Director Ownership, Governance and Performance

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We study the impact of Sarbanes-Oxley Act (SOX) on the relationship between corporate governance and company performance. We consider five measures of corporate governance during the period 1998-2007. We find a negative and significant relationship between board independence and operating performance during the pre-2002 period, but a *positive* and significant relationship during the post-2002 period; this is consistent with and supportive of the event-study results of Chhaochharia and Grinstein (2007). The stock ownership of directors is consistently positively and significantly related to performance for both sub-periods. Other measures, such as the governance indices introduced by Gompers, Ishii and Metrick (2003) and Bebchuk, Cohen and Ferrell (2009) provide inconsistent results. The above findings are robust to a battery of specification tests. The most important contribution of this paper is our proposal of a governance measure, namely – dollar ownership of the board members – that is simple, intuitive, less prone to measurement error, and not subject to the problem of weighting a multitude of governance provisions in constructing a governance index. Consideration of this governance measure by future researchers would enhance the comparability of research findings with more robust progress in governance research.

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ABSTRACT

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The most important contribution of this paper is our proposal of a governance measure, namely – dollar ownership of the board members – that is simple, intuitive, less prone to measurement error, and not subject to the problem of weighting a multitude of governance provisions in constructing a governance index. Consideration of this governance measure by future researchers would enhance the comparability of research findings with more robust progress in governance research.

1. Introduction

The corporate scandals of the early 2000s, including Enron, Worldcom, Tyco and others, led to a wave of regulation aimed at improving the corporate governance environment. A common feature of this was the implementation of guidelines concerning the independence of the members of the board of directors. For example, the Sarbanes-Oxley Act of 2002 (SOX) mandates that all members of a listed firm's audit committee must be independent. Soon thereafter, both the New York Stock Exchange and the NASDAQ Stock Market required all listed companies to have a majority of independent directors.

The regulatory and institutional focus on board independence is surprising given that most of the prior academic research found no statistical relationship, and, in many cases, found a negative relationship, between board independence and firm performance. The above research, however, focuses on time period prior to this recent wave of regulation aimed at increasing board independence on boards and audit committees. Even those studies that do include some post-2002 data mostly include pre-2002 data, so it is difficult to separate the findings into pre-regulation and post-regulation relationships.

This paper fills the above gap in the literature: We study the relationships between various measures of corporate governance – especially board independence – and firm performance during the period 1998-2007. We explicitly separate the sample period into pre-2002 and post-2002 sub-periods to focus on the effects of the regulation. While we confirm the negative relationship between board independence and firm performance (that most prior research has identified) for the pre-2002 period, this result is reversed for the post-2002 period. *During the years 2003-2007, greater board independence is positively correlated with operating performance.* In other tests, we find that this result is driven by firms that increase their number

of independent directors. An event study provides independent evidence supportive of the above results – specifically, when a company goes from being non-compliant to being compliant with SOX's board independence requirement, the market response is significantly positive. The above findings are consistent with and supportive of the event-study results of Chhaochharia and Grinstein (2007) and DeFond, Hann, and Hu (2005). Chhaochharia and Grinstein find that firms that were less compliant with the rules imposed by SOX and the Exchanges earned more positive abnormal returns on the announcement of the rules. DeFond, Hann and Hu document a positive stock market reaction when a director with accounting expertise is appointed to the audit committee.

While SOX specifically affects board independence, perhaps the increased scrutiny of all firms' corporate governance environments forces firms to implement better corporate governance practices, regardless of how those governance practices are measured. As such, board independence is not the only measure of governance that we consider. We find that the dollar value of director stock ownership is positively related to operating performance both pre-2002 and post-2002. We also find that whether or not a firm's CEO is also the board chair is negatively related to operating performance throughout the sample period. These findings are consistent with prior literature. We also consider two popular corporate governance indices: the G-Index of Gompers, Ishii and Metrick (GIM, 2003) and the E-Index of Bebchuk, Cohen and Ferrell (BCF, 2009). During 1998-2001, both the G-Index and the E-Index suggest a positive and significant relation between good governance and performance; these findings are consistent with the extant literature. However, during 2003-2007, the G-Index suggests a *negative* and significant relation between good governance and performance. Also, during 2003-2007, the E-Index suggests an inconsistent relation between good governance and performance.

As many prior studies note, the relationship between corporate governance and company performance is plagued by endogeneity concerns. It is unclear whether performance causes governance or whether governance causes performance. To account for this, we utilize a four-equations system to allow for governance, performance, ownership, and capital structure to be potentially endogenous. We adopt an instrumental variables approach to estimate the system of equations, checking for the validity and strength of our instruments, and specification of the system of equations. In addition, as a robustness check we consider alternative methodologies less susceptible to the endogeneity concern – with consistent results.

Although most prior research has not found a positive relationship between board independence and firm performance prior to 2002, some research has found support for board independence in specific situations. Hermalin and Weisbach (2005) develop a model predicting that board independence provides greater oversight of managerial actions. Bhagat and Bolton (2008) find that firms with greater board independence are more likely to replace the CEO following periods of bad performance. We extend this CEO turnover test to our sample period and find this result persists in the post-2002 time period. In sum, these findings are consistent with the notion that the wave of corporate governance regulation that occurred during 2002 may have had some desired effect. Specifically, post-2002, companies whose boards are more independent are positively correlated with better operating performance.

In addition to studying the changing nature of corporate governance across the pre-2002 and post-2002 sub-periods, we make four addition contributions to the literature. First, consistent with the Efficient Market Hypothesis, we show that none of the governance measures are correlated with current or future stock market performance, in contrast to the claims in papers such as GIM and BCF. Second, we find that given poor firm performance, the probability of

disciplinary management turnover is positively correlated with stock ownership of board members and board independence. However, given poor firm performance, the probability of disciplinary management turnover is *negatively* correlated with better governance measures as proposed by GIM and BCF. In other words, so called "better governed firms" as measured by the GIM and BCF indices are *less* likely to experience disciplinary management turnover in spite of their poor performance. Third, we show that firms that are not compliant with SOX have significantly higher abnormal returns upon becoming compliant than do non-compliant firms that stay non-compliant; this is consistent with and supportive of the results of Chhaochharia and Grinstein (2007) and DeFond, Hann, and Hu (2005). The most important contribution of this paper is our proposal of a governance measure, namely – dollar ownership of the board members – that is simple, intuitive, less prone to measurement error, and not subject to the problem of weighting a multitude of governance provisions in constructing a governance index. Consideration of this governance measure by future researchers would enhance the comparability of research findings with more robust progress in governance research.

The remainder of this paper is organized as follows. The next section discusses the relevant literature. Section 3 introduces our model specification and sample. Section 4 presents the results on the relationship between corporate governance and company performance. Section 5 discusses results of an event study where we focus on the announcement by sample firms of the nomination of additional independent directors that would enable the firm to comply with SOX's board independence requirement for the audit committee. Section 6 considers the relationship between corporate governance, company performance, and CEO turnover. Section 7 notes our conclusions.

2. Corporate Governance and Board Independence

The relationship between board independence and firm performance is one of the most studied relationships in the corporate governance literature. Hermalin and Weisbach (1991) find no relationship between board composition and performance (using Tobin's *Q* as the performance measure). Agrawal and Knoeber (1996) study the interrelationships among seven corporate governance mechanisms and find a negative relationship between independence and firm performance (as measured by Tobin's *Q*). Bhagat and Black (2002) document that firms with more independent boards do not perform better, using a variety of performance measures. They also find that poorly performing firms are more likely to increase the number of independent directors, but that this does not improve performance. More recently, Bhagat and Bolton (2008) find a negative relationship between board independence and operating performance. The overwhelming majority of work finds that having a more independent board of directors does not lead to better performance and may actually lead to worse performance.

Adams and Ferreira (2007) introduce a model that suggests CEOs may be reluctant to share information with more independent boards, thereby decreasing shareholder value. This suggests that the requirements of SOX and the stock exchanges for firms to increase director independence may potentially be detrimental to firm value. Laux (2008) presents a model considering CEO turnover and board independence, and shows that greater board independence might be detrimental to the firm because independent boards might be too active in replacing the CEO and in formulating CEO compensation. Raheja (2005) looks at the board's monitoring role with respect to investment projects. In her model, inside directors have more knowledge of the firm's investments, so the optimal board structure will depend on the project verification costs to outsiders and private benefits from projects to insiders. This suggests greater board independence can be beneficial in some firms while being detrimental in other firms. Similarly,

Coles, Daniel and Naveen's (2008) work suggests that smaller and more independent boards may not be superior in all cases. Using data from 1997-2000, Gillan, Hartzell and Starks (2007) show that firms with more powerful boards (or more independent boards) also have higher *G-Index* scores, suggesting that managers may become more entrenched to protect themselves from the oversight of an independent board. Finally, Chhaochharia and Grinstein (2007) find that firms that were less compliant with the rules imposed by SOX and the Exchanges earned positive abnormal returns on the announcement of the rules, relative to firms that were more compliant.

One common feature of these studies is that they mostly focus on boards and relationships prior to 2002. It is rare to see an exogenous shock to the corporate governance landscape, but the increased regulation of 2002 may be just the kind of event to provide a demarcation of corporate governance regimes. Section 301 of SOX mandates that the audit committees of public firms comprise entirely of independent directors and that the audit committee contain at least one 'finance expert.' While firms could meet the independence requirement by removing affiliated directors from the board, some firms might have to add independent directors in order to meet the 'finance expert' requirement.[1] Further, it stipulates that if a firm does not have a stand-alone audit committee, then the entire board functions as the audit committee and it, therefore, must comprise entirely of outside directors. Subsequent to the passage of SOX, the New York Stock Exchange and the NASDQ Stock Market simultaneously instituted standards requiring listed companies to have a majority of independent directors. This regulation did force firms to add independent directors, as fewer than 80% of firms had majority of independent directors in 2003.[2] Further, SOX and the listing standards impose new

[1] See Securities Exchange Act Release No. 47137 (January 8, 2003), 68 FR 2637, (January 17, 2003), or http://www.sec.gov/rules/sro/34-48745.htm.
[2] Firms could also meet the independence requirement by removing employee and affiliated directors from the board and reducing the size of the board.

responsibilities on firms' directors, such as regular meetings of the independent directors, approval of director nominations by independent directors, and approval of CEO compensation by independent directors. As a consequence of these policies boards began including more independent directors[3], and, arguably the independent directors became more engaged in the firm's governance processes.

While the explicit objective of the SOX and exchange regulations is increasing and improving board effectiveness through greater independence, it is possible that the firm's entire corporate governance environment changes, regardless of how corporate governance is measured. There are many plausible proxies for corporate governance, but there is no agreed upon "best" measure. As such, it is possible these other measures have also been impacted by the new regulations. GIM create a Governance Index (*G-Index*) using 24 anti-takeover provisions. They show that firms with strong shareholder rights outperform firms with weak shareholder rights by 8.50 percent per year during the 1990s. They further show that firms with strong shareholder rights have higher firm value, higher profits and higher sales growth. Core, Guay and Rusticus (2006) extend this work and show that firms with weaker governance as measured by *G-Index* have lower operating performance (and that this is anticipated by the market). BCF modify the *G-Index* using only six of the 24 provisions to create an Entrenchment Index (*E-Index*), and find that firms with higher *E-Index* scores (associated with weaker governance) have lower firm valuation.

Beyond looking at indices that comprise of various corporate governance components, a substantial body of work considers individual firm characteristics as measures of corporate governance. These studies focus on the relationship between one single firm governance characteristic and firm performance. The literature on board independence and firm performance

[3] As shown in Table 1, the percentage of directors that are independent increased from 62% in 1998 to 72% in 2007.

is discussed above. Brickley, Coles and Jarrell (1997) study the benefits and costs of having the CEO also serve as the board chair. Bhagat and Bolton (2008) consider the stock ownership of directors.

Can a single board characteristic be as effective a measure of corporate governance as indices that include dozens of corporate charter and board characteristics?[4] While, ultimately, this is an empirical question, on both economic and econometric grounds it is possible. Bhagat, Bolton, and Romano (2008) argue that since boards have the power to make (or at least ratify) all important company decisions, it is plausible that board members with appropriate stock ownership will have the *incentive* to provide effective monitoring and oversight of these important corporate decisions. Also, simple measures such as board independence and director ownership can be a good proxy for overall good governance on econometric grounds: The measurement error associated with a simple variable such as board independence can be much less than the total measurement error in measuring a multitude of board processes, compensation structures, and charter provisions. Further, construction of a governance index requires proper weighting of these board characteristics, anti-takeover provisions, and compensation variables; if the weights in the index are not the same as the (unobservable) weights used by informed market participants in assessing the governance and performance relationship then incorrect inferences would be made.

In addition to studying board independence, this study proposes a governance measure – namely, dollar ownership of board directors – that is simple, intuitive, less prone to measurement error, and not subject to the problem of weighting a multitude of governance provisions and firm

[4] For example, Brown and Caylor's (2006) *Gov-Score* index includes 51 factors, while commercial providers such as RiskMetrics Group (formerly Institutional Shareholder Services), The Corporate Library, and Glass Lewis & Company offer proprietary governance indices using, sometimes, several hundred governance characteristics.

characteristics to construct a governance index. Consideration of this governance measure in future research would enhance the comparability of research findings.

3. Data description and model specification

3.1. DATA

Our primary source of corporate governance data is the RiskMetrics directors and governance databases (formerly the Investor Responsibility Research Center, IRRC). In addition, we use the Compustat Industrial Annual database for financial statement information, the Center for Research in Security Prices (CRSP) database for stock market data, and the Compustat Executive Compensation (Execucomp) database for CEO ownership and turnover information. The SEC's EDGAR database of SEC filings is also used to obtain specific information from proxy statements.

The RiskMetrics databases track governance and director information for approximately 1,500 large U.S. companies from 1990 to 2007. The governance database provides corporate anti-takeover provisions on these companies, plus the *G-Index* score used in Gompers, Ishii and Metrick (2003). This database provides updates for 1990, 1993, 1995, 1998, 2000, 2002, 2004 and 2007. The director database provides detailed director information annually from 1996 to 2007. However, the director ownership data is not tracked consistently until 1998, so our primary sample is for 1998 to 2007. The Execucomp database provides compensation and ownership data on approximately 1,500 large U.S. firms annually from 1992-2007. There is considerable overlap across these sources which: the final merged sample has 1,000 to 1,400 firms per year. The final sample is an unbalanced panel with 10 years of data from 1998 to 2007 and a total of over 13,000 firm-year observations.

3.2. GOVERNANCE VARIABLES

This study considers the following five measures of corporate governance[5]:

Independence – Board independence is measured as the percentage of directors who are unaffiliated with the sample firm. This includes directors who are neither employees of the firm and directors who do not have any identifiable relationship with the sample firm.

DirectorOwn – Director ownership is measured as the natural log of the dollar value of common stock owned by the median director. We focus on the dollar value rather than percentage of ownership because it serves as a more direct measure of director incentives. Consistent with the political economy literature, we focus on the median director because they have the ability to cast the deciding vote on board issues; see Shleifer and Murphy (2004) and Milavonic (2004).

CEO-Duality – CEO-Chair duality is an indicator variable taking the value of 1 if the CEO of the sample firm is also the board chair, and 0 otherwise.

G-Index – From GIM, the *G- Index* is the compilation of anti-takeover provisions in the firm's bylaws. The Index is comprised of 24 corporate charter provisions, with a possible Index value ranging from 0 to 24. Consistent with GIM, higher Index values represent weaker corporate governance while lower Index values represent stronger corporate governance.

E-Index – From BCF, the *E-Index* is a subset of the *G-Index*. It includes only 6 of the 24 corporate charter provisions believed consistent with entrenching management, thus taking a value of 0 to 6.[6] Again, higher Index values represent weaker corporate governance.

3.3. PERFORMANCE VARIABLES

[5] In supplementary tests, we consider two other measures of corporate governance. *BusyBoards* is the percentage of directors who serve on more than 3 corporate boards; our results are consistent with that of Fich and Shivdasani (2006). *IndepInsider* is the number of sample firm's executives on the board who hold at least one additional outside directorship; our results are supportive of Masulis and Mobbs (2009).

[6] The six provisions are staggered boards, limits to shareholder bylaw amendments, supermajority requirements for mergers, supermajority requirements for charter amendments, poison pills, and golden parachutes.

Consistent with Barber and Lyon (1996) and Core, Guay and Rusticus (2006), we consider Return on Assets (*ROA*) as our primary measure of firm operating performance. In supplementary tests, we also use stock return (*Return*) and Tobin's Q (*TobinsQ*) as alternative measures of firm performance. Industry-adjusted performance is obtained by subtracting the average performance of the sample firm's 4-digit SIC code from the sample firm's performance measure.

3.4. OTHER ENDOGENOUS AND CONTROL VARIABLES

In addition to governance and performance, ownership and capital structure are also presumed to be endogenously determined. We consider *CEOOwn%* as the percentage of stock owned by the CEO. *Leverage* is the capital structure measure, calculated as the long-term debt-to-assets ratio.

Regarding the control variables: Prior literature, for example, Core, Holthausen and Larcker (1999), Gillan, Hartzell and Starks (2003), and Core, Guay and Rusticus (2006), suggests that industry performance, return volatility, growth opportunities and firm size are important determinants of firm performance. Yermack (1996) documents a relation between board size and performance. Demsetz (1983) suggests that small firms are more likely to be closely-held suggesting a different governance structure than large firms. Theoretical work on board independence (Hermalin and Weisbach (1998), Raheja (2005), Adams and Ferreira (2007), and Harris and Raviv (2008)) suggests that more independent boards are not necessarily value-enhancing, rather there is an optimal level of board independence depending on the information cost that outside directors incur in becoming effective monitors. We consider the information cost (*InfoCost*) variables as developed in Krishnaswami and Subramanian (1999) as a

determinant of board independence; specifically we consider the standard deviation of monthly stock returns, and the standard deviation of analyst forecasts.

FirmSize is the natural log of assets for the firm. *R&DAdvExp* is the ratio of research and development plus advertising expenses to assets; if the data are missing they are presumed to be zero. *MktBook* is the ratio of market to book value of equity. *BoardSize* is the number of directors on the board.

We adopt an instrumental variables approach to dealing with the potential endogeneity among governance, performance, ownership and capital structure. We identify the following primary instrumental variables used in the first-stage fitted regressions. We utilize three instruments for the governance variables. *Dir%Own* is the average *percentage* of common stock owned by all directors (this is different from *DirectorOwn* which is the natural log of the dollar value of common stock owned by the median director). We use this variable as an instrument for all five governance variables. *Dir%CEOs* is the percentage of directors who are CEOs; this variable is used as an instrument for *Independence, DirectorOwn* and *CEO-Duality*. Hallock (1997) and Westphal and Khanna (2003) emphasize the role of networks among CEOs that serve on boards, and the adverse impact on the governance of such firms. *Dir%15Ten* is the percentage of directors who have served on the board for at least 15 years; this variable is used as an instrument for *G-Index* and *E-Index.* *TreasStock* is the ratio of treasury stock to assets, which we use as the primary instrument for performance (as in Palia (2001)). *CEOTenAge* is the ratio of CEO tenure to CEO age; this variable is used as the instrument for ownership. A CEO who has had five years of tenure at age 65 is likely to be of different quality and have a different equity ownership than a CEO that has had five years of tenure at age 50. These CEOs likely have different incentive, reputation, and career concerns. Gibbons and Murphy (1992) provide

evidence on this. Therefore, we use the ratio of CEO tenure to CEO age as a measure of CEO quality, which will serve as an instrument for CEO ownership. *ZScore* is the modified Altman's Z-Score (1968); this variable is used as the instrument for leverage.[7] [8]

3.5. MODEL SPECIFICATION

The main relationship analyzed in this study is the effect that corporate governance has on firm performance. We note above the potential endogeneity between governance and performance. Bhagat and Jefferis (2002) highlight the reasons for focusing on the interrelationships between performance, governance, ownership and capital structure. Therefore, we specify the following four-equation system of equations allowing for these interdependencies:

(1a) $$Performance_{i,t} = Governance_{i,t} + Ownership_{i,t} + Leverage_{i,t} + IndustryPerformance_{i,t} + FirmSize_{i,t} + R\&DAdvExp_{i,t} + BoardSize_{i,t} + InfoCost_{i,t} + TreasStock_{i,t} + \varepsilon a_{i,t}$$

(1b) $$Governance_{i,t} = Performance_{i,t} + Ownership_{i,t} + Leverage_{i,t} + FirmSize_{i,t} + R\&DAdvExp_{i,t} + BoardSize_{i,t} + InfoCost_{i,t} + Dir\%Own_{i,t} + Dir\%CEOs_{i,t} + \varepsilon b_{i,t}$$

(1c) $$Ownership_{i,t} = Performance_{i,t} + Governance_{i,t} + Leverage_{i,t} + FirmSize_{i,t} + R\&DAdvExp_{i,t} + BoardSize_{i,t} + InfoCost_{i,t} + CEOTenAge_{i,t} + \varepsilon c_{ai,t}$$

(1d) $$Leverage_{i,t} = Performance_{i,t} + Governance_{i,t} + Ownership_{i,t} + IndustryLeverage_{i,t} + FirmSize_{i,t} + R\&DAdvExp_{i,t} + MktBook_{i,t} + BoardSize_{i,t} + InfoCost_{i,t} + ZScore_{i,t} + \varepsilon d_{i,t}$$

[7] Our choice of the instrument variables is motivated by the extant literature. However, it is difficult for us to argue that the instruments are uncorrelated with the regression error terms. A vast body of theoretical and empirical literature has focused on the interrelationships between performance, governance, ownership and capital structure; see Bhagat and Jefferis (2002). In light of the above interrelationships, and the model we are trying to estimate (equations 1a, 1b, 1c, and 1d as noted below), it is close to impossible - we think -to propose instruments that are in theory *uncorrelated* with the error terms. From an econometric perspective, validity of instruments is a matter of degree not kind; see Berkowitz, Caner and Fang (2008) and Chao and Swanson (2005). Ashbaugh-Skaife, Collins, and Lafond (2006) make a similar point in their study of the effects of corporate governance on firms' credit ratings. We implement a battery of tests checking for the validity and strength of our instruments, and specification of the system of equations; please see section 4.3.1 and Appendix A.

[8] We consider alternative instruments for leverage such as Graham's (1996) marginal tax rate; *ZScore* is more appropriate based on our diagnostic tests.

The primary focus of this study is on equation (1a), and specifically on the coefficient on *Governance* in that equation. This relationship is studied for different time periods and for different sub-samples.

In using instrumental variables estimation, two questions need to be addressed: Are the instruments valid and is instrumental variables (IV) estimation necessary? An instrument is "weak" if the correlation between the instruments and the endogenous variable is small. Nelson and Startz (1990) and Bound, Jaeger and Baker (1995) were among the first to discuss how instrumental variables estimation can perform poorly if the instruments are weak. Nelson and Startz show that the true distribution of the instrumental variables estimator may look nothing like the asymptotic distribution. Bound, Jaeger and Baker focus on two related problems. First, if the instruments and the endogenous variables are weakly correlated, then even a weak correlation between the instruments and the error in the original structural equation (which should be zero) can lead to large inconsistencies in the IV estimates; this is known as the "bias" issue related to weak instruments. Second, finite sample results can differ substantially from asymptotic theory. Specifically, IV estimates are generally biased in the same direction as OLS estimates, with the magnitude of this bias increasing as the R^2 of the first-stage regression between the instruments and the endogenous variable approaches zero; this is known as the "size" issue related to weak instruments.

More recently, Stock and Yogo (2004) formalize the definitions and provide tests to determine if instruments are weak. They introduce two alternative definitions of weak instruments. First, a set of instruments is weak if the bias of the instrumental variables estimator, relative to the bias of the OLS estimator, exceeds a certain limit *b*. Second, the set of instruments is weak if the conventional α-level Wald test based on instrumental variables

statistics has a size that could exceed a certain threshold *r*. These two definitions correspond to the "bias" and "size" problems mentioned earlier.

Consistent with the recommendations of Chenhall and Moers (2007), we use the Stock and Yogo (2004) test for weak instruments and the Hahn and Hausman (2002) test for the validity of the instruments; see 4.3.1 below. We also use the Durbin-Wu-Hausman specification test based on Hausman (1978) to test for differences between the OLS and 2SLS results and to determine which estimation method is more appropriate for statistical inference.[9]

4. Corporate Ggovernance and Firm Performance

4.1. DESCRIPTIVE STATISTICS

Table 1 presents the descriptive statistics for the main governance, performance, and other variables, for the entire sample and for the pre-2002 and post-2002 subsamples. In general, the summary statistics for the entire sample period are similar to prior literature. The average board has 9.3 directors, 67% of whom are outsiders. The average *G-Index* is 9.2 and the average *E-Index* is 2.2. The median director owns about $887,000 worth of company stock, and the CEO is also the board chair in about 60% of the firms.

Some notable differences are seen when we compare the pre-2002 and post-2002 subsamples. We note that boards have become more independent, directors own more stock, boards have become more entrenched (with *G-Index* increasing from 8.9 to 9.4 and *E-Index* increasing from 2.0 to 2.3), but slightly fewer CEOs are serving as board chair. Fewer directors are active CEOs. The size of the board has remained relatively constant, but *Independence* has increased from 61.6% before 2002 to 72.0% after 2002. Median director ownership has significantly increased from about $790,000 before 2002 to about $1,100,000 after 2002.

[9] In addition to 2SLS we also consider 3SLS, which allows for cross-correlation in the errors of the equations in the system. There is qualitatively very little difference between the 2SLS and 3SLS results so we only report the 2SLS results.

Table 2 presents the correlation coefficients for select governance and other variables. For the most part, the governance variables are not highly correlated, with the exception of *G-Index* and *E-Index*. *Independence* and *G-Index* are moderately highly correlated, consistent with Gillan, Hartzell and Starks (2007).

4.2. GOVERNANCE AND PERFORMANCE, PRE-2002 AND POST-2002 PERIODS

2002 was a seminal year in terms of corporate governance regulation, and specifically with respect to board independence. We use 2002 as the break-point for our two sub-periods since SOX was enacted in 2002; for this reason, we exclude 2002 from our analysis.[10]

We find the most interesting result when we consider the relationship between Independence and *ROA* during the pre-2002 and post-2002 periods. Consistent with the extant literature, we find *Independence* is negatively related to *ROA* during the 1998-2001 period; see Table 3, Panel B.[11] However, during the 2003-2007 period, we find that *Independence* is *positively* and significantly related to *ROA;* see Table 3, Panel D. Boards have become more independent, and now this independence is positively correlated with better operating performance.

A second interesting result in Table 3 is that the relationship between *ROA* and *G-Index* is negative and significant in the pre-2002 period (panel B), but positive and significant during the post-2002 period (panel D). The other three governance variables – *DirectorOwn, CEO-Duality, and E-Index* – all have similar signs and significance pre- and post-2002. Director ownership is positively related to operating performance, whereas *CEO-Duality* and *E-Index* are

[10] The results are robust to excluding both 2002 and 2003 from the analysis. We choose to include 2003 because many firms were compliant with SOX by 2003.

[11] In Table 3, Panels A and C, we report OLS and 2SLS results for completeness. However, the Hausman (1978) test indicates that the 2SLS estimates are more appropriate for inference; see Appendix A.

negatively related. (Recall that lower values of the *E-Index* and *CEO-Duality* are associated with better governance.)

Table 3 also summarizes the relationship between various governance measures and stock market based measures of performance, *Return* and *TobinsQ*. Consistent with the Efficient Market Hypothesis, we do not find any consistent significant relation between any measure of governance (including those proposed by GIM and BCF) and stock market based measures of performance. This evidence is consistent with a growing body of evidence that does *not* find a consistent and significant relationship between governance measures proposed by GIM and BCF and stock market based measures of performance; for example, see Johnson, Moorman and Sorescu (2009), Core Guay and Rusticus (2006), Lehn, Patro and Zhao (2007), and Cremers and Martijn (2005).

Table 4 summarizes the relationship between various governance measures and future firm performance. In general, these results are consistent with those discussed above. One exception to this is the relationship between *ROA* in the next two years *and E-Index,* which reverses from negative prior to 2002 to positive after 2002.

We next try to better characterize and understand the surprising significant *positive* relation between board independence and operating performance for the period 2003-2007. Using the sample of 13,135 firm-year observations, we determine the year-to-year change in the number of independent directors for each firm-year. An increase in the number of independent directors from the previous year is observed for only about one-third of these observations. In Table 5, Panel A, we observe a significant *positive* relation between board independence and contemporaneous operating performance for the period 2003-2007 for those observations where there is an increase in the number of independent directors from the previous year; in contrast to

the negative relation for the period 1998-2001. In Table 5, Panel B, we consider observations where there is no increase in the number of independent directors from the previous year: we do not observe a significant relation between board independence and contemporaneous operating performance for the period 2003-2007. Hence, the positive relation between board independence and operating performance for the period 2003-2007 appears to be driven by those companies that increase their number of independent directors from the previous year. This is consistent with and supportive of the event-study results of Chhaochharia and Grinstein (2007) who find that firms that were less compliant with the rules imposed by SOX and the exchanges earned positive abnormal returns on the announcement of the rules.

We document above that director ownership is positively correlated with operating performance. It is possible that the positive relation between board independence and operating performance for the period 2003-2007 might be due to an increase in director ownership over the period 2003-2007. We examine this possibility in Table 6 by including both director ownership and board independence along with the other variables in equation (1a). This involves adding a fifth equation to the system, and using all three governance instrumental variables. Consistent with the evidence in Tables 3 and 4, we document a significant *positive* relation between board independence and contemporaneous operating performance for the period 2003-2007; this is in contrast to the negative relation for the period 1998-2001. Director ownership is positively associated with firm performance during both the sub-sample periods. This indicates that the reversal of the relationship between board independence and operating performance after SOX is independent of the governance effects of director ownership.

4.3. ROBUSTNESS CHECKS

4.3.1. VALIDITY AND STRENGTH OF INSTRUMENTS

We conduct the Stock and Yogo (2004) test to ensure that our instruments are strong. We also perform the Hahn and Hausman (2002) weak instrument test, and the Hansen-Sargan overidentification test as discussed in Davidson and Mackinnon (2004); inferences from these tests are consistent with the reported Stock and Yogo test results. Detailed results are noted in Appendix A.

Second, following the suggestion of Larcker and Rusticus (2009), we consider an alternate set of instruments in addition to the instruments noted above. Specifically, we consider (one year) lagged performance for performance, lagged ownership for ownership, and lagged leverage for leverage.[12] Results using these instruments are consistent with the results reported above.

Third, following the suggestions of Stock, Wright and Yogo (2002) and Hall, Rudebusch and Wilcox (1996) we perform the Cragg-Donald test for model identification. The Cragg-Donald test indicates that our system of equations is well-specified.

Fourth, we perform the Anderson-Rubin test suggested by Dufour (1997) to test the joint significance of the set of endogenous variables in our system of equations. The Anderson-Rubin test supports the joint significance of our set of endogenous variables.

4.3.2. FIXED EFFECTS ESTIMATOR

While we have tried to control for differences across sample firms, unobserved heterogeneity across the sample firms can confound our estimated governance-performance relation. A similar problem arises if we omit yearly variables that impact firms similarly but differently across years. To address these concerns, we estimate the performance-governance

[12] Kennedy (2003) notes, "It may be possible to use as an instrument the lagged value of the independent variable in question; it is usually correlated with the original independent variable, and, although it is correlated with the disturbance vector, because it is lagged it is not contemporaneously correlated with the disturbance (assuming the disturbance is not autocorrelated)." We also conduct the Stock and Yogo (2004) and the Hahn and Hausman (2002) weak instrument tests on these lagged instruments.

relationship using OLS with fixed effects estimator including firm and year fixed effects, and clustered (Rogers) standard errors. These results are noted in Appendix B and are consistent with those reported in Table 4.

4.3.3. k-CLASS ESTIMATOR

In the case of simultaneously determined variables, 2SLS can address this problem by using instrumental variables. There are estimators other than the 2SLS estimator, such as the *k*-class estimator that can address the endogeneity problem; see Kennedy (2003) and Guggenberger (2005). The results for *k*-class estimators and next year's operating performance, next two years' operating performance, stock return and Tobin's Q (for contemporaneous and for the two additional time periods) as the performance measures are consistent with the results reported in Table 4.

4.3.4. ESTIMATION OF STANDARD ERRORS

Petersen (2009) and Wooldridge (2002) provide a careful analysis of the impact of correlated residuals on the bias in standard errors in panel data. While Petersen's work is quite helpful in understanding the standard error estimates for a single equation model, it is unclear how his conclusions might apply to a system of simultaneous equations. Note that both the economics and econometrics of the performance-governance relationship as analyzed above strongly suggest that this relationship needs to be estimated as a system of simultaneous equations. We estimate the performance-governance relationship using 2SLS and heteroscedasticity adjusted White and clustered (Rogers) standard errors. These results are consistent with those reported earlier.

4.3.5. MARKET-TO-BOOK IN GOVERNANCE AND OWNERSHIP EQUATIONS

Market-to-book has been documented as a determinant of ownership structure and board structure by Himmelberg, Hubbard and Palia (1999) and Linck, Netter and Yang (2008), respectively. We include market-to-book in equations (1b) and (1c) above and re-estimate equations (1a) – (1d). The results are consistent with those reported in Table 4; see Appendix C.

4.3.6. DISCRETIONARY ACCRUALS IN PERFORMANCE EQUATION

Cohen, Dey and Lys (2005, 2008) document a significant decrease in earnings management subsequent to the passage of SOX. As a robustness check, we use the Larcker and Richardson (2004) model to estimate discretionary accruals and use this as a control variable when we consider ROA as the performance measure in equation (1a). Including this control variable does not qualitatively change our results in Table 4.

4.3.7. ALTERNATIVE ROA ESTIMATION

Core, Guay and Rusticus (2006) note "to the extent that governance affects firm performance through capital expenditure programs, depreciation expense is an important component of a firm's governance." For this reason, we also consider operating income after depreciation in estimating ROA. The results are consistent with the results in Table 4.

4.3.8. FIRM SIZE AND THE PERFORMANCE-GOVERNANCE RELATION

The performance-governance relationship could be sensitive to firm size for two reasons. First, SOX exempts firms with market capitalization less than $75 million. Second, Linck, Netter and Yang (2008) find that board structure determinants vary cross-sectionally with firm size. The first concern is not quite relevant for this study since less than 0.8% of sample firms have market capitalization less than $75 million in 2002; in 2006 all sample firms have market capitalization greater than $75 million. To address the second concern we estimate the system for five sub-

samples categorized by size. During 1998-2001 (2003-2007) board independence is consistently negatively (positively) related to performance for all size quintiles; see Appendix D.

5. Market Response to Firms' Announcement of Compliance

The focus of this paper is on the impact of SOX on the performance-governance relation. We find a negative and significant relationship between board independence and operating performance during 1998-2001, but a *positive* and significant relationship during 2003-2007. Also, we find that this result is driven by firms that increase their number of independent directors. Given that SOX attempts to increase the number and role of independent board members, the above evidence suggests a positive correlation between SOX's board independence requirements and company performance. However, correlation is not causation – other economic events during 2003-2007 could lead to the above observed correlation; for example, increased shareholder activism and corporate scandals in that period.

To get additional insight on the impact of SOX on the relation between board independence and company performance, we conduct an event study. We focus on the announcement by sample firms of the nomination of additional independent directors that would enable the firm to comply with SOX's board independence requirements for the audit committee.[13] We use the filing of the firm's annual proxy statement as the event date. Table 7 summarizes the stock market's response to these announcements. When a company goes from being non-compliant to being compliant with SOX's board independence requirement, the market response (market adjusted cumulative abnormal return, CAR) is significantly positive for the post-SOX period (July 22, 2002 through December 31, 2007) using a three-day event

[13] Section III, subsection 301 of SOX required that all audit committee members of the board be independent. 69.9% of our sample firms were SOX compliant in 2002; 76.9% in 2003, 82.9% in 2004, 85.8% in 2005, 84.6% in 2006, and 96.8% in 2007. In practice, firms become compliant by removing affiliated directors from the board, or when the nature of an affiliated relationship changes.

window from day -1 to day +1.[14] Also, the market response is positive for each of the years 2002, 2003, 2004, 2005, 2006 and 2007. Similar results are obtained using longer event windows. The above findings are consistent with and supportive of the event-study results of Chhaochharia and Grinstein (2007) and DeFond, Hann, and Hu (2005). Chhaochharia and Grinstein find that firms that were less compliant with the rules imposed by SOX and the Exchanges earned more positive abnormal returns on the announcement of the rules. DeFond, Hann and Hu document a positive stock market reaction when a director with accounting expertise is appointed to the audit committee.

Table 7 also summarizes the stock market's response to announcements of annual board elections by firms that continue being non-compliant with SOX's board independence requirements during 2002-2007. The market response is insignificantly different from zero. Also, the difference in CARs of firms that go from being non-compliant to compliant and firms that stay non-compliant is significantly positive for the post-SOX period, and for each of the years 2002, 2003, 2005, 2006 and 2007. The above evidence is consistent with the argument that SOX's board independence requirement perhaps played a positive role in enhancing firm performance.

6. Corporate Governance and CEO Turnover

The preceding analysis focuses on the relation between governance and performance generally and in the specific case of SOX compliance. However, governance scholars and commentators suggest that governance is especially critical in imposing discipline and providing fresh leadership when the corporation is performing particularly poorly. For this reason, we study the relationship between governance, performance, and CEO turnover.

[14] Value weighted market from CRSP (Center for Research in Security Prices) is used as the market index. We also estimated the CARs based on the market model with similar results. See MacKinlay (1977) for a discussion of event studies.

Using Compustat's Execucomp database, we identify 1,951 CEO changes from 1998 to 2007. We hand-collect information from company press releases and press articles to determine whether the CEO departure was disciplinary or not. Table 8 documents the number of disciplinary and non-disciplinary CEO turnovers during this period. Our criteria for classifying CEO turnover as disciplinary or non-disciplinary is similar to that of Weisbach (1988), Gilson (1989), Huson, Parrino, and Starks (2001), and Farrell and Whidbee (2003). CEO turnover is classified as "non-disciplinary" if the CEO died, if the CEO was older than 63, if the change was the result of an announced transition plan, or if the CEO stayed on as chairman of the board for more than a year. CEO turnover is classified as "disciplinary" if the CEO resigned to pursue other interests, if the CEO was terminated, or if no specific reason is given. [15]

We consider a multinomial logit regression, with three independent categories: no turnover, disciplinary turnover, and non-disciplinary turnover.[16] The dependent variable is equal to 0 if no turnover occurred in a firm-year, 1 if the turnover was disciplinary, and 2 if the turnover was non-disciplinary. We consider the past two years' stock return as the performance measure. We estimate the following baseline equation:

$$\text{(2a)} \quad \textit{Type of CEO Turnover}_{i,t} = \textit{Last 2 Years' Return}_{i,t} + \textit{Last 2 Years' Industry Return}_{i,t} + \textit{CEOOwn\%}_{i,t} + \textit{FirmSize}_{i,t} + \textit{CEO Age}_{i,t} + \textit{CEOTenure}_{i,t} + \varepsilon a_{i,t}$$

The control variables are motivated by a substantial extant literature on performance and CEO turnover; for example, see Huson, Parrino, and Starks (2001), Farrell and Whidbee (2003), and Engel, Hayes and Wang (2003). To determine the role that governance plays in CEO turnover,

[15] For our purposes, distinguishing between the different sub-categories within the "disciplinary" and "non-disciplinary" groups is not essential. There may be situations where a 65 year-old CEO leaves as part of a succession plan and stays on as board chair for 12 months. This is a "non-disciplinary" turnover, regardless of which sub-category it gets classified in.

[16] We also considered a fixed effects logit estimator model. However, there are concerns regarding the bias of such an estimator. Greene (2004) documents that when the time periods in panel data are five or less (as is the case in this study), nonlinear estimation may produce coefficients that can be biased in the range of 32% to 68%.

we create an interactive variable that is equal to (Past 2 years' stock return *x* Governance). The reason behind this is that if the firm is performing adequately, good governance *per se* should not lead to CEO turnover; only when performance is poor do we expect better governed firms to be more likely to replace the CEO. To measure this effect, we estimate the following modified version of equation (2a):

(2b) $$\begin{aligned} \textit{Type of CEO Turnover}_{i,t} = \; & \textit{Last 2 Years' Return}_{i,t} + \textit{Last 2 Years' Industry Return}_{i,t} \\ & + \textit{Governance}_{ii,t} + (\textit{Governance}_{it} \text{ x } \textit{Last 2 Years Return}_{it}) \\ & + \textit{CEOOwn\%}_{i,t} + \textit{FirmSize}_{i,t} + \textit{CEO Age}_{i,t} + \textit{CEOTenure}_{i,t} + \varepsilon a_{i,t} \end{aligned}$$

Table 9 highlights the relation between different measures of governance and disciplinary CEO turnover. Table 9, Panel A, details the multinomial logit regression results for the determinants of disciplinary CEO turnover for the pre-2002 period. Consider first the baseline results without governance variables in the regression. The baseline results indicate that a firm's stock market returns during the previous two years, CEO stock ownership, and CEO tenure are significantly negatively related to disciplinary CEO turnover; these findings are consistent with the prior literature noted above.

Does good governance have an impact on disciplinary CEO turnover directly, or is governance related to disciplinary turnover only in poorly performing companies? The results in Table 9, Panel A, shed light on this question for the pre-2002 period. Note that when the governance variables are included, the prior return variable is not significant in three of the five cases, suggesting that bad performance alone is not enough to lead to a change in senior management. Also note that the governance variable by itself is statistically not significant in most cases.[17] This suggests that good governance *per se* is not related to disciplinary turnover. The coefficient of the interactive term (Past 2 years' stock return *x* Governance) sheds light on the question whether governance is related to disciplinary turnover only for poorly performing

[17] The exception is that when the CEO is also the Chairman, he is less likely to experience disciplinary turnover.

firms. The interactive term suggests that good governance as measured by the dollar value of the median director's stock ownership and the percentage of directors who are independent, increases the probability of disciplinary turnover for poorly performing firms.[18] [19]

Table 9, Panels B shows the results for disciplinary turnover in the post-2002 period. The results in the 2003-2007 period are qualitatively unchanged from the results in the 1998-2001, with the following exception. Both the GIM and BCF measures of good governance are *negatively* related to the probability of disciplinary turnover for poorly performing firms. This suggests that better governed firms as measured by the GIM and BCF indices are *less* likely to experience disciplinary management turnover in spite of their poor performance. With respect to disciplining CEOs following poor firm performance, board independence appears to be an effective monitoring mechanism both before SOX and after SOX. It is important to note that we do not see the reversal post-SOX of the disciplining effect of board independence – in contrast to the performance-independence relation discussed above in Section 4.2.[20]

We also study the determinants of non-disciplinary CEO turnover. We do not expect any relation between good governance and non-disciplinary CEO turnover both unconditionally, and conditional on poor prior performance; untabulated results are consistent with this.

[18] The finding of the probability of disciplinary CEO turnover (given poor prior firm performance) increasing with greater board independence is consistent with the extant literature, for example, see Fich and Shivdasani (2005), and Weisbach (1988).

[19] The economic importance of the dollar ownership of the median director is greater than board independence. We calculate the predicted probability of disciplinary and non-disciplinary turnover, using the coefficient estimates from Table 9. When all parameters are measured at their mean values, the probability of disciplinary turnover is 2.28% with the dollar ownership of the median director as the governance variable; this increases to 12.55% when the (Past Return *x* Director $ Ownership) interaction term decreases by one standard deviation. The corresponding probabilities are 2.90% and 7.96% for board independence.

[20] Similar to footnote 19, we again consider the economic importance of the dollar ownership of the median director, and board independence in disciplining CEOs of poorly performing firms. We calculate the predicted probability of disciplinary turnover, using the coefficient estimates from Table 9. We find a significant increase in the predicted probability of disciplinary turnover for both governance measures (dollar ownership of the median director and board independence). This suggests that the disciplinary role of independent directors and board holdings has increased subsequent to passage of SOX. The increased disciplinary role of independent directors subsequent to SOX is a potential explanation for the positive stock market response to companies becoming compliant to SOX's board independence requirement as noted above in Section 5.

6.1. ROBUSTNESS CHECKS

We conduct three robustness checks: We highlight above the endogenous relationships among corporate governance, performance, capital structure, and corporate ownership structure. It is possible that management turnover and performance (and ownership) are also endogenous. To address turnover endogeneity we estimate a system of five equations: 1a, 1b, 1c, 1d, and 2b.[21] Motivated by the findings of Fich and Shivdasani (2006) we use percentage of board members who are on more than three boards as an instrument for CEO Turnover. The Stock-Yogo (2004) test, the Hahn and Hausman (2002) test and the Hansen-Sargan test suggest that this is an appropriate instrument. Results from taking turnover endogeneity into account are consistent with the disciplinary turnover results noted in Table 9.

Second, we compute the clustered (Rogers) standard errors for the coefficients in the CEO turnover model; the results are consistent with those reported in Table 9.

Third, it is possible that the board considers industry adjusted performance instead of firm performance in deciding whether to discipline the CEO. Results considering industry adjusted performance are similar to those reported above.

7. Conclusions

We study the impact of SOX on the relationship between corporate governance and company performance. A significant part of SOX and other exchange requirements increase the role of independent board members. Given that prior academic research suggests there is no positive relationship between board independence and firm performance, the above regulatory efforts are especially notable.

[21] Wooldridge (2002) cautions about the two-stage estimation procedure when the dependent variable in one of the equations is dichotomous. However, on the basis of the evidence in Angrist (2001) and Alvarez and Glasgow (1999) we interpret the signs of the two-stage estimates in the usual way.

We find a shift in the relationship between board independence and firm performance after 2002. Prior to 2002, we document a *negative* relationship between board independence and operating performance. After 2002, we find a *positive* relationship between independence and operating performance. We find this result is driven by firms that increase their number of independent directors. An event study provides independent evidence supportive of the above results – specifically, when a company goes from being non-compliant to being compliant with SOX's board independence requirement, the market response is significantly positive.

We find a consistent positive performance-governance relationship for director ownership. On average, the median director's stock ownership is 45 percent greater in 2003-2007 than it was in 1998-2001 – and the relationship between director ownership and firm performance is consistently positive for both sub-periods; this relationship is robust to a battery of specification tests. Hence, this study proposes a governance measure, namely – dollar ownership of the board members – that is simple, intuitive, less prone to measurement error, and not subject to the problem of weighting a multitude of governance provisions in constructing a governance index. Consideration of this governance measure by future researchers would enhance the comparability of research findings with more robust progress in governance research.

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TABLE 1

Descriptive statistics

This table presents the mean, median and standard deviation for the primary governance, performance and other variables. The statistics are presented for three time periods: the full sample 1998-2007 and the two subsamples, 1998-2001 and 2003-2007. The variables are as defined in the text. The number of observations refers to observations with *Independence* only; the other governance variables may have slightly more or less observations depending on availability.

	1998-2007 *(n=13,135)*			**1998-2001** *(n=5,230)*			**2003-2007** *(n=6,683)*		
	Mean	Median	Std Dev	Mean	Median	Std Dev	Mean	Median	Std Dev
Governance Variables									
Independence	67.03%	70.00%	17.28%	61.56%	63.64%	19.90%	71.95%	75.00%	14.55%
DirectorOwn	13.696	13.739	1.584	13.580	13.486	1.890	13.898	13.943	1.348
CEO-Duality	59.55%	100.00%	43.05%	59.46%	100.00%	40.75%	58.28%	100.00%	42.26%
G-Index	9.176	9.000	2.663	8.887	9.000	2.789	9.356	9.000	2.579
E-Index	2.210	2.000	1.298	2.029	2.000	1.325	2.332	2.000	1.269
Performance Variables									
ROA	12.50%	12.38%	8.11%	12.63%	12.85%	8.49%	13.02%	12.28%	7.75%
Return	13.20%	7.28%	38.00%	13.81%	1.95%	42.72%	17.82%	13.72%	32.87%
Q	1.999	1.522	1.018	2.200	1.472	1.119	1.957	1.594	0.961
Other Variables									
CEOOwn%	1.78%	0.00%	3.86%	3.53%	0.00%	4.63%	1.32%	0.00%	3.02%
Leverage	18.56%	16.14%	13.45%	20.15%	17.65%	13.84%	17.62%	15.19%	12.97%
FirmSize	7.671	7.508	1.676	7.480	7.294	1.659	7.876	7.699	1.674
R&DAdvExp	3.90%	0.97%	4.63%	4.06%	0.52%	4.63%	3.62%	1.16%	4.62%
BoardSize	9.251	9.000	2.873	9.265	9.000	3.340	9.381	9.000	2.529
InfoCost	11.20%	9.32%	5.48%	14.49%	12.41%	6.05%	8.27%	7.38%	3.89%
TreasStock	5.71%	0.28%	10.57%	6.07%	0.28%	9.78%	8.01%	0.31%	10.65%
Dir%Own	0.41%	0.05%	2.24%	0.40%	0.05%	5.36%	0.14%	0.51%	0.45%
Dir%CEOs	24.22%	22.22%	13.87%	26.53%	25.00%	16.11%	21.36%	20.00%	11.92%
Dir%15Ten	15.95%	11.11%	19.59%	16.37%	10.00%	20.98%	14.26%	11.11%	16.01%
CEOTenAge	0.135	0.095	0.119	0.153	0.108	0.122	0.129	0.093	0.109
MktBook	2.684	2.240	1.708	3.397	2.200	1.912	2.763	2.303	1.560
ZSscore	2.037	1.986	0.950	2.028	1.985	0.971	2.061	1.997	0.940

TABLE 2

Correlation coefficients

This table presents the correlation coefficients for the primary governance variables and other select variables. Pearson correlation coefficients are below the diagonal; Spearman rank correlation coefficients are above the diagonal. Panel A presents the coefficients for 1998-2001 and Panel B presents the coefficients for 2003-2007.

Panel A: Correlation coefficients, 1998-2001

-	*Independence*	*DirectorOwn*	*CEO-Duality*	*G-Index*	*E-Index*	*ROA*	*Return*	*Q*	*Ownership*	*Leverage*	*FirmSize*	*BoardSize*
Independence	-	-0.29	0.06	0.29	0.28	-0.04	0.01	-0.04	-0.17	0.06	0.15	0.13
DirectorOwn	-0.23	-	-0.04	-0.12	-0.14	0.13	0.19	0.45	0.20	-0.16	0.09	-0.09
CEO-Duality	0.05	-0.03	-	0.10	0.07	0.01	-0.02	-0.03	0.07	0.05	0.16	0.14
G-Index	0.27	-0.04	0.10	-	0.74	0.02	0.00	-0.07	-0.12	0.12	0.21	0.30
E-Index	0.28	-0.10	0.07	0.74	-	-0.02	-0.01	-0.10	-0.10	0.12	0.08	0.17
ROA	0.02	0.07	0.01	0.02	-0.03	-	0.18	0.48	0.12	-0.04	-0.12	-0.02
Return	-0.02	0.15	-0.01	-0.04	-0.03	0.09	-	0.29	0.05	-0.05	0.04	0.03
Q	-0.06	0.31	-0.02	-0.11	-0.13	0.00	0.28	-	0.07	-0.28	-0.09	-0.11
Ownership	-0.19	0.10	0.10	-0.14	-0.15	0.07	0.02	0.03	-	-0.12	-0.23	-0.21
Leverage	0.00	-0.08	0.03	0.06	0.06	0.00	-0.02	-0.20	-0.10	-	0.21	0.15
FirmSize	0.16	0.08	0.15	0.17	0.05	0.08	-0.03	-0.12	-0.12	0.11	-	0.58
BoardSize	0.14	-0.04	0.14	0.24	0.13	0.07	-0.04	-0.12	-0.12	0.05	0.59	-

Panel B: Correlation coefficients, 2003-2007

-	*Independence*	*DirectorOwn*	*CEO-Duality*	*G-Index*	*E-Index*	*ROA*	*Return*	*Q*	*Ownership*	*Leverage*	*FirmSize*	*BoardSize*
Independence	-	-0.18	0.10	0.18	0.17	-0.04	-0.03	-0.04	-0.10	0.09	0.17	0.12
DirectorOwn	-0.17	-	-0.04	-0.09	-0.07	0.21	0.12	0.40	0.05	-0.13	0.13	-0.03
CEO-Duality	0.09	-0.05	-	0.11	0.07	-0.02	0.06	-0.06	0.06	0.06	0.14	0.05
G-Index	0.18	-0.07	0.11	-	0.71	-0.02	0.05	-0.10	-0.10	0.12	0.16	0.25
E-Index	0.18	-0.07	0.07	0.70	-	-0.07	0.04	-0.10	-0.05	0.09	0.02	0.12
ROA	-0.04	0.17	-0.02	-0.02	-0.07	-	0.11	0.61	-0.02	-0.08	-0.18	-0.12
Return	-0.05	0.08	0.03	0.02	0.02	0.08	-	0.21	0.01	0.00	0.02	0.00
Q	-0.04	0.31	-0.05	-0.09	-0.11	0.47	0.21	-	0.03	-0.34	-0.25	-0.21
Ownership	-0.15	0.01	0.07	-0.14	-0.14	0.04	-0.02	0.04	-	-0.10	-0.29	-0.24
Leverage	0.06	-0.09	0.03	0.08	0.06	-0.05	-0.03	-0.26	-0.08	-	0.30	0.22
FirmSize	0.16	0.10	0.14	0.12	0.00	-0.13	-0.04	-0.22	-0.15	0.20	-	0.61
BoardSize	0.09	0.01	0.05	0.21	0.10	-0.11	-0.05	-0.19	-0.14	0.11	0.61	-

TABLE 3

Governance and performance, equation (1a)

This table presents the results from estimating equation (1a), the performance equation. Five different specifications are presented with five different governance variables: *Independence,* board independence; *DirectorOwn,* the dollar value of the median director's stock ownership; *CEO-Duality*, whether or not the CEO is also the board chair; *G-Index,* the Gompers, Ishii and Metrick (2003) Governance Index; and, *E-Index*, the Bebchuk, Cohen and Ferrell Entrenchment index. *ROA,* return on assets in the current period is used as the measure of performance. All other variables are as defined in the text. Panel A presents the results using Ordinary Least Squares (OLS) for the 1998-2001 period; Panel B presents the results using Two-Stage Least Squares (2SLS) for the 1998-2001 period. Panel C presents the results using OLS for the 2003-2007 period; Panel D presents the results using 2SLS for the 2003-2007 period. An intercept and year and industry dummy variables are included but not presented. Standard errors are clustered by firm. Coefficients are presented with *p*-values below in parentheses.

Panel A: Ordinary least squares estimation, 1998-2001

	Dependent Variable: Return on Assets (ROA_t)				
	$Independence_t$	$DirectorOwn_t$	$CEO\text{-}Duality_t$	$G\text{-}Index_t$	$E\text{-}Index_t$
$Governance_t$	-0.027	0.015	-0.003	-0.001	-0.006
	(0.01)	*(0.00)*	*(0.57)*	*(0.54)*	*(0.00)*
$Ownership_t$	-0.001	-0.001	0.000	-0.001	-0.001
	(0.80)	*(0.38)*	*(0.59)*	*(0.93)*	*(0.51)*
$Leverage_t$	-0.123	-0.105	-0.122	-0.133	-0.131
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
Industry $Performance_t$	0.575	0.565	0.576	0.590	0.588
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
$FirmSize_t$	-0.003	-0.007	-0.003	-0.002	-0.003
	(0.11)	*(0.00)*	*(0.11)*	*(0.15)*	*(0.07)*
$R\&DAdvExp_t$	-0.895	-0.940	-0.897	-0.890	-0.898
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
$BoardSize_t$	-0.003	-0.002	-0.003	-0.003	-0.003
	(0.00)	*(0.05)*	*(0.00)*	*(0.00)*	*(0.00)*
$InfoCost_t$	-0.076	-0.094	-0.074	-0.053	-0.059
	(0.00)	*(0.00)*	*(0.00)*	*(0.06)*	*(0.04)*
$TreasStock_t$	0.263	0.266	0.263	0.261	0.261
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
# of Observations	5,156	4,665	5,156	4,566	4,566

Panel B: Two-stage least squares estimation, 1998-2001

	Dependent Variable: Return on Assets (ROA_t)				
	$Independence_t$	$DirectorOwn_t$	$CEO\text{-}Duality_t$	$G\text{-}Index_t$	$E\text{-}Index_t$
$Governance_t$	-0.739	0.028	-0.167	-0.097	-0.196
	(0.00)	*(0.02)*	*(0.00)*	*(0.00)*	*(0.00)*
$Ownership_t$	-0.014	-0.008	-0.001	-0.016	-0.014
	(0.00)	*(0.01)*	*(0.10)*	*(0.00)*	*(0.00)*
$Leverage_t$	-0.205	-0.200	-0.202	-0.213	-0.274
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
Industry $Performance_t$	0.714	0.694	0.694	0.791	0.708
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
$FirmSize_t$	0.015	0.006	0.002	0.006	-0.003
	(0.00)	*(0.33)*	*(0.00)*	*(0.30)*	*(0.67)*
$R\&DAdvExp_t$	-0.689	-0.753	-0.658	-0.910	-0.795
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
$BoardSize_t$	-0.008	-0.006	-0.005	0.002	-0.004
	(0.00)	*(0.01)*	*(0.04)*	*(0.68)*	*(0.20)*
$InfoCost_t$	-0.226	-0.198	-0.190	-0.390	-0.251
	(0.00)	*(0.01)*	*(0.01)*	*(0.00)*	*(0.01)*
$TreasStock_t$	0.367	0.364	0.389	0.368	0.329
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
# of Observations	5,156	4,665	5,156	4,566	4,566

Panel C: Ordinary least squares estimation, 2003-2007

	Dependent Variable: Return on Assets (ROA_t)				
	$Independence_t$	$DirectorOwn_t$	$CEO\text{-}Duality_t$	$G\text{-}Index_t$	$E\text{-}Index_t$
$Governance_t$	0.014	0.015	-0.001	-0.001	-0.004
	(0.14)	*(0.00)*	*(0.65)*	*(0.07)*	*(0.00)*
$Ownership_t$	0.000	0.000	0.000	0.000	0.000
	(0.05)	*(0.07)*	*(0.02)*	*(0.08)*	*(0.17)*
$Leverage_t$	-0.042	-0.021	-0.042	-0.042	-0.041
	(0.00)	*(0.01)*	*(0.00)*	*(0.00)*	*(0.00)*
Industry $Performance_t$	0.478	0.461	0.477	0.470	0.468
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
$FirmSize_t$	-0.003	-0.006	-0.003	-0.003	-0.004
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
$R\&DAdvExp_t$	-0.202	-0.242	-0.204	-0.199	-0.203
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
$BoardSize_t$	-0.003	-0.002	-0.003	-0.003	-0.002
	(0.00)	*(0.01)*	*(0.00)*	*(0.00)*	*(0.00)*
$InfoCost_t$	0.456	-0.414	-0.454	-0.460	-0.464
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
$TreasStock_t$	0.147	0.147	0.147	0.147	0.147
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
# of Observations	6,515	6,377	6,515	7,665	7,665

Panel D: Two-stage least squares estimation, 2003-2007

	Dependent Variable: Return on Assets (ROA_t)				
	$Independence_t$	$DirectorOwn_t$	$CEO\text{-}Duality_t$	$G\text{-}Index_t$	$E\text{-}Index_t$
$Governance_t$	0.178	0.006	-0.029	0.014	-0.493
	(0.01)	*(0.03)*	*(0.04)*	*(0.16)*	*(0.05)*
$Ownership_t$	0.002	0.000	0.001	0.001	0.018
	(0.05)	*(0.16)*	*(0.15)*	*(0.18)*	*(0.06)*
$Leverage_t$	-0.671	-0.656	-0.649	-0.673	-0.030
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.09)*
Industry $Performance_t$	0.537	0.537	0.537	0.544	0.501
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.07)*
$FirmSize_t$	0.005	-0.007	0.008	-0.008	-0.072
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.08)*
$R\&DAdvExp_t$	-0.481	-0.453	-0.456	-0.396	-0.500
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.01)*
$BoardSize_t$	-0.003	-0.001	-0.001	-0.003	-0.031
	(0.28)	*(0.27)*	*(0.37)*	*(0.09)*	*(0.07)*
$InfoCost_t$	-0.266	-0.305	-0.313	-0.212	-0.288
	(0.00)	*(0.00)*	*(0.00)*	*(0.01)*	*(0.03)*
$TreasStock_t$	0.156	0.163	0.165	0.156	0.150
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.01)*
# of Observations	6,515	6,377	6,515	7,665	7,665

TABLE 4

Governance and performance, equation (1a), by sub-period

This table presents the results from estimating equation (1a), the performance equation, across two different time periods: 1998-2001 and 2003-2007. Only the coefficient and *p*-value associated with the *Governance* variable in equation (1a) is presented. Five different specifications are presented with five different governance variables: *Independence,* board independence; *DirectorOwn,* the dollar value of the median director's stock ownership; *CEO-Duality*, whether or not the CEO is also the board chair; *G-Index,* the Gompers, Ishii and Metrick (2003) Governance Index; and, *E-Index*, the Bebchuk, Cohen and Ferrell (2009) Entrenchment index. Only the coefficient on the *Governance* variable in equation (1a) is presented. Three different measures of performance are estimated: *ROA*, return on assets, *Return,* stock return, and *Q,* Tobin's Q. Performance is measured in three different time periods: *t, t+1, t+2*. All other variables are as defined in the text. Ordinary Least Squares (OLS) and Two-Stage Least Squares (2SLS) results are both presented. An intercept and year and industry dummy variables are included but not presented. Standard errors are clustered by firm. Coefficients are presented with *p*-values below in parentheses.

	Dependent Variable: Contemporaneous Performance				**Dependent Variable: Next Year's Performance**				**Dependent Variable: Next Two Years' Performance**			
	1998-2001		**2003-2007**		**1998-2001**		**2003-2007**		**1998-2001**		**2003-2007**	
	OLS	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**	**OLS**	**2SLS**
Independence$_t$												
ROA	-0.027	-0.739	0.014	0.178	-0.043	-0.401	0.019	0.116	-0.020	-0.081	0.016	0.013
	(0.01)	*(0.00)*	*(0.14)*	*(0.01)*	*(0.00)*	*(0.00)*	*(0.03)*	*(0.10)*	*(0.00)*	*(0.06)*	*(0.00)*	*(0.10)*
Return	-0.051	-0.352	0.021	-0.180	-0.033	-0.594	0.017	-0.129	-0.037	-0.357	0.008	-0.047
	(0.33)	*(0.27)*	*(0.56)*	*(0.39)*	*(0.61)*	*(0.13)*	*(0.60)*	*(0.47)*	*(0.21)*	*(0.05)*	*(0.59)*	*(0.61)*
Q	-0.537	-0.641	-0.250	0.351	-0.457	1.319	-0.269	0.833	-0.317	-2.210	-0.393	0.613
	(0.00)	*(0.55)*	*(0.06)*	*(0.19)*	*(0.01)*	*(0.32)*	*(0.13)*	*(0.23)*	*(0.07)*	*(0.05)*	*(0.33)*	*(0.14)*
# of Observations	5,156	5,156	6,515	6,515	4,537	4,537	5,738	5,738	3,354	3,354	4,558	4,558
DirectorOwn$_t$												
ROA	0.015	0.028	0.015	0.006	0.008	0.034	0.012	0.004	0.004	0.010	0.003	0.003
	(0.00)	*(0.02)*	*(0.00)*	*(0.03)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.13)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.07)*
Return	0.061	0.046	0.025	0.021	0.006	0.073	0.018	0.012	0.003	0.029	0.009	0.003
	(0.00)	*(0.03)*	*(0.00)*	*(0.10)*	*(0.41)*	*(0.00)*	*(0.28)*	*(0.28)*	*(0.35)*	*(0.09)*	*(0.11)*	*(0.26)*
Q	0.417	0.345	0.286	-0.033	0.308	0.452	0.234	0.015	0.174	0.250	0.142	0.142
	(0.00)	*(0.00)*	*(0.00)*	*(0.54)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.44)*	*(0.00)*	*(0.18)*	*(0.12)*	*(0.18)*
# of Observations	4,665	4,665	6,377	6,377	4,537	4,537	5,738	5,738	2,976	2,976	4,300	4,300

CEO-Duality$_t$												
ROA	-0.003	-0.167	-0.001	-0.029	-0.003	-0.094	-0.003	-0.024	-0.003	-0.023	-0.003	-0.005
	(0.57)	*(0.00)*	*(0.65)*	*(0.04)*	*(0.43)*	*(0.00)*	*(0.41)*	*(0.12)*	*(0.30)*	*(0.02)*	*(0.06)*	*(0.37)*
Return	-0.034	-0.088	-0.009	-0.019	-0.024	-0.193	-0.007	-0.027	-0.021	-0.950	-0.007	-0.012
	(0.18)	*(0.22)*	*(0.46)*	*(0.61)*	*(0.45)*	*(0.03)*	*(0.58)*	*(0.50)*	*(0.15)*	*(0.02)*	*(0.28)*	*(0.56)*
Q	-0.077	-0.243	-0.062	0.028	-0.121	-0.297	-0.082	0.091	0.058	-0.199	-0.048	-0.409
	(0.28)	*(0.27)*	*(0.18)*	*(0.86)*	*(0.17)*	*(0.28)*	*(0.09)*	*(0.59)*	*(0.50)*	*(0.45)*	*(0.50)*	*(0.21)*
# of Observations	5,156	5,156	6,515	6,515	4,537	4,537	5,738	5,738	3,354	3,354	4,558	4,558
G-Index$_t$												
ROA	-0.001	-0.097	-0.001	0.014	0.002	-0.040	-0.007	0.035	-0.001	-0.019	-0.001	0.014
	(0.54)	*(0.00)*	*(0.07)*	*(0.16)*	*(0.00)*	*(0.04)*	*(0.15)*	*(0.00)*	*(0.01)*	*(0.03)*	*(0.30)*	*(0.39)*
Return	-0.001	-0.049	0.003	-0.015	0.006	-0.106	-0.003	-0.006	-0.003	-0.073	0.001	0.007
	(0.82)	*(0.28)*	*(0.11)*	*(0.52)*	*(0.13)*	*(0.05)*	*(0.06)*	*(0.72)*	*(0.23)*	*(0.06)*	*(0.25)*	*(0.53)*
Q	-0.047	-0.583	-0.027	0.138	-0.031	-0.248	-0.020	0.144	-0.016	-0.150	-0.011	0.018
	(0.00)	*(0.00)*	*(0.00)*	*(0.18)*	*(0.00)*	*(0.05)*	*(0.00)*	*(0.08)*	*(0.19)*	*(0.39)*	*(0.40)*	*(0.90)*
# of Observations	4,566	4,566	7,665	7,665	3,758	3,758	6,733	6,733	2,909	2,909	5,479	5,479
E-Index$_t$												
ROA	-0.006	-0.196	-0.004	-0.493	-0.004	-0.247	-0.004	-0.126	-0.003	-0.047	-0.001	0.067
	(0.00)	*(0.00)*	*(0.00)*	*(0.05)*	*(0.00)*	*(0.01)*	*(0.00)*	*(0.17)*	*(0.00)*	*(0.03)*	*(0.02)*	*(0.01)*
Return	0.000	-0.118	0.007	-0.156	0.007	-0.488	0.007	-0.189	0.003	-0.176	0.004	-0.020
	(0.99)	*(0.28)*	*(0.10)*	*(0.24)*	*(0.48)*	*(0.04)*	*(0.30)*	*(0.26)*	*(0.54)*	*(0.05)*	*(0.05)*	*(0.68)*
Q	-0.135	-0.202	-0.072	0.383	-0.149	-2.428	-0.070	0.977	-0.074	-0.953	-0.059	-0.395
	(0.00)	*(0.00)*	*(0.00)*	*(0.21)*	*(0.00)*	*(0.01)*	*(0.00)*	*(0.17)*	*(0.01)*	*(0.05)*	*(0.28)*	*(0.12)*
# of Observations	4,566	4,566	7,665	7,665	3,758	3,758	6,733	6,733	2,909	2,909	5,479	5,479

TABLE 5

Governance and performance, equation (1a), by change in independent directors

This table presents the results from estimating equation (1a), the performance equation, across the two different time periods, 1998-2001 and 2003-2007, for two unique sub-samples: those firms that increased their number of independent directors and those that did not. Five different specifications are presented with five different governance variables: *Independence,* board independence; *DirectorOwn,* the dollar value of the median director's stock ownership; *CEO-Duality*, whether or not the CEO is also the board chair; *G-Index,* the Gompers, Ishii and Metrick (2003) Governance Index; and, *E-Index*, the Bebchuk, Cohen and Ferrell Entrenchment index. Only the coefficient on the *Governance* variable in equation (1a) is presented. Return on assets, *ROA,* is the measure of performance. Panel A shows the results for the subsample of firms that *increased* the number of independent directors on its board; Panel B shows the results for the subsample of firms that *did not increase* the number of independent directors on its board. All other variables are as defined in the text. Only Two-Stage Least Squares (2SLS) results are presented. An intercept and year and industry dummy variables are included but not presented. Standard errors are clustered by firm. Coefficients are presented with *p*-values below in parentheses.

Panel A: Increase in number of independent directors

	Dependent Variable: Contemporaneous *ROA*		**Dependent Variable: Next Year's *ROA***		**Dependent Variable: Next Two Years' *ROA***	
	1998-2001	**2003-2007**	**1998-2001**	**2003-2007**	**1998-2001**	**2003-2007**
$Independence_t$	-0.412	0.509	-0.583	0.114	-0.052	0.177
	(0.10)	*(0.00)*	*(0.00)*	*(0.10)*	*(0.29)*	*(0.03)*
# of Observations	1,344	2,066	1,187	1,982	887	1,588
$DirectorOwn_t$	0.018	0.001	0.017	0.009	0.011	0.007
	(0.03)	*(0.01)*	*(0.00)*	*(0.00)*	*(0.12)*	*(0.02)*
# of Observations	1,283	1,967	1,160	1,871	863	1,454
$CEO\text{-}Duality_t$	-0.087	-0.004	-0.092	0.000	-0.012	-0.075
	(0.18)	*(0.84)*	*(0.01)*	*(0.98)*	*(0.52)*	*(0.00)*
# of Observations	1,344	2,066	1,187	1,982	887	1,588
$G\text{-}Index_t$	-0.053	0.040	0.010	-0.047	0.005	-0.033
	(0.13)	*(0.08)*	*(0.27)*	*(0.00)*	*(0.56)*	*(0.01)*
# of Observations	1,208	2,015	1,085	1,958	793	1,621
$E\text{-}Index_t$	-0.063	-0.567	-0.169	-0.004	-0.008	-0.071
	(0.32)	*(0.27)*	*(0.00)*	*(0.00)*	*(0.58)*	*(0.03)*
# of Observations	1,208	2,015	1,085	1,958	793	1,621

Panel B: No Increase in number of independent directors

	Dependent Variable: Contemporaneous *ROA*		Dependent Variable: Next Year's *ROA*		Dependent Variable: Next Two Years' *ROA*	
	1998-2001	**2003-2007**	**1998-2001**	**2003-2007**	**1998-2001**	**2003-2007**
$Independence_t$	-0.230	-0.077	-0.133	0.181	-0.085	0.074
	(0.01)	*(0.40)*	*(0.03)*	*(0.23)*	*(0.01)*	*(0.02)*
# of Observations	3,812	4,449	3,350	3,756	2,468	2,970
$DirectorOwn_t$	0.018	0.019	0.015	0.024	0.005	0.010
	(0.00)	*(0.08)*	*(0.01)*	*(0.02)*	*(0.04)*	*(0.00)*
# of Observations	3,382	4,410	2,945	3,656	2,113	2,847
$CEO\text{-}Duality_t$	-0.061	-0.023	-0.217	-0.116	-0.048	-0.038
	(0.00)	*(0.18)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.01)*
# of Observations	3,812	4,449	3,350	3,756	2,468	2,970
$G\text{-}Index_t$	-0.036	0.039	0.041	0.019	-0.016	0.029
	(0.02)	*(0.10)*	*(0.00)*	*(0.07)*	*(0.04)*	*(0.00)*
# of Observations	3,358	5,650	2,673	4,775	2,115	3,858
$E\text{-}Index_t$	-0.064	-0.161	0.032	0.145	-0.032	0.217
	(0.03)	*(0.06)*	*(0.29)*	*(0.17)*	*(0.02)*	*(0.15)*
# of Observations	3,358	5,650	2,673	4,775	2,115	3,858

TABLE 6

Two endogenous governance variables

This table presents the results from estimating a modified version of equation (1a), the performance equation, across two different time periods: 1998-2001 and 2003-2007. A fifth equation is added to equation (1) for a second endogenous governance variable. *Independence,* board independence, is presumed to be endogenous in one equation, and *DirectorOwn,* is included as a second endogenous governance variable in a separate equation. Only the coefficients on the two *Governance* variables in equation (1a) are presented. Three measures of operating performance are considered: contemporaneous ROA, next year's ROA, and next two years' ROA. Two-Stage Least Squares (2SLS) results are presented. An intercept and year and industry dummy variables are included but not presented. Standard errors are clustered by firm. Coefficients are presented with *p*-values below in parentheses.

	Dependent Variable: Contemporaneous *ROA*		**Dependent Variable: Next Year's *ROA***		**Dependent Variable: Next Two Years' *ROA***	
	1998-2001	**2003-2007**	**1998-2001**	**2003-2007**	**1998-2001**	**2003-2007**
$DirectorOwn_t$	0.010	0.199	0.009	0.012	0.004	0.002
	(0.03)	*(0.03)*	*(0.00)*	*(0.17)*	*(0.00)*	*(0.00)*
$Independence_t$	-0.325	0.480	-0.015	0.391	-0.006	0.009
	(0.03)	*(0.04)*	*(0.15)*	*(0.02)*	*(0.37)*	*(0.02)*
# of Observations	4,492	6,035	2,515	5,332	1,861	4,217

TABLE 7
Event study results

This table presents the results from event studies performed on a sample of firms that were not compliant with Section 301 of SOX in year *t-1*. Section 301 requires that all members of a firm's audit committee be independent. Market Adjusted Cumulative Abnormal Returns (CAR) are calculated for days -1, 0 and +1 for years 2002 and 2003; day 0 being the proxy mailing date in year *t*. The value weighted market is used as the market index. Two sub-samples are considered: (a) firms that were not compliant in year *t-1* and became compliant in year *t* in columns (1) to (5); and, (b) firms that were not compliant in both year *t-1* and year *t* in columns (6) to (10). Firms audit committees consisting only of independent directors are denoted as "Compliant." Firms whose audit committees do not consist only of independent directors are denoted as "Not Compliant." Panel A presents results from only firms that became SOX compliant and added independent directors to the board; Panel B presents the results from all firms that became SOX compliant. The non-parametric test is the Wilcoxon signed-rank test. The "Difference in means" in the last column tests for the difference in CAR between columns (1) and (6).

Panel A: Firms that became compliant and added independent directors to the audit committee.

	Not Compliant in year *t-1* Compliant in year *t*					**Not Compliant in year *t-1* Not Compliant in year *t***					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(1) - (6)
Period	**CAR**	**z-statistic**	**Sample Size**	**Postive: Negative Returns**	**Non-parametric statistic**	**CAR**	**z-statistic**	**Sample Size**	**Postive: Negative Returns**	**Non-parametric statistic**	**Difference in means, *p*-value**
Post-SOX	0.41%	2.436	478	261:217	2.413	0.02%	0.075	691	321:370	-1.567	<0.0001
2002	0.97%	1.801	67	36:31	1.151	-0.20%	-0.680	256	119:137	-0.594	<0.0001
2003	0.86%	1.939	99	59:40	1.231	-0.08%	-1.233	219	101:118	-1.641	<0.0001
2004	0.27%	1.685	93	54:39	0.921	0.26%	0.298	150	67:83	0.698	0.1214
2005	0.61%	1.907	70	36:34	1.354	0.16%	0.768	130	69:61	0.266	<0.0001
2006	0.49%	0.771	38	20:18	0.854	-0.07%	-1.147	127	55:72	-0.698	<0.0001
2007	0.30%	0.754	166	86:80	0.240	-0.73%	-0.989	19	7:12	-1.062	<0.0001

Panel B: Firms that became compliant by adding independent directors to the audit committee, or removing inside directors from the audit committee.

	Not Compliant in year *t-1* Compliant in year *t*					**Not Compliant in year *t-1* Not Compliant in year *t***					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(1) - (6)
Period	**CAR**	**z-statistic**	**Sample Size**	**Postive: Negative Returns**	**Non-parametric statistic**	**CAR**	**z-statistic**	**Sample Size**	**Postive: Negative Returns**	**Non-parametric statistic**	**Difference in means, *p*-value**
Post-SOX	0.36%	2.841	671	367:304	2.386	0.02%	0.075	691	321:370	-1.567	<0.0001
2002	1.03%	1.725	89	50:39	1.137	-0.20%	-0.680	256	119:137	-0.594	<0.0001
2003	0.56%	2.087	158	92:66	1.612	-0.08%	-1.233	219	101:118	-1.641	<0.0001
2004	0.24%	2.269	149	87:62	1.876	0.26%	0.298	150	67:83	0.698	0.3716
2005	0.26%	1.255	97	50:47	1.299	0.16%	0.768	130	69:61	0.266	0.0008
2006	0.69%	1.646	57	32:25	0.602	-0.07%	-1.147	127	55:72	-0.698	<0.0001
2007	0.13%	0.781	194	100:94	0.005	-0.73%	-0.989	19	7:12	-1.062	<0.0001

TABLE 8

Reasons for CEO turnover

This table presents the classifications for reasons why CEO turnover occurred in a specific year. Lexis-Nexis archives were reviewed to determine the stated reason for why a CEO left the firm. CEO turnover data was obtained from Compustat's Execucomp database. CEO Turnover is classified as "Non-disciplinary" if the CEO died, if the CEO was older than 63, if the change was the result of an announced transition plan, or if the CEO stayed on as chairman of the board. CEO Turnover is classified as "Disciplinary" if the CEO resigned to pursue other interests, if the CEO was fired, or if no specific reason is given.

	Reasons for CEO Turnover: 1998 - 2007			
	Disciplinary	Non-Disciplinary	Other	Total
1998	65	118	18	201
1999	66	127	5	198
2000	92	143	9	244
2001	86	162	7	255
2002	81	100	1	182
2003	82	94	3	179
2004	49	122	3	174
2005	73	135	2	210
2006	61	126	0	187
2007	46	73	2	121
Total	**701**	**1,200**	**50**	**1,951**
% of Total	35.9%	61.5%	2.6%	100%

TABLE 9

CEO turnover-governance relation

This table presents the results from multinomial logistic regressions estimating the probability of CEO Turnover. The dependent variables are type of CEO turnover: 1 = Disciplinary turnover, 2 = Non-disciplinary turnover, 0 = no turnover. Baseline results without governance are presented in the first column; all other columns present results including Governance and (Performance *x* Governance) variables. The other control variables are described in the text 1. Year dummy variables are included but are not shown. Panel A presents the results for disciplinary turnover for 1998-2001; Panel B presents the results for disciplinary turnover for 2003-2007. Sample size refers to the entire sample for the particular period, and not just to cases of disciplinary turnover and non-disciplinary turnover.

Panel A: Disciplinary turnover, 1998-2001

		Governance Variable				
	Baseline Performance	*Independent*$_t$	*DirectorOwn*$_t$	*CEO-Duality*$_t$	*G-Index*$_t$	*E-Index*$_t$
Intercept	-3.330	-3.268	-4.000	-3.310	-2.978	-3.170
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
Return$_{t-2\ to\ t-1}$	-1.576	-0.486	-2.443	-0.956	-1.277	-1.483
	(0.00)	*(0.59)*	*(0.27)*	*(0.06)*	*(0.20)*	*(0.01)*
IndustryReturn$_{t-2\ to\ t-1}$	0.452	0.454	0.531	0.443	0.512	0.543
	(0.20)	*(0.19)*	*(0.12)*	*(0.21)*	*(0.14)*	*(0.12)*
Governance$_t$	-	-0.140	0.045	-0.513	-0.030	0.001
	-	*(0.22)*	*(0.42)*	*(0.01)*	*(0.36)*	*(0.99)*
***Return*$_{t-2\ to\ t-1}$ x *Governance*$_t$**	**-**	**-1.784**	**-0.044**	**-0.929**	**-0.004**	**-0.119**
	-	***(0.07)***	***(0.08)***	***(0.12)***	***(0.85)***	***(0.60)***
CEOOwn%$_t$	-0.119	-0.121	-0.121	-0.118	-0.114	-0.111
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
FirmSize$_t$	-0.093	-0.090	-0.094	-0.059	-0.077	-0.082
	(0.09)	*(0.10)*	*(0.09)*	*(0.30)*	*(0.17)*	*(0.14)*
CEOAge$_{t-1}$	0.020	0.020	0.021	0.022	0.015	0.014
	(0.12)	*(0.11)*	*(0.10)*	*(0.08)*	*(0.23)*	*(0.27)*
CEOTenure$_{t-1}$	-0.025	-0.026	-0.027	-0.025	-0.020	-0.019
	(0.07)	*(0.07)*	*(0.06)*	*(0.08)*	*(0.15)*	*(0.18)*
Years Included	1998-2001	1998-2001	1998-2001	1998-2001	1998-2001	1998-2001
Sample Size	4,257	4,257	4,228	4,257	4,075	4,075

Panel B: Disciplinary turnover, 2003-2007

		Governance Variable				
	Baseline Performance	*Independent*$_t$	*DirectorOwn*$_t$	*CEO-Duality*$_t$	*G-Index*$_t$	*E-Index*$_t$
Intercept	-0.978	-14.468	-11.677	-13.555	-12.921	-12.879
	(0.98)	*(0.87)*	*(0.90)*	*(0.88)*	*(0.88)*	*(0.88)*
Return$_{t-2\ to\ t-1}$	-3.510	-0.712	-0.161	-2.942	0.628	-2.194
	(0.00)	*(0.83)*	*(0.92)*	*(0.00)*	*(0.72)*	*(0.03)*
IndustryReturn$_{t-2\ to\ t-1}$	0.344	0.456	0.542	0.491	0.337	0.309
	(0.05)	*(0.49)*	*(0.41)*	*(0.46)*	*(0.58)*	*(0.61)*
Governance$_t$	-	1.935	-0.121	-0.948	-0.009	-0.025
	-	*(0.14)*	*(0.26)*	*(0.10)*	*(0.83)*	*(0.76)*
Return$_{t-2\ to\ t-1}$ **x** ***Governance***$_t$	-	**-3.726**	**-0.248**	**-1.407**	**-0.519**	**-0.777**
	-	***(0.09)***	***(0.05)***	***(0.21)***	***(0.01)***	***(0.03)***
CEOOwn%$_t$	-0.205	-0.230	-0.221	-0.206	-0.289	-0.285
	(0.04)	*(0.08)*	*(0.09)*	*(0.11)*	*(0.03)*	*(0.04)*
FirmSize$_t$	0.079	0.074	0.101	0.145	0.103	0.105
	(0.14)	*(0.23)*	*(0.10)*	*(0.02)*	*(0.06)*	*(0.06)*
CEOAge$_{t-1}$	0.056	0.068	0.067	0.078	0.059	0.058
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*
CEOTenure$_{t-1}$	-0.030	-0.036	-0.039	-0.029	-0.035	-0.034
	(0.07)	*(0.07)*	*(0.04)*	*(0.12)*	*(0.05)*	*(0.05)*
Years Included	2003-2007	2003-2007	2003-2007	2003-2007	2003-2007	2003-2007
Sample Size	6,410	5,547	5,501	5,547	5,876	5,876

Appendix A: Endogeneity and Instrument Validity Tests

Hausman (1978) test for endogeneity – This tests for differences between the OLS and IV estimates. The test statistic normalizes the differences in coefficients by the differences in standard errors. Large differences between OLS and IV will result in large test statistics and low p-values, suggesting that endogeneity is a problem and that the IV results are more consistent than OLS results.

Stock and Yogo (2004) test for weak instruments – This test evaluates the strength of the first stage regression by considering the *F*-statistic of the reduced form first stage regression of excluded instruments. High *F*-statistics and low p-values suggest strong instruments.

Hahn and Hausman (2002) test for instrument validity – This test is a variation of the Hausman (1978) test for endogeneity, applied to the instruments rather than the specification. This test compares the 'forward' and 'reverse' IV estimates. If the instruments are valid, the difference between the 'forward' and the inverse of the 'reverse' estimates should be small, leading to large test statistics and small p-values.

Cragg-Donald (1993) – This is a test of underidentification. The Stock and Yogo (2004) test was, in part, derived from this test. If the Cragg-Donald *F*-statistic is below the critical value, or the p-value is high, the instruments are deemed to be weak.

Hansen-Sargan – This is a test for overidentifying restrictions, testing the joint significance of the set of endogenous variables in the system of equations. It has a Chi-square distribution (with degrees of freedom equal to the number of instruments minus the number of parameters), and the null hypothesis is that the instruments are valid. Large p-values suggest that the instruments are valid.

Anderson-Rubin – This is a test of the joint significance of a set of endogenous variables in a system of equations. It tests for the joint significance of the excluded instruments by essentially substituting the first-stage reduced-form equations into the second-stage structural equations. The test statistic has a Chi-square distribution; large test statistics and small p-values suggest instrument validity and joint significance of the system.

Shea (1997) Partial R^2 – This test provides the partial R^2 for the excluded instruments on the fitted value of the endogenous regressors. Higher partial R^2 values are deemed to represent valid instruments, although there is no formal test statistic.

Instruments: For each governance variable, we utilize two of three instruments for our governance variables. *Dir%Own* is the average percentage of common stock owned by all directors. *Dir%CEOs* is the percentage of directors who are CEOs. *Dir%15Ten* is the percentage of directors who have served on the board form at least 15 years. *Dir%Own* is used as an instrument for all governance variables. *Dir%CEOs* is used as an instrument for *Independence, DirectorOwn,* and *CEO-Duality; Dir%15Ten* is used as an instrument for *G-Index* and *E-Index*.

TreasStock is the ratio of treasury stock to assets, which we use as the instrument for performance. *CEOTenAge* is the ratio of CEO tenure to CEO age; this variable is used as the instrument for ownership. *ZScore* is the modified Altman's Z-Score; this variable is used as the instrument for leverage

APPENDIX A TABLE

Endogeneity and instrument validity tests

This table presents the results from performing our endogeneity and weak instruments tests in estimating equation (1a). The p-values from each test are given. Brief descriptions of each test are given above. The results are given considering 5 different measures of governance, and considering 3 different time periods for measuring operating performance: Contemporaneous ROA, Next Year's ROA, and Next Two Years' ROA. The governance variables are Board Independence, Median Director Dollar Ownership, Gompers, Ishii and Metrick (2003) G-Index, and Bebchuk, Cohen and Ferrell (2009) E-Index. The Hausman (1978) is a test for endogeneity, comparing the OLS and IV results; the other tests in this table are various forms of evaluating the strength and/or relevance of the instruments used in the instrumental variables analyses. For the Stock and Yogo (2004) test and the Shea Partial R^2, the p-values are given for each first-stage equation. For the other tests, the p-value pertains to the entire system.

	Dependent Variable: Contemporaneous *ROA*		**Dependent Variable: Next Year's *ROA***		**Dependent Variable: Next Two Years' *ROA***	
	1998-2001	**2003-2007**	**1998-2001**	**2003-2007**	**1998-2001**	**2003-2007**
***Independence*$_t$**						
Hausman Test	0.004	0.002	0.007	0.002	0.005	0.003
Stock & Yogo						
Governance	0.007	0.004	0.013	0.012	0.016	0.023
Ownership	0.019	0.004	0.037	0.006	0.047	0.012
Leverage	0.046	0.113	0.020	0.010	0.036	0.054
Hahn & Hausman	0.020	0.043	0.006	0.025	0.048	0.001
Cragg-Donald	0.001	0.004	0.012	0.007	0.009	0.007
Hansen-Sargan	0.847	0.902	0.473	0.605	0.352	0.506
Anderson-Rubin	0.036	0.039	0.025	0.045	0.059	0.054
Shea Partial R^2						
Governance	0.231	0.404	0.264	0.244	0.187	0.277
Ownership	0.330	0.360	0.220	0.302	0.143	0.189
Leverage	0.308	0.332	0.264	0.302	0.220	0.291

	Dependent Variable: Contemporaneous *ROA*		Dependent Variable: Next Year's *ROA*		Dependent Variable: Next Two Years' *ROA*	
	1998-2001	**2003-2007**	**1998-2001**	**2003-2007**	**1998-2001**	**2003-2007**
***DirectorOwn*$_t$**						
Hausman Test	0.001	0.004	0.002	0.001	0.006	0.007
Stock & Yogo						
Governance	0.002	0.003	0.015	0.004	0.007	0.011
Ownership	0.004	0.023	0.028	0.031	0.003	0.018
Leverage	0.004	0.045	0.029	0.095	0.148	0.130
Hahn & Hausman	0.074	0.046	0.008	0.020	0.034	0.064
Cragg-Donald	0.002	0.000	0.008	0.004	0.006	0.004
Hansen-Sargan	0.737	0.671	0.253	0.616	0.209	0.220
Anderson-Rubin	0.060	0.033	0.024	0.016	0.083	0.026
Shea Partial R^2						
Governance	0.264	0.288	0.231	0.230	0.154	0.175
Ownership	0.297	0.432	0.220	0.273	0.220	0.248
Leverage	0.308	0.346	0.187	0.359	0.198	0.204

	Dependent Variable: Contemporaneous *ROA*		Dependent Variable: Next Year's *ROA*		Dependent Variable: Next Two Years' *ROA*	
	1998-2001	**2003-2007**	**1998-2001**	**2003-2007**	**1998-2001**	**2003-2007**
***G-Index*$_t$**						
Hausman Test	0.001	0.000	0.005	0.005	0.008	0.002
Stock & Yogo						
Governance	0.003	0.004	0.019	0.005	0.003	0.009
Ownership	0.006	0.027	0.005	0.036	0.017	0.034
Leverage	0.019	0.021	0.015	0.051	0.014	0.045
Hahn & Hausman	0.017	0.066	0.058	0.015	0.026	0.047
Cragg-Donald	0.003	0.003	0.000	0.000	0.001	0.004
Hansen-Sargan	0.341	0.649	0.231	0.242	0.165	0.352
Anderson-Rubin	0.056	0.018	0.013	0.008	0.042	0.004
Shea Partial R^2						
Governance	0.297	0.432	0.220	0.230	0.220	0.219
Ownership	0.253	0.389	0.275	0.359	0.220	0.291
Leverage	0.308	0.418	0.220	0.287	0.154	0.175

	Dependent Variable: Contemporaneous *ROA*		Dependent Variable: Next Year's *ROA*		Dependent Variable: Next Two Years' *ROA*	
	1998-2001	**2003-2007**	**1998-2001**	**2003-2007**	**1998-2001**	**2003-2007**
E-Index						
Hausman Test	0.002	0.005	0.008	0.008	0.007	0.007
Stock & Yogo						
Governance	0.008	0.009	0.013	0.016	0.015	0.024
Ownership	0.001	0.014	0.033	0.010	0.030	0.048
Leverage	0.086	0.052	0.049	0.082	0.080	0.084
Hahn & Hausman	0.002	0.007	0.022	0.012	0.079	0.026
Cragg-Donald	0.001	0.006	0.007	0.002	0.004	0.004
Hansen-Sargan	0.550	0.418	0.264	0.385	0.451	0.308
Anderson-Rubin	0.017	0.012	0.016	0.038	0.030	0.051
Shea Partial R^2						
Governance	0.286	0.418	0.242	0.244	0.176	0.291
Ownership	0.319	0.432	0.198	0.230	0.165	0.248
Leverage	0.231	0.346	0.264	0.345	0.143	0.189

APPENDIX B TABLE

Fixed effects estimation

This table presents the results from estimating equation (1a), the performance equation, using fixed effects estimation. Specifications are presented with five different governance variables: *Independence,* board independence; *DirectorOwn,* the dollar value of the median director's stock ownership; *CEO-Duality*, whether or not the CEO is also the board chair; *G-Index,* the Gompers, Ishii and Metrick (2003) Governance Index; and, *E-Index*, the Bebchuk, Cohen and Ferrell Entrenchment index. *ROA,* return on assets in the current period is used as the measure of performance. Only the coefficient and corresponding *p*-value for the *Governance* variable in equation (1a) is presented. All other variables in equation (1a) are as defined in the text, and are included in the estimation but not shown in the Table. Panel A presents the results for the 1998-2001 period; Panel B presents the results for the 1998-2001 period. An intercept and year and firm fixed effects are also included but not presented. Standard errors are clustered by firm. Coefficients are presented with *p*-values below in parentheses.

Panel A: 1998-2001

	Fixed Effects Estimation				
	Dependent Variable: Return on Assets (ROA_t)				
	$Independence_t$	$DirectorOwn_t$	$CEO\text{-}Duality_t$	$G\text{-}Index_t$	$E\text{-}Index_t$
$Governance_t$	-0.009	0.004	-0.002	-0.001	-0.004
	(0.04)	*(0.00)*	*(0.06)*	*(0.06)*	*(0.20)*
# of Observations	5,156	4,665	5,156	4,566	4,566

Panel B: 2003-2007

	Fixed Effects Estimation				
	Dependent Variable: Return on Assets (ROA_t)				
	$Independence_t$	$DirectorOwn_t$	$CEO\text{-}Duality_t$	$G\text{-}Index_t$	$E\text{-}Index_t$
$Governance_t$	0.020	0.005	0.003	-0.002	-0.002
	(0.01)	*(0.00)*	*(0.90)*	*(0.11)*	*(0.02)*
# of Observations	6,515	6,377	6,515	7,665	7,665

APPENDIX C TABLE

Market-to-book in governance and ownership equations

This table presents the results from estimating equation (1a), the performance equation, including Market-to-book in governance and ownership equations. Specifications are presented with five different governance variables: *Independence,* board independence; *DirectorOwn,* the dollar value of the median director's stock ownership; *CEO-Duality*, whether or not the CEO is also the board chair; *G-Index,* the Gompers, Ishii and Metrick (2003) Governance Index; and, *E-Index*, the Bebchuk, Cohen and Ferrell Entrenchment index. *ROA,* return on assets in the current period is used as the measure of performance. Only the coefficient and corresponding *p*-value for the *Governance* variable in equation (1a) is presented. All other variables in equation (1a) are as defined in the text, and are included in the estimation but not shown in the Table. Panel A presents the results for the 1998-2001 period; Panel B presents the results for the 1998-2001 period. An intercept and year and firm fixed effects are also included but not presented. Standard errors are clustered by firm. Coefficients are presented with *p*-values below in parentheses.

Panel A: 1998-2001

	2SLS Estimation				
	Dependent Variable: Return on Assets (ROA_t)				
	$Independence_t$	$DirectorOwn_t$	$CEO\text{-}Duality_t$	$G\text{-}Index_t$	$E\text{-}Index_t$
$Governance_t$	-0.441	0.022	-0.199	-0.078	-0.145
	(0.02)	*(0.01)*	*(0.00)*	*(0.01)*	*(0.07)*

Panel B: 2003-2007

	2SLS Estimation				
	Dependent Variable: Return on Assets (ROA_t)				
	$Independence_t$	$DirectorOwn_t$	$CEO\text{-}Duality_t$	$G\text{-}Index_t$	$E\text{-}Index_t$
$Governance_t$	0.209	0.006	-0.106	0.028	-0.192
	(0.00)	*(0.02)*	*(0.02)*	*(0.12)*	*(0.20)*

APPENDIX D TABLE

Board independence on performance by size quintile

This table presents the results from estimating equation (1a) with *Independence* as the governance variable by quintiles sorted by the market value of equity. Only the coefficient and corresponding *p*-value on *Independence*, the *Governance* variable in equation (1a) is presented. All other variables in equation (1a) are as defined in the text, and are included in the estimation but not shown in the Table. The smallest firms are in Quintile 1; the largest firms are in Quintile 5. *ROA* is the performance variable. The Mean MVE shows the average market value of equity for each quintile. Two-Stage Least Squares (2SLS) estimation is used. Panel A presents the results for the 1998-2001 period; Panel B presents the results for the 2003-2007 period. An intercept and year and industry dummy variables are included but not presented. Standard errors are clustered by firm. Coefficients are presented with *p*-values below in parentheses.

Panel A: 1998-2001

	2LS Estimation				
	Dependent Variable: Return on Assets (ROA_t)				
	Smallest Firms----------Sorted by Market Value of Equity----------*Largest Firms*				
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
$Independence_t$	-0.124	-0.353	-0.082	-0.157	-0.026
	(0.18)	*(0.11)*	*(0.23)*	*(0.10)*	*(0.08)*
Mean MVE (millions)	$185.6	$643.3	$1,435.6	$3,555.7	$14,508.1
# of Observations	1,028	1,027	1,027	1,028	1,027

Panel B: 2003-2007

	2LS Estimation				
	Dependent Variable: Return on Assets (ROA_t)				
	Smallest Firms----------Sorted by Market Value of Equity----------*Largest Firms*				
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
$Independence_t$	0.561	0.227	0.082	0.104	0.120
	(0.05)	*(0.13)*	*(0.14)*	*(0.05)*	*(0.02)*
Mean MVE (millions)	$455.3	$1,077.3	$2,206.6	$5,036.3	$18,447.8
# of Observations	1,301	1,300	1,300	1,301	1,301