

Wessels, Roberto E.; Wansbeek, Tom J.

Working Paper

What is the Relation (if any) Between a Firm's Corporate Governance Arrangements and its Financial Performance?

CESifo Working Paper, No. 4599

Provided in Cooperation with:

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Wessels, Roberto E.; Wansbeek, Tom J. (2014) : What is the Relation (if any) Between a Firm's Corporate Governance Arrangements and its Financial Performance?, CESifo Working Paper, No. 4599, Center for Economic Studies and ifo Institute (CESifo), Munich

This Version is available at:

<https://hdl.handle.net/10419/93432>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



What is the Relation (if any) Between a Firm's Corporate Governance Arrangements and its Financial Performance?

Roberto E. Wessels
Tom Wansbeek

CESIFO WORKING PAPER NO. 4599
CATEGORY 11: INDUSTRIAL ORGANISATION
JANUARY 2014

An electronic version of the paper may be downloaded

- from the SSRN website: www.SSRN.com
- from the RePEc website: www.RePEc.org
- from the CESifo website: www.CESifo-group.org/wp

What is the Relation (if any) Between a Firm's Corporate Governance Arrangements and its Financial Performance?

Abstract

This paper presents estimates from a latent variables model of the relation between corporate governance and financial performance. We use data on large US corporations to estimate the correlation, conditional on the firms' investment opportunity set, between governance and performance. We find that this correlation is statistically speaking zero. This result is consistent with the "equilibrium view" (Demsetz, 1983) in which firms optimize corporate governance arrangements subject to the constraints imposed by the investment opportunity set, such that observed corporate governance arrangements and firm performance are uncorrelated. The intuition behind this statement is that, if governance and performance were correlated, performance could be improved by making changes to the governance arrangements, which is at odds with an equilibrium situation.

JEL-Code: C380, G340, L200, M520.

Keywords: corporate governance, firm behavior, hypothesis testing, errors in variables.

Roberto E. Wessels
Faculty of Economics and Business
University of Groningen
Groningen / The Netherlands
rewessels@frissestyn.nl

Tom Wansbeek
Faculty of Economics and Business
University of Groningen
Groningen / The Netherlands
t.j.wansbeek@rug.nl

December 21, 2013

This research was started when Wessels was at the McCombs School of Business of the University of Texas at Austin. The patience and forbearance of Chishen Wei in collecting and shaping the data are hereby gratefully acknowledged. We thank the participants of the Finance workshop at McCombs and the EEF seminar at Groningen for their support. We are indebted to Laura Spierdijk and Lammertjan Dam for providing many helpful suggestions.

1 Introduction

Firms are complicated organizations. In the course of conducting their business they interact with many different parties: employees, providers of capital, communities, suppliers, customers, regulators, and competitors, all whose interests often conflict with those of the firm.¹

Trying to resolve these conflicts is difficult enough as it is, but in particular large, exchange-listed firms have added a further layer of complexity by separating the ownership of the firm (shareholders) from the control over the firm (managers). As a result, managers in these firms are expected to resolve conflicts of interest in which they are often an interested party.

To ensure that managers do what they are hired to do, firms put in place a system of incentives and monitoring mechanisms to deal with these conflicts of interest. How the conflicts of interest eventually get resolved has an impact on the firm's performance. The smaller the impact, the more effective the mechanisms of incentives and monitoring can be said to be.² These mechanisms are collectively referred to as the firm's corporate governance.

In this paper we are interested in the question how corporate governance and the firm's performance are related. Our framework for understanding how firms structure their corporate governance arrangements is as follows. First, a decision by a firm to enter into a relationship that potentially involves conflicts of interest is presumably the result of a calculus in which expected benefits at the margin are made equal to the expected costs subject to the constraints imposed by firm's the investment opportunity set. Effective corporate governance arrangements are designed to solve the conflicts of interest at the individual firm level. An approach where "one size fits all" may appear to be an efficient solution, but is unlikely to be an effective way of controlling conflicts of interest in different kinds of firms.³

To answer the question how effective corporate governance arrangements are in maintaining the efficiency of the firm's performance, we take the following approach. First, individual firm data is collected from a large data set of different types of firms. We then assume that the corporate governance arrangements and firm performance that we

¹In our paper we focus on conflicts arising between shareholders and the firm's managers. There is also a literature that argues that the conflicts should include a larger set of stakeholders, see John and Senbet (1998) and Tirole (2001). However, the conceptual basis for this more inclusive approach is a work in progress, see Hermalin (2012).

²The effectiveness of various corporate governance arrangements is reviewed in Shleifer and Vishny (1997).

³See Coles, Daniel, and Naveen (2008).

observe reflect an equilibrium situation in which governance and performance are at their constrained optimum level. We then estimate the correlation between governance and performance conditional on the investment opportunity set. In the equilibrium view, as firms on average make constrained, optimal allocation choices, it should not be possible for firms to improve performance by changes in their corporate governance arrangements. The testable implication of the equilibrium view is then that the conditional correlation between governance and performance is equal to zero. If, on the other hand, we find that governance and performance are correlated, we clearly have a situation in which there is no equilibrium since firms could improve performance by making changes to their governance arrangements.

One of the challenges that we face in estimating the correlation between governance and performance is that there is no observable variable that we can point to and credibly claim that it represents corporate governance. As Cornelli, Kominek, and Ljungqvist (2013) put it: “To any outside observer, corporate governance is essentially a black box.”

To get a look at what is going on inside the black box, we treat corporate governance, financial performance, and the investment opportunity as latent variables; indicators of the latent variables are used to model the relation between the latent variables and what we can observe in the data.⁴ With this model, we can construct implicit measures of corporate governance, firm performance, and the investment opportunity set as functions of the variances and covariances of the observable indicators and use them to estimate the relations between governance and performance.

The results of our test indicate that the correlation between governance and performance, conditional on the constraints of the investment opportunity set, is small and statistically indistinguishable from zero. We interpret this result as providing support for the equilibrium view: on average, firms choose to implement the most effective corporate governance arrangements given their opportunities. These arrangements are optimal in the sense that there is no other set of arrangements that could increase the efficiency of the firm’s performance.

We also have a second result. When we do not account for the effect of the investment opportunity set, but still model governance and performance as latent variables, we are able to calculate the unconditional correlation between these two variables. This correlation is large and statistically significant. This is an important result because it confirms

⁴For a textbook treatment of models with latent variables see Wansbeek and Meijer (2000) and Skrondal and Rabe-Hesketh (2004). We give the name indicator to a manifestation of a latent variable. A similar concept is a proxy variable, which is the name given to an observable variable that is an imperfect measure of another variable.

that the lack of conditional correlation is not due to performance and governance being generally unrelated, but arises as a result of the constraints imposed by the investment opportunity set. Our two results taken together also suggest that the evidence of a significant relation between governance in models that do not account for the endogenous relation between performance and governance is being driven by a spurious correlation.⁵

Corporate governance arrangements are not always freely chosen by the firms. There are laws and regulations to which firms must adhere. These laws and regulations are sometimes changed in periods in which a general unease with the way firms conduct their business has resulted in widespread calls for reform. For example, in the wake of the corporate scandals at the beginning of this century like the Enron affair, reforms were advocated and changes were legislated.⁶ Examples are the structure of the board (Wintoki, 2007); shareholders' right to a say on pay (Ferri and Maber, 2012, and Cuñat, Gine, and Guadalupe, 2012), and gender quotas for board members⁷ (Ahern and Dittmar, 2012, and Bohren and Staubo, 2013).

Our results suggest that, if the constraints imposed by the new regulations are binding from above, such changes imply that in the new optimum performance will be strictly lower than in the optimum prior to the regulatory change.⁸

The rest of the paper is organized as follows. In the next section we provide a brief review the literature. In section 3 we discuss the indicators used to estimate the relations between corporate governance, firm performance, and the investment opportunity set. In section 4 we use the results of the estimation process to illustrate how the model works. In section 5 we discuss the results. Section 6 concludes.

2 Review of the literature

The empirical literature on corporate governance is vast but quite straightforward. In addition, there are many excellent reviews available. General surveys are: Shleifer and Vishny (1997), Zingales (1998), Tirole (2001), Bebchuk and Weisbach (2010), Hermalin (2012) and Agrawal and Knoeber (2013). Surveys in journals, written as introductions to

⁵See Hermalin and Weisbach (1998).

⁶For example, the Sarbanes-Oxley Act of 2002.

⁷First introduced in Norway and now being considered in the Parliament of the European Union (Nielsen, 2013).

⁸It is of course entirely possible for a change in regulations to loosen a constraint and thus expand the investment opportunity set, as for example happened with the repeal of several sections of the Glass-Steagall act in 1999.

special issues on corporate governance, are: Denis (2001), Gillan (2006), Bebchuk and Weisbach (2010), and Brown, Beekes, and Verhoeven (2010). There are also surveys of particular topics within the corporate governance literature, these are referenced in the text. We do not touch on the literature of corporate governance outside of the US, as our results are based on data of US companies. Our model is however quite general. We restrict our review to two issues.

We first consider is how the relation between governance and performance has been modelled. The clear distinction in the literature is between the view that corporate governance should be treated as an exogenous determinant of performance, and the view that governance is an endogenous variable, simultaneously determined together with performance. The early literature mainly adopted the first approach; in the later literature the second approach has become dominant and has lead to a revision of the previous results.

The second issue we examine is how corporate governance has been measured. As corporate governance is inherently unobservable, it is not obvious how to measure it. The empirical literature has mostly worked around this problem by conducting partial studies that focus on a single observable indicator of corporate governance at a time.

This approach has two problems. First, any indicator used to measure corporate governance is subject to measurement errors, something that is neglected in the literature. This neglect is troublesome as errors of measurement are a cause of endogeneity.⁹ The second reason is that many indicators of corporate governance work as substitutes or as complements for other indicators. It is therefore not obvious that one can credibly invoke the *ceteris paribus* clause to generalize the results obtained from analyzing a single indicator, to corporate governance as a whole (see Adams, Hermalin, and Weisbach, 2010, p.62). Indicators that work as complements are analyzed in Cremers and Nair (2005); indicators that work as substitutes are analyzed in Hartzell and Starks (2003).

Though it would then seem like an obvious solution to use observations on multiple indicators to create comprehensive measures of corporate governance, the number of studies that attempt this is limited. We review this literature in section 2.2 below.

⁹Endogeneity has several causes. The one that has attracted most attention in the literature is simultaneity, in particular the problems caused by ignoring the simultaneous determination of corporate governance arrangements and firm performance, cf. Demsetz (1983). The other causes are omitted variables and measurement errors. For a general treatment of endogeneity, see Roberts and Whited (2012); for critical examination of several commonly applied remedies, see Coles, Lemmon, and Meschke (2012).

2.1 On the relation between corporate governance and firm performance

There are two views about the relation between corporate governance and firm performance. The first is due to Berle and Means (1932); the second comes from Demsetz (1983). Note that these views were developed before the concept of corporate governance, as we now know it, was developed. Thus the early literature did not use the term “corporate governance”, instead the issues were discussed in terms of the impact that decreasing share ownership by management would have on performance.

The Berle and Means view postulates that when the concentration of firm ownership decreases (i.e. when the erstwhile owners become dispersed shareholders), the efficiency of firm performance will also decrease as the managers hired to run the firm increasingly will pursue their own interests rather than those of the dispersed shareholders. To test the null hypothesis that there is a positive relation running from share ownership concentration to firm performance, Morck, Shleifer, and Vishny (1988) and McConnell and Servaes (1990) estimated regressions of performance on measures of ownership concentration and other determinants. These studies confirmed the existence of positive, but nonlinear relation, between ownership structure and firm performance.

According to the “equilibrium view” (Demsetz, 1983), decisions about share ownership concentration are taken in much the same way as in the allocation of any other scarce resource: by optimizing the target variables subject to constraints. This means that decisions about ownership concentration (or more in general, corporate governance) are not exogenously given to the firm, but are obtained after optimizing the costs and benefits of the proposed ownership structure, subject to the constraints of the investment opportunity set.

Ownership structure is therefore an endogenously determined variable. A necessary condition for performance and ownership structure to be in equilibrium is that ownership structures and firm performance be uncorrelated, otherwise it would be possible to improve performance by making adjustments to the structure of ownership, which by definition rules out the existence of an equilibrium.

Results in Demsetz and Lehn (1985), Himmelberg, Hubbard, and Palia (1999), and Demsetz and Villalonga (2001) show that once the endogeneity of share ownership concentration is accounted for, the (spurious) correlation between ownership and performance found by Morck et al. (1988) and McConnell and Servaes (1990) disappears.

There are two things to note about these early studies. First, that strictly speaking these tests were not about corporate governance and firm performance since share ownership is but one feature of corporate governance. However, put into context, the narrow scope is understandable as the discussion about defining the scope of corporate governance only got started after Berle and Means (1932) had specifically identified share ownership as the variable of interest. It is also worth noting is that the null hypothesis derived from the equilibrium view, is much more restrictive than the null implied by the Berle and Means thesis, and therefore provides a better methodological approach to testing the relation between governance and performance.

Following the studies on ownership structure, the scope of the research interest broadened considerably and the relation between firm performance and a large number of other indicators of corporate governance were published.¹⁰ In addition, the evidence showing that performance and corporate governance arrangements endogenously determined by a set of common factors clearly started to increase.

An example of this development is the study of the effect of the number of members of the board of directors on performance. In Jensen (1993), there is a section entitled “Remaking the Board as an effective control system”. Jensen cites Lipton and Lorsch (1992) approvingly, and recommends that in order to be effective, the board of directors should have no more than 8 to 9 members. Relative to the practices then current, this advice represented a considerable downsizing of board membership.

In Yermack (1996) the impact of the size of the board on performance is tested by regressing Tobin’s Q , a measure of firm value, on the number of board members as an independent variable, plus additional control variables. Yermack’s results indicate that the regression coefficient on board size is significantly negative and he concludes that, indeed, a smaller board is significantly better than a larger one.

However, later studies (Boone, Casares Field, Karpoff, and Raheja, 2007, Coles et al., 2008, and Linck, Netter, and Yang, 2008) provide estimates for the relation between board size and performance from a model in which the size of

¹⁰The number of such studies is so large that some of these indicators have been the subject of special reviews: the board of directors (Adams et al., 2010); large shareholders and block-holders (Becht, Bolton, and Roëll, 2005, and Edmans, 2014); institutional investors (Gillan and Starks, 2007); financial disclosure policies (Brown et al., 2010, and Armstrong, Guay, and Weber, 2010), and executive compensation (Frydman and Saks, 2010, and Murphy, 2012).

the board is determined, amongst other things, by the firm's complexity, a proxy of the investment opportunity set. It then turns out that smaller boards are not necessarily better. It depends.

More in general Wintoki, Linck, and Netter (2012), provide an overview of how widely results of the relation between indicators of governance and performance can vary as a function of how the relation between governance and performance is specified. Many results which first were presented as evidence of a causal relation between governance and performance later turned out to be based on a spurious correlation once governance was specified as an endogenous variable.

As pointed out earlier, estimating models in which performance and governance are being simultaneously determined requires the researcher to solve the problem of endogeneity. Unfortunately dealing with endogeneity is not trivial. Traditional econometric methods such as instrumental variables and two-stage least squares are generally open to the criticism that in corporate finance it is difficult to come up with appropriate exclusion restrictions that will help identify the parameters of interest.¹¹ In some cases, using data from so-called natural experiments (Cohn, Gillan, and Hartzell, 2011) or regression discontinuity methods (Cuñat et al., 2012) can provide a solution. But these techniques rely on data obtained from randomly occurring events, which is a rather fragile basis to conduct a research program on.

Thus, though considerable progress has been achieved in recognizing the pitfalls of endogeneity involved in testing the relation between governance and performance, this progress has been bought at the cost of an increase in the complexity of the models to be estimated.

2.2 Using multiple indicators to measure corporate governance

Only a relatively small number of studies have tried, with mixed results, to develop more comprehensive measures of corporate governance by combining several different indicators. Two different methods have been used in the literature: the “check and add” method and multivariate analysis.

The “check and add” method consists in posing questions about the firm's corporate governance arrangements which can be answered by YES or NO and adding a point to the final score if the answer is considered to reflect “good” corporate governance and zero points if the answer implies “bad” corporate governance. For example, the

¹¹See Himmelberg et al. (1999).

question could be “Does the board have an audit committee?” If an audit committee is considered to be good corporate governance practice, then a YES answer will add one point to the firm’s score. Purportedly, the final score then ranks firms according to the quality of their corporate governance. Aggarwal, Erel, Stulz, and Williamson (2009) and Aggarwal, Erel, Ferreira, and Matos (2011) use such scores to compare corporate governance arrangements across countries. In Brown and Caylor (2006), the score is used as an explanatory variable in regressions of firm value on governance measures.

Analyzing the relation between governance and performance with this kind of measure is complicated by the fact that classifying mechanisms of corporate governance as being “good” or “bad” is not based on any existing theory of corporate governance (see Harris and Raviv, 2008, Adams et al., 2010, and Brickley and Zimmerman, 2010). The classification into “good” and “bad”, and thus the score, relies purely on the intuition of whoever has decided what constitutes a good or a bad governance practice. An example of a corporate governance mechanism generally considered to be “bad” but that sometimes is actually “good” is analyzed in Stráska and Waller (2010).

Firms providing investment advisory services to institutional investors are also quite active in promoting this kind of measures of corporate governance as a tool for evaluating the quality of corporate governance. For a critical review of the information gathered and distributed by these services, see Bhagat, Bolton, and Romano (2008). Under the assumptions that these indices are measuring the quality of corporate governance, and that higher quality leads to higher performance, one would expect firms with higher scores to have better future performance. This has been investigated in a paper by Daines, Gow, and Larcker (2010), who found no evidence in support of this claim.

A totally different approach would be to use factor analysis or principal components analysis to find the common factors that best explain the variance of observable characteristics of governance mechanisms. A big advantage of this approach is that the common factors are functions of the covariances among the observable characteristics so that the effects of complementarities and substitution effects between different mechanisms are taken into account when estimating the common factors. An advantage is also that this approach avoids having to make subjective choices about the “quality” of different governance attributes.

Although factor analysis and principal component analysis have been used in the corporate governance literature to create explanatory variables which are inherently unobservable, such as the “investment opportunity set” and “firm

complexity”,¹² for some unknown reason there is no study that has applied these techniques to the problem of measuring corporate governance.

The only study that we are aware of that comes close is an exploratory study by Larcker, Richardson, and Tuna (2007). The authors use a large dataset containing many observable characteristics of corporate governance arrangements to derive 14 factors representing different aspects of corporate governance. Those factors are then used in regressions of firm performance on corporate governance factors.

But even if we lay the endogeneity issues aside, trying to make sense of the relation between firm performance and corporate governance while working with 14 different corporate governance factors is a daunting task.

In section 4, we discuss a model that includes a comprehensive measure of corporate governance taking into account the variety and the interactions between different indicators, while at the same time accounting for the errors of measurement in the indicator variables.

3 The indicators of the corporate governance, firm performance, and the investment opportunity set

In this section we present the observable variables that will be used as indicators of the latent variables. To help distinguish between latent variables and indicators, we use italic capitals to denote latent variables, thus corporate governance is referred to as *CORP-GOV*, and notation in straight capitals for indicators; for example, the CEO’s compensation package is referred to as CEO-COMP. Our data sampling procedures are described in Appendix 1. The sources of the data and a description of how the variables have been constructed are given in Appendix 2. We will use the data through their correlation matrix, which is given in Appendix 3..

3.1 The indicators of corporate governance

CORP-GOV is a latent variable used to characterize the effectiveness of the arrangements firms put in place to align the interests of the shareholders with the interests of those who control and manage the firm. This is a complex and

¹²See for example Gaver and Gaver (1993), Boone et al. (2007) and Coles et al. (2008).

multifaceted concept, which is only indirectly observable through indicators.

As an example of an indicator of *CORP-GOV*, consider the board of directors. According to Adams et al. (2010), the board of directors is the single most important mechanism of the firms corporate governance structure, and the one most studied in the literature. So it is perhaps surprising to realize that there is no measure that reflects the role that the board of directors plays in *CORP-GOV*.

In studying the role of the board, the literature has relied on observable attributes like the structure and the composition of the board (Coles et al., 2008); how the board members are compensated (Ryan and Wiggins, 2004); whether they have business dealings with the firm or are independent (Cohen, Frazzini, and Malloy, 2012); whether they hold concurrent appointments at other boards (Fich and Shivdasani, 2006); and even their geographical proximity to the firm (Lehn, Patro, and Zhao, 2009).

We can also observe some of the actions taken by the board which measure the effectiveness of the board. For example: the hiring of a new CEO (Huson, Malatesta, and Parrino, 2004); deciding the CEO's compensation package (Fahlenbrach, 2009) and the dismissal of the CEO (Huson, Parrino, and Starks, 2001).

On rare occasions we may be given insight into how the board of directors conducts its business, (see Schwartz-Ziv and Weisbach, 2012), but generally our information is restricted to observable attributes and actions.

In addition to there being multiple attributes of corporate governance, there is also evidence in the literature (see Cremers and Nair, 2005, Larcker et al., 2007, and Stráska and Waller, 2010) that the corporate governance outcomes observed in the data are the result of interaction between different attributes of corporate governance. Our model accounts for at least some of these interactions since our measure of *CORP-GOV* is a function of the covariances between the indicators of *CORP-GOV*. This is explained in more detail in section 5.

Our first indicator of *CORP-GOV* is *BSIZE*, which simply measures the number of members of the board of directors. The second indicator of *CORP-GOV* is the CEO's compensation package (*CEO-COMP*). Fahlenbrach (2009) provides evidence that the CEO's compensation package is an important indicator of *CORP-GOV* because determining the CEO's pay package is one of the main instruments the board of directors uses to manage the conflicts of interest between shareholders and management.

Despite many efforts to shine a light on executive compensation practices,¹³ measuring the size and composition of the CEO's compensation package pay remains a difficult task, to put it mildly. Part of the difficulty is that compensation is provided under many different guises: salary, bonus, equity options, outright and restricted stock grants, and retirement benefits. Another reason is that firms reveal only what they are legally required to do. Calibrating all these different elements of compensation to create an optimal package of incentives is primarily the task of the board.

Our definition of CEO-COMP is taken from Frydman and Saks (2010). In addition, we scale the dollar amount of compensation by the firms total assets to adjust for the managers productivity as a function of firm size, see Gabaix and Landier (2008). We assume that effective *CORP-GOV* controls excessive compensation and thus will be negatively related to CEO COMP.

The number of institutions holding shares in the firm, INST-INV, is the third indicators of *CORP-GOV*. Institutional investors have no formal role in the firms corporate governance structure other than that of being a shareholder. But the size of the institutions and the influence they can wield turns them into shareholders that are to be regarded by management as being more equal than other shareholders. In Almazan and Suarez (2003) and Hartzell and Starks (2003) evidence is presented indicating that institutional investors actively monitor the CEOs compensation packages of the firms they invest in. In Bushee, Carter, and Gerakos (2009) and McCahery, Starks, and Sautner (2010) evidence is presented suggesting that institutional investors select the firms in which they invest on the basis of how they evaluate the corporate governance practices of the target firm. We therefore expect to find a positive relation between effective *CORP-GOV* and INST-INV.

Our fourth and final indicator of *CORP-GOV* is SHR-OWN, the percentage of the firms outstanding shares owned by the firms management. As discussed in our review of the literature, this was the first measure of corporate governance used in empirical studies. We include it for reasons of continuity, but do not have a strong prior as to the sign on the relation between effective CORP GOV and SHR-OWN.

¹³See, for example the review in Murphy (2012).

3.2 The indicators of financial performance

The concept of *FIN-PERF* is less fuzzy than that of *CORP-GOV*, yet there seems to be little agreement in the literature as how to measure financial performance. In the corporate governance literature, *FIN-PERF* has been measured by at least three different types of indicators: measures of the firms relative value, such as Tobins *Q*; measures of accounting value such as return on assets; and measures of market value such as returns on equity. If there are many ways of measuring the same variable, then it is safe to assume that all the indicators we use will be subject to measurement error.

Our model has three indicators of firm performance: FCF, a measure of the firm's free cash flow; STK-RET, the market return of the firm's equity and VOL, a measure of the volatility of the firm's stock returns.

FCF is an indicator of the free cash-flow concept due to Jensen (1986). According to Jensen, free cash-flow measures the resources generated by the firm that management could distribute to the shareholders in the form of dividends without impairing the current value of the firm. FCF is very similar to the more commonly used performance measure of return on assets. The difference is that return on assets includes the effects of discretionary accruals and deferrals of certain cash flows to earlier or later periods and is therefore susceptible to what is euphemistically referred to as earnings management. We expect that *FIN-PERF* and FCF are positively related.

According to Holmstrom and Tirole (1993), STK-RET reflects the aggregate markets assessment of the firms financial outlook and is therefore an indicator of its financial performance. We expect that *FIN-PERF* and STK-RET are positively related.

VOL measures the volatility of the firm's stock returns. VOL is not a commonly used indicator of firm performance. An exception is perhaps Demsetz and Lehn (1985), who use volatility as a proxy for the instability of the firm's environment. Here, we follow the accounting (Dichev and Tang, 2009) and asset pricing literature (Ang, Hodrick, Xing, and Zhang, 2006) which finds evidence that stock returns and the volatility of stock returns are significantly negatively correlated, suggesting that volatility is a negatively related indicator of *FIN-PERF*.

3.3 The indicators of the investment opportunity set

The investment opportunity set, *INV-OPP* is the only exogenous variable in our model. In the framework of the equilibrium view, corporate governance and financial performance are being endogenously determined subject to the constraints imposed by *INV-OPP*.

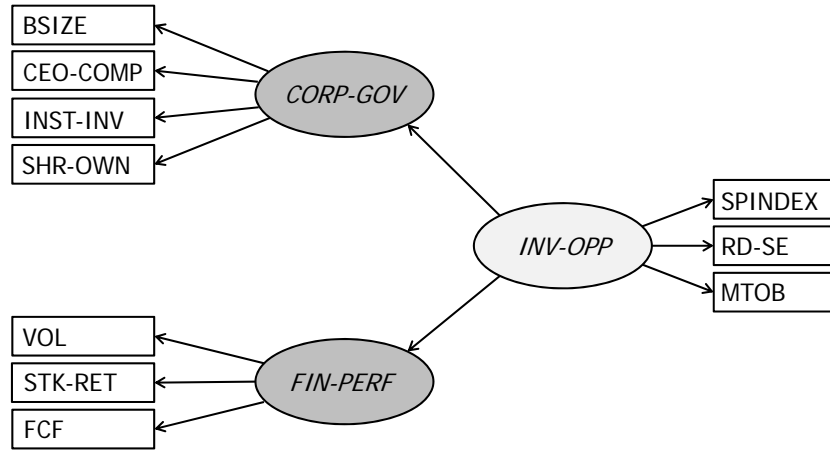
Our approach to measuring *INV-OPP* is not entirely without precedent. At least three papers have measured *INV-OPP* using similar methods and similar indicator variables: Gaver and Gaver (1993), Guay (1999), and Coles et al. (2008).

To measure the latent variable *INV-OPP* we rely on three indicators. The first is SPINDEX, a categorical variable that classifies the firm into one of four categories depending on whether it belongs to one of the three indices that make up the S&P1500 and, if so, to which of the three sub-indices it belongs. SPINDEX thus captures both the differences in size between firms and the differences in complexity arising from the differences in exposure, and compliance and disclosure requirements that come with being included in a major stock market index. We expect that *INV-OPP* and SPINDEX are positively related.

The second indicator is RD-SE, a measure of the firms' investments in intangible assets (see Almeida and Campello, 2007). These investments, which are often in long-lasting projects, are difficult to value and require specific expertise in order to be effectively monitored. There is some evidence that corporate governance arrangements are associated with the specific monitoring requirements of this type of investments, (see Boone et al., 2007, and Coles et al., 2008).

Our final indicator is MTOB, the ratio of the market value to the book value of the firm, an approximation of Tobins *Q* (Tobin and Brainard, 1977). Since Myers (1977), MTOB is a standard measure of the firm's growth opportunities (see Core, Holthausen, and Larcker, 1999, Linck et al., 2008, and Lehn et al., 2009). We expect that, when the firm's investment opportunity set is widened, its growth opportunities will on average increase. Thus the relation between *INV-OPP* and MTOB is expected to be positive.

With respect to MTOB it should be pointed out that there is a considerable literature, starting with Morck et al. (1988), that uses MTOB as a measure of firm performance. We would argue that MTOB is a measure of relative value, skewed towards so-called growth firms, which is not necessarily a reflection of the firm's performance.



4 Model and estimation

Our model is designed to measure the conditional correlation between measures of corporate governance arrangements and financial performance. The model assumes that firm performance and corporate governance arrangements are being simultaneously determined by the firm’s investment opportunity set. We estimate a reduced form version of this specification and derive the conditional correlation between corporate governance and firm performance as the correlation between the error terms of the two regressions, see Zellner (1962).

To test this hypothesis, we estimate the model as sketched in figure 4. For clarity, we have omitted all the model’s error terms in the figure. The relation between the latent variables and their indicators is of the one-factor factor analysis kind, and the relation between the latent variables is given by two equations, one for governance and one for performance, as functions of the investment opportunity set. The equations of the model are given in table 1. Subscripts indicating observation units (i.e, firms) have been omitted.

The top panel of the table contains the regressions of governance and performance on the investment opportunities, the “structural model”. The two error terms, u_1 and u_2 , are allowed to correlate, as is indicated in the last column of the table. Whether this correlation is significantly different from zero is the main issue at stake in this paper.

The other three panels of the table, the “measurement model” together, contain the equations linking the three latent

<i>CORP-GOV</i>	=	β_1	*	<i>INV-OPP</i>	+	u_1	($\sim u_2$)
<i>FIN-PERF</i>	=	β_2	*	<i>INV-OPP</i>	+	u_2	($\sim u_1$)
BSIZE	=	λ_1	*	<i>CORP-GOV</i>	+	ε_1	($\sim \varepsilon_3$)
CEO-COMP	=	λ_2	*	<i>CORP-GOV</i>	+	ε_2	($\sim \varepsilon_6$)
INST-INV	=	λ_3	*	<i>CORP-GOV</i>	+	ε_3	($\sim \varepsilon_1$)
SHR-OWN	=	λ_4	*	<i>CORP-GOV</i>	+	ε_4	
VOL	=	λ_5	*	<i>FIN-PERF</i>	+	ε_5	
STK-RET	=	λ_6	*	<i>FIN-PERF</i>	+	ε_6	($\sim \varepsilon_2, \varepsilon_9, \varepsilon_{10}$)
FCF	=	λ_7	*	<i>FIN-PERF</i>	+	ε_7	
SPINDEX	=	λ_8	*	<i>INV-OPP</i>	+	ε_8	
RD-SE	=	λ_9	*	<i>INV-OPP</i>	+	ε_9	($\sim \varepsilon_6$)
MTOB	=	λ_{10}	*	<i>INV-OPP</i>	+	ε_{10}	($\sim \varepsilon_6$)

Table 1: The equations of the model.

variables to the ten indicators. In the basic specification of our model, the matrix containing the ten variances and 45 covariances of the error terms is specified to be diagonal. So we start with 45 restrictions on this matrix. The software used to estimate the model provides diagnostic tools to evaluate these restrictions. This led us to free four of the 45 restricted error covariances. As is indicated in the last column of the table, these are the error covariances involving BSIZE and INST-INV, CEO-COMP and STK-RET, STK-RET and RD-SE, and STK-RET and MTOB.

There are plausible reasons for finding statistically significant covariances between these error terms. For instance, BSIZE and INST-INV are both highly correlated with firm size. Large firms tend to have large boards and insitutional investors tend to invest in the stock of large companies; CEO-COMP and STK-RET tend to move in response to common economic factors; STK-RET and RD-SE are negatively correlated since growth firms are highly dependent on financing by issuing equity, which is difficult to do when equity markets are losing value; and STK-RET and MTOB are mechanically correlated as the numerator of MTOB moves in unison with STK-RET, while the denominator changes

much more slowly as new stock is issued or profits are retained.

Our model is a so-called structural equation model, SEM. Such models are commonly used in the social sciences, and in some areas of business research like marketing. In the other areas of business research like finance SEMs are seldom used. Titman and Wessels (1988) is an (early) exception.

All variables in the model are standardized to have mean zero and variance one. For the observed variables this means a data transformation. For the latent variables it is a simplifying assumption that can be made without any loss of generality. Estimation of SEMs is essentially GMM estimation. The data are condensed in their covariance matrix, which in the case of standardized variables is an observed correlation matrix. Under the model, the elements of the matrix can be expressed as functions of the model parameters, whose number preferably is much less than the number of elements in the matrix; the theory implies a testable structure on the data. Estimation in this context essentially means that parameter values are sought that lead to a theoretical structure that resembles the observed structure as well as possible.

We also follow this route here. We have ten indicators and hence, taking the symmetry of the correlation matrix into account, 55 variances and covariances available for estimation purposes. The number of parameters driving these 55 variances and covariances is 29, that is, two β 's, ten λ 's, three parameters in the covariance structure of the u 's, ten variances of the ε 's, and the four covariances between them that were allowed to be non-zero. So there are $55-29=26$ degrees of freedom in estimating the model. We do so both by LISREL version 8.71 and by the SEM module in STATA version 12. We estimated with the Weighted Least Squares option available in both programs. We only report the LISREL results; those obtained with STATA are almost identical.

5 Results

In this section we discuss our empirical findings after fitting our model to the data. The normed fit index (e.g., Wansbeek and Meijer, 2000, ch.10) is 0.712.

Our main empirical results concern the regressions of governance and performance on investment opportunities. The results, displayed in table 2 (t -values in parentheses) clearly indicate that the investment opportunity set is a significant

	<i>INV-OPP</i>	error cov. mat.		R^2
<i>CORP-GOV</i>	0.826	0.318		0.68
	(11.861)	(2.291)		
<i>FIN-PERF</i>	0.793	– 0.046	0.370	0.63
	(12.130)	(0.605)	(2.968)	

Table 2: Results of the regressions on investment opportunities.

determinant of corporate governance and financial performance. The regressions explain 68% of the variance of *CORP-GOV* and 63% of the variance of *FIN-PERF*. Firms with larger investment opportunities have more effective governance and better performance. The main finding, though, of table 2, is put in bold and concerns the residual covariance between governance and performance, i.e., the covariance after controlling for the effect of the investment opportunities. We find a very low figure, with a t -value of only 0.605. Based on this result we cannot reject the null hypothesis; the result provides support for the equilibrium view expressed in Demsetz (1983).

In the first column of table 3 we list the indicator variables of *CORP-GOV*, *FIN-PERF* and *INV-OPP* as discussed in section 3. In the next three columns we show the regression coefficients associated with the latent variable shown at the top of the column. In the final column, we show the R^2 of the regression of the indicator on the latent variable, which is a measure of the quality of one particular variable as an indicator of the underlying latent variable by which it is driven.

We interpret the latent variable *CORP-GOV* as representing effective corporate governance arrangements, the higher the value the more effective. The coefficient of the regression of BSIZE on *CORP-GOV* is large, positive and highly significant. Under our interpretation of *CORP-GOV* this result indicates that larger boards of directors are associated with more effective of corporate governance arrangements. This result supports the previous results by Coles et al. (2008). However, the size effect does decrease as BSIZE increases since we have measured BSIZE in logarithms.

The regression coefficient of CEO-COMP on *CORP-GOV* is negative and highly significant, indicating that less

effective corporate governance is, the larger the compensation packages become.

The large and positive coefficient of the regression of INV-INST on *CORP-GOV* provides support for the conjecture that share ownership by institutional investors is influenced by the firms corporate governance arrangements, cf. Bushee et al. (2009) and McCahery et al. (2010).

Judging by the R^2 , the indicator measuring management share ownership, SHR-OWN, is by far the weakest of the four indicators of *CORP-GOV*. In addition, the sign of the regression coefficient is negative, implying that as corporate governance becomes more effective, share ownership decreases. This result would suggest that corporate governance considerations do not play a significant role in determining share ownership by management. This is rather surprising given the importance that the literature has given to the study of share ownership by management as a mechanism for mitigating conflicts of interest. One interpretation of the result is that the productivity of share ownership in dealing with conflicts of interest, especially for larger firms, is relatively low. Share ownership is a costly way of trying to solve a problem that can apparently be solved more effectively by alternative arrangements.

The estimated regression coefficients of VOL, STK-RET and FCF on *FIN-PERF* are all statistically significant and the R^2 of the three regressions are reasonably high, ranging from 0.30 to 0.53, suggesting that all three indicators are plausible functions of the same underlying latent variable. In the data, STK-RET and FCF are positively correlated but both are negatively correlated to VOL. Accordingly, the regression results indicate that STK-RET and FCF are increasing in *FIN-PERF*, and that VOL is decreasing in *FIN-PERF*. This result is consistent with the conjecture of Black (1976) that volatility and stock returns are inversely related because rising stock prices decrease leverage, which tends to decrease volatility.

The results of regressing indicators on *INV-OPP* have one surprise, and that is that RD-SE is negatively related to *INV-OPP*. In the data, research and development expenditures scaled by total assets are negatively correlated with SPINDEX, a proxy of size and complexity, indicating that as firms get larger and more complex, RD SE expenditures increase at lower rate than the increase in the firm's size. Thus the results indicate that when the firm's investment opportunities increase, research and development expenditures tend to increase less than proportionally. Why this is the case is not immediately evident.

	<i>CORP-GOV</i>	<i>FIN-PERF</i>	<i>INV-OPP</i>	<i>R</i> ²
BSIZE	0.605 (13.50)			0.43
CEO-COMP	−0.311 (−7.61)			0.20
INST-INV	0.768 (13.368)			0.61
SHR-OWN	−0.12 (0.074)			0.02
VOL		−0.691 (15.697)		0.53
STK-RET		0.317 (7.041)		0.14
FCF		0.442 (0.016)		0.30
SPINDEX			0.448 (2.963)	0.20
RD-SE			−0.125 (3.459)	0.02
MTOB			0.398 (10.975)	0.29

Table 3: Estimates of the measurement equations

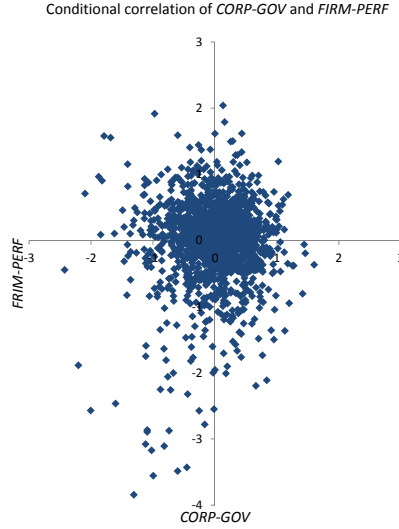


Figure 1: Scatterplot of predicted values of *CORP-GOV* and *FIN-PERF* conditional on the effect of *INV-OPP*

The results of the regressions of the four indicators on the latent variable *CORP-GOV* can be used to compute a corporate governance score for each firm in the sample. This score can then be used to rank firms on the effectiveness of their corporate governance. The computed value is of course only as good as the reliability of the association between the latent variable and the indicators, both in statistical terms and in terms of our theoretical priors about the association between the indicator and the latent variable. This score could be considered as an alternative for those commercially produced “governance indices” about which there has been considerable controversy in the literature. However, in terms of our model, the scores of course have no normative implications as *CORP-GOV* is an endogenous variable.

We can equally well compute scores for financial performance. We thus obtain two scores, for the two focal latent variables, for each firm in the sample. The results can be condensed in a scatter plot. The result is given in figure 1 and shows the graphical face of the equilibrium hypothesis.

We also estimated a restricted version of this model, discarding *INV-OPP*. The results for the measurement equations are very similar to the results for the full model as reported above. The covariance between the error terms u_1 and u_2 now becomes the correlation between *CORP-GOV* and *FIN-PERF*. This correlation appears to be large, estimated as 0.565 with a t -value of 12.253, making this unconditional correlation highly significant. However, as was apparent

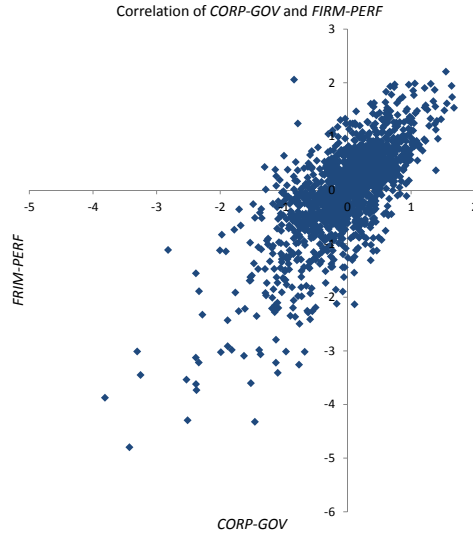


Figure 2: Scatterplot of predicted values of *CORP-GOV* and *FIN-PERF* when the effect of *INV-OPP* is neglected

from table 1, once the constraints imposed by the firms' investment opportunity set are included in the model, the conditional correlation between governance and performance becomes insignificantly different from zero.

Another look at this is obtained by making a graph analogous to 1 for this restricted case where the effect of the investment opportunity set is omitted, making the spurious correlation visible.

6 Conclusions

Based on our empirical results, we argue that observed corporate governance arrangements and firm performance, on average, are consistent with firms being in an equilibrium situation.

We reach our conclusions by taking a fairly simple approach to testing hypotheses when the true variables of interest are either unobservable or latent, or can only be measured with error and there are structural relations between these variables. Given that in empirical corporate finance very many areas of interest are covered by this description, we believe that the approach can fruitfully be applied to a wide range of research questions.

Our results have clear policy implications for the regulation of corporate governance. In fact, the results imply that policies mandating changes in corporate governance arrangements are more than likely to have negative effects on firm

performance. This is especially ironic when, as is usually the case, these changes are promoted as being beneficial for shareholders.

On the more positive side, our model provides activist shareholders with a tool to identify firms that are not even close to an equilibrium situation and who could use some remedial advice. The interesting cases can be found in outer fringes of the third quadrant of figure 1.

Appendix 1: Sample selection

We sample firms from the years 2000 through 2008 (9 years). Our initial sample consists of 15339 firm/year observations. We drop 1087 observations belonging to firms with no assets, no sales, no employees, and no shares outstanding or with negative book equity. We then drop a further 3010 observations from firms belonging to the financial or utility sectors. At this point the sample consists of 11242 observations.

We then select, in each year, firms with complete data records, meaning that in order for a firm to be included in the sample it must have a complete record, in at least one year, of the 10 variables used in our model. This leaves us with 8567 observations. The missing information pertains mostly to the beginning of the sample period. Out of the 2675 dropped observations, 2062 were lost because Compustat had no information on the composition of the board of directors; 325 because of missing information on the CEO's compensation; 65 had no stock returns and we therefore could not calculate the volatility of returns either. Some firms missed more than one variable in a given year, which is why the sum of the missing observations is larger than the total number of deleted firm/years.

Before estimating the model, the data has been adjusted as follows. First, all observations have been winzorized at the 1% and 99% level. Next, from each variable we subtract the industry and time period mean and add back the overall mean. Using the adjusted variables as our unit of analysis is equivalent to using the residual of a variable regressed on time and industry dummies. The transformation adjusts the data for the impact of shocks that affect all firms in a given time period while the correction for industry effects addresses the finding in the literature that firms tend to adjust their corporate governance structures to industry norms.

The observations belonging to the same firm are averaged over time resulting in a cross-section of 1551 firms. This data was then standardized to variables with mean zero and unit standard deviation. This data is then used as the input for our estimation model.

Appendix 2: Definition and sources of the observable variables

BSIZE: the number of members of the board of directors. Measured as the logarithm of 1 plus the number of board members. Source Riskmetrics.

CEO-COMP: Annual total compensation of the CEO divided by total assets. Sources Execucomp and Compustat.

FCF: free cash-flow. Operating income after depreciation divided by the market value of equity. Source Compustat.

INST-INV: the number of institutional investors holding shares in the firm. Measured as the log of 1 plus the number of institutions holding stock in the firm. Source Thompson-Reuters Institutional.

MTOB: the market-to-book ratio. Measured as the market value of the firm divided by its book value. Source Compustat.

RD-SE: the sum of expenditures on research and development, selling expenses and advertising divided by total assets. Source Compustat.

SHR-OWN: percentage of total shares owned by the executive officers of the firm. Source Execucomp.

SPINDEX: indicator for the membership of the Standard and Poor's 1500 stock market index. Measured as a categorical variable indicating the inclusion of the firm of one of the three sub-indices constituting the S&P1500 index: 0=not included in the index; 1=S&P400 (small capitalization firms); 2=S&P600 (mid-size capitalization firms); 3=S&P500 (large capitalization firms). Source Compustat.

STK-RET: stock return. Measured as the annualized total return on common stock calculated using with 36 monthly observations. Source CRSP.

VOL: standard deviation of returns. Calculated using 36 months of total returns observations. Source CRSP.

Appendix 3: The correlation matrix

	BSIZE	CEO-COMP	INST-INV	SHR-OWN	VOL	STK-RET
BSIZE	1.000					
CEO-COMP	-0.342	1.000				
INST-INV	0.324	-0.245	1.000			
SHR-OWN	-0.163	0.012	-0.098	1.000		
VOL	-0.330	0.383	-0.308	0.033	1.000	
STK-RET	-0.066	0.129	0.181	0.011	-0.159	1.000
FCF	0.076	-0.161	0.241	-0.055	-0.388	0.386
SPINDEX	0.255	-0.113	0.357	-0.092	-0.196	0.023
RD-SE	-0.128	0.290	-0.120	0.035	0.180	-0.085
MTOB	0.007	0.196	0.276	-0.005	-0.081	0.467

Correlation matrix - *continued*

	FCF	SPINDEX	RD-SE	MTOB
FCF	1.000			
SPINDEX	0.079	1.000		
RD-SE	-0.111	-0.031	1.000	
MTOB	0.279	0.171	0.179	1.000

References

- Adams, R.B., B.E. Hermalin, and M.S. Weisbach (2010), “The role of boards of directors in corporate governance: a conceptual framework and survey”, *Journal of Economic Literature*, **48**, 58–107.
- Aggarwal, R., I. Erel, M. Ferreira, and P. Matos (2011), “Does governance travel around the world? Evidence from institutional investors”, *Journal of Financial Economics*, **100**, 154–181.
- Aggarwal, R., I. Erel, R. Stulz, and Rohan Williamson (2009), “Differences in governance practices between U.S. and foreign firms: Measurement, causes, and consequences”, *Review of Financial Studies*, **22**, 3131–3169.
- Agrawal, A. and C.R. Knoeber (2013), “Corporate governance and firm performance”, in C.R. Thomas and William Shughart II, editors, *Oxford Handbook of Managerial Economics*, Oxford University Press, New York.
- Ahern, K. and A. Dittmar (2012), “The changing of the boards: The impact on firm valuation of mandated female board representation”, *Quarterly Journal of Economics*, **127**, 137–197.
- Almazan, A. and J. Suarez (2003), “Entrenchment and severance pay in optimal governance structures”, *The Journal of Finance*, **58**, 519–547.
- Almeida, H. and M. Campello (2007), “Financial constraints, asset tangibility, and corporate investment”, *Review of Financial Studies*, **20**, 1429–1460.
- An, A., R.J. Hodrick, Y. Xing, and X. Zhang (2006), “The cross-section of volatility and expected returns”, *Journal of Finance*, **61**, 259–299.
- Armstrong, C., W.R. Guay, and J.P. Weber (2010), “The role of information and financial reporting in corporate governance and debt contracting”, *Journal of Accounting and Economics*, **50**, 179–234.
- Bebchuk, L.A. and M.S. Weisbach (2010), “The state of corporate governance research”, *Review of Financial Studies*, **23**, 939–961.
- Becht, M., P. Bolton, and A. Roëll (2005), *Corporate governance and control*, European Corporate Governance Institute, Brussels.
- Berle, A.A. and G.C. Means (1932), *The modern corporation and private property*, Macmillan.

- Bhagat, S., B.J. Bolton, and R. Romano (2008), “The promise and peril of corporate governance indices”, *Columbia Law Review*, **108**, 1803–1882.
- Boone, A. L., L. C. Field, J. M. Karpoff, and C. G. Raheja (2007), “The determinants of corporate board size and composition: An empirical analysis”, *Journal of Financial Economics*, **85**, 66–101.
- Brickley, J.A. and J.L. Zimmerman (2010), “Corporate governance myths: Comments on Armstrong, Guay, and Weber”, *Journal of Accounting and Economics*, **50**, 235–245.
- Brown, L.D. and M.L. Caylor (2006), “Corporate governance and firm valuation”, *Journal of Accounting and Public Policy*, **25**, 409–434.
- Brown, Ph., W. Beekes, and P. Verhoeven (2010), “Corporate governance, accounting and finance: A review”, *Accounting & Finance*, **51**, 96–172.
- Bushee, B.J., M.E. Carter, and J.J. Gerakos (2009), *Institutional Investor Preferences for Corporate Governance Mechanisms*, SSRN eLibrary.
- Cohen, L., A. Frazzini, and C.J. Malloy (2012), “Hiring cheerleaders: Board appointments of independent directors”, *Management Science*, **58**, 1039–1058.
- Cohn, J., S. Gillan, and J. Hartzell (2011), *On the optimality of shareholder control: evidence from the Dodd-Frank Financial Services Reform Act*, <http://ssrn.com/abstract=1742506>.
- Coles, J.L., N.D. Daniel, and L. Naveen (2008), “Boards: does one size fit all?”, *Journal of Financial Economics*, **87**, 329–356.
- Coles, J.L., M.L. Lemmon, and F.J. Meschke (2012), “Structural models and endogeneity in corporate finance: The link between managerial ownership and corporate performance”, *Journal of Financial Economics*, **103**, 149–168.
- Core, J.E., R.W. Holthausen, and D.F. Larcker (1999), “Corporate governance, chief executive officer compensation, and firm performance”, *Journal of Financial Economics*, **51**, 371–406.
- Cornelli, F., Z. Kominek, and A. Ljungqvist (2013), “Monitoring managers: Does it matter?”, *Journal of Finance*, **68**, 431–481.

- Cremers, K.J.M. and V.B. Nair (2005), “Governance mechanisms and equity prices”, *Journal of Finance*, **60**, 2859–2894.
- Cuñat, V., M. Gine, and M. Guadalupe (2012), “The vote is cast: The effect of corporate governance on shareholder value”, *Journal of Finance*, **67**, 1943–1977.
- Daines, R.M., I.D. Gow, and D.F. Larcker (2010), “Rating the ratings: How good are commercial governance ratings?”, *Journal of Financial Economics*, **98**, 439–461.
- Demsetz, H. (1983), “The structure of ownership and the theory of the firm”, *Journal of Law and Economics*, **26**, 375–390.
- Demsetz, H. and K. Lehn (1985), “The structure of corporate ownership: Causes and consequences”, *Journal of Political Economy*, **93**, 1155–1177.
- Demsetz, H. and B. Villalonga (2001), “Ownership structure and corporate performance”, *Journal of Corporate Finance*, **7**, 209–233.
- Denis, D.K. (2001), “Twenty-five years of corporate governance research and counting”, *Review of Financial Economics*, **10**, 191–212.
- Dichev, I.D. and V.W. Tang (2009), “Earnings volatility and earnings predictability”, *Journal of Accounting and Economics*, **47**, 160–181.
- Edmans, A. (xxxx), “Blockholders and corporate governance”, *Annual Review of Financial Economics*, **xx**, xxx–xxx.
- Fahlenbrach, R. (2009), “Shareholder rights, boards, and CEO compensation”, *Review of Finance*, **13**, 81–113.
- Ferri, F. and D.A. Maber (2012), “Say on pay votes and CEO compensation: Evidence from the UK”, *Review of Finance*, **17**, 527–563.
- Fich, E.M. and A. Shivdasani (2006), “Are busy boards effective monitors?”, *Journal of Finance*, **61**, 689–724.
- Frydman, C. and R.E. Saks (2010), “Executive compensation: A new view from a long-term perspective, 1936–2005”, *Review of Financial Studies*, **23**, 2099–2138.

- Gabaix, X. and A. Landier (2008), “Why has CEO pay increased so much?”, *Quarterly Journal of Economics*, **123**, 49–100.
- Gillan, S. and L. Starks (2007), “The evolution of shareholder activism in the United States”, *Journal of Applied Corporate Finance*, **19**, 55–73.
- Gillan, S.L. (2006), “Recent developments in corporate governance: An overview”, *Journal of Corporate Finance*, **12**, 381–402.
- Gillan, S.L., J.C. Hartzell, and L.T. Starks (2003), *Explaining corporate governance, boards, bylaws and charter provisions*, SSRN eLibrary.
- Guay, W.R. (1999), “The sensitivity of CEO wealth to equity risk: an analysis of the magnitude and determinants”, *Journal of Financial Economics*, **53**, 43–71.
- Harris, M. and A. Raviv (2008), “A theory of board control and size”, *Review of Financial Studies*, **21**, 1797–1832.
- Hartzell, J.C. and L.T. Starks (2003), “Institutional investors and executive compensation”, *Journal of Finance*, **58**, 2351–2374.
- Hermalin, B. (2012), “Corporate governance: a critical appraisal”, in R. Gibbons and J. Roberts, editors, *Handbook of Organizational Economics*, Princeton University Press, forthcoming.
- Hermalin, B.E. and M.S. Weisbach (1998), “Endogenously chosen boards of directors and their monitoring of the CEO”, *American Economic Review*, **88**, 96–118.
- Himmelberg, C. P., R. G. Hubbard and D. Palia (1999), “Understanding the determinants of managerial ownership and the link between ownership and performance”, *Journal of Financial Economics*, **53**, 353–384.
- Huson, M.R., P.H. Malatesta, and R. Parrino (2004), “Managerial succession and firm performance”, *Journal of Financial Economics*, **74**, 237–275.
- Huson, M. R., R. Parrino and L. T. Starks (2001), “Internal monitoring mechanisms and CEO turnover: A long-term perspective”, *Journal of Finance*, **56**, 2265–2297.

- Jensen, M.C. (1993), “The modern industrial revolution, exit, and the failure of internal control systems”, *Journal of Finance*, **48**, 831–880.
- John, K. and L.W. Senbet (1998), “Corporate governance and board effectiveness”, *Journal of Banking & Finance*, **22**, 371–403.
- Jöreskog, K. and D. Sörbom (2001), *LISREL 8: User’s reference guide*, Scientific Software International.
- Larcker, D.F., S.A. Richardson, and İ. Tuna (2007), “Corporate governance, accounting outcomes, and organizational performance”, *Accounting Review*, **82**, 963–1008.
- Lehn, K.M., S. Patro, and M. Zhao (2009), “Determinants of the size and composition of us corporate boards: 1935–2000”, *Financial Management*, **38**, 747–780.
- Linck, J. S., J.M. Netter, and T. Yang (2008), “The determinants of board structure”, *Journal of Financial Economics*, **87**, 308–328.
- Lipton, M. and J. Lorsch (1992), “A modest proposal for improved corporate governance”, *Business Lawyer*, **48**, 59–77.
- McCahery, J.A., L.T. Starks, and Z. Sautner (2010), *Behind the Scenes: The Corporate Governance Preferences of Institutional Investors*, SSRN eLibrary.
- McConnell, J.J. and H. Servaes (1990), “Additional evidence on equity ownership and corporate value”, *Journal of Financial Economics*, **27**, 595–612.
- Morck, R., A. Schleifer, and R.W. Vishny (1998), “Management ownership and market valuation. an empirical analysis”, *Journal of Financial Economics*, **20**, 293–315.
- Murphy, K.J. (2012), “Executive compensation: where we are and how we got there”, in G. Constantinides, M. Harris, and R. Stulz, editors, *Handbook of the Economics of Finance*, ElsevierScience North-Holland, forthcoming.
- Myers, S.C. (1977), “Determinants of corporate borrowing”, *Journal of Financial Economics*, **5**, 147–175.
- Nielsen, N. (2013), “Parliaments back EU-level gender quotas law”, *EUobserver*.
- Roberts, M.R. and T.M. Whited (2012), “Endogeneity in empirical corporate finance”, in G.M. Constantinides, M. Harris, and R.M. Stulz, editors, *Handbook of the Economics of Finance, Volume 2A*, Elsevier.

- Ryan, H.E. and R.A. Wiggins (2004), “Who is in whose pocket? Director compensation, board independence, and barriers to effective monitoring”, *Journal of Financial Economics*, **73**, 497–524.
- Schwartz-Ziv, M. and M.S. Weisbach (2012), “What do boards really do? evidence from minutes of board meetings”, *Journal of Financial Economics*, **108**, 349–366.
- Shleifer, A. and R.W. Vishny (1997), “A survey of corporate governance”, *Journal of Finance*, **52**, 737–783.
- Skrondal, A. and S. Rabe-Hesketh (2004), *Generalized latent variable modeling*, Chapman & Hall.
- StataCorp (2012), *Stata: release 12*, Stata Press.
- Stráska, M. and G. Waller (2010), “Do antitakeover provisions harm shareholders?”, *Journal of Corporate Finance*, **16**, 487–497.
- Tirole, J. (2001), “Corporate governance”, *Econometrica*, **69**, 1–35.
- Titman, S. and R.E. Wessels (1988), “The determinants of capital structure choice”, *Journal of Finance*, **43**, 1–19.
- Tobin, J. and W.C. Brainard (1977), “Asset markets and the cost of capital”, in R. Nelson and B. Balassa, editors, *Economic progress: private values and public policy—Essays in honour of William Feller*, North Holland.
- Wansbeek, T.J. and E. Meijer (2000), *Measurement error and latent variables in econometrics*, North-Holland.
- Wintoki, M.B. (2007), “Corporate boards and regulation: The effect of the Sarbanes-Oxley act and the exchange listing requirements on firm value”, *Journal of Corporate Finance*, **13**, 229–250.
- Yermack, D. (1996), “Higher market valuation of companies with a small board of directors”, *Journal of Financial Economics*, **40**, 185–211.
- Zellner, Arnold (1962), “An efficient method of estimating seemingly unrelated regression and tests for aggregation bias”, *Journal of the American Statistical Association*, **57**, 348–368.
- Zingales, L. (1998), “Corporate governance”, in S.N. Durlauf and L.E. Blume, editors, *The New Palgrave Dictionary of Economics*, second edition, Macmillan.