Dual-class share structures in family firms and the effect on innovation

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ABSTRACT

Family firms are much more likely to employ dual-class share structures than other types of firms. This raises the question if previously studied relationships between family firms and various outcome variables such as innovation are true family effects or in fact disguised dual-class effects. In this paper, we examine this question using three measures of innovation; research & development expenditure (R&D), granted patents and mergers and acquisitions spending (M&A). Using a sample of listed firms on the Nasdaq Stockholm exchange 2009-2014, we find that family firms invest less in R&D compared to non-family firms, while there are no significant differences in granted patents or M&A activity between family firms and non-family firms. These findings can not be explained by the increased use of multiple share classes in family firms. We also show that the propensity to patent is larger in family firms and appears to correlate negatively with R&D investments. Finally, we find that investments in R&D increase with the wedge between voting- and cash flow rights held by the controlling family.

Keywords: Family firms, dual class shares, agency theory, private benefits, innovation

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1. Introduction

The family firm is one of the most common ownership structures in the world (La Porta et al. 1999). Moreover, family firms are despite their general characteristic of investment conservatism widely recognized as a significant contributor to economic progress and technological innovation across the globe (Zahra, 2005). Thus, a large body of literature is naturally focused on family firms to answer questions such as if family firms carry a valuation premium or discount compared to non-family firms, how they invest, who creates and destroys value and much more (e.g. Villalonga and Amit 2006; Anderson and Reeb, 2003).

Another well-documented phenomenon in prior research are the effects of dual-class share structures (multiple share classes, typically firms have A- and B-shares). Researchers have studied the effects of such structures on a multitude of outcomes, for example, firm value and investment preferences (e.g. Gompers et al., 2009; BD Jordan et al., 2014). However, as most of the firms utilizing dual-class share structures are controlled by families (Cronqvist and Nilsson, 2003), it raises the question if the effects, documented by researchers, of family firms are *true* family effects or in fact *disguised* dual class effects or vice versa. Does dual-class share structures help explain family effects on innovation? In this paper, this is the research question we aim to explore by trying to separate the family effect from the dual class effect. More specifically we focus on separating the effects with innovation as the outcome variable. We argue that this is important from the perspective that a firm's ability to innovate is at the core of its long-term competitiveness and continuous value creation. Unraveling the role of different ownership structures and control-enhancing mechanisms on corporate innovation is then an important question to try to answer.

We begin by disentangling the relationship between dual-class share structures and ownership structures using panel data of firms listed on the Nasdaq Stockholm exchange between 2009-2014. Clarifying the relationship between ownership structure and dual-class share structures is necessary to build on the current research of ownership effects on innovation. We do this specifically by introducing the effects of dual-class share structures on

innovation in family and non-family firms. We argue that innovation may be developed internally, as well as acquired through mergers & acquisitions (M&A). To nail down the relationship between dual class share structures, family firms, and innovation, we consequently use innovation proxies for both internal and external innovation. Internal innovation is measured by research & development (R&D) and patents, and external innovation is measured by M&A.

Our methodology has been adjusted to the research gap we are aiming to fill. While Zahra (2005) and other researchers have focused on the relationship between innovation and family firms, and Villalonga & Amit (2008) among others have examined the relation between family firms and dual-class share structures. We have tried to fill the gap in between by looking at the impact of multiple share classes in family firms on innovation.

Our results conclude that family firms are much more likely to utilize dual-class share structures than non-family firms. Family firms invest less in R&D than non-family firms. Founder family firms drive this observed effect. The adoption of dual-class share structures does not help to explain this result. Investments in R&D increase with the wedge between votes- and cash flow rights held by the controlling family. Finally, we also find that family firms produce a similar number of granted patents to non-family firms. Increased R&D spending is not necessarily associated with more granted patents. Instead, the propensity to patent seems to be larger in companies that invest less in R&D and vice versa, the tendency to patent is reduced in companies that invest more in R&D.

This paper adds to two main areas within the family firm literature; innovation and control-enhancing mechanisms. Our hope is that we have helped to explore the relationship between ownership structures and innovation further. The documentation of the extensive use of multiple share classes by family firms on the Nasdaq Stockholm exchange in the present is one example of that. Another example is us connecting R&D investments in family firms to ownership concentration through the wedge between cash flow rights and voting rights among controlling owners in these firms.

Going forward, this paper is structured as follows: Section two introduces relevant theory and concepts used to form the hypotheses. Section three presents our empirical strategy and describes the data collection process. Section four addresses the main results and the robustness of those results. Lastly, section five concludes our results in a discussion about the implications of our findings and possible further research. A dictionary with essential phrases can be found at the end of the Appendix. By including a dictionary, we hope to increase the readability of this paper and make it more accessible to the general audience.

2. Theory and hypotheses

In this section, we will introduce the reader to useful concepts and theories, used as the foundation for the creation of the hypotheses. To begin with, to gain an understanding of what we study in this paper, one must understand the notion of the Family firm and the definition this paper has chosen to adopt. Next, since dual-class share structures in this thesis are applied as a tool to understand if the effects of family ownership on a firm are *true* effects, we lay out the idea of having multiple share classes. Lastly, as a source of economic explanation for our findings, we turn to agency theory and specifically the concept of private benefits. These theoretical cornerstones of our thesis are first addressed separately, followed by a discussion on the combined topic to develop the hypotheses.

2.1 Theoretical Framework

2.1.1 Family firms

The *Family firm* is a loose term in the literature with different definitions. Most of the time a family firm is defined as a firm in which the founder or descendants of the founding family exhibits control of the company through stock ownership, positions in top management or as board members (Amit and Villalonga, 2006). The definition can also be extended to include families or individuals who are neither founders nor descendants of the founder (see section 3.1.1 for the definition of *Family firm*).

Most studies focus on the ownership aspect and families as the largest controller of votes. Here, different levels of thresholds can be used in the

definition of a controlling stake. The main question is at which threshold the principal owner can exert significant influence on the firm's decision? Cronqvist and Nilsson (2003) use a 25% threshold while Claessens et al. (2000) use 20% which acts as guidelines in our thesis to set an appropriate threshold level. There are however likely to be tradeoffs between using a more lenient versus a more restrictive definition. In the robustness section, we therefore test different thresholds in defining a controlling stake.

2.1.2 Dual-class share structures

Dual-class share structures are at its core the differentiation of voting rights among two or more share classes. Thus, because it by construction allows for one share class to carry more voting rights than the other, a wedge between cash flow rights and voting rights held by shareholders is created. Since this allows for control without the need for excessive risks makes, dual-class share structures are a common tool of power retention among business owners. Typically, founders and executives hold relatively more of high vote "superior shares" than low vote "cash flow shares" (Gompers et al., 2009).

Around the world, the use of dual-class share structures is a common phenomenon (La Porta et al., 1999). In the US, where most of the prior research in this field have been conducted, dual-class structures are rather the exception than the rule. In Sweden, on the other hand, dual-class share structures are particularly common and used to the greatest extent in the world (Cronqvist and Nilsson, 2003). From that standpoint, Sweden is an excellent geographical location for examining relationships in which dual-class share structures play a key role. Swedish firms that utilize a dual-class share structure commonly have a superior non-listed A-class share with ten voting rights and an inferior B-class share with a single voting right. The voting ratio between different share classes is capped at 10:1 by law.[1]

[1] The regulation has existed since 1944 in the Swedish Companies Act (Aktiebolagslagen, ABL) (1944:705). Companies that prior to the law had a bigger differentiation of voting rights between share classes have been allowed to keep them in place. Only the real estate company Huvfudstaden has a voting ratio larger than 10:1 (100:1).

2.1.3 Agency theory and private benefits of control

The central element of agency theory is to explain the conflicts and problems that may arise between principals and agents. In business, the role of the principal is often embraced by the firm owner while managers take the role of the agent. As described by Jensen and Meckling (1976), the separation between managers and shareholders may lead to managers not acting in the best interest of shareholders and instead follow their personal agenda. While not central as a source of explanation in this thesis, the conflict mentioned above is often referred to as type I agency problem.

In family firms, there exists a second agency problem which is especially prevalent. That is the conflict between majority and minority shareholders. The problem presents itself when the majority shareholder (in this case the controlling family) seeks private benefits, both monetary and non-monetary ones, at the expense of the minority shareholders (Sheifer and Vishny, 1986). Examples of expropriating smaller investors to the advantage of the controlling owner may be special dividends, risk avoidance and excessive compensation packages (Reeb and Anderson, 2003). We refer to this agency problem as a type II problem. To see why the type II problem is especially prevalent in firms controlled by families, recognize that if the controlling shareholder extracts private benefits at the expense of the minority shareholder, those private benefits are likely shared among a smaller group of individuals if a family controls the firm compared to an institution. There is simply a lower dilution effect in a small group of people, with everyone enjoying higher "shares" of private benefits. Thus, the incentive for the controlling owner to use his or hers position to extract private benefits from the firm is greater in family firms compared to non-family firms and hence, the type II problem is more prevalent in this category of companies (Amit and Villalonga, 2006).

While the extraction of private benefits of control is mainly a type II agency problem (the controlling owner expropriating resources from minority ones), it is important to characterize *private benefits* from the start as the concept may be a bit abstract.

What are private benefits? The most visible form of private benefits of control is company perquisites like jet airplanes (Jensen and Meckling, 1976). However, private benefits of control deemed more valuable by the controlling owner may be more subtle. To understand this, one must recognize the value of information. The controlling owner naturally has access to firm sensitive information of strategic nature (e.g. innovational processes) through board meetings. If the controlling owner has significant or majority control of other businesses in related industries, the controlling owner can use acquired, firm sensitive, information to, in his or her other enterprises, exploit opportunities, gain market share or make other forms of advancements. While the controlling owner might benefit from this transmission of sensitive information, the remaining shareholders do not. Thus, it is an important but subtle example of a type II agency problem, with the extraction of private benefits of control by the controlling owner to the detriment of minority shareholders (Dyck and Zingales, 2004).

2.2 Hypotheses

2.2.1 The use of dual share structures in different ownership structures

The first aim of this study is to understand and explore the use of multiple share classes in various ownership structures. One of the primary reasons why companies adopt dual-class share structures is the wish of the controlling shareholder to keep control of the firm without the need to carry excessive cash flow risks (Adams and Ferreira, 2008). Another aspect is that dual-class share structures allow managers to work long-term on a strategic path without the interference of minority shareholders. Furthermore, once in place, dual-class share structures can be hard to change since the controlling owner can continue blocking such proposals, or endorse proposals that disproportionately favors them and their agenda rather than the firm and minority shareholders (La Porta et al. 1998). Compared to non-family owners and other block holders, family owners have some unique features which make the use of multiple share classes with its attached characteristics described above especially attractive. First, family owners often hold poorly diversified portfolios, making the consequences of bad corporate decisions severe for the family. One can assume that it is in the family owners interest

to lessen the riskiness of the investment but at the same time keep in control. Second, family owners have long-term investment horizons, and it is in their best interest to keep the control within the family, often for generations (Anderson and Reeb, 2003). By adopting multiple classes of shares in their firm, the family can more easily facilitate these interests.

In the study by Cronqvist and Nilsson (2003) an unbalanced panel of Swedish listed firms (1991-1997) is used, comparable to our data for 2009-2014. They find that family firms are strikingly more likely to utilize dual-class share structures. In fact, family firms are 1.5 - 2.5 times more likely to use such a structure compared to non-family firms. The notion that dual-class share structures are relatively more common in family firms compared to other firms is also found to be true in a comprehensive survey by La Porta et al., (1999). Before examining further relationships between innovation, family firms and dual-class share structures, we explore the pattern observed by the literature in our dataset, leading us to our first hypothesis.

Hypothesis 1*: *Dual-class share structures are relatively more common in family firms compared to other firms

2.2.2 Dual-class share structure and innovation in family firms

We now turn to the main objective of the thesis: studying the relationship between innovation, family firms and dual-class share structures. To begin with, studies have shown family firms to avoid risky firm activities that increase firm health in the long run but reduces socioemotional family wealth. Underinvestment in R&D among family firms in relation to non-family firms is one example of the controlling family´s personal agenda to try preserving socioemotional wealth. Likewise, family firms embrace risky activities that jeopardize the long-term health of the firm but helps to preserve that socioemotional wealth of the controlling family owner (Chen & Hsu, 2009). The behavioral agency model has helped explain these observations using the idea that as R&D investments cut into current wealth immediately but with future uncertain firm benefits, creating a risk aversion towards these types of investments (Chrisman and Patel, 2011).

Connecting to the general observed pattern of underinvestment in family firms, Gompers et al. (2003) find that firms with multiple classes of shares underinvest in general (R&D, CAPEX, and advertising). As a potential explanation for this observation, they turn to the idea that managers underinvest and fail to grow their firms properly due to an entrenchment effect of voting control - multiple share classes create a misalignment of incentives in firms. The misalignment of incentives occurs as the controlling owner (who is frequently simultaneously a top executive in family firms) start carrying relatively more voting rights than cash flow rights (Gompers et al., 2003). In other words, relatively more voting rights allow one to make decisions that do not have to be proportionally accounted for in cash flow terms by that person.

With the separation of voting rights and cash flow rights among the controlling shareholder comes an increased incentive to extract private benefits from the firm and minority shareholders, a type II agency problem (Bebchuk et al., 2000; Grossman and Hart, 1988). Not surprisingly then, the extraction of private benefits of control was found to be higher in firms with more concentrated ownership which is a natural outcome of multiple shares classes (Dyck and Zingales, 2004). Masulis et al. (2009) also find that the prevalence of private benefits extraction is more pronounced in dual-class firms. Specifically, they observe that executives in companies with multiple share classes earn more compensation than executives in single-class share firms. There is a connection to family firms here as well as Masulis et al. (2009) also find that the excess compensation to managers in dual class firms is enhanced if the manager is also related to the controlling owner (family firm). On a similar note and importantly to our hypothesis, Faccio et al. (2001) finds that firms with a family as a controlling owner have strong incentives to expropriate wealth from minority shareholders, but that these incentives are further increased by control mechanisms (such as multiple share classes) that allow the family´s influence to exceed its cash flow rights.

In using the theoretical framework to establish our second hypothesis, the literature addressed earlier has demonstrated how family firms adopt dual classes of shares more often than non-family firms (1), how the adoption

of dual classes of shares leads to an ownership concentration (2), how increased ownership concentration causes a misalignment of incentives for the top executive and controlling owner (3) and lastly, how the misalignment of incentives results in an agency type II problem and specifically increased extraction of private benefits by the controlling owner (4).

In relating dual firm underinvestment to the type II agency problem, we make an important assumption: that the extraction of private benefits by the controlling owner occurs at the detriment of innovation. Monetary private benefits extraction carries the alternative cost that they could have been allocated to e.g. research & development, while (non-monetary) exploitation and leakage of firm sensitive information would disturb the innovational process inside of firms.

On those grounds, we hypothesize that dual-class share structures have a negative effect on innovation through the misalignment of incentives of the controlling owner and other shareholders, increasing their extraction of private benefits to the detriment of investments in innovation.

Hypothesis 2*: Dual-class share structures help explain the lower innovation in family firms compared to other firms by negatively affecting R&D, M&A, and patent development*

3 Data and methodology

The first part of this section will describe the data collection process and contains descriptions of variables used in our empirical work. A more detailed description of variables is found in the Appendix Table A1. The second part of this section will present our methodology; the empirical approach which outlines the statistical tests and regressions used to test our hypotheses.

3.1 Data

We examine innovation and dual-class share structures within family firms for publicly traded companies on the Nasdaq Stockholm exchange during the period 2009-2014. In total, the final data set consists of an unbalanced panel with 1,087 firm-year observations. We restrict ourselves to non-financial

companies and industries with twelve or more firm-year observations. Potential problems with survivorship bias are controlled for by allowing firms to exit and enter our sample freely.

The construction of the data set uses five different sources, and the process of building the data set can conveniently be divided into five steps. First, we establish for which firms to collect data. To find companies listed on the Nasdaq Stockholm exchange between 2009 and 2014 we use information from the NASDAQ OMX website and the stock ownership publication "Owners and power in Sweden´s listed companies". Second, we proceed and collect ownership structure data by hand from the above-mentioned publication. Third, we collect financial information such as assets, debt and much more for the individual firm at year's end from the Thomson Reuters Datastream database. Fourth, we collect the number of annually granted patents for the respective companies from the Swedish Patent Database. Fifth, we collect data on realized mergers and acquisitions by firms in our data set over the period 2009-2014 from the database SDC Platinum.

3.1.1 Ownership structure

Data on the ownership structure of selected firms is collected by hand from the yearly publication "Owners and power in Sweden´s listed companies" Sundqvist (2011-2016). The book series presents year-end firm level data on the number of shares, share classes, voting rights per share, free float and ownership fractions of the 25 largest owners of each company listed on the Nasdaq Stockholm exchange. This information allows for firm categorization by type of ownership and if the company employs multiple share classes.

We define family firms as those in which a family or individual is the largest shareholder and, either directly or through affiliates, controls at least 20% of the voting rights (Cronqvist and Nilsson 2003; Sraer and Thesmar, 2007). From this definition, we form our primary family dummy variable called *Family (20%).* For each firm-year observation, the dummy takes the value one if the above statement is true (that is, the controlling owner of the firm at year *t* is a family or individual who controls at least 20% of the voting rights) and zero otherwise. Classification of family firms into a single category implies an underlying assumption of family firms as a homogenous

group. However, families are of course heterogeneous: they differ e.g. regarding their involvement in the company (Bertrand and Schoar, 2006). Furthermore, Chrisman and Patel (2011) find that family firm differences along the dimension of company goals are the main reason for larger behavioral heterogeneity in family firms relative to non-family firms. Since there is often a special firm relationship between the founder and the firm, we have decomposed our classification of family firms into two separate dummy variables: (1) *Founder family (20%)*, which are firms in which the controlling owner is both an individual or family and the founder or descendants of the founder. (2) *Non-founding family (20%),* which are firms in which the controlling owner is an individual or family but not the founder or descendants of the founder. We use the 20% threshold in both cases. To indicate if a firm employs a dual-class share structure we include a dummy variable *Dual* which equals one if the firm has at least two different share classes and zero otherwise.

3.1.2 Measures for Innovation

Innovation can be developed internally (research and development) but can also be acquired externally through merging with or acquiring other firms that in turn possess cutting edge technology, patents, and new knowledge. Previous studies have used both firm-level patent data and R&D expenditures as a measure of internal innovation (Lerner and Wulf, 2007; Block et al., 2013). Investments in R&D is especially central as an outcome variable in this thesis as they benefit the long run survival of the firm while also representing an immediate risk to socioemotional wealth (David et al., 2001). To get the full picture of innovation in family firms, we will apply both measures. R&D expenditure (variable *R&D*) is collected from Thomson Reuters Datastream. Patent data is collected from the Swedish Patent Database (PRV). Specifically, the number of granted patents per listed firm annually (*Patents*) are collected. These are patents that have been granted by the European Patent Office (EPO) and validated in Sweden. We find granted patents to be a better proxy for innovation than filed patent applications. A patent filing by itself is a more uncertain confirmation of the firm having produced something original, creative or innovative. Both granted patents

and patent applications, do have the weakness in that there is usually a lag between the occurrence of innovation activities within the firm and the patent application or the approval of that patent which may make it difficult to estimate the true relationships in a regression. This weakness is discussed later in the robustness section of this paper.

As a proxy for external innovation, the value of a firm's annual M&A spending is used (variable *M&A*). Data on mergers and acquisitions is collected from the SDC Platinum database at a per transaction level. The data is then collapsed to the firm-year level which is how the rest of our data is presented. We recognize that there can be many motives behind an M&A deal and that our data do not capture this. However, a recent survey by PwC (2014) shows that innovation is a significant driver behind M&A deals, especially in the technology sector. In our regressions, all three measures of innovation are transformed using natural logarithms. This transformation is done because the distribution of the three variables is truncated at zero and heavily right skewed, making interpretation of potentially negative predicted results difficult. As especially the *R&D* expenses and mergers & acquisitions spending (*M&A*) varies with several orders of magnitudes it makes more sense to study the effects in percentage than absolute values.

3.1.3 Control variables

We control for a multitude of variables that are likely to affect innovation output in firms. To account for the size of different companies, which potentially affects the scale of innovation output, we use the natural logarithm of total assets (*Assets)*. The market-to-book ratio of common equity (*M/B*) is used to capture future growth, profits and the value of intangible assets. The natural logarithm of capital expenditure (*CAPEX*) measures the investment in tangible assets. To control for investment constraints, we use two different measures. First, *Leverage* is defined as the interest-bearing debt divided by total assets. Second, the operating profit margin (*Profit Margin*) is defined as the operating profit divided by sales used as a measure of the ability to internally fund investments. We also control for the portion of votes held by the largest owner (*Ownership concentration*) as we only wish to capture the effect of the differentiation between cash flow rights and voting

rights with the variable *Dual*. At last, we control for *Capital intensity* which is measured as the natural logarithm of the ratio between property, plant, and equipment to the number of employees. This measure controls especially for any differences in the propensity to patent due to considerable sunk costs (Hall and Ziedonis, 2001). Winsorizing is applied at the 5%, and 95% interval for the variables *M/B* and *Profit Margin* as these contains a few observations with large extreme values.

In later regressions, we add a control for the ratio between voting rights and cashflow rights held by the controlling owner (*Vote/cash flow rights*) and explore interaction effects between the size of the wedge and firm type.

3.1.4 Potential problems with the data

On a general level, accounting figures are always risky to use in an analysis from the point of view that they are easily manipulated through financial shenanigans. However, there is no conclusive evidence that such manipulation is performed in any systematic way across industries and firms in our sample. As for our usage of M&A data, transaction values of M&A deals are seldom reported in the SDC Platinum database. Thus, we have a big drop in the number of observations which will make it harder to uncover any significant relationships between family firms, dual-class share structures, and M&A activity. However, from an interpretation perspective, it is not a problem as with the accounting data the reporting of deal values is not likely done in any systematic way. At last, companies are not required to present R&D expenditures on a separate line in the financial statements or at all in the annual report when following the IAS 38 (accounting) standard. This self-selection is a potentially bigger problem, and it is not hard to imagine that only companies where R&D is a core part of the business and a substantial cost tend to present such data. To mitigate the problem, we follow Reeb and Koh (2015) and replace non-disclosed R&D expenditure a specific firm-year with zero if the number of patents granted is also zero for the calendar year.

3.2 Methodology

In the first part of the results section, we describe the data in detail using descriptive statistics. This will help us bring light on the first hypothesis; *dual-*

class share structures are more common in family firms compared to non-family firms. As a complement, the two subsamples of family and non-family firms are compared using a chi-squared test. We run the test for only a single year of data (2014) as using the whole panel would violate the assumption of independent observations necessary for the chi-squared test.

In the second part of the results section, we run regressions. Given that family firms are likely to be different from non-family firms along several different dimensions it is necessary to conduct multivariate analysis. The main regression builds upon the ordinary least squares (OLS) regression method. We formulate our baseline model for firm *i* at time *t* as follows:

$$Innovation_{it} = \beta_1 Dual_{it} + \beta_2 Family_{it} + \gamma Controls_{it} + Industry_j \times Year_t + \varepsilon_{it}$$

where $Innovation_{it}$ is a measure of innovation proxied by our three outcome variables *R&D*, *Patents*, and *M&A*. $Dual_{it}$ is our dummy variable representing if a firm utilizes a dual-class share structure. $Family_{it}$ is the family dummy variable and indicates if the controlling owner of a firm is a family or not. Widely held firms and companies which have other types of owners (e.g. institutions) are our reference group. In some regressions, the family variable $Family_{it}$ is broken down into two separate dummies 1) *Founder family (20%)*, founder family controlled firms and 2) *Non-founder family (20%)*, non-founder family controlled firms. The $Controls_{it}$ variable contains various control variables which are closely described in section 3.1.3 or Appendix Table A1.

We recognize that there are also potential time-varying industry effects. For instance, some industries may experience rapid innovation in short time periods while other industries are more stagnant due to stiff competition within the industry (Bloom and Van Reemen, 2007). Therefore we run our regressions including the combined industry-year fixed effect. Another problem concerns endogeneity. Both the variable $Dual_{it}$ and $Family_{it}$ vary very little over time and incorporating the firm fixed effect is not possible as that would eliminate almost all variation. The absence of firm fixed effect is a problem if we want to interpret our results in a causal way and it will be further discussed in the robustness and endogeneity section

later. Huber-White's robust standard errors are used throughout all regressions to mitigate heteroscedasticity problems.

4. Results

In this section, we present the output of our empirical work. We begin by describing our data. Here, we first describe the ownership structure of firms in our sample and their use of dual share class structures. We then provide summary statistics for the variables and data used in our regressions. The section continues with a presentation of the regressions conducted to analyze the relationship between family firms, dual-class share structures, and innovation. Lastly, we discuss the robustness of our results and address endogeneity concerns.

4.1 Descriptive statistics

Table 1 provides descriptive statistics concerning vote and capital ownership and the prevalence of dual-class shares structures as well as other control enhancing instruments, by different controlling owner categories. For definitions of ownership categories see Appendix Table A5.

We see that the firms are well distributed among the categories. There are slightly more companies in the *Dispersed ownership* category (318) compared to the *Founder family* (270) and *Non-founder family* (286) categories which in turn have slightly more firms than the *Other controlling owner category* (213). From the same table, we can see that *Founder family* firms and *Non-founder family* firms are much more likely to use dual-class share structures than firms in other owner categories. 89.33% and 53.15% respectively of companies in those categories use dual-class share structures. This observation is also confirmed in Appendix Table A3 where we compare Family firms *(Founder family* and *Non-founder family* firms) against Non-family firms (*Other controlling owner* and *Dispersed ownership*) and their use of dual-class share structures. Here, a chi-squared test is used to determine whether there is a significant difference between family firms and non-family firms for 2014 in their use of dual-class share structures. Only 31.1% of non-family firms use dual-class share structures while the same number for family firms is 61.9%. The difference is statistically significant, $chi2(1) = 17.04$, $p < .001$. On

those grounds, we can accept our first hypothesis that dual-class share structures are relatively more common in family firms compared to non-family firms.

Table 1

Ownership structure and dual-class share structures

Notes: The table presents descriptive statistics about the use votes and capital of the controlling owner and the use of dual-class share structures of firms in different ownership categories. The threshold used for categories is 20% of total votes. Owners controlling less than 20% of the votes are placed in the *Dispersed ownership* category.

	Founder family	*Non-founder family*	*Other controlling owner*	*Dispersed ownership*	*Total*
N	270	286	213	318	1087
Dual-class share structure	83.33%	53.15%	46.48%	26.73%	51.61%
Non-traded superior share	89.33%	62.75%	77.78%	82.05%	78.92%
Other control enhancing mechanism	25.56%	31.12%	39.91%	27.99%	30.54%
Part of capital held by largest owner	27.41%	29.24%	31.51%	11.74%	24.11%
Part of votes held by largest owner	47.49%	37.69%	37.58%	12.90%	32.85%
Controlling owner's controlled votes to capital ratio	2.2872	1.8864	2.0054	2.7992	2.2065
Controlling owner's vote-to-cash flow rights ratio	4.6690	4.1090	4.1826	3.9257	4.3188

Back to our descriptive statistics Table 1, we find that unlisted superior shares are a very common phenomenon in firms with multiple share classes. In *Founder family* firms the superior class share is unlisted in 89.33% of the firms, the most of any category. *Non-founder family* firms have the least amount of unlisted superior shares, 62.75%. Other control-enhancing mechanisms are also quite common. They are most frequently utilized by firms in the *Other controlling owner* category (39.91%) and the least common among firms in the *Founder family* category (25.56%). Amongst the three

categories where there is a controlling owner, *Founder family* owners control the least amount of capital, on average 27.41%, while they control the most number of votes, on average 47.49%. The opposite applies to the category *Other controlling owner* where the owners control the largest part of capital (31.51% on average) and the smallest part of votes (37.58% on average). Among firms using dual-class share structures, *Founder family* owners have the highest vote-to-cash flow rights ratio (average 4.6690) compared to the lowest of 3.9257 for the *Dispersed ownership* category.

Table 2 provides summary statistics describing both our dependent- and independent variables. The table is self-explanatory and exists to give an overview of the number of observations in our dataset, the variable means and how the observations are distributed around the mean.

The dependent variables in their transformed state are difficult to interpret. However, from their non-transformed counterparts, we can highlight some observations. The average R&D expenses are 371 million SEK while the average annual spending on mergers & acquisitions (M&A) is 221 million USD (approximately 2 billion SEK) firms where the value of the transaction has been presented. Both these variables are right-skewed, and the minimum and maximum differ by several orders of magnitude. Despite the high average spending on R&D, the average number of patents granted to a firm annually is only 2.35. The small patents production compared to the R&D spending is further illustrated by the non-transformed Patents/R&D-ratio where we find that on average only 0.0000126 patents are granted per thousand SEK of R&D spent. Just like the other transformed variables, the distribution of the *Patents* variable in its non-transformed state is heavily right-skewed with a maximum value of 158 patents and a minimum value of zero patents, while the median is also zero. The variables presented in the Test variables section of the table have already been described in detail in Table 1 and the corresponding text. From the control variables, we see that the average firm has a leverage ratio of 0.18. The firm with the highest leverage ratio of 1.16 meaning that the equity value of the firm is negative, while the minimum leverage ratio in a firm is 0, meaning that at least one firm does not carry any interest-bearing debt. The market-to-book value of

Table 2

Summary statistics of variables in main regressions

Notes: The table presents descriptive statistics the for both our dependent- and independent variables. Five variables have been transformed using natural logarithms. These are also reported in their non-transformed state. Non-transformed variables, except *Patents* and *M&A,* are presented in the unit thousands of SEK. *Patents* is reported in a discrete number while the value of *M&A* is reported in thousands of USD. For more definitions see Appendix Table A1.

	N	*Mean*	*SD*	*P25*	*Median*	*P75*	*Min*	*Max*
Dependent variables								
R&D	1060	5.33	5.79	0.00	0.00	10.84	0.00	17.40
Patents	1087	0.34	0.86	0.00	0.00	0.00	0.00	5.07
Patents/R&D	1060	-5.01	5.38	-10.53	0	0	-13.93	0
M&A	201	10.28	2.24	8.52	10.36	11.65	4.33	14.46
Test variables								
Dual	1087	0.52	0.50	0.00	1.00	1.00	0.00	1.00
Family (20%)	1087	0.51	0.50	0.00	1.00	1.00	0.00	1.00
Founder family (20%)	1087	0.25	0.43	0.00	0.00	0.00	0.00	1.00
Non-Founder family (20%)	1087	0.26	0.44	0.00	0.00	1.00	0.00	1.00
Vote/cash flow rights	1087	2.72	2.57	1.00	1.00	3.71	1.00	10.00
Control variables								
M/B	1087	2.67	2.02	1.19	2.09	3.46	0.48	8.10
Assets	1087	14.35	1.97	12.97	14.02	15.49	10.10	19.72
Leverage	1087	0.18	0.16	0.03	0.16	0.29	0.00	1.16
CAPEX	1084	10.15	2.86	8.42	10.09	11.85	0.00	16.78
Profit margin	1080	0.01	0.19	0.00	0.06	0.11	-0.64	0.21
Capital intensity	1085	4.98	1.83	3.91	5.01	5.82	-2.85	13.23
Ownership concentration	1087	0.33	0.20	0.18	0.28	0.44	0.01	0.89
Non-transformed variables								
R&D	1060	3.71e+05	2.45e+06	0.00	0.00	51 164.0	0.00	3.60e+07
Patents	1087	2.35	11.15	0.00	0.00	0.00	0.00	158.0
Patents/R&D	503	1.26e-05	4.97e-05	0	0	7.33e-06	0	9.30e-04
M&A	201	2.21e+05	5.03e+05	5000.0	31525.0	1.15e+05	76.0	3.13e+06
Assets	1087	1.37e+07	4.04e+07	4.31e+05	1.23e+06	5.33e+06	24 269,0	3.67e+08
CAPEX	1086	5.69e+05	1.97e+06	4510.0	24 025.5	1.40e+05	6.34e+04	1.93e+07
Capital intensity	1085	1670.74	17826.23	49.81	149.18	335.33	0.06	5.56e+05

common equity (M/B) averages 2.67 and observations are rather concentrated around the mean with P25 1.19 and P75 3.46. There appears to exist at least one large outlier with a max M/B-ratio of 8.10. Lastly, the average operating profit margin is 1% while the median is 6%, indicating that the mean is affected by a few firms that make significant losses. Looking at the minimum value of -64% confirms this.

4.2 Main regression results

We will now present our main regression outputs. We start by looking at internal innovation within firms proxied by R&D and patenting and will then move on to investigate external innovation in firms proxied by M&A.

In Table 3 we run regressions between our first innovation proxy R&D, the natural logarithm of research and development expenditure plus 1, and our independent variables specified in the model presented in section 3.2. In column (1) we find that family firms do not spend statistically significant less amounts on R&D compared to non-family firms. When controlling for the use of dual-class share structure in column (2), we find that the family effect is now more pronounced than before. Family firms spend 45.7%[2] less on R&D annually compared to non-family firms. These results are however only significant on the 10% level. The first results do indicate that there is potentially a family effect that affects R&D expenses in firms.

To investigate which type of family firm that drives this effect we then look at the results for when the family dummy has been split into a founder-family dummy and non-founder family dummy. In column (3) we can see that if we do not control for the use of dual-class share structures, founder family firms spend substantial amounts less on R&D compared to other firms. In fact, they spend 78.6% less per annum, which is significant at the 1% level. On the other hand, non-founder family firms, spend a non-significant amount more on R&D compared to other firms. The difference between founder family firms and non-founder family firms is statistically significant, $F(1, 884) = 13.18$, $p < .0003$. In column (4), where we control for the use of dual-class

[2] Formula for calculating the percentage change of the outcome variable in a log-level regression $\%\Delta y = 100\times(e^{\beta_i} - 1)$

share structure, which 83.3% of founder families use, we see that just like in column (2) the family effect is even more pronounced.

When controlling for the use of dual-class share structures, founder family firms spend 83.6% less on R&D compared to other firms. Again, we do not find any evidence that non-founder family firms spend significantly more or less on R&D compared to other types of firms. The difference between founder family firms and non-founder family firms is again statistically significant, $F(1, 883) = 17.66$, $p < .0000$. The family effect observed in column (2) is clearly driven by founder-family firms. We find that any family effects are not explained by the extensive use of dual-class share structures in family firms.

Columns (5), (6), (7) adds interaction terms to our regressions. Column (6) and (7) also adds a control variable for the controlling owner's votes-to-cash flow rights ratio, *Vote/Cash flow rights*, which is used as an interaction variable. In column (5) we further investigate whether the use of dual-class share structures plays a role in family firms when it comes to R&D investment. We find no significant difference between the R&D spending in founder family firms with or without a dual-class share structure. In non-founder family firms, the results suggest that there is a large difference in R&D expenditure between companies that use dual-class share structures and companies that don't use such structures.

In the last two columns, (6) and (7), we investigate whether the size of the wedge between voting- and cash flow rights that is created when firms use dual-class share structures influence R&D investment in family firms. We can confirm that R&D investment in family firms in fact increases as the wedge grows larger. In other words, families that hold a large part of superior class shares compared to ordinary class shares invest more in R&D.

Moving on to the relationship between family firms, dual-class share structures and patents. In Table 4, we run regressions with the same specification as in Table 3 but with the outcome variable *Patents*, the natural logarithm of the 1 plus the number of granted patents. Here, we do not observe any significant family effects regardless of if we control for dual-class share structures in the firm or not. This finding is interesting since we did see

Table 3

Summary statistics of variables in main regression

Notes: The table presents the regression between R&D, logarithmized, and our independent variables. Noteworthy highlights from this table is e.g. the negative family effect on R&D expenditure, which, when controlled for dual classes of shares, becomes more prominent and statistically significant at 10%, directly contradicting our second hypothesis. This observation, when broken down, is driven by founder family firms, spending 83.6% less on R&D than other firms when controlling for dual shares column 4). Non-founder firms spend significantly less on R&D when having multiple share classes (column 5). Lastly, family firms increase their R&D spending as the vote-cash flow wedge increases among controlling owners (column 6). This is especially the case in founder family firms having a high significance level (column 6). All regressions are run using industry-year fixed effect and robust standard errors. We provide a Wald F-test statistic that compares if there is a significant difference between the Non-founder family and Founder family coefficients.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	R&D	R&D	R&D	R&D	R&D	R&D	R&D
Dual		0.479		0.817**	-0.0278	0.459	0.703*
		(0.329)		(0.333)	(0.475)	(0.412)	(0.418)
Family (20%)	-0.546	-0.610*				-1.447***	
	(0.344)	(0.344)				(0.464)	
Founder family (20%)			-1.540***	-1.807***	-1.406**		-3.037***
			(0.444)	(0.454)	(0.577)		(0.607)
Non-Founder family (20%)			0.120	0.118	1.698***		-0.752
			(0.385)	(0.380)	(0.535)		(0.551)
Vote/Cash flow rights						-0.166	-0.152
						(0.117)	(0.120)
Dual x Founder family (20%)					0.103		
					(0.875)		
Dual x Non-founder family (20%)					-2.879***		
					(0.714)		
Family (20%) x Vote/Cash flow rights						0.339***	
						(0.125)	
Founder family (20%) x Vote/Cash flow rights							0.422***
							(0.148)
Non-founder family (20%) x Vote/Cash flow rights							0.397**
							(0.161)
Wald F-test			13.18***	17.66***			
Observations	1,049	1,049	1,049	1,049	1,049	1,049	1,049
R-squared	0.509	0.510	0.517	0.520	0.529	0.515	0.526
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust SE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

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

a large negative family effect on R&D expenditures, which remember, captures the innovative input while patent measures capture the innovative output. There appears to exists a difference between the propensity to patent inventions in the family- and non-family firms. We will investigate this finding next.

In Table 5 we run the same regressions again but this time with the outcome variable Patents/R&D, the natural logarithm of the 1 plus the number of granted patents minus the natural logarithm of 1 plus the R&D expenditures. This measure reflects how many patents are granted per unit of R&D expensed. We find that the strong negative founder family effect on R&D that was previously observed in Table 3, but not on granted patents in Table 4, is explained by the results in Table 5. In column (3) we see that founder family firms produce on average a staggering 317% more patents per unit of R&D expensed compared to other firms. When controlling for the use of dual-class share structures, the relationship is even stronger, with founder family firms being granted 431% more patents per unit of R&D expensed compared to other firms. While 431% is a large number, one must keep in mind that in absolute terms the number of granted patents per unit of R&D do not differ a lot since the number of average granted patents is low (see Table 2). Furthermore, we do not control for the quality of the patents. These results are statistically significant at the 1% level. Non-founder family and family firms as single categories are not granted statistically significant less or more patents per unit of R&D expenditures respectively. In columns, (5) and (6), we again investigate whether the size of the wedge between voting- and cash flow rights influence R&D decisions in family firms. Just as in the previous columns the coefficients of interest, the interaction coefficients, have the opposite sign as the corresponding coefficients in Table 3. We find evidence for families who hold a large part of superior class shares compared to normal class shares produce fewer patents per unit of R&D invested. To conclude, the results from tables 3, 4, and 5 seem to suggest that regardless of how much different firms spend on R&D they produce a similar number of granted patents. The propensity to patent appears to correlate negatively with investment in R&D.

Table 4

Summary statistics of variables in main regression

Notes: The table presents the regression between granted patents, logarithmized, and our independent variables. The main observation of interest in this table is that the negative family effect on innovation input R&D does not similarly reveal itself on patents (see column 2 non-significant), which one would think as granted patents is an output measure of innovation and often related to R&D inputs. An interpretation of this is that there is a difference in the propensity to patent inventions among family firms compared to non-family firms. All regressions are run using industry-year fixed effect and robust standard errors. We provide a Wald F-test statistic that compares if there is a significant difference between the Non-founder family and Founder family coefficients.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Patents	Patents	Patents	Patents	Patents	Patents	Patents
Dual		0.104**		0.117**	0.0999	-0.0138	-0.0371
		(0.0452)		(0.0466)	(0.0667)	(0.0532)	(0.0558)
Family (20%)	-0.0475	-0.0610				-0.0124	
	(0.0551)	(0.0544)				(0.0594)	
Founder family (20%)			-0.0667	-0.104	-0.135		0.0949
			(0.0731)	(0.0736)	(0.0920)		(0.0840)
Non-Founder family (20%)			-0.0340	-0.0335	0.0466		-0.0911
			(0.0600)	(0.0598)	(0.105)		(0.0699)
Vote/Cash flow rights						0.0491**	0.0574***
						(0.0206)	(0.0210)
Dual x Founder family (20%)					0.202*		
					(0.118)		
Dual x Non-founder family (20%)					-0.158		
					(0.111)		
Family (20%) x Vote/Cash flow rights						-0.0190	
						(0.0247)	
Founder family (20%) x Vote/Cash flow rights							-0.0613**
							(0.0303)
Non-founder family (20%) x Vote/Cash flow rights							0.0248
							(0.0293)
Wald F-test			0.20	0.89			
Observations	1,076	1,076	1,076	1,076	1,076	1,076	1,076
R-squared	0.525	0.527	0.525	0.528	0.531	0.534	0.541
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust SE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

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

Table 5

Summary statistics of variables in main regression

Notes: The table presents the regression between granted patents per unit of R&D expenditure, logarithmized, and our independent variables. The first highlight of the table is that founder family firms, relative to other firms, are granted 317% more patents per unit of R&D investment, which increases even further to 431% when controlling for the use of multiple share classes (column 3 and 4), and significant at the 1% level. This may be viewed as founder family firms being more efficient in innovational processes. Lastly, in column 5 family firms are granted fewer patents per unit R&D invested as the vote-cash flow wedge increases. All regressions are run using industry-year fixed effect and robust standard errors. We provide Wald F-test statistics that compare if there is a significant difference between the Non-founder family and Founder family coefficients.

VARIABLES	(1) Patents/ R&D	(2) Patents/ R&D	(3) Patents/ R&D	(4) Patents/ R&D	(5) Patents/ R&D	(6) Patents/ R&D
Dual		-0.400		-0.718**	-0.454	-0.736*
		(0.317)		(0.320)	(0.392)	(0.396)
Family (20%)	0.486	0.539			1.465***	
	(0.328)	(0.328)			(0.447)	
Founder family (20%)			1.429***	1.664***		3.201***
			(0.426)	(0.434)		(0.580)
Non-Founder family (20%)			-0.147	-0.144		0.648
			(0.370)	(0.366)		(0.532)
Vote/Cash flow rights					0.209*	0.206*
					(0.108)	(0.110)
Family (20%) x Vote/Cash flow rights					-0.374***	
					(0.117)	
Founder family (20%) x Vote/Cash flow rights						-0.516***
						(0.139)
Non-founder family (20%) x Vote/Cash flow rights						-0.367**
						(0.151)
Wald F-test			12.52***	16.47***		
Observations	1,049	1,049	1,049	1,049	1,049	1,049
R-squared	0.471	0.472	0.479	0.481	0.478	0.491
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Robust SE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

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

Table 6

Summary statistics of variables in main regression

Notes: This table only consists of 200 observations which is likely the main reason there are no results that are statistically significant. In essence, all relationships displayed in the table below between the natural logarithm of the deal value of firm M&A activity and our independent variables can be attributed to chance. All regressions are run using industry-year fixed effect and robust standard errors. We provide Wald F-test statistics that compare if there is a significant difference between the Non-founder family and Founder family coefficients.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	M&A	M&A	M&A	M&A	M&A	M&A	M&A
Dual		0.0838		0.147	0.209	0.00306	0.0853
		(0.470)		(0.484)	(0.617)	(0.631)	(0.652)
Family (20%)	0.248	0.227				0.540	
	(0.413)	(0.429)				(0.587)	
Founder family (20%)			0.0816	0.0263	-0.0354		0.135
			(0.520)	(0.551)	(0.618)		(0.719)
Non-Founder family (20%)			0.379	0.355	0.410		0.891
			(0.473)	(0.479)	(0.618)		(0.694)
Vote/Cash flow rights						0.0787	0.0844
						(0.148)	(0.151)
Dual x Founder family (20%)					0.398		
					(0.972)		
Dual x Non-founder family (20%)					-0.102		
					(0.848)		
Family (20%) x Vote/Cash flow rights						-0.107	
						(0.142)	
Founder family (20%) x Vote/Cash flow rights							-0.0587
							(0.156)
Non-founder family (20%) x Vote/Cash flow rights							-0.177
							(0.175)
Wald F-test			0.29	0.34			
Observations	200	200	200	200	200	200	200
R-squared	0.753	0.753	0.754	0.755	0.755	0.755	0.758
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust SE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses

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

Next, we look at external innovation in family firms which is proxied by M&A activity. In Table 6 we run the same regressions as before but with the outcome variable *M&A*, the natural logarithm of the deal value of M&A activity. Here the number of observations are considerably fewer compared to

our three previous regression tables, Table 3, Table 4 and Table 5. Because of this, we do not attain any statistically significant results regarding any potential dual-class share structure effects or family effects. The regression coefficients in columns (3), (4) and (7) potentially suggests that there may be a non-founder family effect but as previously said such an effect is not statistically significant and could be attributed to chance.

4.3 Robustness and endogeneity

In the next phase of the analysis, we perform different robustness checks. Given that innovation is difficult to reliably measure we have used several different proxies to try and capture the effects. A limitation is that we only use quantitative measures and not any qualitative measures that might better capture some aspects of innovation. In the previous section 4.2, we do find that the results differ depending on how innovation is proxied. A further limitation is that we did not explore any potential non-linear relationships between family ownership and innovation. The winsorizing that was applied to some of the continuous variables at the 5% and 95% level respectively did not affect the results in any way.

During the analysis, we have consequently used the same definition of family firms found in Appendix Table A1. We will now conduct robustness checks to show how the results are affected by different definitions of family firms. We run the same regressions presented in Tables 3, 4, 5, 6 again but this time a 5% is used to define controlling ownership, rather than the 20% threshold used in the previous regressions. These tables are unreported because including these would make the volume of this thesis to high. We do so partly because they do not yield any interesting results not accounted for earlier in our analysis. From the unreported tables, we find that most of the results are consistent with what we previously found and none of the statistically significant results that we found changes in any meaningful way, e.g. change of sign. The two most noteworthy findings are that the founder family effect is less pronounced in terms of R&D expenditure as well as the potential non-founder family effect regarding M&A spending is now significant, although at the 10% level. We can conclude that our main results are robust to different definitions of family firms.

We also recognize that there exists a lag between the time a patent is granted and the innovative activities within a firm. The exact time is difficult to estimate as it would likely vary a lot from firm to firm and patent to patent, but the time between when a patent application is filed and when it is granted is often at least 1-2 years. Our data covers only six years which makes it problematic to run regressions with a large lag. We introduce a 1-year leading outcome variable for the patent variables *Patents* and *Patents/R&D*. From the unreported tables, we see that again the results found previously does not change in any substantial way.

Finally, there are some endogeneity concerns. In the main model, we have controlled for industry-year fixed effects which should mean that the results are not vulnerable to any omitted variables at the industry level. Endogeneity problems at the firm level is a more serious concern. One such problem is reverse causality. Family firms in our sample might, based on unobservable factors, have a different optimal innovation strategy which involves more conservative spending on R&D and a higher likelihood of patenting inventions. A similar issue applies to the use of dual-class share structures which is not assigned randomly. This issue could be addressed using an instrument variable for ownership structure. However, finding an appropriate and valid instrument is difficult and such attempts are often unconvincing. An alternative method would be to introduce some form of exogenous shock in the model. This has not been further explored in this paper leaving some question marks regarding endogeneity.

5. Endnote

This section aims to discuss and analyze our results and its implications. We will end this paper by expressing our ideas and views on how one can build on our empirical findings and do further research on related issues and topics that are yet to be explored.

5.1 Discussion

The main takeaway from our results was that our first hypothesis could be accepted while our second hypothesis was rejected. By retrospect, we have found family firms to adopt dual classes of shares more often than non-family

firms. Furthermore, to the opposite of what we originally hypothesized, while family firm ownership does seem to have a negative effect on innovation, the adoption of multiple share classes does not appear to explain this. The increased investment in R&D among family firms with the vote-cash flow wedge among the controlling owners does nonetheless tell an interesting story.

What is the driving force behind family firms´ decision to adopt such a control mechanism relatively more often than non-family firms? One may reason that family firms have more so than institutions clear personal sacrifices invested in the issue of power retention. For example, the controlling owner might look upon the firm as a future employee and learning ground for younger family members. Using control-enhancing mechanisms that help secure an ownership structure- and concentration would then naturally be higher on the agenda in these types of firms.

In testing our second hypothesis, we could not find support for the theory that dual classes of shares have an adverse impact on innovation in family firms. The observation that family firms invest less in R&D than non-family firms became more apparent rather than less so after controlling for the usage of dual classes of shares. We had to reject our second hypothesis. Moreover, family firms´ investments in R&D increase, rather than decrease, with the wedge between voting rights and cash flow rights among the controlling owners in our dataset.

How do we interpret these findings economically? Given these findings, one could make the case that there is no increase in the type II agency problem and the extraction of private benefits by the controlling owner when adopting multiple share classes and growing the ownership concentration.

When making this case, a potential reason may be that family firms value the long-term survival of the firm relatively more than the short-term individual gains from extracting private benefits temporarily from their firm. In other words, securing a future learning ground and family domain is prioritized.

Lastly, one could alternatively make the case that there was no relationship between innovation and the extraction of private benefits from the start. The assumption of increased extraction of private benefits resulting in less innovation was based on the argument that there is an alternative cost attached to the extraction of private benefits: they could have been reinvested in the firm instead. Either case is difficult to exclude, both deserves reflection.

5.2 Conclusion

The two main findings in this paper are the following:

(1) Family firms adopt multiple share classes relatively more often than other firms. As a possible explanation for this family firms may seek to entrench themselves to ensure continued family influence and keeping a learning ground for future family generations.
(2) The adoption of dual-class share structures does not help explain the negative effect on innovation by family ownership.

5.3 Implications & future research

Upon finishing this study, our hope is that we have contributed to explore the dynamics of family firms and its relations to control-enhancing mechanisms and innovation. There are several interesting ways in which one could build one our study.

First, the relationship between family firm effects and dual-class share structure effects should be further explored. Maybe there are other results from the family firm literature where the results are in fact driven by "disguised" dual-class" effects.

Second, it would be interesting to build on our study by examining if one finds similar results when focusing on the prevalence of other control-enhancing mechanisms in firms. Such as cross-ownership and pyramid structures, since they fulfill the same purpose of dual-class share structures in terms of enhancing power retention.

Third, family firms are often treated as a homogeneous group, and it would be of interest to further explore the "family" part of family firms. Narrowing down the focus from family firms to the subcategories such as founder- and non-founder family firms and the relationship to control

mechanisms & innovation would deepen our results. Finally, while not the focus of this study, a "founder effect" on innovation seems to exist and should be explored more closely.

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Appendix

Table A1

Definition of variables in main regressions

Notes: This table presents the definition of variables used in the regressions and their respective data source. Data is presented per annum on the firm level if nothing else is stated. Written in parentheses are the Datastream codes used to collect the data. Winsorizing at the 5% and 95% level was applied to *M/B* and *Profit margin* as there were extreme negative outliers, potentially skewing the results in the regressions. Removing them did not affect the results of the variables of interest or the significance of that result. In addition to the listed variables, we also test for family-group variables at the 5 % threshold, e.g. Family (5%).

	Description	*Data source*
Dependent variables		
R&D	Natural logarithm of 1 plus research and development expenses (WC01201) for a single firm in year *t*.	Datastream
Patents	Natural logarithm of 1 plus the number of European granted patents that have been validated in Sweden for a single firm in year *t*.	Swedish patent database
Patents/R&D	The above Patents divided by the above variable R&D. Patents produced	Datastream and Swedish patent database
M&A	Natural logarithm of the 1 plus the sum of the value of mergers & acquisitions spending for a single firm in year *t*.	SDC Platinum
Test variables		
Dual	Dummy variable that equals 1 if the firms has at least two different share classes and 0 otherwise.	SIS Ägarservice
Family (20%)	Dummy variable that equals 1 if the largest fraction of total votes if held by a family with at least 20% of the total votes. 0 otherwise.	SIS Ägarservice
Non-founder family (20%)	Dummy variable that equals 1 if the largest fraction of total votes if held by a family that is not the founders or descendants of the founder and 0 otherwise.	SIS Ägarservice
Founder family (20%)	Dummy variable that equals 1 if the largest fraction of total votes is held by the firm founder or descendants of the founder and the holding is at least 20 % of the total votes. 0 otherwise.	SIS Ägarservice
Vote/Cash flow rights	The variable describes the controlling owner's votes-to-cash flow rights ratio. The ratio grows with increased holding of superior class shares compared to normal class shares.	SIS Ägarservice

Control variables		
Ownership concentration	The fraction of votes held by the largest shareholder in firm *i* at the end of year *t*.	SIS Ägarservice
M/B	Market to book ratio of common equity. Market value calculated using the number of outstanding common shares multiplied by the share price at the end of year *t*. The book value of common equity (WC03501).	Datastream & SIS Ägarservice
Leverage	Total interest bearing debt (WC03255) divided by total assets (WC02999).	Datastream
Assets	Natural logarithm of total assets in the firm (WC02999).	Datastream
CAPEX	Natural logarithm of 1 plus capital expenditures (WC04601).	Datastream
Profit Margin	The operating profit margin. Operating income (WC01250) divided by sales (WC01001).	Datastream
Capital intensity	Capital intensity is the natural logarithm of 1 plus property, plant and equipment (WC02501) divided by number of employees (WC07011)	Datastream
Industry-Year Fixed Effect	Dummies for industry sector classification in accordance with the ICB standard at the sector level. See appendix table A4 for industry sectors.	Datastream & Nasdaq

Table A2

Selection method and sample sizes

Notes: *Firm year observations with ICB codes: 8300, 8500, 8600, and 8700.
This table presents the selection method and the sample sizes used for the descriptive statistics and to run the regressions.

Selection method			**Sample sizes**		
Category	*Description*	*Source*	*Data loss (n)*	*Data loss (%)*	*Obs.*
Ownership data	Listed firms on NASDAQ OMX Stockholm 2009-2014 registered in Sweden.	Nasdaq & SIS Ägarservice			1404
Financial data	Accounting data, complemented and validated using annual reports.	Datastream & annual reports	37	2.6 %	1367
Financial firms	Exclude financial firms per their ICB classification. *	Datastream & Nasdaq	254	18.6 %	1113
Data errors	Exclude observations where the values do not make any sense.		26	2.3 %	1087
Sum	*Summary statistics*				***1087***
R&D expenditure	Firm-year observations with observed R&D data for year *t*	Datastream & annual reports	38	3.5 %	1049
Sum	*Baseline R&D regression*				***1049***
Patent data	Firm-year observations with data for the number of granted patents year *t*	Swedish Patent Database	11	1.0 %	1076
Sum	*Baseline patents regression*				***1076***
M&A Data	Firm-year observations with observed M&A data year *t*	SDC Platinum	887	81.6 %	200
Sum	*Baseline M&A regression*				***200***

Table A3

Use of dual-class share structures across firm type and time

Notes: This table presents the distribution of the use of dual-class share structures in family and non-family firms. Below the table, the result of a chi-squared test comparing the use of dual-class share structures in family- vs. non-family firms for 2014 is reported. We can see that family firms use dual-class share structures significantly more compared to non-family firms.

	Dual-class share structure		
Firm type	No	Yes	Total
2009			
Non-family	38	21	59
Family	46	72	118
Total	84	93	177
2010			
Non-family	38	21	59
Family	46	72	118
Total	84	93	177
2011			
Non-family	41	18	59
Family	46	78	124
Total	87	96	183
2012			
Non-family	43	20	63
Family	45	76	121
Total	88	96	184
2013			
Non-family	46	20	66
Family	44	73	117
Total	90	93	183
2014			
Non-family	51	23	74
Family	43	70	113
Total	94	93	187

For 2014: Pearson χ^2 (1) = 17.0411 Pr = 0.000

Table A4

Observations across industry sectors

Notes: This table presents the names and ICB-codes of industry sectors used to calculate industry-year fixed effects in the regressions. From the table, the distribution of firm-year observations across industry sectors is also visible. Industry sectors with less than 12 observations and financial industry sectors were eliminated from the sample.

Industry Sector	*ICB-code*	*N*	*Percent*	*Cum.*
Oil & Gas Producers	530	17	1.56	1.56
Forestry & Paper	1730	28	2.58	4.14
Industrial Metals & Mining	1750	22	2.02	6.16
Mining	1770	15	1.38	7.54
Construction & Materials	2350	72	6.62	14.17
Aerospace & Defense	2710	12	1.10	15.27
General Industrials	2720	12	1.10	16.38
Electronic & Electrical Equipment	2730	107	9.84	26.22
Industrial Engineering	2750	78	7.18	33.39
Industrial Transportation	2770	12	1.10	34.50
Support Services	2790	89	8.19	42.69
Automobiles & Parts	3350	28	2.58	45.26
Food Producers	3570	12	1.10	46.37
Household Goods & Home Construction	3720	35	3.22	49.59
Leisure Goods	3740	13	1.20	50.78
Personal Goods	3760	30	2.76	53.54
Health Care Equipment & Services	4530	72	6.62	60.17
Pharmaceuticals & Biotechnology	4570	91	8.37	68.54
Food & Drug Retailers	5330	12	1.10	69.64
General Retailers	5370	70	6.44	76.08
Media	5550	21	1.93	78.01
Travel & Leisure	5750	36	3.31	81.32
Fixed Line Telecommunications	6530	13	1.20	82.52
Mobile Telecommunications	6570	12	1.10	83.62
Software & Computer Services	9530	127	11.68	95.31
Technology Hardware & Equipment	9570	51	4.69	100.00
Total		1,087	100.00	

Table A5

Ownership categories

Notes: This table presents more extensive definitions of the owner categories used in Table 1. There are four different mutually exclusive categories which are also jointly exhaustive.

Ownership category	**Definition**
Founder family	Founder family consists of all firm-year observations where the founder or descendants of the founder is the controlling owner and control more than 20% of the votes in the firm.
Non-founder family	Non-founder family consists of all firm-year observations where an individual or family who is not the founder or descendants of the founder is the controlling owner and controls more than 20% of the votes in the firm.
Other controlling owner	Other controlling owner consist of all firm-year observations where the controlling owner of the firm does not fit in the Founder family or Non-founder family categories but still controls more than 20% of the votes in the firm.
Dispersed ownership	Dispersed ownership consists of all firm-year observations where the largest owner controls less than 20% of the votes in the firm. There is no controlling owner.

Word list: important words and phrases

Notes: This list contains explanations for words essential to the understanding of this paper. By providing such a list we hope to make our thesis more accessible to people otherwise outside the academic world.

General terms and phrases:

***Dual-class share structures**:* Listed firm´s usage of separate share classes, often firms have a share class A with more votes/share than a share class B

***Agency theory**:* A branch of financial economics addressing conflicts of interest between people with different interests in the same assets

***Type II agency problem**:* When the conflict of interest is between majority shareholders & minority shareholders, a majority expropriating the minority

Private benefits of control: The economic gain yielding large shareholders at the expense of small shareholders from exerting influence on a company

R&D: Acronym for "research & development". A firm´s work directed towards innovation, introduction, and improvements of products & processes

CAPEX: Acronym for "capital expenditures". The funds used to upgrade- or invest in new physical assets, such as property and equipment in the firm

M&A: Acronym for "mergers & acquisitions". Transactions in which assets and business organizations are transferred or consolidated.

Dual class effects: A general term for the effects on a firm caused indirectly or directly by the firm´s adoption of multiple share classes

Family firm effects: A general term for the effects on a firm caused indirectly or directly by the firm´s adoption of a controlling family ownership structure

Controlling stake: The threshold at which an owner in a firm has enough votes to exert the main influence and prevail in any stockholders´ motion

Statistical phrases:

Descriptive statistics: Statistics used to describe the essential features of the data in a study. Summaries about the sample and various measures used

Chi-squared test: A test used to evaluate if a statistical result arose by chance. It is used when the underlying sample follows a chi-squared distribution

Ordinary least squares regression: A common statistical method to estimate the unknown parameters in a linear regression model

Dependent variable: The outcome variable believed to depend upon- and be affected by an independent variable. Hence it is specified as "dependent."

Independent variable:
- ***Test variable:*** The specific variable(s) you are interested in as a potential explanation for observed changes in the dependent variable
- ***Control variable:*** The specific variable(s) held unchanged to help clarify the relationship between the dependent- and test variable

Fixed effects estimator: A term introduced in the regression summarizing the combined effect of characteristics that are fixed across all observations, e.g.,

- ***Firm fixed effects:*** The combined effect of the characteristics of a firm that are specific for that firm, e.g. quality of a firm´s business model
- ***Industry fixed effects:*** The combined effect of the characteristics of an industry that are specific for that industry e.g. demand nature
- ***Time fixed effects:*** The combined effect of the characteristics of a time that are specific to that period, e.g**.** 2008 fin. crisis
- ***Industry-time fixed effects:*** The combined effect of the characteristics of an industry that are industry-specific and vary across time

Statistical significance: The result is unlikely to have occurred by chance. This unlikeliness increases with higher levels of statistical significance

Robustness test: Validating the results by testing if the found results can be reproduced by making changes, e.g. of definitions used

Endogeneity: When changes in an explanatory variable are associated with changes in the error term e.g. a variable left outside the regression (omitted)