control variables that are outcomes of family ownership and including them will give rise to selection bias. Limiting payouts to shareholders may be a way to engage in private benefit extraction at the expense of diversified non-family shareholders (Villalonga and Amit, 2006). In other words, such policy may be a means to limit firm risk at the expense of other shareholders. In order to grow firm size, companies may need to issue more securities. Therefore, families arguably may prefer to let their firms remain smaller and not risk losing influence. Finally, since we hypothesize that the family owners may contribute to lower degrees of financial constraint, credit ratings may also incorporate family ownership. In order to find out how family ownership is related to each of the additional control variables on an individual basis, we perform regressions, including the same two fixed effects as above, with each of the three controls as dependent variable and $Family\ Firm_{i,j,t}$ as independent variable. Once this is done, control variables are added to

regressions 5 through 8 step-wise, in order to find out the degree to which our results change in response.

4.3. 2008 Financial Crisis Study

As discussed in Section 2, previous literature has shown that the severity of financial constraints varies over time and is more severe during recessions. Accordingly, in research related to this study and as seen in Section 2.4., credit crises are studied as sources of exogenous shocks with respect to the access to financing.

As mentioned previously, apart from firm characteristics, firm actions have also been used by academics as proxies for financial constraints. With the above discussion on financial constraints and credit crises in mind, we study the differences in actions between family and non-family firms referring to the 2008 Financial Crisis as source of exogenous shock. We conduct a study similar to Campello et al's (2010) and study the differences between family and non-family firms with regards to investment and liquidity decisions.

4.3.1. Selection of Action-Based Proxies of Financial Constraints

The first variable we have chosen to study is the change in investments through capital expenditures. Earlier research (see for instance Fazzari et al, 1988) claimed that financially constrained firms' investments are more sensitive to internal cash flow generation than financially unconstrained firms. Thus, one would reasonably believe that in the 2008 Financial Crisis, financially constrained firms cut investments more than financially unconstrained firms. In case family firms to a larger extent belong to the second category, we would expect to see lower cuts in investments than for non-family firms. The second variable we study is how cash holdings change over the crisis. As Almeida et al (2004) suggest, financially constrained firms build financial slack in economic booms in anticipation of limited access to financing in credit crises and recessions. Constrained firms are hence more likely to burn through financial slack to fund investments in times of recession and strict credit supply. Again, if family firms on average have better access to external financing, we would expect to see less financial slack being consumed at these firms during the crisis than at non-family firms. The third variable studied regards the changes in payout policy. Cutting payouts is one way that financially constrained firms may manage liquidity in a credit crisis. Thus, we would expect to see family firms cut dividends less than non-family firms. All three variables are part of the study by Campello et al (2010) and for constrained firms they see a higher degree of planned investment cuts, decline in cash holdings as well as cuts in planned dividends.

Ideally, we would also have liked to analyze debt patterns over the crisis. Ivashina and Scharfstein (2010) find that bank lending actually rose during the fourth quarter of 2008, but that this increase was driven by precautionary drawdowns of existing credit lines rather than new loans. Campello et al (2010) build further on these findings and show that financially constrained firms are significantly more likely than financially unconstrained firms to draw down on existing credit lines in anticipation of restricted new bank credit. From the Lehman Brothers bankruptcy filing in September 2008 and through Q4 2008, we only have a small sample of 34 credit line drawdowns. Thus, we only provide this data for illustrative purposes and perform no further statistical analysis on the data. Another interesting piece of analysis would have been to study differences in extension of new credit to family and non-family firms, but the sample size is again small and we include the data for illustrative purposes only.

4.3.2. Matching Model Design

In line with Campello et al (2010), we apply the Abadie and Imbens (2003) bias-corrected and heteroscedasticity-consistent matching estimator. As indicated in Section 4.3.1., we perform difference-in-difference estimations, as opposed to studying the mere levels of each. This since it is quite possible that levels prior to the event differ between the treated family firms and the control non-family firms. Just as in our above panel data study, we are aware that there may be confounding factors that could bias any findings from comparing just the average family firm to the average non-family firm. One natural and inherent problem of the study is that we cannot, when entering the crisis, randomly assign each firm to either non-family or family ownership. However, by using a matching approach, we match family firms with non-family firms across a set of covariates. The intention is to find a close-enough counterfactual so that our computed estimator is as close to true as possible.

To achieve the aim of close matching, we include a set of covariates which are the same as the control variables discussed above and which are included in the multivariate regressions. Hence, we include as covariates industry, credit rating, size and dividend payer status. The definitions of each of these variables are also the same as before. Please also note that these covariates are similar to those used in Campello et al's (2010) paper. The Abadie-Imbens estimator allows for exact matching on categorical variables; in our case industry, dividend payer status and credit rating. By including a bias-correction, the estimator minimizes the bias that may arise from matching on continuous covariates; in our case size. Finally, the Abadie-Imbens estimator allows for matching more than once, lowering bias of the estimator. Thus, previous studies (including Campello et al, 2010; Lagaras and Tsoutsoura,

2015) prefer the Abadie-Imbens estimator to other similar methods, such as propensity score matching.

When deciding on how to define the event window of the crisis, a key event used in previous studies is when Lehman Brothers filed for bankruptcy on September 15, 2008 and which triggered a major credit crisis (Marketwatch, 2008). Being right at the end of Q3 2008, we follow Campello et al (2010) who refer to Q4 2008 as their crisis period. Lagaras and Tsoutsoura (2015) use Q4 2008 as starting point, but continue their study over subsequent quarters. However, we also know that the US economy had been in recession since December 2007 and it did not end until June 2009 (NBER, 2015). Thus, we want to make sure to compare crisis figures to clean non-crisis figures. Consequently, changes in investments and cash holdings are calculated comparing Q4 2008 with Q4 2006. This also makes sure that we control for purely seasonal factors. However, since dividend data in Compustat is not available on a quarterly basis we instead refer to 2009 as crisis period. Dividend figures are arguably lumpier and may differ more between periods than cash holdings and investments. Therefore, we apply a binary approach to dividends. Treating dividends with a binary approach is also common in previous research (see for example Campello et al, 2010; Fazzari et al, 1988; Whited and Wu, 2006). Again due to the potentially lumpy nature of dividends, we compare the 2009 dividend figures to an average over three years (2004-2006) during the economic boom preceding the crisis.

Just as in the multivariate regression analysis, we analyze the impact of family ownership first generally, then specifically for the family firms using a supervoting share class system. We continue studying family firms run by outside CEOs and family CEOs, respectively. Finally, we also differentiate between family CEOs depending on whether they are founders or descendants.

The formal and general expression for firms $i = 1, \ldots, n_1$ is as follows:

$$\textit{Average Treatment Effect on the Treated (ATT)} = \frac{1}{n_1} \sum_{i \mid T=1} \{y_i(1) - y_i(0)\} \tag{9}$$

where

ATT = the estimated effect of treatment on the treated firms

n_1 = the number of treated firms in the sample

$T = 1$ indicates treatment. In the first stage of analysis, we include all family firms as treated firms. In the next stage, the only treated firms are those family firms deploying a supervoting share class system. In the third stage, treated firms are family firms run by outside CEOs only, then family CEO-run

family firms. In the fifth and sixth stage founder CEO-run and descendant CEO-run family firms constitute treated firms, respectively

$y_i(1)$ = the outcome for firm *i* when treated

$y_i(0)$ = the outcome for firm *i* when not treated (that is, the counterfactual firm with which the treated firm is matched)

As mentioned above, we study three different ATT. For each firm, *i*, in the sample the three outcomes are computed as follows:

$$\Delta, \textit{Cash Holdings}_i = \frac{\textit{Cash \& Short-Term Inv}_{i,Q4\ 2008}}{\textit{Total Assets}_{i,\ Q4\ 2008}} - \frac{\textit{Cash \& Short-Term Inv}_{i,Q4\ 2006}}{\textit{Total Assets}_{i,\ Q4\ 2006}} \tag{10}$$

$$\Delta, \textit{Capital Expenditures}_i = \frac{\textit{Cap Ex}_{i,Q4\ 2008}}{\textit{P,P \& E}_{i,\ Q3\ 2008}} - \frac{\textit{Cap Ex}_{i,Q4\ 2006}}{\textit{P,P \& E}_{i,\ Q3\ 2006}} \tag{11}$$

$$\Delta, \textit{Dividend Payer Status}_i = \textit{Dividend Payer Status}_{i,\ 2009} - \textit{Avg Dividend Payer Status}_{i,\ 2004\text{-}2006} \tag{12}$$

As an additional and complementary study, we also study the impact of family ownership on each of the above outcomes per industry. Given the housing and mortgage boom prior to the 2008 Financial Crisis and the subsequent bust, the construction industry was particularly negatively affected by the crisis (Mian and Sufi, 2011). Similarly, other pro-cyclical industries were likely also more severely hit by the crisis. Recalling the theories by Bernanke and Gertler (1989), more severe declines in net worth render weaker signals of repayment ability. Higher agency costs and more restricted access to financing follow as a consequence. In line with this reasoning, in industries that face greater declines in net worth, differences between financially constrained and unconstrained firms may become more visible. Thus, if family ownership contributes to mitigating agency costs and financial constraints, we may see greater outcome differences in the construction industry and other industries that traditionally may be seen as having a strong pro-cyclical business cycle. For our study, and in order to obtain a decent number of firms within each industry category, we split firms into the ten main divisions in which SIC codes are organized.

5. Data

5.1. Data Collection and Processing

Our dataset is based on the one used in Anderson et al (2012) and Anderson et al (2009), which is readily available online from Ronald C. Anderson's academic homepage (Anderson, 2012). Ronald C. Anderson is an academic who has written several papers within the field of family firms. Their dataset of 16,230 firm-years is constructed downloading all US firms on Compustat[17] and runs from fiscal year 2001 through fiscal year 2010. Firms in regulated public utilities (SIC codes 4812, 4813, and 4911 through 4991) as well financial firms (SIC codes 6020 through 6799) are excluded from the sample. The former group of firms is excluded due to potential biases related to the possible influence of government regulation on performance and ownership. The latter group of firms is excluded due to measures of financial performance being fundamentally different from non-financial firms. The full list of SIC codes is provided in Appendix A. Furthermore, master limited partnerships and firms with share prices below $0.25 are excluded. As a last step, the sample is limited to the 2,000 largest US firms by total assets in data-year 2001. Based on this sample, family ownership data is collected from company filings. The authors have followed a binary approach, denoting a family firm with an indicator variable equal to one when family ownership (or holding of voting rights) for a single family is or exceeds 5% (zero otherwise). Charitable family foundations are not considered family owners, since these have the intent of public welfare promotion rather than maximizing the economic wealth of the family. The presence of a supervoting share class structure is indicated by a variable equal to one (zero otherwise). Supervoting share class data is compiled for family firms only. Potential selection bias related to survivorship bias is somewhat mitigated by letting firms exit and re-enter the sample.

Based on the above dataset, we manually screen each family firm filing (including 10-K filings and proxy statements) and the internet (including fundinguniverse.com and referenceforbusiness.com) for information on who the CEO for each fiscal year is. We use three categories; founder, descendant and outside CEOs. The occurrence or non-occurrence of a certain CEO type is, similarly to above, denoted using a binary approach. In cases where there is a CEO change during a fiscal year, we consider who held the position as CEO for the majority of the period. In total we manually screen all 5,593 family firm-years in the original dataset.

[17] Compustat is a database of US and Canadian fundamental and market information on active and inactive publicly held companies.

We proceed our data collection effort with gathering the accounting, market and credit rating data needed to conduct our study. For index constituents, we follow the data items used in Farre-Mensa and Ljungqvist (2013). Accounting data is downloaded from Compustat. Security and market data is downloaded from CRSP[18]. Credit ratings are downloaded from Compustat and are the long-term credit ratings supplied by S&P[19]. Inflation statistics (CPI-U[20]) are downloaded from the Bureau of Labor Statistics. General debt issuance data is downloaded from Thomson Reuters Dealscan[21]. Information on credit line drawdowns is not readily available for download, but this data needs to be collected manually. We refer to a list of US credit line drawdowns during Q4 2008 and which is compiled by Ivashina and Scharfstein (2010). These authors in turn compile the data by manually searching for news on drawdowns online (Reuters[22] and SEC[23]). Furthermore, we use GVKEY[24] to identify each firm and match this to PERMNO[25] when working with CRSP data. We match the companies in our sample with the Dealscan database using the linking table based on the work by Chava and Roberts (2008). A full overview of all variables, which are used in our regression and matching analyses, downloaded is presented in Appendix B.

Since our datasets to some extent are based on the collection efforts of others, we must rely on their accuracy. Ideally, we would have re-created and confirmed the datasets. However, the trade-off between time spent on re-creating already existing datasets and potential benefits is not attractive enough. Our results could potential only change on the margin, if at all. Another potential problem to the validity of our results from the regression analysis regards the usage of fiscal years as opposed to calendar years. 5,398 out of 16,230 firm-years have fiscal years ending in other months than December. There will naturally be some timing mismatch (maximum six months) when including firms with different fiscal year ends. One potential solution would be to download quarterly data and create annual data on a calendar year basis. We found that the necessary data is not fully available on a quarterly basis and we would obtain a much smaller sample. Another potential solution could be to exclude firms with fiscal years not ending in December. This would, however, also shrink the sample significantly. We do not find any discussion on timing issues in previous studies using similar panel data (including

[18] CRSP (Center for Research in Security Prices) provides security data, including historical prices and returns.
[19] S&P (Standard & Poor's) is a global credit rating agency.
[20] Consumer Price Index for all Urban consumers
[21] A source for deal information on the global loan markets.
[22] International news agency.
[23] US Securities and Exchange Commission.
[24] Compustat permanent and unique identifier for each company.
[25] CRSP permanent and unique identifier for each security.

Anderson et al, 2009; Anderson et al, 2012). For these reasons, we disregard any potential timing mismatch issue.

Our raw data may contain extreme values that, if used as is, may bias our estimates of the true values. These values may be due to merger activity increasing asset size and sales growth disproportionately, between-year entries and exits of companies in industries distorting industry sales growth numbers as well as one-time special dividends. Also, referring to Exhibit 3, there are observations with zero in asset size and negative (gross debt) leverage. Angrist and Krueger (2000) claim that winsorization is desirable over trimming if the extreme values are just exaggerated versions of the true values, but true values still lie in the tails of the distribution of values. Let us assume that the true index values are in the tails. In this case, winsorization of the index values is appropriate. This way, no observations are deleted, which they would have been should we trim (truncate) the data. Stigler (1977) found that a 10% winsorization (his smallest level of winsorization) provided estimates that were closest to the real values. Others, for instance Gruber (1997), recommend winsorizing at the 1% level. To avoid winsorizing correctly represented values, we deploy a 1% winsorization (at the first and 99th percentiles) of each of the four indices. Also, when reviewing the data and the constructed index values, it appears reasonable to believe the number of extreme index values to be rather low. Following the same logic, when it comes to the 2008 Financial Crisis study, the Q4 2006-Q4 2008 changes in capital expenditures and cash holdings are winsorized at the first and 99th percentiles. Since dividends are measured using a binary approach, we consider no further treatment of the data needed. Ideally, we would have liked to include stock repurchases to paint a full picture of payout policy, but this data is not available to us from Compustat[26]. Finally, we drop firm-years where data is missing for any variables used in either the regressions or the matching analyses.

5.2. Descriptive Statistics

In Exhibit 3 we provide summary statistics in terms of means, medians, standard deviations, maximums and minimums for all variables used in this study. Furthermore, in Exhibit 4, we conduct a simple difference of means test (two-tail t-test), comparing family and non-family firms on the same statistics as in Exhibit 3. Please note that, due to the descriptive nature, the full samples without winsorization or trimming are used. Belonging to some of the most interesting observations, family firms seem to be smaller, more likely to pay dividends and are considered less creditworthy according to S&P. Referring to the correlation matrix (Appendix D), larger asset bases seem to be related with

[26] Precedent studies, including Campello et al (2010), tend to not include stock repurchases when studying payouts.

better credit ratings. Furthermore, there is no significant difference between family and non-family firms in terms of leverage, but family firms appear to be more cash generative (profitable). Worth mentioning is also, that both family firms and non-family firms on average see declines in cash holdings, capital expenditures and dividends over the 2008 Financial Crisis (Exhibit 5).

Exhibit 6 shows a graphical representation of all debt issuances available from Dealscan for the family and non-family firms in our sample. The graph runs from 2006 through 2009, on a quarterly basis. As previously discussed, the sample is small with a total of nine observations in Q4 2008. From Q3 2008 to Q4 2008, family firm debt issuances increased from one to three and non-family firm issuances declined from 15 to six. The overall trend seems to be that issuances of new debt peaked in Q2 2007 and declined steadily to a trough in Q4 2008 (52 versus nine). Referring to Appendix E, there were 34 known credit line drawdowns subsequent to the Lehman bankruptcy filing and through Q4 2008, whereof five were done by family firms. This represents 15% of the total drawdowns versus 35% in the full panel data sample (Appendix A). Again, the sample is small also for credit line drawdowns.

Exhibit 3. Selected Descriptive Statistics on Key Variables

Measures/Variable	Mean	Median	Standard Deviation	Max	Min
KZ Index	-4.373	0.901	11.512	6.908	-75.518
SA Index	-0.775	-0.780	1.088	1.752	-2.491
WW Index	-0.340	-0.334	0.083	-0.157	-0.549
Distance to Default	1.173	0.775	3.114	11.966	-3.983
Size	5 423	1 055	24 594	797 769	0
Leverage	0.345	0.319	2.118	32.304	-225.004
Dividend	0.456	0.000	0.498	1.000	0.000
Cash/assets	0.172	0.077	0.924	110.336	0.000
Capex/ppentlag	0.308	0.183	6.262	794.500	-0.196
Credit Rating	10.895	11.000	3.509	22.000	1.000
Return	0.165	0.078	0.764	28.095	-0.993
Volatility	0.458	0.377	0.311	5.854	0.029
Age	22.337	16.000	16.370	60.000	0.000
Cash Flows	0.046	0.077	0.269	4.850	-17.616
Sales Growth	0.154	0.059	4.667	567.612	-1.000
Tobin's Q	1.755	1.435	1.860	173.639	0.095

Notes: Please see Exhibit 4 on next page (page 28) for description of variables

Exhibit 4. Difference of Means Tests for Family versus Non-family Firms

Measures/Variable	Family firms	Non-family firms	Difference	*t*-statistic
KZ Index	-4.562	-4.278	-0.284	1.491
SA Index	-0.532	-0.904	0.372	-20.985***
WW Index	-0.328	-0.346	0.019	-13.502***
Distance to Default	1.187	1.166	0.021	-0.373
Size	3 866	6 258	-2 391	5.883***
Leverage	0.336	0.350	-0.014	0.404
Dividend	0.485	0.442	0.043	-5.185***
Cash/assets	0.154	0.181	-0.027	1.754*
Capex/ppentlag	0.258	0.335	-0.077	0.747
Credit Rating	11.362	10.715	0.647	-7.267***
Return	0.177	0.158	0.019	-1.492
Volatility	0.463	0.455	0.008	-1.498
Age	19.820	23.708	-3.889	14.463***
Cash Flows	0.052	0.043	0.009	-2.021**
Sales Growth	0.096	0.185	-0.089	1.157
Tobin's Q	1.651	1.810	-0.159	5.179***

Notes: Exhibit 3 provides summary statistics for the data used in the analysis. Exhibit 4 provides a different of means test. The data consists of 16,230 firm observations for the top-2,000 largest firms for the period 2001-2010. The sample is collected from Anderson, Duru and Reeb (2009) and Anderson, Reeb and Zhao (2012). The independent variables indude: total assets (Size), firm leverage calculated as long-term debt and debt in current liabilities divided by shareholders' equity, long-term debt and debt in current liabilities (Leverage), a 0 or 1 indicator of dividend payer status (Dividend), cash and short-term investments divided by total assets (Cash/assets), capital expenditures divided by one-year lagged property, plant and equipment (Capex/ppentlag), credit rating conversion numbers where missing values are exduded (Credit Rating), annual stock return computed by cumulating monthly returns over the previous 12 months (Return), annualized percent standard deviation of returns, estimated from monthly stock returns over the previous 12 months (Volatility), number of years firm shares publidy traded (Age), income before depreciation, amortization and extraordinary items divided by total assets (Cash Flows), year-on-year sales growth (Sales Growth) and Tobin's Q is calculated as the market price divided by book value of firm assets. The financial constraint measures indude KZ Index, SA Index, WW Index and Distance to Default. These are calculated as follows:

$$KZ\ Index = -1.002 \times Cash\ Flows - 39.368 \times Dividends - 1.315 \times Cash\ Balance + 3.139 \times Leverage + 0.283 \times Tobin's\ Q$$

$$SA\ Index = -0.737 \times Size + 0.043 \times Size^2 - 0.040 \times Age$$

$$WW\ Index = -0.091 \times Cash\ Flows - 0.062 \times Dividend\ Payer\ Status + 0.021 \times Leverage - 0.044 \times Size + 0.102 \times Industry\ Sales\ Growth - 0.035 \times Firm\ Sales\ Growth$$

$$Distance\ to\ Default = \frac{Inverse\ Leverage + Stock\ Return - Firm\ Value\ Volatility}{Firm\ Value\ Standard\ Deviation}$$

The significance levels in Exhibit 4 are, represented by (two-tail) t-test levels, 10% (*), 5% (**) and 1% (***). Standard errors are dustered on the firm level to control for heteroscedasticity and serial correlation.

Exhibit 5. Cash, Capex and Dividends Pre and During the 2008 Financial Crisis

	Family firm		Non-family firm	
Measure	Pre-Crisis	Crisis	Pre-Crisis	Crisis
Cash/assets	0.140	0.134	0.167	0.154
Capex/ppentlag	0.211	0.191	0.227	0.207
Dividend	0.487	0.471	0.426	0.415

Notes: The table provides the average values for family and non-family firms for the period preceding the 2008 Financial Crisis and during the crisis. The first two variables are cash and short-term investments divided by total assets (Cash/assets) and capital expenditure divided by one-quarter lagged property, plant and equipment (Capex/ppentlag). The pre-crisis period for is defined as Q4 2006 and the crisis period is defined as Q4 2008. The third variable is a binary indicator of dividend payer staus (Dividend). Dividend payers are denoted with 1 and non-payers with 0. For this variable, the pre-crisis period numbers are caludated taking the average of 2004-2006 and crisis period is defined as 2009.

Exhibit 6. Family and Non-Family Firm Debt Issuances from 2006 to 2009

No. of Obs.	30	48	27	40	23	52	27	27	20	21	16	9	15	14	16	17
Fam Firm	9	17	5	7	4	11	3	7	5	7	1	3	2	7	5	4
Non Fam Firm	21	31	22	33	19	41	24	20	15	14	15	6	13	7	11	13

Notes: The figure presents the number of all debt issuances for the family and non-family firms in our sample, for the period Q1 2006-Q4 2009, as sourced from Dealscan.

6. Results and Analysis

6.1. Panel Data Regression Results

6.1.1. Discussion on Control Variables

Before discussing the panel data regression results, let us analyze the time- and industry-fixed effects regression results for the three control variables discussed in Section 4.2.3. Each of the variables credit rating, dividend payer status and size are regressed on family ownership. Referring to Exhibit 7 column 1, and remembering that AAA renders the number 1 and D the number 22 on our conversion scale, family firms on average appear to have a slightly worse credit rating. The difference to non-family firms is economically and statistically quite insignificant. Although some variation in credit rating may be explained by family ownership, it is reasonable to assume that there is no significantly causal effect of family ownership on credit rating. With regards to credit rating as control variable, excluding it would arguably imply a risk of omitted variable bias that is greater than the risk of bad control from including it.

The second column of Exhibit 7 examines the effect of family ownership on a firm's dividend payer status. Since this is a binary variable measuring whether a firm pays a dividend in a given year or not, the results tell us that on average family firms are slightly more likely to pay dividends. Finally, column 3 tells us that family firms on average are almost $2.7bn smaller than non-family firms in terms of asset size. Both results in columns 2 and 3 are statistically significant at the 5% risk level. As previously discussed in Section 4.2.3., and in case family owners are to extract private benefits from non-family shareholders, one would expect dividends to be lower at family firms. However, we actually see the opposite outcome. Potentially, family owners prefer generating shareholder income from dividends rather than selling down shares. Also, as mentioned previously, family owners may be more prone to limit firm size. Expanding firm size may involve issuing new securities and both equity and debt instruments do have at least some control rights attached to them. We cannot from these results rule out the possibility that family ownership to some degree directly influences the outcomes of payout decisions and firm size. As we know, in theories on financial constraints, being a dividend payer and being large are both being suggested to be related to lower a degree of financial constraint. Consequently, in case family ownership actually has a causal effect on dividends and size, including either of them will bias the estimated effect of family ownership on financial constraints.

Previous closely related studies have indeed included all three variables as control variables. Thus, we have good reasons to believe that researchers have found the omitted variable bias from excluding any of the variables to be greater than any potential risk of bad control. We would avoid the risk of a bad control problem by measuring each additional control variable before firm observations are assigned to treatment (that is, being a family firm or not), which is not possible in practice. However, if including one or more additional controls gets us closer to the causal effect, this is better than omitting them. In any case, we perform all regressions 5 through 8 including the controls stepwise. In the first step we include none of the three additional controls, in the second step we include credit rating and in the third step we include all three additional control variables[27]. Hence we analyze changes in results and whether or not we can observe any differences with regards to sign, magnitude and statistical significance of our estimators which may change the main implications of our paper.

[27] When applicable. Again, variables acting as components in a proxy are not included as control variables in that regression.

Exhibit 7. Additional Control Variable Regressions on Family Ownership

(Standard Errors in Brackets and P-Values in Parentheses)

Variable	(1) Credit Rating	(2) Dividend	(3) Size
FamFirm	0.317	0.046**	-2687.862**
	[0.232]	[0.020]	[1304.607]
	(0.172)	(0.023)	(0.040)
N	7725	16185	16185
R^2	0.168	0.122	0.097

Note: The table displays the estimated coefficients from regressing credit rating (column 1), dividend payer staus (column 2) and size (column 3) on family firm ownership (FamFirm). The regressions are run using time (year)- and industry (2-digit SIC)-fixed effects. FamFirm is a variable that equas 1 if the observation is a family firm and 0 otherwise. Credit Rating is a variable that takes the value 1 (AAA) to 22 (D). Dividend is a binary variable that takes the value 1 if the firm pays a common dividend for a given firm year and 0 otherwise. Size is the asset base size in USD millions. Observations with missing values are exduded from the regressions. We control for heteroscedasticity and serial correlation using Huber-White standard errors dustered on the firm level. The significance levels are represented by (two-tail) test levels 10% (*), 5% (**) and 1% (***).

6.1.2. Panel Data Regression Results

In this sub-section we go through the main regression results for each of the four proxies used; KZ Index, SA Index, WW Index and DtD. The results are presented in one exhibit per index (Exhibits 8-11). Please recall that higher KZ, SA and WW Index values indicate greater financial constraint, whereas the opposite is true for DtD.

KZ Index

Exhibit 8 presents the consolidated results for the KZ Index. The results are divided into three sections, where the first four columns include none of the three above-discussed additional control variables, the next four columns include credit rating and the last four columns include credit rating and size. Dividends are excluded in the third section due to already being accounted for in the construction of the index.

Regardless of which additional control variables are included, family ownership renders no statistically significant results with respect to the effect on the KZ Index (columns 1, 5 and 9). Although dispersion is high, the coefficient on family ownership is positive, which implies a higher KZ Index value on average for family firms. The coefficients on family ownership are 0.392 (column 1), 0.254 (column 5) and 0.320 (column 9). Compared to a mean for the full sample of -4.373 (see Exhibit 3), this is economically speaking quite insignificant. Family firms with supervoting share class systems render higher KZ Index values than the average family firm (columns 2, 6 and 10). Again, the results are statistically insignificant. With respect to the effects from which type of CEO runs the family firm, the coefficient on family CEOs is higher than for the general family firm, whereas the coefficient on family firms run by outside CEOs actually is negative (columns 3, 7 and 11). The results are statistically

significant at a risk level of 10% or lower for family CEO-run firm, but not for family firms with outside CEOs. When differentiating between the two types of family CEOs – descendants and founders – the coefficient is slightly higher for family firms with descendant CEOs (columns 4, 8 and 12). Yet, p-values are relatively high, except when using no additional control variables.

SA Index

Exhibit 9 presents the consolidated results for the SA Index. Just as for the KZ Index, the results are divided into three sections, but with the difference that the third table section includes credit rating and dividend payer status as additional control variables. Size is excluded as control variable, since this is part of the construction of the SA Index.

Family firms on average, and at high statistical significance, render higher SA Index values than non-family firms (columns 1, 5 and 9). The coefficients on family ownership are 0.241 (column 1), 0.194 (column 5) and 0.206 (column 9). Comparing to the full-sample mean of -0.775 (see Exhibit 3), the coefficients should be considered economically quite significant as well. The coefficients on family firms with supervoting share class systems are lower, yet not statistically significant (columns 2, 6 and 10). Family firms run by family CEOs on average render significantly higher coefficients than the average family firm, whereas the opposite is true for family firms run by outside CEOs (columns 3, 7 and 11). The coefficient on family CEO-run family firms appears to entirely stem from those firms that are run by its founder – descendant CEO-run firms actually have statistically insignificant coefficients close to zero (columns 4, 8 and 12).

WW Index

Exhibit 10 presents the consolidated results for the WW Index. Since both size and dividends are constituents of the index, only credit rating is included as additional control variable. Consequently, the exhibit is divided into two sections only.

The average family firm has a slightly higher, and statistically significant at the 5% risk level, index value than the average non-family firm (columns 1 and 5). Comparing the coefficients of 0.013 (column 1) and 0.007 (column 5) to the full-sample mean of -0.340, the results appear economically quite insignificant. There is no material difference in the coefficients when including only family firms with a supervoting share class systems, although the results are statistically less significant (columns 2 and 6). Family firms run by family CEOs see higher WW Index values than the average family firm (columns 3 and 7). This observed difference stems from founder CEO-run family firms, rather than from firms run by descendant CEOs (columns 4 and 8).

Distance to Default

Exhibit 11 presents the consolidated results for Distance to Default. The results are divided into three sections, where the first four columns include none of the three above-discussed additional control variables, the next four columns include credit rating and the last four columns include credit rating, size and dividend payer status.

On average, family firms have a higher DtD value (columns 1, 5 and 9). The coefficients on family ownership are 0.181 (column 1), 0.193 (column 5) and 0.176 (column 9). With the full-sample mean of 1.173 (see Exhibit 3) in mind, we consider the coefficients economically quite significant. Also, the p-values on all three coefficients are approximately 1%. When including only firms with supervoting share class systems, we do not obtain any statistically significant results (columns 2, 6 and 10). The coefficients are still positive, but lower than for the average family firm. Family firms run by family CEOs show coefficients that are higher than for the general family firm (columns 3, 7 and 11). The opposite is true for family firms run by outside CEOs, yet these results are less significant statistically. The coefficients on descendant CEO-run family firms are higher than for family firms in general, but lower than the coefficient on founder CEO-run firms (columns 4, 8 and 12). The dispersion of the coefficients on family firms run by descendant CEOs is relatively high, though. Thus, so are the p-values (12.2% to 15.7%).

Exhibit 8. Panel Data Regression Results - KZ Index

(Standard Errors in Brackets and P-Values in Parentheses)

Additional Controls:	No				Credit Rating				Credit Rating & Size			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
			CEO				CEO				CEO	
Variable	All Family Firms	Supervoting	Family & Outside	All	All Family Firms	Supervoting	Family & Outside	All	All Family Firms	Supervoting	Family & Outside	All
FamFirm	0.392	0.929			0.254	0.803			0.320	0.883		
	[0.370]	[0.724]			[0.350]	[0.683]			[0.356]	[0.681]		
	(0.290)	(0.200)			(0.468)	(0.240)			(0.369)	(0.195)		
FamilyCEO			1.071**				0.721*				0.812*	
			[0.437]				[0.421]				[0.426]	
			[0.014]				(0.087)				(0.057)	
OutsideCEO			-0.530	-0.529			-0.375	-0.371			-0.336	-0.332
			[0.570]	[0.570]			[0.537]	[0.537]			[0.539]	[0.539]
			(0.352)	(0.354)			(0.485)	(0.490)			(0.534)	(0.538)
FounderCEO				1.001*				0.561				0.667
				[0.561]				[0.546]				[0.551]
				(0.075)				(0.305)				(0.226)
DescendantCEO				1.184*				0.976				1.041
				[0.695]				[0.672]				[0.673]
				(0.089)				(0.147)				(0.122)
Credit Rating					0.422***	0.402***	0.414***	0.415***	0.479***	0.492***	0.473***	0.474***
					[0.053]	[0.058]	[0.053]	[0.053]	[0.062]	[0.066]	[0.062]	[0.062]
					(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size									0.422*	0.714***	0.444**	0.441**
									[0.225]	[0.244]	[0.224]	[0.223]
									(0.061)	(0.004)	(0.047)	(0.049)
N	16113	12003	16122	16122	7704	6321	7705	7705	7704	6321	7705	7705
R^2	0.281	0.249	0.284	0.284	0.313	0.281	0.314	0.314	0.314	0.285	0.316	0.316

Notes: The table displays the estimated coefficients from regressing the KZ Index on a binary indicator of family ownership, using industry- (2-digit SIC) and time (year)-fixed effects. These results are presented in column 1. In column 2, all family firms without supervoting share class system are dropped. In columns 3 - 4, KZ Index is regressed on CEO type to indicate a family member serving as CEO (FamilyCEO), an outsider serving as CEO in a family firm (OutsideCEO), the founder of the firm serving as CEO (FounderCEO) and a descendant of the founder of the firm serving as CEO (DescendantCEO). In columns 5 - 8, the same regressions are performed with an additional control variable; Credit Rating (AAA, 1, to D, 22). In columns 9 - 12 a second control variable is added: the natural log of total assets (Size), capped at the natural log of $4.5 billion. We control for heteroscedasticity and serial correlation using Huber-White standard errors clustered on the firm level. The primary specification, including all additional control variables, is:

$$KZ\ Index_{i,j,t} = \beta_0 + \beta_1 FamFirm_{i,j,t} + \beta_2 Credit\ Rating_{i,j,t} + \beta_3 Size_{i,j,t} + \beta_{10-99} Two\text{-}Digit\ SIC\ Code_j + \beta_{2001-2010} Year_t + \varepsilon_{i,j,t}$$

where the KZ Index is calculated as follows (a higher value indicates financial constraint):

$$KZ\ Index = -1.002 \times Cash\ Flows - 39.368 \times Dividends - 1.315 \times Cash\ Balance + 3.139 \times Leverage + 0.283 \times Tobin's\ Q$$

The significance levels are represented by (two-tail) test levels 10% (*), 5% (**) and 1% (***).

Exhibit 9. Panel Data Regression Results - SA Index

(Standard Errors in Brackets and P-Values in Parentheses)

Additional Controls:	No				Credit Rating				Credit Rating & Dividend			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
			CEO				CEO				CEO	
Variable	All Family Firms	Supervoting	Family & Outside	All	All Family Firms	Supervoting	Family & Outside	All	All Family Firms	Supervoting	Family & Outside	All
FamFirm	0.241***	0.124			0.194***	0.082			0.206***	0.109		
	[0.057]	[0.095]			[0.044]	[0.081]			[0.043]	[0.082]		
	(0.000)	(0.192)			(0.000)	(0.314)			(0.000)	(0.184)		
FamilyCEO			0.384***				0.262***				0.261***	
			[0.067]				[0.053]				[0.053]	
			(0.000)				(0.000)				(0.000)	
OutsideCEO			0.047	0.042			0.102*	0.098*			0.132**	0.127**
			[0.071]	[0.071]			[0.054]	[0.054]			[0.052]	[0.052]
			(0.506)	(0.550)			(0.060)	(0.072)			(0.012)	(0.015)
FounderCEO				0.582***				0.430***				0.416***
				[0.081]				[0.062]				[0.061]
				(0.000)				(0.000)				(0.000)
DescendantCEO				0.066				-0.006				0.014
				[0.088]				[0.069]				[0.071]
				(0.453)				(0.933)				(0.845)
Credit Rating					0.148***	0.143***	0.147***	0.146***	0.127***	0.122***	0.127***	0.126***
					[0.005]	[0.006]	[0.005]	[0.005]	[0.006]	[0.006]	[0.006]	[0.006]
					(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dividend									-0.354***	-0.365***	-0.349***	-0.341***
									[0.039]	[0.042]	[0.039]	[0.038]
									(0.000)	(0.000)	(0.000)	(0.000)
N	16172	12045	16184	16184	7719	6332	7720	7720	7719	6332	7720	7720
R^2	0.176	0.153	0.186	0.198	0.467	0.437	0.469	0.478	0.496	0.469	0.497	0.505

Notes: The table displays the estimated coefficients from regressing the SA Index on a binary indicator of family ownership, using industry- (2-digit SIC) and time (year)-fixed effects. These results are presented in column 1. In column 2, all family firms without supervoting share dass system are dropped. In columns 3 - 4, SA Index is regressed on CEO type to indicate a family member serving as CEO (FamilyCEO), an outsider serving as CEO in a family firm (OutsideCEO), the founder of the firm serving as CEO (FounderCEO) and a descendant of the founder of the firm serving as CEO (DescendantCEO). In columns 5 - 8, the same regressions are performed with an additional control variable; Credit Rating (AAA,1, to D, 22). In columns 9 - 12 a second control variable is added: a 0 or 1 indicator of the occurrence of common dividend payments (Dividend). We control for heteroscedasticity and serial correlation using Huber-White standard errors dustered on the firm level. The primary specification, induding all additional control variables, is:

$$SA\ Index_{i,j,t} = \beta_0 + \beta_1 FamFirm_{i,j,t} + \beta_2 Credit\ Rating_{i,j,t} + \beta_3 Dividend_{i,j,t} + \beta_{10-99} Two\text{-}Digit\ SIC\ Code_j + \beta_{2001-2010} Year_t + \varepsilon_{i,j,t}$$

where the SA Index is calculated as follows (a higher value indicates financial constraint):

$$SA\ Index = -0.737 \times Size + 0.043 \times Size^2 - 0.040 \times Age$$

The significance levels are represented by (two-tail) test levels 10% (*), 5% (**) and 1% (***).

Exhibit 10. Panel Data Regression Results - WW Index

(Standard Errors in Brackets and P-Values in Parentheses)

Additional Controls:	No				Credit Rating			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			CEO				CEO	
Variable	All Family Firms	Supervoting	Family & Outside	All	All Family Firms	Supervoting	Family & Outside	All
FamFirm	0.013**	0.015*			0.007**	0.008		
	[0.005]	[0.009]			[0.003]	[0.007]		
	(0.011)	(0.090)			(0.036)	(0.277)		
FamilyCEO			0.027***				0.012***	
			[0.006]				[0.004]	
			(0.000)				(0.003)	
OutsideCEO			-0.004	-0.005			0.001	0.001
			[0.006]	[0.006]			[0.004]	[0.004]
			(0.494)	(0.480)			(0.866)	(0.879)
FounderCEO				0.033***				0.015***
				[0.007]				[0.005]
				(0.000)				(0.002)
DescendantCEO				0.016*				0.008
				[0.009]				[0.006]
				(0.072)				(0.215)
Credit Rating					0.016***	0.015***	0.016***	0.016***
					[0.000]	[0.001]	[0.000]	[0.000]
					(0.000)	(0.000)	(0.000)	(0.000)
N	15615	11620	15624	15624	7572	6206	7573	7573
R^2	0.171	0.172	0.181	0.182	0.572	0.559	0.573	0.573

Notes: The table displays the estimated coefficients from regressing the WW Index on a binary indicator of family ownership, using industry- (2-digit SIC) and time (year)-fixed effects. These results are presented in column 1. In column 2, all family firms without supervoting share dass system are dropped. In columns 3 - 4, WW Index is regressed on CEO type to indicate a family member serving as CEO (FamilyCEO), an outsider serving as CEO in a family firm (OutsideCEO), the founder of the firm serving as CEO (FounderCEO) and a descendant of the founder of the firm serving as CEO (DescendantCEO). In columns 5 - 8, the same regressions are performed with an additional control variable; Credit Rating (AAA,1, to D, 22). We control for heteroscedasticity and serial correlation using Huber-White standard errors dustered on the firm level. The primary specification, induding all additional control variables, is:

$$WW\ Index_{i,j,t} = \beta_0 + \beta_1 FamFirm_{i,j,t} + \beta_2 Credit\ Rating_{i,j,t} + \beta_{10-99} Two\text{-}Digit\ SIC\ Code_j + \beta_{2001-2010} Year_t + \varepsilon_{i,j,t}$$

where the WW Index is calculated as follows (a higher value indicates financial constraint):

$$WW\ Index = -0.091 \times Cash\ Flows - 0.062 \times Dividend\ Payer\ Status + 0.021 \times Leverage - 0.044 \times Size + 0.102 \times Industry\ Sales\ Growth - 0.035 \times Firm\ Sales\ Growth$$

The significance levels are represented by (two-tail) test levels 10% (*), 5% (**) and 1% (***).

Exhibit 11. Panel Data Regression Results - Distance to Default (DtD)

(Standard Errors in Brackets and P-Values in Parentheses)

Additional Controls:	No				Credit Rating				Credit Rating, Size & Dividend			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
			CEO				CEO				CEO	
Variable	All Family Firms	Supervoting	Family & Outside	All	All Family Firms	Supervoting	Family & Outside	All	All Family Firms	Supervoting	Family & Outside	All
FamFirm	0.181**	0.091			0.193***	0.102			0.176**	0.086		
	[0.074]	[0.110]			[0.074]	[0.110]			[0.073]	[0.110]		
	(0.014)	(0.407)			(0.009)	(0.352)			(0.017)	(0.437)		
FamilyCEO			0.212**				0.241***				0.222**	
			[0.091]				[0.091]				[0.092]	
			(0.020)				(0.009)				(0.016)	
OutsideCEO			0.140	0.140			0.129	0.129			0.114	0.113
			[0.102]	[0.102]			[0.102]	[0.102]			[0.101]	[0.102]
			(0.170)	(0.171)			(0.206)	(0.208)			(0.263)	(0.265)
FounderCEO				0.220**				0.257**				0.238**
				[0.105]				[0.106]				[0.107]
				(0.037)				(0.015)				(0.027)
DescendantCEO				0.199				0.216				0.198
				[0.139]				[0.139]				[0.140]
				(0.153)				(0.122)				(0.157)
Credit Rating					-0.030***	-0.032***	-0.031***	-0.031***	-0.038***	-0.038***	-0.038***	-0.038***
					[0.011]	[0.012]	[0.011]	[0.011]	[0.014]	[0.015]	[0.014]	[0.014]
					(0.006)	(0.006)	(0.005)	(0.005)	(0.006)	(0.010)	(0.005)	(0.005)
Size									-0.093*	-0.093	-0.091*	-0.091*
									[0.051]	[0.057]	[0.051]	[0.051]
									[0.070]	[0.104]	[0.076]	[0.078]
Dividend									0.077	0.097	0.080	0.081
									[0.080]	[0.087]	[0.080]	[0.080]
									[0.333]	[0.265]	[0.314]	[0.309]
N	13579	10263	13579	13579	7333	6003	7333	7333	7333	6003	7333	7333
R^2	0.246	0.258	0.246	0.246	0.247	0.259	0.247	0.247	0.247	0.259	0.247	0.247

Notes: The table displays the estimated coefficients from regressing DtD on a binary indicator of family ownership, using industry- (2-digit SIC) and time (year)-fixed effects. These results are presented in column 1. In column 2, all family firms without supervoting share class system are dropped. In columns 3 - 4, DtD Index is regressed on CEO type to indicate a family member serving as CEO (FamilyCEO), an outsider serving as CEO in a family firm (OutsideCEO), the founder of the firm serving as CEO (FounderCEO) and a descendant of the founder of the firm serving as CEO (DescendantCEO). In columns 5 - 8, the same regressions are performed with an additional control variable; Credit Rating (AAA,1, to D, 22). In columns 9 - 12 two more control variables are added: the natural log of total assets (Size), capped at the natural log of $4.5 billion as well as a 0 or 1 indicator of the occurrence of common dividend payments (Dividend). We control for heteroscedasticity and serial correlation using Huber-White standard errors clustered on the firm level. The primary specification, including all additional control variables, is:

$$Distance\ to\ Default_{i,j,t} = \beta_0 + \beta_1 FamFirm_{i,j,t} + \beta_2 Credit\ Rating_{i,j,t} + \beta_3 Size_{i,j,t} + \beta_4 Dividend_{i,j,t} + \beta_{10-99} Two\text{-}Digit\ SIC\ Code_j + \beta_{2001-2010} Year_t + \varepsilon_{i,j,t}$$

where Distance to Default is calculated as follows (a lower value indicates financial constraint):

$$Distance\ to\ Default = \frac{Inverse\ Leverage + Stock\ Return - Firm\ Value\ Volatility}{Firm\ Value\ Standard\ Deviation}$$

The significance levels are represented by (two-tail) test levels 10% (*), 5% (**) and 1% (***).

6.2. 2008 Financial Crisis Study Results

The second part of this paper analyzes the differences in financial constraints between family and non-family firms using corporate actions as proxies for financial constraints. We analyze corporate behavior with respect to investments and liquidity management over the 2008 Financial Crisis. Below you will find a presentation of the results of each of the three outcome variables studied. We also present the results per industry (SIC divisions). Please recall from Section 4 that a positive ATT implies that the outcome variable at hand on average has decreased less for family firms than for their counterfactuals.

Change in Cash Holdings

Referring to Exhibit 12 and Panel A, over the 2008 Financial Crisis, family firms on average decreased their cash holdings by 2.0%-points less than non-family firms (column 1). The difference has a p-value of 1.6%. The full-sample mean is 17.2%, but since it includes some extreme outliers, it is quite much higher than the 7.7% median (Exhibit 3). In light of in particular the full-sample median, a 2.0%-percentage point ATT appears to be quite significant. The ATT for family firms with supervoting share class systems is positive yet not significantly different from zero (column 2). The ATT for family firms run by family CEOs is greater than for the general family firms and the effect is statistically significant at the 5% risk level (column 3). Family firms run by outside CEOs show no significant difference from zero, although ATT is positive (column 4). When separating family CEOs into founder (column 5) and descendant (column 6) CEOs, the effect is greater for the latter than for the former. However, dispersion is higher for founder CEO-run firms.

Change in Capital Expenditures

Referring to Exhibit 12 and Panel B, the change in capital expenditures is not significantly different from zero for any of the six matching operations. Standard errors are high and, as such, p-values are too. The ATT is negative in all six columns, implying family firms on average decreased capital expenditures more than their counterfactuals. The general family firm decreased capital expenditures by 0.9%-points more (column 1). The ATT is more negative for all other operations, except for firms run by descendant CEOs.

Change in Dividends

Exhibit 12 and Panel C displays the results of the change in dividend payment status. The results are quite insignificant statistically. Thus, we cannot with certainty claim that the difference between family firms and their counterfactuals is significantly different from zero. Similar to the study on capital expenditures, both standard errors and hence p-values are high. The main takeaway from the results is that the ATT is positive for all columns, except for when including only family firms with supervoting

shares. In other words, family firms on average decreased dividends to a more limited extent than non-family firms.

Industry-by-Industry Outcomes

As a complement to this part of our study, we split all firms into industries, based on the standard ten SIC divisions. Agriculture, forestry and fishing (Division A) is not included due to the lack of family firms in this industry. Financial firms (Division H) are also excluded, since our sample excludes all such firms. Finally, firms in public administration (Division J) are excluded due to the sample including only four of these firms. This leaves us with seven industry groups in total. The results are presented in Appendix F.

With respect to the results in general, statistical significance is generally lower than for the full-sample study above. This is likely related to lower statistical power from splitting the larger sample into smaller sub-samples. However, we may observe a few key points of interest. The ATT for cash holdings (Panel A) is the largest in the mining (p-value 9.8%) and construction (p-value 31.8%) industries. Cash holdings ATT is positive for all industry groups, except for retail trade (column 6).

When it comes to capital expenditures (Panel B), all divisions except wholesale and retail trade (columns 5 and 6) show negative ATT. The most negative results are obtained for companies within mining, construction as well as transportation, communications, electric, gas and sanitary services (columns 1, 2 and 4). A decently low p-value is only obtained for the latter, however (9.8%).

Finally, when it comes to dividend payments (Panel C), the most notable result is the ATT of 33.9% for construction companies (p-value 3.3%). The corresponding figure for the manufacturing industry is 6.4%, yet at a p-value of 17.2% (column 3) The rest of the results show no indication that the difference between family and non-family firms is significantly different from zero.

Exhibit 12. 2008 Financial Crisis Study Results

(Standard Errors in Brackets and P-Values in Parentheses)

	(1)	(2)	(3)	(4)	(5)	(6)
			CEO			
Measure	**All Family Firms**	**Control**	**Family**	**Outside**	**Founder**	**Descendant**
Panel A						
Cash	2.0%**	0.8%	2.4% **	0.8%	2.2%	2.5% *
	[0.008]	[0.011]	[0.011]	[0.010]	[0.015]	[0.013]
	(0.016)	(0.430)	(0.027)	(0.409)	(0.150)	(0.055)
N	1 362	1 076	1 190	1 127	1 087	1 056
Panel B						
Capex	-0.9%	-1.7%	-1.2%	-1.1%	-1.6%	-0.7%
	[0.008]	[0.011]	[0.010]	[0.010]	[0.015]	[0.013]
	(0.256)	(0.113)	(0.253)	(0.256)	(0.279)	(0.605)
N	1 191	992	1 037	1 039	942	923
Panel C						
Dividend	3.7%	-1.2%	4.7%	1.6%	1.7%	8.3%
	[0.030]	[0.052]	[0.040]	[0.038]	[0.042]	[0.066]
	(0.217)	(0.816)	(0.241)	(0.676)	(0.686)	(0.209)
N	1 318	1 037	1 152	1 083	1 049	1 020

Notes: The table provides the average treatment effects on the treated (ATT) for changes in cash holdings (Cash), capital expenditures (Capex) and dividend payment status (Dividend). ATT are computed using the bias-corrected, heteroscedasticity consistent Abadie and Imbens (2003) matching estimator. Family firms are matched with counterfactual firms based on four categorical covariates - industry classification (two-digit SIC code), credit ratings (AAA,1, to D,22) and common dividend payment status (1 if payer, 0 otherwise) - and one continuos covariate - the natural logarithm of asset base size (capped at the natural logarithm of $4.5 billion). T'he six different columns present the results when using six different treatment variables; all family firms (column 1), family firms deploying supervoting share class systems (column 2), family firms with family CEOs (column 3), family firms with outside CEOs (column 4), family firms with founder CEOs (column 5) as well as family firms with descendant CEOs (column 6). Founder and descendant CEOs both belong to the group of family CEOs The formal specification is as follows:

$$\textit{Average Treatment Effect on the Treated (ATT)} = \frac{1}{n_1} \sum_{i \mid T=1} \{y_i(1) - y_i(0)\}$$

where

ATT = the estimated effect of treatment on the treated firms

n_1 = the number of treated firms in the sample

$T = 1$ indicates treatment

$y_i(1)$ = the outcome for firm i when treated

$y_i(0)$ = the outcome for firm i when not treated (that is, the counterfactual firm with which the treated firm is matched)

The outcome variables are calculated as follows:

$$\Delta, \textit{ Cash Holdings}_i = \frac{\textit{Cash \& Short-Term Inv}_{i,Q4\ 2008}}{\textit{Total Assets}_{i,\ Q4\ 2008}} - \frac{\textit{Cash \& Short-Term Inv}_{i,Q4\ 2006}}{\textit{Total Assets}_{i,\ Q4\ 2006}}$$

$$\Delta, \textit{ Capital Expenditures}_i = \frac{\textit{Cap Ex}_{i,Q4\ 2008}}{\textit{P,P \& E}_{i,\ Q3\ 2008}} - \frac{\textit{Cap Ex}_{i,Q4\ 2006}}{\textit{P,P \& E}_{i,\ Q3\ 2006}}$$

$$\Delta, \textit{ Dividend Payer Status}_i = \textit{Dividend Payer Status}_{i,\ 2009} - \textit{Avg Dividend Payer Status}_{i,\ 2004\text{-}2006}$$

The significance levels are represented by (two-tail) test levels 10% (*), 5% (**) and 1% (***).

6.3. Discussion and Implications

Having presented the main results of both our regression and matching analyses, this section discusses the main implications of the obtained set of results. We will start discussing the panel data regression results, where we used four proxies for financial constraints. The proxies indeed differ in terms of index constituents and which firms that are identified as constrained. Consequently, we will first need to discuss the relevance and the relative weight to be placed on each. Next, we discuss the implications of our results. Having discussed the regression results, we continue analyzing the 2008 Financial Crisis matching study. We use the available literature to discuss the relative weight to place on each of the three outcome variables used before drawing the most important conclusions from the results.

6.3.1. Panel Data Regression Implications

The only of the four proxies that would suggest family firms are less constrained financially than non-family firms is Distance to Default. The degree to which we may draw any conclusions based on these results depends on the validity of DtD as proxy for financial constraints relative to the three other proxies.

In our study, we are unable to identify significant effects on the KZ Index from family ownership. Provided the constituents of the index, the differences between family and non-family seem to on average cancel out. For example, and referring to the descriptive statistics in Exhibit 4, family firms on average generate more cash flows and pay dividends more frequently, but also have lower average cash balances. The SA Index suggests family firms are significantly more constrained than non-family firms. Referring to the descriptive statistics in Exhibit 4 as well as the regression in Exhibit 7 column 3, this comes as no surprise. Family firms seem to on average be significantly smaller – both statistically and economically speaking. As pointed out by Farre-Mensa and Ljungqvist (2013), the WW Index has a lot of overlap with the SA Index with regards to which firms are identified as financially constrained. Accordingly, the WW Index regressions also render a small positive coefficient on family ownership. However, this observed effect is only slightly positive. Family firms, again referring to the descriptive statistics in Exhibit 5, on average generate more cash flows and are more likely to be dividend payers. This probably mitigates the positive impact on the index values from the smaller firm sizes of family firms.

As discussed earlier, Farre-Mensa and Ljungqvist (2013) wrote a paper studying in depth the validity of each of the four proxies. No index, except for DtD, did a good job in identifying financially constrained firms. The KZ Index has been criticized for the lack of external validity due to the potential sample selection bias resulting from being constructed on just 49 manufacturing firms (Whited and

Wu, 2006). As pointed out in Farre-Mensa and Ljungqvist (2013), and confirmed by our results, the SA and WW Indices tend to identify as financially constrained those firms that are younger, faster growing and smaller. Larger firm size, as discussed previously, may indeed to some extent improve access to financing. Referring to Appendix D, credit rating and size are also negatively correlated[28]. However, according to Farre-Mensa and Ljungqvist (2013), smaller firms do not necessarily and categorically have a hard time raising capital externally. Firms of similar sizes may have very different characteristics relevant to determining firms' abilities to access external financing. As a response to this issue, it is arguably more intuitively appealing to accept the simple proposition that firms closer to default also are more financially constrained than those farther from default. Using this measure, one captures risk and performance characteristics such as variation in firm value, financial leverage and stock returns.

If we for the above reasons allow us to place more weight on the Distance to Default measure, our results shows that family firms on average appear to have longer distances to default. The risk of rejecting a correct null hypothesis is relatively low regardless of which control variables are included (p-values of 0.9% - 1.7%)[29]. These results may provide support for the hypothesis that the presence of family ownership mitigates information asymmetries and agency conflicts, lowering financial constraints. These implications would be consistent with the findings in previous research, including those on lower (agency) costs of debt (Anderson et al, 2003; Lagaras and Tsoutsoura, 2015) as well as higher stock market valuations (Villalonga and Amit, 2006) for family firms. Moving on to the implications of our findings with respect to family firms deploying control-enhancing mechanisms in the form of supervoting share class systems, these firms render a smaller positive and statistically insignificant coefficient. This may be due to agency costs arising from an increased likelihood of private benefit extraction, at the expense of in in particular equity investors, being exacerbated. This in turn limits the access to external (equity) financing. These results and implications are consistent with previous papers (Faccio et al, 2001; Villalonga and Amit, 2006). The final part of the analysis regards the type of CEO running the family firm. Our results indicate that the marginal effect of having family CEOs running the family firm is positive. Please recall that we in previous research could not find a unanimous direction of the net agency effects of having a family CEO run the family firm. On the one hand, private benefit extraction (through for instance risk aversion) may become more likely. As a result, agency conflicts with chiefly non-family holders of equity may increase. On the other hand,

[28] That is, a larger asset base is related with a better credit rating.
[29] The null hypothesis being that family ownership has no effect on financial constraints, as measured by DtD.

(private) creditors may value the long-term relationships they have with the family. Also, family members (and in particular founders) have been argued to possess unique idiosyncratic knowledge about their firm, which may make both equity and debt investors more willing to provide capital. The results indicate that the positive agency effects outweigh the negative. Such findings are in line with for instance Lagaras and Tsoutsoura (2015), who study the effect of family CEOs on the relationships with the debt market. However, they are not in line with studies on equity market valuation discounts attributed to family CEOs (including Morck et al, 1988). To paint a more detailed picture, we differentiate between founder and descendant CEOs. The results do support the hypothesis that founder CEOs better serve to lower financial constraints than descendant CEOs and are consistent with previous work (including Anderson and Reeb, 2003; Villalonga and Amit, 2006; Pérez-González, 2006). This may be due to the superior skills that founders have been suggested to possess. The results also help us understand the higher coefficient on family CEOs as a group.

We finish off this section by discussing briefly the changes of our results in response to the inclusion of additional control variables. Relating to the discussion on size above, family firms appear to be significantly smaller than non-family firms. Family owners may be more likely to want and being able to remain blockholders if the firms remain smaller. Alternatively, they may directly influence the firms' decisions to stay smaller. Only the latter is an indication of causality and renders a risk of bad control. When omitting size, and the two other additional controls, from our DtD regression, the coefficient on family ownership is 0.181. Including them renders a coefficient of 0.176. Thus, the implications of our study (using DtD) appear robust regardless of including or omitting any additional control variables.

6.3.2. 2008 Financial Crisis Study Implications

With respect to the overall effect of family ownership, the only significantly positive ATT are obtained when studying the change in cash holdings over the crisis. The ATT for family firms is 2.0% (p-value 1.6%). Capital expenditures show a slightly negative ATT and dividends a positive ATT, both values being statistically insignificant.

In line with Campello et al's (2010) study on the 2008 Financial Crisis, we expected a positive sign on each of the three outcome variables. However, provided the debate in particular on investment-cash flow sensitivity in previous literature, the results are arguably less surprising. Among others, Fazzari et al (1988) suggested that financially constrained firms are more sensitive to internal cash flow generation with respect to investments. Over the years since, and as we have seen, the validity of their conclusions have been questioned by academics. It has been suggested that investment-cash flow

sensitivity is not monotonic[30] (Almeida and Campello, 2002; Kaplan and Zingales, 1997; Pal and Kozhan, 2009) and that the availability of attractive investment opportunities is not constant (Almeida et al, 2004). As a result, making inferences on financial constraints from changes in investment spending may be difficult and even theoretically incorrect. As an alternative indicator of financial constraints, Almeida et al (2004) put forward cash flow sensitivity of cash as theoretically more robust, avoiding some of the issues of investment-cash flow sensitivity. Thus, it is arguably intuitive to accept the proposition that if a given firm at a given point in time has limited access to the capital markets, this firm will be more likely to use internal capital to fund corporate activities than another firm which is able to more freely raise external financing. Continuing to the second indicator of liquidity management, family firms on average decreased dividend payments to a more limited degree. Our results are, however, not significant statistically. This may be due to dividends being sticky in nature – managers may be reluctant to cut dividends due to the potentially adverse signaling effects of such actions (see for instance Asquith and Mullins, 1986).

To conclude the above discussion, and if we place more weight on accepting Almeida et al's (2004) theory, our results with respect to firms' liquidity management actions indicate that family firms showed signs of less financial constraint over the financial crisis. Our results with respect to the existence of supervoting rights and the difference between family and outside CEO-run family firms display a similar pattern to the DtD regression results. The main difference is that family firms run by descendant CEOs generate a slightly higher ATT than those run by founders, although the p-value on founder CEO firms is rather high at 15%. Thus, our implications with regards to the effects on financial constraints from family ownership in combination with supervoting rights and family CEOs are in line with the conclusions drawn in Section 6.3.1. Our hypothesis that founder CEOs contribute to lower financial constraints than descendant CEOs cannot be confirmed, however.

Being a complement to the general study and although statistical significance is generally low, it is worth mentioning that the cash holdings ATT is the largest in the mining (p-value 9.8%) and construction (p-value 31.8%) industries. Also, family firms cut dividends to a significantly lower degree than non-family firms in the construction industry (ATT 33.9%, p-value 3.3%). Family firms are rather common in the construction industry, representing almost half of the firm-years in our full sample, but rather uncommon in mining, representing about a fifth of the firms in the industry (Appendix A).

[30] Recall for instance Almeida and Campello (2002), who claim that within the group of constrained firms, some firms are less constrained and, due to the credit multiplier effect, these firms face a higher borrowing capacity which may make investments more sensitive to cash flow shocks at these firms than at more constrained firms.

As put forward in Section 4.3.2., the construction industry was severely hit by the 2008 Financial Crisis and the recession connected to it. Also, mining is commonly seen as a relatively pro-cyclical industry, given the volatile nature of natural resources prices. These industries likely experienced more severe declines in net worth during the 2008 Financial Crisis. Thus, financially constrained firms in these two industries potentially burnt through more of their cash resources than firms in industries less severely hit by the crisis. If we accept the proposition that founding family ownership mitigates informational asymmetries and agency costs, it is not surprising that we see the greatest ATT in industries where we would expect to see the most severe effects of financial constraints.

6.4. Limitations, Additional Robustness Checks and Alternative Interpretations

As with other studies on financial constraints, and since it is impossible to directly measure financial constraints, the main limitation of this study regards the use of proxies. Our judgement on which proxies are valid is key to the implications of this study. We base our implications chiefly on the results from using Distance to Default and the changes in cash holdings as proxies. These are, as we have discussed, proxies reflecting firm characteristics and actions that are arguably well-motivated theoretically as well as intuitive. Farre-Mensa and Ljungqvist (2013) proposed Distance to Default as a proxy superior to the KZ, SA and WW Indices. However, due to Farre-Mensa and Ljungqvist's (2013) paper being relatively close in time to our paper, we have not seen plenty of precedent papers using DtD as proxy. This is unsurprisingly a limitation to our panel data study.

With respect to the family firm definition used in this paper, we ideally would have liked to also test higher cutoffs of family ownership share as well as the actual dollar value of the family's stake (as done in for example Anderson and Reeb, 2003). Arguably, a family owning a given stake of a large company has greater incentives to, for instance, monitor the firm management than a family owning the same stake of a small company. In addition, Anderson et al (2003) control for the existence of non-family equity blockholders as potential firm monitors, however without finding any impact on agency costs of debt from such blockholders. The reason, they claim, may be that these shareholders are often well-diversified institutional shareholders and are thus less committed monitors. To conduct tests using these two additional specifications, we would need to create entirely new datasets, which would be too time consuming in relation to the potential reward to the study.

Furthermore, although our sample is designed such that firms are allowed to exit and re-enter, our study is arguably subject to remaining survivorship bias. This may be due to events such as merger activity or bankruptcies – both potentially related with a firm's status as family or non-family firm. Consequently, we may have selection bias. In our matching study, survivorship bias is naturally

controlled for by including only observations available over the entire crisis period. For our panel data regression analysis (equation 5) using DtD as proxy for financial constraint, we follow Anderson and Reeb (2003) and control for survivorship bias by including only those firms available over the entire study period. Referring to Appendix G columns 1 to 4, we obtain no materially different results. The coefficient on family firm ownership is slightly lower, but still significantly positive at the 5% risk level.

We previously discussed the risk of including bad controls, but that the main implications of our results do not change materially with the inclusion of one or more of the three additional control variables used. Also, we argued, several closely related papers include all three control variables. An alternative way of dealing with the risk of including bad controls, and in line with Anderson et al (2003), is to run a regression for each of the three control variables as dependent variable and family ownership as independent variable[31]. This way it is possible to estimate the error term – the parts of dividend payer status, size and credit rating not influenced by family ownership. Hence, we conduct our standard industry- and time-fixed effects regression (equation 5) with DtD as dependent variable, but using the residuals computed above as control variables. Referring to Appendix G columns 5 to 8, the results are in line with the original specification results in Exhibit 11 columns 9 to 12. The family ownership coefficient is 0.181 and statistically significant at the 5% risk level. Hence our original regression results seem robust to this test as well.

Earlier in this section, we raised one major problem of using a proxy-based approach – namely that inferences depend on judgement of validity of proxies. Another aspect of relying on proxies relates to the alternative interpretations that are possible to make from the results. With respect to DtD, higher values[32] are driven by low financial leverage, high stock returns and low market value volatility. Family owners may not at all be lowering financial constraints, due to mitigating frictions related to information asymmetries and agency conflicts. Rather, the flip-side of the coin might be true. That is, family firms may see higher DtD due to promoting risk averse corporate policies in terms of investments and financial leverage. Similarly, it is quite possible that risk averse family owners, having strong incentives of safeguarding business continuity, are prone to manage liquidity more conservatively during negative macroeconomic shocks. Although not statistically significant, the ATT on capital expenditures was negative, which may provide support to this concern. Such findings would also be in line with the claims by Lins et al (2011), who claim that risk averse family firms cut investments more in the 2008 Financial Crisis. However, referring to the very simple difference of

[31] As before, we deploy industry- and time-fixed effects.
[32] Again, please recall that higher values indicate lower degrees of financial constraints.

means test (Exhibit 5), neither stock volatility nor leverage seem to differ materially for family firms as a group. Stock returns are, although not statistically significant, on average higher for family firms. We are studying financial constraints in general, not with respect to equity and debt markets separately. Family risk aversion is not something that automatically increases net total agency costs[33]. Relationships with creditors for instance benefit from bankruptcy risk being limited. At the same time, risk aversion may exacerbate agency conflicts between family and non-family shareholders. Diversified equity investors may not be willing to supply their capital to firms foregoing riskier, but positive NPV, projects. Concluding the discussion on alternative implications, in case agency costs of risk aversion exceed benefits related to monitoring and limited risk shifting behavior, family owners do not contribute to mitigating capital markets frictions, when studied on the aggregate level.

7. Conclusion

The purpose of this paper is to assess the effect of founding family ownership on financial constraints. Previous research commonly describes family shareholders as undiversified blockholders with a long-term commitment to the firm and its survival. This has been argued to make family owners credible and willing monitors who are less prone to promote risk shifting activities. In turn, such characteristics have empirically been shown to render better accounting information, better performance, higher stock market valuations and lower costs of debt at family firms. Frictions, such as information asymmetries and agency conflicts, in the capital markets hamper firms' abilities to raise financing and give rise to financial constraints. Building on existing theory and empirical findings, we hypothesize that founding family owners mitigate such capital markets frictions, contributing to family firms facing lower degrees of financial constraints.

We find that, when studying Distance to Default and changes in cash holdings, family firms appear to on average be less financially constrained than non-family firms. These proxies can be argued, supported by theory and empirical studies, to better reflect the behavior and characteristics of firms being constrained financially than the other proxies. The results would confirm the picture commonly painted in previous research, namely that family owners contribute to mitigating information asymmetries and reducing costs arising from agency conflicts. However, we do need to be aware of alternative explanations behind our results. Theory has suggested family owners to be

[33] That is, agency costs stemming from relationships with shareholders and creditors.

excessively risk averse. If risk aversion and the agency costs from such behavior exceed agency benefits from family ownership, family owners do not contribute to lower financial constraints.

Furthermore, our results indicate that family firms deploying supervoting share class systems see smaller and less statistically significant positive effects on Distance to Default and changes in cash holdings. These results are consistent with previous research suggesting that control-enhancing mechanisms contribute to increasing agency costs stemming from an increased likelihood of family private benefit extraction. Furthermore, we find that family CEOs seem to be more successful in lowering financial constraints, potentially due to (private) creditors appreciating the long-term relationships they have built with the founding families. Also, family members, and in particular founders, have been argued to possess unique firm-specific knowledge, impossible for outside CEOs to acquire. The relative effects from having descendants or founders run the family firms are not unanimously clear from our results, however.

We have also throughout this paper highlighted the potentially divergent agency consequences of some characteristics related to founding family ownership. On the one hand, if family risk aversion influences corporate decisions and investments, private benefits may be extracted from non-family shareholders. On the other hand, such risk aversion lowers the likelihood of risk shifting, mitigating the bankruptcy risks creditors are exposed to. Thus, it would be interesting to study family ownership effects on financial constraints related to equity and debt capital supply markets separately. This could be done by, for instance, studying equity recycling as well as debt level changes in response to increases in marginal corporate tax rates. This is beyond the scope of this paper and a potential area for future research.

8. References

Periodicals

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Appendices

Appendix A. Frequencies and Percentages of Family and Non-family Firms by Industries

SIC Code	Industry Description	Family Firms	CEO			Non-family Firms	Percentage Family Firms in Industry
			Outside	Founder	Descendant		
B	**Mining**	**179**	**77**	**71**	**31**	**659**	**21%**
10	Metal mining	3	0	3	0	96	3%
12	Coal mining	0	0	0	0	60	0%
13	Oil and gas extraction	166	67	68	31	478	26%
14	Nonmetallic minerals, except fuels	10	10	0	0	25	29%
C	**Construction**	**156**	**45**	**65**	**46**	**173**	**47%**
15	General building contractors	138	35	61	42	47	75%
16	Heavy construction, except buildings	13	9	0	4	73	15%
17	Special trade contractors	5	1	4	0	53	9%
D	**Manufacturing**	**2476**	**1017**	**811**	**648**	**5791**	**30%**
20	Food and kindred products	262	89	62	111	249	51%
21	Tobacco products	10	5	5	0	27	27%
22	Textile mill products	76	38	10	28	22	78%
23	Apparel and other textile products	104	23	39	42	66	61%
24	Lumber and wood products	53	38	7	8	68	44%
25	Furniture and fixtures	44	19	15	10	91	33%
26	Paper and allied products	68	37	7	24	168	29%
27	Printing and publishing	140	92	18	30	106	57%
28	Chemical and allied products	285	127	98	60	1102	21%
29	Petroleum and coal products	32	8	1	23	92	26%
30	Rubber and miscellaneous plastic products	64	20	20	24	96	40%
31	Leather and leather products	30	3	17	10	26	54%
32	Stone, day, and glass products	13	5	0	8	99	12%
33	Primary metal industries	67	23	8	36	269	20%
34	Fabricated metal products	129	58	23	48	170	43%
35	Industrial machinery and equipment	258	99	127	32	996	21%
36	Electronic and other electrical equipment	427	180	169	78	1079	28%
37	Transportation equipment	144	55	67	22	375	28%
38	Instruments and related products	199	63	86	50	606	25%
39	Miscellaneous manufacturing products	71	35	32	4	84	46%
E	**Transportation, Communications, Electric, Gas and Sanitary Services**	**610**	**172**	**263**	**175**	**549**	**53%**
40	Railroad transportation	12	4	8	0	64	16%
41	Local and interurban passenger transit	0	0	0	0	10	0%
42	Trucking and warehousing	109	23	46	40	51	68%
44	Water transportation	53	19	14	20	71	43%
45	Transportation by air	38	7	20	11	151	20%
46	Pipelines, except natural gas	0	0	0	0	15	0%
47	Transportation services	23	0	13	10	49	32%
48	Communications	375	119	162	94	138	73%

Appendix A Continued

SIC Code	Industry Description	Family Firms	CEO			Non-family Firms	Percentage Family Firms in Industry
			Outside	Founder	Descendant		
F	**Wholesale Trade**	**274**	**115**	**95**	**64**	**409**	**40%**
50	Wholesale trade-durable goods	196	85	67	44	256	43%
51	Wholesale trade-nondurable goods	78	30	28	20	153	34%
G	**Retail Trade**	**649**	**216**	**247**	**186**	**933**	**41%**
52	Building materials and gardening	18	12	6	0	32	36%
53	General merchandise stores	83	36	15	32	131	39%
54	Food stores	73	25	15	33	74	50%
55	Auto dealers and service stations	92	31	42	19	82	53%
56	Apparel and accessory stores	164	67	48	49	136	55%
57	Furniture and home furnishings	49	14	17	18	71	41%
58	Eating and drinking places	65	10	55	0	200	25%
59	Miscellaneous retail	105	21	49	35	207	34%
H	**Real estate**	**10**	**5**	**5**	**0**	**90**	**10%**
63	Insurance carriers	0	0	0	0	10	0%
65	Real estate	0	0	0	0	10	0%
67	Holding and other investment offices	10	5	5	0	70	13%
I	**Services**	**1176**	**444**	**600**	**132**	**1923**	**38%**
70	Hotels and other lodging places	41	14	15	12	37	53%
72	Personal services	26	17	9	0	53	33%
73	Business services	656	253	345	58	1148	36%
75	Auto repair, services, and parking	18	7	1	10	39	32%
76	Miscellaneous repair services	0	0	0	0	2	0%
78	Motion pictures	39	3	16	20	37	51%
79	Amusement and recreation services	153	53	84	16	106	59%
80	Health services	51	18	27	6	276	16%
82	Educational services	48	27	11	10	29	62%
83	Social services	20	11	9	0	8	71%
87	Engineering and management services	124	41	83	0	188	40%
J	**Public Administration**						
99	Non-dassifiable establishments	63	19	34	10	65	49%
	Total	5593	2110	2191	1292	10592	35%

Notes: The table displays the occurence of firm-year observations for the period 2001-2010 by two-digit SIC code as well as SIC code divisions. All family firms are split into CEO categories, depending on who is the CEO for the (majority) of a specific firm-year; outside (hired) CEOs, a founder CEOs as well as descendant CEOs. Percentage family firms per industry is calculated dividing the number of family firm-year observations by total firm-year observations for a given industry. Missing values are exduded.

Appendix B (Panel A). Overview of Compustat and CRSP Data Items Used

Compustat Item	Description
at	Assets - Total
capx	Capital Expenditures
ceq	Common/Ordinary Equity - Total
che	Cash and Short-Term Investments
csho	Common Shares Outstanding
dlc	Debt in Current Liabilities - Total
dltt	Long-Term Debt - Total
dp	Depreciation and Amortization
dvc	Dividends Common/Ordinary
dvp	Dividends - Preferred/Preference
ib	Income Before Extraordinary Items
ppent	Property, Plant and Equipment - Total (Net)
prcc_f	Price Close - Annual - Fiscal
sale	Sales/Turnover (Net)
seq	Stockholders' Equity - Total
splticrm	S&P Domestic Long Term Issuer Credit Rating
txdb	Deferred Taxes (Balance Sheet)

CRSP Item	Description
prc	Price
shrout	Number of Shares Outstanding
ret	Holding Period Return

Notes: The table provides an overview of all data items obtained from Compustat and CRSP used in the analysis. Compustat is a database of US and Canadian fundamental and market information on active and inactive publicly held companies. CRSP (Center for Research in Security Prices) provides security data, including historical prices and returns.

Appendix B (Panel B). Details on the Construction of Proxies and Control Variables Used

The **KZ Index** is constructed following Farre-Mensa and Ljungqvist (2013) where all variables in italics are Compustat items:

$$\text{KZ Index} = -1.002 \times \frac{ib + dp}{\text{lagged } ppent} - 39.368 \times \frac{dvc + dvp}{\text{lagged } ppent}$$
$$- 1.315 \times \frac{che}{\text{lagged } ppent} + 3.139 \times \frac{dltt + dlc}{dltt + dlc + seq} + 0.283 \times \frac{at + prcc\_f \times csho - ceq - txdb}{at}$$

The **SA Index** is constructed following Farre-Mensa and Ljungqvist (2013) where all variables in italics are Compustat items:

$$\text{SA Index} = -0.737 \times \ln(at) + 0.043 \times \ln(at)^2 - 0.040 \times \text{Age}$$

where Age is the number of years the firm has a non-missing stock price in Compustat, *at* is deflated or inflated to 2004 dollars using CPI-U Bureau of Labor Statistics.

Age is capped at 37 years and size is capped at the natural logarithm of $4.5 billion.

The **WW Index** is constructed following Farre-Mensa and Ljungqvist (2013) where all variables in italics are Compustat items:

$$\text{WW Index} = -0.091 \times \frac{ib + dp}{at} - 0.062 \times [\text{Dividend Payer Status equal to one if } (dvc + dvp) \text{ is positive, and zero otherwise}] + 0.021 \times \frac{dltt}{at} - 0.044 \times \ln(at) + 0.102 \times [\text{average industry sales growth estimated for each three-digit SIC code and for each year}] - 0.035 \times \left(\frac{Sale_{t}}{Sale_{t-1}} - 1\right)$$

Distance to Default is constructed following Farre-Mensa and Ljungqvist (2013):

$$\text{Distance to Default} = \frac{\ln[(E + F) / F] + r - 0.5\sigma^2}{\sigma}$$

where (CRSP items in italics) $E = \frac{prc \times shrout}{10^3}$; (Compustat items in italics) $F = dlc + 0.5dltt$,

r is each firm's annual stock return calculated by cumulating monthly returns (CRSP item *ret*) over the previous 12 months; $\sigma = \frac{E}{E+F} \times \sigma_e + \frac{F}{E+F} \times (0.05 + 0.25\sigma_e)$ and

where σ_e is the annualized percent standard deviation of returns, calculated from the monthly returns over the previous 12 months.

Cash Holdings is constructed as follows, where all variables in italics are Compustat items:

$$\Delta, \text{ Cash Holdings}_i = \frac{che_{i,\text{Q4 2008}}}{at_{i,\text{ Q4 2008}}} - \frac{che_{i,\text{Q4 2006}}}{at_{i,\text{ Q4 2006}}}$$

Capital Expenditures is constructed as follows, where all variables in italics are Compustat items:

$$\Delta, \text{ Capital Expenditures}_i = \frac{capx_{i,\text{Q4 2008}}}{ppent_{i,\text{ Q3 2008}}} - \frac{capx_{i,\text{Q4 2006}}}{ppent_{i,\text{ Q3 2006}}}$$

Dividend Payer Status is constructed as follows, where all variables in italics are Compustat items:

$$\Delta, \text{ Dividend Payer Status}_i = [\text{Dividend Payer Status equal to one if } (dvc + dvp) \text{is positive, and zero otherwise}]_{i,\ 2009} - \text{Avg } [\text{Dividend Payer Status equal to one if } (dvc + dvp) \text{is positive and zero otherwise}]_{i,\ 2004\text{-}2006}$$

Control variables and covariates used throughout the analysis where all variables in italics are Compustat items:

Size = natural log of (*at*), where *at* is capped at $4.5 billion

Dividend = [Dividend Payer Status equal to one if (*dvc* + *dvp*) is positive, zero otherwise]

Credit Rating = [conversion number from 1 (AAA) to 22 (D) based on *splticrm*]

Appendix C. Credit Rating Numberical Conversions

Conversion Number	S&P Rating
1	AAA
2	AA+
3	AA
4	AA-
5	A+
6	A
7	A-
8	BBB+
9	BBB
10	BBB-
11	BB+
12	BB
13	BB-
14	B+
15	B
16	B-
17	CCC+
18	CCC
19	CCC-
20	CC
21	C
22	D
23	No

Notes: The table provides credit rating conversion numbers for S&P ratings used in the analysis. Each credit rating is shown alongside the corresponding conversion number.

Appendix D. Correlation Matrix of Selected Variables

	Famfirm	KZ Index	SA Index	WW Index	DtD	Size	Credit Rating	Dividend
Famfirm	1.000							
KZ Index	-0.020	1.000						
SA Index	0.168	0.129	1.000					
WW Index	0.107	0.186	0.798	1.000				
DtD	-0.007	-0.028	-0.005	-0.024	1.000			
Size	-0.031	-0.031	-0.249	-0.398	-0.024	1.000		
Credit Rating	0.103	0.190	0.611	0.698	-0.030	-0.310	1.000	
Dividend	-0.010	-0.206	-0.452	-0.674	0.013	0.126	-0.443	1.000

Notes: The table provides simple correlation data for selected variables. The variables include: family firm ownership status (Famfirm), KZ Index, SA Index, WW Index, Distance to Default (DtD), natural log of total assets in $ millions (Size), credit rating (Credit Rating) and dividend payment status (Dividend). Famfirm takes the value 1 if the firm has family ownership presence, and 0 otherwise. Credit Rating takes a value between 1 (AAA) and 22 (D). Dividend takes a value of 1 if a firm pays common dividends, and 0 otherwise. The correlation coefficients are computed on the full dataset consisting of 16,230 firm observations for the top-2,000 largest firms for the period 2001-2010. However, please note that an observation (that is, firm-year) is omitted if a variable is missing. The KZ, SA, WW and DtD Indices are measures of financial constraints and are calculated as follows:

$$KZ\ Index = -1.002 \times Cash\ Flows - 39.368 \times Dividends - 1.315 \times Cash\ Balance + 3.139 \times Leverage + 0.283 \times Tobin's\ Q$$

$$SA\ Index = -0.737 \times Size + 0.043 \times Size^2 - 0.040 \times Age$$

$$WW\ Index = -0.091 \times Cash\ Flows - 0.062 \times Dividend\ Payer\ Status + 0.021 \times Leverage - 0.044 \times Size + 0.102 \times Industry\ Sales\ Growth - 0.035 \times Firm\ Sales\ Growth$$

$$Distance\ to\ Default = \frac{Inverse\ Leverage + Stock\ Return - Firm\ Value\ Volatility}{Firm\ Value\ Standard\ Deviation}$$

Appendix E. Credit Line Drawdowns, US Corporate Loans

Company	Amount drawn ($MM)	Credit line ($MM)	Family firm
Delta Air Lines	1 000	1 000	No
Marriott	908	2 500	Yes
FairPont Communications	200	200	No
International Lease Finance Corporation	6 500	6 500	No
Michaels Stores	120	1 000	No
General Motors	3 400	4 100	No
Goodyear Rubber & Tire Co.	600	1 500	No
AMR Corp	255	225	No
Duke Energy	1 000	3 200	No
Gannett Co.	1 200	3 400	No
Six Flags	244	275	No
Saks	81	500	No
Monster Worldwide	247	250	Yes
GameStop	150	400	No
Dana Corp	200	650	No
Calpine	725	1 000	No
YRC Worldwide	325	950	No
CMS Energy	420	550	No
American Electric Power	2 000	3 000	No
Lear Corp	400	1 000	No
Southwest Airlines	400	1 200	No
Chesapeake Energy	460	3 000	Yes
Ebay	1 000	1 840	Yes
Parker Drilling	48	60	Yes
Tribune Co.	250	750	No
Freescale Semiconductor	460	750	No
Idearc	249	250	No
Energy Future Holdings Corp. (ex-TXU)	570	2 700	No
Accuride Corp.	78	125	No
Genworth Financial	930	1 700	No
Allied World Assurance	250	400	No
Computer Sciences	1 500	1 500	No
NXP Communications	400	600	No
CNA Financial Corp.	250	250	No

Notes: The table displays US credit line drawdowns, as compiled by Ivashina and Scharfstein (2010), subsequent the bankruptcy of Lehman Brothers on September 23, 2008 and during Q4 2008. The credit line drawdowns data is gathered manually searching the Internet (induding Reuters and the US Securities and Exchange Commission). In total, there were 34 drawdowns, of which five were done by family firms in our sample.

Appendix F. 2008 Financial Crisis Study Results - Industry-by-Industry

(Standard Errors in Brackets and P-Values in Parentheses)

Measure	(1) Div B	(2) Div C	(3) Div D	(4) Div E	(5) Div F	(6) Div G	(7) Div I
Panel A							
Cash	4.6%*	4.6%	1.6%	2.1%	1.8%	-1.2%	1.4%
	[0.028]	[0.046]	[0.012]	[0.025]	[0.023]	[0.020]	[0.020]
	(0.098)	(0.318)	(0.160)	(0.414)	(0.445)	(0.547)	(0.479)
N	68	29	702	97	57	131	239
Panel B							
Capex	-2.4%	-6.2%	-0.4%	-3.6%*	5.0%	3.0%	-2.1%
	[0.071]	[0.050]	[0.010]	[0.022]	[0.048]	[0.019]	[0.020]
	(0.741)	(0.215)	(0.667)	(0.098)	(0.295)	(0.117)	(0.281)
N	67	27	675	95	56	130	223
Panel C							
Dividend	0.0%	33.9% **	6.4%	-2.2%	2.1%	-3.6%	-2.1%
	[0.016]	[0.159]	[0.047]	[0.135]	[0.073]	[0.083]	[0.059]
	(1.000)	(0.033)	(0.172)	(0.868)	(0.777)	(0.661)	(0.725)
N	68	27	690	94	56	128	230

Notes: The table provides the average treatment effects on the treated (ATT) for changes in cash holdings (Cash), capital expenditures (Capex) and dividend payment status (Dividend). ATT are computed using the bias-corrected, heteroscedasticity consistent Abadie and Imbens (2003) matching estimator. Family firms are matched with counterfactual firms based on four categorical covariates - industry classification (two-digit SIC code), credit ratings (AAA,1, to D,22) and common dividend payment status (1 if payer, 0 otherwise) - and one continuos covariate - the natural logarithm of asset base size (capped at the natural logarithm of $4.5 billion). The results in the different columns 1-7 show the treatment effect of family ownership in seven different industries (as selected from the ten SIC code divisions). Div B: Mining; Div C: Construction; Div D: Manufacturing; Div E: Transportation, Communications, Electric, Gas, And Sanitary Services; Div F: Wholesale Trade; Div G: Retail Trade; and Div I: Services. Founder and descendant CEOs both belong to the group of family CEOs The formal specification is as follows:

$$Average\ Treatment\ Effect\ on\ the\ Treated\ (ATT) = \frac{1}{n_1} \sum_{i \mid T=1} \{ y_i(1) - y_i(0) \}$$

where

ATT = the estimated effect of treatment on the treated firms

n_1 = the number of treated firms in the sample

$T = 1$ indicates treatment

$y_i(1)$ = the outcome for firm i when treated

$y_i(0)$ = the outcome for firm i when not treated (that is, the counterfactual firm with which the treated firm is matched)

Outcome variables are calculated as follows:

$$\Delta,\ Cash\ Holdings_i = \frac{Cash\ \&\ Short\text{-}Term\ Inv_{i,Q4\ 2008}}{Total\ Assets_{i,\ Q4\ 2008}} - \frac{Cash\ \&\ Short\text{-}Term\ Inv_{i,Q4\ 2006}}{Total\ Assets_{i,\ Q4\ 2006}}$$

$$\Delta,\ Capital\ Expenditures_i = \frac{Cap\ Ex_{i,Q4\ 2008}}{P,P\ \&\ E_{i,\ Q3\ 2008}} - \frac{Cap\ Ex_{i,Q4\ 2006}}{P,P\ \&\ E_{i,\ Q3\ 2006}}$$

$$\Delta,\ Dividend\ Payer\ Status_i = Dividend\ Payer\ Status_{i,\ 2009} - Avg\ Dividend\ Payer\ Status_{i,\ 2004\text{-}2006}$$

The significance levels are represented by (two-tail) test levels 10% (*), 5% (**) and 1% (***).

Appendix G. Alternative Regression Techniques - Distance to Default

(Standard Errors in Brackets and P-Values in Parentheses)

Robustness:	Survivorship Bias				Control Residuals			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			CEO				CEO	
Variable	All Family Firms	Supervoting	Family & Outside	All	All Family Firms	Supervoting	Family & Outside	All
FamFirm	0.170**	0.080			0.181**	0.090		
	[0.080]	[0.112]			[0.074]	[0.109]		
	(0.035)	(0.477)			(0.014)	(0.413)		
FamilyCEO			0.150				0.228**	
			[0.100]				[0.091]	
			(0.136)				(0.012)	
OutsideCEO			0.196*	0.194*			0.116	0.116
			[0.115]	[0.116]			[0.102]	[0.102]
			(0.089)	(0.093)			(0.257)	(0.260)
FounderCEO				0.227*				0.244**
				[0.125]				[0.105]
				(0.068)				(0.020)
DescendantCEO				0.045				0.203
				[0.138]				[0.139]
				(0.745)				(0.146)
Credit Rating	-0.019	-0.022	-0.019	-0.019	-0.030***	-0.032***	-0.031***	-0.031***
	[0.015]	[0.016]	[0.015]	[0.015]	[0.011]	[0.012]	[0.011]	[0.011]
	(0.199)	(0.171)	(0.204)	(0.209)	(0.006)	(0.006)	(0.005)	(0.005)
Size	-0.127**	-0.143**	-0.129**	-0.126**	-0.000***	-0.000***	-0.000***	-0.000***
	[0.056]	[0.064]	[0.056]	[0.056]	[0.000]	[0.000]	[0.000]	[0.000]
	[0.023]	[0.025]	[0.022]	[0.024]	(0.000)	(0.000)	(0.000)	(0.000)
Dividend	0.086	0.084	0.084	0.088	-0.779**	-0.770**	-0.779**	-0.779**
	[0.086]	[0.094]	[0.087]	[0.087]	[0.328]	[0.320]	[0.327]	[0.327]
	[0.319]	[0.371]	[0.332]	[0.308]	(0.018)	(0.016)	(0.017)	(0.017)
N	5917	4893	5917	5917	7333	6003	7333	7333
R^2	0.260	0.275	0.260	0.261	0.247	0.259	0.247	0.247

Notes: The table displays the estimated coefficients from regressing Distance to Default (DtD) on a binary indicator of family ownership, using industry- (2-digit SIC) and time (year)-fixed effects. We control for survivorship bias by excluding all observations not available for the full samlpe period 2001 to 2010. These results are presented in column 1. In column 2, all family firms without supervoting share class system are dropped. In columns 3 - 4, DtD is regressed on CEO type to indicate a family member serving as CEO (FamilyCEO), an outsider serving as CEO in a family firm (OutsideCEO), the founder of the firm serving as CEO (FounderCEO) and a descendant of the founder of the firm serving as CEO (DescendantCEO). Credit Rating is a number between 1 (AAA) and 22 (D); Size is the natural logarithm of asset base, capped at $4.5 billion; Dividend is a binary variable indicating whether a firm is paying a dividend (1) or not (0) in a given year. Presented in columns 5 - 8 we, instead of controlling for survivorship bias, attempt to control for a potential problem of bad controls. This is done by first regressing Credit Rating, Size and Dividend (separately) on family ownership using time- and industry-fixed effects. In a second step, residuals are computed using the predicted values. These residuals are in a third step used as control variables in the DtD regressions. We control for heteroscedasticity and serial correlation using Huber-White standard errors clustered on the firm level. The primary specification, including all control variables, is:

$$Distance\ to\ Default_{i,j,t} = \beta_0 + \beta_1 FamFirm_{i,j,t} + \beta_2 Credit\ Rating_{i,j,t} + \beta_3 Size_{i,j,t} + \beta_4 Dividend_{i,j,t} + \beta_{10-99}\, Two\text{-}Digit\ SIC\ Code_j + \beta_{2001-2010}\, Year_t + \varepsilon_{i,j,t}$$

where Distance to Default is calculated as follows (a lower value indicates financial constraint):

$$Distance\ to\ Default = \frac{Inverse\ Leverage + Stock\ Return - Firm\ Value\ Volatility}{Firm\ Value\ Standard\ Deviation}$$

The significance levels are represented by (two-tail) test levels 10% (*), 5% (**) and 1% (***).