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Ownership Governance Mechanisms and Firm Performance in Norway

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Abstract

We investigate the relationship between ownership governance mechanisms and firm performance using extensive panel data of medium- and large-sized Norwegian firms from 2000 to 2015 and find that several mechanisms are relevant determinants of firm performance. We identify a curvilinear interaction between ownership concentration and firm performance, with evidence supporting a weakly concave relationship that retains its relevance even when considered in conjunction with other mechanisms. Insider ownership does not have an apparent directional effect on firm performance, neither on a linear nor non-linear basis, on both single- and multi-mechanism model specifications. Institutional ownership has a positive association with performance, whereas we cannot establish a link between state ownership and the performance of firms in our sample. Our research deepens the understanding of ownership governance mechanisms, their inter-linkages, and the extent to which they affect firm performance.

1 Introduction

The interconnected relationships between different stakeholders in corporations are fundamental to our modern economy, but they also give rise to challenges. These challenges stem from conflicts of interest, differences in information access, and the delegation of authority, all of which can impact a company's performance over time. Addressing these issues as early as the 18th century, Adam Smith (1776) noted the potential loss of corporate value due to conflicts between financiers and their fiduciaries who might mismanage funds. Berle and Means (1932) further formalized these conflicts in the modern corporation, where ownership and control are separate. Consequently, agency costs arise as a result of the value lost when the owner's incentives diverge from those of the manager (Jensen & Meckling, 1976). Given today's complex network of stakeholder relationships and unique owner-manager structures, it is more crucial than ever for firms to comprehend how ownership mechanisms in corporate governance impact agency costs, which can ultimately determine their performance.

Corporate governance involves implementing mechanisms that align the interests of stakeholders in order to minimize agency problems and ensure the effective management of the firm (Goergen & Renneboog, 2006). Ownership governance mechanisms, such as concentrated shareholdings and the characteristics of large owners, have a distinct impact on agency issues within a company. When ownership is concentrated or when owners possess specific skills, it can enhance managerial oversight and align stakeholder interests, thereby reducing agency problems mitigated (Jensen & Meckling, 1976; Shleifer & Vishny, 1986). On the other hand, certain ownership mechanisms in governance can lead to conflicts of interest and misaligned incentives, resulting in the extraction of private benefits and value losses (Goergen, 2018; Johnson et al., 2000; Shleifer & Vishny, 1997). The influence of each ownership governance mechanism on agency costs is reflected in its effect on overall firm performance. Ultimately, whether a firm has significant shareholders, attracts institutional and state investors, or offers equity-based compensation to its managers can have wide-ranging implications for value creation within the organization.

This study addresses the research question of whether ownership governance mechanisms affect firm performance in Norway. Previous research in this area has predominantly focused on firms in the US and UK, creating a research gap for other regions with distinct governance systems. Consequently, we seek to contribute to

the existing research by leveraging and refining methodologies used in prior studies to explore the relationship between different corporate governance mechanisms and firm performance in the Norwegian market. Specifically, we investigate the connection between ownership concentration, insider ownership, institutional ownership, and state ownership with firm performance, utilizing a unique corporate governance dataset that encompasses a comprehensive set of Norwegian companies. Compared to other countries, the dataset used in this study for Norway is particularly unique because it provides a significantly more detailed disclosure of ownership information, particularly for privately owned companies.

While research attempting to ascertain the relationship between these mechanisms and firm performance has been a long-standing endeavor undertaken by several authors, the results have been mixed thus far. A careful examination of the literature landscape finds that research in this area has been primarily conducted in the distant past and has focused singularly on the Anglo-American markets, consequently failing to uncover the full extent of the relationship and validity of results in other legal and corporate governance systems (Gugler, 2001). While the groundwork for corporate governance research and its impact on firm performance in Norway has been laid out by Bøhren & Ødegaard (2001), their investigation of governance mechanisms came within a greater investigational effort that took place more than twenty years ago. Therefore, documented research focused on our proposed research topic in the Norwegian market is rather limited, making it an endeavor that offers substantial academic interest.

Our findings, generally, provide some support for a modest economic impact of ownership concentration on firm performance. However, the relationship is unstable, and the effect on agency costs is not easily predictable. These results align with prior studies that have reported inconsistent evidence regarding the role of concentrated ownership as a governance mechanism (e.g., Banerjee et al., 1997; Franks et al., 2001; Renneboog, 2000). While large shareholders can enhance monitoring and align the interests of managers and shareholders (Maug, 1998; Shleifer & Vishny, 1986), the extraction of private benefits from strong control over the firm may counteract the positive effects of ownership concentration (Barclay & Holderness, 1989; Shleifer & Vishny, 1997). Therefore, we may expect a nonmonotonic relationship between ownership concentration and firm performance, where one effect eventually outweighs the other at a certain tipping point (Morck et al., 1988). Although we observe some evidence of a slightly concave relationship, the weakness and

instability of our findings prevent us from identifying a clear threshold where one effect dominates over the other. In a scenario involving multiple governance mechanisms, ownership concentration still exhibits a distinct association with firm performance in five out of 15 years, indicating that it complements other ownership governance mechanisms.

Furthermore, we find that insider ownership does not have a significant impact on firm performance as an ownership governance mechanism. Morck et al. (1988) propose that insider ownership has a positive effect due to interest convergence between the CEO and shareholders but a negative effect due to managerial entrenchment. Our results suggest that these two effects either offset each other or have an overall negligible impact. These findings align with other studies that address endogeneity by considering the possibility that current insider ownership levels are influenced by past performance, and consequently, they find no discernible effect of insider holdings on firm performance (Himmelberg et al., 1999; Kole, 1996).

Moreover, our analysis of large institutional owners reveals a positive effect on firm performance. This finding aligns with the efficient monitoring hypothesis, which suggests that institutional investors act as more effective principals for the firm by offering superior guidance and higher-quality monitoring at lower costs (Bøhren & Ødegaard, 2001; Pound, 1988). In a scenario involving multiple governance mechanisms, institutional ownership primarily acts as a substitute for other ownership governance mechanisms. However, in three out of 12 years in our sample, institutional ownership in the multi-mechanism model shows a positive and significant association, indicating that we cannot definitively exclude the possibility of a complementary effect.

Finally, the relationship between state ownership and firm performance is unclear based on our findings. According to agency theory, state ownership is typically associated with a negative impact on value creation due to factors such as limited accountability to taxpayers, reduced market discipline, and lower-quality monitoring and advice (Aguilera et al., 2021; Grünfeld & Jakobsen, 2006). However, it is also recognized that large state owners may offer nonmarket advantages and privileged access (Aguilera et al., 2021; Boubakri et al., 2008, 2018; Lazzarini & Musacchio, 2018). Our results are consistent with a meta-study by Shirley & Walsh (2000), which found no significant relationship between state ownership and firm performance in 15 out of 52 papers. The lack of a clear link between state

ownership and firm performance suggests that the potential negative effects associated with agency issues and the potential positive effects associated with nonmarket advantages may offset each other or have an overall negligible impact.

The existing empirical research on the relationship between governance and firm performance has been somewhat limited in scope. Many of the papers published on the topic of ownership structure and firm performance share common issues that can be categorized into the following areas: data quality and reliability of findings, narrow regional focus and variation in firm size, limited consideration of ownership governance mechanisms, lack of analysis of potential interactions between mechanisms, and insufficient testing of results over time. Within each of these aspects, we see an opportunity to make a valuable contribution to the growing literature on the impact of ownership governance mechanisms. Therefore, we aim to provide new, valuable, and distinctive insights based on our exclusive sample of Norwegian firms, while also addressing some of the identified shortcomings in existing studies.

Firstly, despite the significant academic interest in the relationship between ownership structure and firm performance, empirical research in this area has been somewhat limited and under-explored. This is partly due to challenges in obtaining high-quality data and the lack of a well-developed theoretical foundation (Bøhren & Ødegaard, 2001). Although recent developments in corporate governance theory can aid our understanding of this relationship, finding recent empirical studies based on reliable and valuable data remains challenging. To address this gap, we utilize a comprehensive dataset from the CCGR at BI Norwegian Business School for firms in Norway, which offers unique insights yet to be explored. Additionally, our use of panel data allows us to examine the stability of these relationships over a 15-year period, providing more robust and insightful conclusions.

Secondly, existing empirical papers have often focused on a narrow range of ownership governance mechanisms within large Anglo-American firms, leading to mixed and inconclusive findings that may not be applicable to other geographical contexts (Gugler, 2001). Morck et al. (1988), Agrawal & Knoeber (1996), and Cho (1998) all based their samples on Fortune 500 companies. But since performance can depend on firm size (Hawawini & Keim, 1995), this approach raises firm size heterogeneity issues. Alternatively, McConnell & Servaes (1990) randomly drew their sample from the NYSE and Amex indices. However, this approach biases the sample to only consider public companies. Our study contributes to the literature

by examining Norwegian firms, considering a more recent sample period, and including public and private companies of different sizes, thus providing a more comprehensive perspective.

Thirdly, our research investigates multiple ownership governance mechanisms and their interactions. Previous studies have given less attention to the impact of insider ownership and owner types, creating a significant knowledge gap (Gugler, 2001). As institutional and state owners may differ in their intentions and objectives, exploring their impact adds a tangible contribution to the literature. Both aspects are of added importance in the Norwegian economic context, home to one of the world's leading institutional investors (NBIM), and where state ownership have a notable economic role (Jakobsen & Grünfeld, 2006). Against a backdrop of recently changing perspectives on the roles of owner types, establishing an empirical foundation that addresses their relationships with firm performance becomes even more important.

2 Literature review

2.1 Agency theory

The Classical economist Adam Smith (1776) gave an early address to agency theory as he argued that company directors with limited liability will manage the funds of financiers through negligence and profusion. Berle and Means (1932) formalized Adam Smith's premise by analyzing corporate separation of ownership and control, including the causes, concerns, and mitigating actions to the diverging interests of property owners and managers. In the foundational corporate governance paper by Jensen and Meckling (1976), earlier theories on agency, delegated authority, and property rights were unified in the principal-agent relationship. In an agency relationship, a person or owner (the "principal") engages another person or manager (the "agent") to act on the principal's behalf through the delegation of decision-making authority to the agent (Jensen & Meckling, 1976; Ross, 1973). This relationship gives rise to the principal-agent problem (Eisenhardt, 1989), whereby conflicting interests, asymmetric information, delegated authority, and protection from disciplinary and monitoring mechanisms incentivize deviation from the principal's interests.

Agency costs address the value loss associated with the deviation of the principal's interests by the agent and arise from three main sources. First, the agent incurs bonding costs when building trust with the principal by credibly bonding their

incentives to the principals', improving transparency, or contractually limiting their power to deviate from the interests of the principal. Second, monitoring costs incur to the principal as expenses associated with observing and constraining the agent's behavior or aligning their interests to the principals'. Third, residual loss is the deviation from value-maximizing activities by the agent despite optimal bonding and monitoring, as the cost of fully enforcing incentives alignment would exceed the benefits from doing so (Fama & Jensen, 1983; Jensen, 1983; Jensen & Meckling, 1976).

Conflicts of interest in agency theory can occur across different stakeholders to the firm. Preliminary papers emphasized the relationship between shareholders and managers. However, Jensen & Meckling (1976) emphasized the shareholder-manager relationship as just one of many in a nexus of implicit and explicit relationships that constitute the modern firm. Stakeholders constitute any group similarly affected by the dynamics of the firm (Freeman, 1984) by being bound to the nexus of relationships that give rise to agency problems. Agency theory therefore encompasses conflicts of interest between and across all stakeholder types to the firm, including managers, shareholders, debtholders, employees, customers, suppliers, and the general public (Hill & Jones, 1992).

Conflicts of interest in agency theory can happen between both different and similar stakeholder types (Urban, 2019). The quintessential agency problem across stakeholder types is the shareholder-manager conflict. It occurs when managers shirk (by exerting insufficient effort, avoiding cognitively difficult activities, and underinvesting in efficiency improvement), entrench themselves (by investing in unprofitable projects, underinvesting to avoid firm-specific risk, and resisting takeovers), and collect private benefits (by exploiting perks, promoting nepotism, and engaging in insider trading) (Bøhren & Ødegaard, 2001; Goergen, 2018; Tirole, 2001; Urban, 2019). Between similar stakeholders, the quintessential agency problem is the dominant-dispersed shareholder conflict. It manifests when dominant shareholders expropriate dispersed shareholders via their control rights (Shleifer & Vishny, 1997). The dominant shareholder may expropriate the dispersed shareholders via tunneling (transferring assets to themselves), conducting transfer pricing (overcharging the firm), and engaging in nepotism (appointing relatives to top positions instead of the most competent candidate) (Goergen, 2018; Johnson et al., 2000; Urban, 2019).

Agency problems exist across all stakeholder groups. Debtholders risk expropriation by shareholders or managers via excessive risk-taking, changes in control, or large dividends that increase equity value at the expense of existing bonds (Asquith & Wizman, 1990; Dhillon & Johnson, 1994; Jensen & Meckling, 1976). Oppositely, debtholders may instill agency costs to shareholders by exploiting private information to increase borrowing costs or colluding with shareholders under financial distress to collect their senior debt claims at the expense of non-financial stakeholders (Berlin et al., 1996; Greenbaum et al., 1989). Note that examples of agency problems among corporate stakeholders have been defined here. However, agency problems can arise in any circumstances where corporate effort between two or more people occurs (Jensen & Meckling, 1976). Such circumstances all share a common characteristic: the extraction of private benefits by an agent at the expense of a principal, while the incentives, conditions, and mechanisms for which they occur will differ (Urban, 2019).

2.2 Governance mechanisms

A system of governance is needed to deal with corporate agency problems and minimize the associated value loss from agency costs. This requires aligning the incentives of shareholder types and managers to ultimately limit the extraction of private benefits by the agent. Goergen and Renneboog (2006, p. 100) equivalently define corporate governance as mechanisms for interest alignment:

> *A corporate governance system is the combination of mechanisms which ensure that the management (the agent) runs the firm for the benefit of one or several stakeholders (principals). Such stakeholders may cover shareholders, creditors, suppliers, clients, employees, and other parties with whom the firm conducts its business.*

Interest alignment mechanisms improve economic efficiency (Goergen & Renneboog, 2006) and the failure of these mechanisms enables the agent, through opportunistic behavior, to extract private benefits at the cost of the principal and the economy (Urban, 2019). The main theoretical models on interest alignment mechanisms derived from ownership structure are highlighted below. However, specific mechanisms are more likely to prevail in some countries compared to others due to different systems of corporate governance, and most studies on their impact have been in an Anglo-American context. An implication is that the impact of ownership

governance mechanisms outside the USA and UK governance systems remains underexplored (Goergen, 2018). Our evaluation of the standing theories from a Norwegian perspective serves to bridge this theoretical gap and address the deficit of empirical research on the impact of these mechanisms in other governance systems.

2.2.1 Ownership concentration

Berle and Means (1932) nascently highlighted the separation of ownership and control in modern corporations between shareholders who provide equity financing and managers who run the firm. Jensen and Meckling (1976) link this separation of ownership and control to agency theory and argue that if the monitoring of managers is weak, agency costs may incur. Monitoring by shareholders is, therefore, a crucial incentives alignment mechanism to minimize the agency problem and ensure that the behavior of managers maximizes value creation. However, monitoring is costly, and coordination problems between small shareholders incentivize free riding on monitoring efforts. Owners must therefore hold a sufficiently large claim to the residual cash flows of the firm to find it worthwhile to monitor managers (Shleifer & Vishny, 1986). If monitoring improves the quality of managerial decisions and other adverse effects of ownership concentration do not outweigh the benefits, then increased ownership concentration is expected to improve firm value (Bøhren & Ødegaard, 2001; Kahn & Winton, 1998; Maug, 1998).

Concentrated ownership is also associated with agency problems. Burkart et al. (1997) emphasize a trade-off between managerial control and initiative and argue that tight control by shareholders will *ex ante* impose an expropriation threat on managers that reduces managerial initiative to exert costly but shareholder value-maximizing effort. Dominant shareholders may also expropriate minority shareholders and even collude with managers via self-dealing mechanisms of tunneling, transfer pricing, and nepotism, while non-controlling owners are unable to intervene (Goergen, 2018; Johnson et al., 2000; Shleifer & Vishny, 1997; Urban, 2019). Barclay and Holderness (1989) argue that these so-called private benefits of control are value increases that accrue disproportionality to controlling shareholders and that blocks of shares trading at a premium reflect the value benefits from control.

Empirical studies fail to consistently find a positive link between ownership concentration and firm performance, reflecting the mixed predictions from theory. Franks (2001) and Renneboog (2000) do not find that ownership concentration leads to more managerial disciplining. Furthermore, Banerjee‘s (1997) empirical

study on French holding companies finds that not all large shareholder types are equally likely to exercise the monitoring required to create value. Morck et al. (1988) argue that the failure of some papers to find a relationship between ownership concentration and firm performance may be due to the misuse of a linear specification to capture a nonlinear relationship. Correspondingly, there is some evidence that strong family ownership and control creates value but that the relationship is nonlinear and becomes negative up to a certain threshold (Anderson & Reeb, 2003) and only holds if the founder is CEO or chairman (Andres, 2008; Villalonga & Amit, 2006). This suggests that in the context of family control by founders, the benefit of mitigating shareholder-manager agency conflicts outweighs the costs from minority-majority shareholder agency conflicts.

In summary, theoretical papers do not provide a consistent prediction on the impact of ownership concentration, and empirical studies have mixed predictions given the type of large shareholder and degree of ownership concentrations. Therefore, more empirical studies are needed considering different governance systems to adequately uncover a positive or negative link between ownership concentration and firm performance. We thus propose the following hypothesis:

Hypothesis 1: *Ownership concentration does not affect firm performance*

2.2.2 Insider ownership

As the principal-agent problem originates from the separation of ownership and control, a key mechanism to align incentives may be to make the manager a shareholder (Jensen & Meckling, 1976). As insider ownership increases, managers' costs associated with deviating from shareholder value-maximizing activities will increase. Higher insider ownership should therefore align the interests of owners and managers as the managers become owners themselves. Accordingly, the need for monitoring by large shareholders is reduced. The Morck et al. (1988) convergence-of-interest hypothesis therefore posits that firm performance increases uniformly with insider ownership.

Insider ownership may also cause agency problems from managerial entrenchment. In some jurisdictions, managers with a certain ownership stake may be shielded from disciplinary actions by the board (e.g., having the power to call resolutions to general meeting agendas, preventing extraordinary general meetings as a blocking minority, and creating counter-resolutions) (Goergen, 2018). Hence, a

manager with a substantial ownership stake may have enough power to resist governance mechanisms and guarantee her employment while deriving private benefits of control. Accordingly, the entrenchment hypothesis by Morck et al. (1988) predicts lower firm performance when a manager has an ownership stake that shields her from disciplinary actions. However, the level of ownership stake at which firm performance becomes adversely affected cannot be predicted. Entrenchment can set in at different stakes given the manager's status, the presence of other large shareholders, and the legal system. Insiders also carry a larger share of the lower market value from their value-destroying actions as their ownership stake increases. The insider ownership's effect on firm performance may, therefore, once again turn positive at even higher levels of ownership stakes (Bøhren & Ødegaard, 2001; Morck et al., 1988).

Additionally, empirical evidence by Morck et al. (1988) finds that insider ownership positively affects firm performance from 0 to 5%, supporting the convergence-of-interest hypothesis dominating the relationship. They find a negative effect from 5 to 25%, supporting value destruction from the entrenchment hypothesis. Finally, insider ownership above 25% creates value, supporting the idea that convergence-of-interest once again dominates at very high ownership stakes. More recently, findings from Shan (2019) suggest that the convergence-of-interests effect dominates from 0 to 20%.

McConnell and Servaes (1990) find a concave link between insider ownership and firm performance, where stakes held by insiders improves firm performance from 0% until the inflection point in the 30 to 70% range of insider ownership. Bøhren and Ødegaard (2001) confirm these findings in a Norwegian context with a pooled inflection point of around 50%. These findings suggest that the convergence-of-interest value creation dominates until a certain threshold until the negative effect of entrenchment dominates at all higher ownership stakes.

Kole (1996) and Himmelberg et al. (1999) allow for insider ownership to depend on past performance and fail to find a link between managerial ownership and current performance. Consistent with these findings, Rose (2005) investigates the Danish governance system and finds that causation runs from firm performance to insider ownership. Additionally, Agrawal and Knoeber (1996) find no effect of insider ownership on firm performance when accounting for the interdependence of other governance mechanisms, while other studies find that insider ownership interacts with other governance mechanisms (Adelopo et al., 2023; Guthrie & Hobbs,

2021) and creates value if these mechanisms are weak (Lilienfeld-Toal & Ruenzi, 2014).

The inconsistencies in current empirical evidence, the interdependence of governance mechanisms, and theoretical ambiguity between the effect of the convergence-of-interests hypothesis vis-à-vis the entrenchment hypothesis lead us to propose the following hypothesis:

Hypothesis 2: *Insider ownership does not affect firm performance*

2.2.3 Institutional ownership

The governance mechanisms of institutional owners become increasingly important to investigate. Institutional owners represent a growing share of global equity and are the most important shareholders in the US, UK, and other countries (Bøhren & Ødegaard, 2001; Goergen, 2018). Jakobsen and Grünfeld (2006) consider the Norwegian equity market and find that international institutional investors account for a high degree of share turnover, and that a majority of equity is owned in aggregate by the State, Co-operatives, holding companies, and institutional investors.[1] Yet despite their importance, there exists a dearth of research on institutional investors in Norway (Gulbrandsen, 2004).

Institutional ownership may improve firm performance if the institutions have lower monitoring costs and better advice-giving competencies. The efficient monitoring hypothesis posits that institutions have lower monitoring costs and that the value of their advice is higher (Bøhren & Ødegaard, 2001; Pound, 1988). It follows from the principal-agent model that agency costs are reduced, and intervention becomes more likely with lower monitoring costs (Jensen & Meckling, 1976). This implies that institutional ownership positively affects firm performance.

Conversely, institutions may lower firm value from conflicts of interest with investee firms and from institutions' fiduciary role, which may reduce value creation incentives. The conflict-of-interest hypothesis states that institutions may avoid challenging incumbent managers of firms where they are jointly invested and have business relationships to protect the latter (Bøhren & Ødegaard, 2001; Pound,

[1] The data used by Jakobsen and Grünfeld (2006) is from 2003, reflecting the dearth of recent empirical research on Norwegian institutional ownership. Jakobsen and Grünfeld (2006) identify increased specialization, internationalization, and risk-adjusted return optimization as key drivers for the high share of institutional owners, and we expect these to have accelerated the trend toward institutional ownership in more recent years.

1988). It may be more worthwhile for the institution to cater to management and not pursue shareholder-maximizing activism, deriving more value from its business relationship with the firm. We extend the conflict-of-interest hypothesis to cover the investments the institutional investor has in other companies and posit that institutional owners may refrain from pursuing value-creating activities in a given firm to protect its other portfolio firms, for example, to protect the other firm's market share or profitability.

The fiduciary role of institutions may reduce the incentive and quality of monitoring. Institutional shareholders are entities that invest other people's money. These entities, including banks, pension funds, mutual funds, and insurers, often have investments from a large and dispersed pool of investors with low monitoring incentives. Institutions are, therefore, subject to agency problems between their financiers and the institution's managers. Accordingly, the strategic-alignment hypothesis posits that the agency problems between the invested company's manager and its owner and between the institution's manager and financiers jointly reduce incentives for shareholder value maximization (Bøhren & Ødegaard, 2001; Pound, 1988).

Empirical evidence finds positive and negative effects on performance and the mitigation of agency problems from institutional ownership. Lee and Park (2009) find a positive effect on shareholder value from institutional activism. Oppositely, Bushee (2001) finds that institutions prefer short-term gains. Whether institutional shareholders actively engage managers is hard to determine, as activism may also happen through private interventions and not only voting. A case study by Becht et al. (2010) documents that some institutional investors actively engage with the management, and firm performance improves as a result, but this activism often occurs non-publicly.

Theory provides no singular prediction on the effect of institutional ownership on firm performance, and empirical studies are split on whether institutions actively and effectively monitor management. The lack of empirical studies in Norway also means we cannot *a priori* conclude whether institutional ownership is an effective governance mechanism. This prompts us to propose the following hypothesis:

Hypothesis 3: *Institutional ownership does not affect firm performance*

2.2.4 State ownership

Agency theory mostly indicates a negative link between state ownership and firm performance, which is highly relevant for Norway, where the state plays an important role in the domestic equity market (Jakobsen & Grünfeld, 2006). Grünfeld and Jakobsen (2006) argue that the distance between ownership (by the Norwegian population as financiers) and control (by the state as investor) is large enough for the state not to hold residual accountability to the economic consequences of its investment gains and losses. State ownership is, therefore, an extreme case of the strategic-alignment hypothesis, having less incentive to monitor as fiduciary to other people's money. Aguilera et al. (2021) argue that a state owner may have lower monitoring competencies, implement less competitive strategies, and are incentivized to pursue societal goals which deviate from shareholder value maximization. Firm ownership may be seen as another venue to push societal agendas, similar to taxation and welfare. For example, to pursue low unemployment rates by maintaining high employment in state-owned firms. State ownership may also reduce the effectiveness of market governance mechanisms (Grünfeld & Jakobsen, 2006). Publicly owned firms are more protected against bankruptcy when the state acts as the "financier of last resort," which may reduce the disciplining mechanism of product markets. The state may also be reluctant to give up ownership or offer competitive managerial remuneration due to concerns outside shareholder value-maximization, limiting the disciplining mechanism of the market for corporate control and managerial labor markets. Agency theory thus points to state owners' lack of willingness and ability to pursue value creation effectively (Aguilera et al., 2021). However, state ownership may also confer advantages not available to privately-owned firms, including nonmarket rents (exclusive operating rights, subsidies, and preferential financing) and foreign government networks (Aguilera et al., 2021; Boubakri et al., 2008, 2018; Lazzarini & Musacchio, 2018).

Empirical studies mostly indicate a negative impact or ambiguous effect of state ownership on firm performance. Shirley and Walsh (2000) review 52 state ownership studies and find that private firms significantly outperform their counterparts in 32 papers. Only five studies support state ownership improving performance, while 15 papers find no meaningful differences. Lazzarini and Musacchio (2018) examine firms with majority and minority state ownership and find that they do not generally underperform private firms, except when societal shocks occur, making the state prioritize societal goals over performance. A meta-study by Aguilera et al.

(2021) finds that state-owned firms generally underperform but with considerable heterogeneity across countries. Goldeng et al. (2008) find that state-owned firms in Norway have lower return on assets (RoA) and costs relative to sales revenue compared to privately-owned firms.

Despite agency theory predicting a negative effect on firm performance from state ownership, nonmarket mechanisms may cancel out or exceed the costs, while current empirical studies also contain varying results. This ambiguity in theoretical predictions and current evidence leads us to propose the following hypothesis:

Hypothesis 4: *State ownership does not affect firm performance*

3 Data

Our dataset consists of a cross-section of Norwegian firms with observations of the ownership structure governance mechanisms of interest from 2000 to 2015. The data was obtained from the CCGR (Centre for Corporate Governance Research) at BI Norwegian Business School and is compliant with all legal and ethical regulations. The initial data universe comprises all companies in Norway, irrespective of size, listing status, or any other criteria. To clean the data, we remove outliers and erroneous data points from the sample that would otherwise skew our analysis and findings. Additionally, we restrict our analysis to companies with turnover and balance sheet asset values greater than one hundred million NOK. This restriction allows us to remove micro- and small enterprises from our sample (Publications Office of the EU, 2016).

Our final subsample consists of 1,145 observations across the 15 years from 2000 to 2015, resulting in an average of 76 companies yearly. This represents a substantial reduction from the initial universe of companies in our dataset, but in our view, one that stands to improve the quality of our estimates and conclusions. We note, however, that we are dealing with an unbalanced panel of data, as the number of companies in our sample is not stable throughout the years. This should not be an issue, provided that the reason we have missing data is not correlated with the idiosyncratic error terms (Wooldridge, 2013). Furthermore, given that trying to balance the panel by removing the companies for which we do not have all observations throughout the years would not be a suitable approach, we choose to perform our analysis on the panel as it is.

We include several proxies for each ownership governance mechanism of interest. Using such alternative proxies throughout our analysis should help improve the validity of our potential results and the robustness of our conclusions by letting us assess their sensitivity to different measures of choice. Table 3.1 reports summary statistics for the variables in our sample.

Table 3.1

Summary Statistics

Table 3.1 reports the summary statistics for governance mechanism variables, control variables, and firm performance variables, for our sample of Norwegian firms. The ownership concentration variables are the Herfindahl index, shares held by >5% owners, and shares held by >10% owners. The insider ownership variables are the fraction of CEO ownership and the fraction of CEO family ownership. The institutional ownership variables are the fraction of institutional ownership and whether the largest owner is institutional. The state ownership variables are the fraction of state ownership and whether the largest owner is the state. The control variables are book value of assets, investment intensity, and leverage. The firm performance variable is return on assets (RoA). The summary statistics are the number of observations, median, mean, and standard deviation, of the variables. The variables are reported in the first column. The summary statistics are reported in the remaining columns.

Variable	N	Median	Mean	Std. Dev.
Ownership concentration				
Herfindahl index	1,145	0.44	0.52	0.33
Share >5%	1,145	100.00	95.00	13.20
Share >10%	1,145	99.80	88.19	20.55
Insider ownership				
CEO owner	1,145	41.44	49.29	35.28
CEO family owner	1,145	91.00	70.86	34.48
Institutional ownership				
Inst. owner	1,145	0.00	2.31	11.65
Largest owner inst.	1,145	0.00	0.02	0.15
State ownership				
State owner	1,145	0.00	0.24	3.31
Largest owner state	1,145	0.00	0.00	0.07
Controls				
Book assets	1,145	181,900,000	354,700,000	601,524,231
Inv. Intensity	1,145	0.72	5.35	37.02
Leverage	1,145	0.16	0.23	0.24
Firm performance				
Return on assets	1,145	0.06	0.10	0.12

To capture the various dimensions of ownership concentration, we employ three measures widely used in existing literature. Two variables, aggregate share held by owners with more than 5% and more than 10% of equity, yield two ownership concentration measurements through the presence of large shareholders. Moreover, we also measure ownership concentration with the Herfindahl index, which takes squares of the percentage share of equity held by each shareholder and adds the

squared values together. This measure has boundaries of $\frac{1}{n}$ and 1, where 1 represents full ownership by one singular owner, and the lower the value, the higher the dispersion in ownership. Its calculation is given by:

$$Herfindahl\ index = \sum_{i=1}^{N} (OS_i)^2$$

where OS_i is the ownership share of the individual firm held by shareholder i and N is the number of shareholders.[2]

In aggregate, and on a pooled basis, we observe that the firms in our sample seem to display a pattern of high concentration levels, irrespectively of our measure of choice. The mean (0.52) and standard deviation (0.33) for the Herfindahl Index reported are both slightly greater than the ones reported by Bøhren and Ødegaard (2001) in their study of Norwegian firms. Firms in our sample also seem to indicate the presence of strong blockholder ownership, with very high ownership levels by owners with greater than 10% and 5% shares.

Insiders can exercise considerable influence over the company through their individual ownership. However, they may also aggregate the ownership held by close relatives with incentives aligned with their own to exercise even greater control over the company. Therefore, we consider the individual ownership fraction held by the CEO and the fraction held by the CEO's family to measure insider ownership. Regardless of the chosen metric, our sample of Norwegian companies indicates high insider ownership.

For state- and institutional owner types, we use proxies measuring the fraction held by each, and dummy variables depending on the type of the largest owner. This choice of variables allows us to capture two important dimensions of ownership types and further support our potential findings relating firm performance to institutional- and state ownership.

We include several control variables in our multivariate regression models that have an observable impact on firm performance to isolate the effect of the ownership governance mechanisms. Following previous choices in the literary landscape, we opt for firm size (Demsetz & Lehn, 1985), measured through the book value of assets, investment intensity (Bøhren & Ødegaard, 2001), calculated by normalizing the firm's investments with its reported income level, and leverage (Morck et al.,

[2] Adapted from Rhoades (1993) 'The Herfindahl-Hirschman Index'.

1988) as the control variables in our analysis. We further note that we will log transform the firm size control variable in the model specifications to enhance the data interpretability. Summarizing our sample, we observe that the average firm has assets valued at approximately 355 million NOK, investment intensity ratio of 5.35, and a debt-to-asset ratio of 0.23. Deviations around mean values are nevertheless sizeable, indicating sufficient heterogeneity across the wide range of firms in our dataset.

Lastly, we opt for RoA as a performance measure, which is a common choice in empirical research. Including private and public companies in our analysis keeps us from establishing market values for equity and estimating Tobin's Q. On average, companies in our sample report RoA in the 10% range.

4 Empirical strategy

We analyze the following corporate governance mechanisms of interest: ownership concentration, insider-, institutional-, and state ownership, to answer whether ownership structure governance mechanisms affect Norwegian firm performance. The analytical tools we plan to employ are largely based on regression analysis, and our sample consists of panel data for a cross-section of firms that represent a sufficiently broad range in the use of each mechanism under investigation. Similarly to Bøhren & Ødegaard (2001), we employ a step-by-step approach to studying these governance mechanisms, starting with the simplest of model specifications and transitioning to more advanced ones through continuous refinements and gradual model adjustments.

In each section, we start with a univariate approach and then analyze the interactions between governance mechanisms, control variables, and firm performance, which we progressively develop into multivariate models. In addition to pooled regression, at this stage, we also introduce the concept of time-fixed effects and year-by-year regressions and implement these carefully in all our models. At each step in our analysis, we report the results of our models, highlighting specific points when necessary, and propose a possible interpretation of those results through the lens of corporate governance theory and previous empirical evidence. Nevertheless, because this first step is only a rudimentary method of analysis known to carry several shortcomings that can bias our conclusions, we will save more extensive interpretations for later stages in the sections. Throughout each section, we transition from the single-equation, univariate approach to a multivariate one by including

relevant controls. The emphasis in section 5.1 is on ownership concentration as a mechanism, while a similar focus to the other mechanisms is dedicated in sections 5.2, 5.3, and 5.4, following the same methodological approach. As a first exercise in these sections, we examine the relationships between the mechanisms of interest and firm performance, first with univariate models and then while controlling for variables known to influence firm performance yet cannot be characterized as governance mechanisms. One pitfall of linear multivariate regression models is model misspecification, which becomes relevant in the case of nonlinearity in the relationships under study (Wooldridge, 1994). The econometric reasoning, along with theory and empirical evidence arguing for possible nonlinearity in the link between firm performance and corporate governance mechanisms (Morck et al., 1988), motivates our choice to extend the linear models to nonlinear ones. This will be an exercise continuously endeavored at each stage of our analysis of ownership concentration and insider ownership, where we have theoretical reasoning to explore possible nonlinearity in their link to firm performance. As argued by McConnell & Servaes (1990), this should be done via quadratic approximation since it offers substantial advantages over piecewise linear regression.

The natural progression followed through the sections will culminate with the multi-mechanism, full multivariate model in section 5.5 that examines the relationship between the ownership governance mechanisms of interest and firm performance in a less restrictive context. This has the additional benefit of allowing us to grasp better the full extent of the interactions between mechanisms and firm performance. By exploring the interactions and relationships between the mechanisms themselves, we gain a complete understanding of the extent to which they tend to depend on one another and their substitutive or complementary nature.

Lastly, our conclusion, limitations, and suggestions for further research of our analysis are aggregated in section six.

5 Results

5.1 Ownership concentration

Ownership concentration can positively or negatively affect firm performance, given the impact on agency costs. The presence of large shareholders reduces agency costs if their monitoring induces managerial value creation incentives that outweigh the costs of monitoring and coordination among shareholders (Bøhren & Ødegaard, 2001; Kahn & Winton, 1998; Maug, 1998; Shleifer & Vishny, 1986).

However, controlling shareholders may also expropriate the firm by extracting private benefits that negatively impact firm performance (Barclay & Holderness, 1989; Shleifer & Vishny, 1997). Given that empirical evidence is inconclusive on the role of large shareholders as mechanisms of governance (e.g., Banerjee et al., 1997; Franks et al., 2001; Renneboog, 2000), we expect ownership concentration to not affect firm performance.

In this section, we analyze the link between ownership concentration and firm performance through the lens of different models. We start with the simplest approach, analyzing the interaction between our concentration measures, Herfindahl index, and shares held by owners with greater than 5% and 10% stakes and firm performance one at a time and at the singular level. As this represents the most partial of approaches, we report only estimated signs of coefficients and significance levels, postponing more extensive interpretations to a later stage after we implement more complex models. These more complex models are founded in multivariate year-by-year regressions and under different functional form specifications.

Table 5.1.1 summarizes the results from all univariate regression models linking ownership concentration variables to firm performance. For each model, we regress RoA on one independent variable proxying ownership concentration and report significance at the conventional levels of 1%, 5%, and 10% with *, **, and ***, respectively. As documented in Panel A, irrespectively of the measure of choice, the significant relationships between performance and concentration are negative.

However, a univariate, pooled regression model analysis can raise significant econometric issues. Importantly, when working with time series observations across several years, the same firm may appear multiple times in the sample, which can lead to issues of serial correlation (Wooldridge, 2010). Furthermore, given the possibility of a changing underlying relationship between the variables in focus across the 15-year period of our analysis, a time-independent model specification will also disregard a true picture of instability. To mitigate these issues, we run separate year-by-year regressions in addition to the pooled ones, a practice that will be followed throughout our investigation. Results from this approach should show no time-series correlation in a single year's cross-section and will reflect any structural changes in the relationship dynamics throughout the 15 years as varying patterns in the estimated coefficients.

Table 5.1.1

Univariate regressions of ownership concentration on firm performance

Table 5.1.1 reports the sign of the regression coefficients and significance levels (* 10%, ** 5%, *** 1%) from univariate regressions of firm performance on ownership concentration. The ownership concentration independent variables are the Herfindahl index, shares held by >5% owners, and shares held by >10% owners. The firm performance dependent variable is return on assets (RoA). The independent variables are reported in the first column. The coefficient signs and significance levels of firm performance regressed on ownership concentration are reported in panel A column two for the pooled regressions, and the year-by-year coefficient signs and significance levels are reported in the remaining columns in panel B.

Panel A: Pooled univariate regressions

Ownership concentration	RoA
Herfindahl index	-
Share >5%	-**
Share >10%	-**

Panel B: Year-by-year univariate regressions

Ownership concentration	RoA														
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Herfindahl index	-	-	+	+	+**	+***	+*	-	+	-	-	-	+	+	+
Share >5%	-	-	+	+*	+**	+***	+*	-	+	-	-	-	+	+	+
Share >10%	-	-	+	+*	+**	+***	+*	-	+	-	-	-	+	+	+

Nevertheless, the downside to running year-by-year regressions will be reflected in a smaller number of observations (from 1,145 in total to less than 100 per year), which should see the standard errors of the estimated coefficients increase and therefore bias our conclusions in favor of no relationship between performance and concentration.

The year-by-year univariate regression models of firm performance on ownership concentration are documented in Panel B of Table 5.1.1. Indeed, we find evidence of instability in the relationship between concentration and performance from 2000 to 2015, which is observable regardless of the measure of choice and is mirrored in the changing coefficient signs from negative to positive. Further, based on year-by-year regressions, the period from 2004 to 2007 contradicts the previous observations from the pooled results, displaying a positive and significant association between all concentration measures and firm performance instead. We will be careful not to place too much weight on any interpretations drawn thus far, as the room for improvement in our models remains critically wide.

We have, until now, ignored the possibility that other variables beyond ownership concentration might impact firm performance. Naturally, it becomes relevant to extend our previous models by including control variables that may impact firm performance.

Table 5.1.2

Pooled multivariate regressions of firm performance on ownership concentration

Table 5.1.2 reports the sign of the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from pooled multivariate regressions of firm performance on ownership concentration. The ownership concentration independent variables are the Herfindahl index, shares held by >5% owners, and shares held by >10% owners. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on ownership concentration and control variables are reported in the remaining column.

Panel A: Herfindahl index

Variable	Coefficient (t-statistics)
Intercept	0.36***
	(4.23)
Herfindahl index	-0.01
	-(1.02)
Ln book assets	-0.01**
	-(2.52)
Inv. intensity	-0.00***
	-(3.65)
Leverage	-0.15***
	-(10.90)
n	1145
R^2	0.11
Adj. R^2	0.10

Panel B: Shares held by >5% owners

Variable	Coefficient (t-statistics)
Intercept	0.41***
	(4.58)
Share >5%	-0.00*
	-(1.89)
Ln book assets	-0.01***
	-(2.65)
Inv. intensity	-0.00***
	-(3.66)
Leverage	-0.15***
	-(10.85)
n	1145
R^2	0.11
Adj. R^2	0.11

Panel C: Shares held by >10% owners

Variable	Coefficient (t-statistics)
Intercept	0.38***
	(4.39)
Share >10%	-0.00
	-(1.48)
Ln book assets	-0.01**
	-(2.57)
Inv. intensity	-0.00***
	-(3.65)
Leverage	-0.15***
	-(10.82)
n	1145
R^2	0.11
Adj. R^2	0.11

In Table 5.1.2, we report the results from this approach at the pooled level by regressing firm performance on each chosen measure of concentration and relevant controls one at a time. These results show that by including the control variables in the linear model, only the fraction of shares held by owners with a greater than 5% stake remains significant (see Panel B – Table 5.1.2). Nevertheless, the small absolute size of the coefficient in Panel B suggests that concentration levels tend to have an almost negligible impact on firm performance, *ceteris paribus*, for the firms in our sample.

Implementing a corresponding year-by-year analysis to the multivariate approach leads us to the results documented in Table 5.1.3. We report coefficient estimates and significance levels for each concentration measure of choice across the 15-year period, with each panel summarizing the results for each respective concentration proxy. Corroborating our previous observation, the multivariate models also seem to indicate the presence of instability in the relationship between concentration measures and firm performance, irrespective of the measure of choice.

Table 5.1.3

Year-by-year multivariate regressions of firm performance on ownership concentration

Table 5.1.3 reports the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from year-by-year multivariate regressions of firm performance on ownership concentration. The ownership concentration independent variables are the Herfindahl index, shares held by >5% owners, and shares held by >10% owners. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on ownership concentration and control variables are reported in the remaining columns for the years 2000 to 2015.

Panel A: Herfindahl index

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	0.35	0.44*	0.30	0.70**	0.13	0.12	0.28	0.21	0.64	0.81*	0.75**	0.43**	0.15	0.35	0.58*	0.37
	(1.56)	(1.95)	(1.03)	(2.11)	(0.48)	(0.32)	(0.50)	(0.63)	(1.20)	(1.75)	(2.44)	(2.04)	(0.60)	(0.80)	(1.88)	(0.61)
Herfindahl index	-0.00	0.03	-0.04	-0.04	-0.01	0.07	0.00	-0.03	-0.08	0.06	-0.06*	0.00	0.00	0.07	-0.06	0.04
	-(0.03)	(0.96)	-(0.96)	-(0.86)	-(0.47)	(1.57)	(0.02)	-(0.67)	-(1.31)	(1.29)	-(1.92)	(0.06)	(0.07)	(1.31)	-(1.65)	(0.98)
Ln book assets	-0.01	-0.02	-0.01	-0.03	0.00	0.00	-0.00	-0.00	-0.02	-0.04	-0.03*	-0.02	-0.00	-0.01	-0.02	-0.01
	-(0.91)	-(1.55)	-(0.44)	-(1.50)	(0.24)	(0.06)	-(0.04)	-(0.06)	-(0.86)	-(1.48)	-(1.97)	-(1.59)	-(0.26)	-(0.57)	-(1.30)	-(0.39)
Inv. intensity	-0.01***	-0.00*	-0.00*	-0.00*	-0.01***	-0.01	-0.02***	-0.00*	-0.00	-0.00**	-0.00	-0.00*	-0.00	-0.00*	-0.00*	-0.00***
	-(3.45)	-(1.90)	-(1.99)	-(1.66)	-(3.70)	-(1.45)	-(2.81)	-(1.80)	-(1.14)	-(2.44)	-(1.06)	-(1.80)	-(1.09)	-(1.81)	-(1.84)	-(2.94)
Leverage	-0.17***	-0.11**	-0.20***	-0.23***	-0.19***	-0.15**	-0.25**	-0.18***	-0.22***	-0.06	-0.10**	-0.09***	-0.06	-0.15**	-0.15***	-0.18**
	-(3.34)	-(2.36)	-(3.39)	-(4.13)	-(4.33)	-(2.20)	-(2.22)	-(3.35)	-(2.97)	-(0.87)	-(2.44)	-(3.08)	-(1.57)	-(2.34)	-(3.17)	-(2.64)
n	89	86	78	97	108	65	54	82	29	54	64	54	81	81	97	26
R^2	0.19	0.12	0.18	0.22	0.24	0.16	0.20	0.17	0.33	0.19	0.20	0.22	0.05	0.12	0.22	0.38
Adj. R^2	0.16	0.07	0.14	0.19	0.21	0.10	0.14	0.13	0.22	0.12	0.14	0.16	0.00	0.08	0.18	0.26

Panel B: Shares held by >5% owners

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	0.32	0.52**	0.25	0.63*	0.17	0.07	0.26	0.36	1.15	0.49	0.53	0.60**	0.08	0.42	0.66**	0.38
	(1.29)	(2.07)	(0.82)	(1.71)	(0.61)	(0.16)	(0.50)	(1.04)	(1.64)	(0.93)	(1.42)	(2.21)	(0.32)	(0.91)	(2.09)	(0.63)
Share >5%	0.00	-0.00	0.00	0.00	-0.00	0.00	-0.00**	-0.00	-0.00	0.00	0.00	-0.00	0.00	0.00	-0.00	0.00
	(0.27)	-(0.60)	(0.68)	(0.43)	-(0.74)	(0.45)	-(2.27)	-(1.20)	-(0.78)	(0.57)	(1.04)	-(0.95)	(1.06)	(0.01)	-(0.96)	(1.23)
Ln book assets	-0.01	-0.02	-0.01	-0.03	0.00	0.00	0.01	0.00	-0.04	-0.03	-0.04**	-0.02	-0.00	-0.02	-0.02	-0.02
	-(0.81)	-(1.64)	-(0.50)	-(1.45)	(0.26)	(0.04)	(0.34)	(0.02)	-(1.36)	-(1.23)	-(2.13)	-(1.60)	-(0.23)	-(0.62)	-(1.33)	-(0.53)
Inv. intensity	-0.01***	-0.00*	-0.00*	-0.00**	-0.01***	-0.01	-0.02***	-0.00*	-0.00	-0.00**	-0.00	-0.00*	-0.00	-0.00	-0.00**	-0.00***
	-(3.46)	-(1.92)	-(1.92)	-(2.01)	-(3.61)	-(1.56)	-(2.98)	-(1.79)	-(0.67)	-(2.35)	-(1.29)	-(1.91)	-(1.13)	-(1.54)	-(2.13)	-(3.05)
Leverage	-0.17***	-0.11**	-0.21***	-0.23***	-0.18***	-0.16**	-0.23**	-0.19***	-0.20**	0.06	-0.09**	-0.10***	-0.06	-0.14**	-0.16***	-0.19**
	-(3.35)	-(2.39)	-(3.65)	-(4.12)	-(4.27)	-(2.44)	-(2.18)	-(3.45)	-(2.64)	-(0.93)	-(2.14)	-(3.13)	-(1.65)	-(2.23)	-(3.41)	-(2.83)
n	89	86	78	97	108	65	54	82	29	54	64	54	81	81	97	26
R^2	0.19	0.11	0.18	0.22	0.24	0.13	0.28	0.18	0.30	0.17	0.16	0.23	0.06	0.10	0.20	0.40
Adj. R^2	0.16	0.07	0.13	0.18	0.21	0.07	0.22	0.14	0.19	0.10	0.11	0.17	0.01	0.06	0.17	0.28

Table 5.1.3 (continued)

Year-by-year multivariate regressions of firm performance on ownership concentration

Panel C: Shares held by >10% owners

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	0.33	0.43*	0.29	0.69**	0.13	0.15	0.23	0.39	0.94	0.69	0.68**	0.40*	0.12	0.36	0.62**	0.45
	(1.39)	(1.84)	(1.00)	(2.05)	(0.48)	(0.37)	(0.44)	(1.22)	(1.68)	(1.48)	(2.04)	(1.77)	(0.46)	(0.81)	(1.99)	(0.74)
Share >10%	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	-0.00***	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	0.00
	(0.33)	(0.56)	(0.92)	(0.27)	-(0.52)	(0.36)	-(1.57)	-(2.69)	-(0.79)	-(0.37)	(0.64)	(0.49)	(0.50)	(0.67)	-(1.56)	(0.74)
Ln book assets	-0.01	-0.02	-0.01	-0.03	0.00	0.00	0.01	-0.00	-0.04	-0.03	-0.03*	-0.02	-0.00	-0.02	-0.02	-0.02
	-(0.83)	-(1.49)	-(0.61)	-(1.56)	(0.29)	(0.02)	(0.25)	-(0.09)	-(1.34)	-(1.07)	-(1.98)	-(1.50)	-(0.21)	-(0.68)	-(1.24)	-(0.55)
Inv. intensity	-0.01***	-0.00*	-0.00*	-0.00**	-0.01***	-0.01	-0.02***	-0.00	-0.00	-0.00**	-0.00	-0.00*	-0.00	-0.00	-0.00**	-0.00***
	-(3.47)	-(1.97)	-(1.96)	-(1.99)	-(3.60)	-(1.49)	-(2.97)	-(1.66)	-(0.67)	-(2.32)	-(1.33)	-(1.83)	-(1.12)	-(1.60)	-(2.05)	-(2.91)
Leverage	-0.17***	-0.11**	-0.22***	-0.23***	-0.19***	-0.16**	-0.24**	-0.20***	-0.21**	-0.07	-0.09**	-0.10***	-0.01	-0.14**	-1.16***	-0.19**
	-(3.35)	-(2.40)	-(3.72)	-(4.17)	-(4.30)	-(2.41)	-(2.19)	-(3.78)	-(2.79)	-(1.07)	-(2.17)	-(3.13)	-(1.63)	-(2.25)	-(3.33)	-(2.77)
n	89	86	78	97	108	65	54	82	29	54	64	54	81	81	97	26
R^2	0.19	0.11	0.18	0.22	0.24	0.13	0.24	0.24	0.30	0.16	0.16	0.22	0.05	0.11	0.21	0.37
Adj. R^2	0.16	0.07	0.13	0.18	0.21	0.07	0.18	0.20	0.19	0.10	0.10	0.16	0.00	0.06	0.18	0.25

For all three ownership concentration measures, we find variation in the signs of the coefficients throughout the 15 years, further supporting our choice to run separate regressions. Accounting for controls, the Herfindahl index now loses statistical significance in every year apart from 2010, where its negative effect on firm performance persists (see Panel A – Table 5.1.3). All else equal, this result indicates that a one-point increase in ownership concentration can be associated with a decrease in RoA in the order of 6%. Similar interpretations can be derived from Panels B and C in Table 5.1.3, where the concentration proxies of choice remain significant in 2006 and 2007, respectively, albeit with lower regression coefficients in absolute values.

The conclusions drawn from our results until now have presupposed that the functional relationship between ownership and firm performance is one of a linear nature. Should that not be the case, the models implemented may have been misspecified. Morck et al. (1988) pointed out that using a linear specification may fail to capture an important nonmonotonicity we expect to observe in the behavior of ownership concentration and performance, which is why we proceed with our analysis through the quadratic approximation model.

Table 5.1.4

Quadratic function multivariate regressions of firm performance on ownership concentration

Table 5.1.4 reports the sign of the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from quadratic function multivariate regressions of firm performance on ownership concentration. The ownership concentration independent variables are shares held by >5% owners, shares held by >10% owners, and the squared terms of these variables. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on ownership concentration and control variables are reported in the remaining column.

Panel A: Shares held by >5% owners

Variable	Coefficient (t-statistics)
Intercept	0.42***
	(4.33)
Share >5%	-0.00
	-(0.57)
(Sq) Share >5%	0.00
	(0.21)
Ln book assets	-0.01***
	-(2.64)
Inv. intensity	-0.00***
	-(3.66)
Leverage	-0.15***
	-(10.85)
n	1145
R^2	0.11
Adj. R^2	0.11

Panel B: Shares held by >10% owners

Variable	Coefficient (t-statistics)
Intercept	0.33***
	(3.74)
Share >10%	0.00
	(1.46)
(Sq) Share >10%	-0.00*
	-(1.83)
Ln book assets	-0.01**
	-(2.44)
Inv. intensity	-0.00***
	-(3.61)
Leverage	-0.15***
	-(10.88)
n	1145
R^2	0.11
Adj. R^2	0.11

The results of the quadratic approximation multivariate models at the pooled level are contained in Table 5.1.4. As the table documents, the squared concentration term seems significant when considering shares held by owners with greater than 10% stake, even though the coefficients remain almost negligible in absolute value.

Implementing the year-by-year regressions found relevant in our previous steps, we find further support for the idea that a squared term captures a vital component of the relationship between concentration and firm performance. As evidenced in Table 5.1.5, the years 2000 (see Panel B), 2006 (see Panels A and B), 2007 (see Panel B), 2008 (see Panel A), 2012 (see Panel B), and 2014 (see Panel A and B) are clear indications of the benefit of including the squared ownership proxy. In all these years, we find evidence of nonmonotonicity in the interaction of these variables, per the line of reasoning first proposed by Morck et al. (1988). Interestingly, we note that the signs for the coefficients in the significant nonlinear model specifications vary from year-to-year, offering further proof of underlying instability. In detail, we find an initially negative relationship that turns positive for higher concentration levels in 2006 and 2007 and vice-versa for 2000, 2008, 2012, and 2014. In aggregate, it is difficult to discern a predominant and significant sign of the relationship between ownership concentration and firm performance from the data at our disposal. However, throughout the 15-year period, a firstly positive and subsequently negative order of interaction does seem to prevail and to be more frequently observed in our sample. Furthermore, the improvements in the models stemming from the inclusion of the squared term are universal across years, with adjusted R-squared registering improvements over the previous linear specifications.

Table 5.1.5

Year-by-year quadratic function multivariate regressions of firm performance on ownership concentration

Table 5.1.5 reports the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from year-by-year quadratic function multivariate regressions of firm performance regressed on ownership concentration. The ownership concentration independent variables are shares held by >5% owners, shares held by >10% owners, and the squared terms of these variables. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on ownership concentration and control variables are reported in the remaining columns for the years 2000 to 2015.

Panel A: Shares held by >5% owners

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	0.22	0.53	0.06	0.89	0.37	-0.52	0.40	-0.06	-7.99*	3.46	0.17	-1.65	0.07	-0.63	0.09	0.36
	(0.83)	(1.65)	(0.17)	(1.77)	(1.07)	-(0.30)	(0.79)	-(0.05)	-(1.76)	(0.41)	(0.08)	-(0.59)	(0.29)	-(0.58)	(0.25)	(0.58)
Share >5%	0.00	-0.00	0.01	-0.01	-0.01	0.02	-0.01**	0.01	0.21*	-0.06	0.01	0.05	-0.00	0.03	0.02***	0.00
	(1.24)	-(0.11)	(0.98)	-(0.70)	-(1.04)	(0.37)	-(2.50)	(0.31)	(2.01)	-(0.34)	(0.22)	(0.78)	-(0.05)	(1.06)	(2.80)	(0.86)
(Sq) Share >5%	-0.00	0.00	0.00	0.00	0.00	0.00	0.00*	-0.00	-0.00*	0.00	-0.00	-0.00	0.00	-0.00	-0.00***	-0.00
	-(1.21)	(0.04)	-(0.92)	(0.75)	(0.96)	-(0.35)	(2.01)	-(0.39)	-(2.04)	(0.36)	-(0.17)	-(0.81)	(0.28)	-(1.06)	-(3.04)	-(0.66)
Ln book assets	-0.01	-0.02	-0.01	-0.03	0.00	0.00	0.01	0.00	-0.04	-0.03	-0.04**	-0.02	-0.00	-0.01	-0.02	-0.02
	-(0.84)	-(1.61)	-(0.60)	-(1.41)	(0.20)	-(0.02)	(0.30)	(0.00)	-(1.61)	-(1.24)	-(2.11)	-(1.50)	-(0.16)	-(0.60)	-(1.06)	-(0.59)
Inv. intensity	-0.01***	-0.00*	-0.00*	-0.00**	-0.01***	-0.01	-0.02**	-0.00*	-0.00	-0.00**	-0.00	-0.00**	-0.00	-0.00	-0.00**	-0.00***
	-(3.23)	-(1.90)	-(1.91)	-(2.02)	-(3.62)	(1.51)	-(2.34)	-(1.76)	-(0.57)	-(2.31)	-(1.29)	-(2.05)	-(1.14)	-(1.50)	-(2.03)	-(2.88)
Leverage	-0.17***	-0.11**	-0.21***	-0.23***	-0.19***	-0.17**	-0.23**	-0.19***	-0.23***	-0.07	-0.09**	-0.10***	-0.06	-0.13**	-0.16***	-0.18**
	-(3.36)	-(2.37)	-(3.60)	(4.20)	-(4.26)	-(2.44)	-(2.24)	-(3.43)	-(3.15)	-(0.97)	-(2.13)	-(3.17)	-(1.63)	-(2.09)	-(3.43)	-(2.51)
n	89	86	78	97	108	65	54	82	29	54	64	54	81	81	97	26
R^2	0.21	0.11	0.18	0.22	0.25	0.13	0.34	0.18	0.41	0.17	0.17	0.24	0.06	0.12	0.28	0.41
Adj. R^2	0.16	0.06	0.13	0.18	0.21	0.05	0.27	0.13	0.28	0.08	0.09	0.16	0.00	0.06	0.24	0.26

Panel B: Shares held by >10% owners

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	0.21	0.45*	0.25	0.57	0.02	0.12	0.39	0.87**	0.36	0.10	0.52	0.37	0.11	0.40	0.37	0.45
	(0.88)	(1.79)	(0.84)	(1.59)	(0.07)	(0.24)	(0.77)	(2.28)	(0.37)	(0.06)	(1.36)	(1.62)	(0.45)	(0.74)	(1.21)	(0.72)
Share >10%	0.00*	-0.00	0.00	0.00	0.00	0.00	-0.01***	-0.02**	0.02	0.01	0.01	0.00	0.00*	-0.00	0.01**	0.00
	(1.77)	-(0.12)	(0.55)	(1.06)	(0.92)	(0.13)	-(2.96)	-(2.54)	(0.68)	(0.40)	(0.86)	(0.96)	(1.74)	-(0.05)	(2.48)	(0.28)
(Sq) Share >10%	-0.00*	0.00	-0.00	-0.00	-0.00	-0.00	0.00**	0.00**	-0.00	-0.00	-0.00	-0.00	-0.00*	0.00	-0.00***	-0.00
	-(1.74)	(0.24)	-(0.37)	-(1.03)	-(1.04)	-(0.09)	(2.65)	(2.21)	-(0.74)	-(0.41)	-(0.78)	-(0.87)	-(1.67)	(0.13)	-(2.93)	-(0.17)
Ln book assets	-0.01	-0.02	-0.01	-0.03	0.01	0.00	0.01	-0.00	-0.04	-0.03	-0.03**	-0.02	-0.01	-0.02	-0.02	-0.02
	-(0.62)	-(1.50)	-(0.57)	-(1.44)	(0.47)	(0.02)	(0.26)	-(0.27)	-(1.33)	-(1.03)	-(2.06)	-(1.50)	-(0.39)	-(0.65)	-(1.02)	-(0.55)
Inv. intensity	-0.01***	-0.00*	-0.00*	-0.00*	-0.01***	-0.01	-0.02**	-0.00*	-0.00	-0.00**	-0.00	-0.00*	-0.00	-0.00	-0.00*	-0.00**
	-(3.38)	-(1.96)	-(1.93)	-(1.90)	-(3.56)	-(1.48)	-(2.38)	-(1.82)	-(0.63)	-(2.28)	-(1.27)	-(1.86)	-(1.04)	-(1.59)	-(1.98)	-(2.84)
Leverage	-0.18***	-0.11**	-0.21***	-0.23***	-0.19***	-0.16**	-0.22**	-0.17***	-0.24***	-0.07	-0.09**	-0.10***	-0.06*	-0.14**	-0.15***	-0.19**
	-(3.48)	-(2.39)	(3.53)	-(4.14)	-(4.28)	-(2.36)	-(2.13)	-(3.25)	-(2.83)	-(1.10)	-(2.26)	-(3.19)	-(1.76)	-(2.23)	-(3.24)	-(2.57)
n	89	86	78	97	108	65	54	82	29	54	64	54	81	81	97	26
R^2	0.22	0.11	0.18	0.23	0.25	0.13	0.34	0.28	0.32	0.17	0.16	0.23	0.08	0.11	0.28	0.37
Adj. R^2	0.18	0.06	0.12	0.18	0.21	0.05	0.27	0.23	0.17	0.08	0.09	0.15	0.02	0.05	0.24	0.21

Overall, we do not consistently find that ownership concentration does not affect firm performance, indicating that ownership concentration tends to impact firm agency costs, albeit modestly and without exact predictions on the direction of the effect. The observed relationship between ownership concentration and firm performance is not stable year-to-year, with the variable's significance and coefficient signs changing. Furthermore, the three proxies for ownership concentration do not consistently deliver similar predictions on firm performance. Notably, most significant coefficients of ownership concentration from the linear regression models have a value of zero. Introducing a quadratic term extends the range of significant linear term coefficients from -0.02 to 0.02, with the shares held by >5% owners in 2008 being an outlier, with an estimated coefficient of 0.21. Our results indicate that while ownership concentration may impact firm value, the economic effect seems to be negligibly positive or negative in many instances. Hence, we cannot a priori conclude that the presence of large shareholders mitigates or exacerbates agency costs.

Our findings support a curvilinear relation between ownership concentration and firm performance. Including a squared term broadly increases the explanatory power of the models and suggests that ownership concentration may improve firm value up to a certain threshold, after which there are marginal costs to added concentration. In line with our prior findings, however, we observe general instability between the year-by-year relationship of the variables. Additionally, the significant squared terms all present an estimated coefficient of approximately 0. This suggests that the relationship between ownership concentration and firm performance is only marginally concave.

The weakness of the nonmonotonic relationship and instability across years does not allow us to determine a clear threshold of ownership concentration, at which agency costs from value expropriation by controlling owners outweigh the benefits from firm monitoring, and vice versa. Even so, different levels of ownership concentration seemingly affect firm performance, but the different agendas and strategies imposed by large shareholders on their firm's portfolio may contribute to the discrepancy in our findings. The strategies can also vary in nature and outcome given specific time periods, e.g., in the end-cycle period of an economic expansion. The heterogeneity of large shareholders consequently raises the possibility that specific owner types may provide a more apparent directional impact on firm value, which we explore in the subsequent sections.

5.2 Insider ownership

Insider owners may also accumulate concentrated shares of equity ownership. Meanwhile, their position in the firm's strategic leadership allows them to align the firm more effectively towards value creation or extract private benefits to the detriment of firm performance. According to the convergence-of-interest hypothesis, more insider ownership will increase firm performance due to the alignment of manager-shareholder interests. Conversely, the managerial entrenchment hypothesis predicts worse performance from increased insider holdings as managers derive private benefits of control. Notably, theory does not clearly predict which effect dominates (Morck et al., 1988). Meanwhile, some papers indicate a curvilinear relationship between insider holdings and firm performance (Bøhren & Ødegaard, 2001; McConnell & Servaes, 1990; Shan, 2019), where the convergence-of-interest effect positively affects performance up until a given threshold of insider holdings, by which the managerial entrenchment effect subsequently dominates. There is, however, evidence that firm performance is the determinant of insider ownership (Rose, 2005) and that the level of insider holdings no longer has a discernible effect on value creation when accounting for past performance. Given the ambiguous predictions from the current literature, we expect that insider ownership does not affect firm performance.

In this section, we follow a similar approach to the one employed for ownership concentration, investigating the interactions between insider ownership and firm performance through a range of models. Once again, we will begin with the simplest of approaches and progressively develop our models to account for the relevant control variables and a possibly nonlinear functional form specification. In addition, we will also take steps to eliminate the possible bias stemming from unobservable changes in the relationship over time that remain constant across firms by using year-by-year regressions. As argued in the previous section, this approach will also mitigate any issues related to serial correlation.

Table 5.2.1 summarizes the results from all univariate regression models relating insider ownership variables to firm performance at the pooled level in Panel A and on a year-by-year basis in Panel B. As the table documents, irrespectively of the measure of choice, the relationship between the variables is negative at the pooled level and only significant when considering the CEO's family ownership.

Table 5.2.1

Univariate regressions of firm performance on insider ownership

Table 5.2.1 reports the sign of the regression coefficients and significance levels (* 10%, ** 5%, *** 1%) from univariate regressions of firm performance regressed on insider ownership. The insider ownership independent variables are the fraction of CEO ownership and the fraction of CEO family ownership. The firm performance dependent variable is return on assets (RoA). The independent variables are reported in the first column. The coefficient signs and significance levels of firm performance regressed on insider ownership are reported in panel A column two for the pooled regressions, and the year-by-year coefficient signs and significance levels are reported in the remaining columns in panel B.

Panel A: Pooled univariate regressions

Insider ownership	RoA
CEO owner	-
CEO family owner	-***

Panel B: Year-by-year univariate regressions

Insider ownership	RoA														
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Fraction CEO ownership	-	-	+	+	+**	+***	+*	-	+	-	-	-	+	+	+
Fraction CEO family ownership	-	-	+	+*	+**	+***	+**	-	+	-	-	-	+	+	+

Interestingly, we uncover a positive and significant relationship from 2005 to 2007 for both proxies, tentatively suggesting that there may be a convergence of interest benefits attributable to insider ownership, leading to greater firm performance. Nevertheless, the seemingly unstable relationship between the variables at the pooled level throughout the years and the notable shortcomings of the regression models thus far employed should prevent us from drawing definitive interpretations. Specifically, the models in Table 5.2.1 ignore that other extraneous variables could impact firm performance. This issue is mitigated with control variables, and the results from their inclusion in the regression models are reported in Table 5.2.2.

Table 5.2.2

Pooled multivariate regressions of firm performance on insider ownership

Table 5.2.2 reports the sign of the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from pooled multivariate regressions of firm performance regressed on insider ownership. The insider ownership independent variables are the fraction of CEO ownership and the fraction of CEO family ownership. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on insider ownership and control variables are reported in the remaining column.

Panel A: Fraction of CEO ownership

Variable	Coefficient (t-statistics)
Intercept	0.36***
	(4.25)
CEO owner	-0.00
	-(0.91)
Ln book assets	-0.01**
	-(2.56)
Inv. intensity	-0.00***
	-(3.65)
Leverage	-0.15***
	-(10.90)
n	1145
R^2	0.11
Adj. R^2	0.10

Panel B: Fraction of CEO family ownership

Variable	Coefficient (t-statistics)
Intercept	0.37***
	(4.40)
CEO family owner	-0.00**
	-(2.35)
Ln book assets	-0.01**
	-(2.58)
Inv. intensity	-0.00***
	-(3.59)
Leverage	-0.15***
	-(10.81)
n	1145
R^2	0.11
Adj. R^2	0.11

Accounting for controls, we observe that CEO family ownership remains negative and significant at the pooled level, even though its impact on firm performance seems negligible (see Table 5.2.2 – Panel B). As before, it then becomes relevant to study the dynamics underlying this relationship on a year-by-year basis.

Table 5.2.3 summarizes the year-by-year results from regressing firm performance on insider ownership. In line with our previous results in Table 5.2.1, the multivariate models also seem to support the idea that instability is underlying the relationship between insider ownership and firm performance. Nonetheless, any discerning patterns of significance are hard to uncover throughout the 15 years, regardless of the measure of choice. Moreover, even in the years of significance, 2010 and 2014 for CEO Ownership and 2004 and 2014 for CEO Family ownership, their impact on firm performance remains almost entirely negligible, as evidenced by the regression coefficient of zero.

Table 5.2.3

Year-by-year multivariate regressions of firm performance on insider ownership

Table 5.2.3 reports the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from year-by-year multivariate regressions of firm performance regressed on insider ownership. The insider ownership independent variables are the fraction of CEO ownership and the fraction of CEO family ownership. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on insider ownership and control variables are reported in the remaining columns for the years 2000 to 2015.

Panel A: Fraction of CEO ownership

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	0.35	0.44*	0.30	0.72**	0.16	0.14	0.32	0.21	0.71	0.75	0.76**	0.43*	0.12	0.20	0.64**	0.34
	(1.56)	(1.94)	(1.03)	(2.18)	(0.61)	(0.36)	(0.58)	(0.64)	(1.33)	(1.65)	(2.50)	(2.01)	(0.49)	(0.43)	(2.10)	(0.58)
CEO owner	-0.00	0.00	-0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00	0.00	-0.00**	0.00	0.00	0.00	-0.00**	0.00
	-(0.22)	(1.03)	-(0.52)	-(1.27)	-(1.20)	(1.39)	(0.48)	-(0.32)	-(0.95)	(1.19)	-(2.08)	(0.14)	(0.45)	(1.29)	-(1.99)	(1.44)
Ln book assets	-0.01	-0.02	-0.01	-0.03	0.00	0.00	-0.00	-0.00	-0.03	-0.03	-0.03**	-0.02	-0.00	-0.01	-0.03	-0.01
	-(0.89)	-(1.54)	-(0.47)	-(1.54)	(0.15)	(0.04)	-(0.13)	-(0.09)	-(1.02)	-(1.38)	-(2.03)	-(1.57)	-(0.17)	-(0.20)	-(1.54)	-(0.36)
Inv. intensity	-0.01***	-0.00*	-0.00*	-0.00	-0.01***	-0.01	-0.02***	-0.00*	-0.00	-0.00**	-0.00	-0.00*	-0.00	-0.00*	-0.00*	-0.00***
	-(3.44)	-(1.94)	-(1.92)	-(1.57)	-(3.67)	-(1.41)	-(2.75)	-(1.84)	-(1.05)	-(2.42)	-(0.99)	-(1.81)	-(1.15)	-(1.83)	-(1.80)	-(3.13)
Leverage	-0.17***	-0.10**	-0.20***	-0.23***	-0.19***	-0.15**	-0.25**	-0.18***	-0.22***	-0.05	-0.11**	-0.09***	-0.06	-0.15**	-0.14***	-0.18**
	-(3.27)	-(2.30)	-(3.46)	-(4.19)	-(4.31)	-(2.29)	-(2.28)	-(3.33)	-(2.84)	-(0.83)	-(2.65)	-(3.07)	-(1.56)	-(2.36)	-(3.06)	-(2.76)
n	89	86	78	97	108	65	54	82	29	54	64	54	81	81	97	26
R^2	0.19	0.12	0.17	0.23	0.25	0.15	0.21	0.17	0.31	0.18	0.21	0.22	0.05	0.12	0.23	0.41
Adj. R^2	0.16	0.07	0.13	0.20	0.22	0.09	0.14	0.12	0.20	0.12	0.15	0.16	0.00	0.08	0.19	0.30

Panel B: Fraction of CEO family ownership

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	0.37	0.46**	0.29	0.71**	0.12	0.17	0.26	0.21	0.80	0.64	0.75**	0.42*	0.05	0.35	0.62**	0.36
	(1.62)	(2.01)	(1.00)	(2.18)	(0.47)	(0.44)	(0.48)	(0.65)	(1.48)	(1.42)	(2.37)	(1.97)	(0.20)	(0.76)	(2.06)	(0.59)
CEO family owner	-0.00	-0.00	-0.00	-0.00	-0.00*	0.00	-0.00	0.00	-0.00	0.00	-0.00	0.00	0.00	0.00	-0.00**	0.00
	-(0.53)	-(0.19)	-(0.65)	-(1.63)	-(1.69)	(0.08)	-(0.37)	-(0.17)	-(0.14)	(0.86)	-(0.66)	(0.54)	(1.57)	(0.55)	-(2.52)	(0.89)
Ln book assets	-0.01	-0.02	-0.01	-0.03	0.01	0.00	0.00	0.00	-0.04	-0.03	-0.03*	-0.02	0.00	-0.01	-0.02	-0.01
	-(0.95)	-(1.55)	-(0.41)	-(1.47)	(0.35)	(0.03)	(0.02)	-(0.10)	-(1.26)	-(1.18)	-(1.96)	-(1.58)	(0.04)	-(0.50)	-(1.40)	-(0.37)
Inv. intensity	-0.01***	-0.00*	-0.00*	-0.00	-0.01***	-0.01	-0.02***	-0.00*	-0.00	-0.01**	-0.00	-0.00*	-0.00	-0.00	-0.00*	-0.00***
	-(3.33)	-(1.91)	-(1.84)	-(1.64)	-(3.43)	-(1.51)	-(2.87)	-(1.88)	-(0.74)	-(2.48)	-(1.26)	-(1.73)	-(1.24)	-(1.60)	-(1.91)	-(2.94)
Leverage	-0.17***	-0.11**	-0.20***	-0.23***	-0.18***	-0.16**	-0.24**	-0.18***	-0.20**	-0.06	-0.09**	-0.09***	-0.07*	-0.15**	-0.15***	-0.18**
	-(3.18)	-(2.37)	-(3.45)	-(4.11)	-(4.17)	-(2.31)	-(2.15)	-(3.33)	-(2.66)	-(0.85)	-(2.26)	-(3.08)	-(1.78)	-(2.32)	-(3.22)	-(2.71)
n	89	86	78	97	108	65	54	82	29	54	64	54	81	81	97	26
R^2	0.20	0.11	0.17	0.24	0.26	0.12	0.21	0.16	0.29	0.17	0.16	0.22	0.08	0.11	0.25	0.38
Adj. R^2	0.16	0.06	0.13	0.20	0.23	0.07	0.14	0.12	0.17	0.10	0.10	0.16	0.03	0.06	0.21	0.26

The evidence thus far seems to suggest that there may not be a tangible impact from insider ownership when assuming linearity. Implementing a quadratic approximation approach to insider ownership leads us to the results in Table 5.2.4. As we can observe, adding a squared term to the regression equation does not seem to improve the quality of the models substantially. Regardless of the proxy of choice for insider ownership, we find no statistical significance between insider ownership and firm performance, with adjusted R-squared recording no material improvements over its linear model's counterpart.

Table 5.2.4

Quadratic function multivariate regressions of firm performance on insider ownership

Table 5.2.4 reports the sign of the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from quadratic function multivariate regressions of firm performance regressed on insider ownership. The insider ownership independent variables are the fraction of CEO ownership, the fraction of CEO family ownership, and the squared terms of these variables. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on insider ownership and control variables are reported in the remaining column.

Panel A: Fraction of CEO ownership

Variable	Coefficient (t-statistics)
Intercept	0.39***
	(4.44)
CEO owner	-0.00
	-(1.50)
(Sq) CEO owner	0.00
	(1.34)
Ln book assets	-0.01***
	-(2.72)
Inv. intensity	-0.00***
	-(3.67)
Leverage	-0.15***
	(10.89)
n	1145
R^2	0.11
Adj. R^2	0.11

Panel B: Fraction of CEO family ownership

Variable	Coefficient (t-statistics)
Intercept	0.38***
	(4.39)
CEO family owner	-0.00
	-(0.83)
(Sq) CEO family owner	0.00
	(0.36)
Ln book assets	-0.01***
	-(2.60)
Inv. intensity	-0.00***
	-(3.59)
Leverage	-0.15***
	-(10.73)
n	1145
R^2	0.11
Adj. R^2	0.11

Table 5.2.5

Year-by-year quadratic function multivariate regressions of firm performance on insider ownership

Table 5.2.5 reports the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from year-by-year quadratic function multivariate regressions of firm performance regressed on insider ownership. The insider ownership independent variables are the fraction of CEO ownership, the fraction of CEO family ownership, and the squared terms of these variables. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on insider ownership and control variables are reported in the remaining columns for the years 2000 to 2015.

Panel A: Fraction of CEO ownership

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	0.43*	0.46*	0.25	0.71**	0.19	0.24	0.51	0.23	0.52	0.92*	0.75**	0.36	-0.02	0.25	0.66**	0.35
	(1.83)	(1.95)	(0.87)	(2.12)	(0.70)	(0.63)	(0.87)	(0.67)	(0.81)	(1.86)	(2.32)	(1.56)	-(0.06)	(0.51)	(2.15)	(0.58)
CEO owner	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	-0.00	0.00	0.00**	-0.00	-0.00	-0.00
	-(1.17)	-(0.06)	(1.12)	-(0.15)	-(1.50)	-(1.16)	-(0.84)	-(0.29)	(0.33)	-(0.64)	-(0.25)	(0.84)	(2.25)	-(0.10)	-(1.20)	-(0.05)
(Sq) CEO owner	0.00	0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	-0.00	-0.00**	0.00	0.00	0.00
	(1.16)	(0.32)	-(1.28)	-(0.12)	(1.28)	(1.42)	(0.96)	(0.24)	-(0.53)	(0.88)	-(0.14)	-(0.82)	-(2.20)	(0.42)	(0.73)	(0.33)
Ln book assets	-0.01	-0.02	-0.01	-0.03	0.00	-0.00	-0.01	-0.00	-0.02	-0.04	-0.03*	-0.02	0.00	-0.01	-0.03	-0.01
	-(1.14)	-(1.56)	-(0.45)	-(1.53)	(0.15)	-(0.10)	-(0.41)	-(0.12)	-(0.63)	-(1.58)	-(1.94)	-(1.26)	(0.26)	-(0.26)	-(1.55)	-(0.36)
Inv. intensity	-0.00***	-0.00*	-0.00*	-0.00	-0.01***	-0.01	-0.02**	-0.00*	-0.00	-0.00**	-0.00	-0.00*	-0.00	-0.00*	-0.00*	-0.00***
	-(3.09)	-(1.87)	-(1.87)	-(1.53)	-(3.57)	-(1.48)	-(2.63)	-(1.83)	-(1.13)	-(2.40)	-(0.98)	-(1.90)	-(0.92)	-(1.86)	-(1.88)	-(2.96)
Leverage	-0.16***	-0.11**	-0.20***	-0.23***	-0.18***	-0.14**	-0.23**	-0.18***	-0.22***	-(0.07)	-0.10**	-0.09***	-0.06*	-0.15**	-0.15***	-0.18**
	-(3.12)	-(2.30)	-(3.47)	-(4.14)	-(4.31)	-(2.14)	-(2.05)	-(3.31)	-(2.84)	-(1.00)	-(2.55)	-(3.06)	-(1.78)	-(2.33)	-(3.07)	-(2.56)
n	89	86	78	97	108	65	54	82	29	54	64	54	81	81	97	26
R^2	0.21	0.12	0.19	0.23	0.26	0.18	0.22	0.17	0.32	0.20	0.21	0.23	0.11	0.13	0.23	0.41
Adj. R^2	0.16	0.06	0.14	0.19	0.22	0.11	0.14	0.11	0.17	0.11	0.14	0.15	0.05	0.07	0.19	0.27

Panel B: Fraction of CEO family ownership

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	0.41*	0.52**	0.28	0.73**	0.15	0.16	0.34	0.18	0.91	0.63	0.74**	0.43**	0.04	0.36	0.64**	0.30
	(1.69)	(2.12)	(0.93)	(2.14)	(0.54)	(0.40)	(0.63)	(0.53)	(1.58)	(1.35)	(2.34)	(2.01)	(0.15)	(0.75)	(2.11)	(0.47)
CEO family owner	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00	0.00	0.00	-0.00	0.00
	-(0.60)	-(0.72)	-(0.03)	-(0.51)	-(0.71)	-(0.41)	-(1.21)	(0.27)	-(0.61)	(0.27)	(0.55)	-(0.98)	(1.25)	(0.06)	-(1.30)	(0.74)
(Sq) CEO family owner	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00
	(0.50)	(0.70)	-(0.10)	(0.21)	(0.38)	(0.43)	(1.16)	-(0.31)	(0.60)	-(0.12)	-(0.68)	(1.10)	-(0.93)	(0.06)	(0.76)	-(0.61)
Ln book assets	-0.01	-0.02*	-0.01	-0.03	0.00	0.00	0.00	-0.00	-0.04	-0.03	-0.03**	-0.02	0.00	-0.01	-0.02	-0.01
	-(1.04)	-(1.67)	-(0.39)	-(1.47)	(0.31)	(0.13)	-(0.05)	-(0.05)	-(1.33)	-(1.16)	-(2.02)	-(1.48)	(0.03)	-(0.50)	-(1.43)	-(0.27)
Inv. intensity	-0.01***	-0.00*	-0.00*	-0.00	-0.01***	-0.01	-0.02***	-0.00*	-0.00	-0.01**	-0.00	-0.00	-0.00	-0.00	-0.00**	-0.00***
	-(3.30)	-(1.91)	-(1.82)	-(1.63)	-(3.38)	-(1.45)	-(2.86)	-(1.89)	-(0.71)	-(2.42)	-(1.26)	-(1.42)	-(1.19)	-(1.58)	-(1.99)	-(2.95)
Leverage	-0.16***	-0.11**	-0.20***	-0.23***	-0.18***	-0.15**	-0.24**	-0.19***	-0.17*	-0.06	-0.09**	-0.09***	-0.07*	-0.15**	-0.15***	-0.20**
	-(3.13)	-(2.35)	-(3.42)	-(4.09)	-(4.14)	-(2.14)	-(2.13)	-(3.27)	-(1.73)	-(0.85)	-(2.25)	-(2.94)	-(1.82)	-(2.27)	-(3.24)	-(2.68)
n	89	86	78	97	108	65	54	82	29	54	64	54	81	81	97	26
R^2	0.20	0.11	0.18	0.24	0.26	0.13	0.23	0.17	0.30	0.17	0.16	0.24	0.09	0.11	0.25	0.39
Adj. R^2	0.15	0.06	0.12	0.20	0.22	0.05	0.15	0.11	0.15	0.08	0.09	0.16	0.03	0.05	0.21	0.24

At the pooled level, our results show no evidence of a potentially nonlinear relationship, an observation that seems to be, for the most part, corroborated by the year-by-year regression results contained in Table 5.2.5. On a year-by-year basis, apart from 2012 for CEO ownership, we see no evidence in favor of including a squared insider ownership term. Correspondingly, this is also one of the only years when the quadratic model reports a higher adjusted R-squared than that of its linear counterpart. Furthermore, even in 2012, when we observe statistical significance for the relationship between insider ownership and firm performance, its impact is, at best negligible, with coefficients for both the linear and quadratic terms being approximately zero. Interestingly, these coefficients' signs, first positive and then negative, seem to support the argument that convergence of interests occurs at low ownership levels and that the entrenchment effect subsequently dominates at higher levels. Nevertheless, it is hard to place too much weight on this observation as we find no support or even statistical significance in any other year in our sample.

In aggregate, our evidence suggests that insider ownership does not affect firm performance to a measurable extent. While we found tentative significance in the univariate relationships and pooled regression for family insider ownership, considering time-fixed effects largely eliminated the stable and economically impactful findings. Therefore, either the convergence-of-interest and managerial entrenchment effects are of little impact on overall firm performance, or the effects largely cancel each other out in linear terms. However, including a quadratic term did not facilitate the discernability of a clear inflection point at which the convergence-of-interest value effect is surpassed by managerial entrenchment value destruction. Our findings thus support the notion that if the effects are present, they have little impact on overall firm performance.

The inference that insider ownership does not create or destroy value to a measurable extent is in line with more recent findings that account for reverse causation and the impact of other governance mechanisms on insider holdings. While prior literature has found a link between insider ownership and firm performance (e.g., Bøhren & Ødegaard, 2001; McConnell & Servaes, 1990; Shan, 2019), other papers have found that the effect dissipates when allowing the current level of insider holdings to be determined by past performance (Himmelberg et al., 1999; Kole, 1996). While we do not explore the effect of past performance, our results are in line with their dismissal of insider ownership as having any discernible effect on current firm performance.

It is possible that adjustments to compensation, or supervision that ensures better CEO performance, have evolved over the past decades to eliminate the effects that interest convergence and entrenchment from insider ownership would otherwise have on firm performance. Other compensation schemes not involving equity ownership may provide similar incentives, including performance-based adjustments to CEO wage. Meanwhile, board supervision, reputational effects, and effective regulatory systems may eliminate the opportunity for managers to extract excessive private benefits at the detriment of firm value. Accordingly, it is possible that other large shareholders are not under the same scrutiny as equity-owning managers, and their presence has a more tangible influence on firm performance. We explore the case of large institutional owners in the ensuing section.

5.3 Institutional ownership

Institutional investors are a unique type of owner as they may concurrently possess strong analytical competencies, are fiduciaries of their investors' assets, and may have business relations spanning various stakeholders. These factors create distinctive agency relationships, which may aggravate or reduce agency costs. According to the efficient monitoring hypothesis, institutional investors lower agency costs as they possess better advisory capabilities and can monitor the firm at lower costs. On the other hand, the institutional investors themselves manage invested funds from a large group of dispersed investors, with subsequently lower monitoring incentives.

Accordingly, the strategic-alignment hypothesis predicts lower value creation incentives for the institutional investor, which reduces the performance of their portfolio firms. Moreover, the conflict-of-interest hypothesis posits that agency problems may be aggravated by the presence of shared business relationships with the manager and industry competitors, where the institutional investor may choose to protect the incumbent manager, or its portfolio firms, which lowers firm performance (Bøhren & Ødegaard, 2001; Pound, 1988).

Despite the predictions on the impact on firm performance from the presence of large institutional investors and their importance in the Norwegian equity market, there is a shortfall in empirical evidence on the role of institutional investors in Norway (Gulbrandsen, 2004; Jakobsen & Grünfeld, 2006). Due to the conflicting theoretical predictions and lack of evidence from the Norwegian market, we explore

the impact of this owner type from our preliminary prediction that institutional ownership does not affect firm performance.

The approach employed in this section will, to a great extent, follow the previous sections, with some significant adjustments, nevertheless. As before, we model the relationship between our variables of interest through the lens of both univariate and multivariate models, mitigating any potential serial correlation concerns via the use of year-by-year regressions at all stages. However, unlike before, our analysis of the effect of institutional ownership on firm performance will presuppose an underlying linear relationship. As theory provides no *a priori* expectation of nonmonotonicity that would motivate the inclusion of a quadratic term in the study of institutional ownership, we abstain from investigating an alternative functional form model specification in this section.

Table 5.3.1 reports the results from the univariate regression models using both dimensions of institutional ownership, the fraction of ownership, and the largest owner type, as independent variables, at the pooled level in Panel A and on a year-by-year basis in Panel B. While the pooled regression models find no statistically significant relationship between ownership held by institutions and firm performance, the year-by-year regressions in Panel B identify a positive and significant relationship from 2005 to 2007. Throughout these three years, institutional ownership tends to be associated with greater financial performance, at least without accounting for other influencing variables. Furthermore, the pattern of significance in the year-by-year regressions does not seem to be sensitive to the choice of variable, with both dimensions of institutional ownership providing consistent interpretations, apart from 2005 when no observations established the type of the largest owner.

Table 5.3.1

Univariate regressions of firm performance on institutional ownership

Table 5.3.1 reports the sign of the regression coefficients and significance levels (* 10%, ** 5%, *** 1%) from univariate regressions of firm performance regressed on institutional ownership. The institutional ownership independent variables are the fraction of institutional ownership and whether the largest owner is institutional. The firm performance dependent variable is return on assets (RoA). The independent variables are reported in the first column. The coefficient signs and significance levels of firm performance regressed on institutional ownership are reported in panel A column two for the pooled regressions, and the year-by-year coefficient signs and significance levels are reported in the remaining columns in panel B.

Panel A: Pooled univariate regressions

Institutional ownership	RoA
inst. owner	-
Largest owner inst.	+

Panel B: Year-by-year univariate regressions

Institutional ownership	RoA														
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Inst. owner	-	-	+	+	+**	+***	+*	-	Na	Na	Na	-	+	-	+
Largest owner inst.	Na	-	Na	Na	Na	+***	+*	Na	Na	Na	Na	-	+	+	+

Accounting for controls leads us to the results summarized in Table 5.3.2. Once again, at the pooled level and when considering extraneous variables, we observe no statistical significance in the relationship between institutional ownership and firm performance, regardless of the variable of choice.

Table 5.3.2

Pooled multivariate regressions of firm performance on institutional ownership

Table 5.3.2 reports the sign of the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from pooled multivariate regressions of firm performance regressed on institutional ownership. The institutional ownership independent variables are the fraction of institutional ownership and whether the largest owner is institutional. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on institutional ownership and control variables are reported in the remaining column.

Panel A: Fraction of institutional ownership

Variable	Coefficient (t-statistics)
Intercept	0.36***
	(4.19)
Inst. owner	0.00
	(0.13)
Ln book assets	-0.01**
	-(2.55)
Inv. intensity	-0.00***
	-(3.71)
Leverage	-0.15***
	-(10.90)
n	1145
R^2	0.11
Adj. R^2	0.10

Panel B: Largest owner is institutional

Variable	Coefficient (t-statistics)
Intercept	0.36***
	(4.19)
Largest owner inst.	-0.01
	-(0.31)
Ln book assets	-0.01**
	-(2.54)
Inv. intensity	-0.00***
	-(3.71)
Leverage	-0.15***
	-(10.91)
n	1145
R^2	0.11
Adj. R^2	0.10

Studying these dynamics on a year-by-year basis becomes then relevant. The results of this approach are contained in Table 5.3.3. However, we precede our analysis by noting that this investigation poses some challenges stemming from missing data points in our sample. We overcome this issue by dedicating our attention to the years we have enough data to draw reasonable economic interpretations.

Interestingly, the three-year period from 2005 to 2007, where we initially observed a positive and significant relationship at the pooled level across variables, has lost all statistical significance (see Panels A and B in Table 5.3.3). When accounting for controls, we uncover a significant relationship between institutional ownership and firm performance only in the years 2000 and 2003 for the ownership fraction dimension and in 2014 for the largest owner dimension.

Nevertheless, even with missing observations, our investigation still yields valuable insights. In all three cases, a positive relationship between the two variables seems to exist, likely providing evidence of the underlying monitoring benefits that institutional owners stand to offer to companies where they exercise significant influence.

All else equal, in 2000 and 2003, we note that a 1% increase in the fraction held by institutional owners was linked to an increase in RoA nearly twice as high, in the order of approximately 2%. This economic interpretation is further corroborated by the observation that in 2014, a company whose largest owner was an institution tended to report an RoA approximately 8% higher than its counterparts, holding all other variables constant. In conjunction, we can interpret these results as indicating that institutional owners can bring tangible and material benefits to their companies through increased financial returns.

To summarize, our findings support a one-directional effect of institutional ownership positively affecting firm performance, albeit with many years where we cannot document a significant relationship. While we cannot derive a significant effect from the pooled regressions and across several years in the year-by-year models, the significant results that we derive all point to a positive and substantial impact on firm performance from having large institutional owners. However, a clear weakness of this evidence is a lack of data points across several years. It is possible that, as with ownership concentration, we may uncover a more unstable relationship across periods if more years are included in the regression, but we do not currently find evidence of this being the case for our given sample.

The evidence tentatively supports the efficient monitoring hypothesis, while the conflict-of-interest and strategic-alignment hypotheses seem to be of less impact. The positive effect on firm performance may be derived from institutional owners' unique in-house competencies, which allow them to provide better advice to their portfolio firms.

Table 5.3.3

Year-by-year multivariate regressions of firm performance on institutional ownership

Table 5.3.3 reports the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from year-by-year multivariate regressions of firm performance regressed on institutional ownership. The institutional ownership independent variables are the fraction of institutional ownership and whether the largest owner is institutional. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on institutional ownership and control variables are reported in the remaining columns for the years 2000 to 2015.

Panel A: Fraction of institutional ownership

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	0.57***	0.45*	0.32	0.70**	0.11	0.17	0.26	0.22	0.77	Na	Na	Na	0.12	0.45	0.61*	0.23
	(2.75)	(1.90)	(1.08)	(2.15)	(0.43)	(0.44)	(0.46)	(0.68)	(1.44)	Na	Na	Na	(0.49)	(0.98)	(1.96)	(0.36)
Inst. owner	0.02***	-0.00	-0.00	0.02*	0.00	0.00	-0.00	0.00	0.00	Na	Na	Na	-0.00	0.00	0.00	0.00
	(4.72)	-(0.05)	-(0.22)	(1.85)	(0.70)	(0.07)	-(0.18)	(1.00)	(0.37)	Na	Na	Na	-(0.61)	(0.25)	(0.85)	(0.96)
Ln book assets	-0.02**	-0.02	-0.01	-0.03	0.00	0.00	0.00	-0.00	-0.03	Na	Na	Na	-0.00	-0.02	-0.02	-0.00
	-(2.11)	-(1.45)	-(0.55)	-(1.60)	(0.27)	(0.04)	(0.01)	-(0.16)	-(1.22)	Na	Na	Na	-(0.14)	-(0.67)	-(1.50)	-(0.12)
Inv. intensity	-0.01***	-0.00*	-0.00*	-0.00*	-0.01***	-0.01	-0.02**	-0.00*	-0.00	Na	Na	Na	-0.00	-0.00	-0.00**	-0.00**
	-(3.50)	-(1.94)	-(1.88)	-(1.92)	-(3.66)	-(1.50)	-(2.55)	-(1.82)	-(0.78)	Na	Na	Na	-(1.11)	-(1.55)	-(2.29)	-(2.69)
Leverage	-1.13***	-0.11**	-0.21***	-0.22***	-0.19***	-0.16**	-0.25**	-0.19***	-0.21**	Na	Na	Na	-0.06	-0.14**	-0.16***	-0.20***
	-(2.87)	-(2.37)	-(3.61)	-(4.02)	-(4.30)	-(2.40)	-(2.23)	-(3.43)	-(2.70)	Na	Na	Na	-(1.60)	-(2.18)	-(3.37)	-(2.86)
n	89	86	78	97	108	65	54	82	29	Na	Na	Na	81	81	97	26
R^2	0.36	0.11	0.17	0.24	0.24	0.12	0.20	0.17	0.29	Na	Na	Na	0.05	0.10	0.20	0.38
Adj. R^2	0.33	0.06	0.13	0.21	0.21	0.07	0.14	0.13	0.17	Na	Na	Na	0.00	0.06	0.17	0.26

Panel B: Largest owner is institutional

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	Na	Na	0.33	Na	Na	Na	0.22	0.22	Na	Na	Na	Na	0.12	0.46	0.63**	0.24
	Na	Na	(1.14)	Na	Na	Na	(0.41)	(0.67)	Na	Na	Na	Na	(0.49)	(1.02)	(2.03)	(0.38)
Largest owner inst.	Na	Na	-0.08	Na	Na	Na	-0.09	-0.02	Na	Na	Na	Na	-0.03	0.02	0.08*	0.08
	Na	Na	-(0.67)	Na	Na	Na	-(0.72)	-(0.25)	Na	Na	Na	Na	-(1.05)	(0.42)	(1.76)	(0.93)
Ln book assets	Na	Na	-0.01	Na	Na	Na	0.00	-0.00	Na	Na	Na	Na	-0.00	-0.02	-0.03	-0.00
	Na	Na	-(0.61)	Na	Na	Na	(0.06)	-(0.14)	Na	Na	Na	Na	-(0.12)	-(0.71)	-(1.58)	-(0.13)
Inv. intensity	Na	Na	-0.00*	Na	Na	Na	-0.02**	-0.00*	Na	Na	Na	Na	-0.00	-0.00	-0.00**	-0.00**
	Na	Na	-(1.90)	Na	Na	Na	-(2.50)	-(1.90)	Na	Na	Na	Na	-(1.13)	-(1.55)	-(2.34)	-(2.67)
Leverage	Na	Na	-0.21***	Na	Na	Na	-0.25**	-0.18***	Na	Na	Na	Na	-0.06	-0.14**	-0.15***	-0.19**
	Na	Na	-(3.65)	Na	Na	Na	-(2.29)	-(3.31)	Na	Na	Na	Na	-(1.64)	-(2.15)	-(3.31)	-(2.79)
n	Na	Na	78	Na	Na	Na	54	82	Na	Na	Na	Na	81	81	97	26
R^2	Na	Na	0.18	Na	Na	Na	0.21	0.16	Na	Na	Na	Na	0.06	0.11	0.22	0.38
Adj. R^2	Na	Na	0.13	Na	Na	Na	0.15	0.12	Na	Na	Na	Na	0.01	0.06	0.19	0.26

Furthermore, scale economies may also lower the monitoring cost for institutional owners. Compared to other large owner types, institutional investors are specialized vehicles for investments and have traditionally been attractive employers for burgeoning financial industry talents. Being uniquely placed in the financial eco-system may also allow for more informed decision-making, proactivity, and lower-cost interactions from monitoring their portfolio firms.

While we cannot rule out that fiduciary agency conflicts persist, or institutional owners may, in some cases, protect their managers or other portfolio firms, these two effects seem to have a negligible negative impact on firm performance, which is overshadowed by the efficient monitoring that institutional owners can provide. While the owner types we have covered so far can be essentially argued to possess a consistent *ex-ante* motive for value creation, the government juxtaposes various internal and external incentives, which may or may not directly align with shareholder value creation. We uncover this relation in the next section.

5.4 State ownership

As a large owner, the state may bring unique incentives and competencies that can affect the firm's orientation toward improved performance. The considerable distance between its financiers (the taxpayers), and the fiduciary role of the state, may reduce residual accountability and lower value creation incentives for the state, in an extreme case of the strategic-alignment hypothesis (Grünfeld & Jakobsen, 2006). The market-intervening force of large state owners can also reduce the disciplining mechanism of product markets (Grünfeld & Jakobsen, 2006). Furthermore, the state may also be less adept in monitoring and advisory guidance, resulting in sub-optimal disciplining and corporate strategies, while the pursuit of alternative societal goals risks orienting the state away from performance maximization (Aguilera et al., 2021).

While a plethora of arguments rooted in agency theory support an adverse effect of state ownership on firm performance, there may also be benefits. Market intervention by large state owners may also provide nonmarket rent to its firm portfolio, including operating rights and favorable subsidies and finance. Furthermore, a state owner can provide ease of access to networks of foreign governments, with privileged investment- and export access to follow (Aguilera et al., 2021; Boubakri et al., 2008, 2018; Lazzarini & Musacchio, 2018).

As empirical findings largely support a negative effect, or no effect, of state ownership on firm performance (e.g., Aguilera et al., 2021; Goldeng et al., 2008; Lazzarini & Musacchio, 2018; Shirley & Walsh, 2000), and given the various theoretical arguments, we expect that state ownership does not affect firm performance.

As in the previous section, we begin our study of state ownership and firm performance by ascertaining the relationship between our variables of interest at the univariate and multivariate levels, using year-by-year regressions to mitigate possible issues of serial correlation. Because we have no *a priori* expectations that motivate the inclusion of a quadratic term in the models, the interactions between state ownership and firm performance will be captured only through the lens of a linear functional form specification.

Table 5.4.1 summarizes the results from the univariate regression models using both dimensions of state ownership, the fraction of ownership, and the type of largest owner, as independent variables at the pooled level in Panel A and on a year-by-year basis in Panel B. Overall, at the univariate level, there are no discernible patterns of significance neither on a pooled basis nor on a year-by-year basis throughout the 15-year period of our sample. Moreover, despite missing data points for several years in our sample, the seemingly insignificant relationship between state ownership and firm performance still holds irrespectively of the variable of choice. Including control variables in the linear model specification does not seem to change our interpretations, as evidenced by the results contained in Table 5.4.2.

Even when accounting for other variables that may drive firm performance, state ownership has no apparent impact on firm performance and seems to very much be of negligible value as an ownership governance mechanism, an observation that is corroborated by extending the multivariate regression model to a year-by-year approach.

Table 5.4.1

Univariate regressions of firm performance on state ownership

Table 5.4.1 reports the sign of the regression coefficients and significance levels (* 10%, ** 5%, *** 1%) from univariate regressions of firm performance regressed on state ownership. The state ownership independent variables are the fraction of state ownership and whether the largest owner is the state. The firm performance dependent variable is return on assets (RoA). The independent variables are reported in the first column. The coefficient signs and significance levels of firm performance regressed on state ownership are reported in panel A column two for the pooled regressions, and the year-by-year coefficient signs and significance levels are reported in the remaining columns in panel B.

Panel A: Pooled univariate regressions

State ownership	RoA
State owner	-
Largest owner state	-

Panel B: Year-by-year univariate regressions

State ownership	RoA														
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
State owner	-	Na	Na	+	Na	Na	Na	Na	Na	Na	Na	-	+	+	+
Largest owner state	Na	Na	Na	+	Na	Na	Na	Na	Na	Na	Na	Na	+	+	+

Table 5.4.2

Pooled multivariate regressions of firm performance on state ownership

Table 5.4.2 reports the sign of the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from pooled multivariate regressions of firm performance regressed on state ownership. The state ownership independent variables are the fraction of state ownership and whether the largest owner is the state. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on state ownership and control variables are reported in the remaining column.

Panel A: Fraction of state ownership

Variable	Coefficient (t-statistics)
Intercept	0.36***
	(4.20)
State owner	-0.00
	-(0.67)
Ln book assets	-0.01**
	-(2.55)
Inv. intensity	-0.00***
	-(3.72)
Leverage	-0.15***
	-(10.91)
n	1145
R^2	0.11
Adj. R^2	0.10

Panel B: Largest owner is the state

Variable	Coefficient (t-statistics)
Intercept	0.36***
	(4.20)
Largest owner state	-0.04
	-(0.68)
Ln book assets	-0.01**
	-(2.55)
Inv. intensity	-0.00***
	-(3.72)
Leverage	-0.15***
	-(10.90)
n	1145
R^2	0.11
Adj. R^2	0.10

Employing a year-by-year approach to the study of state ownership's impact on firm performance leads to the results contained in Table 5.4.3. As the results show, regardless of the measure of choice, we find no evidence suggesting that state ownership has a statistically significant impact on firm performance. Furthermore, in the years for which sufficient data observations exist, no discernible pattern in the sign of the coefficients can be identified.

Table 5.4.3

Year-by-year multivariate regressions of firm performance on state ownership

Table 5.4.3 reports the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from year-by-year multivariate regressions of firm performance regressed on state ownership. The state ownership independent variables are the fraction of state ownership and whether the largest owner is the state. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on state ownership and control variables are reported in the remaining columns for the years 2000 to 2015.

Panel A: Fraction of state ownership

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	0.35	0.46**	Na	Na	0.11	Na	Na	Na	Na	Na	Na	Na	0.12	0.46	0.61*	0.30
	(1.55)	(2.01)	Na	Na	(0.42)	Na	Na	Na	Na	Na	Na	Na	(0.47)	(1.04)	(1.95)	(0.43)
State owner	-0.01	0.01	Na	Na	-0.00	Na	Na	Na	Na	Na	Na	Na	-0.04	-0.00	-0.00	-0.00
	-(0.86)	(0.13)	Na	Na	-(0.37)	Na	Na	Na	Na	Na	Na	Na	-(0.49)	-(0.67)	-(0.08)	-(0.41)
Ln book assets	-0.01	-0.02	Na	Na	0.00	Na	Na	Na	Na	Na	Na	Na	-0.00	-0.02	-0.02	-0.01
	-(0.88)	-(1.54)	Na	Na	(0.28)	Na	Na	Na	Na	Na	Na	Na	-(0.13)	-(0.72)	-(1.48)	-(0.20)
Inv. intensity	-0.01***	-0.00*	Na	Na	-0.01***	Na	Na	Na	Na	Na	Na	Na	-0.00	-0.00	-0.00**	-0.00**
	-(3.51)	-(1.94)	Na	Na	-(3.72)	Na	Na	Na	Na	Na	Na	Na	-(1.08)	-(1.59)	-(2.24)	-(2.75)
Leverage	-0.17***	-0.11**	Na	Na	-0.18***	Na	Na	Na	Na	Na	Na	Na	-0.06	-0.15**	-0.16***	-0.18**
	-(3.33)	-(2.37)	Na	Na	-(4.14)	Na	Na	Na	Na	Na	Na	Na	-(1.58)	-(2.31)	-(3.44)	-(2.65)
n	89	86	Na	Na	108	Na	Na	Na	Na	Na	Na	Na	81	81	97	26
R^2	0.20	0.11	Na	Na	0.24	Na	Na	Na	Na	Na	Na	Na	0.05	0.11	0.19	0.36
Adj. R^2	0.16	0.06	Na	Na	0.21	Na	Na	Na	Na	Na	Na	Na	0.00	0.06	0.16	0.24

Panel B: Largest owner is the state

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	Na	Na	Na	Na	0.11	Na	Na	Na	Na	Na	Na	Na	Na	0.46	0.61*	0.30
	Na	Na	Na	Na	(0.42)	Na	Na	Na	Na	Na	Na	Na	Na	(1.03)	(1.95)	(0.43)
Largest owner state	Na	Na	Na	Na	-0.04	Na	Na	Na	Na	Na	Na	Na	Na	-0.07	-0.01	-0.04
	Na	Na	Na	Na	-(0.37)	Na	Na	Na	Na	Na	Na	Na	Na	-(0.67)	-(0.12)	-(0.41)
Ln book assets	Na	Na	Na	Na	0.00	Na	Na	Na	Na	Na	Na	Na	Na	-0.02	-0.02	-0.01
	Na	Na	Na	Na	(0.28)	Na	Na	Na	Na	Na	Na	Na	Na	-(0.71)	-(1.48)	-(0.20)
Inv. intensity	Na	Na	Na	Na	-0.01***	Na	Na	Na	Na	Na	Na	Na	Na	-0.00	-0.00**	-0.00**
	Na	Na	Na	Na	-(3.72)	Na	Na	Na	Na	Na	Na	Na	Na	-(1.59)	-(2.24)	-(2.75)
Leverage	Na	Na	Na	Na	-0.18***	Na	Na	Na	Na	Na	Na	Na	Na	-0.14**	-0.16***	-0.18**
	Na	Na	Na	Na	-(4.14)	Na	Na	Na	Na	Na	Na	Na	Na	-(2.30)	-(3.44)	-(2.65)
n	Na	Na	Na	Na	108	Na	Na	Na	Na	Na	Na	Na	Na	81	97	26
R^2	Na	Na	Na	Na	0.24	Na	Na	Na	Na	Na	Na	Na	Na	0.11	0.19	0.36
Adj. R^2	Na	Na	Na	Na	0.21	Na	Na	Na	Na	Na	Na	Na	Na	0.06	0.16	0.24

In aggregate, we do not find state ownership to significantly impact firm performance, supporting our hypothesis of no effect. Interestingly, for state ownership vis-à-vis other investigated ownership governance mechanisms, our hypothesis of no effect is supported throughout all our statistical models. Both the univariate and multivariate models fail to uncover a noticeable impact of having a large state owner on firm performance. While we do not have valid data points for approximately half of the observed years for state ownership across both proxy variables, we do not expect that including more years beyond the currently observed would significantly alter our conclusion.

The negative impact of state ownership predicted by agency theory largely seems negligible or cancels out with the nonmarket rents derived from having a large state owner. Our findings thus largely follow 15 out of the 52 papers reviewed in Shirley and Walsh's (2000) meta-study of state ownership and firm performance. It is also possible that country heterogeneity explains the cause of no impact. Political ideology may determine the impact of state ownership on firm performance. Meanwhile, checks-and-balances can limit the effectiveness of interventionism by the state, which may lower monitoring given a free-market-oriented institutional context or reorient the firm away from non-performance maximizing societal goals if the political ideology is conducive to nonmarket interventionism[3] (Aguilera et al., 2021). Goldeng et al. (2008) explore the performance of Norwegian state-owned companies and find that they generally have lower RoAs than their private peers.

Our research, covering a more recent sample period, does not find the same underperformance among companies with large state owners. While we also include private firms in which the government is a minority owner, our data does not generally support that a lower level of state ownership leads to improved RoAs. While other studies may attempt to discern the agency effect and nonmarket rent effect from each other, our preliminary conclusion is that state ownership, in a Norwegian context, does not seem impact firm performance.

[3] (Aguilera et al., 2021) distinguishes between right-leaning and left-leaning political ideology. Norway has, for our sample, been ruled by coalitions across both sides of the ideological spectrum without a discernible impact on our results (DSS, 2023). Additionally, Norwegian governments typically consist of minority coalitions of several parties and ideologies, which must subsequently confer support from other supporting parties, while a tradition of broad political agreements makes the ideological distinction less clear-cut. Therefore, we refrain from defining a specific political ideology for the Norwegian state across our sample period.

5.5 Interactions between ownership governance mechanisms

So far, we have evaluated how ownership governance mechanisms affect firm performance on their own. In this section, we consider each mechanism in conjunction with other mechanisms for which we have found a significant impact on performance. We cannot *a priori* predict whether the ownership governance mechanisms of interest are readily substitutable or complementary in affecting performance, given that various instruments that affect agency problems are present across several of our mechanisms. For example, both ownership concentration and type of large owner may, through similar instruments, aggravate agency problems (e.g., from private benefits, entrenchment, conflicting interests, and misaligned incentives) or mitigate such conflicts (e.g., from monitoring, interest alignment, and advisory services). We thus investigate whether each mechanism works in isolation in its influence on firm performance, thereby being complementary, or if the effect dissipates when allowing the mechanisms to coexist, suggesting substitutability.

We subsequently specify a full multi-mechanism, multivariate regression model that includes the mechanisms found to affect firm performance in the previous sections. More specifically, this comprehensive model will incorporate the fraction of shares held by owners with a greater than 10% ownership stake in the firm and its squared term as measures of ownership concentration. It will also include the shares held by the CEO's family as a proxy for insider ownership and the fraction of shares held by institutional owners. As we failed to uncover a relationship of significance between state ownership and firm performance, we opted to exclude state ownership from this full multi-mechanism regression model.

Finally, with the relevant ownership governance mechanisms identified, we extend the set of independent variables in our regression equation to include the same controls as in the preceding sections: firm size, investment intensity, and leverage. As before, firm performance is measured through RoA, which should help us ascertain the validity of the preceding observations and conclusions.

On a pooled regression level, the results summarized in Table 5.5.1 tentatively indicate that the mechanisms of interest tend to interact in a substitutive fashion and that no mechanism has a separate, unique, and individual link to firm performance. As we have previously pointed out, however, potential issues of serial correlation prevent us from placing too much weight on these observations. Compounded by the fact that the underlying relationships between the mechanisms of interest, and between the mechanisms and firm performance, might not remain stable throughout

the 15 years in our sample, we find it highly relevant to test the validity of these results on a separate year-by-year basis.

Table 5.5.1

Pooled multivariate regressions of firm performance on multiple ownership mechanisms

Table 5.5.1 reports the sign of the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from pooled multivariate regressions of firm performance regressed on ownership concentration, insider ownership, and institutional ownership. The ownership concentration independent variable is shares held by >10% owners, and the squared terms of this variable. The insider ownership independent variable is the fraction of CEO family ownership. The institutional ownership independent variable is the fraction of institutional ownership. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on ownership concentration, insider ownership, institutional ownership, and control variables are reported in the remaining column.

Variable	Coefficient (t-statistics)
Intercept	0.34***
	(3.78)
Share >10%	0.00
	(1.36)
(Sq) Share >10%	-0.00
	-(1.43)
CEO family owner	-0.00
	-(1.55)
Inst. owner	-0.00
	-(0.61)
Ln book assets	-0.01**
	-(2.44)
Inv. intensity	-0.00***
	-(3.56)
Leverage	-0.15***
	-(10.85)
n	1145
R^2	0.11
Adj. R^2	0.11

The results from employing a separate year-by-year regression are contained in Table 5.5.2. These results seem to suggest that the way in which the mechanisms interact between themselves and relate to firm performance throughout the 15-year period in our sample is not constant. At a high level, and as we would expect to see in the behavior of these variables throughout a period as long as that of our sample, we can observe the underlying dichotomy driving the interlinkages between the mechanisms and their relationships with firm performance. The robustness, or lack thereof, of the coefficient estimates to retain their significance from their previous corresponding sections is clear evidence of this complementary *vis-à-vis* substitutive nature, respectively, that we would expect to observe in our sample.

Table 5.5.2

Year-by-year multivariate regressions of firm performance on multiple ownership mechanisms

Table 5.5.2 reports the regression estimates and significance levels (* 10%, ** 5%, *** 1%) from year-by-year multivariate regressions of firm performance regressed on ownership concentration, insider ownership, and institutional ownership. The ownership concentration independent variable is shares held by >10% owners, and the squared terms of this variable. The insider ownership independent variable is the fraction of CEO family ownership. The institutional ownership independent variable is the fraction of institutional ownership. The control variables are log-book value of assets, investment intensity, and leverage. The firm performance dependent variable is return on assets (RoA). The independent variables and control variables are reported in the first column. The coefficient estimates and significance levels of firm performance regressed on ownership concentration, insider ownership, institutional ownership, and control variables are reported in the remaining columns for the years 2000 to 2015.

	Year															
Variable	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Intercept	0.39*	0.47*	0.24	0.58	0.04	0.13	0.40	0.95**	0.35	0.46	0.49	0.35	0.02	0.44	0.40	0.04
	(1.76)	(1.81)	(0.78)	(1.66)	(0.13)	(0.26)	(0.75)	(2.51)	(0.34)	(0.30)	(1.28)	(1.53)	(0.08)	(0.76)	(1.28)	(0.06)
Share >10%	0.00*	-0.00	0.00	0.00	0.00	0.00	-0.01***	-0.02***	0.01	0.01	0.01	0.00	0.00**	-0.00	0.01**	0.00
	(1.85)	-(0.15)	(0.45)	(0.79)	(0.80)	(0.07)	-(2.87)	-(2.68)	(0.63)	(0.14)	(0.73)	(1.39)	(2.10)	-(0.17)	(2.50)	(0.32)
(Sq) Share >10%	-0.00	0.00	0.00	-0.00	-0.00	-0.00	0.00**	0.00**	-0.00	-0.00	-0.00	-0.00	-0.00**	0.00	-0.00**	-0.00
	-(1.49)	(0.39)	(0.00)	-(0.48)	-(0.67)	-(0.02)	(2.48)	(2.15)	-(0.71)	-(0.21)	-(0.51)	-(1.36)	-(2.27)	(0.22)	-(2.56)	-(0.35)
CEO family owner	-0.00	-0.00	0.00	-0.00*	-0.00	-0.00	0.00	0.00*	0.00	0.00	-0.00	0.00	0.00*	0.00	-0.00	0.00
	-(0.05)	-(0.69)	-(1.56)	-(1.92)	-(1.50)	-(0.12)	(0.02)	(1.92)	(0.43)	(1.39)	-(1.20)	(1.11)	(1.87)	(0.54)	-(1.45)	(1.04)
Inst. owner	0.02***	0.00	0.00	0.01*	0.00	0.00	0.00	0.00**	0.00	Na	Na	Na	0.00	0.00	-0.00	0.00
	(4.86)	(0.12)	-(0.73)	(1.72)	(0.39)	(0.12)	(0.09)	(2.08)	(0.56)	Na	Na	Na	(0.10)	(0.61)	-(0.89)	(1.20)
Ln book assets	-0.02*	-0.02	-0.01	-0.02	0.01	0.00	0.01	-0.01	-0.04	-0.03	-0.03*	-0.02	-0.00	-0.02	-0.02	0.00
	-(1.69)	-(1.50)	-(0.46)	-(1.39)	(0.44)	(0.03)	(0.23)	-(0.53)	-(1.23)	-(1.06)	-(1.85)	-(1.57)	-(0.10)	-(0.60)	-(1.08)	(0.08)
Inv. intensity	-0.01***	0.00*	-0.00*	-0.00	-0.01***	-0.01	-0.02**	-0.00	-0.00	-0.00**	-0.00	-0.00	-0.00	-0.00	-0.00*	-0.00**
	-(3.54)	-(1.87)	-(1.99)	-(1.65)	-(3.39)	-(1.36)	-(2.20)	-(1.66)	-(0.67)	-(2.40)	-(1.26)	-(1.63)	-(1.18)	-(1.65)	-(1.74)	-(2.68)
Leverage	-0.15***	-0.11**	-0.21***	-0.21***	-0.18***	-0.17**	-0.22**	-0.19***	-0.26**	-0.05	-0.10**	-0.10***	-0.07**	-0.14**	-0.14***	-0.20**
	-(3.16)	-(2.42)	-(3.52)	-(3.91)	-(4.11)	-(2.28)	-(2.06)	-(3.57)	-(2.79)	-(0.74)	-(2.40)	-(3.15)	-(2.02)	-(2.17)	-(3.18)	-(2.59)
n	89	86	78	97	108	65	54	82	29	54	64	54	81	81	97	26
R^2	0.40	0.12	0.21	0.28	0.27	0.13	0.34	0.33	0.33	0.20	0.18	0.25	0.14	0.11	0.30	0.43
Adj. R^2	0.34	0.04	0.13	0.22	0.21	0.02	0.24	0.27	0.11	0.09	0.10	0.16	0.06	0.03	0.24	0.21

As the results in Table 5.2.2 suggest, the years 2000, 2003, 2006, 2007, 2012, and 2014 do seem to indicate that some of the mechanisms under study retain their own individual link to firm performance. Opposingly, in all the years apart from the ones mentioned, where the model fails to uncover a relationship of significance between the mechanisms and firm performance, the evidence seems to favor the interpretation that these mechanisms relate to each other in a substitutive manner, thereby indicating that no mechanism offers a separate and unique link to firm performance, and none should be deemed better or worse than its alternatives. The mechanisms are, in other words, interchangeable.

Focusing on the first of the mechanisms under investigation, ownership concentration, our conclusions remain to a great extent, unchanged. While these new results corroborate the benefits of including the squared term in the regression functional form specification, indicating that a curvilinear relationship first argued for by Morck et al. (1988) does indeed exist, and relates to firm performance in its own, separate way, the directional effect of that relationship remains indiscernible. As in the single-mechanism study for ownership concentration, a convex relationship seems to prevail in the years of 2006 and 2007, meanwhile the years of 2000, 2012, and 2014 point towards a concave relationship. Across the remaining years, a relationship of concavity seems to predominate. These results substantiate our observation that ownership concentration may improve firm performance up to a certain point, after which marginal costs to increased concentration ensue and drive the relationship in the opposite direction.

Our study of insider ownership and its impact on firm performance in the multi-mechanism model offers some newfound insights compared to its corresponding single-mechanism study. Although insider ownership also seems to retain its own separate link to firm performance, it does so less often than ownership concentration throughout the 15-year period in our sample, as evidenced by the observation that the estimated regression coefficients are significant only in 2003, 2007, and 2012. Interestingly, comparing these results with those from the single-mechanism study, we find that the signs of the coefficients in the years of significance remain unchanged apart from 2007, where a negative relationship in the latter has been inversed in the former. In addition, including this proxy for insider ownership in a complete year-by-year multi-mechanism regression equation sees the years 2003, 2007, and 2012 gain statistical significance, whereas the opposite happens in the years 2004 and 2014.

Overall, these findings offer evidence that CEO family ownership can indeed be a significant explanatory variable of firm performance for Norwegian firms in our sample when considered conjunctly with other governance mechanisms. Nevertheless, the directional effect of their interaction is somewhat ambiguous, as the positive relationship we observe in 2007 and 2012 is not supported by a similar observation in 2003. Across all years, CEO family ownership seems to have a positive association with firm performance approximately the same number of times that it does not for the firms in our sample. A consistent observation, however, is that the material impact of insider ownership in the performance of the firm is almost entirely negligible, suggesting that either the convergence-of-interest and managerial entrenchment effects are of little impact on overall firm performance, or the effects tend to largely cancel each other out in linear terms.

Finally, as far as institutional ownership is concerned, its inclusion in the full multi-mechanism regression model corroborates our previous findings. As evidenced by the significant and positive coefficient estimates in the years 2000, 2003, and 2007 when considered in conjunction with other ownership governance mechanisms, institutional ownership, at least in these years, seems to have its own separate link to firm performance. However, excluding the years with missing observations from our interpretations, leads us to the observation that institutional ownership tends to interact with other mechanisms in a substitutive fashion more often than not. Their relationship could be considered complementary only in three of the 12 years we have available data. Moreover, throughout the sample period, the relationship can be seen as predominantly positive, indicating that firms in our sample with a greater fraction of shares held by an institutional owner tend to report a greater RoA, all else equal.

Interestingly, however, the impact of institutional ownership on firm performance in absolute terms is smaller than the one reported in the single-mechanism study. Overall, our evidence seems to lend support to the efficient monitoring hypothesis, while the conflict-of-interest and strategic-alignment hypotheses seem to be of less impact. Potential downsides from increased institutional ownership, such as fiduciary agency conflicts or management/firm portfolio protection, which can bear material costs to firm performance, seem negligible in our multi-mechanism study. In any case, the marginal benefits of increased institutional ownership seem to outweigh the costs, opening the door for firm value creation.

6 Conclusion

The existing literature on the relationship between ownership governance mechanisms and firm performance has several limitations, including issues with data quality, narrow regional focus, isolated treatment of mechanisms, and lack of stability testing over time. To address these gaps, we conducted a study in Norway from 2000 to 2015, investigating how specific corporate governance mechanisms, namely ownership concentration, insider-, institutional-, and state ownership, relate to firm performance. We examined these mechanisms individually, using univariate and multivariate regressions, and then analyzed their interactions through a comprehensive multivariate, multi-mechanism model that incorporated all relevant ownership mechanisms.

We observed a non-linear relationship between ownership concentration and firm performance, with evidence of a weakly concave pattern over the 15-year period. This suggests that ownership concentration has a positive impact on firm performance up to a certain threshold, beyond which it becomes negative. The significance of ownership concentration persisted in the multi-mechanism model, indicating it has its own independent link to firm performance.

Insider ownership did not show a tangible impact on firm performance in our study, and the direction of the effect was unclear. This makes it challenging to draw a conclusive interpretation regarding the influence of insider ownership on the performance of Norwegian firms.

Firms with higher levels of institutional ownership performed better during the sample period, supporting the efficient monitoring hypothesis, and providing evidence of the benefits associated with institutional investors' involvement. Institutional ownership appeared to substitute for other ownership governance mechanisms in the multi-mechanism model, although a complementary effect was observed in three of the years.

Finally, we did not identify a statistically significant relationship between state ownership and firm performance throughout our analysis, regardless of the measure used.

While our research has contributed to understanding the relationship between ownership governance mechanisms and firm performance, further analysis and exploration can enhance our understanding. Future research could explore endogenous determination of ownership mechanisms, two-way causality between mechanisms and firm performance, extending the sample on time or subsampling on

sector- and industry for specific insights, alternative model specifications and controls, and the impact of market-derived governance mechanisms. Bridging the gap between ownership structure and market conditions as complementary or substitutable drivers of firm performance also presents an interesting avenue for future investigation.

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