CORPORATE GOVERNANCE AND EFFICIENCY: EVIDENCE FROM U.S. PROPERTY-L
Huang, Li-Ying;Lai, Gene C;McNamara, Michael;Wang, Jennifer
Journal of Risk and Insurance; Sep 2011; 78, 3; ProQuest Central
pg. 519

© *The Journal of Risk and Insurance*, 2011, Vol. 78, No. 3, 519-550
DOI: 10.1111/j.1539-6975.2011.01410.x

CORPORATE GOVERNANCE AND EFFICIENCY: EVIDENCE FROM U.S. PROPERTY–LIABILITY INSURANCE INDUSTRY

Li-Ying Huang
Gene C. Lai
Michael McNamara
Jennifer Wang

ABSTRACT

This study examines the relation between corporate governance and the efficiency of the U.S. property–liability insurance industry during the period from 2000 to 2007. We find a significant relation between efficiency and corporate governance (board size, proportion of independent directors on the audit committee, proportion of financial experts on the audit committee, director tenure, proportion of block shareholding, average number of directorships, proportion of insiders on the board, and auditor dependence). We also find property–liability insurers have complied with the Sarbanes-Oxley Act (SOX) to a large extent. Although SOX achieved the goal of greater auditor independence and might have prevented Enron-like scandals, it had some unexpected effects. For example, insurers became less efficient when they had more independent auditors because the insurers were unable to recoup the benefits of auditor independence.

INTRODUCTION

The role and quality of corporate governance mechanisms are the subjects of current debate in the United States. The impetus for much of this interest was a series of unexpected accounting scandals (e.g., Enron and WorldCom) that highlighted the apparent weaknesses in the system of governance and accountability. The principal response to these concerns was passage of the Sarbanes-Oxley Act (SOX) in 2002. This law imposes a number of corporate governance, auditor independence, financial disclosure, and other rules on all publicly traded companies in the United States. Passage of SOX provides additional motivation for insurers to address corporate governance issues.

Li-Ying Huang is Assistant Professor at Overseas Chinese University in Taiwan. Gene C. Lai is the Safeco Distinguished Professor of Insurance, Department of Finance and Management Science, Washington State University. Michael McNamara is an Associate Professor at Washington State University. Jennifer Wang is Professor and Chairperson of Risk Management and Insurance Department, National Cheng-Chi University, and Research fellow of Risk and Insurance Research Center (RIRC), National Cheng-Chi University. The authors can be contacted via e-mail: genelai@wsu.edu.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

The past decade has also witnessed increased interest in the quality of corporate governance in academic research. Many empirical studies examine the effect of corporate governance on the performance of industrial firms (e.g., Prowse, 1998; Rajan and Zingales, 1998; Vafeas and Theodorou, 1998; Core et al., 1999). While much public and academic interest has been directed at nonfinancial service industries, little attention has been paid to the insurance industry with few exceptions.[1] The issue of the role of board structure for property–liability insurers is important, because they face a different set of agency costs and more intense regulatory scrutiny than do the boards of nonfinancial firms. Prior studies use profitability measures (e.g., return on equity) or Tobin's Q as proxies for performance, but they have not examined the relation between corporate governance and efficiency performance in the U.S. property–liability insurance industry. Performance in this study is measured by efficiency scores estimated using data envelopment analysis (DEA).

Using 224 firm-year observations of the U.S. property–liability insurance industry over the period from 2000 to 2007, this study examines the relation between corporate governance and firm efficiency.[2] In addition, we investigate whether SOX affects insurer efficiency through changes in corporate governance. Our results are summarized below. We find a significant relation between efficiency and corporate governance (board size, proportion of independent directors on the audit committee, proportion of financial experts on the audit committee, director tenure, proportion of block shareholding, average number of directorships, proportion of insiders on the board, and auditor dependence). We also find property–liability insurers have complied with SOX to a large extent. For example, dependence of the auditor as measured by the ratio of nonaudit fees to total fees decreased from 37.2 percent to 13.9 percent. While SOX achieved the goal of greater auditor independence, it had some unexpected consequences. For example, insurers became less efficient when the auditors were more independent because the insurers were unable to reap the benefits of auditor independence.

We believe our findings shed additional light on the issues related to corporate governance. This is the first study to document a relation between corporate governance and firm efficiency in U.S. property–liability insurance industry. Second, SOX has imposed a number of changes in corporate governance for U.S. publicly traded companies since 2002. However, no study has examined compliance with SOX by property–liability insurers. This study not only examines compliance, but explores the relation between corporate governance mechanisms and firm efficiency after implementation of SOX. Our results have important policy implications. For example, evidence of a linkage between board characteristics and efficiency measures could enable regulators to decide whether or not to improve the existing governance mechanisms of property–liability insurers.

SOX also requires auditor independence. One of the problems with Enron was that the auditing firm was collecting large fees for rendering additional services to Enron. Our study is important for understanding not only auditor independence after the implementation of SOX but also the impact of auditor independence upon insurers'

[1] For example, Diacon and O'Sullivan (1995) focus on the relation between corporate governance and performance in the insurance industry, but they do not investigate efficiency.

[2] Some also call it the property and casualty insurance industry.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

efficiency. Lastly, we use efficiency scores as a measurement of firm performance. Efficiency scores are calculated based on inputs and outputs, thus measuring operating efficiency. While most of the literature examines the relation between corporate governance and profitability, we examine the relation between corporate governance and operating efficiency.

The study proceeds as follows. The second section introduces SOX and agency theory, reviews the literature, presents our research questions, and develops the hypotheses. The third section describes the data and methodology employed. The fourth and fifth sections present empirical results and discuss the effect of SOX on firm efficiency. The sixth section concludes the article.

THEORETICAL BACKGROUND AND RESEARCH HYPOTHESES

A number of researchers have examined the relation between corporate governance and firm performance. We review the relevant literature and develop our hypotheses.

The Sarbanes-Oxley Act

The U.S. Congress enacted SOX July 30, 2002. This law imposes a number of rules on all U.S. publicly traded companies. SOX contains 11 titles that include establishment of a Public Company Accounting Oversight Board, auditor independence, corporate responsibility, and enhanced financial disclosures, among others. We focus our discussion on the audit committee. All public companies must comply with the audit committee financial expert disclosure requirements promulgated under Section 407 of SOX for fiscal years ending on or after July 15, 2003. Each member of a public company's audit committee must be an independent director under Section 301. Under Section 201, the nonaudit services an audit company can provide to their clients are severely restricted in order to promote auditor independence. As noted, SOX was passed into law July 30, 2002. However, as firms usually have financial statements that end at the conclusion of a calendar month, we do not expect financial statements coinciding with passage of SOX that end on July 31, 2002 to be affected by SOX. We perform separate analysis on the pre-2002 period (encompassing 2000–2002) and the post-2002 period (encompassing 2003–2007).

Theoretical Background

Corporate governance studies increasingly recognize that boards of directors have a central role in reducing agency problems (Zahra and Pearce, 1989). Agency theory argues that the delegation of managerial responsibilities by principals (owners) and agents (managers) requires the presence of mechanisms that either align the interests of principals and agents or monitor the performance of managers to ensure that they use their delegated powers in the best interests of the principals. It has been argued that weak governance and limited protection of minority shareholders intensify the traditional principal–agent problems in transitioning economies (Dharwadkar et al., 2000).

In accordance with agency theory, we hypothesize that the independence of the audit committee, the proportion of directors with financial expertise on the audit committee, and the proportion of block shareholding are all positively associated with firm efficiency. On the other hand, board size, board tenure, the number of appointments (directorship) that directors serve concurrently, the proportion of insider seats on the

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

board, and dependence of auditors are all negatively associated with firm efficiency. We are also interested in whether there is an improvement in efficiency after implementation of SOX because it addresses corporate governance issues including auditor independence. If our hypotheses above are supported, we can argue that such reforms were motivated by economic necessity, and they seem to mitigate agency problems.

Research Hypotheses

This section develops hypotheses related to the relation between corporate governance and efficiency in the U.S. property–liability insurance industry. One main role of board structure in the corporate governance process is to minimize agency costs arising from the separation of ownership and control and to preserve shareholder value (e.g., Williamson, 1985; Shleifer and Vishny, 1997). A number of researchers examine whether there is a link between board structure and firm performance. For example, Hillman and Dalziel (2003) argue that a key activity for boards is monitoring management on behalf of shareholders and that effective monitoring can improve firm performance by reducing agency costs. We develop our hypotheses mainly from the agency cost perspective.

Board Size. Board size can affect the decision-making process and effectiveness of the board (Dwivedi and Jain, 2005). Ning et al. (2010) suggest that corporate decision makers seem to consider both agency costs and resource dependency when setting a firm's board size. Resource dependence theory suggests that larger boards are associated with higher levels of firm performance (Dalton et al., 1999). By becoming larger and more diverse, boards help to link their organizations to their external environment, obtaining prestige, and legitimacy (Goodstein et al., 1994). Some researchers find a positive relation between board size and corporate performance (e.g., Dalton et al., 1999;[3] Dwivedi and Jain, 2005;[4] Bathula, 2008;[5] Abidin et al., 2009;[6] Belkhir, 2009[7]).

Some finance literature finds evidence consistent with the theory that a smaller board is related to better firm performance (Yermack, 1996). Yermack (1996) argues that large boards may be less cohesive and more difficult to coordinate, and easier to control by the CEO; thus, larger boards would harm performance. Smaller boards also reduce the possibility of free riding by individual directors and improve their decision-making processes. Various researchers present empirical evidence, which supports this view and have found a negative relation between board size and corporate performance (e.g., Conyon and Peck, 1998;[8] Eisenberg et al., 1998; Bhagat and Black, 2002; Wang

[3] Dalton et al. (1999) use meta-analytic procedures to correct for various statistical artifacts and yield 27 studies with total of 131 samples drawn from an aggregate 20,620 companies.
[4] Dwivedi and Jain (2005) use a sample of listed Indian firms for the period 1997–2001.
[5] The sample of Bathula (2008) is 156 New Zealand publicly traded firms over the 2004–2007 period.
[6] Abidin et al. (2009) use a sample of 75 companies listed on the Bursa Malaysia.
[7] Belkhir (2009) investigates the relation between board size and performance in a sample of 174 U.S. bank and saving and loan holding companies, over the period 1995–2002.
[8] Conyon and Peck (1998) use a sample of five European economies over the period 1990–1995.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

et al., 2007[9]). Finally, Connelly and Limpaphayom (2004) find board size does not have any relation to firm performance. Hence, the relation between firm performance and board size is unclear based on different theories and empirical evidence. Based on agency theory, we propose the following hypothesis:

H_1: *There is a negative relation between board size and firm efficiency.*

Audit Committee Independence. The audit committee serves many important corporate governance functions and provides advice on operational and regulatory matters (Menon and Williams, 1994). It helps to alleviate agency problems by facilitating the timely release of unbiased accounting information by managers to shareholders, creditors, thus reducing information asymmetry between insiders and outsiders (Klein, 1998). From an agency perspective, the composition of the audit committee is an important governance mechanism because the presence of outside directors provides a way of monitoring the actions of managers and of ensuring that shareholder interests are being safeguarded. If effective monitoring leads to higher day-to-day firm performance, then firm performance will be positively related to the percentage of outside directors who are members of the audit committee (Klein, 1998). Some studies report a positive relation between the independence of the audit committee and firm performance (Weir et al., 2002a;[10] Erickson et al., 2003;[11] Chan and Li, 2008[12]). Thus, we propose the following hypothesis:

H_2: *There is a positive relation between the independence of the audit committee and firm efficiency.*

Financial Expertise of the Audit Committee. In December 1999, the Security and Exchange Commission (SEC) approved proposed rule changes by the NYSE, AMEX, and NASD to amend the listing standards regarding corporate audit committees. Under the new standards, a public firm must have on its audit committee at least one member with financial expertise. One provision of SOX requires public companies to disclose to the SEC whether they have financial experts on the audit committee of their board of directors. These provisions represent an effort to solve an agency problem between shareholders. As managers do not always act in the best interest of shareholders, shareholders should have an effective audit committee to ensure financial reporting quality. The new provision attempts to assure audit committee financial expertise, enabling members to monitor the financial reporting process more

[9] Wang et al. (2007) use a sample from the insurance industry in Taiwan over the 2000–2002 period.

[10] Weir et al. (2002a) find that independence of audit committee has a positive effect on performance in a sample of 312 U.K. quoted companies over the period 1994–1996.

[11] Erickson et al. (2003) investigate the relation between the independence of audit committee and Tobin's Q in a sample of 66 Canadian firms over the period 1993–1997. The evidence is in favor of a positive relation between the independence of audit committee and Tobin's Q.

[12] Using a sample of 200 publicly traded Fortune 500 firms in the United States in the year of 2000, Chan and Li (2008) find the independence of the audit committee is positively related to Tobin's Q.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

effectively, thus mitigating agency problems between managers and shareholders (Davidson et al., 2004). To the best of our knowledge, there is no empirical evidence on the relation between the proportion of directors with financial expertise on the audit committee and firm performance. From an agency perspective, the inclusion of financial experts on the audit committee is expected to be associated with greater monitoring and better firm performance.

H_3: *There is a positive relation between the proportion of directors with financial expertise on the audit committee and firm efficiency.*

Director Tenure. There are conflicting arguments regarding whether the length of directors' tenure on the board impacts performance. The expertise hypothesis suggests that a long-term director engagement is associated with greater experience, commitment, and competence, because it provides a director with important knowledge about the firm and its business environment (Vafeas, 2003). Thus, if longer board tenure is associated with more firm-specific expertise and more effective oversight of management, there should be a positive relation between board tenure and firm performance. Some prior studies find a positive relation between board tenure and firm performance (Olson, 2000;[13] Golden and Zajac, 2001;[14] Dulewicz and Herbert, 2004[15]).

In contrast, Katz (1982) finds that extended tenure reduces intragroup communication and isolates groups from key information sources. Vafeas (2003) proposes a management friendliness hypothesis, suggesting that extended board service time marks directors who befriend management at the expense of shareholders. Mason and Wallace (1987) report that directors with excessive tenure may become increasingly complacent toward management, thus tolerating poor performance. From an agency perspective, longer board tenure would decrease a director's independence because a director's objectivity about the management is reduced with the passage of time. Thus, if longer board tenure is associated with more firm-specific expertise and more effective oversight of management, there should be a negative relation between board tenure and firm performance. The impact of the average tenure of directors on firm performance is unclear. Based on agency theory, we propose the following hypothesis:

H_4: *There is a negative relation between the average tenure of directors and firm efficiency in the U.S. property–liability insurance industry.*

[13] Olson (2000) studies the relation between various aspects of board characteristics at 43 independent colleges and the colleges' gifts and total revenues. His findings suggest that board tenure is positively associated with performance.

[14] Golden and Zajac (2001) find board tenure is positively related to efficiency in a sample of U.S. hospital industry over the 1985–1990 period.

[15] Dulewicz and Herbert (2004) find there is a positive relation between average tenure of nonexecutive directors and firm performance in a study of U.K.-listed companies over the 1997–2000 period.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

Block Shareholding. There are conflicting arguments regarding whether block shareholding impacts performance. Agency theory suggests that large block shareholders have both the incentive and influence to assure that officers and directors operate in the interests of shareholders (Bethel and Liebeskind, 1993). Shleifer and Vishny (1997) justify the greater monitoring role of large investors because of the resources they invest in the firm. Therefore, firms with more block shareholding are thought to enjoy lower agency costs, resulting in superior performance relative to firms with fragmented ownership (Fama and Jensen, 1983). This view suggests a positive relation between block shareholding and firm performance. Empirical studies report a positive impact of block shareholding on firm performance (Leech and Leahy, 1991; Golden and Schmid, 1996;[16] Lehmann et al., 2004[17]).

In contrast, block shareholders may seek the maximization of their own wealth to the detriment of other investors (Shleifer and Vishny, 1997). The private benefits of block shareholding increase with the accumulation of control rights and could have a negative impact on firm performance (Lehmann et al., 2004). Some studies find evidence showing block shareholding has a negligible effect on firm performance (Anderson and Reeb, 2003;[18] Mura, 2007[19]). Overall, both theory and evidence are inconsistent on whether block shareholding are linked to improved corporate performance. Based on agency theory, we propose the following hypothesis:

H_5: *There is a positive relation between the proportion of block shareholding and firm efficiency in the U.S. property–liability insurance industry.*

Busy Board Members. Both theory and evidence are inconsistent on whether busy board members are linked to improved corporate performance. Fama (1980) argues that the market for outside directorships serves as an important source of incentives for outside directors to develop reputations as monitoring specialists. Mace (1996) suggests that outside directorships are perceived to be valuable because they provide executives with prestige, visibility, and commercial contacts. The resource dependence perspective views the board as one of a number of instruments that management may use to facilitate access to resources critical to the firm's success. Hence, the resource dependence theory suggests that a board with members who hold multiple directorships would be helpful to firm performance. Some empirical studies found a positive relation between the average numbers of additional directorships held by board members and performance (Dowen, 1995; Ferris et al., 2003).

[16] Gorton and Schmid (1996) show that bank block holders improve the performance of German companies in their 1974 sample, and both bank and nonbank block holders improve performance in a 1985 sample.

[17] Lehmann et al. (2004) employ a data set of 361 firms from the German mining and manufacturing sector over the 1991–1996 period. They find that there is a positive relation between ROA and block shareholders.

[18] Anderson and Reeb (2003) find that block holders have a negative affect on firm performance in as study of U.S. Standard & Poors 500 firms over the 1992–1999 period.

[19] Mura (2007) finds a negative relationship between performance and blockholding in a study of 1,100 nonfinancial U.K.-listed firms for the period 1991–2001.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

From an agency perspective, too many directorships may lower the effectiveness of outside directors as corporate monitors and harm firm performance. Shivdasani (1993) and Fich and Shivdasani (2006) use the average number of additional directorships as a measure of director quality. They find that a higher number of directorships may lower the effectiveness of outside directors as corporate monitors and increase agency problems, thereby harming firm performance. Core et al. (1999) examine a sample of 205 U.S. publicly traded firms over 1982–1984 and find that directors are less effective when they serve on multiple boards. Fich and Shivdasani[20] present evidence that busy outside directors are associated with weak company operating profitability.

However, Klein (1998) and Weir et al. (2002b) find no relation between the average number of additional directorships and performance. Overall, the impact of the average number of directorships on firm performance is unclear. Although the above literature focuses on the relation between number of directorships and performance, the arguments can also be applied to the relation between number of appointments (e.g., officer positions) and performance. Based on agency theory, we propose the following two hypotheses:

H_6: *There is a negative relation between the average number of appointments that directors serve concurrently and firm efficiency in the U.S. property–liability insurance industry.*

H_7: *There is a negative relation between the average number of directorships that directors serve concurrently and firm efficiency in the U.S. property–liability insurance industry.*

Proportion of Insider Directors. Since outside directors are regarded as more independent than inside directors, it is argued that outsiders can monitor managerial performance more effectively (Fama, 1980). Agency theory asserts that outside directors are more effective at monitoring managerial actions by limiting managerial discretion. Fama and Jensen(1983) argue that outside directors possess an incentive to act as monitors of management because they wish to protect their reputations. Inside directors, by virtue of their employment with the firm, are unlikely to aggressively monitor and evaluate the CEO (Daily and Dalton, 1993). Some studies find evidence that shows the proportion of insiders on the board has a negative effect on firm performance (Pfeffer, 1972; Hermalin and Weisbach, 1988; Dahya and McConnell, 2007).

In contrast, stewardship theory claims that managers are essentially trustworthy individuals and therefore good stewards of the resources entrusted to them (Donaldson, 1990; Kiel and Nicholson, 2003). Proponents of stewardship theory contend that superior corporate performance will be linked to a majority of inside directors as they work to maximize profit for shareholders (Kiel and Nicholson, 2003). This occurs because inside directors may contribute to board effectiveness with their skill, expertise, and industry-specific knowledge of the business, thereby boosting firm performance. In addition, insiders want to boost firm performance to protect their own jobs. Vance

[20] Fich and Shivdasani (2006) present evidence based on a sample of U.S. industrial firms from 1989 to 1995.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

(1964) and Dulewicz and Herbert (2004)[21] find the number of executive directors is positively related to performance.

Overall, both theory and evidence are inconsistent on whether the proportion of executive directors is linked to improved corporate performance. Based on agency theory, we propose the following hypothesis:

H_8: There is a negative relation between the proportion of executive directors on the board and firm efficiency in the U.S. property–liability insurance industry.

Auditor Dependence. In agency theory, the role of the annual audit is to reduce contractual or transaction costs related to asymmetric information among parties of an obligation (Jensen and Meckling, 1976). Independent audits enhance the credibility and reliability of financial statements, thus contributing to effective corporate governance (DeFond et al., 2000) and alleviating agency problems. From an agency perspective, we expect a positive (negative) relation between firm performance and auditor independence (dependence).

It is suggested that more nonaudit services (e.g., consulting services) provided by auditors to their clients result in greater firm efficiency. This is consistent with the view that nonaudit services help auditors gain competencies and capabilities that are essential to the audit process (Schroeder and Hamburger, 2002). DeFond et al. (2002) find that there is a positive relation between return on assets and the ratio of nonaudit services to total fees. Based on agency theory, we propose the following hypothesis:

H_9: There is a negative relation between auditor dependence (nonaudit services) and firm performance in the U.S. property–liability insurance industry.

DATA AND METHODOLOGY

Data Selection

Our data set initially consisted of all property–liability insurers for the period from 2000 to 2007. There were initially 24,161 data points (number of firms times years of data available, "firm-years"). We focus on publicly traded, pure-play insurers because the SOX applies only to publicly traded companies. These companies have more complete corporate governance data available than companies that are not publicly traded. Given the statistical technique employed, we excluded firms that reported negative output and input variables (7,368 firm-year observations) and firms with fewer than 8 years of complete data available (5,402 firm-year observations). These restrictions result in a final sample 28 publicly traded firms with 224 firm-year observations.[22] These companies have complete data available in the National Association of Insurance Commissioners (NAIC) database over the 8-year period. We obtained corporate governance data from Form DEF 14A (Definitive Proxy Solicitation Material) that these insurers filed with the SEC.

[21] Dulewicz and Herbert (2004) examine the composition of board of directors and firm performance in U.K. firms during 1997 to 2000. They find the number of executive directors is positively related to performance.

[22] Please see Table 1 for details.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

Methodology

Previous studies examining performance have used a number of measures, such as return on assets (Core et al., 1999; Anderson and Reeb, 2003; Lai and Limpaphayom, 2003; Filatotchev et al., 2004) and Tobin's Q (Chen, 2001; Evans et al., 2002; Anderson and Reeb, 2003). A growing body of recent literature utilizes alternative measures of efficiency as proxies for performance. Specifically, the mathematical programming (nonparametric) approach of DEA (see Cummins and Weiss, 2000) has been employed to measure efficiency. These alternative methods provide meaningful and reliable measures of firm performance.

Following the previous literature in the insurance industry, we use the nonparametric mathematical linear programming approach of DEA to measure efficiency (see Cummins et al., 1999; Cummins and Weiss, 2000; Hardwick et al., 2003; Jeng and Lai, 2005; Jeng et al., 2007). One advantage of the DEA approach is that multiple inputs and outputs are considered when estimating efficiency. Moreover, it is less demanding than parametric approaches in terms of degrees of freedom. Finally, it avoids the problem of vulnerability to specification errors frequently encountered when the econometric approach is used (Cummins and Weiss, 2000; Diacon et al., 2002; Hardwick et al., 2003). To save space, we do not discuss the DEA approach in detail here. Please see Cummins and Weiss (2000) for a description of the technique. The DEA approach requires multiple inputs and outputs to estimate efficiency. We use the value-added approach of DEA to measure outputs (Cummins et al., 1999; Jeng and Lai, 2005; Jeng et al., 2007).

Outputs. We define insurance output as losses incurred (e.g., Cummins and Weiss, 1993; Berger et al., 1997). Because underwriting risk and service intensity vary by line of business, we further disaggregate losses into four categories: short-tail personal lines, long-tail personal lines, short-tail commercial lines, and long-tail commercial lines. Losses are deflated to the base year 2000 using the Consumer Price Index (CPI). In addition to pooling losses and providing insurance services, insurers perform a financial intermediation function by borrowing funds from policyholders and investing the funds in financial securities. We use total invested assets as the output for the intermediation function. Total invested assets are deflated to the base year (2000) using the CPI.

Inputs and Input Prices. Following Cummins et al. (1999) and Cummins and Weiss (2000), we define three inputs: labor, business services, and equity capital. Labor input is the sum of salaries, employee benefits, payroll taxes, and other employment-related costs. The quantity of labor input is defined as labor costs divided by a salary deflator, which indexes average weekly employee wages for the North American Industry Classification System (NAICS) code 524126. The salary deflator is the price of the labor input. Business services consist of outside service costs (measured by agents' commissions) and material costs (measured by loss adjustment expenses). The price of business services is the labor price index that indexes average weekly wages for the NAICS code 54. Following Jeng and Lai (2005), we use current surplus to measure equity capital. The price of capital input equals the debt–equity ratio of the previous year.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

TABLE 1
Sample Selection

Criteria	Firm-Year Data Points
Total number of firm-year data points in the NAIC database, 2000–2007	24,161
Less: Negative outputs and inputs data points	(7,368)
Data points for firms without complete data in NAIC	(5,386)
Data points for mutual firms	(6,848)
Data points for nonpublic stock firms	(4,319)
Data points for firms without complete corporate governance data	(16)
Final sample of data points (8 years of data for 28 firms)	224

TABLE 2
Descriptive Statistics of Inputs/Outputs Using the Value-Added Approach

	Mean	Standard Deviation
Output		
Y1 = Losses incurred in short-tail personal lines	465,346,897	856,498,419
Y2 = Losses incurred in long-tail personal lines	1,164,337,913	2,404,424,445
Y3 = Losses incurred in short-tail commercial lines	200,089,550	544,234,524
Y4 = Losses incurred in long-tail commercial lines	1,193,530,858	2,675,031,742
Y5 = Total invested assets	8,171,493,451	13,725,635,866
Input		
X1 = Labor	549,351.11	822,107.12
X2 = Business services	147,178.91	260,955.95
X3 = Equity	3,067,839,557	4,773,943,504
Input prices		
P1 = Price of labor	790.60	24.03
P2 = Price of business services	779.44	20.06
P3 = Price of equity capital	2.13	0.87

Note: This table reports the average and standard deviation of all output and input variables. The data source is the regulatory annual statements filed by insurers with the National Association of Insurance Commissioners (NAIC).

Table 2 provides the descriptive statistics for both inputs and outputs for all firms. The data indicate that the insurers in the sample, on average, have higher percentages of their insurance output in long-tail lines than short-tail lines. The average total invested assets of the sample firms is $8.17 billion. It should be noted that the standard deviations of all output and input variables are very high. These results reflect the large differences in the firm sizes in our sample.

Bootstrapping DEA Scores

Although DEA methods are widely applied, most researchers ignore the statistical properties of the DEA efficiency estimators. The DEA estimators may be biased. In order to correct the bias in DEA estimators, we implement the bootstrapping

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

TABLE 3
DEA Efficiency Score Results—Value-Added Approach

	Original Technical Efficiency	Original Cost Efficiency
2000	0.903	0.795
2001	0.904	0.801
2002	0.918	0.791
2003	0.868	0.760
2004	0.891	0.803
2005	0.905	0.802
2006	0.918	0.832
2007	0.924	0.805

Note: This table reports the average efficiency scores.

procedure proposed by Simar and Wilson (2007). The steps in the bootstrapping procedure can be described as follows: (1) Using the original outputs and inputs to compute original efficiency score $\hat{\delta}_i$. (2) Using the method of maximum likelihood to obtain an estimate $\hat{\beta}$ of β as well as an estimate $\hat{\sigma}_\varepsilon$ of σ_ε in the regression of $\hat{\delta}_i$ on corporate governance variables (z_i). (3) The next four steps are repeated L times to obtain a set of bootstrap estimates $B_i = \{\hat{\delta}_{ib}^*\}_{b=1}^L$:[3.1] for each $i = 1,\ldots,n$, draw ε_i from the $N(0,\hat{\delta}_\varepsilon^2)$ distribution with left truncation $(1 - z_i\hat{\beta})$. [3.2] Again for each $i = 1,\ldots,n$, compute $\hat{\delta}^* = z_i\hat{\beta} + \varepsilon_i$. [3.3] Set $x_i^* = x_i$, $y_i^* = y_i\hat{\delta}_i/\delta_i^*$ for all $i = 1,\ldots,n$. [3.4] Using $Y^* = [y_1^*,\ldots,y_n^*]$, $X^* = [x_1^*,\ldots,x_n^*]$, compute $\hat{\delta}_i^*$. (4) For each $i = 1,\ldots,n$, compute the bias-corrected estimator $\hat{\delta}_i$, using the bootstrap estimates in B_i obtained in step [3.4] and the original estimate $\hat{\delta}_i$. This procedure was implemented using the software package FEAR and the statistical software R.

EMPIRICAL RESULTS

Empirical results are provided below. We first report the original efficiency scores of the value-added approach in Table 3 and then report the results of the DEA bootstrapping analysis in Table 4.

Results of the Value-Added Approach

We present average original technical efficiency (TE) and original cost efficiency (CE) scores by year in Table 3. Technical efficiency involves input and output quantities only, whereas CE involves prices and allocation of inputs and outputs. The means of the TE score in the sample range from 86.8 percent to 92.4 percent during the period from 2000 to 2007. The results show that, on average, all insurers could have produced their outputs using 86.8 percent to 92.4 percent of the inputs that they actually consumed from year 2000 to 2007. The average CE scores ranged from 76 percent to 83.2 percent.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

TABLE 4
Original and Bias-Corrected Efficiency Means

	Original Efficiency Means	Bias-Corrected Efficiency Means	Correlation[a]
TE			
Model 1	0.904	0.903	0.996
Model 2	0.904	0.902	0.994
Model 3	0.904	0.901	0.992
CE			
Model 1	0.799	0.798	0.999
Model 2	0.799	0.797	0.999
Model 3	0.799	0.797	0.999

Notes: TE = technical efficiency score; CE = cost efficiency score.
[a]Correlation between the original and bias-corrected efficiency scores.

Original Efficiency Scores and Bias-Corrected Efficiency Scores

In Table 4, we report original efficiency score means and bias-corrected efficiency scores means.[23] The bias-corrected efficiency scores are consistently lower than the original efficiency scores. The correlations between the original and bias-corrected scores range from 99.2 percent to 99.9 percent, suggesting that both sets of estimates are similar. Both estimates (original and bias-corrected) efficiency scores are compared in further regression analyses and investigations.

Regression Models and Results

In addition to univariate analysis, we also conduct regression analysis to explain the efficiency scores. The regression model is specified below:

$$ES_{it} = \alpha + \beta_1 Bosize_{it} + \beta_2 Audind_{it} + \beta_3 Audexp_{it} + \beta_4 Tenure_{it} + \beta_5 Block_{it} + \beta_6 Conmgt_{it} + \beta_7 Condir_{it} + \beta_8 Insider_{it} + \beta_9 Auditdependence_{it} + \beta_{10} Size_{it} + \varepsilon_{it}. \quad (1)$$

The dependent variable in the model, *ES* (efficiency score), is the efficiency variable that can be TE or CE. The independent variables are defined as follows. $Bosize_{it}$ is the total number of directors on the board for firm i in year t. $Audind_{it}$ is defined as the proportion of independent nonexecutive directors on the audit committee for firm i in year t. $Audexp_{it}$ is defined as the proportion of the members of the audit committee who have financial expertise[24] for firm i in year t. $Tenure_{it}$ is defined as the average

[23] In bootstrapping procedure (4), the bootstrapping DEA scores ($\hat{\delta}^*_{ib}$) and original efficiency scores ($\hat{\delta}_i$) are used to compute bias($\hat{B}ias_i = \frac{1}{B_1}\sum_{b=1}^{B_1}\hat{\delta}^*_{ib} - \hat{\delta}_i$) and original efficiency scores and bias are used to compute bias-corrected efficiency scores ($\hat{\delta}_i = \hat{\delta}_i - \hat{B}ias_i$). The bias-corrected efficiency score mean is the average value of the bias-corrected efficiency scores.

[24] We use disclosure required by sections 406 and 407 of SOX to determine audit committee expertise.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

TABLE 5
Variable Definitions

	Definition
Dependent variables	
TE	Technical efficiency score
CE	Cost efficiency score
Independent variables	
Bosize	Total number of directors on the board
Audind	The proportion of independent nonexecutive directors on the audit committee
Audexp	The proportion of financial expert seats on the audit committee
Tenure	The average number of years the directors have been on the board
Block	The shares held by block shareholders divided by the outstanding shares
Conmgt	The average number of appointments that directors serve concurrently
Condir	The average number of directorships that directors serve concurrently
Insider	The proportion of executive directors on the board
Auditdependence	The ratio of nonaudit fees to total fees
Size	Natural log of the total equity

number of years the directors have been on the board for firm i in year t. $Block_{it}$ is defined as shares held by block shareholders divided by the outstanding shares for firm i in year t. $Conmgt_{it}$ is defined as the average number of appointments[25] that directors serve concurrently for firm i in year t. $Condir_{it}$ is defined as the average number of directorships that directors serve concurrently for firm i in year t. $Insider_{it}$ is defined as the proportion of executive directors on the board for firm i in year t. $Auditdependence_{it}$ is defined as the ratio of the nonaudit fee to the total fee[26] charged by the auditor for firm i in year t. Previous research has repeatedly shown that company size has an impact on corporate performance (e.g., Chen, 2001; Hardwick et al., 2003; O'Sullivan and Diacon, 2003). Therefore, we use firm size as a control variable in the regression. Size is measured by the natural logarithm of the total equity of the firm. Table 5 presents the definition of each of these variables.

The descriptive statistics for the independent variables are presented in Table 6. The average board in our sample is composed of 10.75 members. The board size in our sample appears similar to Diacon and O'Sullivan (1995) and O'Sullivan and Diacon (2003), who report boards with 10 or fewer members. The mean proportion of independent nonexecutive directors on the audit committee and the mean proportion of financial expertise on the audit committee are about 95 percent and 40 percent, respectively. The insurers are conforming to the independence requirement of SOX

[25] Other appointments means the director serves as an executive officer with another company.
[26] The ratio of nonaudit fee to total fee is a proxy for audit dependence. The higher the audit fee compares to the total fee, the greater the independence of the auditor.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

TABLE 6
Descriptive Statistics of Independent Variables

	Minimum	Maximum	Mean	Standard Deviation
Bosize	6	20	10.75	2.63
Audind	0	1	0.95	0.18
Audexp	0	1	0.40	0.27
Tenure	0.75	27.26	10.49	5.44
Block	0	0.93	0.30	0.22
Conmgt	0	3.5	0.72	0.56
Condir	0	4.18	1.44	1.14
Insider	0	0.67	0.20	0.16
Auditdependence	0	0.89	0.23	0.20
Size	16.81	24.04	20.64	1.55

Note: This table reports the minimum, maximum, average, and standard deviation of all independent variables. The variables are defined in Table 5. The data source is SEC Form DEF14A filings.

for audit committees.[27] The range for tenure of all directors is from 0.75 years to 27.26 years. The average directors' tenure is about 10.49 years, which is higher than the average tenure of directors found in other studies (e.g., 9.2 years, Anderson et al., 2004). The minimum and the maximum fractions of block shareholding are 0 percent and 93 percent, respectively, and the average is 30 percent. The average number of directorships and appointments that directors serve concurrently are 1.44 and 0.72, respectively, suggesting that directors of property–liability insurers do not serve on many other boards and/or have many other appointments. The standard deviation of *Conmgt* and *Condir* are 0.56 and 1.14, suggesting insignificant variation in *Conmgt* and *Condir* across the sample of insurers. The average proportion of executive directors on the board is 20 percent and the standard deviation is 0.16. The proportion of executive directors on the board is lower than the 0.61 reported by Vafeas and Theodorou (1998). Our results appear similar to Vafeas and Theodorou, who find that compared to the United States, the percentage of nonexecutive outsider is significantly lower than the percentage of nonexecutives on U.S. boards. The average ratio of nonaudit fee to total fee, 0.23, is lower than the 0.487 reported by Agrawal and Chadha (2005).

We conduct regression analysis to examine our hypotheses. The above regression model assumes that corporate governance is exogenous. If corporate governance variables are endogenously determined, the regression model may be misspecified. We use the two-stage least squares method (2SLS) to deal with the endogeneity issue. The Durbin–Wu–Hausman (DWH) test is performed to justify the use of 2SLS. First, a "suspicious" endogenous variable (e.g., *Bosize, Audind, Audexp, Tenure, Block, Conmgt, Condir, Insider, Auditdependence*) is regressed against all the exogenous variables and instrumental variables, and the residuals (i.e., *Bosize_res*) are saved. The instrumental

[27] The proportion of independent nonexecutive directors on the audit committee in our sample appears similar to Agrawal and Chadha (2005) who report the proportion of independent directors with 94 percent.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

variables are Tobin's Q (Q), sales growth rate (*SaleGrowth*), and cash flow growth rate (*CashGrowth*). Tobin's Q is defined as the market value of equity plus the book value of debt divided by the book value of total assets.[28] For example, the equation for examining the endogeneity of *Bosize* is specified as follows:[29]

$$\begin{aligned} Bosize_{it} = {} & \alpha + \beta_1 Audind_{it} + \beta_2 Audexp_{it} + \beta_3 Tenure_{it} + \beta_4 Block_{it} + \beta_5 Conmgt_{it} \\ & + \beta_6 Condir_{it} + \beta_7 Insider_{it} + \beta_8 Auditdependence_{it} + \beta_9 Size_{it} + \beta_{10} Q_{it} \\ & + \beta_{11} SaleGrowth_{it} + \beta_{12} CashGrowth_{it} + u_{it}. \end{aligned}$$

Second, the residuals of the endogenous variable (*Bosize_res*) obtained from first stage are added as an additional independent variable in the following equation:

$$\begin{aligned} ES_{it} = {} & \alpha + \beta_1 Bosize_{it} + \beta_2 Audind_{it} + \beta_3 Audexp_{it} + \beta_4 Tenure_{it} + \beta_5 Block_{it} \\ & + \beta_6 Conmgt_{it} + \beta_7 Condir_{it} + \beta_8 Insider_{it} + \beta_9 Auditdependence_{it} + \beta_{10} Size_{it} \\ & + \beta_{11} Bosize\_res_{it} + e_{it}. \end{aligned}$$

If the coefficient of *Bosize_res* is statistically significant, the regression result obtained from Equation (1) will be inconsistent and biased. Therefore, 2SLS is justified and should be applied to Equation (1). As shown in Table 7, the DWH test results show that coefficients of residuals of corporate governance variables are not statistically significant, suggesting that all corporate governance variables are exogenous.

Another estimation issue arises because the dependent variables (DEA efficiency scores) in the regressions fall between the interval 0 and 1, making the dependent variable a limited dependent variable. Ordinary least squares (OLS) regression estimates would lead to biased parameter estimates since OLS assumes a normal and homoskedastic distribution of the disturbance and the dependent variable (Maddala, 1983). A common approach to resolve this issue is to employ Tobit regression. Use of a Tobit model can handle the characteristics of the distribution of efficiency scores and thus provide results that can guide policies to improve performance. Therefore, we conduct our regressions using the Tobit maximum likelihood procedure. Tobit is employed by a number of researchers, including Chadwick and Cappelli (2000), Worthington and Hurley (2000), and Hussels and Ward (2007). This study has complete data over the entire sample period, so a balanced panel data model can be applied.

Before conducting the regression analysis, we first consider the possibility of multicollinearity among independent variables. Table 8 reports the Pearson correlation between the independent variables in the sample. The table shows the correlation between *Bosize* and *Block* is negative and statistically significant. Firms that have larger board size have lower stock holdings by block holders. The relation

[28] The instrumental variables are inspired by Bhagat and Black (1999). We do not use the exact variables used by Bhagat and Black because their samples included manufacturing firms.

[29] We examine the endogeneity of every corporate governance variable and size. For example, to test for the endogeneity of *Audind*, we replace the dependent variable *Bosize* with *Audind*.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

TABLE 7
Results of Testing for Endogeneity

	TE *t*-statistic	CE *t*-statistic	Bias-Corrected TE *t*-statistic	Bias-Corrected CE *t*-statistic	Decision
Bosize_Res	1.418	0.870	0.950	1.193	Not endogeneity
Audind_ Res	1.445	0.822	0.954	1.095	Not endogeneity
Audexp_ Res	1.422	0.853	0.949	1.088	Not endogeneity
Tenure_ Res	1.417	0.873	1.078	1.192	Not endogeneity
Block_ Res	1.446	0.857	1.070	1.146	Not endogeneity
Conmgt_ Res	1.440	0.887	0.948	1.136	Not endogeneity
Condir_ Res	1.438	0.788	0.970	1.189	Not endogeneity
Insider_ Res	1.391	0.868	0.955	1.191	Not endogeneity
Auditdependence_Res	1.419	0.872	0.929	1.190	Not endogeneity
Size_ Res	1.450	0.852	0.971	1.183	Not endogeneity

Note: Bosize_Res is the residual of *Bosize*. *Audind_Res* is the residual of *Audind*. *Audexp_Res* is the residual of *Audexp*. *Tenure_Res* is the residual of *Tenure*. *Block_Res* is the residual of *Blockholding*. *Conmgt_Res* is the residual of *Conmgt*. *Condir_Res* is the residual of *Condir*. *Insider_Res* is the residual of *Insider*. *Auditdependence_Res* is the residual of *Auditdependence*. *Size_Res* is the residual of *Size*. This table reports results of the Durbin, Hausman, and Wu specification tests. The residual value of every independent variable is obtained from the first procedure of the Durbin, Hausman, and Wu specification tests. The coefficient of the residual value of every independent variable is then used in the second procedure of the Durbin, Hausman, and Wu specification tests to test for endogeneity.

between *Bosize* and *Audind* is positive. In addition, the results of Table 8 suggests that there are significantly negative relations between the average tenure of directors (*Tenure*) and other variables, including the "busy directors" variables (*Condir*) and (*Conmgt*). The results indicate that directors who have lengthy tenure on the board are less likely to hold a concurrent post as director or other appointment outside the firm. On the contrary, the relation between the average tenure of directors and the proportion of executive directors on the board is positive, indicating the directors who have lengthy tenure on the board are likely to be executive officers of the firm. *Audexp* is positively related to *Insider*. The untabulated test results indicate that variance inflation factors (VIFs) of the independent variables are all less than four, suggesting that multicollinearity is unlikely to be a problem.

Table 9 reports the regression results for corporate governance and firm efficiency. The two efficiency scores are used separately as dependent variables. The results of TE and CE are presented in Panel A and Panel B, respectively. Overall, the chi-square value for each model in Table 9 is significant. Model 1 in each panel includes all of the independent variables. For robustness and to avoid potential multicollinearity problems, we also provide other regression results (models 2 and 3).

The results for Panel A, model 1 in Table 9 show that *Bosize, Audind, Tenure,* and *Insider* are positive and significantly related to the original TEs. The positive coefficient of *Bosize* suggests that the larger the board size, the higher the efficiency score. The positive

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

TABLE 8
Correlation Coefficient Matrix

	Bosize	*Audind*	*Audexp*	*Tenure*	*Block*	*Conmgt*	*Condir*	*Insider*	*Auditdependence*	*Size*
Bosize	1	0.135*	−0.197**	0.106	−0.401**	−0.169*	0.050	−0.035	0.079	0.000
		0.043	0.003	0.115	0.000	0.011	0.455	0.605	0.236	0.889
Audind		1	0.113	0.135*	0.223**	0.149*	0.060	−0.033	−0.118	0.010
			0.092	0.044	0.001	0.026	0.375	0.624	0.078	0.878
Audexp			1	0.334**	−0.080	−0.028	−0.113	0.204**	−0.131	0.001
				0.000	0.236	0.676	0.090	0.002	0.051	0.990
Tenure				1	0.054	−0.238**	−0.426**	0.255**	−0.116	0.022
					0.419	0.000	0.000	0.000	0.083	0.749
Block					1	0.067	−0.364**	−0.071	−0.117	0.005
						0.315	0.000	0.292	0.081	0.941
Conmgt						1	0.314**	0.349**	0.080	0.096
							0.000	0.000	0.233	0.150
Condir							1	0.266**	−0.011	0.005
								0.000	0.867	0.938
Insider								1	−0.120	−0.047
									0.073	0.482
Auditdependence									1	0.041
										0.544
Size										1

Notes: For the definition of each of these variables, please see Table 5.
** Correlation is significant at the 1% level (two-tailed); *correlation is significant at the 5% level (two-tailed).

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

TABLE 9
Regression Analysis of Efficiency Scores

Panel A: Dependent Variable = Technical Efficiency Score						
	(1)		(2)		(3)	
	Original Efficiency	Bias-Corrected Efficiency	Original Efficiency	Bias-Corrected Efficiency	Original Efficiency	Bias-Corrected Efficiency
Constant	1.038***	1.124***	1.083***	1.086***	0.980***	1.042***
Bosize	0.002*	0.006**	0.012**	0.010**		
Audind	0.107**	0.174**	0.136***	0.169***		
Audexp	−0.094***	−0.141***	−0.109**	−0.098**		
Tenure	0.005**	0.007**			0.002**	0.003*
Block	−0.063*	−0.062*			−0.101***	−0.128**
Conmgt	0.006	0.009			0.003	0.002
Condir	0.012	0.018	0.024	0.006		
Insider	0.020**	0.014	0.021	0.077*		
Auditdependence	0.028	0.103*	0.043**	0.105**	0.013	0.074
Size	−0.003*	−0.006	−0.004*	−0.005	−0.003*	−0.005
LM test	211.74***	139.31***	244.46***	156.54***	245.07***	163.82***
Hausman test	7.91	7.31	9.57	8.09	6.41	6.00
Log likelihood	241.74	117.62	239.82	114.57	229.55	109.15
Chi-squared	125.43***	83.574***	131.17***	84.81***	121.76***	86.68***
N	224	224	224	224	224	224

(*Continued*)

TABLE 9
Continued

Panel B: Dependent Variable = Cost Efficiency Score						
	(1)		(2)		(3)	
	Original Efficiency	Bias-Corrected Efficiency	Original Efficiency	Bias-Corrected Efficiency	Original Efficiency	Bias-Corrected Efficiency
Constant	1.358***	1.598***	1.214***	1.502***	1.140***	1.266***
Bosize	0.014***	0.021***	0.007*	0.010		
Audind	0.076**	0.133*	0.099**	0.231**		
Audexp	−0.143***	−0.222***	−0.121**	−0.148**		
Tenure	0.002**	0.003			0.002**	0.004
Block	−0.154**	−0.215**			−0.111**	−0.169**
Conmgt	0.010	0.035			0.005	0.013
Condir	0.010*	0.029**	0.008*	0.035**		
Insider	0.086*	0.076*	0.065*	0.048		
Auditdependence	0.178***	0.308***	0.003***	0.310***	0.175***	0.306***
Size	−0.011*	−0.014	−0.007*	−0.015	−0.012*	−0.014
LM test	238.11***	184.91***	282.98***	221.35***	283.95***	226.92***
Hausman test	9.35	14.69	8.77	5.28	9.13	7.90
Log likelihood	173.76	60.50	173.49	59.80	170.72	55.77
Chi-squared	146.16***	120.56***	153.16***	127.05***	161.92***	134.35***
N	224	224	224	224	224	224

Notes: This table reports results of regressing firm efficiency on corporate governance variables during 2000-2007. Data source of firm efficiency is from the regulatory annual statements filed by insurers with the National Association of Insurance Commissioners (NAIC). Data source of corporate governance variables is from SEC filings-Form DEF14A. For the definition of each of these variables, please see Table 5. Model 1 in each panel includes all of the independent variables. For robustness and to avoid potential multicollinearity problems, we remove some variables from model 1 and provide the results in models 2 and 3. Hausman tests suggest random effects model should be used.
***Significant at the 1% level; **significant at the 5% level; *significant at the 10% level.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

relation between firm efficiency and board size is consistent with Golden and Zajac (2001), who find that board size is positively related to corporate performance.[30,31] One possible reason for the result is that a larger board will have representation of people with diverse backgrounds, who bring knowledge and a range of experience to the board, thus improving corporate efficiency. The positive coefficient of *Audind* suggests that the independence requirement for audit committees required by SOX benefits firm efficiency. The finding of a positive relation between the percentage of outsiders on the audit committee and firm efficiency is consistent with Weir et al. (2002a), who show that better performing English firms have a greater proportion of independent nonexecutives on the audit committee. This result, however, conflicts with Klein (1998), who finds the percentage of outsiders on the audit committee is unrelated to performance. We find *Audexp* is negatively and statistically related to the efficiency scores, implying that having too many financial expert seats on the audit committee is harmful to audit committee effectiveness, outweighing the expected benefits.

We find the coefficient of *Tenure* is positive and statistically significant, suggesting the longer the directors are on the board, the more efficient the firms become. The positive coefficient of *Tenure* is consistent with Dulewicz and Herbert (2004). They find the average tenure of nonexecutive directors to be positively related to company performance.[32] The negative relation between *Block* and TE suggests that block holders may be more interested in their own wealth maximization rather than stockholder value maximization. The results are consistent with Mura (2007).[33] The coefficient of *Insider* is significant and positive. The positive relation between *Insider* and efficiency is consistent with Dulewicz and Herbert (2004). They find the number of executive directors is positively related to performance.

For robustness, we also report bias-corrected efficiency scores because DEA estimators may be biased. The regression results of model 1, when bias-corrected efficiency scores are used as the dependent variable, are similar to the results when the original efficiency scores are used as the dependent variable with two exceptions. The *Insider* variable is not statistically significant, but the *Auditdependence* variable becomes significant at the 10 percent level. The positive coefficient of *Auditdependence* suggests that more nonaudit services provided by auditors to their clients results in greater firm efficiency. This result is consistent with the view that nonaudit services help auditors gain competencies and capabilities that are essential to the audit process (Schroeder and Hamburger, 2002). In model 2, we drop the *Tenure*, *Block*, and *Conmgt* variables, and in model 3, we drop *Bosize*, *Audind*, *Audexp*, *Condir*, and *Insider* because of possible multicollinearity problems. The results of models 2 and 3 are similar to those of model 1.

[30] Golden and Zajan (2001) chose the U.S. hospital industry during the period 1985–1990 as the empirical setting.

[31] It should be noted that the results of the literature are obtained from different data sets in terms of countries, financial or nonfinancial firms, time horizon, and so forth, thus, the results of the literature may not be directly compare to those of this study.

[32] Dulewicz and Herbert (2004) use cash flow return on total assets and sales turnover as proxies for company performance.

[33] Mura (2007) uses Tobin's Q to measure firm performance and finds that there is a negative relation between firm performance and block holding.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

Panel B of Table 9 reports the results when the CE scores are used as the dependent variable. The empirical results in Panel B are very similar to those in Panel A, with one exception. The coefficient of *Condir* is significantly positive, implying that the more directorships the directors serve concurrently, the more efficient a firm becomes. The positive coefficient of *Condir* is consistent with Ferris et al. (2003) but not consistent with Core et al. (1999), which suggests that directors are less effective when they serve on several boards. It should be noted that our result is not necessarily inconsistent with the argument of Core et al. The reason is that the average of number of directorships that the directors serve concurrently is only 1.44. Apparently, the board members are not too busy with other responsibilities.

THE EFFECT OF SOX

This section examines whether the property–liability insurance industry responded to the implementation of SOX. Specifically, we are interested in two issues. First, whether corporate structure changed after SOX was implemented. This question is interesting because SOX covers corporate governance issues but does not, specifically, address changes in corporate structure. For example, SOX does not deal with board size and duality issues. Second, we are interested in whether there is an improvement in efficiency after implementation of SOX because it addresses corporate governance issues including auditor independence and establishment of a quasi-public agency, the Public Company Accounting Oversight Board. It is believed SOX improves the effectiveness of corporate governance and makes firms more efficient. This argument is supported by anecdotal evidence in trade journals. They report that, for example, it has become more difficult for firms to find new directors because candidates do not want to commit to the job if they do not have adequate time. In other words, board candidates are now taking the role of being a director more seriously since SOX was enacted. Although SOX was signed into law in July 2002, the new corporate governance rules did not become effective until 2003. Thus, we compare governance data during the period from 2000 to 2002 with data during the period from 2003 to 2007.

Descriptive Statistics Prior to and After Implementation of SOX

Table 10 presents the results of a difference of means test for our efficiency scores and governance variables prior to and following the implementation of SOX. The evidence shows that board size is slightly but significantly smaller, the number of financial experts on the audit committee is significantly higher, and the firms increased their board independence and auditor independence after implementation of SOX.[34] In summary, the U.S. property–liability insurers did respond and complied with SOX.

Regression Analysis

Table 11 presents the regression results for the 2000–2007 sample periods. The dependent variables in Panel A and Panel B are original (bias-corrected) TEs and original cost (bias-corrected) efficiency scores, respectively. The independent variables included in the model comprise all of the corporate governance measures used in Table 9, a year

[34] The results show that more fees are paid for the audit rather than for nonaudit services. Thus, the independence of the audit firm has increased after enactment of SOX.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

TABLE 10
Student *t*-Test of Difference in Corporate Governance Variables Prior to and Following the Implementation of the Sarbanes-Oxley Act

	Mean Prior to 2002	Mean Pollowing 2002	*t*-statistic	*Z*-statistic
Original technical efficiency	0.908	0.901	0.45	2.761*
Original cost efficiency	0.796	0.801	−0.22	0.004
Bosize	10.774	10.75	0.07	5.126**
Tenure	10.689	10.382	0.41	0.909
Audind	0.955	0.961	−0.21	0.121
Audexp	0.360	0.434	−1.97*	0.009
Block	0.281	0.316	−1.1	0.017
Conmgt	0.777	0.690	1.11	0.001
Condir	1.461	1.443	0.12	1.988
Insider	0.219	0.187	1.38	6.358**
Auditdependence	0.372	0.139	9.91***	16.265***

Note: The table reports the average of firm efficiency and corporate governance variables and the results of difference of means tests prior to and following the implementation of the Sarbanes-Oxley Act. For the definition of each of these variables, please see Table 5.
***Significant at the 1% level; **significant at the 5% level; *significant at the 10% level.

dummy variable, and interaction terms for the dummy year variable and corporate governance variables. The interaction variables in the regressions are used to examine if the implementation of SOX affected the relation between corporate governance variables. Hanlon et al. (2003) suggest that the interaction term is nearly perfectly correlated with the other included variables. Therefore, including all variables in one equation creates some serious multicollinearity problems and makes it impossible to assign a meaningful interpretation to the coefficients. To avoid the multicollinearity problem, we separate the dummy year variable and the interaction term of the dummy year variable and the corporate governance variables. Only three interaction terms (*Daudind*, *Daudexp*, and *Ddependence*) are examined because SOX-mandated changes will directly affect independence of the audit committee, the proportion of financial experts on audit committee, and auditor independence.

Model 1 in Panels A and B in Table 11 includes all corporate governance measures and a year dummy variable (*Dyear*), but no interaction terms. The coefficients of *Dyear* are not significant, implying that insurers are not more efficient after SOX was implemented than before SOX. In model 2, we replace the dummy year variable (*Dyear*) with three interaction terms (*Daudind*, *Daudexp*, and *Ddependence*). To address potential multicollinearity problems, we provide other regression results (models 3 and 4). The coefficients of the interactions of *Dyear* and *Audind* (*Daudind*) are positive and significant, suggesting that greater independence of the audit committee has a more positive effect on the efficiency scores after SOX was implemented. The coefficients of the interaction variables *Dyear* and *Audexp* (*Daudexp*) are negative and significant, suggesting that more financial expert seats on the audit committee may be harmful to firm efficiency after implementation of SOX. The coefficients of *Ddependence* are

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

TABLE 11
Regression Analysis of Efficiency Scores

Panel A: Dependent Variable = Technical Efficiency Score

	(1)		(2)		(3)		(4)	
	Original	Bias-Corrected	Original	Bias-Corrected	Original	Bias-Corrected	Original	Bias-Corrected
Constant	1.043***	1.118***	1.052***	1.134***	1.105***	1.118***	1.010***	1.072***
Dyear	−0.004	−0.004						
Bosize	0.002	0.006*	0.003*	0.006	0.012**	0.011**		
Audind	0.108**	0.173**	0.155***	0.242***	0.157***	0.243***		
Daudind			0.057*	0.086	0.020*	0.094**		
Audexp	−0.093***	−0.143***	−0.021**	−0.046	−0.071*	−0.002		
Daudexp			−0.117**	−0.156*	−0.059**	−0.160**		
Tenure	0.005***	0.007**	0.004**	0.007**			0.002*	0.002*
Block	−0.062*	−0.063	−0.054*	−0.052			−0.099***	−0.126**
Conmgt	0.006	0.009	0.004	0.006			0.002	0.003
Condir	0.012	0.018	0.012	0.018	−0.022***	0.024**		
Insider	0.017*	0.011	0.014*	0.016	0.005	0.023*		
Auditdependence	0.033	0.097**	0.008	0.064	0.044	0.051	0.003	0.064
Ddependence			0.080	0.107	0.057	0.162	0.076	0.077
Size	−0.003*	−0.006	−0.003*	−0.006	−0.004*	−0.005	−0.004*	−0.006
LM test	210.08***	137.03***	207.60***	135.43***	233.57***	152.15***	246.82***	164.42***
Hausman test	8.19	15.23	18.56	17.32	13.57	12.18	7.21	6.39
Log likelihood	242.59	117.65	243.98	118.12	242.65	116.64	230.52	109.35
Chi-squared	127.10***	83.60***	124.27***	80.65***	129.60***	83.99***	122.10***	86.44***
N	224	224	224	224	224	224	224	224

(Continued)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

TABLE 11
Continued

Panel B: Dependent Variable = Cost Efficiency Score								
	(1)		(2)		(3)		(4)	
	Original	Bias-Corrected	Original	Bias-Corrected	Original	Bias-Corrected	Original	Bias-Corrected
Constant	1.409***	1.168***	1.421***	1.682***	1.258***	1.620***	1.234***	1.405***
Dyear	0.035	0.041						
Bosize	0.013***	0.020***	0.012**	0.019***	0.004*	0.008		
Audind	0.088**	0.147	0.137*	0.247**	0.155***	0.343***		
Daudind			0.062	0.129*	0.053	0.128*		
Audexp	−0.132***	−0.209***	−0.058**	−0.069	−0.029*	−0.001		
Daudexp			−0.119*	−0.224**	−0.072*	−0.233*		
Tenure	0.002**	0.003	0.001**	0.002			0.003**	0.005
Block	−0.145*	−0.204**	−0.137**	−0.189**			−0.105**	−0.160**
Conmgt	0.008	0.032	0.011	0.037			0.001	0.019
Condir	0.011*	0.030**	0.010	0.027	0.020*	0.035**		
Insider	0.063*	0.049*	0.065*	0.053	0.003	0.003		
Auditdependence	0.225***	0.364***	0.135*	0.219*	0.009*	0.225*	0.142***	0.258***
Ddependence			0.223*	0.360**	0.104**	0.394**	0.246***	0.362***
Size	−0.012*	−0.015	−0.014**	−0.016	−0.009**	−0.018	−0.016**	−0.019
LM test	239.99***	184.70***	238.00***	183.62***	273.97***	212.13***	269.07***	212.20***
Hausman test	7.90	14.00	18.05	13.78	10.59	6.95	8.02	10.09
Log likelihood	173.81	60.62	176.12	65.02	174.59	62.96	172.76	58.45
Chi-squared	144.60***	119.86***	143.08***	121.20***	145.76***	123.23***	157.61***	132.27***
N	224	224	224	224	224	224	224	224

Notes: Dyear = a dummy variable, equal to one for year 2003, 2004, 2005, 2006, and 2007, zero otherwise; *Daudind* = the interaction of *Dyear* and *Audind*; *Daudexp* = the interaction of *Dyear* and *Audexp*; *Ddependence* = the interaction of *Dyear* and *Auditdependence*. Hausman tests suggest the random effects model should be used.

*** Significant at 1% the level; **significant at the 5% level; *significant at the 10% level.

significantly positive in models 2, 3, and 4 of Panel B, implying that auditor dependence has a more positive affect upon firm CE after SOX became effective.

To avoid the multicollinearity problem we are unable to analyze the results of the interaction terms of the year dummy and all of the variables. For a better robustness check, we further separate the sample into two different groups, the period before and after SOX was enacted, and compare the regression results. Table 12 presents the regression results for the relation between corporate governance and firm efficiency before and after SOX was implemented. The results in Panel A of Table 12 show that *Bosize*, *Conmgt*, and *Auditdependence* are significant and positive before SOX and become insignificant after SOX became effective. *Condir* and *Insider*, which are not significant before SOX become positive and significant post-SOX. In addition, *Audexp* is not significant before SOX and becomes negative and significant after SOX. Panel B shows that *Audind*, *Conmgt*, *Condir*, *Insider*, and *Auditdependence* are not significant before SOX and became positive and significant post-SOX.

CONCLUSION

This study examines the effects of corporate governance on firm efficiency and the impact of implementation of the SOX on the relation between corporate governance mechanisms and firm efficiency in the U.S. property–liability insurance industry. We summarize our findings below. We find the following corporate governance variables are significantly and positively related to CE: board size, the proportion of independent directors on the audit committee, director tenure, the average number of directorships, the proportion of insiders on the board, and auditor dependence. On the other hand, we find that the proportion of financial experts on the audit committee and the percentage of ownership of block shareholders are negatively related to CE. The results of the relation between corporate governance and technical efficiency are very similar to the relation between corporate governance and CE. Using efficiency scores rather than profitability as used in the previous literature, we are able to find different results. For example, Vafeas and Theodorou (1998) use return on assets as a performance measure and do not discern a significant link between board structure and firm performance. We do find significant relation between board structure and firm performance using efficiency measures. The results of the difference of means tests for the corporate governance variables prior to and following SOX implementation show that some governance measures changed significantly, implying that the property–liability insurance industry has responded to the implementation of SOX.

The evidence shows that there is no difference in terms of efficiency prior to or following SOX implementation. One possible reason is that most insurance policies are renewal policies, insurers cannot change the policies terms overnight. Another reason is that the insurance industry is a regulated industry. Regulators serve as a governance monitoring body. An improvement in certain corporate governance may not have significant impact on efficiency, if the industry has been governed well.

Proponents of government intervention in corporate governance argue that there is a positive relation between the use of governance measures and firm efficiency. Therefore, proper governance measures should be mandated through law (e.g., Vafeas and Theodorou, 1998). Our overall results have important public policy implications. They show that most corporate governance variables do have a statistically significant

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

TABLE 12
Comparison of Regression Analysis of Efficiency Scores—Prior to and Following Implementation of the Sarbanes-Oxley Act

	Prior		After	
	Original	Bias-Corrected	Original	Bias-Corrected
Panel A: Dependent Variables = Technical Efficiency Score				
Constant	1.118***	1.237***	0.989***	1.023***
Bosize	0.009*	0.014**	0.000	0.003
Audind	0.142*	0.235*	0.130**	0.199**
Audexp	−0.012	0.004	−0.178***	−0.256***
Tenure	0.001	0.001	0.007***	0.011***
Block	−0.008*	−0.038*	0.048	0.054
Conmgt	0.050	0.076**	0.028	−0.042
Condir	0.009	−0.009	0.032	0.045**
Insider	0.021	−0.065	0.104**	0.108
Auditdependence	0.002	0.049*	0.038	0.104
Size	−0.009*	−0.015	−0.001*	0.001
LM test	45.42***	30.63***	70.76***	51.50***
Hausman test	10.13	9.26	11.83	10.75
Log likelihood	100.52	51.39	153.88	74.48
Chi-squared	60.76***	39.97***	64.59***	40.18***
N	84	84	140	140
Panel B: Dependent Variables = Cost Efficiency Score				
Constant	1.642***	2.049***	0.835***	1.412***
Bosize	0.017**	0.025**	0.009	0.015
Audind	0.003	0.046	0.091*	0.191*
Audexp	−0.113*	−0.138	−0.202***	−0.305***
Tenure	0.002*	0.002	0.001*	0.002
Block	−0.333***	−0.455***	−0.016	−0.038**
Conmgt	0.017	0.004	0.015	0.075*
Condir	0.007	0.006	0.030*	0.046*
Insider	0.029	0.019	0.230*	0.204
Auditdependence	0.120	0.191	0.216**	0.532***
Size	−0.025**	−0.036*	−0.011***	−0.006
LM test	42.94***	26.91***	70.49***	76.58***
Hausman test	8.42	7.94	10.25	13.62
Log likelihood	76.76	21.89	105.18	37.58
Chi-squared	69.36***	36.74***	68.42***	65.26***
N	84	84	140	140

Notes: Hausman tests suggest the random effects model should be used.
***Significant at the 1% level; **significant at the 5% level; *significant at the 10% level.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

impact on the efficiency of insurers. Although SOX achieved the goal of greater auditor independence and might have prevented Enron-like scandals, it had some unexpected effects. For example, insurers became less efficient when they had more independent auditors because the insurers were unable to recoup the benefits of auditor independence.

REFERENCES

Abidin, Z. Z., N. M. Kamal, and K. Jusoff, 2009, Board Structure and Corporate Performance in Malaysia, *International Journal of Economics and Finance*, 1: 150-164.

Agrawal, A., and S. Chadha, 2005, Corporate Governance and Accounting Scandals, *Journal of Law and Economics*, 48: 371-406.

Anderson, R. C., S. A. Mansi, and D. M. Reeb, 2004, Board Characteristics, Accounting Report Integrity, and the Cost of Debt, *Journal of Accounting and Economics*, 37: 315-342.

Anderson, R. C., and D. M. Reeb, 2003, Founding-Family Ownership and Firm Performance: Evidence From the S&P 500, *Journal of Finance*, 58: 1301-1328.

Bathula, H, 2008, Board Characteristics and Firm Performance: Evidence From New Zealand, Working paper.

Belkhir, M., 2009, Board of Director's Size and Performance in Banking Industry, *International Journal of Managerial Finance*, 5: 201-221.

Berger, A. N., J. D. Cummins, and M. A. Weiss, 1997, The Coexistence of Multiple Distribution Systems for Financial Services: The Case of Property-Liability Insurance, *Journal of Business*, 70: 515-546.

Bethel, J. E., and J. Liebeskind, 1993, The Effects of Ownership Structure on Corporate Restructuring, *Strategic Management Journal*, 14: 15-31.

Bhagat, S., and B. Black, 1999, The Uncertain Relationship Between Board Composition and Firm Performance, *Business Lawyer*, 54: 921-963.

Bhagat, S., and B. Black, 2002, The Non-correlation Between Board Independence and Long-Term Firm Performance, *Journal of Corporation Law*, 27: 227-273.

Chadwick, C., and P. Cappelli, 2000, Strategy, Human Resource Management, and the Performance of Life Insurance Firms, Working paper.

Chan, K. C., and J. Li, 2008, Audit Committee and Firm Value: Evidence on Outside Top Executives as Expert-Independent Directors, *Corporate Governance: An International Review*, 16: 16-31.

Chen, J., 2001, Ownership Structure as Corporate Governance Mechanism: Evidence From Chinese Listed Companies, *Economics of Planning*, 34: 53-72.

Connelly, J. T., and P. Limpaphayom, 2004, Board Characteristics and Firm Performance: Evidence From the Life Insurance Industry, *Chulalongkorn Journal of Economics*, 16: 101-124.

Conyon, M. J., and J. I. Peck, 1998, Board Size and Corporate Performance: Evidence From European Countries, *European Journal of Finance*, 4: 291-304.

Core, J. E., R. W. Holthausen, and D. F. Larcker, 1999, Corporate Governance, Chief Executive Officer Compensation, and Firm Performance, *Journal of Financial Economics*, 51: 371-406.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

Cummins, J. D., S. Tennyson, and M. A. Weiss, 1999, Consolidation and Efficiency in the US Life Insurance Industry, *Journal of Banking and Finance*, 23: 325-357.

Cummins, J. D., and M. A. Weiss, 1993, Measuring Cost Efficiency in the Property-Liability Insurance Industry, *Journal of Banking and Finance*, 17: 463-481.

Cummins, J. D., and M. A. Weiss, 2000, Analyzing Firm Performance in the Insurance Industry Using Frontier Efficiency and Productivity Methods, in: G. Dionne, ed., *Handbook of Insurance* (Boston: Kluwer Academic Publishers).

Dahya, J., and J. J. McConnell, 2007, Board Composition, Corporate Performance, and the Cadbury Committee Recommendation, *Journal of Finance and Quantitative Analysis*, 42: 535-564.

Daily, C. M., and D. R. Dalton, 1993, Board of Directors Leadership and Structure: Control and Performance Implications, *Entrepreneurship: Theory and Practice*, 17: 65-81.

Dalton, D. R., J. L. Johnson, and A. E. Ellstrand, 1999, Number of Directors and Financial Performance: A Meta-Analysis, *Academy of Management Journal*, 42: 674-686.

Davidson, W. N., III, B. Xie, and W. Xu, 2004, Market Reaction to Voluntary Announcements of Audit Committee Appointments: The Effect of Financial Expertise, *Journal of Accounting and Public Policy*, 23, 279-293.

DeFond, M., J. Francis, and T. Wong, 2000, Auditor Industry Specialization and Market Segmentation: Evidence from Hong Kong, *Auditing: A Journal of Practice and Theory*, 19: 49-66.

DeFond, M. L., K. Raghunandan, and K. R. Subramanyam, 2002, Do Non-Audit Service Fees Impair Auditor Independence? Evidence From Going Concern and Audit Opinion, *Journal of Accounting Research*, 40: 1247-1274.

Dharwadkar, R., G. George, and P. Branders, 2000, Privatization in Emerging Economies: An Agency Perspective. *Academy of Management Review*, 25: 650-669.

Diacon, S. R., and N. O'Sullivan, 1995, Does Corporate Governance Influence Performance? Some Evidence From UK Insurance Companies, *International Review of Law and Economics*, 15: 405-424.

Diacon, S.R., K. Starkey, and C. D. O'Brien, 2002, Size and Efficiency in European Long-Term Insurance Companies: An International Comparison. *Geneva Papers on Risk and Insurance: Issues and Practice*, 27: 444-466.

Donaldson, L., 1990, The Ethereal Hand: Organizational Economics and Management Theory, *Academy of Management Review*, 15: 369-381.

Dowen, R. J., 1995, Board Director Quality and Firm Performance? *International Journal of the Economics of Business*, 2: 123-132.

Dulewicz, V., and P. Herbert, 2004, Does the Composition and Practice of Boards of Directors Bear Any Relationship to the Performance of their Companies? *Corporate Governance*, 12: 263-280.

Dwivedi, N., and A. K. Jain, 2005, Corporate Governance and Performance of Indian Firms: The Effect of Board Size and Ownership, *Employee Responsibilities and Rights Journal*, 17: 161-172.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

Eisenberg, T., S. Sundergn, and M. T. Wells, 1998, Larger Board Size and Decreasing Firm Value in Small Firms, *Journal of Financial Economics*, 48: 35-54.

Erickson, J., Y. W. Park, J. Reising, and H. H. Shin, 2003, Board of Directors as an Endogenously Determined Institution and Firm Value: The Canadian Evidence, Working paper.

Evans, J., R. Evans, and S. Loh, 2002, Corporate Governance and Declining Firm Performance, *International Journal of Business Studies*, 10: 1-18.

Fama, E. E., 1980, Agency Problems and the Theory of the Firm, *Journal of Political Economy*, 88: 288-307.

Fama, E., and M. Jensen, 1983, The Separation of Ownership and Control, *Journal of Law and Economics*, 26: 301-325.

Ferris, S. P., M. Jagannathan, and A. C Pritchard, 2003, Too Busy to Mind the Business? Monitoring by Directors With Multiple Board Appointments, *Journal of Finance*, 58: 1087-1112.

Fich, E. M., and A. Shivdasani, 2006, Are Busy Boards Effective Monitors? *Journal of Finance*, 61: 689-724.

Filatotchev, I., Y. C. Lien, and Jenifer Piesse, 2004, Corporate Governance and Performance in Publicly Listed, Family-Controlled Firms: Evidence from Taiwan, *Asia Pacific Journal of Management*, 22: 257-283.

Golden, B. R., and E. J. Zajac, 2001, When Will Boards Influence Strategy? Inclination × Power = Strategic Change, *Strategic Management Journal*, 22: 1087-1117.

Golden, G., and F. Schmid, 1996, Universal Banking and the Performance of German Firms, Working paper.

Goodstein, J., Kl Gautam, and W. Boeker, 1994, The Effects of Board Size and Diversity on Strategic Change, *Strategic Management Journal*, 15: 241-250.

Hanlon, M., J. Myers, and T. Shevlin, 2003, Dividend Taxation in Firm Valuation: A Re-Examination, *Journal of Accounting and Economics*, 35: 119-153.

Hardwick, P., M. Adams, and H. Zou, 2003, Corporate Governance and Cost Efficiency in the United Kingdom Life Insurance Industry, Working paper, European Business Management School.

Hermalin, B., and M. Weisbach, 1988, Endoenously Chosen Boards of Directors and Their Monitoring of the CEO, *American Economic Review*, 88: 96-118.

Hillman, A. J., and T. Dalziel, 2003, Boards of Directors and Firm Performance: Integrating Agency and Resource Dependence Perspective, *Academy of Management Review*, 28: 383-396.

Hussels, S., and D. Ward, 2007, The Impact of Deregulation on the German and UK Life Insurance Markets: An Analysis of Efficiency and Productivity Between 1991-2002, Cranfield Research Paper Series (4).

Jeng, V., and G. C. Lai, 2005, Ownership Structure, Agency Costs, Specialization and Efficiency: Analysis of Keiretsu and Independent Insurers in the Japanese Non-Life Insurance Industry, *Journal of Risk and Insurance*, 72: 105-158.

Jeng, V., G. C. Lai, and M. J. McNamara, 2007, Efficiency and Demutualization: Evidence From the U.S. Life Insurance Industry in the 1980s and 1990s," *Journal of Risk and Insurance*, 74: 683-711.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

Jensen, M.C., and W. H. Meckling, 1976, Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure, *Journal of Financial Economics*, 3: 305-350.

Katz, R., 1982, Project Communication and Performance: An Investigation Into the Effects of Group Longevity, *Administrative Science Quarterly*, 27: 81-104.

Kiel, G. C., and G. J. Nicholson, 2003, Board Composition and Corporate Performance: How the Australian Experience Informs Contrasting Theories of Corporate Governance, *Corporate Governance*, 11: 189-205.

Klein, A., 1998, Firm Performance and Board Committee Structure, *Journal of Law and Economics*, 41: 137-165.

Lai, G. C., and P. Limpaphayom, 2003, Organization Structure and Performance: Evidence From the Nonlife Insurance Industry in Japan, *Journal of Risk and Insurance*, 70: 735-757.

Leech, D. and J. Leahy, 1991, Ownership Structure, Control Type Classifications, and the Performance of Large British Companies, *Economic Journal*, 101: 1418-1437.

Lehmann, E. E., S. Warning, and J. Weigand, 2004, Governance Structures, Efficiency and Firm Profitability, Discussion paper, MPI Jena, Germany.

Mace, M., 1996, *Directors: Myth and Reality* (Cambridge, MA: Harvard University Press).

Maddala, G. S., 1983, *Limited Dependent and Quantitative Variables in Econometrics* (New York: Cambridge University Press).

Mason, T., and D. Wallace, 1987, The Downfall of a CEO, *Business Week*, 16: 76-84.

Menon, K., and J. D. Williams, 1994, The Use of Audit Committees for Monitoring, *Journal of Accounting and Public Policy*, 13: 121-139.

Mura, R., 2007, Firm Performance: Do Non-Executive Directors Have a Mind of Their Own? Evidence From UK Panel Data, *Financial Management*, 36: 81-112.

Ning, Y. N., W. N. Davidson, III, and J. Wang, 2010, Does Optimal Corporate Board Size Exist? An Empirical Analysis, Working paper.

Olson, D. E., 2000, Agency Theory in the Not-for-Profit Sector: Its Role at Independent Colleges, *Nonprofit and Voluntary Sector Quarterly*, 29: 280-296.

O'Sullivan, N., and S. R. Diacon, 2003, Board Composition and Performance in Life Insurance Companies, *British Journal of Management*, 14: 115-129.

Pfeffer, J., 1972, Size and Composition of Corporate Boards of Directors: The Organization and Its Environment, *Administrative Science Quarterly*, 17: 218-222.

Prowse, S., 1998, *Corporate Governance: Emerging Issues and Lessons From East Asia, Responding to Global Financial Crisis* (Washington, DC: The World Bank).

Rajan, R., and L. Zingales, 1998, Which Capitalism? Lessons From the East Asian Crisis, *Journal of Applied Corporate Finance*, 11: 40-48.

Schroeder, M., and T. Hamburger, 2002, Accounting Reform Gets Big Lift as Senate Panel Backs New Board, *Wall Street Journal*, June 19: A1.

Shivdasani, A., 1993, Board Composition, Ownership Structure, and Hostile Takeovers, *Journal of Accounting and Economics*, 16: 167-198.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www

Shleifer, A., and R. W. Vishny, 1997, A Survey of Corporate Governance, *Journal of Finance*, 52: 737-783.

Simar, L., and P. W. Wilson, 2007, Estimation and Inference in Two-Stage, Semi-parametric Models of Production Processes, *Journal of Econometrics*, 136: 31-64.

Vafeas, N., 2003, Length of Board Tenure and Outside Director Independence, *Journal of Business Finance & Accounting*, 30: 1043-1064.

Vafeas, N., and E. Theodorou, 1998, The Relationship Between Board Structure and Firm Performance in the UK. *British Accounting Review*, 30: 383-407.

Vance, S.C., 1964, *Boards of Directors: Structure and Performance* (Boston, MA: Harvard Business School Press).

Wang, J. L., V. Jeng, and J. L. Peng, 2007, The Impact of Corporate Governance Structure on the Efficiency Performance of Insurance Companies in Taiwan, *Geneva Papers on Risk and Insurance: Issues and Practice*, 32: 264-282.

Weir, C., D. Laing, and P. McKnight, 2002a, Internal and External Governance Mechanisms: Their Impact on the Performance of Large UK Public Companies, *Journal of Business Finance and Accounting*, 29: 579-611.

Weir, C., D. Laing, and P. J. McKnight, 2002b, An Empirical Analysis of the Impact of Corporate Governance Mechanisms on the Performance of UK Firms, Working paper.

Williamson, O. E., 1985, *The Economic Institutions of Capitalism: Firms, Markets, Relationship Contracting* (New York: Free Press).

Worthington, A.C., and E. V. Hurley, 2000, Technical, Allocative and Cost Efficiency in the Australian General Insurance Industry." Discussion paper No. 74 in Economics, Finance and International Competitiveness, School of Economics and Finance, Queensland University of Technology, Australia.

Yermack, D., 1996, Higher Market Valuation of Companies With a Small Board of Directors, *Journal of Financial Economics*, 40: 185-211.

Zahra, S., and J. Pearce, 1989, Boards of Directors and Corporate Financial Performance: A Review and Integrative Model, *Journal of Management*, 15: 291-334.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission. www