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CHAPTER 3

Governance and Performance Revisited

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INTRODUCTION

The fundamental question in finance-based corporate governance research is whether economic value is driven by governance mechanisms, such as the legal protection of capitalists, the firm's competitive environment, its ownership structure, board composition, and financial policy. Research on the interaction between governance and economic performance has been rather limited, however, and the empirical evidence is mixed and inconclusive. This is both because corporate governance is a novel academic field and because high-quality data are hard to obtain. Not surprisingly, therefore, we cannot yet specify what the best governance system looks like, neither in a normative nor a positive sense.

There are four different ways in which our chapter may contribute to a better understanding of how governance and performance interact. First, unlike most existing research, we include a wide set of mechanisms, such as

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the identity of outside owners (for example, institutional, international, and individual), the use of voting and nonvoting shares, board size, and dividend policy. This approach brings us closer to capturing the full picture and allows us to explore the validity of more partial approaches (for example, Demsetz and Lehn 1985; Morck et al. 1988; McConnell and Servaes 1990; Gugler 2001). Due to limited data availability in most countries, such partial approaches will also have to be used in the future.

Second, we help clarify how the existing evidence depends on its specific context. Most extant research deals with large U.S. firms operating in a common-law regime with an active market for corporate control, where outside ownership concentration is very low, strong incentive contracts for management are the rule, and inside directors are common. In contrast, our Norwegian sample firms are much smaller, the legal regime is the Scandinavian version of civil law, hostile takeovers are practically nonexistent, firms are more closely held, performance-related pay is less common, and boards have at most one inside director, who by law is never the chairperson. Principal agent theory predicts that all these governance mechanisms matter for performance. By testing these predictions on firms with quite different mechanism profiles, we can better judge their general validity.

Third, the quality of our data may produce more reliable evidence. Anderson and Lee (1997), who replicate three U.S. studies using four alternative data sources, find that changes in data quality distort conclusions, and that poor data quality reduces the power of the tests. Existing analyses of ownership structure in the United States, Japan, the U.K., and continental Europe are based on large holdings (blocks) only, as there is no legal obligation to report other stakes (Barca and Becht 2001). This means holdings below a minimum reporting threshold cannot be observed, typically implying that the owners of roughly one third to one half of outstanding equity are ignored. As changes in large holdings are only registered at certain discrete thresholds, any stake between these discrete points is estimated with error, and every stake above the highest reporting threshold is underestimated. Also, except for the U.K. and the United States, the available international evidence refers to just one or two years in the mid-1990s. In contrast, our data include every single stake in all firms listed on the Oslo Stock Exchange over the period 1989–1997. They involve a relatively long time series and suffer from neither the large holdings bias nor the discrete thresholds problem.

The fourth contribution concerns endogeneity and reverse causality, which is underexplored theoretically and empirically. Endogeneity occurs when mechanisms are internally related, for example, when agency theory argues that outside concentration and insider holdings are substitute

governance tools. Reverse causation occurs when performance drives governance; an example would be privately informed insiders asking for stock bonus plans before unexpectedly high earnings are reported. Our simultaneous equation approach, which has the potential of capturing both mechanism endogeneity and reverse causation, has been used earlier in a governance-performance setting (Agrawal and Knoeber 1996; Loderer and Martin 1997; Cho 1998; Demsetz and Villalonga 2002; Bhagat and Jefferis 2002). The typical findings using this approach, which Becht et al. (2003) call third-generation studies due to what they consider "vastly improved econometrics," differ markedly from those of single-equation methods. In particular, the significant relationships between governance and performance in single-equation models often disappear under third-generation approaches. We explore whether this is due to the nature of the corporate governance problem or to the methodological difficulty of using a simultaneous system when the theory cannot specify how mechanisms interact.

Using the traditional single-equation approach, we find a highly significant inverse relationship between outside concentration and economic performance as measured by Tobin's Q. In contrast, insider holdings are value creating up to roughly 60%, which is far above the insider fraction in most sample firms. Individual (direct) owners are associated with higher performance than multiple-agent intermediaries, small boards create more value than large, and firms issuing shares with unequal voting rights lose market value. Practically all these results survive across a wide range of single-equation models, suggesting that governance mechanisms are rarely substitutes or complements. Thus, studying a comprehensive set of mechanisms is unnecessary for capturing the true effect of any single one of them. In contrast, the choice of performance measure in governance-performance research does matter, as very few of the results based on Tobin's Q hold up under other proxies used in the literature, such as book return on assets and market return on equity. Moreover, most relationships are sensitive to the choice of instruments when we use simultaneous equations to handle endogeneity and two-way causation. Because the theory of corporate governance cannot rank alternative instruments, simultaneous system modeling is not necessarily superior to single-equation models when exploring the relationship between governance and performance.

Existing research is discussed in the first section below, and the second section presents descriptive statistics of our governance and performance data. The third section analyzes the interaction between governance and performance in a single-equation setting, whereas the fourth section uses a simultaneous equation framework. We conclude in the final section.

THEORETICAL FRAMEWORK AND EXISTING EVIDENCE

Corporate governance mechanisms are vehicles for reducing agency costs, that is, tools for minimizing the destruction of market value caused by conflicts of interest between the firm's stakeholders (Shleifer and Vishny 1997; Tirole 2001; Becht et al. 2003). Focusing on the principal-agent problem between managers and owners and between subgroups of owners, we start by briefly outlining the major theoretical ideas behind the mechanisms we will analyze empirically, which are the large outside owners, the identity of outside owners, inside owners, board composition, security design, and financial policy.

Predictions

When products, labor, and takeover markets are fully competitive, self-serving managers will maximize their welfare by maximizing the market value of equity (Fama 1980; Fama and Jensen 1985; Stulz 1988). Outside such a world, agency problems may still be solved with complete contracts, but such contracts can in practice not be written without excessive costs (Hart 1995; Vives 2000). Therefore, market discipline alone is insufficient, and other governance mechanisms must be called upon to reduce agency costs. Our theoretical framework assumes imperfect markets and incomplete contracts.

The expected effect of outside ownership concentration on performance is unclear, as it reflects the net impact of several benefits and costs which are difficult to rank a priori. The benefits are the principal's monitoring of his agents (Jensen and Meckling 1976; Demsetz and Lehn 1985; Shleifer and Vishny 1986), higher takeover premia (Burkart 1995), and less free riding by small shareholders (Shleifer and Vishny 1986). The costs are reduced market liquidity (Holmstrom and Tirole 1993; Brennan and Subrahmanyam 1996; Chordia et al. 2001), lower diversification benefits (Demsetz and Lehn 1985), increased majority–minority conflicts (Shleifer and Vishny 1997; Johnson et al. 2000), and reduced management initiative (Burkart et al. 1997).Since theory cannot specify the relative importance of these costs and benefits, the shape of the relation between concentration and performance must be determined empirically.

Agency theory argues that owner type matters. Direct principal–agent relationships represented by personal investors is considered better than indirect ownership, where widely held private corporations or the state invest on others' behalf (Jensen and Meckling 1976). Pound (1988), however, argues that institutions may still outperform personal owners, provided the institutions' lower monitoring costs are not offset by the negative

incentive effect of delegated monitoring. The net impact of replacing personal investors by institutions is therefore unclear. Furthermore, since international (foreign) investors may be at an informational disadvantage, they bias their portfolio toward domestic firms and invest abroad only to capture diversification benefits rather than to improve governance (Kang and Stulz 1994; Brennan and Cao 1997). Thus, we would expect that because increased holdings by international investors reduces monitoring, firm performance is adversely affected.

Whereas the primary governance function of outside owners is to monitor management, a larger insider stake reduces the need for such control. The convergence-of-interest hypothesis predicts that insider holdings and economic performance are positively related. In contrast, Morck et al. (1988) argue that powerful insiders may entrench themselves and expropriate wealth from outside owners. Also, because there are other sources of insider power than insider ownership, such as tenure and charisma, one cannot predict at what fraction the insider stake diminishing returns sets in. Finally, as insiders carry a larger fraction of the destructed market value the higher their stake, the negative entrenchment effect may diminish as the insider stake becomes sufficiently large. Consequently, governance theory cannot specify the relation between insider ownership and performance unless we put a priori restrictions on the component costs and benefits.

Because groups communicate less effectively beyond a certain size, there is pressure from self-serving managers or entrenched owners to expand board size beyond its value-maximizing level (Jensen 1993). Agency theory predicts that board size will be larger than optimal from the owners' point of view. The security design mechanisms of voting/nonvoting shares represent a deviation from one share–one vote, creating a stockholder conflict resembling the one between majority and minority voting owners. Since most theories of price differences between dual class shares assume a potential extraction of private benefits by voting shareholders, we expect firms to have lower market value the higher the fraction of nonvoting shares outstanding (Grossman and Hart 1988; Harris and Raviv 1988b).

Financing policy can be used to limit management discretion over free cash flow by financing with debt rather than equity and paying out earnings as dividends or stock repurchase (Jensen 1986). Also, higher payout forces the firm more frequently to the new issue market and exposes it to more monitoring (Easterbrook 1984). Thus, owners may reduce agency costs through high leverage and high payout.

The equilibrium hypothesis of Demsetz (1983) argues that if optimally installed, every mechanism satisfies a zero marginal value condition, such

that a small change in any mechanism leaves firm value practically unaltered. Since two firms may have different sets of optimal mechanisms, the equilibrium condition implies that no mechanism will be significantly related to performance in a cross-sectional regression. Conversely, a significant relationship reflects a disequilibrium and a source of improved performance. Coles et al. (2003) questions this simple idea by showing that when managerial ownership is optimally tailored to managerial and capital productivity in every firm, reasonable parameter values produce a roughly quadratic cross-sectional relationship between managerial ownership and Tobin's Q.

Empirics

Our chapter compares the performance of firms with given governance mechanisms in place. The analytical tool used by existing research in this field is regressions, the sample is a cross section, and the vast majority of papers analyze one or a few ownership characteristics, which is most often outside concentration. Most studies use just one performance measure, which is either Tobin's Q, book return on assets, or market return on equity.

Among the 33 empirical ownership performance papers from 1932 through 1998 surveyed by Gugler (2001), 27 deal with outside and 6 with inside concentration. The papers mostly find either a positive or no link between outside concentration and performance, except Lehmann and Weigand (2000), which estimates a negative relationship for a sample of German firms. Four of the six insider papers (Morck et al. 1988; McConnell and Servaes 1990; Belkaoui and Pavlik 1992; Holderness et al. 1999) find a nonmonotone relationship between insider holdings and firm performance. The curve increases with insider holdings at low insider stakes, then decreases, then either still decreases, slightly increases, or stays constant. The two other studies (Agrawal and Knoeber 1996; Cho 1998), which both use simultaneous equations, cannot detect a significant link.

The evidence on owner identity is mixed, and according to Gugler (2001) "remarkably unexplored." Some find a positive performance effect of family control (Jacquemin and de Ghellinck 1980; Mishra et al. 2000), of founder-insiders in young firms (Morck et al. 1988), of private ownership (Boardman and Vining 1989), and of institutional investors (McConnell and Servaes 1990). Others cannot detect any pattern, like Kole and Mulherin (1997) for state owners and Smith (1996) for institutional shareholder activism.

Security design, financial policy, and market competition are the mechanisms that have been studied the least. The governance effect of product market competition is analyzed by Palmer (1973) and Crespi et al. (2004),

and the findings are consistent with the notion that outside owner monitoring and product market competition are substitute mechanisms. We are unaware of any paper on security design and economic performance in a corporate governance setting. Except for Agrawal and Knoeber (1996), who model the debt-to-equity ratio as one of seven governance mechanisms, existing research only includes financial policy as a control variable reflecting governance-independent determinants of performance, such as the interest tax shield (Demsetz and Lehn 1985; Morck et al. 1988; McConnell and Servaes 1990; Cho 1998). Finally, although research on board characteristics and economic performance has produced mixed results (Bhagat and Black 1998; Becht et al. 2003), the finding that performance decreases with increasing board size is quite robust, suggesting that boards are on average too large.

Three Problems in Governance-Performance Research

Partial Theories Corporate governance theory very often deals with univariate rather than multivariate relationships. For instance, Demsetz and Lehn (1985) model the performance effect of outside ownership concentration, whereas Morck et al. (1988) and Stulz (1988) focus on insiders. Not surprisingly, more formal models are even more restrictive. For instance, Burkart et al. (1997) derive optimal concentration under one benefit (improved monitoring) and one cost (reduced management initiative).

Testing such predictions is problematic if real-world mechanisms are substitute or complementary ways of reducing agency costs. For instance, although McConnell and Servaes (1990) consider ownership concentration, insider holdings, and institutional owners, they present no theory of interrelations and use a multivariate approach that cannot capture mechanism endogeneity. In contrast, the pioneering paper by Agrawal and Knoeber (1996) establishes a system of endogenous, multiple governance mechanisms, arguing theoretically (although rather incompletely) why the mechanisms are modeled as functions of each other and of exogenous firm characteristics.

The second partiality problem concerns the order of causation between governance and performance. Since causation may run either way, the relationship should be modeled accordingly. Although the issue has been raised earlier (for example, McConnell and Servaes 1990), it has only recently been analyzed empirically (Agrawal and Knoeber 1996; Loderer and Martin 1997; Cho 1998; Demsetz and Villalonga 2002). The only paper that addresses the problem both theoretically and empirically is Cho (1998).

Biased Samples The data used in the empirical tests are dominated by U.S. firms, where the firms are very large, the ownership structure variables only reflect block-holders, insider holdings are often biased toward board members, the set of owner types is narrow, and most of the evidence is based on a single year. Among the 28 studies surveyed by Gugler (2001), 18 use U.S. data, 5 are British, 2 are German, and the remaining 3 use data from respectively Australia, France, and Japan. The 6 insider papers are all from the United States. Morck et al. (1988), Agrawal and Knoeber (1996), and Cho (1998), among whose are the most sophisticated and influential papers, all sample from the Fortune 500 list. McConnell and Servaes (1990) are less restrictive, as they randomly sample NYSE and Amex firms. Ownership concentration per firm is always based on the aggregate fraction across all reported blocks, that is, stakes above a certain limit (normally 5%). As the most common insider proxy is the aggregate director stake, ownership by non-board insiders like non-director officers is ignored. Most studies ignore owner identity altogether, and the others use two categories only, such as institutional versus noninstitutional, state versus private, and personal versus nonpersonal. Finally McConnell and Servaes (1990) and Holderness et al. (1999) are exceptions to the single-year approach, sampling from two different years and testing the predictions on both sets.

This sample bias creates several generalization problems. If the regulatory environment drives the governance mechanisms, the U.S. evidence may be insufficient to judge the general validity of any theory. The overrepresentation of large firms is problematic if the link between governance and performance depends on firm size. The current focus on block-holdings is not dictated by theory, but by an arbitrary cutoff point for mandatory reporting. If the ratio of board to non-board insider holdings differs systematically across firms, the focus on directors rather than all insiders or other insider subgroups like the management team may fail to detect the true relationship between insider ownership and performance. Since different owner types have different roles to play when ownership is separated from control, a data set with a richer classification of types has a better chance of capturing the relevance of owner identity for economic performance. Finally, the snapshot approach, which is due to limited data availability, cannot tell whether relationships between governance and performance persist over time, or are due to the specific period chosen.

Weak Simultaneous Equations Table 3.1 classifies the methodologies used in existing empirical research into four groups. Almost without exception, existing research belongs in cell 1, where the econometric approach takes the mechanisms as externally given, causation is supposed to run from governance to performance, and where the single-equation regression typically contains one or two mechanisms.

TABLE 3.1 Mechanism Interaction and Mechanism Performance Causality

	Causation	
Mechanisms	One-way	Two-way
Exogenous	1	3
Endogenous	2	4

Himmelberg et al. (1999) come close to cell 2. Although they ignore mechanism interaction and analyze one-way causation running from insider ownership to performance only, they do estimate insider ownership from firm characteristics. Cell 3 is infeasible, as two-way causation cannot be modeled without letting at least one mechanism be endogenously related to performance.

Starting with a cell 1 approach and then moving to cell 4 by estimating the governance mechanisms and performance as a system of simultaneous equations, Agrawal and Knoeber (1996) and Cho (1998) find that most of the significant results disappear. This evidence brings the authors close to concluding that the equilibrium condition prevails. For instance, Agrawal and Knoeber (1996) find that if each of their seven governance mechanisms are considered exogenous and related to Q one by one, four of them are significant. Keeping the exogeneity assumption, but allowing for all the exogenous mechanisms in one multivariate regression, one more mechanism drops out. Finally, when allowing for two-way causality, board independence is the only significant mechanism in their simultaneous system. Whereas Agrawal and Knoeber (1996) do not report their findings on causation, Cho (1998) concludes that causation is reversed, running from performance to insider holdings (which is their only governance mechanism) rather than the opposite way.

Endogeneity and reverse causation favor simultaneous system equations, which is a cell 4 methodology. However, successful implementation of this method depends on whether corporate governance theory can offer well-founded restrictions on the equation system. Such a theory does not yet exist. The theoretical literature addresses neither how a wide set of mechanisms interact, nor what exogenous variables are driving two-way causation, nor the nature of the equilibrium in terms of an optimal combination of governance mechanisms for a given set of exogenous variables. Since the findings of Agrawal and Knoeber (1996) and Cho (1998) strongly depend on whether cell 1 or cell 4 approaches

are used, an important unresolved issue is whether cell 4 methodologies provide reliable evidence on the interaction between governance and performance. The findings reported in the fourth section suggest the answer is no.

DESCRIPTIVE STATISTICS

Our sample is all the nonfinancial firms listed on the Oslo Stock Exchange (OSE) in 1989–1997. The OSE is medium-sized by European standards, plays a modest but increasingly important role in the national economy, and became considerably more liquid over the sample period. The 217 firms listed in 1997 had an aggregate market cap equivalent of 67 billion U.S. dollars, which ranks the OSE twelfth among the 21 European stock exchanges for which comparable data are available. The number of firms listed rose from 129 to 217 over the sample period, market cap grew by 7% per year, and turnover increased from 52% to 97%. Market capitalization per unit GDP grew steadily to 43% in 1997, when the European median was 49% (www.fibv.com).

Although Norway has a civil law regime, the protection of shareholder rights is better than in the average common-law country (La Porta et al. 2000). This may be one reason why OSE firms have less concentrated ownership than any other European country except the U.K. For instance, the typical holding of the largest owner in a listed firm in the mid-1990s was 3% in the United States, 14% in the U.K., 45% in continental Europe (Barca and Becht 2001), and 30% in Norway (Bøhren and Ødegaard 2001).

Table 3.2 presents descriptive statistics for governance mechanisms, controls, and performance measures. Except when we study security design, every conclusion in this chapter is based on direct holdings of cash flow rights. However, no result changes materially if we alternatively use voting rights.

A common concentration measure in the literature is the Herfindahl index, which is the sum of all squared ownership fractions. It has a maximum of one when one investor owns everything and approaches its minimum of zero as ownership gets increasingly diffuse. Another measure often used is the fraction of outstanding equity owned by the *n*th or the *n* largest shareholders, *n* mostly varying between 1 and 5. The table reports the Herfindahl index and large owner fractions for *n* up to 20, the number of owners, the median and mean fraction, and the average stake of the largest outside (that is, non-insider) owner. The median owner is minuscule, the largest holds 29%, the two largest are a blocking minority against charter

TABLE 3.2 Descriptive Statistics

Panel A

	Mean	StDev	Q1	Median	Q3	n
Ownership concentration						
Herfindahl index	0.2	(0.2)	0.0	0.1	0.2	1069
Median owner	0.0	(0.0)	0.0	0.0	0.0	1069
Mean owner	0.2	(0.3)	0.0	0.1	0.1	1069
Largest owner	29.0	(19.2)	14.3	23.2	40.6	1069
1–2 largest owners	40.1	(20.2)	23.6	36.3	53.8	1069
1–3 largest owners	47.0	(20.0)	30.3	44.2	62.6	1069
1–4 largest owners	52.0	(19.6)	35.8	50.5	66.9	1069
1–5 largest owners	55.9	(19.1)	40.6	55.0	70.4	1069
1–10 largest owners	67.5	(16.9)	54.7	68.4	80.9	1069
1–20 largest owners	77.4	(14.0)	67.6	79.5	88.4	1069
Number of owners	4392.5	(9578.5)	691.0	1245.0	2938.0	1069
2nd largest owner	11.1	(6.1)	6.9	9.7	13.8	1069
3rd largest owner	7.0	(3.6)	4.7	6.3	8.8	1069
4th largest owner	5.0	(2.3)	3.5	4.7	6.3	1069
5th largest owner	3.9	(1.8)	2.7	3.7	4.9	1069
Largest outside owner	25.7	(19.3)	11.0	19.1	35.6	1069
Insider ownership						
Directors	7.8	(20.7)	0.0	0.1	2.5	1069
Officers	4.2	(14.7)	0.0	0.0	0.7	1069
Insiders	8.2	(19.0)	0.0	0.4	4.5	1069
Largest insider	5.5	(12.1)	0.0	0.4	4.5	1062
Owner type						
Aggregate state holdings	5.1	(13.8)	0.0	0.0	3.8	1069
Aggregate international holdings	22.1	(22.3)	4.6	14.8	32.8	1069
Aggregate individual holdings	17.8	(15.6)	6.5	12.4	25.2	1069
Aggregate financial holdings	16.6	(14.0)	5.5	14.2	23.7	1069
Aggregate nonfinancial holdings	39.0	(24.0)	17.5	37.5	58.7	1069
Aggregate intercorporate holdings	9.0	(14.9)	0.3	3.0	10.7	1067
Board characteristics						
Board size	6.6	(2.5)	5.0	6.0	8.0	964
Security design						
Fraction voting shares	96.8	(9.3)	100.0	100.0	100.0	1054

(Continued)

TABLE 3.2 *(Continued)*

Panel A

	Mean	StDev	Q1	Median	Q3	n
Financial policy						
Debt to assets	57.1	(19.4)	46.2	60.2	70.0	1058
Dividends to earnings	26.5	(68.1)	0.0	0.0	33.0	1040
Controls						
Investments to income	60.2	(283.7)	3.2	8.1	30.4	1006
Stock volatility	54.2	(28.7)	33.7	46.3	65.3	949
Stock turnover	59.4	(65.3)	13.4	40.3	79.0	1034
Stock beta	0.9	(0.6)	0.5	0.8	1.2	947
Equity value	1995.4	(6062.9)	168.6	480.8	1429.9	1069
Performance measures						
Q	1.5	(1.0)	1.0	1.2	1.6	1068
RoA	5.0	(14.8)	3.2	7.3	10.9	1061
RoS	33.1	(92.4)	−16.7	13.0	49.0	894

Panel B

Type of Largest Owner	Percentage of Sample
State	8.6
International	13.2
Individual	10.4
Nonfinancial	54.9
Financial company	7.8
Listed company	12.9

Panel A shows equally weighted averages across firms and years. Equity value is in millions of constant 1997 NOK. The other variables are in percent except for the Herfindahl index, board size, stock beta, and Q, which are in their natural units. The listed companies in panel B are either nonfinancial or financial owners. Data for all nonfinancial firms listed on the Oslo Stock Exchange, 1989–1997.

amendments (1/3 of the votes required), the four largest produce a simple majority, and the 10 largest can force a charter amendment. Considering only firms where the largest owner holds less than two-thirds of the shares, the average (median) firm needs the 15 (7) owners next in line to block a charter amendment. The largest outside owner holds 26% on average.

We classify investors into five types: state, individuals (persons), financials (institutions), nonfinancials, and international. To capture a case of

pure indirect holdings in firms with many owners, we also consider intercorporate holdings between OSE firms (cross holdings). The equally weighted averages show that national corporations are the largest type by aggregates and also the most frequent largest owner. However, value-weighted averages not shown in the table reveal that international investors hold the largest and personal investors the smallest fraction of the market portfolio. International investors hold almost one third of OSE market cap, nonfinancial domestic firms about one fourth, the state and financial investors both own roughly one fifth, and individuals about one tenth. Financial investors increase and individuals decrease their share almost every year. By 1997, individuals owned a smaller fraction of market cap than in any other European country (Bøhren and Ødegaard 2001).

Due to the overlap between directors (8%) and officers (4%), who together constitute the insiders, the average insider fraction (officers and directors) is 8%. Since the CEO is the only inside director of OSE firms, these figures reflect that officer holdings are mostly CEO holdings. Unfortunately, no reliable data exist on performance-dependent pay other than stock ownership.

Norwegian boards are outsider dominated and small by international standards. The average number of directors is seven, and 75% of the boards have eight members or less. Nonvoting shares are issued by 14% of the firms; international investors hold 54% of these shares and are heavily overrepresented. The average debt to total assets is 57%; dividends are 27% of earnings for all firms and 52% for the dividend payers, which is half the firms. Regulation made stock repurchases practically nonexistent in the sample period.

Our controls are investments (measured as accounting investments over sales), stock volatility, stock liquidity (annual turnover), stock beta, and equity value (the log of market value of equity). Asset pricing theory predicts that equity value is negatively related to beta and positively to liquidity. Demsetz and Lehn (1985) argue that the value of owner monitoring increases with increasing uncertainty in the firm's environment, making concentration and volatility positively related. Investments are supposed to control for noise in accounting-based performance measures (Demsetz and Lehn 1985), and equity value is used to capture the association between size and performance (Hawawini and Keim 2000). The average value of our sample firms in 1997 is roughly one-fifth the average NYSE firm and twice the average NASDAQ firm.

The performance proxies used in the literature are Tobin's Q, the accounting rate of return on assets (RoA), and the market return on the stock (RoS). Because we miss data on replacement values, Q is operationalized as the market value to book value of assets. The mean (median) estimate is

1.5 (1.2) for Q, 5.0% (7.3%) for RoA, and 33.1% (13.0%) for RoS. The consistency between these performance measures is generally low. A typical rank correlation is 0.25; pairwise consistency is higher when Q is one of the performance measures and stronger when RoA and RoS are based on five-year returns rather than annual.

SINGLE EQUATION ESTIMATES

This section tests and compares a wide range of models that all belong in cell 1 of Table 3.1. We start with the simplest univariate approach, switch to the opposite extreme of a full multivariate model, and finally compare both approaches to the findings from several partial multivariate models.

Univariate Analysis

Table 3.3 summarizes the findings of univariate regressions under five alternative performance measures. For each model, where we regress a performance measure on either a governance mechanism or a control variable, the table shows the sign and the significance level of the coefficient estimate. We use both annual and five-year average returns, and we measure outside concentration by single investor stakes (for example, fraction held by largest owner), aggregate stakes (for example, fraction held by five largest), and a proxy that reflects the entire ownership structure (the Herfindahl index). We do not report the R^2 values, which all vary between 0 and 4%.

Two distinct patterns in the table suggest that the choice of performance measure matters. First, the strength of a relationship differs across performance measures. In particular, the covariation is more often significant with Q, more often with the five-year averages RoA_5 and RoS_5 than with their annual counterparts, and, for a given averaging period, more often when performance reflects total assets than equity. Second, consistency across performance measures is higher when the return on assets and equity are five-year averages than annual. This is particularly true for the relationship between Q and RoA_5, which both measure value creation for the firm as a whole.

Although both Q and RoA_5 produce the cleanest relationships, we use Q as our base case in the remainder of the chapter. Since it is the most commonly used measure in the recent literature, using Q facilitates the comparison with extant research. RoA_5 is constructed from overlapping observations, which will induce autocorrelation in pooled panel–time series regressions. Also, since RoA_5 is accounting based, it may deviate from market returns and be biased by earnings management.

TABLE 3.3 Summary of the Univariate Regressions

	Dependent Variable (Performance Measure)				
	Q	RoA_5	RoS_5	RoA	RoS
Ownership concentration					
Herfindahl index	−***	−***	−	−	−
Largest owner	−***	−***	−	−	−
1–3 largest owners	−***	−***	−*	−	−
1–5 largest owners	−***	−***	−**	−	−
2nd largest owner	−	−	−**	+	−
3rd largest owner	+	−	−	−	−
4th largest owner	+	+	−	−	−
5th largest owner	+	+	−	−	−**
Owner type					
Aggregate state holdings	−***	−	−*	−	−
Aggregate international holdings	+	−	+	−	−
Aggregate individual holdings	+***	+***	+***	−***	+***
Aggregate financial holdings	+	+	−*	+***	+
Aggregate nonfinancial holdings	−***	−*	−	+	−
Aggregate intercorporate holdings	−***	−**	−	+***	+
Largest owner is state	−***	−	−*	+	−
Largest owner is international	−	+	+	−	+
Largest owner is individual	+***	+**	+***	−*	+
Largest owner is financial	−	−	−	+	−
Largest owner is nonfinancial	−***	−	−	+***	−
Largest owner is listed	−*	−**	−	+	+
Insider ownership					
Directors	+***	+***	−	+	+
Officers	+	+**	+***	−	+
Insiders	+***	+***	+*	−	+
Board characteristics					
ln(Board size)	−	−	−***	+	−
Security design					
Fraction voting shares	+*	−	+*	−	+
Financial policy					
Debt to assets	−***	−***	−***	+***	−
Dividends to earnings	−	+	−	+***	+
Market competition					
Industrial	+	−	+	+	+
Transport/shipping	−***	−***	−**	+	−
Offshore	−*	−***	+	−	+

(Continued)

TABLE 3.3 *(Continued)*

	Dependent Variable (Performance Measure)				
	Q	RoA_5	RoS_5	RoA	RoS
Controls					
ln(Equity value)	+***	–	–	+***	+*
Investments to income	–	–	–	+	–
Stock volatility	–***	–**	+***	–***	+
Stock turnover	+***	+	+***	–	+***
Stock beta	+	–	+***	–	+

The table summarizes univariate regressions relating five alternative performance measures to one independent variable (a governance mechanism or control) by showing the estimated sign and its significance. The univariate relationship is estimated with an OLS regression:

$$\text{Performance} = a + b \text{ Independent variable} + \varepsilon$$

We report the estimated sign of b and indicate statistical significance with *, **, and ***, which means the relationship is significant at the 5%, 2.5% and 1% level, respectively. The performance measures are Tobin's Q (Q, operationalized as the market value of the firm divided by its book value), the book return on total assets (RoA), and the market return on stock (RoS). Variables subscripted with a 5 are five-year averages. Data for all nonfinancial firms listed on the Oslo Stock Exchange, 1989–1997.

Focusing on Q, the univariate models in Table 3.3 show that outside ownership concentration is inversely related to performance when concentration is measured by the Herfindahl index, the largest stake, and by alliances of large owners, such as the three or five largest as a group rather than the third or fifth largest alone. The covariation with performance is positive for individual investors and negative for the state and nonfinancials, regardless of whether we measure owner identity by aggregate holdings per type or type of the largest owner. Directors and insiders as a group both have large stakes when performance is high, and performance is lower for firms that finance heavily with debt.

The Full Multivariate Model

Based on the theory and evidence discussed in the first section, we specify a full multivariate model relating Q to ownership concentration, insider holdings, owner type, board characteristics, security design, financial policy, and controls. The estimates are presented in Table 3.4,

TABLE 3.4 The Full Multivariate Model

	coe	(stdev)	pvalue	mean
Constant	–1.04	(0.69)	0.13	
Ownership concentration	–0.63	(0.19)	0.00	0.28
Insiders	1.64	(0.47)	0.00	0.08
Squared (Insiders)	–1.34	(0.58)	0.02	0.04
Aggregate state holdings	–0.37	(0.34)	0.29	0.06
Aggregate international holdings	0.15	(0.25)	0.54	0.21
Aggregate individual holdings	1.04	(0.30)	0.00	0.18
Aggregate non-financial holdings	–0.17	(0.26)	0.52	0.38
ln(Board size)	–0.19	(0.09)	0.03	1.83
Fraction voting shares	1.19	(0.36)	0.00	0.97
Debt to assets	–1.51	(0.18)	0.00	0.59
Dividends to earnings	–0.10	(0.05)	0.05	0.27
Industrial	–0.20	(0.08)	0.01	0.37
Transport/shipping	–0.47	(0.09)	0.00	0.22
Offshore	–0.56	(0.14)	0.00	0.06
Investments to income	–0.00	(0.01)	0.98	0.59
ln(Equity value)	0.14	(0.02)	0.00	20.06
n	868			
R^2	0.29			
Average Q	1.52			

The table reports estimates for a OLS regression relating performance (Q) to ownership concentration (measured as the fraction of equity held by the largest owner), insider ownership (the fraction held by officers and directors), the squared value of the insider ownership measure, the fraction held by respectively state, international, individual, and nonfinancial owners, the natural logarithm of board size, the fraction of equity which is nonvoting (B) shares, debt to assets, dividends to earnings, dummy variables for whether the firm is an industrial, transport/shipping or offshore company, investments as a fraction of income, and the natural logarithm of the firm's equity value. Q is the dependent variable, and the independent variables are listed in the first column. The column labeled "coe" contains the regression coefficient, "(stdev)" holds the estimated standard deviation, the "pvalue" column shows the probability that the coefficient differs from zero under a normal distribution, and the "mean" column holds the average of the explanatory variable. n is the number of observations, and R^2 is the adjusted R-squared for the regression. Equity value is in terms of the 1997 general price level. The regression pools data for all nonfinancial firms listed on the OSE from 1989 to 1997.

which also reports sample means of the dependent and independent variables. It turns out that the results are insensitive to whether we measure concentration by the holdings of the largest owner as used in Table 3.4, the two largest, three largest, four largest, five largest, or by the Herfindahl index. Also, since our results are robust to whether we proxy for owner identity by aggregate holding per type or by the identity of the largest owner, we use aggregate holding per type. Because the five aggregate fractions sum to unity per firm by construction, we avoid econometric problems by excluding one type and interpreting it as the reference case. We arbitrarily choose financial owners as the base type.

The table shows that outside ownership concentration and economic performance are inversely related, that individual owners are associated with higher performance than others, that performance increases with insider ownership up to roughly 60% and then decreases, and that performance is inversely related to board size, to the fraction of nonvoting shares outstanding, and to financial leverage. Also, performance varies systematically with industry and firm size.

The finding that performance and outside concentration are inversely related supports the idea that outside monitoring by powerful owners either does not occur or does not benefit all owners if carried out. If the primary function of the outside owner is to hold on to a big stake, the typical firm would do better with small owners who vote with their feet. This finding differs from the mostly positive or neutral effects reported in the literature, but is consistent with evidence from Germany (Lehmann and Weigand 2000). The superior performance of individual owners supports the hypothesis that owner identity matters and that delegated monitoring destroys value. Thus, although performance is inversely related to outside concentration in general, the negative effect is less pronounced when the outside ownership is direct rather than indirect. The third ownership structure result suggests that although ownership concentration in general destroys value, this may be driven by unique costs of outside as opposed to inside concentration. It highlights the difference between inside incentives and outside control, supports the notion that minority shareholder protection is value creating, and is consistent with most earlier findings. Since the average insider fraction in the sample is 8%, and only 3% of the firms have insider holdings above 60%, many firms are on the steep, increasing part of the curve, and almost all are on the increasing part. Thus, although there are universally decreasing returns to insider holdings, the marginal return is typically positive.

The negative link between board size and performance is consistent with earlier evidence that small groups are more efficient than large, and that the efficiency loss sets in at a rather small group size. The security design hypothesis that nonvoting equity enables voting shareholders to extract wealth from others may explain why issuing such securities reduces market value. The inverse link between leverage and performance does not support the agency argument that debt disciplines management. The significant industry effects are difficult to interpret because we do not know whether our rather crude industry index reflects a governance mechanism (market competition) or a governance-independent industry effect. Anyway, the evidence does reflect some source of industrywide performance differences that are not picked up by other variables in the model, and which would otherwise have ended up in the error term. The positive association between firm size and Q reflects a governance independent value source, possibly market power and economies of scale and scope. Finally, since several mechanisms covary significantly with performance, the full multivariate model rejects the equilibrium hypothesis. Performance is inferior because the average firm has suboptimal governance.

Even if two governance mechanisms have coefficients that both differ significantly from zero, their importance for performance may still be widely different. We may quantify this performance sensitivity by the impact on Q of a modified mechanism, focusing on ownership concentration, insider holdings, individual investors, board size, and security design. Table 3.4 shows directly that Q decreases by 0.63 units when outside concentration increases with one unit, and that performance sensitivity is roughly twice as strong to aggregate individual holdings (1.04) and to voting shares (1.19). These effects may also be expressed as valuation effects for the average firm. Due to the two nonlinear terms, we cannot estimate such effects by simply plugging in the mean values from the rightmost column, but instead insert the square of the mean insider stake and the log of average board size. Similarly, the estimated Q for the average firm is not the average Q (1.520), but the Q of a firm where every governance and control variable equals the sample mean (1.558).

Following this procedure, we find that the ownership characteristic with the strongest impact on firm value is insider holdings, where a percentage point higher stake increases firm value by 1% for the average firm. The performance effect of a corresponding growth in the other governance mechanisms is 0.8% for individuals' holdings, –0.4% for outside ownership concentration, and 0.8% for the fraction of voting shares. Firm value will grow by approximately 2% if board size is reduced by one member. Since equity is on average 40% of total assets, the relative impact on equity will be higher, and more so the less debt is influenced by modified governance mechanisms. If debt value is unaffected, the relative equity value effect will be 2.5 times the relative firm value effect.

Robustness of the Full Multivariate Model

Table 3.4 was estimated using OLS and pooled data. Disregarding simultaneity and reverse causation, which we address in the fourth section, this approach means that the same firm may appear numerous times in the sample (autocorrelation), that the independent variables be related (multicollinearity), and that a time-independent model is misspecified if the underlying structure changes over the nine years (instability). We address these problems by first running year-by-year OLS regressions, which have no time series correlation, and where structural shifts will show up in the time series of estimated coefficients. Since these regressions only have roughly 100 rather than 900 observations, we expect less significant coefficients, and hence a bias toward accepting the equilibrium hypothesis. To avoid the small sample problem and also address autocorrelation and instability, we use two other approaches with the pooled data. In GMM regressions, error term dependency is picked up by the estimated standard errors and hence reflected in the p-values. We also add annual indicator variables to the pooled OLS model, such that the resulting fixed effects regression may capture certain types of instability by allowing the constant term to change over time. Finally, since multicollinearity inflates standard errors in all three approaches and also in our base case model in Table 3.4, it biases our tests toward keeping the equilibrium hypothesis.

Table 3.5 shows that the overall pattern from Table 3.4 mainly persists. The inverse relation between performance and concentration shows up everywhere, is highly significant in the GMM and fixed effects regressions (panel B), but is only significant at the 1% level in two of the nine years in the year-by-year regressions (panel A). Although both methods in panel B estimate the usual positive and significant coefficient for the linear insider term and a negative coefficient for the quadratic insider term, the p-value of the latter is 10% with GMM and 4% with fixed effects. The fixed effects model produces a significantly positive coefficient for international investors, and the structural relationship changes in the two final sample years, when the marketwide Q moves strongly upward.

Because Table 3.3 showed that the univariate relationships are sensitive to the choice of performance measure, Table 3.6 reestimates the full multivariate model with five alternative performance measures. To simplify the comparison, we repeat the findings for Q in the second column.

Just as in the univariate case, consistency across performance measures is low, particularly for the market return on stock. For instance, outside concentration is only significant using Q. Thus, our findings on the interaction between governance and performance based on Q cannot be generalized to other performance measures.

TABLE 3.5 Robustness of the Full Multivariate Model

Panel A: Year-by-Year OLS Regressions

	Year										
	1989	1990	1991	1992	1993	1994	1995	1996	1997		
Constant	+	+	–	–	+	–	–*	+	–		
Ownership concentration	–***	–*	–*	–	–	–***	–	–	–		
Insiders	+	–	+	+	+	+	+	+	+		
Squared (Insiders)	+	+	+	–	–	–	+	–	–		
Aggregate state holdings	+	+	+	+	–	+	+	–	–		
Aggregate international holdings	+	+	+	–	+	+*	+***	+	+		
Aggregate individual holdings	+	+	+	+	+	+	+	+**	+		
Aggregate nonfinancial holdings	+	+	+	–	–	+	+	+	–		
ln(Board size)	–***	–	–	–	–	–	+*	–	–		
Fraction voting shares	+	+	+	–	+	+	+***	+	+		
Debt to assets	–	–	–*	+	–	–*	–**	–***	–***		
Dividends to earnings	+	+	+	–	–	+	–	–			
Industrial	–	–	+	–	–	–	–	–	–		
Transport/shipping	–	–*	–*	–	–**	–***	–	–	–		
Offshore	–	–	–*	–	–	–*	–	–	–		
Investments to income	+	–	–	–	–	–	–	–	–		
ln(Equity value)	+***	+*	+	+***	+	+*	+	+	+*		
n	81	73	64	83	90	98	108	118	153		
R^2	0.35	0.30	0.37	0.34	0.34	0.43	0.53	0.40	0.36		
Average *Q*	1.32	1.18	1.13	1.07	1.41	1.34	1.51	2.04	2.00		

(Continued)

TABLE 3.5 *(Continued)*

Panel B: Pooled GMM and Fixed Annual Effects Regressions

	coe	pvalue		coe	pvalue
Constant	−0.94	0.10	Constant	−0.42	0.54
Ownership concentration	−0.68	0.00	Ownership concentration	−0.82	0.00
Insiders	1.64	0.01	Insiders	1.43	0.00
Squared (Insiders)	−1.37	0.10	Squared (Insiders)	−1.15	0.04
Aggregate state holdings	−0.43	0.10	Aggregate state holdings	0.01	0.99
Aggregate international holdings	0.12	0.63	Aggregate international holdings	0.61	0.01
Aggregate individual holdings	1.02	0.00	Aggregate individual holdings	1.10	0.00
Aggregate nonfinancial holdings	−0.23	0.25	Aggregate nonfinancial holdings	0.10	0.68
ln(Board size)	−0.19	0.01	ln(Board size)	−0.23	0.01
Fraction voting shares	1.14	0.00	Fraction voting shares	0.93	0.01
Debt to assets	−1.54	0.00	Debt to assets	−1.36	0.00
Dividends to earnings	−0.11	0.00	Dividends to earnings	−0.08	0.13
Industrial	−0.19	0.02	Industrial	−0.16	0.03
Transport/shipping	−0.46	0.00	Transport/shipping	−0.45	0.00
Offshore	−0.57	0.00	Offshore	−0.60	0.00
Investments to income	−0.00	0.95	Investments to income	−0.00	0.86
ln(Equity value)	0.14	0.00	ln(Equity value)	0.10	0.00
n	868		1990	−0.20	0.15
Average Q	1.52		1991	−0.20	0.17
			1992	−0.11	0.42
			1993	0.11	0.41
			1994	−0.05	0.68
			1995	0.06	0.64

TABLE 3.5 *(Continued)*

Panel B: Pooled GMM and Fixed Annual Effects Regressions

	coe	pvalue
1996	0.52	0.00
1997	0.49	0.00
n	868	
R^2	0.35	
Average Q	1.52	

The table explores the robustness of the full multivariate model by redoing the regression in Table 3.4 with OLS on annual data, GMM on pooled data, and OLS on pooled data with fixed annual effects. Panel A shows OLS estimates on a year-by-year basis. The left table in panel B uses GMM and pooled data. The table to the right in panel B shows results of a pooled OLS regression where dummy variables for each year capture fixed effects, using 1989 as the base year. Each regression relates performance (Q) to ownership concentration (measured as the fraction held by the largest owner), insider ownership (the fraction owned by officers and directors), the squared insider holding, the equity fraction held by respectively state, international, individual and nonfinancial owners, the natural logarithm of board size, the fraction of equity which is nonvoting (B) shares, debt to assets, dividends to earnings, dummy variables for whether the firm is an industrial, transport/shipping or offshore company, investments as a fraction of income, and the natural logarithm of the firm's equity value. Q is the dependent variable. The independent variables are listed in the first column. The column labeled "coe" in panel B contains the regression coefficient, the "pvalue" column shows the probability that the coefficient differs from zero under a normal distribution. *n* is the number of observations, and R^2 is the adjusted R-squared. Equity value is in terms of the 1997 general price level. The regressions include data for all nonfinancial OSE firms from 1989 to 1997.

TABLE 3.6 The Full Multivariate Model under Five Alternative Performance Measures

	Dependent Variable (Performance Measure)				
Independent variable	**Q**	**RoA_5**	**RoS_5**	**RoA**	**RoS**
Ownership concentration	−***	−	+	+	+
Insiders	+***	+***	−	+**	+
Squared (Insiders)	−**	−**	+	−***	−
Aggregate state holdings	−	+	−	−***	−
Aggregate international holdings	+	+	+	−***	−
Aggregate individual holdings	+***	+	+***	−	+***
Aggregate nonfinancial holdings	−	−	−	−	−
ln(Board size)	−*	−	−**	+	−
Fraction voting shares	+***	−	+*	−	+
Debt to assets	−***	−***	−***	+*	−
Dividends to earnings	−*	+	−	+**	−
Industrial	−**	−***	+**	−	+
Transport/shipping	−***	−**	+	−	+
Offshore	−***	−***	+	−	+
Investments to income	−	−	−	+	+
ln(Equity value)	+***	−	+	+	+***
n	868	851	621	869	743
R^2	0.27	0.12	0.12	0.11	0.05

The table summarizes results from estimating the full multivariate model of Table 3.4 using five alternative performance measures. The performance measures are Q (the market value of the firm divided by its book value) *RoA* (the book return on total assets), and *RoS* (the market return on stock). Performance variables subscripted with a 5 are five-year averages. The independent variables are listed in the first column. Each regression relates a performance measure to ownership concentration (measured as the fraction held by the largest owner), insider ownership (the fraction owned by officers and directors), the squared insider holding, the equity fraction held by respectively state, international, individual and nonfinancial owners, the natural logarithm of board size, the fraction of equity which is nonvoting (B) shares, debt to assets, dividends to earnings, dummy variables for whether the firm is an industrial, transport/shipping or offshore company, investments as a fraction of income, and the natural logarithm of the firm's equity value. The regression summarized in the first column corresponds to the one in Table 3.4. We report the sign of the regression coefficients, and indicate statistical significance with *, **, and ***, which means the relationship is significant at the 5%, 2.5% and 1% level, respectively. Data for all nonfinancial firms listed on the Oslo Stock Exchange, 1989–1997.

One may wonder whether the use of equity market capitalization as a control for size matters for the estimated relationship, since the dependent variable Q is partially determined by the same market cap. Using instead sales as the size proxy, we find that although no estimated sign is reversed for any governance mechanism, the coefficient is no longer significant at the 5% level for the quadratic insider term, individual owners, board size, and the fraction of voting shares. The negative impact of indirect ownership through nonfinancial firms becomes significant at the 1% level.

Partial Multivariate Models

After having used the simplest univariate relationships and the opposite extreme of a full multivariate model, we compare both approaches to the findings from several partial multivariate models in Table 3.7, where our estimates of the full multivariate model from Table 3.4 are reported as model (8) in the rightmost column. First, we briefly relate (1) through (7) to the existing international evidence, which is mostly based on these models.

Demsetz and Lehn (1985) (hereafter DL) relate Q to the holdings of the five largest owners in large U.S. corporations. Their estimated relationship is insignificant at conventional levels, which is inconsistent with Berle and Means (1932), but supportive of the equilibrium argument of Demsetz (1983). Model (1) in Table 3.7 shows the results of a replication of the DL approach with our data. Unlike DL, we find that ownership concentration and performance are significantly related. The DL controls are industry dummies for utilities and financials, investments in real assets, R&D, advertising, firm size, and stock price volatility. Because our sample contains no financials and very few utilities, we use the industry classification from Table 3.2. Since Norwegian firms do not specify R&D and advertising, these items must be ignored. We use investment intensity (investment over sales) as a substitute, and we log transform the holding of the five largest owners in order to be consistent with DL. DL's assumption of a linear concentration performance relationship was criticized by Morck et al. (1988), stating that "the failure of Demsetz and Lehn to find a significant relationship between ownership concentration and profitability is probably due to their use of a linear specification that does not capture an important nonmonotonicity." Letting the five largest owners' stake enter both in a linear and a quadratic fashion, we still find a negative and significant linear term, but the quadratic term is insignificant. Thus, the simple linear specification of DL captures the essentials of the concentration-performance interaction in our sample.

TABLE 3.7 Alternative Multivariate Models

	Regression							
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
lntrans(1–5 largest owners)	–***							
Largest owner			–***					
Ownership concentration				–***	–***	–***	–***	–***
Insiders (0 to 5)		+***						
Insiders (5 to 25)		+**						
Insiders (25 to 100)		–						
Insiders			+***	+***	+***	+***	+***	+***
Squared (Insiders)			–***	–***	–***	–***	–***	–**
Aggregate state holdings				–				–
Aggregate international holdings				+				+
Aggregate individual holdings				+***				+***
Aggregate nonfinancial holdings				–				–
ln(Board size)					–***			–*
Fraction voting shares						+***		+***
Debt to assets		–***	–***	–***	–***	–***	–***	–***
Dividends to earnings							–	–*
Industrial	–***	–***	–***	–***	–***	–***	–***	–**
Transport/shipping	–***	–***	–***	–***	–***	–***	–***	–***
Offshore	–***	–***	–***	–***	–***	–***	–***	–***
Investments to income	–							–
ln(Equity value)	+***	+***	+***	+***	+***	+***	+***	+***
Stock volatility	–							
n	905	1057	1057	1057	906	1042	1028	868
R^2	0.14	0.20	0.22	0.23	0.21	0.22	0.22	0.27

The table summarizes the estimated sign and significance levels in eight different multivariate models which all use performance measured by Q (market to book) as the dependent variable. Each column summarizes the results of a OLS regression relating Q as dependent variable to various permutations of explanatory variables. Model (1) is a pure concentration model, (2) is a pure insider model, (3) is a concentration-insider model, (4) is a concentration-insider-owner type model, (5) is a concentration-insider-board model, (6) is a concentration-insider-security design model, (7) is a concentration-insider financial policy model, and (8) corresponds to the full multivariate model in Table 3.4. The variable 1–5 largest owners is the fraction of equity held by the five largest owners, lntrans( ) is the logarithmic transformation used by Demsetz and Lehn (1985), Largest owner is the fraction of equity owned by the largest owner, and Ownership concentration is the Herfindahl index, which is the sum of squared ownership fractions, and insiders is the fraction of equity owned by directors and officers. The variables (0 to 5), (5 to 25) and (25 to 100) are dummy variables as used by Morck et al. (1988) to model a piecewise linear relationship with the stake of the largest owner being respectively less than 5%, between 5 and 25% and higher than 25%. Squared(Insiders) is the Insiders holdings squared. Aggregate holdings reflects the fraction of the company's equity held by the given type, Board size is the number of directors, ln() is the natural logarithm, and Fraction voting shares is the fraction of the company's equity with full voting rights. Industrial, Transport/Shipping and Offshore are industry dummy variables, Equity value is the market value of the company's equity, and Stock volatility is the standard deviation of the firm's daily stock returns. We report the sign of the regression coefficients and indicate statistical significance with *, **, and ***, which means the relationship is significant at the 5%, 2.5% and 1% level, respectively. *n* is the number of observations. R^2 is the adjusted R-squared for the regression, equity value is in terms of the 1997 general price level, and the sample is all nonfinancial firms on the OSE from 1989 to 1997.

Morck, Shleifer, and Vishny (1988) (MSV) analyze the relationship between Q and insider holdings, capturing nonmonotonicity through a piecewise linear function with prespecified steps that maximize the R^2. They find that performance increases with insider holdings up to 5%, decreases as the stake grows further to 25%, and increases again thereafter. Model (2) estimates the MSV model in our sample. Our results are different, as the relationship is positive through the first two intervals up to 25% and negative thereafter. Like in MSV, our p-values increase as we move upward in the insider size intervals, p being below 1%, 3%, and 7%, respectively.

McConnell and Servaes (1990) (McS) expand the MSV approach by roughly doubling the sample size, using more heterogeneous firms in terms of size, and by including two years (1976 and 1986) instead of just one (1980). They also consider outside concentration and institutional ownership, their insiders are officers and directors, and they allow for a less restrictive and more smooth relation between insider holdings and performance by using a quadratic functional form. Their estimated insider-performance relation has its maximum at 38% in 1986 and at 49% in 1976.

Model (3) replicates McS by including outside concentration, a linear and a quadratic insider term, and controls. We find a significant quadratic relationship between insiders and performance, and that the negative effect of outside concentration from (1) survives. One may perhaps wonder whether this result is caused by an overlap between concentration and insider holdings, since some of the large owners may also be insiders. However, no conclusion changes if we account for this overlap by removing the insiders from the concentration measure. Alternatively, if we include an additional insider variable representing the stake of the largest insider, its estimated coefficient is significantly negative, once more suggesting that concentration per se is value destroying, also when the large owner is an insider.

Model (4) expands further by adding not just institutional owners used by McS, but all five owner types discussed earlier. The positive, significant coefficient for individual holdings suggests that direct monitoring performs better than delegated monitoring, regardless of whether the intermediary is private or state, institutional or noninstitutional. According to Allen and Phillips (2000), however, ownership by nonfinancials may still be better if it acts as a sharing mechanism for jointly produced profits or an information channel in strategic alliances. Using intercorporate ownership between OSE firms as a proxy for holdings between large firms with many owners, we find a significantly negative link to performance. Thus, any positive strategic effect of intercorporate investments seems more than offset by the negative monitoring effect hypothesized by the agency model.

The multivariate regression of model (5), which includes outside concentration, linear and quadratic insider effects, board size, and controls, supports the international evidence that performance is negatively and significantly related to board size. Model (6) supports the security design prediction that since Q ignores the value of private, nonsecurity benefits, firms with dual-class shares will be less valuable than others by this measure, and more so the lower the fraction of voting outstanding. However, model (7) does not support an agency story for financial policy, as the estimated sign is negative for both debt and dividends. At conventional levels, the coefficient is significant for leverage and insignificant for payout.

Since most governance research has not tested for financial policy as a governance mechanism, (2) through (6) include the debt-to-assets ratio as a governance independent control.

Table 3.7 has one striking property. Notice by reading the table horizontally that most relationships survive all the way from the simplest models on the left to the most comprehensive models on the right. Performance is always significantly related to outside ownership concentration (–), direct ownership (+), the use of voting shares (+), and inside ownership (+) up to a certain point. The irrelevance of state, international, and nonfinancial owner identity occurs everywhere. In fact, these relationships also showed up in the univariate models in Table 3.3, except that univariate models cannot reflect nonmonotonicity. The only discrepancy is that although performance and board size are always inversely related in the univariate case, the link is only significant in the multivariate setting. Conversely, the negative univariate performance effect of state and nonfinancial owners disappears once we control for other governance mechanisms and controls.

This very persistent pattern suggests that the estimated interaction between governance and performance is relatively independent of what model specification we choose within cell 1 of Table 3.1. Because each mechanism has a separate, independent function, the performance effect of a given mechanism may not have to be estimated by complex, data intensive models. Our finding that signs and p-values persist when new variables are introduced suggests that governance mechanisms are not used as substitutes and complements.

SIMULTANEOUS EQUATION MODELS

We have so far taken the governance mechanisms as exogenously given by modeling neither their internal dependence nor the order of causation between governance and performance. Simultaneous equation models may in

principle handle both aspects and bring us from cell 1 to cell 4 in Table 3.1. This section shows that because the estimates are sensitive to the choice of instruments (coefficient restrictions), and since governance theory cannot rank alternative instruments, the simultaneous equation approach is no panacea in cell 4 settings. This problem is evident in Agrawal and Knoeber (1996), who establish six equations to capture mechanism endogeneity. Any equation relates a mechanism linearly to the five others and to a set of exogenous variables. To model two-way causation, Q is included as an independent variable in each governance equation, and each mechanism is an independent variable in the Q equation.

The resulting system of 7 equations and 15 exogenous variables is to be estimated by 2SLS, which is infeasible unless the researcher restricts several coefficients, such as assuming independence between institutional ownership and board size. Because there is no theory yet providing such predictions, Agrawal and Knoeber (1996) must choose instruments in an ad-hoc fashion.

Because we cannot hope to validly restrict a system of equations that includes all the governance mechanisms analyzed in the third section, we choose to only endogenize outside ownership concentration and insider holdings. These two mechanisms have received the widest attention in the literature, and agency theory argues that they represent alternative vehicles for reducing agency costs (external monitoring versus internal incentives). Moreover, there is little theoretical guidance on how the two interact with the remaining mechanisms. This makes our setup well suited to explore how conclusions change when we alter the interaction assumptions by choosing alternative instruments for the two endogenous variables. The problems we encounter in this limited setting of two endogenous mechanisms and two-way causation should be sufficient to illustrate what would happen if more mechanisms were endogenized. We specify nine alternative models, each representing a particular set of instruments. The basic relationship is the full multivariate model from the third section except that we remove the quadratic term on insider ownership to avoid potential econometric problems in equation systems with nonlinear endogenous variables (Davidson and MacKinnon 1993, ch 18.7). In fact, the performance effect captured by the quadratic insider term in single-equation estimates may now instead be found directly in a system which allows for linear interaction.

Model (A) uses stock volatility and board size to identify the concentration and insider equations, respectively. Thus, higher stock volatility is assumed to increase concentration, but not insider ownership, using the Demsetz and Lehn (1985) idea that higher uncertainty increases the value of outside monitoring. Board size is assumed to affect insider ownership, but not concentration, by arguing that a larger board increases the number

of insiders and hence the potential insider stake. One problem with this model is, however, that higher volatility increases the risk of an undiversified insider portfolio, the value of inside information, and also the power of incentive-based compensation. In fact, because the net benefit of holding insider shares may depend on total risk, Loderer and Martin (1997) assume that stock volatility and inside ownership are related. Therefore, our model (B) identifies the concentration equation not by the stock's volatility, but by its liquidity, which we operationalize as equity turnover. Because large owners may invest strategically and because block sales create price pressure, large owners hesitate to sell out. Thus, a smaller fraction of the equity will be traded under concentrated ownership. We assume no similar effect on insider holdings, which are normally much smaller. As in model (A), board size is supposed to identify the insider equation.

Model (C) introduces a new instrument for both mechanisms. The insider instrument is debt, arguing that more debt reduces the amount required to buy a given equity fraction. Although we cannot convincingly argue why this should not apply to outside concentration as well, it may be even more costly for insiders than for large outsiders to hold a large stake. We choose intercorporate shareholdings as the new instrument for ownership concentration, based on the evidence that when one firm owns nontrivial parts of another firm, the holding is relatively large. For instance, Bøhren and Ødegaard (2000) show that the mean intercorporate holding is 10% while the median is 3%. This reflects an ownership structure with a few large holdings and many small ones. We do not expect intercorporate investments and insider holdings to be related.

Stock beta is used to identify Q in all three models. Asset pricing theory predicts that systematic risk influences Q through the cost of capital, but we cannot convincingly argue why this instrument is unrelated to the other endogenous variables. One possibility is the order of magnitude argument that although beta drives all three variables, it has a stronger effect on firm value than on ownership concentration and insider holdings.

We consider two other methods for generating instruments. Models (D), (E), and (F) lag the instruments from models (A), (B), and (C) one period. Because most of these variables are persistent, the rationale for using time t–1 instruments is that they are strongly correlated with time t endogenous variables, but unrelated to time t error terms. The second class of alternative instruments, used in models (G) through (I), is lagged endogenous variables. Because these time t–1 variables are known data in the information set at t, they can be treated as constants in the time t regression.

The estimates shown in Table 3.8 leave three impressions. First, the estimated sign of the impact of an independent variable often differs across

TABLE 3.8 Summary of Simultaneous Equation Estimations

Panel A: The Performance Equation

Dependent Variable	Independent Variables	(A)	(B)	(C)	Instruments Lagged (D)	(E)	(F)	Dependent Variable Lagged (G)	(H)	(I)
Performance	Ownership concentration	+	−	−*	+	−	−*	−	−	−
	Insiders	−	+	−*	−	+	−	+	+	+
	Aggregate state holdings	−	+	+	−	+	+	−	+	−
	Aggregate international holdings	−	−	+**	−	−	+**	−	+	−
	Aggregate individual holdings	+	−	+**	+	−	+	+**	−	−
	Aggregate nonfinancial holdings	−	−	+*	−	−	+	−	+	−
	ln(Board size)			−			−	−	−	+
	Fraction voting shares	−	+	−	−	+	+**	+**	+	+
	Debt to assets	−***	−		−	−		−	+	
	Dividends to earnings	−	−	+	−	−	+	−	+	−
	Industrial	−	+	−**	−	+	+***	−	+	+
	Transport/shipping	−	+	−***	−	−	−***	−	−	+
	Offshore	−*	−	−	−	−	−**	−	+	+
	Investment to income	+	+	−	+	−	−	−	−	+
	ln(Equity value)	+	+	+	+	+	+**	+***	−	+
	Stock beta	−	+	−	−	+	−			
	lag(-1) (Performance)							+***		
	lag(-1) (Ownership concentration)								+	
	lag(-1) (Insiders)									−
	Constant	−	−	−	−	−	−	−***	+	−

Panel B: The Concentration Equation

Dependent Variable	Independent Variables	(A)	(B)	(C)	Instruments Lagged (D)	(E)	(F)	Dependent Variable Lagged (G)	(H)	(I)
Ownership concentration	Insiders	+	+	+	+	−	+***	+	+	+
	Performance	+	+	−	+	+	−*	−	−	−
	Aggregate state holdings	+***	+***	+***	+***	+***	+***	+***	−	−
	Aggregate international holdings	+***	+***	+***	+***	+***	+***	+***	−	−
	Aggregate individual holdings	−	−	+	−	−	+	−	−	+
	Aggregate nonfinancial holdings	+***	+***	+***	+***	+***	+***	+**	−	−
	Aggregate intercorporate holdings			+**			+*			
	ln(Board size)			−*			−**	−	+	−
	Fraction voting shares	+	+	+***	+	+	+***	+	+	+
	Debt to assets	+	+		+	+	+	+	−	−
	Dividends to earnings	+*	+	+	+	+	+	+	−	−
	Industrial	+	+	−	+	+	−	+	+	−
	Transport/shipping	+	+	−*	+	+	−***	−	+	−
	Offshore	+	+	−	+	+	−	+	+	−
	Investments to income	−	−	−	−	−	−*	−	+	−
	ln(Equity value)	−	−	−	−	−	+	−*	+	+
	Stock volatility	+			+					
	Stock turnover		−***			−*				
	lag(-1) (Performance)									+
	lag(-1) (Ownership concentration)							+***		
	lag(-1) (Insiders)								−	
	Constant	+	+	−	+	+	−	+	−	−

(Continued)

TABLE 3.8 *(Continued)*

Panel C: The Insider Equation

Dependent Variable	Independent Variables				Instruments Lagged			Dependent Variable Lagged		
		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
Insiders	Ownership concentration	+	+	+	+	+	+	+	+	+
	Performance	−	+	+	−	+	+***	+	+	+
	Aggregate state holdings	−	−	−	−	−	−	+	+	−
	Aggregate international holdings	−	−	−	−	−	−	+	+	−
	Aggregate individual holdings	+	−	−	+	+	−	+	−	+
	Aggregate nonfinancial holdings	−	−	−	−	−	−	+	+	−
	ln(Board size)	−	+	+	−	+	+	−	+	+
	Fraction voting shares	−	−	−	+	−	−***	−*	−	−
	Debt to assets	−	+	+		+	+	+	+	−
	Dividends to earnings	−	+	+		+	+	+	+	−
	Industrial	−	+	+		+	+**	−	+	−
	Transport/shipping	−	+	+		+	+***	−	+	+
	Offshore	−	+	+		+	+**	−	+	−
	Investments to income	+	+	+	+	+	+	−	+	+
	ln(Equity value)	+	−	−	+	−	−**	−**	−	+
	lag(-1) (Performance)								−	
	lag(-1) (Ownership concentration)									−
	lag(-1) (Insiders)							+***		
	Constant	−	+	+	−	+	+**	+**	+	−

The table explores the simultaneous determinants of performance, ownership concentration, and insider holdings, using nine alternative sets of instruments to estimate the equation system:

Performance = f(Concentration, Insiders, Other variables, Instruments)
Concentration = f(Performance, Insiders, Other variables, Instruments)
Insiders = f(Performance, Concentration, Other variables, Instruments)

The results for the performance equation, concentration equation, and insiders equation are reported in panels A, B, and C, respectively. Performance is measured as Q and ownership concentration by the Herfindahl index, which is the sum of squared ownership fractions. Insiders is the equity fraction owned by directors and officers, Aggregate holdings reflects the fraction held by the given type, Board size is the number of directors, ln() is the natural logarithm, and Fraction voting shares is the percentage of the company's equity which has voting rights. Industrial, Transport/Shipping and Offshore are industry dummy variables, Equity value is the market value of equity, Stock volatility is the standard deviation of daily stock returns, Stock turnover is annual trading volume of the stock divided by outstanding equity, Beta is the estimated beta of the company's stock, using daily returns over a 2 year period, and lag(-1) indicates that the variable equals the previous period's observation. The instruments for performance, ownership concentration, and insider holdings are stock beta, stock volatility, and board size in model (A), stock beta, stock turnover, and board size in model (B), and stock beta, intercorporate shareholdings, and debt to assets in model (C). Models (D)–(F) use the same instruments lagged one period, and the instruments in (G)–(I) are the endogenous variables lagged one period. We report the sign of the regression coefficients and indicate statistical significance with *, **, and ***, which means the relationship is significant at the 5%, 2.5%and 1% level, respectively. We use 3SLS with Stata as the estimation engine. Data for all nonfinancial firms listed on the Oslo Stock Exchange, 1989–1997.

the nine instrument sets. For instance, the association between Q and insider holdings is positive in (B), (E), (G), (H), and (I), but negative in (A), (C), (D), and (F). Outside concentration is an exception, as the inverse relation to performance and the positive association with insiders is very robust to instrument choice. Second, compared to our earlier models in Tables 3.3 and 3.7, there is less significance. Still, the ability to produce significant coefficients in Table 3.8 differs considerably across models. For instance, five mechanisms in the performance equation are significant at the 5% level in (C), two mechanisms have this property in (G), and no variable is significant in (B). There is still some consistency in the sense that significant coefficients tend to have the same sign across models.

The third impression is that whereas significant coefficients are quite rare in the insider equation except in model (F), they are very common across the four owner types in the concentration equation. Judging from the interaction coefficients, there is no substitution between concentration and insider holdings, but rather independence. Since the insider coefficient is typically insignificant in the Q equation and Q is insignificant in the insider equation, we do not replicate the finding of Loderer and Martin (1997) and Cho (1998) that performance drives insider holdings and not vice versa.

Like us, Agrawal and Knoeber (1996), Cho (1998) and Demsetz and Villalonga (2002) conclude that the relationship between governance and performance is considerably less significant with a simultaneous equation system than with single-equation models. Unlike us, they do not consider different instruments, but interpret their mostly insignificant coefficients as supporting evidence of the equilibrium hypothesis of Demsetz (1983). We are not convinced by this conclusion, which implicitly assumes that the system is better specified than single-equation models. As illustrated by Table 3.8, the instability of qualitative results across instruments and the reduced significance in systems may be driven by the choice of instruments. Since there is no proper theoretical basis for choosing instruments, we cannot conclude that system estimates are better. Similar concerns have recently been expressed by others. Studying how takeover defense, performance, and takeover activity interact, Bhagat and Jefferis (2002) state that "from an econometric viewpoint, the proper way to study the relationship between any two of these variables would be to set up a system of simultaneous equations. . . . However, specification and estimation of such a system of simultaneous equations are nontrivial." To eliminate the problem of not knowing the underlying structural model, Coles et al. (2003) specify the true endogenous relationship between Q and managerial ownership, letting it be driven by the productivity of investment and management effort. They conclude: "The results in this section illustrate the difficulties associated with specifying a simultaneous equation system. First, we find that the inferences are quite sensitive to small changes in the regression specifications. . . . Second, the regressions using the modeled values of Q show that the simultaneous equations approach does not generally eliminate the relationships between the endogenous variables. Our speculation is that the specification errors and the difficulties in finding valid instruments to identify the system are the causes; however, more research is warranted on this issue."

CONCLUSION

Corporate governance is a young academic field characterized by partial theories, limited access to high-quality data, inconsistent empirics, and unresolved methodological problems. This chapter has tried to improve the empirical insight into the relationship between governance and performance by analyzing it in a different way in a new empirical setting. With better data for a wide range of governance mechanisms, a Scandinavian regulatory framework, and governance structures that differ considerably from those of most existing studies, we analyze how the interaction between governance and performance depends on the choice between simple and comprehensive single-equation models, on the instruments used in simultaneous equation models, and on how performance is measured. We have found that the estimated relationship depends critically on the performance measure used, on the choice between alternative instruments with weak theoretical backing, but not on whether single-equation models are simple or comprehensive.

Measuring performance by Tobin's Q and operationalizing it as market to book, most of our findings from single-equation models are consistent with agency theory. Large outside owners seem to destroy market value, inside owners to create it unless the stakes are unusually big, direct ownership seems more beneficial than indirect, small boards seem to produce more value than large, and firms issuing dual-class shares seem to lose market value. Although other performance measures generally produce more fuzzy relationships, Tobin's Q is usually consistent with long-term book return on assets, but not with stock returns.

The finding that most significant relationships in single-equation models survive all the way from the univariate analysis through partial to full multivariate models suggests that governance mechanisms are seldom complements or substitutes. When analyzing the performance relevance of any individual mechanism, it seems unnecessary to control for the others, which are often difficult to measure. Earlier findings that single-equation

relationships change sign or become insignificant under simultaneous equation estimation have been used to support the idea that real-world governance mechanisms are optimally installed. Our analysis suggests the alternative hypothesis that this result is due to a misspecified model driven by ad-hoc instruments. Until corporate governance theory can capture how performance relates to a wider set of governance mechanisms instead of just to one at a time, we doubt whether simultaneous systems can offer deeper insight than single-equation models into how corporate governance and economic performance interact.