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Pyramidal ownership in Swedish public companies – implications for top executive compensation

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Abstract

The correlation between pyramidal structures along with family ownership and executive compensation has been studied in Swedish public companies between the years 2001-2007. The results show that no difference in executive compensation can be attributed to the pyramidal structure itself, but in combination with family ownership it can. CEOs at family controlled firms on a pyramidal level 2 are experiencing a compensation premium compared to CEOs at other family controlled firms. Their salary is also more sensitive to changes in firm performance. Also for family controlled pyramidal level 1 firms is a CEO compensation premium against other family controlled firms observed, which however is reduced in case the chairman of the board is related to the controlling family. The results support a view that the pyramidal structure in combination with family ownership may create agency problems which result in a CEO compensation premium relative to non-pyramidal family firms.

1. Introduction

Pyramid structures in publically traded companies are common in many countries in the world, especially in Sweden (La Porta et al., 1999). In essence it is a structure where controlling shareholders let a company control other companies instead of controlling them themselves directly. This creates potential agency problems that in turn could lead to expropriation of minority shareholders and entrenchment effects.

The reasons and implications for employing pyramid structures in general and in Sweden in particular have been and are widely discussed, see for example Almeida et al. (2011), Claessens, Djankov and Lang (2000), Holmén and Högfeldt (2009) and Masulis, Pham and Zein (2010). Current studies are often focused on the formation process of the pyramid structure and the implications for minority shareholders and stock valuation. I will in this paper investigate the effects of pyramidal ownership on executive compensation. The pyramid structure achieves a separation of voting and cash flow rights, which has been seen to create agency problems between controlling and minority shareholders and be detrimental to firm value (Claessens et al., 2002). Previous studies have also shown that CEOs at firms with greater agency problems are rewarded a higher compensation and the firms have also been seen to perform worse (Core, Wolthausen and Larcker, 1999). I will in this paper examine whether the potential agency problems created in pyramidal firms in fact does result in higher CEO compensation at the concerned companies and if the sensitivity in executive compensation to firm performance is different than at non-pyramidal firms.

Assuming that overpaying the CEO in a pyramid structure is a form of expropriation of minority shareholder, since the controlling owners only have to pay for a fraction of the salary premium, then finding a positive correlation between pyramidal ownership and CEO compensation indicates that the structure is negative to shareholders.

To evaluate the implications on CEO compensation from pyramidal structure I have used a dataset containing information about firm characteristics, ownership details and executive compensation from Swedish public companies between the years of 2001-2007. I have created econometrical models based on similar studies on executive compensations and added pyramidal and other ownership variables. My results show that differences in compensation in terms of size and sensitivity to performance exist between pyramidal firms in combination with family ownership and other firms. My results add some support to findings of agency problems in pyramidal structures and the implication of these problems for executive compensation.

The paper will be outlined as follows: In section 2 will I present the literature that is related to the different topics that are covered, in section 3 present my hypotheses, in section 4 describe my dataset, as well as the definitions and models used. I will present my results in section 5, discuss them in section 6 and draw my conclusions in section 7.

2. Literature review

I will in this paper focus on the interrelation and various effects of having controlling shareholders, family and management ownership, pyramidal ownership structure and executive compensation. Since - to my knowledge - this combination of topics has not been jointly studied before, this section will focus on previous studies conducted in the five areas individually.

2.1 Large shareholders and management ownership

The structure and implications of controlling owners have been studied extensively. La Porta et al. (1999) study the corporate ownership in 27 countries and find that many firms have one controlling owner. The controlling shareholders frequently have more power than capital rights, which they accomplished by for example using pyramids and being part of the firm's management. Theories on the implication of management ownership are dominated by the two offsetting effects: (1) alignment of interests and (2) entrenchment. Alignment of interest means that as the management have higher stake in the company, their interests are better aligned with those of other shareholders, and the agency costs should thereby decrease as management ownership increases (Jensen and Meckling, 1976). However, as the ownership of the management increases, their voting power may be large enough to guarantee their own employment, avert takeovers, award themselves higher than deserved salaries and employ family members that are not as qualified as nonfamily candidates (Morck et al., 1988 and Morck, Wolfenzon and Yeung, 2005). A model developed by Stultz (1988) predicts that the relationship between management ownership and firm value therefore increases with managerial ownership at low levels of ownership but then decreases, i.e. as the management ownership passes some point the entrenchment costs exceed the saved agency costs. This relationship is empirically identified by McConnell and Servaes (1990) while Morck et al. (1988) find that the firm value initially increases with management ownership up to 5 %, decreases up to about 25 % and then increases again. According to Himmelberg, Hubbard and Palia (1999), the relationship between managerial ownership and performance is endogenous and failing to account for this may hence generate biased results.

Claessens et al. (2002) study the effects of having one controlling shareholder. They identify the individual effects of incentive and entrenchment and find that firm value increases with cash-flow ownership (incentive effect) of the largest shareholder, but falls when the difference between control

rights and cash-flow rights increases (entrenchment effect). Lins (2003) investigates the effect of large differences between control rights and cash-flow rights in East Asian economies. His findings show that the divergence does reduce the value of the firm but not enough to offset the benefits of having large ownership concentration. Gomes (2000) argues that due to reputational effects, controlling shareholders may implicitly commit to not expropriate minority shareholders, since expropriation will be noticed and their remaining shares will be discounted and sold at a lower price accordingly. Cronqvist and Nilsson (2003) study the costs of what they call controlling minority shareholders (CMSs) is Sweden. A CMS is defined as a shareholder with control of the votes but owning only a small fraction of the cash-flow rights. They find that families are more likely to utilize these structures, that their existence is negatively related to Tobin's q and the reason is a lower return on assets for companies with CMSs.

2.2 Family ownership

The principal-principal agency (PPA) problem is a slight modification of the principal-agent problem where there instead are mismatching goals between two types of principals, for example minority and majority shareholders (Dharwadkar, George and Brandes, 2000). Dharwadkar, George and Brandes (2000) point out that family owned firms and business groups could be prone to such problems. Costs associated with these problems include sibling rivalry, generational envy, non-merit based compensation and irrational strategic decisions. Although there are potential costs involved with family ownership, there are also potential gains, such as reduced monitoring costs, greater trust and to larger extent common goals among the owners. In firms where the costs of PPA are higher than the gains, family members could be placed in key positions ignoring nonfamily employees that have better credentials for the job (George and Kabir, 2008). Some families have a large part of their wealth in the family company and due to concern for the family legacy, they may show excessive risk-aversion and miss out on profitable expansion strategies and mergers (Morck, Strangeland and Yeung, 2000).

Miller et al. (2007) evaluate a number of studies on the subject of family business performance and find that the results are highly sensitive to the definition of a family firm and the nature of the sample. They point out that to evaluate performance of family firms, a distinction between lone-funder firms and firms with multiple relatives being owners and/or managers should be made. In a sample from Fortune 1000 firms, lone-funder firms outperformed other, while firms including relatives never outperformed. In a randomly drawn sample, neither of the firm categories revealed superior performance. Villalonga and Amit (2006) study the impact on firm value for different types of family firms. They find that if the founder serves as the CEO or as the chairman with a hired CEO, family ownership creates value. If pyramids, dual class shares or voting agreements are used, it reduces the founder premium. On the contrary, when descendants serve as CEOs in family firms it is detrimental to firm value. Furthermore,

they find that the owner-manager conflict is less costly in founder managed firms than in nonfamily firms, but more costly than in nonfamily firms in case descendants serve as CEOs. King and Santor (2008) identify an underperformance among family firms in Canada, but argue that it is not the family ownership itself that is the cause of it, but rather the family ownership in combination with dual-class shares that is associated with the underperformance. They find that family owned firms that use single-class shares have similar Tobin's q, higher return on assets and higher leverage than other firms on average. Furthermore, it has been suggested that family groups may have negative effects on the economic efficiency in general by hampering with the development of external capital markets (Almedia and Wolfenzon, 2006a) and promoting regulations that slow down the financial development (Rajan and Zingales, 2003).

2.3 Pyramid structures

Pyramid structures among publically traded companies occur when owners of a publically traded firm control other publically traded firms by letting the top level firm be a majority owner, instead of directly being the majority owner. These lower level firms can in turn be majority owners of other firms, thereby making the top owners control them too. This is a way of separating cash-flow and voting rights since the top owners may have effective control of a firm at for example level three but have only 12.5 % (0.5^3) cash-flow right. Figure 1 shows an example of a pyramid structure where individual I is the controlling owner of company A with 50 % of the votes, which in turn is the controlling owner of company B with 50 % of the votes, which in turn is the controlling owner of company C with 50 % of the votes. The individual I now has ultimate control of all three companies, but only 50 % of the cash flow rights of company A, 25 % of the cash flow rights in company B and 12.5 % of the cash flow rights in company C.

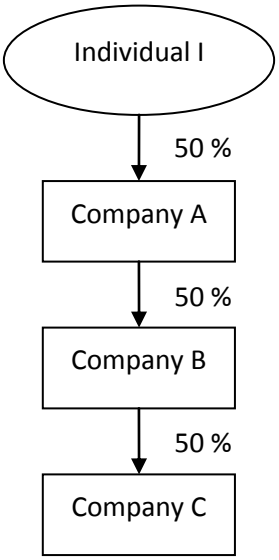

Figure 1
An example of a pyramidal ownership with the individual I having ultimate control of all three companies, but only12.5 % cash flow right in company C.

To evaluate the buildup of pyramidal structures in family business groups, Almeida and Wolfenzon (2006b) develop a model which justifies the use of a pyramidal structure instead of the alternative horizontal structure, distinction between the two ownership structures visually explained in Figure 2.

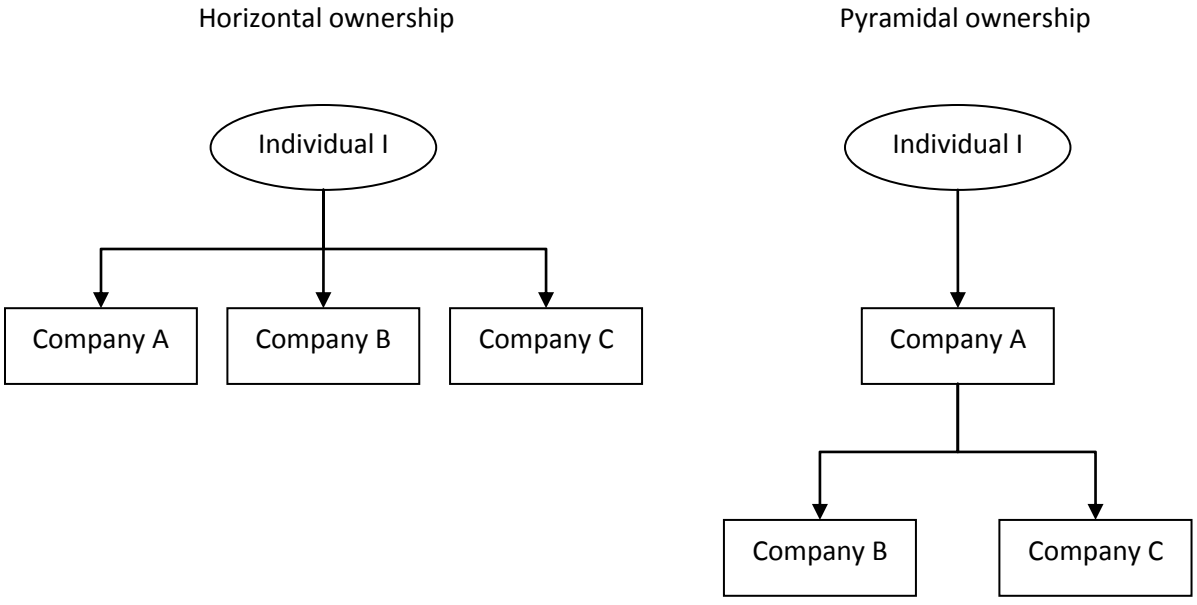

Figure 2
Schematically showing the difference between horizontal and pyramidal ownership.

Their model explains why assets become concentrated to a single family, why the assets are grouped into independent firms and which structure of firm ownership is chosen. They argue that the choice of pyramid structure is not a way for the controlling families to separate cash-flow and voting rights, but rather an indication of poor investor protection. By setting up a new firm B using cash-flow generated in firm A, the owners sell a fraction of the new firm B to minority shareholders of A but can in turn use the full cash-flow of A instead of only the actual cash-flow owned in A if a horizontal structure would be used. This shows that the pyramid structure can be chosen even though the corresponding cash-flow and voting rights separation can be reached with dual-class shares. Almeida et al. (2011) perform tests based on this model and find that family groups grow vertically (pyramidal) when they set up or acquire firms with low profitability and high capital requirements, while choosing a horizontal structure when the acquire firms that are highly profitable and require less capital. This explains why one has found that firms in the lower parts of pyramids often are less profitable, and trade at a discount. An alternative theory for why business groups operate their firms in a pyramid structure is because of tunneling. Bae, Kang and Kim (2002) argue that pyramids create tunneling incentives where funds are transferred from firms with low cash-flow rights to firms with high. Baek, Kang and Lee (2006) also find empirical evidence that pyramids are associated with high levels of expropriation. Riyanto and Toolsema (2008) however argue that tunneling alone cannot justify the use of pyramid structure, since rational investors will anticipate tunneling and adjust their willingness to pay accordingly. They introduce the propping effect, which is the opposite movement of funds within the pyramid structure, intended to protect the lower placed firm against bankruptcy. Combining tunneling with propping, investors may then be willing to be expropriated to some extent in exchange for protection against economic failure and hence make the pyramid structure optimal. Bany-Ariffin, Nor and McGowan (2010) argue that the pyramid structure may also affect the choice of capital structure since the top owner may want to use more leverage in the bottom firms to not dilute his/her own equity ownership. Masulis, Pham and Zein (2011) argue that pyramid structures are not only used to maintain control, but used as an efficient method for internal financing. They show that internal equity funding, investment intensity and firm value increase the lower in the pyramid structure the firm is placed.

2.4 Executive compensation

The structure and level of compensation for managers have also been studied extensively. The relationship between managers and shareholders is a schoolbook example of the principal-agent problem. Therefore, the main focus in many studies is how to layout executive compensation to incentivize managers according to the shareholders' goals and thereby increase the firm value. Mehran (1995) does this among manufacturing firms and finds that the level of compensation is not as important as the structure when it comes to motivating managers. His findings show that the more

equity held by managers and the larger the share of their compensation that is equity based, the better the firm performance. Brunello, Graziano and Parigi (2001) note that ownership in Italy is characterized by hierarchical groups, often organized as pyramids under family control. They find empirical results that partly because of this, CEO compensation in Italy is less sensitive to performance compared to German, Anglo-Saxon and Japanese models. Basu et al. (2007) study Japanese corporations and find that after controlling for standard economic determinants, top executive compensation is higher for firms with weaker corporate governance. Variables they use to describe corporate governance are for example management ownership, family control and keiretsu[1] affiliation. They find that executives at firms that are part of industrial groups earn on average less than others and that greater family influence results in higher top executive income, which suggests higher entrenchment among family firms. Firms under influence of founding families are often run by family members as top executives in Japan, and their results therefore indicate that they show tendencies to overpay themselves. However, due to the nature of their dataset, the excess income among top executives in family influenced firms can also be caused by higher dividends to the executives. In addition, they find that the excess pay results in subsequent negative accounting performance.

3. Hypotheses

There exist a number of theories and explanations to why pyramid structures are formed within business groups. The offsetting effects of tunneling and propping may make it a good way for the top owners to share risk among their holdings and let minority shareholder get a sort of insurance against bankruptcy at the cost of expropriation.

The fact that Cronqvist and Nilsson (2003) find that controlling families in Sweden are more likely to have CMS structures in their companies even though they are negatively related to firm value indicates there is a degree of entrenchment or expropriation of minority shareholders among these that are value destroying. A pyramid structure is a way of establishing a controlling minority shareholder position with more voting rights more than cash-flow rights for the top owner. King and Santor (2008) identify an underperformance among family controlled firms when in combination with dual-class shares. Combining their result while also noting that the controlling family only have to pay for a fraction of the cost of rewarding a CEO a higher than deserved compensation and family controlled companies have shown to take irrational decisions (George and Kabir, 2008 and Morck, Strangeland and Yeung, 2000), my first hypothesis (H1) is that a pyramid structure combined with family ownership will be positively related to CEO compensation.

[1] Japanese industrial groups

Extending this hypothesis further to another form of minority shareholder expropriation could suggest that a family related CEO at a lower level pyramidal firm should be awarded a higher than justified compensation. However, no observations with family related CEOs at lower level pyramidal firms exist in the dataset, so this extension of the hypothesis cannot be investigated.

Furthermore, if the CEO compensation decisions at family controlled pyramidal firms are based on other factors than firm performance and value, I expect that family ownership combined with a pyramidal structure should have a negative effect on the sensitivity of pay for performance. A CEO at another type of firm should hence be rewarded proportionally more for each improvement of the company, since the governance at family controlled pyramidal firms is expected to be worse. This effect is expected to the observed at both absolute compensation levels (H2) and for bonuses (H3).

4. Method and Data

4.1 Dataset

The sampled data is of panel type and consists of 1601 observations from 274 publicly listed Swedish companies on the Stockholm Stock Exchange between the fiscal years 2001 and 2007. It contains information about stock market performance, operating performance, executive compensation and detailed ownership information.

The data has been collected and assembled from a number of sources; accounting data has been collected from datastream, management and compensation data has been collected from annual reports, and ownership and share data from the books "Owners and Power in Sweden's Listed Companies" by Fristedt and Sundqvist (2002-2008)[2].

The dataset is not complete, in that it does not contain information about all the companies that were listed on the Stockholm Stock Exchange during the years studied. I received the data after the assembly process had been initiated, and many companies had been left out. There should be no systematic approach to which companies have been left out that could potentially create a selection bias. It is rather due to the fact that some companies do not disclose all information that was sought and were therefore left out. A selection bias could however arise in case companies that potentially have something to hide deliberately make it hard to find data on their business, but this is not thought to be the case.

[2] Contains information about companies listed on Stockholm Stock Exchange or NGM. Does not contain information about companies listed in Stockholm but that are foreign legal personalities (e.g. ABB, Astra Zeneca).

Some firms disappear from the dataset after a couple of year, due to them going private either following an acquisition or a buyout. Since these are included from the beginning, no survivorship bias should be present in the dataset. Some firms are also introduced to the dataset after a couple of years, either because data has become available or because they were introduced to the stock market through an IPO or a spinoff.

4.2 Controlling owner

There has been some discussion of how to define a shareholder as a controlling owner (see for example Edwards and Weichenrieder, 2009). I will be defining the controlling owner as the shareholder with the largest voting right regardless of the actual voting right. According to the weakest-link-principle one should define a threshold voting right for which an owner becomes controlling. Commonly used threshold values are for example 5, 10 or 20 %, but a problem with this principle is that there is often no theoretical motivation behind a specific threshold value, and the decision then becomes arbitrary. Studies on control- and cash-flow rights based on the weakest link principle have sometimes given different results than other measures of control rights, questioning the accuracy of this measure (Edwards and Weichenrieder, 2009). Alternative measures such as the Banzhaf voting power index (Banzhaf, 1965) or the similar Shapley-Shubik power index (Shapley and Shubik, 1954) could potentially be used, but since these indices give very different measures of the same voting right distribution, I will not be using them as measures of voting power in any of my econometrical models. The Shapley-Shubik index measures the voting power by the number of times a voter is pivotal in a sequential combination of voters, while the Banzhaf voting power index measures the number of times that a voter is critical. In other words, the Shapley-Shubik index measures the number of times that a voter changes a losing sequence into a winning one by entering it, while the latter measures the number of times the voter changes a winning sequence into a losing one by leaving it. Using an example of one large shareholder owning 40 % of the voting rights and 60 small shareholders owning 1 % each, the Shapley-Shubik index gives the large owner a voting index of 65.6 % and each of the small owners 0.57 %. The Banzhaf voting power index is 100 % for the large owner and 0 % for each of the small owners (Edwards and Weichenrieder, 2009).

The decision to define the largest shareholder as automatically controlling might be misleading in some cases where the largest owner holds no more than a couple of percent of the voting rights[3], but since defining a threshold value introduces the problem of deciding on this exact level without a real theoretic justification, this decision has been taken anyway.

[3] For example, after 2001, no single owner has owned more than 4 % of the voting rights in Kungsleden.

Many companies in Sweden are controlled by a family group[4], such as for example the Wallenberg family, the Bonnier family, the Douglas family and the Stillström family. There are also a number of non-family groups with widespread ownership such as SHB and The Swedish State. In case the largest owner is part of a group then the voting and capital rights of the largest owner is defined as the total voting and capital right of the whole group. This is exemplified with the case of Ericsson in 2007, as can be seen in Table 1. The six owners in the table are all part of the SHB group, and their combined voting rights makes SHB the owner with the largest voting right. The largest single owner is defined to be Industrivärden with an effective voting and capital right of 20.2 % and 3.9 % respectively.

Table 1
Example of SHB group ownership in Ericsson, year 2007.

Owner	Percent of votes	Percent of capital
Industrivärden	13.4	2.4
SHB pensionsstiftelse	3.0	0.5
SHB pensionskassa	2.3	0.4
SHB personalstiftelse	0.7	0.1
Oktogonen	0.5	0.1
SHB	0.3	0.4
Total	**20.2**	**3.9**

4.3 Family ownership and management

To determine whether a specific company is controlled by a family or not, the owner or group with the largest voting right is identified. The company is defined to be family controlled if the owner with the largest voting right is either a person, family or a public company in a pyramidal ownership structure with a person or family as the largest owner. The company will also be classified as family controlled if the largest owner is a non-listed company but with distinct family ownership, such as for example Nordstjernan AB[5]. Examples of companies that are non-family controlled have for example mutual funds or non-listed companies without a distinct family ownership as largest owners.

If the firm is defined as family controlled, then the CEO and/or the chairman of the board may be appointed from within the family. These positions are defined to be occupied by family members if their last names are the same as the controlling owner.

For example in Table 1, we can see that the largest single owner in Ericsson is Industrivärden, which is a public company controlled by the SHB group. Industrivärden in turn has SHB pensionsstiftelse as the

[4] In Swedish: “sfär”.
[5] Controlled by the Ax:son Johnson group.

largest single owner. Hence, this is not a family controlled company and can apparently not appoint a family member as CEO or chairman of the board. Table 2 shows an example of Duroc in 2007. The largest owner is the Stillström group, with the largest individual owner being Traction AB. The largest owner in Traction is also the Stillström group with the largest individual owner being Bengt Stillström with family. Through this chain Duroc is defined to have a chairman of the board from the controlling family and Traction has both the CEO and chairman of the board from the owner family.

Table 2
Example of ownership and management in Duroc and Traction, year 2007.

Duroc	
Largest owner	Traction (Stillström group)
CEO	Albinsson Erik
Chairman	Stillström Petter
Traction	
Largest owner	Stillström Bengt with family (Stillström group)
CEO	Stillström Petter
Chairman	Stillström Bengt

By using this definition of family management, two possible errors are introduced; (1) a person with the same last name, but with no personal relation to the controlling family will be classified as a family manager and (2) family managers that for some reason have different last names than the rest of the family will be classified as non-family managers. Hopefully and probably, the number of managers that meet either of these criteria is negligible[6]. Developing another method that controls for these errors is probably hard, an option could be to recursively ask for birth certificates for the managers from Skatteverket[7], which are public records in Sweden, to find out if their parents or parents' parents are related to the largest owners. This would be a time demanding task, and the gain would probably be minimal.

CEO turnover has been measured as the number of observations where the CEO is not the same as the previous year. Out of the 7 studied fiscal years, only 6 are eligible to fulfill that criterion since the CEO of

[6] Regarding the error type 1: All the family groups present in the dataset have quite unusual last names, so for them error 1 should be negligible. Some owners which control only one or a few companies (not part of a group) have more common last names, but in most of those cases both the first and last name is the same for the largest owner and the executive. Regarding error type 2, it is very hard to determine how common it might be without a thorough investigation of family relations.
[7] http://www.skatteverket.se/

2001 cannot be compared to previous year (2000 is not in the dataset). This does not create a bias towards any category of firms, but the CEO turnover will be estimated at a rate lower than the actual.

4.4 Pyramidal ownership

The pyramidal ownership structure means that some firms are in the top level of the pyramid and other firms are at various lower levels. A firm C in the dataset is defined to be on a low pyramidal level when another public company B has the largest voting right in C, or when B is the largest single owner in a group that has the largest combined voting right in C. A firm is defined to be at the top pyramidal level if it fulfills the criterion for B above, but its own largest owner is not another public company.

The example with Duroc and Traction in Table 2 implies that Duroc is on a low pyramidal level since its largest owner is the Stillström group, with the largest single owner being Traction: another public company. Traction is also controlled by the Stillström group, but the largest single owner is Bengt Stillström: a person, implying that Traction must be at the top level of the pyramid and Duroc is hence at pyramid level 2.

The example in Figure 3 shows a selected pyramidal part of the Wallenberg group in 2007. The Wallenberg group is the largest owner of Investor, with Wallenberg foundations as the single largest owners. Investor in turn is the single largest owner in Atlas Copco, Electrolux, SAAB, OMX and SEB, placing them on a second pyramidal level and Investor on a first (top) pyramidal level. The largest owner in Orc Software is OMX, placing Orc Software on a third pyramidal level.

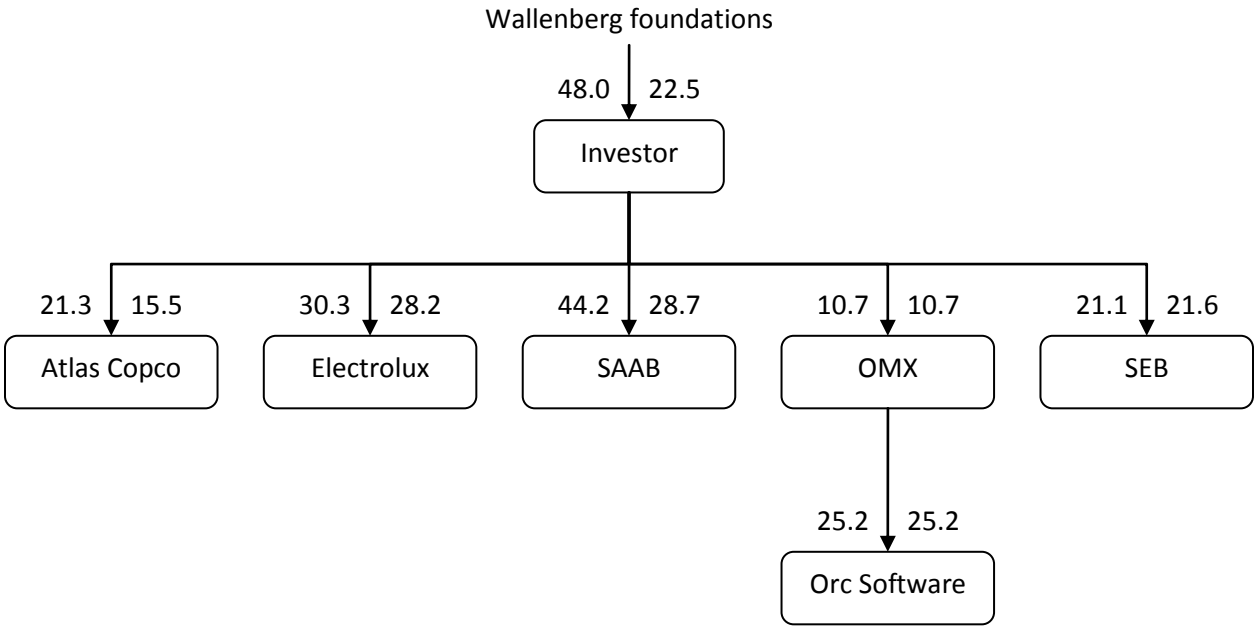

Figure 3
A selected part of the pyramidal structure in the Wallenberg group, year 2007. The left figure next to an arrow represent the effective voting right in percent of the upper company/foundation in the lower company and the right figure represent the capital right in percent.

4.5 Tobin's q

A central determinant in many studies of executive compensation is the firm performance, which in many cases is measured by Tobin's q (see for Example Mehran (1995), Chung and Priuitt (1996), George and Kabir (1998)). Tobin's q is useful as a firm performance indicator since it estimates the value of intangible assets, including for example management quality. Tobin introduced q as the ratio between market value and replacement cost (Tobin and Brainard (1968, 1977), Tobin (1969, 1978)). If the ratio is higher than one for a particular project/firm then there would be an incentive to invest, since the value after the investment would be higher than before it. Although the concept of Tobin's q and its implications are quite straightforward, measuring it is not quite that simple. Perfect and Wiles (1994) note that the empirical constructions of the ratio is prone to measurement errors and compare five different estimators for Tobin's q, including the simple q ratio. Although the simple q ratio is shown to give values not close to the other four, more complex, estimators it is still shown to be useful for studying *changes* in the q ratio. I will in some cases use fixed effect panel estimation, where changes in management compensation is likely to correspond to changes in firm value and due to that, the simple q ratio will be used as a proxy for Tobin's q. In other cases, where fixed effect panel estimation will not be utilized, it will still be used as a proxy for Tobin's q due to it being simple to construct and because it does not serve as the dependent variable. The ratio will be constructed from the sample data from

$$q_s = \frac{MV(E) + BV(TD)}{BV(A)}, \tag{4.1}$$

where MV(E) is the market value of equity, from the books of Fristedt and Sundqvist (2001-2007) and BV(TD) and BV(A) are the book value of total debt and total assets respectively, from datastream.

4.6 Descriptive statistics

Descriptive statistics of the variables that have been used in the study can be seen in Table 3 below. Selection of explanatory and control variables has been done using the studies of Mehran (1995) and Basu et al. (2007) as a basis. Many other studies have used CEO education as an explanatory variable for CEO compensation. This variable has however been left out in this study because of two main reasons. First of all there is lack of completeness in the dataset since 709 of the total 1601 observations give no information about the CEO education. Secondly, among the observations where education level is provided they are all very similar in an objective measure (determined by the length/level of highest

education). 42 % have an MSc in business administration[8], 33 % an MSc in engineering[9], 10 % a master degree in law, medicine or politics, 14 % have a double degree; either an MSc and a PhD, an MSc and an MBA or two MScs while only 2.6 % have a BSc as highest education and 0.8 % have only secondary school education[10]. Because of the low variation in education length and lack of data this variable has been dropped as an explanatory variable.

From Table 3 we see that the average annual compensation for a CEO in the dataset is about 3.6 MSEK, but with a fairly large standard deviation. Since the median value is smaller than the mean value there seems to be a few CEOs earning a lot that lift the mean and thereby giving the sample a large standard deviation. There is hence a huge difference in the CEO compensation with the highest paid CEO earning almost 25 MSEK and the lowest paid not even 100 kSEK. Due to the large standard deviation in relation to the mean value, the natural logarithm of the compensation variable has been constructed. This shows a much narrower band of compensation and will hence be more suitable in an econometric model (it is probably closer to being t-distributed). We can also see that the return on assets has a lower mean value than median value. The mean value is about 3.8 % while the median value is closer to 10 %. Also here is the standard deviation large in comparison to the mean value with a value of almost 36 %. This is likely due to naturally huge variation in ROA among different types of companies; we see that the worst firm had a ROA of -700 %[11] while the best performing company had a ROA of about 70 %. The mean value of Tobin's q was 1.64 and the median value about 1.14. Also here is the standard deviation quite large in relation to the mean value and the span of values large with the maximum value almost the 28[12] and the minimum value less than 0.1. The mean value of Tobin's q should roughly be equal to 1 assuming that the average is investment will be worth the invested value, which is almost the case in the sample.

Sales are divergent with the best selling firm having almost 0.3 billion SEK in sales, while the worst selling firm had less than a thousand SEK. A few large companies seem to dominate the sample mean reflected in the large mean value compared to the median value. The standard deviation is almost three times as large as the mean value further indicating the presence of a few large companies (as the case with the CEO compensation). The natural logarithm of sales is less divergent and the span of values much smaller, making it more suitable for the econometric model. The fraction of capital expenditures to total sales has a mean of about 10 % and much smaller median value, roughly 2 %. The standard

[8] Swedish: Civilekonom
[9] Swedish: Civilingenjör
[10] Swedish: Gymnasiet
[11] The two lowest ROA values are from 2001 by Klövern and Framfab (at the time IT-consultancies with massive losses and few assets). During 2002 Klövern called for a equity issuance and changed their operations to property instead (Klövern - Annual Report, 2002).
[12] In 2007, Sintercast had zero long term liabilities, only 28.1 MSEK in assets and a market valuation of 777 MSEK resulting in the extremely high Tobin's q (Sintercast – Annual Report, 2007).

Table 3
Descriptive statistics on executive compensation and explanatory and control variables in the dataset.

Variable	# of obs.	Mean	Median	Std. dev.	Min	Max
Compensation variables						
COMP	1557	3,563,516	2,381,000	3,548,834	97,000	24,692,000
LNCOMP	1557	14.744	14.683	0.8117	11.482	17.022
PBONUS	1557	0.126	0	0.173	0	1
CEOHASOPTIONS	1601	0.443	0	0.497	0	1
Firm performance variables						
ROA	1597	0.038	0.0998	0.357	-7.314	0.697
TOBINSQ	1597	1.640	1.141	1.829	0.0939	27.651
Firm size variables						
SALES	1580	9,409,159	1,097,584	26,605,996	335	285,404,900
LNSALES	1580	13.921	13.909	2.167	5.814	19.469
Firm growth opportunity variable						
CAPEX	1580	0.104	0.0230	0.622	0	17.886
Risk variables						
LEV	1583	0.365	0.189	0.666	0	16.869
Management characteristics variables						
AGE	1559	48.902	49	6.902	29	81
TENURE	1433	5.913	3	6.993	0	39
FAMCEO	1601	0.141	0	0.348	0	1
FAMCHAIR	1601	0.230	0	0.421	0	1
Ownership/governance variables						
PCEOOWN	1598	0.0365	0.00120	0.101	0	0.709
FAMILY	1601	0.658	1	0.475	0	1
PYRAMID1	1601	0.0500	0	0.218	0	1
PYRAMID2	1601	0.166	0	0.372	0	1
PYRAMID3	1601	0.0181	0	0.133	0	1
FAMPYR1	1601	0.0425	0	0.202	0	1
FAMPYR2	1601	0.1243	0	0.330	0	1
FAMPYR3	1601	0.0125	0	0.111	0	1
FAMCEOPYR1	1601	0.0194	0	0.138	0	1
FAMCEOPYR2	1601	0	0	0	0	0
FAMCEOPYR3	1601	0	0	0	0	0
FAMCHAIRPYR1	1601	0.0244	0	0.154	0	1
FAMCHAIRPYR2	1601	0.0487	0	0.215	0	1
FAMCHAIRPYR3	1601	0	0	0	0	0
NEWCEO	1601	0.1568	0	0.364	0	1

COMP is the annual total compensation in SEK (fixed salary plus cash bonus), LNCOMP the natural logarithm of the measure, PBONUS is the percentage of the total salary that is given as bonus, CEOHASOPTIONS is a dummy for whether the CEO own options in the company, ROA is the return on assets measured by EBITDA over Total Assets, TOBINSQ is Tobin's q defined as market value of equity + book value of total debt over book value of total assets, SALES is the total sales during the fiscal year in SEK, LNSALES the natural logarithm of this measure, CAPEX is the total capital expenditures over total sales, LEV is the leverage measured by the book value of total debt over book value of total assets minus book value of total debt, AGE is the age of the CEO during the fiscal year defined as the current year minus the year of birth of the CEO, TENURE is the tenure of the CEO during the fiscal year measured by the current year minus the year the CEO started at the company, FAMCEO is a dummy for whether the CEO is a part of the controlling family, FAMCHAIR is a dummy for whether the chairman of the board is a member of the controlling family, PCEOOWN is the fraction of the total number of shares that the CEO owns, FAMILY is a dummy for whether the company is controlled by a family, PYRAMID1, PYRAMID2, PYRAMID3 are dummies for whether the company is at a pyramid level 1,2 or 3 respectively, FAMPYR1, FAMPYR2 and FAMPYR3 are dummies for whether the company is family controlled and at pyramidal level 1, 2 or 3 respectively. FAMCEOPYR1, FAMCEOPYR2 and FAMCEOPYR3 are dummies for whether the company is at pyramidal levels 1, 2 or 3 respectively and has a CEO from the controlling family. FAMCHAIR1, FAMCHAIR2 and FAMCHAIR3 are dummies for whether the company is at pyramidal level 1, 2 or 3 respectively and the chairman of the board is from the controlling family. NEWCEO is a dummy for whether the CEO is new compared to the previous year.

deviation is more than 60 % showing that there is a huge difference in capital spending among the companies in the dataset. The same applies to the leverage, with a mean of about 40 %, median of about 20 % but standard deviation almost 70 %.

Not surprisingly is the CEO age much more evenly distributed, due to the limits to human working age. The mean and median value of CEO age is about 49 years with a standard deviation of only 6.9 years. The youngest CEO was only 29 years and the oldest 81. The same applies to the tenure where the mean is about 6 years, the median 3 and the standard deviation about 7. The CEO with the longest tenure has been around for 39 years. We can also see that 14 % of the companies have a CEO that is a member of the controlling family. Combining this with the fact that only 65.8 % of the companies are controlled by a family, we understand that 21.4 % of the family controlled companies employ a CEO from within the family. When it comes to the chairman of the board, 23 % of the companies employ this position from the controlling family. Repeating the fact that only 65.8 % of the companies are family controlled, we understand that 35 % of the family controlled firms choose a chairman of the board from within the family. The mean value of the CEO stock ownership is 3.6 % but the median value much lower, i.e. 0.1 %. This tells us that most CEOs are not large owners of the company they work for but that there are some CEOs with substantial ownership and stake in their company which may lead to either alignment of interest with minority shareholders or entrenchment. The reported mean value of 65.8 % family ownership compares well to value reported by La Porta et al. (1999) who have found that 60 % of the Swedish companies are family controlled. We can see that about 44 % of the CEOs have options in the company which may work as an alternative to high salary or bonus.

Concerning the pyramid structures we see that 5 % of the companies are classified as level 1 companies, 17 % as level 2 companies and 1.8 % as level 3 companies. The total fraction adds up to 23.8 % which is a bit lower than the 50 % reported for Sweden by La Porta et al. (1999), but a bit higher than the 15.9 % reported by Faccio and Lang (2002). The observed difference may be due to differences in the datasets and/or differences in the definitions of pyramidal control. The combination of pyramid structure and family ownership shows that 4.3 % of the companies are level 1 companies controlled by a family, 12.4 % are level 2 companies controlled by a family and 1.3 % are level 3 companies controlled by a family. Since only 5 %, 17 % and 1.8 % of the companies are level 1, level 2 and level 3 companies respectively, this means that 86 % of the level 1 companies are family controlled, 75 % of the level 2 companies are family controlled, and 69 % of the level 3 companies are family controlled. We can hence note that the occurrence of family control becomes less common as move down the pyramid levels. The probability of a level 2 or a level 3 pyramidal firm being family controlled is about the same as the sample average, while it is more common that level 1 pyramidal firms are family controlled than the sample average.

Looking at the pyramid structure and family management, we see that 1.9 % of the firms are pyramidal 1 firms with a CEO related to the controlling family. Since 4.3 % of the firms are family controlled level 1 pyramidal firms, this means that 46 % of the family controlled level 1 pyramidal firms have employed a CEO that is related to the controlling family. This value is much higher than for family firms in general where the corresponding value is 21.4 %. It seems as if the controlling families want a relative to control the level 1 firms. On the other hand, not a single family CEO is identified for family controlled level 2 and level 3 pyramidal firms. The reason for this is not clear, but indicates that the controlling families want someone from the outside to control the lower level pyramidal firms. Not one single observation of a family member being the chairman of the board is seen for pyramidal level 3 firms, while 2.4 % and 4.9 % of the observations have family members at level 1 and level 2 pyramidal firms respectively. Since 4.3 % and 12.4 % of the observations are family controlled level 1 and level 2 pyramidal firms respectively, this means that 57.4 % and 39.2 % of the family controlled level 1 and level 2 firms have a chairman of the board that is related to the controlling family respectively. These values are higher than for family firms in general where the corresponding value is 35 %.

The differences in mean values of the compensation and management and firm characteristics variables in different subsets can be seen in Table 4, where observations missing some information have been removed, resulting in a total of 1373 observations. In some of the regression models later used, delta

values of for example market value of equity used according to $DELTA\_MVE_t = MVE_t - MVE_{t-1}$, which obviously requires information about the value from previous years. When removing observations where this is missing, 1169 observations remain.

Table 5 shows descriptive statistics about the variables within different subsets of the data and differences in means between them. When the t-statistics of mean differences were calculated I assumed that the sample sets were independent and the variance where about the same in the two sets. The t-statistics can hence be calculated as in equation (4.2), with the sample standard deviation s_{a-b} according to equation (4.3) where $\overline{X_a}$ and $\overline{X_b}$ are the sample means, n_a and n_b the sample sizes and s_a^2 and s_b^2 the sample variances. The null hypothesis was that $H_0: \mu_a = \mu_b$ and alternative hypothesis $H_1: \mu_a \neq \mu_b$, resulting in a two sided test. The degrees of freedom for the t-statistics are $n_a + n_b - 2$ (Rice, 2007).

$$t_{a-b} = \frac{\overline{X_a} - \overline{X_b}}{s_{a-b} \cdot \sqrt{\frac{1}{n_a} + \frac{1}{n_b}}} \tag{4.2}$$

$$s_{a-b}^2 = \frac{(n_a - 1) \cdot s_a^2 + (n_b - 1) \cdot s_b^2}{n_a + n_b - 2} \tag{4.3}$$

As can be seen in Table 4 there are some statistically significant differences between the means of the studied variables in different subsets of the data. First of all we see that when we compare pyramidal firms on any pyramid level to non-pyramidal firms, the differences in compensation, Tobin's q and sales are statistically significant at 1 % significance level. The difference in the percent of compensation given as bonus is statistically significant at 5 % significance level. The differences show that among firms in a pyramidal structure, the firms are larger measured by annual sales, the CEOs have higher salaries and higher proportion of the salary is given as bonus but that Tobin's q is lower on average. From this we understand that the average pyramidal firm is larger than non-pyramidal firms, but perform worse (lower Q) and pay their CEOs better and use bonuses more extensively. From the management ownership and family influence variables, we see that CEOs in pyramidal firms own a smaller percentage of the firm shares compared to CEOs at non-pyramidal firm. We can also see that for pyramidal firms, it is less common that the CEO is related to the controlling family, but more common that the chairman of the board is compared to non-pyramidal firms. These differences are all statistically significant at 1 % level of significance.

Table 4
Descriptive data and tests for difference in means.

	a. Non-pyramid		b. Pyramid		c. Pyramid 1		d. Pyramid 2		e. Pyramid 3					
Variable	n = 1057		n = 316		n = 67		n = 224		n = 25		b - a	c - a	d - a	e - a
	Mean	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**t**	**t**	**t**	**t**
LNCOMP	14.664	0.718	15.122	0.980	14.691	1.143	15.328	0.874	14.428	0.712	7.922***	0.190	10.56***	-1.452
PBONUS	0.127	0.172	0.152	0.177	0.139	0.205	0.162	0.171	0.098	0.131	2.211**	0.444	2.655***	-0.870
ROA	0.047	0.257	0.065	0.403	0.075	0.133	0.064	0.465	0.057	0.260	0.808	1.096	0.542	0.167
TOBINSQ	1.756	1.980	1.233	0.728	1.064	0.415	1.168	0.623	2.263	1.284	-6.32***	-4.16***	-6.15***	1.433
LNSALES	13.605	2.030	15.263	2.168	14.399	1.733	15.707	2.183	13.596	1.525	12.18***	3.099***	12.94***	-0.024
CAPEX	0.093	0.362	0.076	0.311	0.073	0.288	0.079	0.334	0.051	0.060	-0.811	-0.443	-0.524	-0.840
LEV	0.378	0.762	0.345	0.404	0.370	0.529	0.355	0.372	0.191	0.259	-0.942	-0.098	-0.577	-1.682*
AGE	48.902	6.781	48.421	6.717	46.522	7.374	49.536	6.368	43.520	4.389	-1.113	-2.379**	1.279	-4.44***
TENURE	6.178	6.916	5.658	7.536	6.776	7.716	5.589	7.716	3.280	4.373	-1.105	0.576	-1.036	-2.370**
PCEOOWN	0.041	0.106	0.019	0.078	0.078	0.156	0.002	0.007	0.009	0.020	-3.96***	1.886*	-8.34***	-2.221**
FAMCEO	0.161	0.368	0.073	0.260	0.343	0.478	0.000	0.000	0.000	0.000	-4.57***	2.949***	-9.92***	-3.31***
FAMCHAIR	0.209	0.407	0.310	0.463	0.478	0.503	0.295	0.457	0.000	0.000	3.540***	4.076***	2.549**	-3.89***
NEWCEO	0.145	0.352	0.165	0.371	0.060	0.239	0.170	0.376	0.400	0.500	0.846	-3.51***	-1.339	1.779*

Firms in category a are not part of a pyramidal structure, while the firms in category b are either on level 1, 2 or 3 in a pyramidal structure. The firms in categories c, d and e are on pyramidal levels 1, 2 and 3 respectively. For the tests confidence levels of 1 %(***), 5 %(**) and 10 %(*) have been used. The null hypothesis is $\mu_a = \mu_b$, the alternative hypothesis $\mu_a \neq \mu_b$ and the degrees of freedom $n_a + n_b - 2$. Definitions of variables can be seen in Table 3.

Table 5
Descriptive data and tests for difference in means.

	f. Non-family		g. Family		h. PyrNon-Fam		i. FamNon-Pyr		k. PyrFam				
Variable	n = 461		n = 912		n = 74		N = 670		n = 242		g – f	k - h	k-i
	Mean	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**Mean**	**Std. Dev**	**T**	**t**	**t**
LNCOMP	14.991	0.751	14.658	0.815	15.360	0.724	14.516	0.664	15.049	1.037	-7.35***	-1.184	6.238***
PBONUS	0.163	0.196	0.117	0.159	0.129	0.157	0.103	0.147	0.159	0.182	-4.58***	0.619	3.566***
ROA	0.046	0.358	0.053	0.260	-0.001	0.804	0.042	0.294	0.086	0.119	0.424	0.655	2.426**
TOBINSQ	1.623	1.913	1.642	1.718	1.351	0.812	1.803	1.935	1.197	0.698	0.191	-0.756	-5.24***
LNSALES	14.357	2.376	13.800	2.044	16.223	2.347	13.377	1.881	14.969	2.026	-4.51***	-2.112**	8.742***
CAPEX	0.099	0.450	0.083	0.288	0.039	0.060	0.082	0.260	0.087	0.353	-0.774	0.586	0.141
LEV	0.368	0.482	0.372	0.782	0.318	0.345	0.378	0.877	0.353	0.421	0.077	0.322	-0.442
AGE	49.013	6.350	48.679	6.969	49.041	5.461	48.840	6.936	48.231	7.056	-0.864	-0.444	-0.943
TENURE	4.200	5.349	6.998	7.621	3.500	5.266	7.243	7.471	6.318	7.998	7.053***	1.411	-1.284
PCEOOWN	0.008	0.032	0.050	0.119	0.001	0.003	0.060	0.127	0.024	0.089	7.472***	1.177	-3.71***
FAMCEO			0.212	0.409			0.254	0.435	0.095	0.294			-4.96***
FAMCHAIR			0.350	0.477			0.330	0.471	0.405	0.492			1.683*
NEWCEO	0.176	0.381	0.136	0.343	0.189	0.394	0.128	0.335	0.157	0.365	-1.953*	-0.309	0.878

The controlling owner in the firms in category f is not a member of a family, while that is the case for the firms in category g. PF stands for Pyramid Family, i.e. the company is in a pyramid and controlled by a family, which is the case for firms in category j. Firms in category h are in a pyramid, but not controlled by a family. For the tests confidence levels of 1 %(***), 5 %(**) and 10 %(*) have been used. The null hypothesis is $\mu_a = \mu_b$, the alternative hypothesis $\mu_a \neq \mu_b$ and the degrees of freedom $n_a + n_b - 2$. Definitions of variables can be seen in Table 3.

Digging down into the pyramidal levels, there are actually some surprising results. We see that CEOs in level 1 pyramidal firms are indeed paid more than CEOs at non-pyramidal firms but the difference is statistically insignificant. The CEOs at level 3 pyramidal firms are actually paid less than CEOs at non-pyramidal firms but the difference is also here statistically insignificant. What seems to be the main contributor to the difference in CEO payment between pyramidal and non-pyramidal firms is the CEO compensation at pyramid level 2. Here, the difference is statistically significant at 1 % significance level. This is also the only level where the difference in mean use of bonuses is statistically significant at all. Judging from these results, the biggest differences in CEO payment amount and structure between pyramidal and non-pyramidal firms lie in the level 2 firms. This does seem a bit counterintuitive since Tobin's q is statistically significantly lower for level 2 firms compared to non-pyramidal firms. What drives this difference in CEO compensation might be that they are statistically significantly larger than non-pyramidal firms, which is also the case for level 1 pyramidal firms. Regarding management ownership family management, we see that in pyramid level 1 firms, it is more common that the CEO and the chairman of the board is related to the controlling family compared to non-pyramidal firms. The differences are statistically significant at 1 % level of significance. The CEOs in the pyramid level 1 companies also own a higher percentage of the total outstanding shared compared to CEOs in non-pyramidal firms, the difference is statistically significant at 10 % level of significance. Contrary to level 1 pyramidal firms, it is less common that the CEO is related to the controlling family for the level 2 and level 3 pyramidal firms compared to non-pyramidal firms, the difference statistically significant at 1 %. For level 2 companies it is still more common that the chairman of the board is related to the controlling family, while for level 3 firms it is actually less common compared to non-pyramidal firms. The differences are statistically significant at 5 % and 1 % respectively. When looking at the CEO turnover, we see that it is higher for pyramidal level 1 firms but lower for pyramidal 3 firms, compared to non-pyramidal firm, the differences are statistically significant at 1 % and 10 % respectively. The difference between pyramidal firms in general and pyramidal level 2 firms is not statistically significant compared to non-pyramidal firms. It seems as if the CEOs at level 1 pyramidal firms stay longer with the firm than CEOs at non-pyramidal firms and CEOs at level 3 pyramidal firms stay shorter. This is most likely related to the fact that CEOs at level 1 pyramidal firms are more likely to be related to the controlling family, while CEOs at level 3 pyramidal firms are less likely to be, compared to non-pyramidal firms.

Another interesting observation is that the average age of the CEOs in pyramid level 1 and 3 firms is lower and the difference statistically significant at 5 % and 1 % significance levels respectively. It could be that level 3 firms are on average younger firms than other firms and the CEOs therefore are younger

and have less tenure on average. For the level 1 firms, there is no intuitive reasonable explanation since the tenure of the CEOs at this level is not lower than for other firms and the firms are intuitively not younger.

When I compare family to non-family controlled firms in Table 5 there are some statistically significant differences between these. First of all we see that both the compensation amount and percentage of salary paid as bonus is lower for family controlled firms, both differences statistically significant at 1 % significance level. This may be explained by the fact that family controlled firms hire CEOs from within the family to a large extent (20 % of the CEOs are in fact hired from within the family), thereby reducing the need for an incentivizing salary to the CEO. This is probably also the reason why the percentage of the total shares owned by the CEO is higher for family controlled firms compared to non-family controlled firms, the difference being statistically significant at 1 %. Another statistically significant difference is that the family controlled firms are on average smaller than non-family controlled firms and that the CEO tenure is longer. The tenure difference might arise if CEOs from the controlling family more commonly stay and work with the one family firm during their career, thereby increasing their tenure within that company. The reason family controlled firms on average are smaller than non-family controlled firms is not clear and needs to be further investigated.

Comparing family controlled pyramidal firms with non-family controlled pyramidal firms, we see that there are not many variables that are statistically significant different. Only the difference in sales is statistically significant at 5 % level of significance, telling us that the family controlled pyramidal firms are on average smaller than the non-family controlled pyramidal firms. Apparently, by looking at the averages of pyramidal firms, there is no real difference between the family controlled and non-family controlled. The FAMCEO and FAMCHAIR variables can from natural causes not be compared within these subsets since non-family firms cannot appoint family members. The CEO turnover does seem to be lower at family controlled firms compared to non-family controlled firms, though the difference is only statistically significant at 10 %. Since family firms do hire CEOs from the family to some extent, there is reason to believe that the CEO turnover should be lower for the family firms, in case the family related CEOs stay longer at the family firm than a non-related CEO would.

The two variables where no statistically significant differences in means were identified were capital expenditures and leverage[13], implying that we cannot reject the null hypothesis that firms within different subsets spend the same on capital investments or take on the same financial risk.

The Wilcoxon rank sum test for equal medians has also been conducted with very few qualitative differences, i.e. the differences that are statistically significant in the t-tests comparing means are typically also statistically different in the Wilcoxon rank sum tests comparing medians. The results of these tests can be found in the appendix A in Table 8.

4.7 Models

I will be studying the CEO compensation level and structure using three different models. The first will test parameters including firm characteristics and performance and CEO characteristics, excluding ownership and pyramidal structure variables. This model, called model 1 is described by (4.4) below.

$$LNCOMP_{i,t} = \alpha + \beta_0 \cdot TOBINSQ_{i,t} + \beta_1 \cdot ROA_{i,t} + \beta_2 \cdot LNSALES_{i,t} + \\ + \beta_3 \cdot CAPEX_{i,t} + \beta_4 \cdot LEV_{i,t} + \beta_5 \cdot AGE_{i,t} + \beta_6 \cdot TENURE_{i,t} + \epsilon_{i,t} \quad (4.4)$$

The subscript i, t at the variables stand for the observation of firm i at year t. The second model, called model 2, is used to study how management, family ownership and pyramid structure and their combinations affect executive compensation. Variables describing these effects are therefore added to model 1 resulting in the model described by (4.5) below.

$$LNCOMP_{i,t} = \alpha + \beta_0 \cdot TOBINSQ_{i,t} + \beta_1 \cdot ROA_{i,t} + \beta_2 \cdot LNSALES_{i,t} + \beta_3 \cdot CAPEX_{i,t} + \\ + \beta_4 \cdot LEV_{i,t} + \beta_5 \cdot AGE_{i,t} + \beta_6 \cdot TENURE_{i,t} + \beta_7 \cdot PCEOOWN_{i,t} + \beta_8 \cdot FAMILY_{i,t} + \\ + \beta_{10} \cdot FAMCEO_{i,t} + \beta_{10} \cdot FAMCHAIR_{i,t} + \beta_{11} \cdot PYRAMID1_{i,t} + \beta_{12} \cdot PYRAMID2_{i,t} + \\ + \beta_{13} \cdot PYRAMID3_{i,t} + \beta_{14} \cdot FAMPYR1_{i,t} + \beta_{15} \cdot FAMPYR2_{i,t} + \beta_{16} \cdot FAMPYR3_{i,t} + \\ + \beta_{17} \cdot FAMCHAIRPYR1_{i,t} + \beta_{18} \cdot FAMCHAIRPYR2_{i,t} + \beta_{19} \cdot FAMCEOPYR1 + \\ + \beta_{20} \cdot CEOHASOPTIONS_{i,t} + \epsilon_{i,t} \quad (4.5)$$

The third model will be used to study how the management, family ownership and pyramid structure affect the structure of the executive compensation, i.e. if these variables have any effect on the

[13] Level 3 pyramidal firms have lower leverage than non-pyramidal firms, but statistically significant only at 10 %. Due to the small sample size and low level of significance this observation is not reflected upon.

sensitivity in pay for performance to the CEO. This will be studied using model 3, described by (4.6), where the variables of the form PYR*n*ROA are the dummy variables for pyramid level *n* multiplied with the ROA variables and variables on the form FAMPYR*n*ROA are these variables multiplied with the FAMILY dummy variable.

$$
\begin{aligned}
LNCOMP_{i,t} = \ & \alpha + \beta_0 \cdot ROA_{i,t} + \beta_1 \cdot FAMILY_{i,t} + \beta_2 \cdot PYRAMID1_{i,t} + \\
& + \beta_3 \cdot PYRAMID2_{i,t} + \beta_4 \cdot PYRAMID3_{i,t} + \beta_5 \cdot FAMILY\_ROA_{i,t} + \\
& + \beta_6 \cdot PYR1\_ROA_{i,t} + \ \beta_7 \cdot PYR2\_ROA_{i,t} + \beta_8 \cdot PYR3\_ROA_{i,t} + \\
& + \beta_9 \cdot FAMILY\_PYR1\_ROA_{i,t} + \ \beta_{10} \cdot FAMILY\_PYR2\_ROA + \\
& + \beta_{11} \cdot FAMILY\_PYR3\_ROA + \beta_{12} \cdot LNSALES_{i,t} + \ \beta_{13} \cdot AGE_{i,t} + \\
& + \beta_{14} \cdot TENURE_{i,t} + \beta_{14} \cdot CAPEX_{i,t} + \beta_{15} \cdot LEV_{i,t} + \\
& + \beta_{16} \cdot CEOHASOPTIONS_{i,t} + \epsilon_{i,t}
\end{aligned}
\tag{4.6}
$$

A forth model will be used to study the effect on bonus payments, and in this case the LNCOMP variable will be exchanged with the PBONUS variable as the dependent one in (4.6).

The coefficients in the models will be estimated using the Huber Sandwich estimator to control for incorrectly specified model and robust errors. A fixed effect estimator would be preferred but as Zhou (2001) has previously pointed out, there is too little variation in the ownership variables to find any statistically significant relationships. The used estimator will not take into account potential heterogeneity between for example performance and compensation, which could be done in a future extension of this study.

5. Results

The results from model 1 and model 2 can be seen in Table 6. By looking at the results of the most basic model for determinants of executive compensation (model 1), we see that the coefficients for lnsales and Tobin's q are positive and statistically significant at 1 %, indicating that large firm size and performance are positive related to the executive salary. ROA is negative and statistically significant at 5 % which means that increased return on assets is negatively related to CEO compensation. This finding is unexpected and the implications are further discussed in the following section. We can also see that the TENURE coefficient is negative and statistically significant at 10 %. This is also counterintuitive, indicating that tenure is negatively related to CEO compensation.

Furthermore, when we look at the more complex model 2, we see that also here are the coefficients for Tobin's q and LNSALES positive and significant at 1 %. The coefficients for PCEOOWN, FAMILY and PYRAMID3 are negative and statistically significant at 1 %. Adding to the results of the first model, we can therefore say that substantial stock ownership by the CEO is related to reduced compensation, which also family ownership and working at a firm at pyramidal level 3 is. ROA is still negative and statistically significant at 5 %, which also the coefficient for FAMCHAIRPYR1 is. The coefficients for FAMPYR2 and CEOHASOPTIONS are positive and statistically significant at 5 %. These results indicate that having a family related chairman at a pyramidal level 1 firm can be associated with a lower CEO compensation, while being a CEO at a family controlled pyramidal level 2 is positively related to the compensation. The correlation between the CEO owning options on the company stocks and CEO compensation is also positive indicating that having options schemes is also positive for the compensation in cash and bonuses or vice versa. We can also note that the coefficients for the LEV and FAMPYR1 variables are positive and statistically significant at 10 % indicating that increased leverage is positively related CEO compensation, as well as working for a family controlled pyramidal level 1 firm.

I have also run the regression in model 2 while controlling for Industry Classification Benchmark[14] dividing companies into 10 main categories. The dummy variables created from the different categories where all insignificant at 10 % and did not qualitatively change any of the results. The FAMPYR1 and FAMCHAIRPYR1 variables became significant at 5 % and 1 % respectively compared to 10 % and 5 % respectively before controlling for the classification, which were the only quantitative changes.

Since there were some extreme observations in the dataset, I removed the observations with the five largest and five smallest values in the COMP, ROA, TOBINSQ, SALES, CAPEX[15] and LEV[16] variables and reran the regressions with few qualitative changes in the results. Nothing changed in the results of model 1 while in model 2 the coefficient for CAPEX became positive and statistically significant at 5 % and the coefficient for the LEV variable became insignificant.

I also ran the regression with the PYRAMID2 and PYRAMID3 combined to a PYRAMID23 variable and as the FAMPYR2 and FAMPYR3 variables combined to a FAMPYR23 variable. In this case the coefficient for the PYRAMID23 variable was not significant and the FAMPYR23 variable had the same sign and significance as the FAMPYR2 variable in the results in Table 6 (positive at 5 %).

[14] http://www.icbenchmark.com/
[15] Only the observations with the five largest values removed.
[16] Only the observations with the five largest values removed.

Table 6
Results for model 1 and model 2 using Huber Sandwich estimator, describing natural logarithm of total compensation (LNCOMP).

Variable	Model 1	Model 2
Intercept	10.4942***	10.9429***
	(35.65)	(-43.43)
TOBINSQ	0.0861***	0.0833***
	(7.36)	(7.21)
ROA	-0.2224**	-0.1674**
	(-2.22)	(-2.1)
LNSALES	0.28***	0.2474***
	(15.68)	(14.24)
CAPEX	0.0598	0.0677
	(0.99)	(1.02)
LEV	0.0016	0.0392*
	(0.05)	(1.82)
AGE	0.0057	0.0069
	(1.04)	(1.54)
TENURE	-0.0089*	-0.0009
	(-1.88)	(-0.24)
PCEOOWN		-1.6067***
		(-4.58)
FAMILY		-0.1879***
		(-3.34)
FAMCEO		0.049
		(0.42)
FAMCHAIR		-0.0099
		(-0.16)
PYRAMID1		0.0967
		(0.83)
PYRAMID2		-0.1019
		(-0.89)
PYRAMID3		-0.4002***
		(-5.02)
FAMPYR1		0.5793*
		(1.84)
FAMPYR2		0.3517**
		(2.19)
FAMPYR3		0.1959*
		(1.68)
FAMCHAIRPYR1		-0.8136**
		(-2.18)
FAMCHAIRPYR2		-0.0534
		(-0.42)
FAMCEOPYR1		-0.522
		(-1.19)
CEOHASOPTIONS		0.102**
		(2.35)
Number of observations	1373	1373
R^2	0.509 (Adjusted)	0.582

Variables that are statistically significant are indicated at 1 % (***), 5 % (**) and 10 % (*), t-value within parenthesis below estimated coefficient value. Variable definitions can be seen in Table 3.

The results for model 3 and 4 can be seen in Table 7. Similar to the results in Table 6, we see that the coefficient in model 3 for the FAMILY and PYRAMID3 variables are negative, statistically significant at 1 %. The same similar results apply to the coefficients for the LNSALES and CEOHASOPTIONS variables which are positive, statistically significant at 1 %. What is added to the results is now the positive and, at 5 % statistically significant coefficient for the FAMILY_PYR2_ROA variable which tells us that increased return on assets has greater positive impact on CEO compensation at family controlled pyramidal level 2 firms ceteris paribus. We also see that the coefficient for the FAMILY_PYR1_ROA variable is negative and statistically significant at 1 % suggesting that a higher ROA for family controlled pyramidal level 1 firms does not result in as much increased CEO compensation as for other firms.

The same study has also been carried out using the percentage change in market value of equity from one year to the next instead of ROA, but no statistically significant results were found suggesting that change in market value of equity cannot be shown to be an important determinant for CEO compensation.

Looking at the results for model 4 we see that the coefficient for ROA is positive and statistically significant at 1 %, suggesting that a high ROA is related to a higher fraction of the total salary being paid out as bonus. We also see that PYR2_ROA is negative and statistically significant at 5 % suggesting that increased ROA at a pyramidal level 2 firm is not as strongly related to an increased fraction of the salary being paid out as bonus as for other firms, ceteris paribus. The opposite effect is seen for the coefficient for the FAMILY_PYR2_ROA variable which is positive and statistically significant at 1 %. This means that increased ROA is stronger related to a higher fraction of the salary being paid out as bonus. We can also see that the coefficient for the FAMILY_ROA variable is negative and statistically significant at 5 % which means that increased ROA at a family controlled firm is not as strongly related to higher bonus fractions as it is at other firms.

Also for this model was the same study performed using change in market value of equity instead of ROA with no interesting statistically significant results, suggesting that neither for the bonus fraction can the change in market value of equity be shown to be an important determining factor.

When the most extreme observations were removed in the same fashion as described for models 1 and 2, the significance of the coefficient of the PYRAMID3 variable in model 3 disappears, probably due to the very limited number of observations at this pyramidal level. Furthermore, all significance disappears for the ROA-coefficients (PYRn_ROA, FAMILY_PYRn_ROA) in model 4.

Table 7
Results for model 3 and model 4, describing natural logarithm of compensation and percentage of salary paid as bonus respectively using Huber Sandwich estimator.

Variable	Model 3 *LNCOMP*	Model 4 *PBONUS*
intercept	11.1807***	-0.08
	(34.76)	(-1.11)
ROA	-0.1554	0.2442***
	(-0.64)	(3.45)
FAMILY	-0.2038***	-0.0265*
	(-3.66)	(-1.82)
PYRAMID1	0.1061	0.0017
	(0.47)	(0.03)
PYRAMID2	0.046	-0.0157
	(0.59)	(-0.78)
PYRAMID3	-0.1964***	-0.0349
	(-2.65)	(-1.5)
FAMILY_ROA	-0.0319	-0.1715**
	(-0.12)	(-2.45)
PYR1_ROA	0.5059	-0.2221
	(1.25)	(-1.01)
PYR2_ROA	0.1348	-0.2176***
	(0.55)	(-3.06)
PYR3_ROA	-0.2901	-0.1316
	(-1.04)	(-1.34)
FAMILY_PYR1_ROA	-2.8386*	0.3252
	(-1.68)	(0.78)
FAMILY_PYR2_ROA	1.4554**	0.4716***
	(2.19)	(2.91)
FAMILY_PYR3_ROA	0.2495	0.0637
	(0.49)	(0.35)
LNSALES	0.2419***	0.0166***
	(12.83)	(4.61)
AGE	0.0059	0.00
	(1.08)	(-0.04)
TENURE	-0.0054	-0.002**
	(-1.22)	(-2.19)
CAPEX	0.0464	0.0183
	(0.76)	(0.94)
LEV	0.0004	-0.005
	(0.01)	(-0.65)
CEOHASOPTIONS	0.158***	0.0132
	(3.13)	(1.08)
Number of observations	1373	1373
R^2	0.517	0.124

Variables that are statistically significant are indicated at 1 % (***), 5 % (**) and 10 % (*), t-value within parenthesis below estimated coefficient value. Variable definitions can be seen in Table 3.

6. Discussion

The first thing that amazes me is that not one single family related CEO is found at level 2 or 3 pyramidal firms. There are quite many family related CEOs at level 1 pyramidal firms when put in relation to how many family controlled level 1 pyramidal firms that exist. I wonder if this is an anomaly that is observed due to a limited dataset or if this is actually the case. The fact that no family related CEO can be found at lower pyramidal levels might be because it would give bad reputation hiring a relative at such an important position, which would then cause the stock to be traded at a discount. Or it could simply be because there are not enough people in the family that are interested or enough skilled.

6.1 Model 1 and 2

The surprising result that tenure has a negative coefficient in model 1 may be due the correlation between family ownership and tenure. Since the family CEOs are paid less but the family variable is not included in model 1, tenure can be subject to omitted variable bias. It is in fact insignificant in the more complex models taking into account more variables, which supports this idea. The other counterintuitive fact with model 1 is that ROA has a negative coefficient, which could perhaps be explained by some of the positive effects of having a high ROA are already incorporated in the higher Tobin's q for example, so the ROA will seem insignificant or even negative. The fact that ROA has a negative coefficient is in fact quite troublesome since it is used in later models to measure the sensitivity in payment for performance. The only result that shows that ROA is positive and statistically significant is in the determination of bonus level.

Proceeding to model 2 I do find a result that support my first hypothesis, namely that CEOs at family controlled level 2 pyramidal firms are paid more. This effect does need to be compared against the family effect, which is negative but smaller. When I test the combined coefficient of family control and family control at pyramidal level 2, I receive insignificant results. Altogether, it seems as CEOs at family controlled pyramidal level 2 firms are paid more than at other family controlled firms, but this compensation premium does not offset the family compensation discount, meaning that I cannot say that they are paid more than CEO as non-family controlled firms. This result indicates that CEOs at family controlled level 2 pyramidal firms are able to get a higher salary perhaps because the governance by the controlling family is weaker at the lower level pyramidal firms than at other family controlled firms. This result hence supports an idea that family firms are good at monitoring the CEO and do not need to pay an incentivizing salary, but that this positive monitoring effect somewhat disappears when utilizing a pyramidal structure, i.e. they have difficulties monitoring the CEO in a pyramid structure. The net effect

is however insignificant, indicating that family controlled pyramidal firms are equally bad/good monitored as non-pyramidal, non-family controlled firms.

The reason that the CEOs at family controlled pyramidal level 2 firms enjoy a salary premium relative to CEOs at other family controlled firms might also be because the controlling family has a relatively lower cash flow right in the lower pyramidal firms, meaning that they don't have to pay for the overpaid CEO entirely from their own pocket (the rest is paid by minority shareholders), so they don't care. The latter explanation is in line with the results by King and Santor (2008) who find that underperformance among family firms occurs only in combination with dual-class shares, an alternative way of separating cash-flow and voting rights.

Reasons for the lower CEO salary effect of pyramidal 3 firms might be that these firms are smaller and/or on average less risky (and the effects are not fully being captured by the sales and leverage variables). It might also be a random effect caused by the small number of observations for pyramid level 3 firms.

An interesting result from model 2 is that the effect of having a family related chairman at a level 1 pyramidal is negatively related to the CEO salary. A reasonable explanation is that having the board run by a relative to the controlling family strengthens the governance to such a large extent that the CEO salary does not need to be as incentivizing. This relation is not seen for family related chairmen at pyramidal level 2 firms, which could potentially be needed after having observed the salary premium for CEOs at this type of firms.

I also find that the correlation between the CEO owning a large fraction of the outstanding shares in the company and the CEO compensation is negative. This result is intuitive since if the CEO already owns a substantial part of the company, there should not be the same need for an incentivizing salary. As Mehran (1995) finds, it is rather the structure of the compensation that is important for incentivizing CEOs and not the amount. On the other hand, if the CEO is also the controlling shareholder, the entrenchment effect may take overhand and make the CEO award himself/herself higher than deserved salary without the minority shareholder being able to intervene.

I also find that the dummy for if the CEO has options in the company is positively related to the CEO salary. Intuitively one may think of CEO option schemes as substitutes to high salaries or bonuses, but apparently they are complements. The fact that bonus schemes are associated with higher salary may

be because bonus schemes are associated with larger companies and larger companies are associated with higher salaries (not fully captured in the sales variable).

6.2 Model 3 and 4

In addition to the result found in model 2, I also find that the sensitivity in salary for CEOs at family controlled level 2 pyramidal to performance is higher compared to other CEOs. In addition to being paid more in general than CEOs at other firms, they are apparently also better rewarded for improvement as measured by ROA. Similarly, they are also therefore punished more for a decrease in performance. This increased sensitivity of executive compensation to ROA has to be compared against the decreased sensitivity in family controlled firms in general to find whether the two opposite relationships offset each other. Testing for the combined effect of family control sensitivity, family control at pyramidal level 2 sensitivity and pyramidal level 2 sensitivity to ROA shows that the CEO compensation at family controlled pyramidal level 2 firms is more sensitive to ROA than other family, non-family and non-pyramidal firms and statistically significant. The higher salary could then be justified with a riskier salary, since it is more dependent on performance than for other CEOs.

The case is the opposite for CEOs at level 1 family controlled pyramidal firms, whose salaries are not as sensitive to firm performance as other CEOs. This effect might be due to the fact that relatively more CEOs at family controlled level1 pyramidal firms are related to the owners or are themselves large owners, thereby decreasing the need for incentivizing salaries. That these results were robust even when extreme observations were removed indicates that the found effects are not spurious.

Some quite interesting results were also found in model 4 where bonuses where studied. The significance on pyramid and family controlled pyramid related variables however completely disappeared when the most extreme observations were removed. I hence consider these results to be highly sensitive to the data, and will not take these into account further.

7. Conclusion

I have found that the pyramidal structure in combination with family control is significantly related to CEO compensation. CEOs at family controlled firms are on average paid less than their counterparts at non-family controlled firms. If they are employed at level 2 pyramidal firms however, they are experiencing a salary premium over CEOs at family controlled firms but could not be found to do so over CEOs at non-family firms. This implies that the CEOs at this type of firms are either less governed by the

controlling family relative to other family firms or that due to their relatively low cash flow rights, the controlling owners do not care if the CEO is overpaid.

There is some indication that the positive compensation effect is also prevalent at family controlled level 1 pyramidal firms, but that this is reduced in case the chairman of the board is related to the controlling family. Having a relative running the board hence seems to regain some of the governance that is lost through the pyramid structure.

In addition to being paid more than at other family controlled firms, the CEO compensation at family controlled level 2 pyramidal firms is more sensitive to changes in firm performance, i.e. they are rewarded more for improving the company performance, but also punished more if the performance is worsened. This extra compensation sensitivity effect was also seen over non-family firms as well. The effect is the opposite at family controlled level 1 firms where the sensitivity is lower.

Any effect on the CEO compensation from merely being in a pyramidal structure has not been observed.

Previous studies have found that performance results of family controlled firms are sensitive to the classification of family ownership. For future studies, it would therefore be interesting to reclassify the family variable in a more detailed way and see if other effects for executive compensation can be found. It would also be of interest to see whether the relationship between the pyramidal structure, family control and CEO compensation differs between different types of firms.

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A. Wilcoxon rank sum test of equal medians

In addition to the t-tests performed for evaluating the differences between mean of variables in different subsets of the sample data, the Wilcoxon rank sum test of equal medians have been conducted. The results from the tests can be seen in Table 8 below.

Table 8
Probabilities of equal medians under the null hypothesis that the observations A and B come from samples with the same median using the Wilcoxon rank sum test.

	a	b	c	d	e	f	g
A	Non-pyramid n = 1057	Non-pyramid n = 1057	Non-pyramid n = 1057	Non-pyramid n = 1057	Non-family n = 461	PyrFam n = 242	PyrFam n = 242
B	Pyramid n = 316	Pyramid 1 n = 67	Pyramid 2 n = 224	Pyramid 3 n = 25	Family n = 912	PyrNon-Fam n = 74	FamNon-Pyr n = 670
LNCOMP	0.000**	0.260	0.000**	0.220	0.000**	**0.046****	0.000**
PBONUS	0.017**	0.735	0.001**	0.509	0.000**	0.381	0.000**
ROA	0.315	0.238	0.105	0.473	0.246	0.390	**0.859**
TOBINSQ	0.000**	0.000**	0.000**	**0.009****	0.941	0.325	0.000**
LNSALES	0.000**	0.000**	0.000**	0.822	0.000**	0.000**	0.000**
CAPEX	0.128	**0.002****	**0.003****	0.118	0.973	0.263	**0.031****
LEV	**0.005****	0.216	**0.001****	0.143	0.228	0.601	**0.002****
AGE	0.398	0.032**	**0.188**	0.000**	0.327	0.292	0.357
TENURE	0.114	0.223	0.065	0.019**	0.000**	**0.000****	0.055
PCEOOWN	0.000**	0.064	0.000**	0.036**	0.000**	**0.000****	0.000**
FAMCEO	0.000**	0.000**	0.000**	0.029**			0.000**
FAMCHAIR	0.000**	0.000**	0.005**	0.010**			**0.036****
NEWCEO	0.386	**0.052**	0.342	**0.000****	0.051	0.515	0.265

For values indicated with (**) we reject the null hypothesis at 5 % significance level. For values that are bold and highlighted the result differ from the one found in Table 4 or Table 5, i.e. there is a statistically significant difference at 5 % in mean using t-test but not in median using Wilcoxon rank sum test or vice versa. As we can see there are qualitatively few differences between the Wilcoxon rank sum test of medians and the t-test of means. Most differences arise in either CAPEX or LEV variables, which are not extensively discussed in the previous sections. Definitions of variables can be seen in Table 3.