

BI NORWEGIAN BUSINESS SCHOOL

Master Thesis

Ownership Dynamics

How ownership changes hands over time
and the determinants of these changes

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Abstract

This paper investigates the determinants of ownership structure and adjustments in ownership for Norwegian private firms. We find that firm characteristics such as size, riskiness, profitability, growth prospects, leverage and liquidity have a significant impact on concentration, but much of the variation in ownership structures is explained by an unobserved heterogeneity component. When investigating the drivers of adjustments we establish that previous ownership level together with the lagged changes in concentration, firm riskiness, profitability and share owned by families are significant predictors of a subsequent change in ownership concentration. To our knowledge, this paper is the first to take both a static and dynamic approach in the study of ownership concentration in private firms and it sets the ground for further research on ownership in private firms.

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1. Motivation

The debate around firm ownership in the corporate governance literature is almost one century old. By looking at the ownership structure of US firms, Berle and Means (1932) were the first to notice a trend of dispersed ownership. They then raised the hypothesis that ownership diffuseness adversely affects firm performance. Today, after Markowitz, the benefits of portfolio diversification have become well-known; thus it is puzzling that many firms still have concentrated ownership. What determines their owners to hold large stakes despite the undiversification costs they are bearing? And what makes them change their stakes in time?

The view on owners shifted from mere capital providers in the classical theory of the firm to important factors influencing the behavior of firms, in the governance theory paradigm. There is a wide variation in ownership patterns today and the focus in the literature on corporate ownership has been mainly on the relationship between ownership and performance. One direction of research is to examine the differences in performance for firms with various ownership structures. Conversely, an alternative direction is to assume that ownership is determined by the particularities of each firm and its contracting environment. According to this view, each firm will adjust its ownership in response to particular factors facing the firm, in order to reach an optimal ownership structure.

Following the latter view, our paper investigates the role of firm characteristics in explaining the variation in ownership structure. We explore how ownership structure adjusts to changes in firm-specific factors, in accordance with the value maximizing mechanisms of the firm.

Although private firms represent the largest fraction in the economy, most studies consider listed companies, which are more accessible in terms of the information available. We choose to focus exclusively on non-listed firms and explore whether the theory developed on public companies applies despite the particularities of private firms.

We use rich panel data on Norwegian firms, well suited for identifying patterns in the evolution of ownership concentration. Our study brings additional evidence

for the ownership endogeneity hypothesis. Observable firm characteristics along with unobserved differences between firms determine ownership concentration. We find that firm characteristics have a significant impact on concentration, but much of the variation in ownership structures is explained by an unobserved heterogeneity component. When investigating the drivers of adjustments we identify factors that are significant predictors of a subsequent change in ownership concentration.

To our knowledge, this study is among the first few that provide empirical grounds for the further development of a theory on ownership in private firms. This paper is structured as follows: section 2 provides a review of the existing literature on the topic, based on which we derive predictions in section 3; the data and descriptive statistics are presented in section 4; in section 5 we investigate the determinants of the level of and changes in ownership concentration; we conclude in section 6.

2. Literature review

The corporate governance model of the firm treats ownership as a governance mechanism, as opposed to the classical model in which the owner's main function was of providing capital. In the governance model owners are able to shape the firm's behavior and the way it creates shareholder value. When the manager is the sole owner, he or she appropriates the entire firm value. The existence of outside shareholders leads to an agency relationship between owners and managers, as first introduced by Jensen and Meckling (1976). The authors highlight the costs associated with such a relationship and present managerial ownership as one way of mitigating agency costs. They further develop a theory of the ownership structure of the firm from the agency perspective, approach which has later become central to the corporate ownership literature.

2.1. Berle and Means thesis

Berle and Means (1932) were the first who advanced the idea of a relationship between ownership and performance, noticing a trend of increased ownership diffuseness in the 1930s. A major implication of what was later referred to as the Berle and Means thesis is that there is an inverse relationship between ownership diffuseness and firm performance. The authors infer that the resulting separation

of ownership and control creates favorable conditions for the transfer of profits from the shareholders to the controlling groups, given that the two parties naturally have conflicting interests. On one hand, more concentrated ownership provides incentives for monitoring management and reduces the discretionary power of officers in allocating the firm's resources. On the other hand, controlling blockholders may channel resources away from the firm, in order to serve their own interests. However, it is not evident which effect dominates. The Berle and Means thesis is the starting point of a series of empirical studies on the relationship between ownership concentration and firm performance.

2.2. Exogenous ownership

Two directions of research followed the Berle and Means thesis. Building on their arguments, a series of papers have researched how dispersed ownership affects firm performance. Gugler (2001) collects a set of articles among those written over a period of 70 years on the topic. The findings are rather ambiguous, with most of the evidence supporting either a positive or no relationship from ownership concentration to firm performance. Findings of an inverse relationship are less common (Agrawal and Knoeber 1996; Bøhren and Ødegaard 2006). Morck et al. (1988) attribute the ambiguity of previous findings to the non-linearity of the true relationship between the two. Examining insider ownership, they find evidence of a non-monotonic relationship: positive up to a level of 5% and negative afterward.

A common finding in countries from Continental Europe is that beyond a certain level of ownership concentration, large owners expropriate minority shareholders and expropriation is more pronounced in countries with low shareholder protection (Gugler 2001). Both large shareholders and investor protection are key elements of a successful governance system (Shleifer and Vishny 1997). Ownership tends to be more concentrated in countries with a legal regime that provides low investor protection (La Porta et al. 1998). La Porta et al. find a systematic variation in the ownership patterns across four major legal regimes. Since the legal environment is exogenous to all firm-specific factors, the direction of causality must go from the legal origin to the ownership structure. Thus the authors provide evidence that ownership concentration is determined by factors outside the firm. Although they document ownership variation across legal regimes, their paper does not explain the variation within a regime.

2.3. Endogenous ownership

Demsetz (1983) was the first to advance the hypothesis of endogenous ownership structure. Optimal ownership concentration is due entirely to firm characteristics, more specifically to the firm's main activity, as reflected by its internal processes, its scale of operations and the inside owners' managing abilities. Demsetz concludes that "no single ownership structure is suitable for all situations if the value of the firm's assets is to be maximized" (p. 386).

In a later study, Demsetz and Lehn (1985) test empirically for the endogeneity of ownership on a sample of 511 US public firms. In the first set-up, they examine how ownership concentration responds to four factors: a. *firm size*, b. *control potential* – profit potential from exercising more effective control, c. *systematic regulation* – constraints imposed on the scope and impact of shareholder decisions and d. *amenity potential* – owners' potential for consumption of goods obtained through the firm's business. The determinants above explain at least 30% of the variation in ownership concentration, which is measured as the fraction held by the five largest owners. In the second set-up, they test the existence of a linear relationship between ownership diffuseness and the firm's accounting profit rate and find that the two are unrelated. The results are robust to alternative concentration measures.

Using a similar approach and a subsample of firms from the Demsetz and Lehn study (1985), Demsetz and Villalonga (2001) claim they find strong evidence of the endogeneity of ownership structure. With respect to the determinants of ownership concentration, the authors argue that market forces yield firm specific ownership structures. Variation across firms emerges because of differences in the circumstances facing each firm, more specifically economies of scale, regulation and the stability of the environment in which they function. In addition, they find that ownership has no effect on performance when using a simultaneous equations system, therefore including profitability as an explanatory variable for the variation in ownership structure would raise no concerns about a potential simultaneity bias. Findings from using a simultaneous equations approach are questioned by Bøhren and Ødegaard (2006). They analyze the interaction between a set of governance mechanisms and firm performance and find that the majority of the relationships which were significant in single equations disappear when using simultaneous equations. The authors suspect this happens more likely

because the theory is partial and underdeveloped and fails to impose proper restrictions on the simultaneous system, rather than because of the nature of the relationship between governance and performance itself.

A step further in developing the ownership endogeneity hypothesis is made by Cho (1998) who investigates the relationship between insider ownership, investments and corporate value. He finds evidence that investment affects corporate value, which in turn alters the ownership structure, but he finds no support for the reverse relationship. The author concludes that assuming the ownership structure to be exogenous can lead to biased estimates and misinterpreting the results. Subsequently, Himmelberg et al. (1999) examine the hypothesis that managerial ownership is linked to firm characteristics that affect contracts, and find that the proxies for what they call the *contracting environment* of the firm are strong predictors of managerial ownership structure. Several other studies on insider ownership support the ownership endogeneity hypothesis (Holderness, Kroszner, and Sheehan 1999; Loderer and Martin 1997).

Given that ownership is endogenous, a description of the mechanism which links firm characteristics with ownership concentration is found in a survey by Holderness (2003). He asserts that block ownership is attractive because it gives blockholders access to both shared and private benefits of control. As large owners have higher incentives to monitor actively and to advise management, shared benefits of control will stem from such a concentration of control. In contrast to shared benefits of control, only the blockholders can enjoy private benefits of control and the more profitable the firm is, the higher the private benefits that can be extracted. As the scale of both shared and private benefits is prone to vary with firm characteristics, ownership concentration should vary systematically in accordance with firm characteristics that are related to benefits of control (Demsetz and Lehn 1985).

2.4. Ownership dynamics

Himmelberg et al. (1999) suggest the study of a dynamic firm model regarding changes in the contracting environment which would further explain the relationship between ownership and performance. Such an approach is attempted by Zhou (2001) who examines the relation between managerial ownership and equity-based incentives. In a study of 619 US firms over 5 years, the author

documents the relatively low variation in a firm's managerial ownership across time compared to the significant variation in cross-sectional variation. The insight is that small changes in managerial ownership are unlikely to yield changes in managerial incentives and thus have an effect on firm performance. He implies that if there is any relationship, it would most likely be identifiable in cross-sectional analyses.

While Zhou (2001) studies contemporaneous changes, Fahlenbrach and Stulz (2009) confront the endogeneity problem by examining the impact of lagged changes in firm characteristics on changes in insider ownership. They use a set of firm-specific financial and non-financial measures as proxies for information asymmetry. They find evidence that the fraction held by managers is more likely to fall when the firm was performing well and its asset value was growing. However, when the firm stock was doing poorly managerial ownership is not more likely to increase and there is a weak relationship between past poor firm results and increases in the managers' stake. Similarly, they analyze the relationship between lagged ownership changes and changes in Tobin's Q as a proxy for performance. Their results show that an increase in managerial ownership is associated with a subsequent improved firm performance, but a decrease in managerial ownership does not appear to be followed by a decline in firm value.

In a study on US IPOs, Helwege et al. (2007) investigate the determinants of large decreases in managerial ownership. They identify stock market liquidity as a driver, along with firm-specific factors, such as good recent stock performance, high stock liquidity and high market valuation.

Urosevic (2001) addresses theoretically another dimension of public firms – the pressure on the stock price driven by information asymmetry. Because outside investors perceive the sale of shares by insiders as lack of commitment, the resulting decrease in the stock price leads to a “race to diversify” among insiders. This race translates into a dynamic stake adjustment towards the optimal allocation and its speed increases with the number of insiders. Thus both Helwege et al. (2007) and Urosevic (2001) provide more insight into how a mix of factors, both endogenous and exogenous to the public firm, drive adjustments in the ownership structure.

Dynamic stake adjustment is researched by Heiss and Köke (2004) on a sample of both private and public German firms. They conclude that firm characteristics together with the existing level of ownership concentration contribute to altering the ownership structure. Dewaelheyns and Van Hulle (2010) conduct one of the few studies that focus exclusively on private firms. They investigate the relationship between firm leverage and whether the firm belongs to a business group and find significant differences in the capital structure. In addition, affiliation to a business group leads to more frequent adjustment in the leverage level.

Public firms represent the focus in the existent literature on ownership and its relation to both firm-specific and external factors. In contrast, the theory regarding ownership in non-listed companies is underdeveloped and it is also unclear whether the mechanisms that apply to public firms are also valid for private ones.

2.5. Contribution

Following the direction initiated by Demsetz, we investigate the role of firm characteristics in explaining the variation in ownership. We examine the dependence between the levels of variables as well as the dynamics of ownership and how they relate to changes in the firms' features. We find that several firm characteristics are strong predictors of both levels and changes in ownership concentration. To our knowledge, this paper is one of the first to take both a static and dynamic approach in the study of ownership concentration. In addition, it represents a building block for empirical research on private firms.

The quality and size of our data set are unique. We use a sample of private firms that is representative for the entire industrial sector of the Norwegian economy. The database contains rich panel data on all the main firm characteristics. By analyzing the patterns of ownership in private firms, we provide an original insight into the drivers of private shareholdings adjustment.

3. Empirical predictions

The drivers of ownership are both observed (for instance, financial performance) and unobserved (such as intangible assets or managerial ability). As follows from the existing literature, they are related to either the firm's environment or

macroeconomic factors.

The underlying assumption in our analysis is that ownership is endogenous. We focus exclusively on the factors relating to the firm and control for observable external drivers. To our knowledge, such factors have been identified to be regulation (La Porta et al. 1998) and stock liquidity together with market valuation (Helwege, Pirinsky, and Stulz 2007). The effects of capital market valuation and stock liquidity are negligible as we study private firms. As far as regulation is concerned, Demsetz and Lehn (1985) expect greater diffuseness in more strictly regulated industries because regulation restricts the potential for discretionary managerial behavior and provides to some extent cost-free management monitoring. For our analysis, we control for the effect of regulation by excluding firms in heavily regulated industries, such as financial and utilities, so that the firms in our sample become more homogenous from a regulatory point of view.

Demsetz and Lehn (1985) identify *firm size* as an important determinant of ownership structure. As firm size increases, the price of a given ownership fraction increases and therefore shareholders need to commit more capital to maintain their existing stake. In itself, this effect implies a more diffuse ownership. In addition, shareholders are risk averse and maximize their own utility based on the return they are getting and the risk they are bearing. By tying up more of their wealth into the firm, they would bear an undiversification risk for which they are not compensated. However, if a group of owners chooses to concentrate and monitor management, the value added would be captured by all stockholders (including passive ones), unlike the undiversification risk which affects owners individually. We expect the net cost of concentration to be higher for owners of larger firms and thus, we predict an inverse relationship between firm size and concentration.

As far as the development stage of the firm is concerned, Fahlenbrach and Stulz (2009) point out that particularly young firms are characterized by high *growth opportunities* and that in such firms ownership is more likely to be concentrated in the hands of owner-managers. As the firm matures and it becomes larger, we expect owners to diminish their stakes.

Selling shares in private firms requires a demand for such shares, which can be

influenced by *firm performance*. Empirical findings (for instance Demsetz and Villalonga (2001)) usually show an inverse relationship from performance to concentration. When the firm exhibits good financial results, owners relinquish more control and have better opportunities to cash out, leading to a decrease in concentration. In addition, in a study on financial contracting, Aghion and Bolton (1992) argue that it is optimal for financiers to retain more control in the bad state, leading to more concentrated ownership. Similarly, it is optimal for shareholders to have tighter control in firms with a higher *risk* profile. Demsetz and Lehn (1985) define it as the owner's control potential, meaning the profit achievable through closer management monitoring. More stable environments imply easier monitoring, which in turn disciplines management. A more concentrated structure would bring no additional value to the owners. As the environment becomes more risky, tighter control brings greater payoff to the shareholders through higher concentration.

Cost-free monitoring can be obtained from increased firm *leverage*, as governance theory advocates. Banks are potentially active monitors given their interest in securing repayment as well as their control rights resulting from lending contracts. However, for private firms there is higher information asymmetry between owners and insiders on one hand and creditors on the other hand, which leads to more credit rationing for private firms. Firm growth will be financed through equity if the firm has little access to debt financing. In this case, the largest owner either commits more capital, thus keeping his or her stake or dilutes it as a result of outside investors providing capital. It is not clear which of the effects dominates.

Firm *liquidity* is also a feature that has an impact on concentration through the opportunities it creates for extracting private benefits. We expect to find a positive association with concentration because owners would be less likely to give away control in firms with a large amount of cash on the table.

Another driver of ownership concentration is what Demsetz and Lehn (1985) call the *amenity potential* of a firm's output. They define it as the capability of owners to impose their personal preferences and influence managers' decisions with regard to the goods produced by the firm. Media and sports firms are examples of firms in which increased owner control allows for expressing the owner's

particular taste. This type of potential is expected to give rise to more concentrated ownership than what would be predicted only by size and control potential.

The testable implications above are derived from the theory and empirics on listed firms. In the following, we relate to them as the building block in analyzing private firms' behavior.

4. Data and descriptive statistics

We test our predictions by examining the relationship between ownership structure and firm characteristics in two set-ups based on the assumption that ownership structure is endogenous. In the first set-up we investigate how a given set of firm characteristics relates to the ownership structure of the firm. In the second set-up we look at changes in firm specific factors and the resulting probability of a change in the ownership structure.

4.1. Data

Our data consist of an unbalanced panel of firms made available by the Center for Corporate Governance Research (CCGR) at BI Norwegian Business School. The database contains accounting data, industry NACE codes (companies can be classified as having several NACE codes) and governance data on ownership. The data panel consists of Norwegian non-listed firms. The sample period spans from 2000 to 2009, excluding 2006, for which accurate data were not available.

In this paper we study ultimate ownership, a concept advocated by La Porta et al. (1999). As opposed to direct ownership, this method identifies the true owners of a firm, after accounting for the complexities of ownership structures, such as pyramids and cross-ownership. Ultimate ownership therefore provides a more accurate image of who owns the private firms in our sample. A weakness of using ultimate ownership is that the resulting share of the largest owner might exceed 100% due to errors in the summing of the control stakes. This is the case for 36 firms in our sample, which we exclude from our analysis.

As opposed to cross-sectional data, panel data have unique characteristics, which make it suitable for exploring issues such as persistence, change, growth and developmental processes. The disadvantages come from subject attrition and relatively short time span (Pedhazur and Schmelkin 1991).

4.2. Descriptive statistics

Table 1 gives an overview of the distribution of the annual ownership concentration across firms.

Table 1.
Ownership concentration (percentage held by the largest owner) by year

Year	No. of firms	Mean	Median	Percentiles						
				p5	p20	p25	p35	p60	p65	p75
2000	74 207	67.7	64.0	25.0	42.5	50.0	50.0	75.0	92.3	100.0
2001	64 980	66.7	64.0	25.0	40.0	50.0	50.0	70.0	90.0	100.0
2002	59 493	67.0	64.0	25.0	40.0	50.0	50.0	72.0	91.0	100.0
2003	77 134	66.9	64.0	25.0	40.0	49.3	50.0	74.4	91.0	100.0
2004	74 082	67.1	64.0	25.0	40.0	49.6	50.0	75.0	93.2	100.0
2005	83 759	68.3	65.0	25.0	41.3	50.0	50.0	83.0	100.0	100.0
2007	96 157	68.9	65.7	25.0	42.8	50.0	50.0	90.6	100.0	100.0
2008	96 809	69.2	66.0	25.0	42.7	50.0	50.0	95.0	100.0	100.0
2009	91 743	69.6	66.0	25.0	42.0	50.0	50.0	97.8	100.0	100.0
Overall	718 364	68.1	65.0	25.0	40.7	50.0	50.0	81.0	100.0	100.0

This table shows summary statistics for ownership concentration data by year. The panel is constructed by applying a set of filters in order to improve data integrity for the purpose of our paper. We impose a non-negativity condition on revenues, total assets and fixed assets and a non-zero condition on revenues and total assets. We exclude firms with no employees, firms for which we cannot establish the industrial sector in which they operate or for which we have missing values on any of the variables in the model. To control for outliers, all variables are winsorized at the 1 and 99% level, respectively. After filtering, the sample consists of 158 720 different firms resulting in 718 364 firm-year observations. The percentage held by the largest owner is recorded at the end of the calendar year. We report the annual mean and median values and percentiles 5, 20, 25, 35, 60, 65 and 75 for our sample. The overall values comprise all firm-year observations.

During the sample period the average ownership concentration constantly increased. The trend can be observed from both the rising values of the mean and median concentration, but also from the increase in the proportion of firms with higher ownership levels. This indicates that when modeling ownership one must control for annual variation in the variables.

The average firm in our sample has a high ownership concentration, of over 60%. More than a quarter of the firms have a sole owner. Given this distribution of ownership, we consider firms with low concentration as having less than 40% (20th percentile) and firms with high concentration as having above 80% (60th percentile).

As ownership is assumed endogenous to the firm, different levels of ownership concentration should be accompanied by differences in firm characteristics. In Table 2 we present a set of financial and ownership measures by ownership concentration and by change in ownership, respectively.

Table 2 provides preliminary evidence of the relationship between the specificities of ownership structure and firm characteristics in private firms.

Table 2.
Firm characteristics by concentration and change in ownership

Variable	Ownership concentration			Change in concentration			Difference (p-values)	
	Low (<p20)			No change	Negative change	Positive change	Negative vs. no change	Positive vs. no change
	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)	Mean (Median)
% Equity held by first largest	29.26 (32.00)	55.60 (50.50)	98.39 (100.00)	75.24 (91.70)	42.09 (39.90)	52.62 (50.00)	0.000 (0.000)	0.000 (0.000)
% Equity held by two largest	54.01 (56.31)	91.48 (100.00)	99.65 (100.00)	91.71 (100.00)	66.19 (66.66)	75.12 (79.05)	0.000 (0.000)	0.000 (0.000)
% Equity held by three largest	73.67 (75.00)	96.34 (100.00)	99.79 (100.00)	96.20 (100.00)	77.40 (84.26)	83.84 (93.90)	0.000 (0.000)	0.000 (0.000)
Herfindahl index	0.23 (0.25)	0.47 (0.50)	0.97 (1.00)	0.72 (0.85)	0.33 (0.31)	0.42 (0.39)	0.000 (0.000)	0.000 (0.000)
Size	15.64 (15.64)	15.23 (15.21)	15.16 (15.06)	15.24 (15.19)	15.94 (15.92)	15.86 (15.84)	0.000 (0.000)	0.000 (0.000)
Riskiness	0.23 (0.15)	0.23 (0.15)	0.24 (0.15)	0.23 (0.15)	0.27 (0.18)	0.26 (0.17)	0.000 (0.000)	0.000 (0.000)
ROA	2.28 (4.09)	6.27 (5.13)	4.49 (3.89)	6.45 (4.17)	2.13 (4.36)	2.53 (3.97)	0.000 (0.000)	0.000 (0.000)
Growth prospects	16.68 (3.76)	11.78 (2.62)	10.80 (1.84)	10.55 (2.19)	23.62 (5.79)	19.06 (4.08)	0.000 (0.000)	0.000 (0.000)
Leverage	0.27 (0.67)	0.33 (0.68)	0.26 (0.66)	0.24 (0.67)	0.31 (0.68)	0.32 (0.68)	0.000 (0.000)	0.000 (0.000)
Firm liquidity	1.78 (0.77)	1.30 (0.71)	1.51 (0.62)	1.27 (0.62)	1.80 (0.76)	1.40 (0.76)	0.000 (0.000)	0.000 (0.000)
% Equity held by first largest in media firms	27.73 (30.00)	56.15 (51.00)	97.78 (100.00)	72.87 (76.00)	38.75 (35.00)	49.36 (45.00)	0.000 (0.000)	0.000 (0.000)
% Media firms out of total	0.91%	1.36%	1.31%	2.40%	0.32%	0.32%	-	-
CEO ownership	27.29 (30.00)	51.37 (50.00)	96.19 (100.00)	72.00 (75.00)	37.70 (33.33)	45.43 (46.67)	0.000 (0.000)	0.000 (0.000)
% firms with CEO largest owner	30.31%	53.68%	55.77%	55.04%	24.44%	31.21%	-	-
D&O ownership	75.28 (79.00)	87.26 (100.00)	98.51 (100.00)	92.50 (100.00)	72.13 (76.00)	78.16 (90.00)	0.000 (0.000)	0.000 (0.000)
% Equity held by family	80.51 (93.99)	89.79 (100.00)	98.41 (100.00)	95.12 (100.00)	74.94 (85.83)	76.12 (92.91)	0.000 (0.000)	0.000 (0.000)
% Family firms out of total	19.11%	37.64%	34.73%	66.07%	6.67%	5.28%	-	-
% Firms with largest owner:								
Institutional	0.74%	1.13%	1.09%	1.94%	0.50%	0.25%	-	-
State	0.16%	0.17%	0.23%	0.41%	0.03%	0.03%	-	-
Person	9.90%	27.25%	28.91%	52.24%	2.59%	2.28%	-	-
International	0.14%	0.35%	2.39%	2.57%	0.08%	0.09%	-	-
Unspecified	7.40%	7.65%	6.38%	12.27%	3.21%	2.49%	-	-

The first 3 columns of this table report means and medians for the pooled firm-year observations grouped by ownership concentration into high, medium and low. We define the cutoff points for the three categories as percentiles 20 and 60, corresponding to a fraction owned by the largest owner of 40 and 80%, respectively. Columns 4 to 6 report means and medians across firm-year observations for which there has been no change, a negative or a positive change in ownership compared to the previous year. Columns 5 and 6 display the test for statistical differences between the means (standard t-test) and medians (Wilcoxon rank-sum test). The differences are reported between change (positive and negative, respectively) and no change. Ownership concentration is expressed as the percentage of equity held by the largest owner and the cumulative share of the first two and three largest owners, respectively. The Herfindahl index measures concentration on a scale from 0 to 1, where 1 represents the highest concentration. Firm characteristics are measured as follows: size – the natural log of sales; firm riskiness – the variation in sales over the previous three years; growth prospects – the geometric average of the annual sales growth rate over the previous three years; debt level – debt over assets and liquidity – the quick ratio. We also report the fraction owned by the largest owner in a media firm, the share owned by the firm's CEO and

the cumulative share owned by officers and directors together. A series of dummy variables are further displayed, isolating firms which belong to the media industry, are owned by a family or the largest owner belongs to a specific group, as listed in the table. Family ownership is defined as the cumulative ownership share of direct or ultimate owners, board member or CEO, where the family is defined by the CCCR as a group of persons related by blood and marriage (Berzins, Bøhren, and Rydland 2008). A firm is accounted as a family firm if more than 50% of the shares are held by a family and the grouping by owner type is based on mutually exclusive categories. A more detailed description of the variables is provided in Table 4. All variables are in real terms, adjusted for inflation in accordance with the Consumer Price Index published by Statistics Norway (*Statistics Norway. Standard Industrial Classification* 2011).

With respect to size, the smallest firms have the highest concentration and the average size is higher for firms which experienced at least one change. The larger the firms become, the more diffuse their ownership structure is.

More than 50% of firms with medium and highly concentrated ownership have the CEO as the largest owner and on average, the CEO stake is slightly lower than that of the largest owner. However, it seems that the second and/or third largest owners are usually directors. Such a setting makes the first agency problem less obvious than in public firms where managerial stock ownership is smaller and usually offered for incentive and interest alignment purposes. In addition, when the CEO holds the largest stake, fewer changes in the ownership structure occur. The tendency is even more pronounced for family firms or when the ultimate owner is a person.

The pattern for concentration changes entails special attention. Cases in which no change takes place refer to the firms having the highest concentration level. Firms with lower concentration tend to become even less concentrated, one possible explanation being the illiquidity of the market for private firm shares. Owners of highly concentrated firms are undiversified, possibly due to an inability to sell part of their stake. On the same note, growth prospects seem to enhance the demand for shares.

The relationship between performance measured as ROA and ownership concentration is not straightforward. The dependence appears hump-shaped, which is puzzling. One potential explanation might be the high variation in the variable and large extreme values (unreported standard deviation is lowest for medium concentration firms). However, there might as well be an economic explanation for the phenomenon, which we fail to provide. The mean debt ratio also follows a hump-shaped pattern, but in this case the median values are almost the same, indicating that lower debt levels are more frequent. Also, firms which do not experience a change seem to have the lowest leverage.

Contrary to our predictions, firm riskiness does not change significantly for

different ownership levels (steady around 25%), and ownership concentration for media firms is very similar to that of the average private firm.

We distinguish between four investor types: international, institutional, state, and individual owners (persons), as defined by Bøhren et al. (2009). Table 3 provides an overview of changes by owner type for our sample.

Table 3.
Number of changes between investor types

From\To	Person	State	International	Institutional	Total
Person	38 822	6	203	864	39 895
State	24	366	4	11	405
International	135	3	985	35	1 158
Institutional	148	10	55	2 021	2 234
Total	39 129	385	1 247	2 931	
Cases with a change					43 692
% out of total observations					6.082%

This table shows the number of changes in ownership by type of owner, for firm-year observations. It does not include firms for which we could not identify the type of the largest owner, resulting in 43 692 firm-year cases in which there has been a change. They represent 6.082% out of the total cases in which there has been a change. Columns 2 to 5 show the number of cases in which the largest owner changed to person, state, international, and institutional, respectively. Column 6 displays the total number of firms that changed the owner type, from person, state, international, and institutional, respectively.

Out of the total firm-year observations, more than 90% did not experience a change. When a change takes place, the largest owner usually remains a person (88.9% of the cases). Ownership will most likely be transferred to the same type of owner (96.6% cases). When it changes to another owner type, it is least likely that the state was or will become the largest owner. It is more common to have transactions between an individual owner on one side, and institutional or international owners, on the other side. Given that persons are the predominant type of owner in private firms, and shifts between owner types happen in only 3.4% (1485) of the cases, we will not further investigate this direction.

For our study, we choose to analyze the relationship between ownership changes by type of change (positive, negative, no change), as described in Table 2, given the significant differences in firm characteristics between the groups.

5. Methodological approach and results

In this section, we present a longitudinal analysis in two set-ups. The first set-up is a fixed effects regression model for variables measured as levels. The second one

shifts focus on changes in the variables and employs conditional fixed effects logit regression. The section ends with an assessment of the statistical and economic significance of the variables and robustness tests.

5.1. Variables and model specification

Table 4 contains summary definitions of the variables used in our analysis. A more detailed description of the underlying rationale for using these measures follows.

Table 4.
Definition and description of variables

Variable	Description
<i>Ownership concentration</i>	
Ownership Concentration	Percentage of equity held by the largest owner in the current year. We apply the logistic transformation: $\text{Log}(\frac{x}{100-x})$
Herfindahl index	Ownership concentration index calculated as the sum of square equity fractions in the firm.
CEO Ownership	Percentage of equity held by the CEO in the current year
D&O Ownership	Percentage of equity held by directors and CEO in the current year
Family Ownership	Percentage of equity held by family in the current year
<i>Size</i>	
Size (sales)	The natural log of annual operating revenue.
<i>Firm-specific risk</i>	
Firm risk	The previous 3 years standard deviation of sales scaled by the 3-year average sales level, according to the formula: $\frac{\left[\frac{1}{2}\sum_{i=1}^3(Sales_i - Avg_{3-\text{year}}(Sales))^2\right]^{1/2}}{ Avg_{3-\text{year}}(Sales) }$
<i>Profitability</i>	
ROA	Return on assets, as EBIT to total assets at the end of the year.
<i>Growth prospects</i>	
Growth prospects	Geometric average growth in sales over the previous 2 years.
<i>Leverage</i>	
Leverage	Year-end debt to assets ratio.
<i>Liquidity</i>	
Firm liquidity	Year-end quick ratio calculated as current assets less inventories to current liabilities.
<i>Amenity potential</i>	
Media	Dummy variable taking the value 1 if the firm belongs to the media industry and 0 otherwise.

We measure *ownership concentration* as the fraction owned by the largest owner because our sample displays high concentration, thus making the fraction held by the five largest owners (used by Demsetz et al. (1985; 2001)) an ineffective measure. Demsetz and Villalonga (2001) engage in a critique of the fraction owned by the largest owner when testing agency theory-based predictions. They argue that such a measure is inadequate if it proxies for managerial ownership as

well. There is high correlation (0.921) between ownership concentration and managerial ownership in our case, but our predictions, although derived from a theory on public firms, are not strongly rooted in agency theory. Therefore, their critique has limited reach for the purpose of our study.

Size is measured in the literature either as the natural logarithm of sales (Himmelberg, Hubbard, and Palia 1999), log of market value of common equity (Demsetz and Lehn 1985) or of book value of assets (Demsetz and Villalonga 2001; Fahlenbrach and Stulz 2009). We consider appropriate to use the natural logarithm of sales instead of assets, because the firms in our sample operate in diverse sectors, which can lead to significant differences in the value of assets (for instance, between a firm in the manufacturing industry and one in the services industry). Operating revenue captures the core business development and excludes the part of revenue that is not related to the firm's main activity. We also include a quadratic size term in order to account for the functional dependence.

As a proxy for the instability of the firm's environment we use the relative standard deviation of sales. Calculated over a three-year window, this measure of *firm riskiness* shows how volatile the yearly operating revenues of a firm are and controls for the size of those revenues.

ROA is our proxy for *firm performance* because it reflects the firm's operating performance and moreover, the value creation in the firm for both equity- and debt-holders. The drawback is that ROA is an accounting measure and it can be manipulated through accounting artifacts like earnings management. Given that we are studying private firms, we believe the pressure related to "making the numbers" is relatively small and thus we consider ROA as a suitable measure, reflecting the firm's true operating performance.

We define the *growth prospects* of a firm as its expected increase in annual sales. We assume that owners observe the past change in operating revenue and expect a similar evolution in the future. Therefore we use the past two-year average growth in sales as a proxy for future growth.

Leverage is measured as total debt over total assets. We use total debt because it reflects the financial burden of the firm.

As far as *liquidity* is concerned, the quick ratio measures the ability of a firm to pay its current liabilities from assets which can be easily converted into cash. For the purpose of our paper, the ratio measures the cash at hand existent in the firm.

To account for the *amenity potential* we use a dummy variable that takes a value of one if the firm belongs to the media industry and zero otherwise.

Industry dummy variables are created by classifying the firms in the sample into seven industry sectors (Agriculture, forestry, fishing, mining; Manufacturing, chemical products; Energy; Construction; Service; Trade; Transport) based on the Standard Industrial Classification codes (*Statistics Norway. Standard Industrial Classification* 2011). The industry classification is as defined by the CCCR (Berzins, Bøhren, and Rydland 2008) and a detailed description follows in Appendix 1.

5.2. Fixed effects linear estimation

The descriptive evidence in section 4.2 gives a first indication of the relationships between ownership concentration and its determinants. In this section we present an econometric model for explaining these associations and we further comment on the results.

According to our theoretical framework, the firm-related factors which determine ownership concentration are both observable and unobservable. We approximate the observable characteristics with the variables measured as described in the previous section. The unobservable factors are referred to as *unobservable firm heterogeneity*. Himmelberg (1999) provides a series of examples that illustrate this concept (p. 357-358). A longitudinal design enables us to control for the unobserved firm heterogeneity. Baltagi (2005) points out the main advantages and drawbacks of working with panel data. First, such data allow us to eliminate potential bias by controlling for individual heterogeneity. Second, panel data contain more information and variability and lead to less collinearity among the variables, more degrees of freedom and more efficiency. Third, a panel is more suited for investigating the dynamics of adjustments, as it allows for the identification and measurement of effects that are unobservable in cross-section or time-series alone. The disadvantage lies in a usually short time-series dimension, as in our case. In addition, there is a risk of cross-section dependence, which could affect inferences.

In general terms, a linear model of endogenous ownership can be written as:

$$y_{it} = \alpha + \beta \cdot X_{it-1} + u_{it},$$

where y_{it} is the concentration level for each firm i in year t , X_{it-1} is the set of explanatory variables and u_{it} stands for the error component. The explanatory variables in the model are lagged one year in order to control for potential endogeneity. We assume that owners do not take more than one year to respond to the observed behavior of a firm. In the form written above, the explanatory variables are observed firm characteristics. Not accounting for firm heterogeneity would result in a bias in the OLS estimator because the unobserved effects will be captured in the residuals:

$$u_{it} = \mu_i + v_{it},$$

where μ_i is a time invariant parameter specific to each firm and v_{it} stands for stochastic disturbances. Assuming that μ_i elements are fixed parameters, one can include a matrix of individual dummies, Z_{it} , in the regression and estimate each μ_i :

$$y_{it} = \alpha + \beta' \cdot X_{it-1} + \mu' \cdot Z_{it} + v_{it}$$

The above is called a fixed effects estimator. Baltagi (2005) notes that such a model is appropriate when we are interested in the behavior of a specific number of firms.

When working with panel data, two main econometric models are available – fixed effects and random effects. Our choice is motivated by the fundamental difference between the two models. A fixed effects model assumes that the subjects (in our case, firms) are fixed and they form the population we are interested to draw inferences upon. Keeping the subjects “fixed” means that we are not interested in the variation between, but the variation within them. Thus, the inferences we make apply to the specific sample we look at. By contrast, in the random effects model, the subjects are randomly drawn from the population, and we rely on the variance between them in order to say something about the entire population. Our sample includes almost all Norwegian private firms, thus the fixed effects model would provide an accurate description of the present relationships between variables. However, if the number and average characteristics of firms fluctuate significantly in the future, the inferences drawn from estimating the model may no longer be valid.

Moreover, a fixed effects model enables us to control for time-invariant variables that differ between firms and are correlated with the explanatory variables.

Random effects models control for such variables as well as for variables that vary over time but are constant across firms and are assumed uncorrelated with the regressors. The Hausman test (Appendix 2) rejects the null hypothesis of no correlation between individual effects and the regressors at the 0.1% significance level, which is in favor of the fixed effects model.

For the variables in our study, the model translates into the following simplified form:

$$\begin{aligned} Ownership_{it} = & \alpha + \beta_1 Size_{it-1} + \beta_2 Size_{it-1}^2 + \beta_3 FirmRisk_{it-1} + \beta_4 ROA_{it-1} \\ & + \beta_5 Growth_{it-1} + \beta_6 Debt_{it-1} + \beta_7 Liquidity_{it-1} \\ & + \beta_8 Amenity_{it-1} + \nu_{it} \end{aligned}$$

The model results presented in Table 5 indicate that agency theory is applicable to a lesser extent to the private firms in our sample.

First, the diversification reason appears to be a main driver of concentration. As expected, the larger and/or riskier the firm, the less concentrated ownership is. Contrary to Demsetz and Lehn's (1985) findings, owners appear to be more concerned about mitigating portfolio risk, rather than the potential profit achievable through closer management monitoring. This may be due, in fact, to the high insider ownership, which makes the first agency problem negligible in private firms. In addition, by comparing the first two columns, we see that variables size and firm risk no longer have statistical significance, possibly because they are correlated with the time component.

Second, the marginal effect of profitability is negative as expected, although surprisingly small. Contrary to our prediction, the growth prospects of a firm seem to have a negative impact on concentration. One reason may be that both characteristics are associated with better performance, which may facilitate access to external financing, thus making it likely for the existing owners to sell part of their shares to outside investors.

Third, the coefficient for leverage supports the access to financing prediction, thus firms that are able to leverage up can finance their growth in operations through debt rather than equity. Another explanation is that private firms may be part of a business group, thus having access to an internal capital market, which again allows owners to keep large stakes.

The only variable that is not statistically significant is the amenity potential

achievable in private media firms, perhaps because the largest and most influential media trusts in Norway are listed companies.

Table 5.
Fixed effects linear regression results for ownership concentration

	Ownership Concentration			
	Firm and year effects	Firm effects	Industry and year effects	Industry effects
Size	0.171***	0.061	-0.141***	-0.158***
Size-squared	-0.010***	-0.001	-0.006***	-0.006***
Firm risk	-0.059**	0.043	0.510***	0.607***
ROA	-0.000***	-0.001***	0.006***	0.005***
Growth	-0.000***	-0.002***	-0.003***	-0.003***
Debt	0.009***	-0.006**	0.055***	0.025***
Liquidity	0.011**	-0.011***	-0.081***	-0.118***
Amenity	0.014	-0.015	-0.529***	-0.542***
Year dummies	Yes	No	Yes	No
Industry dummies	No	No	Yes	Yes
Number of observations	559 625	559 625	559 625	559 625
Number of groups	130 554	130 554	7	7
Overall R-squared	0.710%	0.101%	1.510%	1.220%
Adjusted R-squared	-	-	1.510%	1.220%
Fraction explained by unobserved heterogeneity	81.765%	81.751%	-	-

This table displays coefficients of the fixed effects regression of ownership concentration level on lagged firm characteristics. Columns 1 and 2 show the results of firm fixed effects with and without year fixed effects, respectively. Columns 3 and 4 display the results of industry fixed effects with and without year fixed effects, respectively. Intercept terms are included for all regressions, but not reported. The *, **, *** indicate that the coefficients are statistically significant at the 10, 5 and 1% level, respectively. The number of observations represents the total firm-year cases in the sample. The number of groups refers to the number of firms for the first two columns and the number of mutually exclusive industry sectors for the last two columns. The overall R-squared shows the proportion of variance explained by the regressors. The adjusted R-squared takes into account the number of explanatory variables. The fraction explained by firm heterogeneity is the proportion of the total variance in resulting from the panel-level variance component. For the first two columns this variance component is not part of the overall R-squared as it is for the last two columns.

The low R-squared is due to the large fraction of the cross-sectional variation that is explained by unobserved firm heterogeneity. More than 80% of the variation in ownership concentration is driven by unobserved differences between firms. In the first and third columns we see that the coefficients for ROA, firm risk and

liquidity change signs. One possible explanation is that unobserved firm heterogeneity that is not controlled for in the industry effects set-up is correlated with observed firm characteristics which biases the coefficients in the industry effects regression.

Taken together, the results presented above show that observable firm characteristics influence ownership concentration. There are notable differences compared to results from previous studies on public firms, which casts considerable doubt on the asserted effects of agency theory implications for private firms.

5.3. Conditional fixed effects logistic estimation

In addition to examining the determinants of ownership concentration levels, in this paper we also investigate the drivers of adjustments in ownership concentration. Measuring changes provides additional insight into the way ownership concentration adjusts to the variation in the set of determinants.

The univariate results presented in Table 2 show that there are statistically significant differences between characteristics of firms which experienced a change in ownership structure and those which did not. Moreover, for one third of the firm-year observations in the sample, the largest owner has an equity share of 100%. As Woolridge (2001) notes, in such a case a non-linear model might be more appropriate. The dependent variable is defined as equal to 1 if there is a change in ownership concentration compared to the previous year and 0 otherwise. Each year, a firm can either maintain the same level of concentration or change it, thus we employ the following models: negative change, positive change and change (either positive or negative). The interest lies in the probability of a change occurring, conditional on changes in firm characteristics in the year prior to the change in ownership and on unobservable firm heterogeneity. Similar with the previous model for levels of concentration, the logistic regression model accounts for the unobserved firm heterogeneity through the fixed effects estimator. For our study, the model can be expressed as follows:

$$\begin{aligned}
P(Ownership_{change_{it}} = 1) &= \\
&= \Lambda(\alpha + \beta_1 Ownership_{conc_{it-1}} + \beta_2 \Delta Ownership_{conc_{it-1}} \\
&\quad + \beta_3 \Delta Size_{it-1} + \beta_4 \Delta FirmRisk_{it-1} + \beta_5 \Delta ROA_{it-1} \\
&\quad + \beta_6 \Delta Growth_{it-1} + \beta_7 \Delta Debt_{it-1} + \beta_8 \Delta Liquidity_{it-1} \\
&\quad + \beta_9 \Delta Amenity_{it-1} + \beta_{10} \Delta Family_{it-1} + \nu_{it}),
\end{aligned}$$

where $\Lambda(\bullet)$ is the logistic cumulative distribution function.

The dependent variable is calculated as change in current year (compared to the previous one ($t \rightarrow t - 1$)) and transformed in a dichotomous variable. The independent variables are calculated as lagged differences from $t - 2$ to $t - 1$.

Ownership concentration is a persistent variable, therefore both the previous level of concentration and any change it might have suffered in the past year may have an influence on the likelihood of a subsequent change in control. In addition, since many private firms in our sample are owned by families, we include a family ownership variable, measured as the difference in the fraction held relative to the previous year.

In Table 6 we report the estimation results. Changes in several firm characteristics are significant predictors of positive, negative and overall changes in ownership concentration. In addition, our model is consistent across the three categories of change in ownership.

High previous ownership concentration is likely to remain that way or decrease in the following year. However, changes in concentration, if they occur, will lead to more concentrated structures, tendency which can also be noticed in Table 1. In addition, there are more cases where the change is positive rather than negative. Firms that become larger are more likely to experience a decrease in concentration and less likely to have an increase.

When adopting a dynamic perspective, risk becomes an important driver of more concentrated structures, as advocated by Demsetz and Lehn (1985). The odds that a riskier firm will experience a change in ownership increase with 17.8% over those of a less risky firm, with each unit of risk. When also considering the results from our levels model, we see that riskier firms which have diffuse ownership are likely to change to more concentrated structures.

If the outlook of a firm improves, the ownership structure will be less likely to change, but if it does, it will become more diffuse as owners sell their fraction rather than increase it. Both higher ROA and higher growth have a small effect on the increase in the odds of ownership becoming more diffuse, rather than concentrated.

Table 6.
Conditional fixed effects regression results for changes in ownership concentration

	All changes	Positive change	Negative change
Coefficients (Marginal effects)			
Ownership			
Change in ownership	-0.016*** (0.984)	-0.114*** (0.892)	0.067*** (1.069)
Change in size	0.003*** (1.003)	0.016*** (1.016)	-0.010*** (0.990)
Change in firm risk	-0.006 (0.994)	-0.027 (0.973)	0.035 (1.035)
Change in ROA	0.164*** (1.178)	0.173*** (1.188)	0.037 (1.037)
Change in growth	-0.001** (0.999)	-0.000 (1.000)	0.001 (1.001)
Change in debt	-0.000* (1.000)	-0.000 (1.000)	0.000 (1.000)
Change in liquidity	0.000 (1.000)	0.001 (1.001)	-0.000 (1.000)
Media	-0.142 (0.867)	-0.180 (0.835)	0.156 (1.168)
Change in family ownership	-0.007*** (0.993)	-0.007*** (0.993)	-0.001** (0.999)
P(Chi-squared)			
Time dummies	0.000	0.000	0.000
Industry dummies	Yes	Yes	Yes
No. of observations	89 583	67 462	51 313
Number of groups	20 012	15 253	11 481

This table presents coefficients of the conditional fixed effects logit regression of changes in ownership concentration on lagged changes in firm characteristics. Columns 1, 2 and 3 show the results of the estimation including year fixed effects, for an overall change, positive change and negative change in ownership, respectively. The *, **, *** indicate that the coefficients are statistically significant at the 10, 5 and 1% level, respectively. The number of observations represents the number of firm-year cases for which a certain type of change occurred. The number of groups refers to the number of firms. The associated p-value for the Chi-square test statistic leads us to conclude that at least one of the regression coefficients is not equal to zero.

Contrary to our prediction, we find that more leveraged firms are more likely to experience a change and to become more concentrated.

The negative coefficients for family ownership indicate that ownership tends to be more persistent in family firms. If the largest owner is a family, it is less likely that the ownership concentration will change, which can be explained by the tendency of family owners to keep the shares in the family and pass the firm ownership to the heirs rather than sell to outside investors.

One pitfall is pointed out by Falenbrach and Stulz (2009) who analyze the determinants of large increases and decreases in managerial ownership and find that the level of significance drops when they re-estimate the regressions using lower thresholds. We do not use a threshold when defining changes in ownership concentration, thus it might be that by eliminating small changes in ownership concentration from our analysis the significance of the variables would increase.

5.4. Robustness

To verify whether our results are sensitive to the proxies we use, we test our models using alternative measures for our dependent variable as well as for the explanatory variables. In addition, we check whether attrition in the sample has any influence on the reliability of our findings.

In the following we test whether using alternative measures produces results that differ noticeably from our findings presented in this paper. Since there are many commonly accepted measures for ownership concentration and for the firm characteristics, it is not evident that the measures we use in our base-case model are the most appropriate.

First, we replace the measure *fraction owned by the largest owner* with the Herfindahl index. The index contains information about the fractions owned by all owners, thus there is more variation in the dependent variable, compared to our base case model. The explanatory variables are the same as the ones used in the base-case model. Second, we use alternative measures for several explanatory variables: log of book value of assets for *size*, variability of the growth rate in sales for *firm risk*, geometric average of the annual growth rate in operating income over the previous three years for *growth prospects* and return on equity (ROE) for *profitability*.

One weakness of using an unbalanced data panel is that we are unable to establish

the reasons for which firms disappear from our dataset. We cannot distinguish between the disappearance of a firm due to bankruptcy and that due to a corporate restructuring activity that leads to the creation of a new firm. If the latter is the case, we do not account for such changes in ownership since we measure changes across time for the same firm. In order to control for attrition in our sample, we take a balanced panel and run our regressions for both levels and changes in ownership.

The results from our robustness tests are presented in Appendix 3. When comparing the results from the fixed effects linear regressions (Panel A) we find that both size and its quadratic term are robust to all variations. In contrast, liquidity is the most sensitive measure, changing sign in Alternative 1 and losing significance in both Alternative 1 and 3. Using Alternative 2 leads to loss of significance for risk and debt. The profitability measure (ROA) changes sign and keeps significance in Alternative 2, but the magnitude of the effect is very small. We conclude that our model is most sensitive to the use of alternative explanatory variables (Alternative 2) and least sensitive to sample attrition (Alternative 3).

In Appendix 3 we also provide the robustness results for the logistic regression. Panels B, C and D refer to the *all changes*, *positive changes* and *negative changes* model, respectively. Out of the ownership-based variables, the most stable are previous ownership concentration and the lagged change in ownership, while family ownership changes sign and significance for the *negative change* model (Panel D). Another point is that there are variables (risk and profitability) which lose significance under Alternative 2 and others (size and growth) which become significant under Alternative 3. Under Alternative 2 our set-up shows the highest instability for all three models (*all changes*, *positive changes* and *negative changes*), while under Alternative 3, the *positive change* model displays the highest stability. The drawback of using different measures for the explanatory variables (Alternative 2) is that we obtain missing values, which decreases sample size. This leads to inefficiencies and to a potential selectivity bias if the firms eliminated from our analysis differ systematically from those remaining.

6. Concluding remarks

Our study provides an improved understanding of the determinants and dynamics of the ownership structure of private firms. Taking the view that ownership is endogenous, we analyze the relationship between several observed firm characteristics and ownership concentration on a sample of Norwegian non-listed firms. The estimation method enables us to control for unobserved heterogeneity among firms. We find that features such as firm size, riskiness, profitability, growth prospects, leverage and liquidity have a significant impact on concentration, but much of the variation in ownership structures is explained by the unobserved heterogeneity component, similar to what Himmelberg et. al. (1999) found. Our results support the findings of Demsetz and Lehn (1985) with regard to the negative effect of size. The positive effect of leverage is contrary to the results of Demsetz and Villalonga (2001), but the significant negative effect of performance on ownership supports their findings.

We then turn to investigating the drivers of adjustment in ownership. We estimate a logistic regression to establish how changes in firm characteristics affect the likelihood of a change in ownership concentration. Our results show that previous ownership level together with the lagged changes in concentration, firm riskiness, profitability and share owned by families are significant predictors of a subsequent change in ownership concentration. These findings are consistent with those of Büchelhofer (2008), who studies ownership changes in Chinese listed firms, although the explanatory variables in his study are measured as levels and not changes.

Overall, the firm's contracting environment has modest explanatory power on changes in ownership, as there is a high degree of heterogeneity among private firms. While public firms must fulfill a set of requirements in order to become listed, private firms can range from start-ups to mature, well-developed companies. Due to differences in the stages of development of private firms, the governance mechanisms can apply to different extents. Another challenge in studying private firms is the degree of illiquidity of the shares, a likely driver of the ownership structure. To our knowledge, a proxy for such a liquidity variable has yet to be identified. Matching private and public firms according to similar characteristics would provide a measure of liquidity for private firms, based on

the stock liquidity of listed firms, since other differences have been controlled for. This will provide additional insight into what drives ownership concentration.

To our knowledge, this paper is the first to take both a static and dynamic approach in the study of ownership concentration in private firms and sets the ground for further research on ownership in private firms. In addition, the rich panel data explored in this study, covering almost all Norwegian private firms, is well suited for extended analyses of ownership structure in private firms.

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Appendix 1. Classification of industries by sectors

Industry Sector	Standard Industrial Classification
Agriculture, forestry, fishing, mining	Agriculture, hunting and related service activities Forestry, logging and related service activities Fishing, fish farming and related service activities Mining of coal and lignite, extraction of peat Mining of uranium and thorium ores Mining of metal ores Other mining and quarrying
Manufacturing, chemical products	Manufacture of food products and beverages Manufacture of tobacco products Manufacture of textiles Manufacture of wearing apparel, dressing and dyeing of fur Tanning and dressing of leather, manufacture of luggage, handbags, saddlery, harness and footwear Manufacture of wood and of products of wood and cork, except furniture, manufacture of articles of straw and plaiting materials Manufacture of pulp, paper and paper products Publishing, printing and reproduction of recorded media Manufacture of coke, refined petroleum products and nuclear fuel Manufacture of chemicals and chemical products Manufacture of rubber and plastic products Manufacture of other non-metallic mineral products Manufacture of basic metals Manufacture of fabricated metal products, except machinery and equipment Manufacture of machinery and equipment n.e.c. Manufacture of office machinery and computers Manufacture of electrical machinery and apparatus n.e.c.

	<p>Manufacture of radio, television and communication equipment and apparatus</p> <p>Manufacture of medical, precision and optical instruments, watches and clocks</p> <p>Manufacture of motor vehicles, trailers and semi-trailers</p> <p>Manufacture of other transport equipment</p> <p>Manufacture of furniture, manufacturing n.e.c.</p>
Energy	Extraction of crude petroleum and natural gas, service activities incidental to oil and gas extraction excluding surveying
Construction	Construction
Service	<p>Sale, maintenance and repair of motor vehicles and motorcycles, retail sale of automotive fuel</p> <p>Hotels and restaurants</p> <p>Real estate activities</p> <p>Renting of machinery and equipment without operator and of personal and household goods</p> <p>Computers and related activities</p> <p>Research and development</p> <p>Other business activities</p> <p>Education</p> <p>Health and social work</p> <p>Activities of membership organizations n.e.c.</p> <p>Activities of households with employed persons</p> <p>Extra-territorial organizations and bodies</p>
Trade	<p>Wholesale trade and commission trade, except of motor vehicles and motorcycles</p> <p>Retail trade, except of motor vehicles and motorcycles;</p> <p>Repair of personal and household goods</p>
Transport	<p>Land transport; transport via pipelines</p> <p>Water transport</p> <p>Air transport</p> <p>Supporting and auxiliary transport activities, activities of travel agencies</p>

Appendix 2. The Hausman test result

	Fixed effects	Random effects	Difference	S.E.
Size	0.1720	0.1756	-0.0036	0.0140
Size squared	-0.0106	-0.0138	0.0032	0.0006
Firm risk	-0.0597	-0.0938	0.0341	0.0099
ROA	-0.0008	0.0004	-0.0012	0.0001
Growth prospects	-0.0005	-0.0003	-0.0002	0.0001
Leverage	0.0092	0.0112	-0.0020	0.0006
Liquidity	0.0114	-0.0015	0.0129	0.0013
Amenity	0.0145	-0.3720	0.3865	0.0427
Year 2001	-0.0822	-0.0818	-0.0005	0.0021
Year 2002	0.1004	0.1020	-0.0016	0.0013
Year 2003	0.1610	0.1541	0.0069	0.0018
Year 2004	0.5631	0.5561	0.0070	0.0019
Year 2005	0.6956	0.6917	0.0039	0.0028
Year 2007	0.7927	0.8237	-0.0310	0.0043
Year 2008	0.8805	0.9152	-0.0346	0.0056

Test: Ho: difference in coefficients not systematic

Chi2(15)=827.61

Prob>Chi2=0.0000

The Hausman test is a specification test which, when applied to panel data models, tests the orthogonality condition of the random effects model. If the regressors in a model are correlated with the unobserved factors, only the fixed effects estimator is consistent. Otherwise, the fixed effects estimator is still consistent, but inefficient while the random effects estimator is both consistent and efficient. The Hausman test statistic has a chi-square distribution and Prob>Chi2 is equal to the probability of the null hypothesis, that the estimates generated by the two models differ meaningfully. This means that the orthogonality assumption is violated, thus a random effects estimator is inconsistent.

Appendix 3. Robustness tables

Panel A.
Robustness results for the fixed effects linear regression

	Ownership Concentration			
	Base-case	Alternative 1	Alternative 2	Alternative 3
Size	0.171***	0.009**	0.301**	0.246***
Size-squared	-0.010***	-0.001***	-0.014***	-0.015***
Firm risk	-0.059**	-0.011***	0.000	-0.088*
ROA	-0.000***	0.001**	-0.000*	-0.001***
Growth	-0.000***	-0.000***	0.000***	-0.000***
Debt	0.009***	0.001***	0.002	0.006
Liquidity	0.011**	-0.001	0.030***	0.007
Amenity	0.014	-0.001	-0.069	-0.152
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	No
No. of observations	559 625	559 644	202 698	233 330
Number of groups	130 554	130 554	64 206	29 167
Overall R-squared	0.710%	1.730%	0.630%	0.780%
Fraction explained by unobserved heterogeneity	81.765%	81.629%	83.498%	78.358%

This panel presents the results of our base-case model as well as three variations. In Alternative 1 the dependent variable is replaced with the Herfindahl concentration index, on which we apply a logistic transformation and the independent variables are the same as in the base-case model. In Alternative 2 size is measured as the log of total assets, firm-specific risk as the standard deviation of the sales growth rate over the past three years, growth as the geometric average of the annual growth rate in operating income over the previous three years and profitability as ROE. The measures for debt, liquidity and amenity are the same as in our base-case model. To preserve consistency in the treatment of outliers, all the new variables used in the robustness tests are winsorized at the 1st and 99th percentiles. Alternative 3 represents the base-case model applied on a balanced data panel which we obtain by eliminating the observations corresponding to those firms for which we have missing values for at least one year.

Panel B.

Robustness tests for the conditional fixed effects logistic estimation on all changes in ownership concentration

All changes

	Base case	Alternative 1	Alternative 2	Alternative 3
Coefficients (Marginal effects)				
Ownership				
Ownership	-0.016*** (0.984)	-0.020*** (0.980)	-0.013*** (0.987)	-0.015*** (0.985)
Change in ownership	0.003*** (1.003)	0.003*** (1.003)	0.002** (1.002)	-0.003*** (0.997)
Change in size	-0.006 (0.994)	0.005 (1.005)	-0.060 (0.941)	0.053* (1.054)
Change in firm risk	0.164*** (1.178)	0.111** (1.117)	0.003 (1.003)	0.238*** (1.268)
Change in ROA	-0.001** (0.999)	-0.001* (0.999)	-0.000 (1.000)	-0.001** (0.999)
Change in growth	-0.000* (1.000)	-0.000 (1.000)	0.000 (1.000)	-0.001** (0.999)
Change in debt	0.000 (1.000)	-0.000 (1.000)	0.000 (1.000)	-0.000 (1.000)
Change in liquidity	-0.001 (0.999)	-0.001 (0.999)	-0.001 (0.999)	0.001 (1.001)
Media	-0.142 (0.867)	-0.085 (0.918)	-0.268 (0.764)	-0.224 (0.799)
Change in family ownership	-0.007*** (0.993)	-0.007*** (0.993)	-0.006*** (0.994)	-0.007*** (0.993)
P(Chi-squared)	0.000	0	0.000	0.000
Time dummies	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	No
No. of observations	89 583	95 298	23 147	61 958
Number of groups	20 012	21 173	7 461	11 647

Panels B, C and D present the results of our base-case logit model as well as three variations. Alternatives 1, 2 and 3 respectively are constructed similar to the ones described in Panel A. Instead of using levels of variables, we measure changes from $t - 2$ to $t - 1$. Panel B refers to all changes in ownership (both positive and negative), Panel C only to positive changes and Panel D only to negative ones.

Panel C.
Robustness tests for the conditional fixed effects logistic estimation on positive changes in ownership concentration

	Base case	Alternative 1	Alternative 2	Alternative 3
	Coefficients (Marginal effects)			
Ownership	-0.114*** (0.892)	-0.100*** (0.904)	-0.123*** (0.884)	-0.106*** (0.899)
Change in ownership	0.016*** (1.016)	0.012*** (1.012)	0.014*** (1.014)	0.018*** (1.018)
Change in size	-0.027 (0.973)	0.024 (1.024)	-0.033 (0.967)	-0.005 (0.995)
Change in firm risk	0.173*** (1.188)	0.072 (1.074)	-0.003 (0.997)	0.248*** (1.281)
Change in ROA	-0.000 (1.000)	-0.000 (1.000)	-0.000 (1.000)	-0.001 (0.999)
Change in growth	-0.000 (1.000)	-0.000 (1.000)	0.000 (1.000)	-0.000 (1.000)
Change in debt	0.001 (1.001)	-0.000 (1.000)	0.001 (1.001)	0.001 (1.001)
Change in liquidity	-0.001 (0.999)	-0.001 (0.999)	-0.002 (0.998)	-0.001 (0.999)
Media	-0.180 (0.835)	-0.123 (0.884)	-0.660* (0.516)	-0.172 (0.841)
Change in family ownership	-0.007*** (0.993)	-0.010*** (0.990)	-0.006*** (0.994)	-0.008*** (0.992)
P(Chi-squared)	0.000	0	0.000	0.000
Time dummies	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	No
No. of observations	67 462	75 493	16 769	46 514
Number of groups	15 253	17 063	5 497	8 817

Panels B, C and D present the results of our base-case logit model as well as three variations. Alternatives 1, 2 and 3 respectively are constructed similar to the ones described in Panel A. Instead of using levels of variables, we measure changes from $t - 2$ to $t - 1$. Panel B refers to all changes in ownership (both positive and negative), Panel C only to positive changes and Panel D only to negative ones.

Panel D.

Robustness tests for the conditional fixed effects logistic estimation on negative changes in ownership concentration

	Base case	Alternative 1	Alternative 2	Alternative 3
	Coefficients (Marginal effects)			
Ownership	0.067*** (1.069)	0.047*** (1.048)	0.084*** (1.087)	0.061*** (1.062)
Change in ownership	-0.010*** (0.990)	-0.007*** (0.993)	-0.011*** (0.989)	-0.011*** (0.989)
Change in size	0.035 (1.035)	0.035 (1.035)	0.042 (1.0428)	0.122*** (1.129)
Change in firm risk	0.037 (1.037)	0.037 (1.037)	0.003 (1.003)	0.110 (1.116)
Change in ROA	0.001 (1.001)	0.001 (1.001)	-0.000 (1.000)	0.001 (1.001)
Change in growth	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	-0.000** (1.000)
Change in debt	-0.000 (1.000)	-0.000 (1.000)	-0.001 (0.999)	-0.001 (0.999)
Change in liquidity	-0.000 (1.000)	-0.000 (1.000)	0.001 (1.001)	0.001 (1.001)
Media	0.156 (1.168)	0.090 (1.094)	-0.085 (0.918)	-0.191 (0.826)
Change in family ownership	-0.001** (0.999)	0.002*** (1.002)	-0.001 (0.999)	-0.001 (0.999)
P(Chi-squared)	0.000	0	0.000	0.000
Time dummies	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	No
No. of observations	51 313	63 419	12 352	35 065
Number of groups	11 481	14 183	3 989	6 547

Panels B, C and D present the results of our base-case logit model as well as three variations. Alternatives 1, 2 and 3 respectively are constructed similar to the ones described in Panel A. Instead of using levels of variables, we measure changes from $t - 2$ to $t - 1$. Panel B refers to all changes in ownership (both positive and negative), Panel C only to positive changes and Panel D only to negative ones.



Ownership dynamics

How ownership fractions change hands over time
and the determinants of these changes

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Motivation

This paper investigates the role of firm characteristics in explaining the variation in ownership structure across private companies, if ownership structure is endogenous and thus reflects the value maximizing mechanisms of the firm.

Unlike the classical model of the firm where the owner's main function was of providing capital, the corporate governance model treats ownership as a governance mechanism. The role of owners does not resume only to providing capital, but also consists in shaping the firm's behavior and the way it creates shareholder value. Large shareholders have the incentives and the ability to collect information and monitor management, thus addressing the first agency problem by assuring that managers' interests are aligned with their own – value creation and profit maximization (Shleifer and Vishny 1997). Ownership matters for the firm's behavior and performance.

Berle and Means (1932) were the first who advanced the idea of a relationship between ownership and performance, noticing a trend of increased ownership diffuseness in the 1930s. They discuss that the resulting separation of ownership and control creates favorable conditions for the transfer of profits from the shareholders to the controlling groups, given that the two groups naturally have conflicting interests. The implication is that more concentrated ownership provides incentives for monitoring management and reduces the discretionary power of officers in allocating the firm's resources. However, another point is that controlling block-holders may channel resources away from the firm, in order to serve their own interests. A major implication of what was later referred to as the Berle and Means thesis, is that there is an inverse relationship between ownership diffuseness and firm performance.

Two directions of research followed the Berle and Means thesis. Building on their arguments, a series of papers have researched the effects of ownership concentration on firm performance. Gugler (2001) gathers a set of articles among those written over a period of 70 years on the topic. The findings are ambiguous, with most of the evidence supporting either a positive or no relationship from ownership concentration to firm performance. A common finding in countries

from Continental Europe is that beyond a certain level of ownership concentration, large owners expropriate minority shareholders. Expropriation is more pronounced in countries with low minority shareholder protection.

The connection between ownership concentration and the legal climate is an aspect researched by La Porta et al. (1998), who find that ownership tends to be more concentrated in countries with a legal regime that provides low investor protection. They observe a systematic variation across legal regimes, but their paper does not explain the large variations within a regime.

Fifty years after the Berle and Means thesis, Demsetz (1983) challenged their arguments and advanced the hypothesis of endogenous ownership structure, resulting from decisions which reflect shareholders' influence and trading in the equity market. In a later study, Demsetz and Lehn (1985) test empirically for the endogeneity of ownership structure, defined as ownership concentration. They introduce four firm-specific factors that alter ownership structure: firm size, control potential, systematic regulation and amenity potential.

The authors define on one hand the risk neutral effect of size. As firm size increases, the price of a given ownership fraction increases and therefore shareholders need to commit more capital to maintain their existing stake. In itself, this effect implies a more diffuse ownership. On the other hand, shareholders are risk averse and maximize their own utility based on the return they are getting and the risk they are bearing. By tying up more of their wealth into the firm, they would bear an undiversification risk for which they are not compensated, which again implies greater ownership diffuseness. In addition, the disadvantage of disperse ownership translates into passive owners. However, if a group of owners chooses to concentrate and monitor management, the value added would be captured by all stockholders, unlike the undiversification risk which affects owners individually.

The disadvantages are expected to be higher than the advantages, such that the net cost of concentration is generally higher for owners of larger firms. We test the inverse relationship between firm size and concentration, in the sense that changes in the size of the firm would lead to an adjustment of the ownership structure to a level that best suits the stockholders.

The next determinant of ownership concentration, control potential, is the profit potential achievable through closer management monitoring. This arises because management and owners have diverging interests. Demsetz and Lehn (1985) take the view that owners are able to influence to some extent the risks and opportunities facing the firm and are able to discipline management. The authors argue that the profit potential from exercising control is correlated with the stability of the firm's environment. More stable environments imply easier monitoring, which naturally disciplines management. A more concentrated structure would bring no additional value to the owners. As the environment becomes more risky, tighter control brings greater payoff to the shareholders. We therefore test for a positive relation between firm-specific risk and ownership concentration.

Further on, the two authors consider regulation an explanatory factor of the ownership structure, because first, regulation restricts the control potential of owners and second, it provides to some extent, cost-free management monitoring. They expect greater diffuseness in more strictly regulated industries. However, for our analysis, we control for the effect of regulation by using a sample of firms that are homogenous from a regulatory point of view. Unlike previous studies on the subject, which analyze samples of public firms, our sample consists entirely of Norwegian private firms that operate in industries with a similar level of regulation. We exclude public firms and also firms in heavily regulated industries, such as financial and utilities.

Another driver of ownership concentration is what Demsetz and Lehn (1985) call the amenity potential of a firm's output. They define it as the capability of owners to impose their personal preferences and influence managers' decisions with regard to the goods produced by the firm. Media and sports firms are examples of firms in which increased owner control allows for expressing the owner's particular taste. This type of potential is expected to give rise to more concentrated ownership than what would be predicted only by size and control potential. They found more empirical support for excess ownership concentration in media firms. Given the large influence of the media industry today, we include it in our analysis, expecting to find that it explains residual ownership concentration in private media firms.

The Demsetz and Lehn study (1985) treats ownership structure as endogenous to firm characteristics, in order to further examine how firm performance is influenced by ownership structure.

In a later study, Demsetz and Villalonga (2001) investigate as well the possibility that ownership structure itself is affected by firm performance. Their view is that it is more plausible that firm performance affects ownership than the other way around. Demsetz and Villalonga illustrate this through the example of a management leveraged buy-out and stock options as a form of management compensation, given that inside owners' expectations about future performance play a major role in altering the ownership structure.

Demsetz and Villalonga (2001) provide evidence that firm performance determines ownership structure, but do not find support for the reverse relationship, when ownership structure is treated as endogenous to firm performance within a system of simultaneous equations. These findings imply that including firm profitability as an explanatory variable for the variation in ownership structure would raise no concerns about a potential simultaneity bias.

Another determinant of ownership concentration is brought up by Urosevic (2001), who addresses the issue of insider ownership dynamics with respect to the interaction among risk-averse insiders facing a moral hazard problem. Inside investors willing to diversify strategically sell their stakes taking into account that outside investors are risk-averse and perceive the sale of shares by inside owners as evidence of their lack of commitment. This translates into a "race to diversify", as the insider who sells second will receive a lower share price. The result is a dynamic stake adjustment towards the optimal allocation, whose speed increases with the number of insiders.

Literature Review

The focus in the literature regarding ownership is the relation between firm performance and ownership concentration, where firm performance is endogenous. Traditionally, governance mechanisms have been assumed exogenous and determining corporate value.

The Berle and Means thesis is the starting point of a series of empirical studies on the relationship between ownership concentration and firm performance. Since the advancement of their theory, a lot of attention has been given to establishing the nature of the relationship. Most of the papers that tackled the subject have found a positive or no relationship (Gugler (2001) provides a detailed analysis of country reports). Findings of an inverse relationship are less common, i.e. Agrawal and Knoeber (1996), Bøhren and Ødegaard (2004).

To our knowledge, a first attempt in examining the determinants of the ownership structure itself is made by Demsetz (1983) who challenges the Berle and Means thesis and brings up the issue of ownership structure endogeneity. Furthermore, he states that optimal ownership structure is due entirely to firm characteristics, more specifically to the firm's main activity, as reflected by its internal processes, on its scale of operation (and therefore size) and on the inside owners' managing abilities.

Demsetz and Lehn (1985) first analyze the determinants of ownership structure and then assess the consequences of diffuse ownership structure for the performance of the firm, arguing that the two variables should be unrelated. They find that firm size, control potential, systematic regulation and amenity potential have a significant impact on ownership concentration in the anticipated direction. In the same time, they approach the issue of endogeneity using simultaneous equations and find that ownership has no effect on performance.

Following the direction initiated by Demsetz and Lehn (1985), Cho (1998) applies the same approach when investigating how ownership structure affects investments and corporate value. Regressions of insider ownership on the level of investments and investments on corporate value suggest a significant non-linear relationship between ownership structure and corporate value. Further on, he explores the possibility that insider ownership, investment and corporate value are endogenously determined. By estimating a simultaneous equations system, he finds evidence that investment affects corporate value, which in turn alters the ownership structure, but he finds no support for the reverse relationship. The author concludes that treating ownership structure as exogenous severely affects the results from OLS regressions on single equations.

Using a similar approach, Demsetz and Villalonga (2001) claim they found unequivocal evidence for the endogeneity of ownership structure. Findings from using a simultaneous equations approach are questioned by Bøhren and Ødegaard (2004). They analyze the interaction between a set of governance mechanisms and the economic performance of the firm and find significant relationships that are robust across a wide range of single equation models. However, when using simultaneous equations, the majority of relationships disappear. The authors suspect this happens more likely because the theory is partial and underdeveloped and fails to impose proper restrictions on the simultaneous system, rather than because of the nature of the relationship between governance and performance itself.

At this stage of the theory there is still an open debate whether ownership concentration is exogenous to firm performance or endogenously determined by it.

With respect to the determinants of ownership concentration, Demsetz and Villalonga (2001) argue both theoretically and empirically that market forces yield firm specific ownership structures, either diffused or concentrated. Variation across firms emerges because of differences in the circumstances facing each firm, more specifically economies of scale, regulation and the stability of the environment in which they function.

As far as the dynamics of ownership structure is concerned, a study that treats the variables as changes versus changes is Fahlenbrach and Stulz (2009). They examine the determinants of large changes in ownership structure, which they measure as changes in managerial ownership. They use a different estimation technique, logit and probit regressions, and find evidence that the managerial ownership fraction is more likely to fall when the firm was performing well and its asset value is growing. However, when the firm stock is doing poorly managerial ownership is not more likely to increase and there is a weak relationship between past poor firm results and increases in the managers' stake. The authors found evidence to support the so-called "financing reason": managerial ownership is a cheap source of financing for financially constrained firms, therefore managers' stake increases for firms that have become more leveraged.

Himmelberg et al. (1999) signal that most studies use managerial ownership only as explanatory variable, without considering potential endogeneity issues. They use panel data to examine the hypothesis that managerial ownership is linked to firm characteristics that affect contracts, and found that the proxies for what they call the “contracting environment” of the firm are strong predictors of managerial ownership structure. Another important finding is that managerial ownership and firm performance are determined by several common characteristics in the firm’s contracting environment.

The interaction between inside and outside owners is an aspect researched by Gregoric et al. (2008), having as sample period the post-privatization years in Slovenia. They find empirical evidence of the competition for private benefits among owners during transition. Owner’s behavior varies between listed and non-listed firms. In non-listed firms, the competition for control takes place mainly among outside and inside owners. Outside investors that are of similar kind and hold similar stakes tend to share control. With the purpose of extracting rents, they form coalitions that concentrate ownership beyond the optimal level in a transition period. In the case of listed firms, ownership concentration is more likely to occur when the firm is performing well since the non-largest investors are more inclined to sell their shares to the largest owner.

The existing literature has focused mostly on the relation between governance and performance, with ownership as the most researched among governance mechanisms. The theory regarding ownership is not fully developed and there is no general consensus regarding the interaction between the governance mechanisms or between governance and performance.

Methodology

We use a sample of panel data from the Center for Corporate Governance Research at BI Norwegian School of Management. The database contains accounting data, industry NACE codes (companies can be classified as having several NACE codes), and governance data regarding the owners. It consists of Norwegian non-listed firms and includes a subsample of family firms. The sample period is from 2000 to 2009.

For the set of variables that enter the model we report the following descriptive statistics: mean, median, maximum, minimum, standard deviation.

We examine the relationship between ownership structure and firm characteristics in two set-ups. In the first setting we investigate how a given set of firm characteristics relates to the ownership structure of the firm. In the second setting we look at the relationship between changes in the variables and to what extent changes in the firm's features alter the ownership structure.

In the first setting, all variables are measured in levels and the model can be summarized as:

The dependent variable: Ownership concentration, measured by the fraction owned by the largest owner, and denoted OC.

The explanatory variables:

- a) Firm size, as book value of assets, Size_asset.
- b) Firm-specific risk, as relative standard deviation of sales, SD_sales.
- c) Profitability, as return on capital employed, ROCE.
- d) Leverage, as debt-to-assets, D/A.
- e) Growth prospects, as average percentage growth in sales, Growth_prev.
- f) Managerial ownership, as fraction owned by officers, MO.
- g) Indicator variable for firms in the media industry, as a dummy variable, M.

We measure ownership concentration as the fraction owned by the largest owner. In contrast, Demsetz et al. (1985; 2001) use the fraction held by the five largest owners. Using the same measure as they did in our sample of private firms would result in very little variation in the dependent variable, due to high ownership concentration in the private firms. Therefore, the largest owner measure is more appropriate for our purpose. We consider ultimate ownership as opposed to direct ownership, in order to allow for transparency in the assessment of ownership structures. Using ultimate ownership provides insight into the complexities in the chain of control.

To measure firm size, we use the average annual book value of assets. Although Demsetz and Lehn (1985) use the market value of equity as a proxy for firm size, they report that the findings are robust to using other measures, i. e. the book value of assets. In accordance to the theory previously outlined, we expect to find a negative relation.

We measure the relative riskiness of the firm by the difference between the ratio of the firm's standard deviation of sales to its average sales and the ratio of the industry's standard deviation of sales to industry average sales. Because the standard deviation measure alone does not account for firm size, we divide each term by the average sales, in order to eliminate the influence of size. We expect to find a positive relation between the stability of the firm's environment and its ownership concentration.

The measure for profitability, return on capital employed, is the ratio of operating profit to capital employed. Capital employed is defined as working capital plus non-current assets. ROCE reflects the firm's ability of generating profits given the level of its assets, acting also as a measure of the firm's efficiency. An artifact of this accounting measure is that it does not account for the intangible assets held by the firm, which is particularly relevant for young firms. However, the consequence of using a sample of private firms is that other measures of profitability also fail to account for this fact. The nature of the relation is difficult to predict in advance, given the mixed effects that profitability has on ownership concentration.

Leverage is measured by the value of debt as a fraction of the book value of assets. Demsetz and Villalonga (2001) argue that leverage as an explanatory variable captures on one hand the relative gains or losses from movements in interest rates and on the other hand the value added by creditors' monitoring role. Along with the present value of tax shields, gains from movements in interest rates add value to the company. Because leverage also implies potential bankruptcy costs, it is difficult to assess the nature of the relationship. Another aspect is that creditors monitor management, and from this point of view, ownership concentration is less likely to increase.

The proxy for growth is the historical average percentage growth in sales for the past three years. Particularly young firms are characterized by high growth

opportunities. In addition, in young firms ownership is more likely to be concentrated in the hands of owner-managers (Fahlenbrach and Stulz 2009). From this point of view, we expect to find a positive relation.

Managerial ownership is described by the fraction owned by officers. Other measures in the literature include the fraction owned by both officers and directors. Using this measure, Falenbrach and Stulz (2009) found that in young firms there is a high level of managerial ownership. They interpret this as a response to the limited access of young firms to capital markets. In this case, managerial ownership can be viewed as a cheap source of financing.

To account for the amenity potential that, according to Demsetz and Lehn's (1985) findings, is present in firms in the media industry, we use a dummy variable which takes a value of one if the firm belongs to the media industry and zero otherwise. We do so only for media firms, because the authors found evidence that the amenity potential leads to higher ownership concentration in this particular type of firms.

In the second set-up the variables will be measured as first order differences. We choose this approach because the ownership concentration in levels is a highly persistent variable. Also, the model captures the nature and intensity of the relationships between variables. Measuring changes provides additional insight into the way ownership concentration adjusts to variation in the set of determinants.

As estimation technique, we use the OLS framework. Multivariate regressions are performed across firms for each of the ten sample years. This approach is useful to test whether the relations are persistent in time and not due to a particularity that affects the variables in a given period.

In addition to the base-case model presented above, we also test the model on a family firm subsample, due to their unique sample characteristics, as well as to the fact that the family firm is the dominant firm type among private firms. We also apply the model to subsamples consisting of several investor types: foreign, industrial (nonfinancial), institutional (financial), state, and individual (personal) owners, as identified by Bøhren et al. (2009). With this approach we intend to determine whether different investors react differently to changes in firm

characteristics. The analysis of Bøhren et al. (2009) shows that large foreign and financial investors are more likely to sell and also large investors in general sell when the firm has short-term projects or has a history of high earnings.

The set of alternative measures that is used to test the robustness of the model is listed in Table 1.

Table 7.

Variable	Measure	Definition
Ownership concentration	OCH	Herfindahl index: sum of squared fractions across all owners (Demsetz and Lehn 1985)
Firm size	Size_sales	Average annual sales
Relative riskiness	SD_profit	Difference between the ratio of the firm's standard deviation of net profit to its average profit and the ratio of the industry's standard deviation of profit to industry average profit
Profitability	ROE	Return on equity: profit after tax divided by equity
	ROA	Return on assets: profit after tax divided by total assets (Gregoric, Masten, and Zajc 2008)
Leverage	Liq/A	Liquid assets divided by total assets
Growth prospects	Growth_fut	Average percentage growth in sales over the next three years

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