The Non-Correlation Between Board Independence and Long-Term Firm Performance

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ABSTRACT

The boards of directors of American public companies are dominated by independent directors. Many commentators and institutional investors believe that a "monitoring board," composed almost entirely of independent directors, is an important component of good corporate governance. The empirical evidence reported in this Article challenges that conventional wisdom.

We conduct the first large-sample, long-horizon study of whether the degree of board independence (proxied by the fraction of independent directors minus the fraction of inside directors on a company's board) correlates with various measures of the long-term performance of large American firms. We find evidence that low-profitability firms increase the independence of their boards of directors. But there is no evidence that this strategy works. Firms with more independent boards do not perform better than other firms. Our results support efforts by firms to experiment with board structures that depart from the conventional monitoring board.

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I. INTRODUCTION

Over the last thirty years, American corporate boards have undergone a gradual but dramatic change. In the 1960s, most had a majority of inside directors. Today, almost all have a majority (usually a large majority) of outside directors, most have a majority (often a large majority) of independent directors, and an increasing number have only one or two inside directors. This pattern reflects the conventional wisdom that the board's principal task is to monitor management, and only independent directors can be effective monitors. In contrast, an insider-dominated board is seen as a device for management entrenchment.[1] For example, guidelines adopted by the Council of Institutional Investors call for at least 2/3 of a company's directors to be independent; guidelines adopted by the California Public Employees Retirement System and by the National Association of Corporate Directors call for boards to have a "substantial majority" of independent directors.[2] American corporate governance experts and institutional investors are now

1. *See, e.g.*, MELVIN A. EISENBERG, THE STRUCTURE OF THE CORPORATION: A LEGAL ANALYSIS (1976); William B. Chandler III, *On the Instructiveness of Insiders, Independents, and Institutional Investors*, 67 U. CIN. L. REV. 1083, 1084 (1999) (describing the "conventional wisdom" in exactly these terms); Ira M. Millstein, *The Evolution of the Certifying Board*, 48 BUS. LAW. 1485 (1993); AMERICAN LAW INSTITUTE, PRINCIPLES OF CORPORATE GOVERNANCE: ANALYSIS AND RECOMMENDATIONS § 3A.01 (1994).

2. COUNCIL OF INSTITUTIONAL INVESTORS, SHAREHOLDER BILL OF RIGHTS (1998); CALIFORNIA PUBLIC

exporting this conventional wisdom around the world. It has only an occasional dissenting voice.[3] Even the Business Roundtable (an organization of large-firm CEOs), which once opposed proposals for more independent boards, now recommends that boards have a "substantial majority" of independent directors.[4] Yet there are numerous anecdotes where a highly independent board hasn't prevented large-scale wealth destruction. Enron (with eleven independent directors on its fourteen-member board) is only the most recent example. When we turn from anecdote to quantitative evidence, the conventional wisdom favoring highly independent boards lacks a solid empirical foundation, in this or other studies.

We study in this Article three related questions. First, does greater board independence produce better corporate performance, as conventional wisdom predicts? Second, and conversely, does board composition respond to firm performance? Third, does board size predict firm performance? Prior quantitative research on the first two questions has been inconclusive; for the third, two studies report that firms with large boards perform worse than firms with smaller boards. We report here evidence from the first large-scale, long-time-horizon study of the relationship among board independence, board size, and the long-term performance of large American firms. We study measures of financial performance and growth from 1985-1995 for 934 of the largest United States firms, using data on these firms' boards of directors in early 1991 and board data for a random subsample of 205 firms from early 1988.

Our principal findings: We find evidence that low-profitability firms respond to their business troubles by following conventional wisdom and increasing the proportion of independent directors on their boards. There is no evidence, however, that this strategy works. Firms with more independent boards (proxied by the fraction of independent directors minus the fraction of inside directors) do not achieve improved profitability, and there are hints in our data that they perform worse than other firms. This evidence suggests that the conventional wisdom on the importance of board independence lacks empirical support. Board size also shows no consistent correlation with firm performance, though we find hints of the negative correlation found in other studies.

We conduct a number of robustness checks on our results. Our results on the noncorrelation between board independence and performance persist: (i) after controlling for board size, firm size, industry effects, CEO stock ownership, stock ownership by outside directors, and number and size of outside 5% blockholders; (ii) in both an ordinary least squares and a simultaneous equations framework; (iii) when we run

EMPLOYEES RETIREMENT SYSTEM, CORPORATE GOVERNANCE CORE PRINCIPLES AND GUIDELINES (1998), *at* http://www.calpers-governance.org/principles/domestic/us/page01.asp; NATIONAL ASSOCIATION OF CORPORATE DIRECTORS, REPORT OF THE NACD BLUE RIBBON COMMISSION ON DIRECTOR PROFESSIONALISM 12 (2001).

3. For examples of these dissents, see Bevis Longstreth, *Corporate Governance: There's Danger in New Orthodoxies*, CORP. GOVERNANCE ADVISOR, July/August 1994, at 18-21; James M. Tobin, *The Squeeze on Directors—Inside is Out*, 49 BUS. LAW. 1707 (1994).

4. BUSINESS ROUNDTABLE, STATEMENT ON CORPORATE GOVERNANCE 10 (1997), *at* http://www.brtable.org/pdf/11.pdf. For the Business Roundtable's earlier views, see generally STATEMENT OF THE BUSINESS ROUNDTABLE ON THE AMERICAN LAW INSTITUTE'S PROPOSED PRINCIPLES OF CORPORATE GOVERNANCE AND STRUCTURE: RESTATEMENT AND RECOMMENDATIONS (1983) [hereinafter BUSINESS ROUNDTABLE (1983)].

Koenker-Bassett robust regressions, which give less weight to outlying observations;[5] (iv) for regressions that use dummy variables for different ranges of board independence or otherwise allow for a nonlinear relationship between board independence and firm performance; and (v) in regressions that include separate independent variables for the proportion of independent directors and the proportion of inside directors.

If our results are correct, the current focus on board independence as a core measure of board quality could detract from other, perhaps more effective strategies for addressing poor firm performance. At the least, corporate governance advisors and institutional investors should support efforts by firms to experiment with different board structures and be more tentative in their advice that other countries should adopt American-style monitoring boards.

We do not doubt that independent directors are important. No one else can effectively restrain insider self-dealing or fire the CEO when necessary. Indeed, one of us has stressed, in other recent work, the role of independent directors in controlling self-dealing.[6] The policy question raised by our results is whether inside and affiliated directors also play valuable roles that may be lost in a single-minded drive for greater board independence.

This Article is organized as follows. Part II briefly reviews the literature on the relationship between firm performance and board composition and between firm performance and board size. Part III describes our research design and sample characteristics. Part IV contains our principal results on the correlation and direction of apparent causation between board independence and firm performance, and the correlation between board size and performance. Part V explores the relationship between firm growth rates and board independence. Part VI develops possible explanations for our results and offers some policy conclusions.

II. PRIOR RESEARCH ON BOARD COMPOSITION

A. Does Board Composition Affect Firm Performance?

Two recent articles, one written by us, survey the literature on how board composition affects firm performance or vice versa. Thus, our discussion of prior research is brief and emphasizes recent research not covered in these surveys.[7] Studies of the effect of board composition on firm performance generally adopt one of two approaches. The first approach involves studying how board composition affects the board's behavior on discrete tasks, such as replacing the CEO, awarding golden parachutes to executives, acquiring another firm, or defending against a takeover bid. The second approach directly examines the relationship between board composition and firm performance.

5. *See* Roger Koenker & Gilbert Bassett, Jr., *Regression Quantiles*, 46 ECONOMETRICA 33 (1978).

6. Bernard S. Black, *The Legal and Institutional Preconditions for Strong Securities Markets*, 48 UCLA L. REV. 781, 810 (2001).

7. *See* Sanjai Bhagat & Bernard Black, *The Uncertain Relationship Between Board Composition and Firm Performance*, 54 BUS. LAW. 921 (1999); Michael S. Weisbach & Benjamin E. Hermalin, *Boards of Directors as an Endogeneously Determined Institution: A Survey of the Economic Literature* (working paper 2000), *at* http://papers.ssrn.com/abstract=233111 (Social Science Research Network).

Board behavior on discrete tasks. The first approach to studying boards of directors focuses on particular board tasks. This approach can involve tractable data, which makes it easier for researchers to find statistically significant results. But it doesn't tell us how board composition affects overall firm performance. For example, there is evidence that firms with majority-independent boards perform more effectively than other boards on particular tasks, such as replacing the CEO[8] and making takeover bids.[9] However, there are other monitoring tasks where differences based on board independence have been hypothesized but not found, including gains from divestitures and the likelihood that management will commit illegal acts.[10] On still other tasks, there is little evidence of effective monitoring. For example, there is evidence that CEO compensation correlates positively with the compensation of the outside directors from their own firms, and only negligibly with the CEO's performance.[11]

Moreover, even if majority-independent boards perform better than other boards on some tasks, they could perform worse on other tasks for which inside directors may be valuable, but which cannot readily be studied using this approach (such as selecting a new CEO or choosing a new strategic direction for the firm). If so, firms might realize no net gain in overall performance from having majority-independent boards.

Furthermore, even if firms perform better on some tasks when they have a majority of independent directors, it is not clear that having a *supermajority* (substantially more than 50%) of independent directors will further improve board performance. Most studies do not address this question. Some report differences between majority-independent and non-majority-independent boards, while others report differences between firms with at least 60% independent directors and other firms. No study asks whether there are behavior differences between, for instance, a board with six independent directors out of nine (67%), and a board with seven out of nine (78%) or eight out of nine (88%) independent directors. Yet current conventional wisdom calls for supermajority-independent boards, with only one or two inside directors on a typical nine or eleven member board.

Overall correlation between board composition and firm performance. The second approach to studying boards of directors, and the approach adopted in this Article, involves studying whether board composition affects overall firm performance. This approach allows us to examine the "bottom line" of firm performance (unlike the first approach), but involves much less tractable data. Firm performance must be measured

8. *See* Michael S. Weisbach, *Outside Directors and CEO Turnover*, 20 J. FIN. ECON. 431 (1988).

9. *See* John W. Byrd & Kent A. Hickman, *Do Outside Directors Monitor Managers?: Evidence from Tender Offer Bids*, 32 J. FIN. ECON. 195 (1992) (noting higher bidder returns if firms have majority-independent boards). *But see* V. Subrahmanyam, N. Rangan & S. Rosenstein, *The Role of Outside Directors in Bank Acquisitions*, FIN. MGMT., Autumn 1997, at 23 (finding the opposite result for banks that acquire other banks).

10. *See, e.g.*, Robert C. Hanson & Moon H. Song, *Managerial Ownership, Board Structure, and the Division of Gains in Divestitures*, 6 J. CORP. FIN. 55 (2000) (finding no general correlation between fraction of independent directors and divestiture gains, but also an odd (to our eyes) correlation conditioned on the buyer and seller realizing joint gains); Idalene F. Kesner, Bart Victor & Bruce T. Lamont, *Board Composition and the Commission of Illegal Acts: An Investigation of Fortune 500 Companies*, 4 ACAD. MGMT. J. 789 (1986).

11. *See* Charles A. O'Reilly III, Brian G. Main & Graef S. Crystal, *CEO Compensation as Tournament and Social Comparison: A Tale of Two Theories*, 33 ADMIN. SCI. Q. 257 (1988).

over a long period, which means that performance measures are noisy and perhaps misspecified.[12]

Prior research does not support a clear correlation between board independence and firm performance. For example, early work by Vance reports a positive correlation between the proportion of *inside* directors and a number of performance measures.[13] Baysinger and Butler,[14] Hermalin and Weisbach,[15] and MacAvoy and coauthors[16] all report no significant same-year correlation between board composition and various measures of corporate performance. A recent large-sample study by Ferris and his coauthors finds no significant correlation between proportion of outside directors in 1995 and ratio of market value to book value in 1997.[17] An early exception to these nonresults comes from Baysinger and Butler, who report that the proportion of independent directors in 1970 correlates with *1980* industry-adjusted return on equity.[18] However, their ten-year lag period is very long for any effects of board composition on performance to persist. Studies in Australia, Singapore, and the United Kingdom also find no correlation between board composition and firm performance.[19]

A few studies offer hints that firms with a high percentage of independent directors may perform *worse*. Yermack reports a significant negative correlation between the proportion of independent directors and contemporaneous Tobin's *q*,[20] but no significant correlation for several other performance variables (sales/assets; operating income/assets; operating income/sales).[21] Agrawal and Knoeber report a negative correlation between

12. On the specification of stock price returns over long periods, see S.P. Kothari & Jerold B. Warner, *Measuring Long-Horizon Security Price Performance*, 43 J. FIN. ECON. 301 (1997); Brad M. Barber & John D. Lyon, *Detecting Long-Run Abnormal Stock Returns: The Empirical Power and Specification of Test Statistics*, 43 J. FIN. ECON. 341 (1997); Brad M. Barber & John D. Lyon, *Detecting Abnormal Operating Performance: The Empirical Power and Specification of Test Statistics*, 41 J. FIN. ECON. 359 (1996).

13. *See* STANLEY C. VANCE, BOARD OF DIRECTORS: STRUCTURE AND PERFORMANCE (1964).

14. *See* Barry Baysinger & Henry Butler, *Corporate Governance and the Board of Directors: Performance Effects of Changes in Board Composition*, 1 J. L. ECON. & ORG. 101 (1985).

15. *See* Benjamin E. Hermalin & Michael S. Weisbach, *The Effect of Board Composition and Direct Incentives on Firm Performance*, FIN. MGMT, Winter 1991, at 101.

16. *See* Paul W. MacAvoy et al., *ALI Proposals for Increased Control of the Corporation by the Board of Directors: An Economic Analysis*, *in* BUSINESS ROUNDTABLE (1983), *supra* note 4, at exh. C-1.

17. *See* Stephen P. Ferris, Murali Jagannathan & A.C. Pritchard, *Too Busy to Mind the Business? Monitoring by Directors with Multiple Board Appointments* (working paper 2002), *earlier version available at* http:/papers.ssrn.com/abstract=167288 (Social Science Research Network). Other U.S. studies finding no significant results include Hamid Mehran, *Executive Compensation Structure, Ownership and Firm Performance*, 38 J. FIN. ECON. 163 (1995).

18. *See* Baysinger & Butler (1985), *supra* note 14, at 115-18.

19. *See* Mara Faccio & M. Ameziane Lasfer, *Managerial Ownership, Board Structure and Firm Value: The UK Evidence* (working paper 1999), *at* http://papers.ssrn.com/abstract=179008 (Social Science Research Network); Jeffrey Lawrence & G.P. Stapledon, *Is Board Composition Important? A Study of Listed Australian* Companies (working paper 1999), *at* http://papers.ssrn.com/abstract=193528 (Social Science Research Network); Y.T. Mak & Yuan Li, *Determinants of Corporate Ownership and Board Structure: Evidence from Singapore*, 7 J. CORP. FIN. 235 (2001).

20. Tobin's *q* is the ratio of the market value of a firm's assets to the book value of its assets. It is often approximated by the ratio of the market value of a firm's long-term debt and equity to the book value of its long term debt and equity. Tobin's *q* is used as a measure of good management because high Tobin's *q* suggests that a firm's managers have produced greater market value from the same assets.

21. *See* David Yermack, *Higher Market Valuation of Companies with a Small Board of Directors*, 40 J. FIN. ECON. 185 (1996).

the proportion of outside directors and Tobin's *q*.[22] Klein reports a significant negative correlation between a measure of change in market value of equity and proportion of independent directors, but insignificant results for return on assets and stock market returns.[23] Fosberg reports that majority-outside boards have a significantly lower sales/assets ratio, but finds insignificant (although generally negative) results for several other performance measures.[24]

Event studies. Rosenstein and Wyatt find that stock prices increase by about 0.2%, on average, when a company appoints an additional outside director.[25] This increase, while statistically significant, is economically small and could reflect signaling effects. Appointing an additional outside director could signal that a company plans to address its business problems, even if board composition doesn't affect the company's ability to address these problems. Moreover, Rosenstein and Wyatt find a stronger price reaction for outside directors who work for financial institutions than for directors whose principal job is with another unrelated non-financial corporation.[26] Yet outside directors who work for financial institutions are usually treated as affiliated outside directors rather than independent directors, because their own firm may be interested in business dealings with the firm on whose board they sit.Rosenstein and Wyatt find that stock prices neither increase nor decrease on average when an *insider* is added to the board.[27]

Composition of board committees. Klein finds that *inside* director representation on a board's investment committee correlates with improved firm performance. She finds little evidence that the "monitoring" committees that are usually dominated by independent directors—the audit, compensation, and nominating committees—affect performance, regardless of how they are staffed.[28]

B. Does Firm Performance Affect Board Composition?

An important issue in studying the correlation between board composition and firm performance is the direction of causation. Board composition could affect firm performance, but firm performance can also cause the firm to change its board composition. Prior researchers have found limited evidence of an endogenous relationship between firm performance and board composition, in which performance affects board composition. (We discuss in Part III.E other possible sources of an endogenous relationship among board composition, firm performance, and other firm characteristics.)

22. *See* Anup Agrawal & Charles R. Knoeber, *Firm Performance and Mechanisms to Control Agency Problems Between Managers and Shareholders*, 31 J. FIN. & QUANTITATIVE ANALYSIS 377 (1996).

23. *See* April Klein, *Firm Performance and Board Committee Structure*, 41 J.L. & ECON. 275, 286-88 (1998).

24. *See* Richard H. Fosberg, *Outside Directors and Managerial Monitoring*, AKRON BUS. & ECON. REV., Summer 1989, at 24.

25. *See* Stuart Rosenstein & Jeffrey G. Wyatt, *Outside Directors, Board Independence, and Shareholder Wealth*, 26 J. FIN. ECON. 175 (1990).

26. *Id.* at 188-90.

27. *See* Stuart Rosenstein & Jeffrey G. Wyatt, *Inside Directors, Board Independence, and Shareholder Wealth*, 44 J. FIN. ECON. 229, 239 (1997).

28. *See* Klein (1998), *supra* note 23, at 293-96.

Hermalin and Weisbach, and Weisbach (using the same data set), report that the proportion of independent directors on large firm boards increases when a company has performed poorly. This effect is statistically significant but numerically small. Firms in the bottom performance decile in year *X* (measured using either earnings changes or stock price changes) increase their proportion of independent directors by less than 1% in year *X*+1, relative to other firms, from 1972 through 1983.[29] Weisbach concludes from this evidence that "[s]ince the change in board composition following poor performance is relatively small, and board composition changes very slowly over time, it is unlikely that the potential endogeneity of the board composition is a serious problem."[30]

In contrast to Hermalin and Weisbach, Klein finds no evidence that performance affects board composition. In her sample, firms in the bottom quintile for 1991 stock price returns are no more likely to add independent directors in 1992 and 1993 than firms in the top quintile.[31] Denis and Sarin report that firms that substantially increase their proportion of independent directors had *above-average* stock price returns in the previous year. They also report that average board composition for a group of firms changes slowly over time and that board composition tends to regress to the mean, with firms that have a high (low) proportion of independent directors reducing (increasing) this percentage over time.[32]

C. The Unsolved Puzzle: Why Has Board Composition Changed So Radically?

The weak, equivocal data on the overall connection between board independence and firm performance leaves an unsolved puzzle. The composition of public company boards of directors has changed radically over the last thirty years. Until around 1970, insiders numerically dominated boards of directors. For example, Baysinger and Butler found 54% inside directors, 26% affiliated directors, and only 20% independent directors in a sample of 266 large firms in 1970. By 1980, the proportion of inside directors in their sample had dropped to 43% and the proportion of independent directors had risen to 31%.[33] Similarly, Hermalin and Weisbach, using a narrower definition of affiliated directors, found that firms had 49% inside directors, 13% affiliated directors, and 38% independent directors in 1971. By 1983, inside directors had fallen to 34% and independent directors had grown to 54%.

The trend toward greater board independence has continued. In our 1991 sample, the median firm has an eleven member board with three inside directors, one affiliated director, and seven independent directors. In percentages, the median firm had 23% inside directors, 13% affiliated directors, and 64% independent directors (see Table 1 below). By 1997, the mean number of inside directors at S&P 500 firms (which should be comparable to our sample) had dropped from three to two, and 56% of the S&P 500 firms had only one or two inside directors.[34]

29. Benjamin E. Hermalin & Michael S. Weisbach, *The Determinants of Board Composition*, 19 RAND J. ECON. 589 (1988); Weisbach (1988), *supra* note 8, at 454.

30. Weisbach (1988), *supra* note 8, at 454.

31. *See* Klein (1998), *supra* note 23, at 292.

32. *See* David J. Denis & Atulya Sarin, *Ownership and Board Structures in Publicly Traded Corporations*, 52 J. FIN. ECON. 187 (1999).

33. *See* Baysinger & Butler (1985), *supra* note 14, at 113.

34. *See* Bhagat & Black (1999), *supra* note 7, at 922; SPENCERSTUART, 1997 BOARD INDEX: BOARD TRENDS AND PRACTICES AT S&P 500 CORPORATIONS (1997).

At any point in time, different firms have different board structures. Those differences can predict performance, respond endogenously to performance or other firm characteristics, or both. Interfirm differences in board independence may reflect departures from efficiency, but they could also be an efficient response to differences in firm characteristics. Even if interfirm variation in board composition is partly endogenous, however, the large multidecade shift in board composition makes it hard to explain board composition entirely as an efficient, endogenous response to economic pressures that push firms to choose efficient governance structures. It is simply not apparent why (hypothetically) a majority-inside board was efficient up to around 1970, a roughly 50% independent board was efficient in the 1980s, and a supermajority-independent board is efficient today.

More plausibly, the large long-term shift in board structures responds to changes in conventional wisdom and perhaps also to legal pressures. The Delaware Supreme Court, for example, has long encouraged majority-independent boards by giving greater deference to decisions by these boards.[35] If the shift in board composition responds to external pressure, then it may be neither efficient nor an endogenous response to firm characteristics.

Given the equivocal data and the importance that conventional wisdom attaches to highly independent boards, a closer look at whether greater board independence predicts improved firm performance, using more recent data, a larger sample (to improve signal to noise ratio), and a long time horizon (because the effects of composition on performance may appear only over time) seems warranted. We undertake that study here.

III. RESEARCH DESIGN AND SAMPLE CHARACTERISTICS

We follow the common practice of dividing directors into *inside directors* (persons who are currently officers of the company), *affiliated directors* (relatives of officers; persons who are likely to have business relationships with the company, such as investment bankers and lawyers; and persons who were officers in the recent past) (sometimes called *gray directors*) and *independent directors* (outside directors without such affiliations).[36]

We indicate the proportions of independent and inside directors as f_{indep} and f_{inside}, respectively. Prior studies have generally used f_{indep} as the board composition variable of interest. This treats inside and affiliated directors as equally (non)independent, when in fact, affiliated directors may often be substantially independent. We instead measure

35. *See, e.g.*, Unocal Corp. v. Mesa Petroleum Co., 493 A.2d 946, 955 (Del. 1985) (stating that judicial deference to board's decision to oppose a takeover is "materially enhanced" when the board has a majority of independent directors). Idalene F. Kesner & Roy B. Johnson, *An Investigation of the Relationship Between Board Composition and Stockholder Suits*, 11 STRATEGIC MGMT. J. 327 (1990), confirm that firms with a higher proportion of inside directors are subject to more shareholder lawsuits.

36. See the definitions in INSTITUTIONAL SHAREHOLDER SERVICES, THE ISS PROXY VOTING MANUAL 3.7-3.9 (3d ed., rev. 2001) and Council of Institutional Investors, *at* http://app.cii.org/glossary.cfm. Our categories of "independent director," "affiliated director," and "inside director" correspond to the "outside director," "gray director," and "inside director" categories used by other authors. *See* Baysinger & Butler (1985), *supra* note 14; MacAvoy et al. (1983), *supra* note 16; Weisbach (1988), *supra* note 8; at 435-36.

board independence as $INDEP = f_{indep} - f_{inside}$. This effectively treats independent, affiliated, and inside directors as having independence weights of +1, 0, and -1, respectively.[37]

A. Procedure for Data Collection and Analysis

This study seeks to measure the correlation between board independence and firm performance, and also the correlation between board size and firm performance, while correcting weaknesses (especially limited sample size, short measurement period, and limited control variables) in prior studies that may explain why these studies generally do not find significant results. We focus primarily on the relationship between board independence and firm performance, but return in Part IV.G to the effects of board size on firm performance.

We use both an ordinary least squares and a simultaneous equations (three stage least squares) approach to assess whether board composition affects firm performance, firm performance affects board composition, or both. We use data on board composition in early 1991 from a database compiled by Institutional Shareholder Services (ISS) of 957 large U.S. public corporations, including virtually all of the largest American firms. ISS classified each director, at each firm, as inside, independent, or affiliated. We exclude from this database twenty-three firms without stock price data available from the Center for Research in Security Prices (CRSP), to produce a "1991 sample" of 934 firms. To test the robustness of our results, we also collect data on board composition in early 1988 for a randomly chosen subsample of 205 firms using proxy statements obtained from LEXIS/NEXIS.

We supplement this board data with: data from Compustat on the sample firms' accounting performance between 1985 and 1995 (available for 928 firms for at least some variables and some years); data from CRSP on the sample firms' stock price performance during this period; and data on share ownership obtained from proxy statements (available for 780 firms). We collect the following information on holdings of voting shares (to the nearest 0.1%):[38]

- the chief executive officer's (CEO's) percentage ownership;[39]

37. As a robustness check on our results, we reran most of the regressions reported in this Article using f_{indep} and f_{inside} as separate independent variables. Both variables were only intermittently significant.

38. Any share ownership study faces difficulty handling stock options and firms with two or more classes of voting stock. Our decision rules were as follows: SEC rules require ownership disclosure for options that are exercisable currently or within sixty days. We include these options in computing share ownership. When two classes of voting stock have identical or nearly identical *economic* interests but different voting rights (typically two classes of common stock), we compute share ownership as the percentage of total outstanding shares of both classes. This percentage *economic interest* will differ from percentage *voting interest*. If two classes have different economic interests (most commonly when a firm has voting convertible preferred stock), we use voting power as a proxy for economic interest, and compute ownership interest based on the percentage of total votes for shares of both classes.

It can be frustrating and sometimes impossible to determine from proxy statements a family group's total share ownership when the family's shares are held by multiple trusts with overlapping trustees. We treat such family groups as a single shareholder, doing our best to compute total ownership. We treat the family group as an outside shareholder if no person with that family name is a company officer.

39. Where a firm has nonstandard titles, or separates the titles of CEO and Chairman, it can be difficult to determine who is the real chief executive officer. If a firm has a CEO and a Chairman who are different people, we treat the named CEO as the chief executive officer if the named Chairman is an outsider with another

- the percentage ownership by all directors and officers;
- the percentage ownership by all outside directors (for 1988, by all independent directors) (these two measures are highly correlated);
- the number of outside shareholders or shareholder groups that own 5% or more of the company's voting shares; and
- the total percentage ownership by all outside 5% shareholders.

We expect board composition to affect performance only gradually. We therefore cumulate performance data over a multiyear period surrounding the date(s) when we measure board composition. Below, when we use board composition and stock ownership data from early 1991, we report regression results for performance measures for the "retrospective" period from 1988-1990 (preceding the board composition measurement date) and for the "prospective" period from 1991-1993 (following the board composition measurement date). We also compute, but do not report, results for the earlier retrospective period of 1985-1987 and the later prospective period of 1994-1995; these results are similar to those for the closer-in-time periods that we report. When we use board composition and stock ownership data from early 1988 (for our 1988 subsample), we treat 1985-1987 as the retrospective period and 1988-1990 as the prospective period.

B. Tests for Entry and Exit Bias

This study, like any study of long-term performance, could produce biased results due to entry into and exit from the sample over time. For the retrospective period, firms that were included in our sample in early 1991, but not in earlier years, may have a different relationship between board independence and performance than firms that appear in the sample for the entire period. Similarly, firms that drop out of the sample during the prospective period may have a different relationship between board independence and performance than firms that survive for this period of time.

However, entry and exit bias does not appear to be a significant concern for our sample. With regard to exit during the prospective period, we find no significant correlation between board composition or board size and the probability that a firm exits the sample between 1991 and 1995:

Spearman Correlation Coefficients
(two-tailed significance levels in parentheses; sample size = 815)

	Proportion of Inside Directors	**Proportion of Independent Directors**	**Board Size**
Probability that Firm, Included in Sample In 1991, Survives Through 1995	-.008 (.817)	.034 (.303)	.025 (.464)

primary job, and treat the named Chairman as the chief executive officer if he appears to be an executive of the company without another primary job.

Also, for the 1985-1987, 1988-1990, and 1991-1993 periods, we measure the correlation between firm performance and board composition with board composition measured at two different times, early 1988 and early 1991, and obtain similar results. This suggests that entry bias is not significant because the full 1991 sample includes, while the 1988 subsample excludes, firms that enter the full sample between 1988 and 1991.

C. Performance Variables

There is no single ideal measure of long-term firm performance. We collect data on four measures of firm performance, each with support in the accounting and finance literature as a respectable measure of firm performance.

Description	**Variable Name**
Tobin's *q*[40]	*Q*
Return on assets (ratio of operating income to assets)	*OPI/AST*
Ratio of sales to assets	*SAL/AST*
Market adjusted stock price returns[41]	*MAR*

The accounting variables are chosen to be independent of a firm's capital structure (ratio of debt to total capital) and its tax position. We obtain similar results with a number of other performance variables, including sales per employee, operating margin (operating income/sales), and a cash flow measure (cash flow/assets).

Stock price returns must be used with caution as a performance measure because they are susceptible to investor anticipation. If investors anticipate the effects of board composition on performance, long-term stock returns will be insignificant, even if a significant correlation between performance and board independence in fact exists. For this reason, we rely mostly on Tobin's *q (Q)*, ratio of operating income to assets *(OPI/AST)*, and ratio of sales to assets *(SAL/AST)* as our performance measures. In the Appendix we present selected results using market adjusted stock price returns as the performance measure. The results using stock price returns are consistent with the results for other variables.

40. We compute Tobin's *q* for a particular year as *q* = (market value of common stock + book value of preferred stock + book value of long-term debt)/(book value of total assets), with all values measured at year-end. Other measures of Tobin's *q* are possible, but Chung and Pruitt report a very high correlation between relatively careful and relatively crude measures. *See* Kee H. Chung & Stephen W. Pruitt, *A Simple Approximation of Tobin's q*, FIN. MGMT., Autumn 1994, at 70. More sophisticated measures also require additional data, which leads to missing observations and can cause sample selection bias. *See* Darrell E. Lee & James G. Tompkins, *A Modified Version of the Lewellen and Badrinath Measure of Tobin's Q*, FIN. MGMT., Spring 1999, at 20.

41. We use a simple measure of stock returns, *market-adjusted return (MAR)*, measured by cumulating over the measurement period daily returns minus the return on the S&P 500 index, *without* an adjustment for beta. For the multi-year periods over which we cumulate returns, Kothari & Warner report that MAR is better specified than abnormal return measures that include a beta adjustment. *See* Kothari & Warner (1997), *supra* note 12. In separate regressions (not shown), we confirm for our sample that MAR is better specified than measures based on cumulative abnormal returns or standardized abnormal returns.

D. Control Variables

Our regression results control for a number of factors that could affect firm performance, board composition, or both. The control variables that we use are:

- board size;
- CEO ownership (percent);
- outside director ownership (percent);
- firm size, proxied by log(sales);[42]
- number of outside 5% blockholders;[43]
- industry control—we classify firms into 302 industry groups based on 4-digit SIC codes, omitting industries for which Compustat has data on only one or two firms in that 4-digit industry;[44] and
- a constant term (not shown in the regressions).

E. Endogeneity

Board composition could affect future firm performance, but a firm's need for a particular board structure, the firm's past performance, and other factors could also affect the firm's future board composition.[45] The factors that influence board composition are not well understood. As we noted in Part II.C, the large changes in the composition of typical boards over the last several decades suggest that board composition is also affected by conventional wisdom, legal rules, and other external pressures that likely relate only weakly to firm characteristics.

Inter-industry differences in percentage of independent directors, at any one point in time, are relatively modest. This suggests that endogeneity that reflects industry-specific characteristics is limited. Agrawal and Knoeber report, for a sample of large firms in 1987, that the proportion of outside directors in eleven broad industry groups varied only from 66% in textiles to 77% in instruments, with a mean of 72%.[46] Moreover, some industry differences could reflect factors, other than industry, which influence the

42. For the performance variable with sales in the numerator *(SAL/AST)*, we use log(assets) instead of log(sales) to control for firm size. We also run regressions (not reported) using log(assets) instead of log(sales) as the size control for *Q* and *OPI/AST*. The results are similar to the regressions with log(sales) that we report in the text. For regressions using 1991 (1988) board composition and stock ownership data, we measure firm size at year-end 1990 (1987) for assets, and in 1990 (1987) for sales.

43. We also run regressions (not reported) using percentage holdings of all outside 5% blockholders as an additional control variable. This variable is generally insignificant. The coefficients for the number of outside 5% blockholders decline because the number of outside 5% blockholders and percentage holdings of all outside 5% blockholders are highly correlated (Spearman correlation coefficient = .909). The coefficients for other variables are virtually unchanged.

44. The control variable for each regression is the mean value for the industry of the performance variable that is used as a dependent variable in that regression. We also run regressions using 2-digit SIC code industry groups, and using four broad "1-digit" industry groups as a dependent variable: utility (SIC codes 4800-4999), financial (SIC codes 6000-6999), transportation (SIC codes 3700-3799, 4000-4581, 4700-4799), and industrial (all other SIC codes). The results with 2-digit industries are similar to those that we report in the text. The results with 1-digit industry groups are similar except as noted in the text.

45. For a general discussion of endogeneity in board composition studies, see Weisbach & Hermalin (2000), *supra* note 7.

46. *See* Anup Agrawal & Charles R. Knoeber, *Do Some Outside Directors Play a Political Role?*, 44 J.L. & ECON. 179, 182 (2001).

proportion of outside directors. For example, smaller firms have a higher proportion of inside directors, and the textile industry is composed of relatively small firms. There is also evidence that some firms choose some directors for their political connections,[47] that board composition is related to a firm's ownership structure (firms with high inside ownership have less independent boards),[48] and that firms with powerful CEOs have less independent boards.[49]

If board composition is endogenous, ordinary least squares (OLS) coefficient estimates can be biased. Simultaneous equations methods can address endogeneity, but are often more sensitive than OLS to model misspecification.[50] We address the combination of endogeneity and uncertainty about which econometric model to use partly by using an extensive set of control variables and robustness checks, and also by running both OLS and three-stage least squares (3SLS) regressions. Our OLS and 3SLS coefficient estimates and *t*-statistics for the effect of board independence on firm performance are similar, which suggests that endogeneity and model misspecification are not seriously skewing our results.[51]

F. Sample Characteristics

Table 1 provides summary statistics for the composition of the boards of directors of our sample firms. The median firm has an eleven member board, with seven independent directors, three inside directors, one affiliated director, and *INDEP* = .40. The variable δ*INDEP* is the change in *INDEP* between 1991 and 1988.

47. *See id.* at 187-91.

48. *See infra* Part III.F.

49. For a theoretical model, see Benjamin E. Hermalin & Michael S. Weisbach, *Endogenously Chosen Boards of Directors and Their Monitoring of the CEO*, 88 AM. ECON. REV. 96 (1998). For empirical evidence, see N. Arthur, *Board Composition as the Outcome of an Internal Bargaining Process: Empirical Evidence*, 7 J. CORP. FIN. 307 (2001); April Klein, CEO Power, Board Independence and CEO Compensation (2000) (working paper, New York University, Stern School of Business); Anil Shivdasani & David Yermack, *CEO Involvement in the Selection of New Board Members: An Empirical Analysis*, 54 J. FIN. 1829 (1999).

50. *See* Scott W. Barnhart & Stuart Rosenstein, *Board Composition, Managerial Ownership, and Firm Performance: An Empirical Analysis*, 33 FIN. REV. 1 (1998).

51. We also reran selected tables using Koenker-Bassett robust regressions, which give less weight to outlying observations rerun for both dependent and independent variables. *See* Koenker & Bassett (1978), *supra* note 5. These regressions (not reported) show only minor variations in coefficients and *t*-statistics from the results reported in the text. Thus, our results are not significantly affected by outlying observations.

Table 1
Sample Characteristics: Board of Directors

Summary statistics for the board composition of the 934 large U.S. public companies included in the Institutional Shareholder Services director database for 1991 and for change in board independence from 1988 to 1991 *(δINDEP).* Standard deviation is in parentheses.

				Percentiles				
Category	**Median**	**Mean (std. dev.)**	**Min.**	**10**	**20**	**80**	**90**	**Max.**
Inside Directors	3	2.84 (1.64)	0	1	2	4	5	14
Affiliated Directors	1	1.59 (1.52)	0	0	0	3	3	9
Independent Directors	7	7.03 (3.48)	0	3	4	9	11	22
Entire Board	11	11.45 (3.74)	4	7	8	14	16	30
Fraction: Inside Directors	.23	.26 (.14)	0	.10	.14	.38	.46	.83
Fraction: Affiliated Directors	.12	.14 (.13)	0	0	0	.25	.31	.75
Fraction: Independent Directors	.64	.60 (.19)	0	.18	.43	.75	.82	1.00
$INDEP = f_{indep} - f_{inside}$	.40	.33 (.31)	-1.00	-.11	.09	.58	.67	1.00
$\delta INDEP$	.00	-.02 (.22)	- .80	-.28	-.17	.16	.22	.67

As Table 1 shows, most large U.S. public companies have a high proportion of independent directors. The sample median (mean) of 64% (60%) independent directors can be compared with earlier studies, which generally show a smaller fraction of independent directors.[52] These studies are snapshots taken at different times during a long-term trend, discussed in Part II.C, toward greater board independence.

About 70% of the firms in our sample have majority-independent boards. About 85% have more independent than inside directors ($INDEP > 0$). Only 54 firms (5.8% of the sample) have majority-inside boards. Firms with majority-inside boards tend to be smaller and to have higher inside ownership than the other sample firms.[53] Table 2 reports summary statistics for our performance variables.

52. Our board composition results are similar to those of Klein (1998), *supra* note 23, at 275, who studies 485 large companies in 1991-1992, and finds a mean board size of 12.3, with 23% inside directors, 19% affiliated outside directors, and 58% independent directors. Klein finds a higher percentage of affiliated outside directors than we do because she treats interlocking directorships, where Company *A*'s CEO sits on Company *B*'s board, and vice-versa, as indicating affiliation, while we do not.

53. The fifty-four firms with majority-inside boards had mean (median) total assets of $3,981 million ($917 million) in 1993, compared to $9,002 million ($2,178 million) for the full sample, and mean (median) inside ownership of 21.1% (10.9%), compared to 9.0% (3.0%) for the full sample.

Table 2
Sample Characteristics: Performance Variables

Performance variables for 928 large U.S. public companies for 1985, 1990, and 1995. The variables *Q*, *OPI/AST* and *SAL/AST* are defined in Part III.C. *Q* 85 means Tobin's *q* for 1985, and similarly for other variables.

Variable	Median	Mean	Minimum	Maximum	Std. Deviation	Sample Size
Q 85	0.93	1.28	0.06	12.2	1.21	790
Q 90	0.88	1.18	0.03	8.4	1.1	898
Q 95	1.05	1.31	0.05	11.6	1.1	795
OPI/AST 85	.23	.25	-.17	.98	.13	651
OPI/AST 90	.21	.23	-.22	1.15	.11	764
OPI/AST 95	.20	.22	-.06	.99	.10	654
SAL/AST 85	.98	1.06	.01	6.28	.80	825
SAL/AST 90	.93	1.00	.07	5.62	.75	901
SAL/AST 95	.92	.97	.02	4.75	.69	797

Table 3 shows summary share ownership data for our sample. Board composition is related to inside share ownership. In our sample, the Spearman correlation coefficient between percentage of shares held by company officers and f_{inside} (f_{indep}) is .32 (-.41). Also, independent directors who own substantial blocks of stock may monitor more intensely than directors who own little stock. Similarly, monitoring by large outside blockholders could complement or substitute for monitoring by the board of directors. Thus, it important to control for stock ownership in assessing the relationship between board composition and firm performance.

Table 3
Sample Characteristics: Firm Ownership Structure

Stock ownership data for early 1991 for 780 large U.S. public companies (to nearest 0.1%). Standard deviation is in parentheses.

		Mean		Percentiles					Sample
Ownership Data	Median	(std. dev.)	Min.	10	20	80	90	Max.	Size
CEO ownership	0.5	3.8 (9.9)	0.0	0.0	0.1	3.0	9.7	84.2	779
Ownership by all directors and officers	3.0	9.0 (14.0)	0.0	0.3	0.8	4.5	27.2	85.1	780
Outside director ownership	1.0	2.8 (5.6)	0.0	0.1	0.2	3.2	6.5	71.1	768
No. of outside 5% blockholders (up to 5)	1.0	1.4 (1.3)	0	0	0	2	3	5	778
For firms with outside 5% blockholders:									
Ownership by all blockholders	17.8	21.9 (15.6)	5.0	6.4	8.3	31.7	43.2	96.9	520
Ownership of largest 5% blockholder	10.2	14.4 (11.9)	5.0	6.0	7.2	18.2	28.6	82.0	537
Ownership of 2d largest 5% blockholder	6.9	7.8 (3.3)	5.0	5.3	5.6	9.3	10.6	39.0	330
Ownership of 3d largest 5% blockholder	6.2	6.8 (1.9)	5.0	5.2	5.4	8.0	9.6	16.0	148
Ownership of 4th largest 5% blockholder	5.8	6.4 (1.9)	5.0	5.1	5.2	6.7	8.4	14.7	63
Ownership of 5th largest 5% blockholder	5.7	6.1 (1.3)	5.0	5.2	5.2	7.0	8.4	9.6	17

Table 4
OLS Estimates: Performance Variables on Board Independence and Ownership Structure

Ordinary least squares regression results for various performance variables on board independence and stock ownership for 928 large U.S. public companies for 1988-1990 and 1991-1993. The performance variables *Q*, *OPI/AST*, and *SAL/AST* are defined in Part III.C. *Q* 88-90 means average *Q* during 1988-1990 and similarly for other performance variables. Board and stock ownership variables are based on early 1991 data. Industry control for each regression is the mean of the dependent variable for that regression for each firm's industry group; 302 industry groups are constructed on the basis of 4-digit SIC codes from Compustat. Sample size varies from 552 to 684 because of missing data. *t*-statistics are in parentheses. Significant results ($p < .05$) are in **boldface** (not shown for firm size or industry control).

Dependent Variables	**Independent Variables**							**Adj. R^2**
	INDEP	**Board size**	**CEO ownership**	**Outside director ownership**	**No. of Outside 5% Holders**	**Log (firm size)**	**Industry control**	
Q 88-90	**-.44 (-4.98)**	-.001 (-.03)	.004 (1.59)	**.009 (2.13)**	**-.074 (-3.76)**	-.13 (-5.56)	.64 (14.79)	.376
Q 91-93	**-.22 (-2.09)**	-.018 (-1.81)	.003 (.79)	.007 (1.38)	**-.067 (-2.92)**	-.09 (-3.29)	.80 (18.92)	.429
OPI/AST 88-90	**-.07 (-4.87)**	**-.003 (-2.07)**	-.001 (-.91)	.001 (1.49)	-.003 (-.84)	.002 (.60)	.42 (9.49)	.187
OPI/AST 91-93	-.01 (-.88)	.001 (.06)	.001 (.68)	.001 (1.44)	-.005 (-1.61)	-.001 (-.34)	.71 (11.78)	.214
SAL/AST 88-90	**-.21 (-3.09)**	**-.020 (-2.64)**	**-.005 (-2.22)**	.005 (1.53)	.022 (1.42)	.08 (4.38)	.82 (26.5)	.588
SAL/AST 91-93	-.07 (-1.36)	**-.016 (-3.00)**	-.003 (-1.93)	.004 (1.64)	**.025 (2.18)**	.05 (3.55)	.89 (35.0)	.699

IV. FULL SAMPLE RESULTS (USING 1991 BOARD AND STOCK OWNERSHIP DATA)

A. OLS Results for Board Independence and Firm Performance

Table 4 presents our basic OLS results for the full 1991 sample.[54] During the retrospective period, board independence, proxied by *INDEP*, correlates significantly and *negatively* with all three performance measures. During the prospective period, the correlation remains negative for all variables, but is significant only for *Q*. These results are consistent with poor performance inducing firms to adopt more independent boards.

The results in Table 4 offer no evidence that firms with more independent boards perform better. They provide evidence instead that firms with more independent boards do *not* perform better, and hints that these firms suffer worse performance than other firms. Whatever reasons prompt poorly performing firms to increase board independence, this strategy does not improve their future performance.[55]

B. Simultaneous Equations Results for Board Independence and Firm Performance

We address the possible endogeneity of board independence and firm performance, suggested by the results in Table 4, by adopting a three stage least squares approach (3SLS), as described by Theil.[56] This procedure permits firm performance, board independence, and CEO ownership to be endogenously determined. For each endogenously determined variable, we need an instrumental variable—a variable that is correlated with the variable of interest, but is ideally (and in the 3SLS procedure, is assumed to be) uncorrelated with the error term. The endogenous variables and corresponding instrumental variables we use are:

54. When data is available for only some years in a multiyear measurement period, we compute the average for the period using the year(s) with available data. We use $p < .05$ (in a two-tailed test) as the threshold for statistical significance. Results with $.05 < p < .10$ are considered "marginally significant." Significant results are shown in **boldface**.

55. We perform a variety of checks for robustness, in addition to those described elsewhere in this Article. First, results are similar with two-digit industry controls. With one-digit industry controls, OPI/SAL 91-93 becomes significantly negative and OPI/AST 91-93 is negative and marginally significant. Second, we obtain similar results with a number of other performance variables, including sales per employee, operating margin (operating income/sales), and cash flow/assets. The coefficients on *INDEP* are negative and significant or marginally significant for 1988-1990, and generally negative but only sometimes significant for 1991-1993. Third, we obtain similar results in regressions where we replace *INDEP* ($= f_{indep} - f_{inside}$) with f_{inside} and f_{indep} (in direct or log form) as independent variables, except that the negative coefficient on *INDEP* is typically split between a negative coefficient on f_{indep} and a positive coefficient on f_{inside}. This is consistent with our judgment that *INDEP* is a better measure of board independence than f_{indep} alone.

56. *See* HENRI THEIL, PRINCIPLES OF ECONOMETRICS 508-23 (1971). 3SLS is a systems estimating procedure that estimates all the identified structural equations together as a set, instead of estimating the structural parameters of each equation separately as in the two stage least squares procedure (2SLS). The 3SLS procedure is a full information method that uses knowledge of all the restrictions in the entire system when estimating the structural parameters. The 3SLS estimator is consistent and in general is asymptotically more efficient than the 2SLS estimator. *See* W.M. Mikhail, *A Comparative Monte Carlo Study of the Properties of Economic Estimators*, 70 J. AM. STAT. ASS'N 94, 103 (1975).

- *firm performance measure*: normalized earnings per share (earnings per share divided by share price at the beginning of the measurement period);
- *board independence*: f_{indep}; and
- *CEO ownership*: share ownership by all directors and officers.

We estimate the following system of equations:

- *Equation 5.1: firm performance* = f_1 (*INDEP*, CEO ownership, board size, outside director ownership, no. of outside 5% holders, log(firm size), industry performance control)
- *Equation 5.2: INDEP* = f_2 (firm performance, CEO ownership, outside director ownership, no. of outside 5% holders, log(firm size))
- *Equation 5.3: CEO Ownership* = f_3 (firm performance, outside director ownership, log(firm size))

Our 3SLS results are shown in Panel *A* of Table 5, with our performance variables as the nominally dependent variables. These results are comparable to Table 4. The coefficients and *t*-statistics for board independence are virtually unchanged from Table 4. This increases our confidence in both the OLS and 3SLS results. We again find no evidence that firms with more independent boards perform better than other firms. Once again, we find hints that firms with more independent boards may perform worse.

Panel *B* strongly confirms the suggestion from the 1988-1990 data in Table 4 and in Panel *A* of a correlation between poorer firm performance in the recent past and greater board independence. This is consistent with firms responding to poor performance by increasing board independence. The coefficients on all three performance variables for 1988-1990 are negative and highly significant.

In Panel *A* of Table 5, we include regressions using performance variables for 1988-1990, and in Panel *B*, we include regressions using performance variables for 1991-1993. We include these regressions for parallelism with Table 4, but omit these regressions in subsequent 3SLS tables because they have no obvious causal interpretation in a simultaneous equations framework.

Table 5: Simultaneous Equations (3SLS) Instrumental Variables Estimates

Simultaneous equations (three stage least squares) regression results for various performance variables on board independence and stock ownership for 928 large U.S. public companies for 1988-1990 and 1991-1993. The instrumental variables and system of equations are defined in Part IV.B. The performance variables *Q*, *OPI/AST*, and *SAL/AST* are defined in Part III.C. *Q* 88-90 means average *Q* during 1988-1990 and similarly for other performance variables. Board and stock ownership variables are based on early 1991 data. Industry control for each regression in Panel *A* is the mean of the dependent variable for that regression for each firm's industry group; 302 industry groups are constructed on the basis of 4-digit SIC codes from Compustat. Sample size varies from 552 to 684 because of missing data. *t*-statistics are in parentheses. Significant results ($p < .05$) are in **boldface** (not shown for firm size or industry control).

Panel *A*: Equation 5.1 (Firm Performance as Dependent Variable)

Dependent Variable: Firm Performance	**Independent Variables**							**Adj. R^2**
	INDEP	**Board Size**	**CEO Ownership**	**Outside Director Ownership**	**No. of Outside 5% Holders**	**Log (firm size)**	**Industry Control**	
Q 88-90	**-.49 (-4.86)**	-.001 (-.06)	.005 (1.46)	**.009 (2.05)**	**-.07 (-3.51)**	-.12 (-5.29)	.65 (14.8)	.3777
Q 91-93	**-.28 (-2.29)**	-.02 (-1.72)	.002 (.54)	.007 (1.36)	**-.06 (-2.85)**	-.08 (-3.28)	.80 (18.8)	.4289
OPI/AST 88-90	**-.08 (-5.23)**	-.003 (-1.90)	-.001 (-.59)	.001 (1.32)	-.002 (-.86)	.002 (.53)	.45 (9.61)	.1978
OPI/AST 91-93	-.01 (-.74)	.001 (.12)	.001 (.77)	.001 (1.46)	-.005 (-1.57)	-.001 (-.29)	.71 (11.8)	.2165
SAL/AST 88-90	**-.21 (-2.66)**	**-.02 (-2.29)**	-.001 (-.34)	.005 (1.44)	.02 (1.56)	.08 (4.48)	.81 (26.1)	.5806
SAL/AST 91-93	-.09 (-1.46)	**-.01 (-2.77)**	-.001 (-.52)	.004 (1.57)	**.03 (2.36)**	.05 (3.72)	.89 (34.7)	.6975

Panel *B*: Equation 5.2 (Board Independence as Dependent Variable)

Dependent Variable	Independent Variables						Adj. R^2
	Firm Performance Measure	Firm Performance	CEO Ownership	Outside Director Ownership	No. of Outside 5% Holders	Log (firm size)	
INDEP	*Q* 88-90	**-.21 (-6.81)**	**-.01 (-6.80)**	-.0001 (-.03)	.009 (.90)	-.004 (-.40)	.203
	Q 91-93	**-.11 (-5.57)**	**-.01 (-7.91)**	-.001 (-.49)	.016 (1.80)	.001 (.10)	.179
	OPI/AST 88-90	**-2.42 (-8.70)**	**-.01 (-5.31)**	.002 (.69)	.015 (1.30)	.02 (1.48)	.198
	OPI/AST 91-93	**-.90 (-3.38)**	**-.01 (-6.88)**	-.001 (-.42)	.02 (1.97)	.02 (2.40)	.149
	SAL/AST 88-90	**-.13 (-6.23)**	**-.01 (-7.99)**	-.001 (-.16)	**.04 (4.64)**	.04 (4.39)	.198
	SAL/AST 91-93	**-.12 (-6.64)**	**-.01 (-8.41)**	-.001 (-.17)	**.04 (4.54)**	.03 (3.77)	.193

Panel *C*: Equation 5.3 (CEO Ownership)

Dependent Variable	Independent Variables				Adj. R^2
	Firm Performance Measure	Firm Performance	Outside Director Ownership	Log (firm size)	
CEO Ownership	*Q* 88-90	**4.13 (4.34)**	.04 (.63)	-.73 (-2.13)	.062
	Q 91-93	**2.44 (3.95)**	.03 (.46)	-.95 (-3.21)	.056
	OPI/AST 88-90	**28.3 (3.62)**	-.05 (-.62)	-1.40 (-4.43)	.056
	OPI/AST 91-93	**31.9 (3.83)**	-.08 (-.99)	-1.33 (-4.30)	.057
	SAL/AST 88-90	**1.41 (1.99)**	.04 (.61)	-1.50 (-5.09)	.0419
	SAL/AST 91-93	1.16 (1.93)	.03 (.51)	-1.39 (-5.15)	.0394

C. Does Growth or Growth Opportunity Affect Board Composition?

We check the robustness of the results in Tables 4 and 5 in various ways. First, we test for the possibility that a correlation between firm (or industry) growth rate or growth prospects and both firm profitability and board composition may be driving our results. To do so, we add the following additional control variables to equation 5.2:

- *GrSAL* 88-90 = fractional *firm* sales growth from 1987 to 1990 (as a measure of firm growth in the recent past);
- fractional *industry* sales growth from 1987 to 1990 (as a measure of the growth opportunities available in the industry in the recent past, even if not seized by this particular firm);
- *GrSAL* 91-93 = fractional *firm* sales growth from 1990 to 1993 (as a measure of the future growth opportunities available to the firm, because realized future growth is a proxy for current growth opportunities); and
- fractional *industry* sales growth from 1990 to 1993 (as a measure of the future growth opportunities available in the industry, even if not seized by this particular firm).

Our system of simultaneous equations then becomes:

- *Equations 6.1 and 6.3:* same as equations 5.1 and 5.3, respectively
- *Equation 6.2: INDEP* = f_2 (firm performance, CEO ownership, outside director ownership, number of outside 5% holders, log(firm size), *GrSAL* 88-90, industry sales growth from 1987 to 1990, *GrSAL* 91-93, industry sales growth from 1990 to 1993)

Our results are shown in Table 6-*SAL*. We show results only for Panel *B* (Equation 6.2). The coefficients for Panels *A* and *C* of Table 6-*SAL* are very close to those in Table 5, except that the negative coefficient on *INDEP* for *Q* for the prospective 1991-1993 period, reported in Panel *A* of Table 5, loses significance in Table 6-*SAL*.

The growth controls in Table 6-*SAL* do not change the central implication from Tables 4 and 5: Poor prior firm performance over the last several years predicts greater future board independence. However, firms with more independent boards do not achieve improved performance. There is no consistent evidence that either recent past (1988-1990) firm or industry growth or future firm growth prospects (proxied by *GrSAL* 91-93) affects board independence in early 1991. We do find evidence of a negative relationship between future industry growth during 1991-1993 and board independence in early 1991. This relationship is significant using *OPI/AST* as the performance measure, and marginally significant for the other two performance measures. We have no good explanation for this correlation.

Table 6 –SAL
Simultaneous Equations Estimates With Controls for Firm and Industry Sales Growth and Growth Opportunities

Simultaneous equations (three stage least squares) regression results for various performance variables on board independence and stock ownership for 928 large U.S. public companies for 1988-1990 and 1991-1993, with controls for firm and industry sales growth in the recent past and for growth opportunities. The instrumental variables and system of equations are defined in Parts IV.B and C. The performance variables *Q*, *OPI/AST*, and *SAL/AST* are defined in Part III.C. *Q* 88-90 means average *Q* during 1988-1990 and similarly for other performance variables. *GrSAL* 88-90 means fractional growth in firm sales from 1987 to 1990 and similarly for *GrSAL* 91-93. Board and stock ownership variables are based on early 1991 data; 302 industry groups are constructed on the basis of 4-digit SIC codes from Compustat. Sample size varies from 552 to 684 because of missing data. *t*-statistics are in parentheses. Significant results ($p < .05$) are in **boldface**.

Panel *B*: Equation 6.2 (Board Independence as Dependent Variable)

Dependent Variable	**Independent Variables (also includes CEO ownership, Outside director ownership, number of outside 5% holders, Log(firm size), but coefficients not shown)**						**Adj. R^2**
	Firm performance measure	**Firm performance**	***GrSAL* 88-90**	**Industry sales growth 88-90**	***GrSAL* 91-93**	**Industry sales growth 91-93**	
INDEP	*Q* 88-90	**-.20 (-6.05)**	-.001 (-.35)	-.16 (-.29)	**.001 (2.34)**	-.77 (-1.67)	.176
	OPI/AST 88-90	**-2.03 (-8.19)**	-.001 (-1.20)	-.46 (-.80)	.001 (.21)	**-1.58 (-3.05)**	.190
	SAL/AST 88-90	**-.14 (-6.35)**	**-.001 (-2.27)**	-.56 (-1.10)	.001 (1.21)	-.75 (-1.69)	.180

Table 6-OPI
Simultaneous Equations Estimates With Controls for Firm and Industry Operating Income Growth and Growth Opportunities

Simultaneous equations (three stage least squares) regression results for various performance variables on board independence and stock ownership for 928 large U.S. public companies for 1988-1990 and 1991-1993, with controls for firm and industry operating income growth in the recent past and for growth opportunities. The instrumental variables and system of equations are defined in Parts IV.B and C. The performance variables *Q*, *OPI/AST*, and *SAL/AST* are defined in Part III.C. *Q* 88-90 means average *Q* during 1988-1990 and similarly for other performance variables. *GrOPI* 88-90 means fractional growth in firm operating income from 1987 to 1990 and similarly for *GrOPI* 91-93. Board and stock ownership variables are based on early 1991 data; 302 industry groups are constructed on the basis of 4-digit SIC codes from Compustat. Sample size varies from 552 to 684 because of missing data. *t*-statistics are in parentheses. Significant results ($p < .05$) are in **boldface**.

Panel *B*: Equation 6.2 (Board Independence as Dependent Variable)

Dependent Variable	**Independent Variables (also includes CEO ownership, Outside director ownership, number of outside 5% holders, Log(firm size), but coefficients not shown)**						**Adj. R^2**
	Firm performance measure	**Firm performance**	***GrOPI* 88-90**	**Industry operating Income growth 88-90**	***GrOPI* 91-93**	**Industry operating Income growth 91-93**	
INDEP	*Q* 88-90	**-.22 (-5.68)**	.001 (-.78)	-.55 (-.78)	-.67 (-.19)	**-.20 (-2.03)**	.154
	OPI/AST 88-90	**-2.03 (-8.19)**	-.001 (-.80)	-.46 (-.80)	.0001 (.21)	**-.16 (-3.01)**	.190
	SAL/AST 88-90	**-.17 (-5.59)**	-.0001 (-.58)	-.39 (-.58)	.0002 (.74)	-.17 (-1.84)	.162

We also rerun the regressions in Table 6 using growth in operating income instead of growth in sales as the growth measure. Table 6-*OPI* shows Panel *B* of this revised table. Panels *A* and *C* are omitted; they are similar to the corresponding (omitted) panels in Table 6-*SAL*. Once again, the growth controls do not affect the negative correlation between firm performance in 1988-1990 and board independence in early 1991. There is again some evidence in Table 6-*OPI* of a negative correlation between industry growth prospects (proxied by industry growth in 1991-1993) and board independence. The coefficient on industry operating income growth in 1991-1993 is significantly negative for *Q* and *OPI/AST*, and marginally significant for *SAL/AST*. As before, we have no good explanation for this correlation.

D. Robustness Check Using 1988 Board Composition and Ownership Data

As a check on our results, we collect board composition and share ownership data in early 1988 for a randomly chosen subsample of 205 firms, and compute a 1988 measure of board independence, which we label *INDEP88*. We run both OLS regressions comparable to Table 4 and 3SLS regressions comparable to Table 5. We report the 3SLS results in Table 5-1988 below. OLS regressions with measures of firm performance as the dependent variable produce coefficient estimates similar to the 3SLS results reported in Panel *A* of Table 5-1988. As we saw for the full sample with 1991 board data, there are hints that greater board independence not only does not improve performance, it may lead to worse performance. In Panel *A*, the coefficients on board independence are negative for all three performance variables for the prospective 1988-1990 period, and the coefficient for *OPI/AST* is statistically significant.

Panel *B* of Table 5-1988 tests for a correlation running from poor past performance to greater board independence. We find evidence of such a correlation. Recent past performance (during 1985-1987) correlates significantly and negatively with board independence in early 1988 for *Q* and *OPI/AST*, and negatively but not significantly for *SAL/AST*. Moreover, for the full 1991 sample, 1985-1987 performance correlates significantly and negatively with board independence in 1991 for all three performance variables (regression results omitted). These results confirm similar evidence from Tables 4 and 5, and reinforce the inference that poorly performing firms respond by increasing board independence.

Table 5-1988
Simultaneous Equations Regressions for 1988 Subsample

Simultaneous equations (three stage least squares) regression results for various performance variables on board independence and stock ownership for 205 large U.S. public companies for 1985-1987 and 1988-1990. The instrumental variables and system of equations are defined in Part IV.B, and are the same as in Table 5, except that *INDEP88* replaces *INDEP* in all equations. The performance variables *Q*, *OPI/AST*, and *SAL/AST* are defined in Part III.C. *Q* 88-90 means average *Q* during 1988-1990 and similarly for other performance variables. Board and stock ownership variables are based on early 1988 data. Industry control for each regression in Panel *A* is the mean of the dependent variable for that regression for each firm's industry group; 302 industry groups are constructed on the basis of 4-digit SIC codes from Compustat. Sample size varies from 195 to 201 because of missing data. *t*-statistics are in parentheses. Significant results ($p < .05$) are in **boldface**.

Panel *A*: Firm Performance as Dependent Variable

Dependent Variable: Firm Performance	**Independent Variables (other independent variables same as in Panel *A* of Table 5, but not shown)**	**Adj. R^2**
	Board Independence in Early 1988 (*INDEP*88)	
Q 88-90	-.27 (-1.53)	.447
OPI/AST 88-90	**-.06 (-2.24)**	.139
SAL/AST 88-90	-.18 (-1.31)	.492

Panel *B*: Board Independence as Dependent Variable

Dependent Variable	**Independent Variables (other independent variables same as in Panel *B* of Table 5, but not shown)**		**Adj. R^2**
	Firm Performance Measure	**Firm Performance**	
INDEP88	*Q* 85-87	**-.32 (-2.49)**	.113
	OPI/AST 85-87	**-2.59 (-2.59)**	.185
	SAL/AST 85-87	-.06 (-1.40)	.168

Panel *C*: CEO Ownership

Dependent Variable	**Independent Variables (other independent variables same as in Panel *C* of Table 5, but not shown)**		**Adj. R^2**
	Firm Performance Measure	**Firm Performance**	
CEO Ownership	*Q* 85-87	-3.03 (-1.12)	.070
	OPI/AST 85-87	3.26 (.21)	.084
	SAL/AST 85-87	2.55 (1.84)	.086

E. Robustness Check Using Changes in Board Composition From 1988-1991

The tables above report evidence that firms that have performed poorly in the past have more independent boards than other firms. This suggests, but cannot prove, that there is cause and effect—that these firms increase the independence of their boards in response to poor performance. These strong results contrast to mixed results from other studies on whether firm performance affects board composition (we discuss studies in

Part II.B). The results that we report above are based on absolute levels of board independence. We explore in this section the reasons for these differing results. We begin by asking, in an ordinary least squares framework, whether firms that performed poorly in the recent past (1985-1987) or contemporaneously (1988-1990) measurably increase their level of board independence between 1988 and 1991 (the two dates at which we measure board composition). This approach is similar to that used in the earlier studies. Here the evidence is equivocal.

Using the subsample of 205 firms for which we have board composition data for both 1988 and 1991, we construct a measure of *change* in board independence from 1988 to 1991: $\delta INDEP = INDEP - INDEP88$. In Table 7, $\delta INDEP$ is the dependent variable, and different measures of recent past (1985-1987) and contemporaneous (1988-1990) performance and growth are the principal independent variables.

If recent past or contemporaneous poor performance (slow growth) drives board independence, the coefficients in Table 7 should be negative. In fact, however, Table 7 offers no evidence of a correlation between change in board composition and recent past or contemporaneous performance or growth. The signs on the coefficients vary and most *t*-statistics are small. This nonresult is consistent with the mixed results found by other researchers.

Table 7
Effect of Change in Board Independence on Performance and Growth

Change in board independence for 205 large U.S. public companies between early 1988 and early 1991. The performance variables are defined in Part III.C, and the growth variables are defined in Part IV.C. Board composition data is from early 1988 and early 1991. Industry control for each regression is the mean of that variable for each firm's industry group; 302 industry groups are constructed on the basis of 4-digit SIC codes from Compustat. Sample size varies from 195 to 201 because of missing data. *t*-statistics are shown in parentheses. Significant results ($p < .05$) are in **boldface**.

Dependent Variable	**Independent Variables (industry control and log(1987 sales) are included in the regressions but are not shown)**				**Adj. R^2**
	Performance or Growth Variable	**Recent Past Performance or Growth (Same Variable over 1985-1987)**	**Contemporaneous Performance or Growth (Same Variable over 1988-1990)**	**Board Size**	
$\delta INDEP = INDEP - INDEP88$	*Performance Variables*				
	Q	-.02 (-.70)	-.01 (-.20)	-.001 (-.24)	-.021
	OPI/AST	.10 (.31)	-.18 (-.52)	.004 (.54)	-.032
	SAL/AST	-.09 (-1.14)	.17 (1.93)	.002 (.40)	.005
	Growth Variables				
	GrAST	-.001 (-.24)	-.001 (-.12)	.002 (.28)	-.028
	GrSAL	-.001 (-.33)	-.001 (-1.00)	.004 (.73)	-.022
	GrOPI	-.001 (-.23)	.001 (.31)	.003 (.53)	-.031

The story changes when we move to a simultaneous equations framework. Table 8 uses the same equations and instrumental variables as Table 5, except that we replace *INDEP* with *δINDEP*. Panel *C* on CEO ownership is omitted. In Panel *A* of Table 8, there is no significant relationship between change in board independence from 1988 to 1991, and subsequent firm performance in 1991-1993. This is consistent with our earlier conclusion that firms with more independent boards do not perform better.

In Panel *B*, there is a significant negative correlation between contemporaneous performance (during 1988-1991) and change in board independence over the same period for *Q* and *OPI/AST*, but not for *SAL/AST*. This is generally consistent with poorly performing firms responding by increasing the independence of their boards.

Table 8
Simultaneous Equations Estimates for Changes in Board Independence

Simultaneous equations (three stage least squares) regression results for various performance variables on change in board independence from 1988 to 1991 (*δINDEP*) and stock ownership for 205 large U.S. public companies for 1988-1990 and 1991-1993. The instrumental variables and system of equations are the same as in Table 5, except that *δINDEP* replaces *INDEP* in all equations. The performance variables *Q*, *OPI/AST*, and *SAL/AST* are defined in Part III.C. *Q* 88-90 means average *Q* during 1988-1990 and similarly for other performance variables. Board composition is based on data from early 1988 and early 1991; stock ownership is based on early 1991 data. Industry control for each regression in Panel *A* is the mean of the dependent variable for that regression for each firm's industry group; 302 industry groups are constructed on the basis of 4-digit SIC codes from Compustat. Sample size varies from 195 to 201 because of missing data. *t*-statistics are in parentheses. Significant results ($p < .05$) are in **boldface**.

Panel *A*: Firm Performance as Dependent Variable

Dependent Variable	**Independent Variables (other independent variables same as in Panel *A* of Table 5, but not shown)**	**Adj. R^2**
	δINDEP	
Q 88-90	**-.92 (-2.12)**	.372
Q 91-93	-.50 (-1.07)	.403
OPI/AST 88-90	**-.15 (-2.20)**	.122
OPI/AST 91-93	.14 (1.36)	.063
SAL/AST 88-90	.33 (1.12)	.508
SAL/AST 91-93	.36 (1.35)	.612

Panel *B*: Change in Board Independence as Dependent Variable

Dependent Variable	**Independent Variables (other independent variables same as in Panel *B* of Table 5, but not shown)**		**Adj. R^2**
	Firm Performance Measure	**Firm Performance**	
δINDEP	*Q* 88-90	**-.12 (-2.75)**	.033
	OPI/AST 88-90	**-2.00 (-3.36)**	.043
	SAL/AST 88-90	.01 (.30)	-.007

A puzzle, given the strong *t*-statistics in Panel *B* of Table 5, is why the negative correlation in Panel *B* of Table 8 between 1988-1990 performance and 1988-1991 changes in board independence is not stronger. Perhaps the strategy of increasing board independence in response to poor performance, or not doing so if the firm is doing well, emerges over time in response to persistent performance. If so, the strategy will be reflected more clearly in the absolute levels of board independence that we rely on in Table 5 than in the changes in board independence over a limited time period that we rely on in Table 8.

F. Robustness Check: Nonlinear Relationship Between Board Independence and Firm Performance

The OLS and 3SLS regressions above provide evidence that poor firm performance leads firms to increase their board independence. There is no evidence that this strategy improves future performance, and hints of a *negative* relationship between board independence and future firm performance. To see if we can strengthen these hints, this section explores a possible nonlinear relationship between board independence and future firm performance. For example, it could be valuable for firms to have a significant number of inside directors—for example 30%—to achieve the benefits of these directors' firm-specific knowledge, but thereafter it may be unimportant or even detrimental to further increase the proportion of inside directors. Similarly, it could be valuable to have more independent than inside directors, a majority of independent directors,[57] or a 60% supermajority of independent directors.[58] It could also be detrimental to have a supermajority-independent board with a high proportion of independent directors (and hence too few inside or affiliated directors).[59]

We test these hypotheses in Table 9 using dummy variables to divide boards into four independence ranges defined as follows:

- *Dummy1*: equal to 1 if *INDEP* < 0 (more inside than independent directors); and 0 otherwise;
- *Dummy2:* equal to 1 if 0 < *INDEP* < 0.2 (a 50-50 to 60-40 split between independent and inside directors); and 0 otherwise;
- *Dummy3*: equal to 1 if 0.2 < *INDEP* < 0.4 (a 60-40 to 70-30 split between independent and inside directors); and 0 otherwise; and
- *Residual category*: highly independent boards, with *INDEP* > 0.4.

Other independent variables are the same as in Table 4, but are not shown in Table 9 because their coefficients and *t*-statistics are virtually identical to Table 4. About 15% of our sample has *Dummy1* = 1; 15% of the sample has *Dummy2* = 1; 20% of the sample

57. *See* Thomas H. Noe & Michael J. Rebello, The Design of Corporate Boards: Composition, Compensations, Factions, and Turnover (1997) (working paper, Georgia State Univ. College of Business Administration) (theoretical work); Byrd & Hickman (1992), *supra* note 9 (empirical work).

58. *See* Weisbach (1988), *supra* note 8; James F. Cotter, Anil Shivdasani & Marc Zenner, *Do Independent Directors Enhance Target Shareholder Wealth During Tender Offers?*, 43 J. FIN. ECON. 195 (1997).

59. The only effort we know of to assess whether firms with highly independent boards perform differently from other firms is Fosberg (1989), *supra* note 24 (no significant difference in performance between firms with more than 80% outside directors and firms with 50-67% outside directors).

has *Dummy 3* = 1; the remaining 50% of the firms are in the residual category of highly independent boards.

Table 9
OLS Regressions: Firm Performance with Board Independence Dummy Variables

Regression results for various performance variables on dummy variables for board independence and stock ownership variables for 928 large U.S. public companies for 1991-1993. The performance variables *Q, OPI/AST*, and *SAL/AST* are defined in Part III.C. *Q* 91-93 means average *Q* during 1991-1993 and similarly for other performance variables. Board and stock ownership variables are based on early 1991 data. Industry control for each regression is the mean of the dependent variable for that regression for each firm's industry group; 302 industry groups are constructed on the basis of 4-digit SIC codes from Compustat. Sample size varies from 552 to 684 because of missing data. *t*-statistics are in parentheses. Significant results ($p < .05$) are in **boldface**.

Dependent Variable	**Independent Variables (other independent variables same as Table 4 but not shown)**			**Adj. R^2**
	***Dummy1* = 1 if *INDEP* < 0; otherwise = 0**	***Dummy2* = 1 if 0 < *INDEP* < 0.2; otherwise = 0**	***Dummy3* = 1 if 0.2 < *INDEP* < 0.4; otherwise = 0**	
Q 91-93	.16 (1.52)	.15 (1.68)	**.19 (2.56)**	.428
OPI/AST 91-93	-.002 (-.17)	.01 (.58)	.02 (1.58)	.214
SAL/AST 91-93	.09 (1.64)	-.004 (-.08)	-.035 (-.90)	.699

Table 9 does not provide strong evidence of breakpoints. The coefficients are mostly insignificant, and sometimes vary in sign. In separate regressions (not shown), we further explore a possible nonlinear relationship between board independence and firm performance by rerunning the regressions in Table 4 with $INDEP^2$ as an additional control variable. The coefficient on $INDEP^2$ varies in sign and is insignificant for all performance variables.

G. Results for Board Size

Two studies report an inverse correlation between board size and firm performance. Yermack reports a significant negative correlation between board size and *Q, SAL/AST, OPI/AST*, and *OPI/SAL* for large U.S. public firms.[60] Eisenberg, Sundgren and Wells report a negative correlation between performance and board size for small and midsize Finnish firms.[61] In contrast, Ferris and coauthors find a positive and (depending on other control variables) sometimes significant correlation between log(board size in 1995) and ratio of market value to book value in 1997.[62] Mak and Li find a significant and *positive*

60. *See* Yermack (1996), *supra* note 21.

61. *See* Theodore Eisenberg, Stefan Sundgren & Martin T. Wells, *Larger Board Size and Decreasing Firm Value in Small Firms*, 48 J. FIN. ECON. 35 (1998).

62. *See* Ferris, Jagannathan & Pritchard (2002), *supra* note 17.

correlation between Tobin's *q* and board size for Singapore firms in OLS regressions, but the coefficient changes sign in two-stage-least-squares (2SLS) regressions.[63]

Our results cast further doubt on the robustness of any correlation between board size and firm performance. In Tables 4 and 5, we find hints, but no solid evidence, of the inverse correlation found by Yermack. For example, in Table 5, board size takes a significant negative coefficient for 1991-1993 for *SAL/AST*, a negative and marginally significant coefficient for *Q*, and is insignificant and of the opposite (positive) sign for *OPI/AST*. We also run regressions (not shown) using *OPI/SAL* as a performance variable, for comparability with Yermack; board size is not significant. We obtain similarly equivocal results in regressions (not shown) using our 1988 subsample, where board size is again significant and negative only for SAL/AST.

One reason why our results differ from Yermack's is that board size is known to be endogenously related to many other factors that may correlate with performance, including industry, inside share ownership, firm size, and board independence. Yermack includes controls for all of these other factors, but perhaps regression results are sensitive to how the control is conducted, or to whether one uses an OLS or a simultaneous equations approach. For example, Mak and Li report that board independence (which we measure differently than Yermack) predicts the board size of Singapore firms, using a 2SLS approach, and also that the sign of the coefficient on board size differs in OLS and 2SLS regressions of Tobin's *q* on board size and other explanatory variables.[64]

H. Results for Share Ownership

Board monitoring is one possible way to induce good firm performance. A potential substitute is to provide incentives to management through stock ownership. However, there is no evidence, either from the OLS regressions in Panel *A* of Table 4 or the 3SLS regressions in Panel *A* of Table 5, that higher CEO share ownership translates into improved future performance.[65]

An alternate possibility is that CEOs are rewarded through higher stock ownership for performing well in the past: stock-based compensation serves as a reward, even though it is not an effective incentive.[66] Panel *C* of Table 5 provides evidence of a positive correlation between *past* performance and CEO ownership. However, this possible link between performance and future CEO share ownership is not confirmed in Table 5-1988, where we use 1985-1987 performance and 1988 board and share ownership data.

There are hints, in both the OLS regressions in Table 4 and the 3SLS regressions in Table 5, that stock ownership by outside directors correlates with improved performance.

63. *See* Mak & Li (2001), *supra* note 19.

64. *See id.*, at 249-52.

65. For a sampling of other studies on the relationship between inside ownership and performance, see Harold Demsetz & Belen Villalonga, *Ownership Structure and Corporate Performance*, 7 J. CORP. FIN. 209 (2001); Charles P. Himmelberg, R. Glenn Hubbard & Darius Palia, *Understanding the Determinants of Managerial Ownership and the Link Between Ownership and Performance*, 53 J. FIN. ECON. 353 (1999); Stacey R. Kole, *Managerial Ownership and Firm Performance: Incentives or Rewards?*, 2 ADVANCES FIN. ECON. 119 (1996).

66. *See* Kole (1997), *supra* note 65.

The coefficients on outside director ownership are positive although insignificant for all performance variables for the prospective 1991-1993 period. We return to this issue in Part VI.B.

There is no evidence, either in the OLS regressions in Table 4 or the 3SLS regressions in Table 5, that monitoring by outside 5% blockholders affects firm performance. In both tables, the coefficients in these regressions on number of outside 5% blockholders vary in sign, are significantly negative for *Q*, but are significantly positive for *SAL/AST*.

V. CORRELATION BETWEEN BOARD INDEPENDENCE AND FIRM GROWTH

In this section, we investigate the relationship between board independence and firm growth. The growth measures we use are:

Variable	**Definition**
GrAST xx yy	percentage growth in assets from year *xx* - 1 to year *yy*; for example *GrAST* 85-87 is percentage growth in assets from 1984 (treated as the baseline year) to 1987
GrSAL xx yy	percentage growth in sales from year *xx* -1 to year *yy*
GrOPI xx yy	percentage growth in operating income from year *xx* - 1 to year *yy* (we discard observations with negative initial *OPI*)

Because firm growth may both determine and be determined by board independence, we use a simultaneous equations (3SLS) structure. We estimate the following system of equations:

- *Equation 10.1: firm growth measure* = f_1 (*INDEP*, CEO ownership, board size, outside director ownership, number of outside 5% holders, log(firm size), industry growth control)
- *Equation 10.2: INDEP* = f_2 (firm growth measure, CEO ownership, outside director ownership, number of outside 5% holders, log(firm size))
- *Equation 10.3: CEO ownership* = f_3 (firm growth measure, outside director ownership, log(firm size)

The endogenous variables and corresponding instrumental variables we use are:

- *firm growth measure*: for *GrSAL* and *GrOPI*, we use *GrAST* as an instrumental variable; for *GrAST*, we use *GrSAL* as an instrumental variable;
- *board independence*: f_{indep}; and
- *CEO ownership:* share ownership by all directors and officers.

Our results are presented in Table 10. There is evidence from Panel *B* that slow firm growth in sales and assets (but not operating income) predicts greater board independence. This is consistent with the evidence we report in Part IV that poor performance predicts greater board independence. However, there is no evidence from Panel *A* of Table 10 that greater board independence leads to either faster or slower growth. The coefficients in Panel *A* are insignificant and vary in sign.

Table 10
Simultaneous Equations: Growth Accounting Variables and Board Composition

Simultaneous equations (three stage least squares) regression results for various growth variables for 928 large U.S. public companies for 1988-1990 and 1991-1993. The instrumental variables, system of equations, and growth variables *GrAST*, *GrSAL*, and *GrOPI* are defined in Part V. *GrAST* 88-90 means percentage growth in assets during the period from 1984 to 1987, and similarly for other variables. Board and stock ownership variables are based on early 1991 data. Industry control for each regression in Panel *A* is the mean of the dependent variable for that regression for each firm's industry group; 302 industry groups are constructed on the basis of 4-digit SIC codes from Compustat. Sample size varies from 552 to 684 because of missing data. *t*-statistics are shown in parentheses. Significant results ($p < .05$) are in **boldface**.

Panel *A*: Equation 10.1 (Firm Growth as Dependent Variable)

Dependent Variable	**Independent Variables (other independent variables same as in Panel *A* of Table 5, but not shown)**	**Adj. R^2**
	Board Independence (*INDEP*)	
GrAST 91-93	5.67 (1.46)	.023
GrSAL 91-93	3.74 (.93)	.050
GrOPI 91-93	-1.42 (-.12)	.039

Panel *B*: Equation 10.2 (Board Independence as Dependent Variable)

Dependent Variable	**Independent Variables (other independent variables same as in Panel *B* of Table 5, but not shown)**		**Adj. R^2**
	Growth Measure	**Firm Growth**	
INDEP	*GrAST* 88-90	**-.002 (-5.03)**	.152
	GrSAL 88-90	**-.002 (-4.29)**	.142
	GrOPI 88-90	.0001 (1.14)	.114

VI. CONCLUSION

We find a reasonably strong *inverse* correlation between firm performance in the recent past and board independence. However, there is no evidence that greater board independence leads to improved firm performance. If anything, there are hints that greater board independence may impair firm performance. The weak results in this Article, combined with similar results from the other research surveyed in Part II.A, do not support the conventional wisdom favoring the monitoring board, with a high degree of board independence. In this concluding section, we explore some reasons why greater board independence may not improve firm performance.

A. The Case for Inside Directors

One reason why increasing board independence doesn't lead to improved performance is that having a reasonable number—even if not a majority—of inside directors could add value. Baysinger and Butler suggest that an optimal board contains a

mix of inside, independent, and perhaps also affiliated directors, who bring different skills and knowledge to the board.[67] Including insiders on the board may make it easier for other directors to evaluate them as potential future CEOs.[68] Insiders also may be better at strategic planning decisions, consistent with Klein's evidence that inside director representation on investment committees of the board correlates with improved firm performance.[69] This "mixed board" explanation is consistent with Klein's evidence that affiliated directors are more likely to be found on the boards of firms that need the affiliated director's expertise, although Klein finds no significant correlation between the proportion of affiliated directors and firm performance.[70]

To be sure, senior managers *could* be invited to board meetings even if they are not board members. But there is no guarantee that they will be invited. Moreover, the interaction between senior managers (other than the CEO) and other directors may be different if the managers have seats on the board, are expected to attend every meeting, must vote, and are expected to participate in board discussions, than if they attend at the CEO's pleasure, speak only when asked to, and could be disinvited to future meetings if the CEO so decides.

A further reason why inside directors may be valuable involves the tradeoff between independence and other factors that affect board decisions. Inside directors are conflicted but well informed. Independent directors are not conflicted but are relatively ignorant about the company. Perhaps independent directors will act more quickly than inside directors if something goes wrong. But they may do the wrong thing if their deliberations are not leavened by the information available to inside directors. Noe and Rebello offer a theoretical model in which having a minority of inside directors improves board decisionmaking, due to their superior information.[71] Westphal offers a qualitative "collaborative board" model, and some supporting survey evidence, suggesting that social ties between the CEO and other board members could enhance board effectiveness; the same could be true for other senior managers who have board positions.[72]

There is also a tradeoff between independence and incentives. Many independent directors own small amounts of their company's shares, and hence have limited incentives to monitor carefully. Inside directors lack independence, but have their human capital, and often most of their financial capital, committed to their company. Hall and Liebman provide evidence of the sensitivity of managers' financial wealth to firm performance.[73] The hypothesis that directors' incentives affect firm performance is

67. *See* Baysinger & Butler (1985), *supra* note 14.

68. *See* RICHARD F. VANCIL, PASSING THE BATON: MANAGING THE PROCESS OF CEO SELECTION (1987); Weisbach (1988), *supra* note 8.

69. *See* Klein (1998), *supra* note 23, at 277.

70. *See* Klein (2000), *supra* note 49. For a defense of mixed boards based on social interaction among directors, see Donald C. Langevoort, *The Human Nature of Corporate Boards: Law, Norms, and the Unintended Consequences of Independence and Accountability* (working paper 2000), *at* http://papers.ssrn.com/abstract=241402 (Social Science Research Network).

71. *See* Noe & Rebello (1997), *supra* note 57.

72. *See* James D. Westphal, *Collaboration in the Boardroom: Behavioral and Performance Consequences of CEO-Board Social Ties*, 42 ACAD. MGMT. J. 7 (1999).

73. *See* Brian J. Hall & Jeffrey B. Liebman, *Are CEOs Really Paid Like Bureaucrats?*, 113 Q.J. ECON. 643 (1998).

consistent with the evidence we report in Part VI.B that independent directors may perform better when they hold substantial amounts of a company's stock.

A priori, it is not obvious that independence (without knowledge or incentives) leads to better director performance than knowledge and strong incentives (without independence). Maybe the optimal board has some knowledgeable, incentivized inside directors, and some independent directors—who might thereby become better informed, and could also be better incentivized than many independent directors are today.

B. Interaction Between Independence and Stock Ownership

Bhagat, Carey and Elson report that directors with substantial stock ownership act more quickly to replace the CEO.[74] Bradbury and Mak report that directors of New Zealand firms who represent unaffiliated blockholders are more likely to adopt charter provisions that encourage takeover bids.[75] Consistent with these studies, there are hints in Tables 4 and 5 that independent directors are more effective if motivated by significant stock ownership. To test for this possibility, Table 11 reports OLS results using the interaction between $\log(f_{indep})$ and outside director ownership as a board composition variable, together with $\log(f_{inside})$.

Table 11
OLS Regressions: Interaction Between Board Composition and Stock Ownership

Regression results for various performance variables on $\log(f_{inside})$, stock ownership, and interaction between $\log(f_{indep})$ and outside director ownership, for 928 large U.S. public companies for 1991-1993. The performance variables *Q*, *OPI/AST*, and *SAL/AST* are defined in Part III.C. *Q* 91-93 means average *Q* during 1988-1990 and similarly for other performance variables. Board and stock ownership variables are based on early 1991 data. *t*-statistics are shown in parentheses. Significant results ($p < .05$) are in **boldface**.

Dependent Variable	**Independent Variables (other independent variables same as Table 4, but not shown)**	
	$\log(f_{inside})$	**$\log(f_{indep})$ * (Outside Director Ownership)**
Q 91-93	**.17 (2.43)**	.02 (.90)
OPI/AST 91-93	.014 (1.69)	**.008 (2.41)**
SAL/AST 91-93	**.15 (3.35)**	**.04 (2.04)**

In Table 11, the coefficients on $\log(f_{inside})$ are positive and statistically significant for Q and *SAL/AST*, and marginally significant for *OPI/AST*. This is consistent with the negative coefficients on *INDEP* for the regression with these performance variables in Table 4. It is also consistent with the usually positive and sometimes significant

74. *See* Sanjai Bhagat, Dennis C. Carey & Charles M. Elson, *Director Ownership, Corporate Performance, and Management Turnover*, 54 BUS. LAW. 885 (1999).

75. *See* Michael E. Bradbury & Y.T. Mak, *Ownership Structure, Board Composition and the Adoption of Charter Takeover Procedures*, 6 J. CORP. FIN. 165 (1999).

coefficients on $\log(f_{inside})$ in separate regressions (not shown), in which we replace *INDEP* as an independent variable with $\log(f_{inside})$ and $\log(f_{indep})$ as separate independent variables.

The interaction variable $\log(f_{indep})$* (outside director ownership) is positive for all three performance variables and is significant for *OPI/AST* and *SAL/AST*. This contrasts with the usually *negative* and sometimes significant coefficients on $\log(f_{indep})$ in separate regressions (not shown), in which we replace *INDEP* as an independent variable with $\log(f_{inside})$ and $\log(f_{indep})$ as separate independent variables. Thus, Table 11 supports the hypothesis that independent directors who hold significant stock positions may add value, while other independent directors do not.

C. The Arguments for Independent Directors

How might one make the case for a modified version of the conventional wisdom that favors highly independent boards? One possibility, explored in the previous section, is that independent directors need to be better incentivized. A second possibility is that today's "independent" directors aren't independent enough. Perhaps, as Gilson and Kraakman argue, "corporate boards need directors who are not merely independent [of management], but who are *accountable* [to shareholders] as well."[76] But if this is true, institutional investors may need to put their own representatives on boards of directors, a step that few are interested in and which is difficult under current U.S. rules.[77]

A third possibility is that some directors who are classified as independent are not truly independent of management, because they are beholden to the company or its current CEO in ways too subtle to be captured in customary definitions of "independence." For example, some nominally independent directors may serve as paid advisors or consultants to a company, or may be employed by a university or foundation that receives financial support from the company. Unfortunately, the data needed to capture these relationships are not currently available.

Perhaps, too, some directors have personal relationships with the CEO that affect their independence. This possibility is consistent with evidence that directors who were appointed during the current CEO's tenure are more generous in determining the CEO's compensation.[78] One way to begin to untangle these subtle relationships would be for the SEC to require additional disclosure of financial or personal ties between directors (or the organizations they work for) and the company or its CEO.

Perhaps independent directors who have served for too long become, over time, less vigorous monitors. Conversely, perhaps directors who were on the board before the CEO are more truly independent than shorter-tenured directors. Evidence favoring the latter possibility is offered by a study of bank boards by Mishra and Nielsen. They find that return on assets correlates inversely with board independence (measured as fraction of independent directors), but *positively* with a measure of the average tenure of the

76. Ronald J. Gilson & Reinier Kraakman, *Reinventing the Outside Director: An Agenda for Institutional Investors*, 43 STAN. L. REV. 863, 865 (1991).

77. *See* Bernard Black, *Shareholder Passivity Reexamined*, 89 MICH. L. REV. 520 (1990); MARK J. ROE, STRONG MANAGERS, WEAK OWNERS: THE POLITICAL ROOTS OF AMERICAN CORPORATE FINANCE (1994).

78. *See* Robert W. Holthausen & David F. Larcker, Board of Directors, Ownership Structure, and CEO Compensation (1993) (working paper, University of Pennsylvania, Wharton School); Yermack (1996), *supra* note 21.

independent directors relative to the CEO's tenure.[79] Age may matter, too. Older directors, at some point, likely become less effective. Many firms have director retirement policies, often at age seventy, but whether these are pegged to the right age is unknown.

A fourth possibility is that some types of independent directors may be valuable, while others are not. Maybe CEOs of companies in other industries (who are, by number, the majority of independent directors) are too busy with their own business, know too little about a different business, and are overly generous in compensating another CEO. Maybe "visibility" directors—well-known persons with limited business experience, often holding multiple directorships and adding gender or racial diversity to a board, are not effective on average. But this explanation suggests that to push for greater board independence may be fruitless or even counterproductive, unless independent directors have particular attributes, which are currently unknown.

A final possibility is that independent directors can add value, but only if they are embedded in an appropriate committee structure. This would let independent directors perform the monitoring function that they are best suited for, while letting inside and affiliated directors perform the informing and advising function to which they bring more firm-specific expertise. However, most large firms already have such committee structures and Klein finds little evidence that the principal outsider-dominated "monitoring" committees—audit, compensation, and nominating committees—affect performance, regardless of how they are staffed.

D. Policy Implications

What would the implications be if the conventional wisdom is wrong and our data are right—if greater board independence does not improve, and may reduce, firm performance? Steps like insisting that independent directors own more shares, or that they be more completely independent, are worth trying. Focusing on board procedures, such as an annual meeting of independent directors devoted to reviewing management's performance and appointing a lead independent director, as Millstein and MacAvoy advocate, may be valuable.[80]

Our results do not support a return to the 1960s, when boards were insider dominated and usually passive. Our results do suggest that investors should not complain if companies experiment with departures from the current norm of a "supermajority independent" board with only one or two inside directors. A board with, for example, six independent directors, four inside directors, and one affiliated director, instead of nine independent directors and two inside directors, might bring subtle benefits and conveys no obvious harm. The independent directors will still numerically dominate the board and can take appropriate action in a crisis.

79. *See* Chandra S. Mishra & James F. Nielsen, *Board Independence and Compensation Policies in Large Bank Holding Companies*, FIN. MGMT., Autumn 2000, at 51.

80. *See* Ira M. Millstein & Paul W. MacAvoy, *The Active Board of Directors and Improved Performance of the Large Publicly Traded Corporation*, 98 COLUM. L. REV. 1283 (1998); *see also* Martin Lipton & Jay W. Lorsch, *A Modest Proposal for Improved Corporate Governance*, 48 BUS. LAW. 59 (1992).

REFERENCES

Agrawal, Anup & Charles R. Knoeber, *Firm Performance and Mechanisms to Control Agency Problems Between Managers and Shareholders*, 31 J. FIN. & QUANTITATIVE ANALYSIS 377 (1996).

Agrawal, Anup & Charles R. Knoeber, *Do Some Outside Directors Play a Political Role?*, 44 J.L. & ECON. 179 (2001).

AMERICAN LAW INSTITUTE, PRINCIPLES OF CORPORATE GOVERNANCE: ANALYSIS AND RECOMMENDATIONS § 3A.01 (1994).

Arthur, N., *Board Composition as the Outcome of an Internal Bargaining Process: Empirical Evidence*, 7 J. CORP. FIN. 307 (2001).

Bhagat, Sanjai, Dennis C. Carey & Charles M. Elson, *Director Ownership, Corporate Performance, and Management Turnover*, 54 BUS. LAW. 885 (1999).

Barber, Brad M. & John D. Lyon, *Detecting Long-Run Abnormal Stock Returns: The Empirical Power and Specification of Test Statistics*, 43 J. FIN. ECON. 341 (1997)

Barnhart, Scott W. & Stuart Rosenstein, *Board Composition, Managerial Ownership and Firm Performance: An Empirical Analysis*, 33 FIN. REV. 1 (1998).

Baysinger, Barry & Henry Butler, *Corporate Governance and the Board of Directors: Performance Effects of Changes in Board Composition*, 1 J. L. ECON. & ORG. 101 (1985).

Bhagat, Sanjai & Bernard Black, *The Uncertain Relationship Between Board Composition and Firm Performance*, 54 BUS. LAW. 921 (1999).

Black, Bernard S., *The Legal and Institutional Preconditions for Strong Securities Markets*, 48 UCLA L. REV. 781 (2001).

Black, Bernard, *Shareholder Passivity Reexamined*, 89 MICH. L. REV. 520 (1990).

Bradbury, Michael E. & Y.T. Mak, *Ownership Structure, Board Composition, and the Adoption of Charter Takeover Procedures*, 6 J. CORP. FIN. 165 (1999).

BUSINESS ROUNDTABLE, STATEMENT ON CORPORATE GOVERNANCE 10 (1997), *at* http://www.brtable.org/pdf/11.pdf.

Byrd, John W. & Kent A. Hickman, *Do Outside Directors Monitor Managers?: Evidence from Tender Offer Bids*, 32 J. FIN. ECON. 195 (1992).

CALIFORNIA PUBLIC EMPLOYEES RETIREMENT SYSTEM, CORPORATE GOVERNANCE CORE PRINCIPLES AND GUIDELINES (1998), *at* http://www.calpers-governance.org/principles/domestic/us/page01.asp.

Chandler, William B., *On the Instructiveness of Insiders, Independents, and Institutional Investors*, 67 U. CIN L. REV. 1083 (1999).

Chung, Kee H. & Stephen W. Pruitt, *A Simple Approximation of Tobin's q*, FIN. MGMT., Autumn 1994.

Cotter, James F., Anil Shirdasani & Marc Zenner, *Do Independent Directors Enhance Target Shareholder Wealth During Tender Offers?*, 43 J. FIN. ECON. 195 (1997).

COUNCIL OF INSTITUTIONAL INVESTORS, SHAREHOLDER BILL OF RIGHTS (1998).

Council of Institutional Investors, *at* http://app.cii.org/glossary.cfm.

Demsetz, Harold & Belen Villalonga, *Ownership Structure and Corporate Performance*, 7 J. CORP. FIN. 209 (2001).

Denis, David J. & Atulya Sarin, *Ownership and Board Structures in Publicly Traded Corporations*, 52 J. FIN. ECON. 187 (1999).

EISENBERG, MELVIN A., THE STRUCTURE OF THE CORPORATION: A LEGAL ANALYSIS (1976).

Eisenberg, Theodore, Stefan Sundgren & Martin T. Wells, *Larger Board Size and Decreasing Firm Value in Small Firms*, 48 J. FIN. ECON. 35 (1998).

Faccio, Mara & M. Ameziane Lasfer, *Managerial Ownership, Board Structure and Firm Value: The UK Evidence* (working paper 1999), *at* http://papers.ssrn.com/ abstract=179008 (Social Science Research Network).

Ferris, Stephen P., Murali Hagannathan & A.C. Pritchard, *Too Busy to Mind the Business? Monitoring by Directors with Multiple Board Appointments* (working paper 2002), *earlier version available at* http:/papers.ssrn.com/abstract=167288 (Social Science Research Network).

Fosberg, Richard H., *Outside Directors and Managerial Monitoring*, AKRON BUS. & ECON. REV. Summer 1989, at 24.

Gilson, Ronald J. & Reinier Kraakman, *Reinventing the Outside Director: An Agenda for Institutional Investors*, 43 STAN. L. REV. 863 (1991).

Hall, Brian J. & Jeffrey B. Liebman, *Are CEOs Really Paid Like Bureaucrats?*, 113 Q.J. ECON. 643 (1998).

Hanson, Robert C. & Moon H. Song, *Managerial Ownership, Board Structure, and the Division of Gains in Divestitures*, 6 J. CORP. FIN. 55 (2000).

Hermalin, Benjamin E. & Michael S. Weisbach, *Endogenously Chosen Board of Directors and Their Monitoring of the CEO*, 88 AM. ECON. REV. 96 (1998).

Hermalin, Benjamin E. & Michael S. Weisbach, *The Effect of Board Composition and Direct Incentives on Firm Performance*, FIN. MGMT, Winter 1991.

Hermalin, Benjamin E. & Michael S. Weisbach, *The Determinants of Board Composition*, 19 RAND. J. ECON. 589 (1988).

Himmelberg, Charles P., R. Glenn Hubbard & Darius Palia, *Understanding the Determinants of Managerial Ownership and the Link Between Ownership and Performance*, 53 J. FIN. ECON. 353 (1999).

Holthausen, Robert W. & David F. Larcker, Board of Directors, Ownership Structure, and CEO Compensation (University of Pennsylvania, Wharton School, working paper, 1993).

INSTITUTIONAL SHAREHOLDER SERVICES, THE ISS PROXY VOTING MANUAL (3d ed., rev. 2001);

Institutional Shareholder Services, *at* http://app.cii.org/glossary.cfm (last visited October 30, 2001).

Kesner, Idalene F., Bart Victor & Bruce T. Lamont, *Board Composition and the Commission of Illegal Acts: An Investigation of Fortune 500 Companies*, 4 ACAD. MGMT J. 789 (1986).

Kesner, Idalene F. & Roy B. Johnson, *An Investigation of the Relationship Between Board Composition and Stockholder Suits*, 11 STRATEGIC MGMT. J. 327 (1990).

Klein, April, CEO Power, Board Independence and CEO Compenstion (2000) (working paper on file with New York University, Stern School of Business).

Klein, April, *Firm Performance and Board Committee Structure*, 41 J.L. & ECON. 275 (1998).

Koenker, Roger & Gilbert Bassett, Jr., *Regression Quantiles*, 46 ECONOMETRICA 33 (1978).

Kole, Stacey R., *Managerial Ownership and Firm Performance: Incentives or Rewards?*, 2 ADVANCES FIN. ECON. 119 (1996).

Kothari, S.P. & Jerold B. Warner, *Measuring Long-Horizon Security Price Performance*, 43 J. FIN. ECON. 301 (1997).

Langevoort, Donald C., *The Human Nature of Corporate Boards: Law, Norms, and the Unintended Consequences of Independence and Accountability* (working paper 2000), *at* http://papers.ssrn.com/abstract=241402 (Social Science Research Network).

Lawrence, Jeffrey & G.P. Stapledon, *Is Board Compostion Important? A Study of Listed Australian Companies* (working paper 1999), *at* http://papers.ssrn.com/ abstract=193528 (Social Science Research Network).

Lee, Darrell E. & James G. Tompkins, *A Modified Version of the Lewellen and Badrinath Measure of Tobin's Q*, FIN. MGMT., Spring 1999.

Lipton, Martin & Jay W. Lorsch, *A Modest Proposal for Improved Corporate Governance*, 48 BUS. LAW. 59 (1992).

Longstreth, Bevis, *Corporate Governance: There's Danger in New Orthodoxies*, CORP. GOVERNANCE ADVISOR, July/August 1994.

MacAvoy, Paul W., et al., *ALI Proposals for Increased Control of the Corporation by the Board of Directors: An Economic Analysis*, *in* STATEMENT OF THE BUSINESS ROUNDTABLE ON THE AMERICAN LAW INSTITUTE'S PROPOSED PRINCIPLES OF CORPORATE GOVERNANCE AND STRUCTURE: RESTATEMENT AND RECOMMENDATIONS (1983).

Mak, Y.T. & Yuan Li, *Determinants of Corporate Ownership and Board Structure: Evidence from Singapore*, 71 J. CORP. FIN. 235 (2001).

Mehran, Hamid, *Executive Compensation Structure, Ownership, and Firm Performance*, 38 J. FIN. ECON. 163 (1995).

Mikhail, W.M., *A Comparative Monte Carlo Study of the Properties of Economic Estimators*, 70 J. AM. STAT. ASS'N 94 (1975).

Millstein, Ira M., *The Evolution of the Certifying Board*, 48 BUS. LAW. 1485 (1993).

Millstein, Ira M., & Paul W. MacAvoy, *The Active Board of Directors and Improved Performance of the Large Publicly Traded Corporation*, 98 COLUM. L. REV. 1283 (1998).

Mishara, Chandra S. & James F. Nielsen, *Board Independence and Compensation Policies in Large Bank Holding Companies*, FIN. MGMT., Autumn 2000.

NATIONAL ASSOCIATION OF CORPORATE DIRECTORS, REPORT OF THE NACD BLUE RIBBON COMMISSION ON DIRECTOR PROFESSIONALISM, 1996.

Noe, Thomas H. & Michael J. Rebello, The Design of Corporate Boards: Composition, Compensations, Factions, and Turnover (March 1996) (unpublished manuscript, on file with Georgia State Univ. College of Business Administration).

O'Reilly III, Charles A., Brian G. Main & Graef S. Crystal, *CEO Compensation as Tournament and Social Comparison: A Tale of Two Theories*, 33 ADMIN. SCI. Q. 257 (1988).

ROE, MARK J., STRONG MANAGERS, WEAK OWNERS: THE POLITICAL ROOTS OF AMERICAN

CORPORATE FINANCE (1994).

Rosenstein, Stuart & Jeffrey G. Wyatt, *Inside Directors, Board Independence, and Shareholder Wealth*, 44 J. FIN. ECON. 229 (1997).

Rosenstein, Stuart & Jeffrey G. Wyatt, *Outside Directors, Board Independence, and Shareholder Wealth*, 26 J. FIN. ECON. 175 (1990).

Shivdasani, Anil & David Yermack, *CEO Involvement in the Selection of New Board Members: An Empirical Analysis*, 54 J. FIN. 1829 (1999).

SPENCERSTUART, 1997 BOARD INDEX: BOARD TRENDS AND PRACTICES AT S & P 500 CORPORATIONS (1997).

STATEMENT OF THE BUSINESS ROUNDTABLE ON THE AMERICAN LAW INSTITUTE'S PROPOSED PRINCIPLES OF CORPORATE GOVERNANCE AND STRUCTURE: RESTATEMENT AND RECOMMENDATIONS (1983).

Subrahmanyam, V., N. Rangan & S. Rosenstein, *The Role of Outside Directors in Bank Acquisitions*, FIN. MGMT, Summer 1997.

THEIL, HENRI, PRINCIPLES OF ECONOMETRICS (1971).

Tobin, James M., *The Squeeze on Directors—Inside is Out*, 49 BUS. LAW. 1707 (1994).

Unocal Corp. v. Mesa Petroleum Co., 493 A.2d 946 (Del. 1985)

VANCE, STANLEY C, BOARD OF DIRECTORS: STRUCTURE AND PERFORMANCE (1964).

VANCIL, RICHARD F., PASSING THE BATON: MANAGING THE PROCESS OF CEO SELECTION (1987).

Westphal, James D., *Collaboration in the Boardroom: Behavioral and Performance Consequences of CEO-Board Social Ties*, 42 ACAD. MGMT. J. 7 (1999).

Weisbach, Michael S. & Benjamin E. Hermalin, *Boards of Directors as an Endogeneously Determined Institution: A Survey of the Economic Literature* (working paper 2000), http://papers.ssrn.com/abstract=233111 (Social Science Research Network).

Weisbach, Michael S., *Outside Directors and CEO Turnover*, 20 J. FIN. ECON. 431 (1988).

Yermack, David, *Higher Market Valuation of Companies with a Small Board of Directors*, 40 J. FIN. ECON. 185 (1996).

Appendix: Results Using Market-Adjusted Returns (MAR) as a Performance Variable

As we noted in Part III.C, stock price returns must be used with caution as a performance measure because they are susceptible to investor anticipation. If investors fully anticipate the effects of board composition on performance, stock returns will be insignificant, even if a significant correlation between performance and board independence exists. For this reason, we rely mostly on Tobin's *q* (*Q*), the ratio of operating income to assets (*OPI/AST*), and the ratio of sales to assets (*SAL/AST*) as our performance measures. However, results using stock market returns as a performance measure are consistent with these results.

The tables below report selected OLS and 3SLS regression using market-adjusted returns (*MAR*) as a dependent variable. *MAR* is stock price return adjusted for overall market movements, but not for firm specific risk as proxied by β. We obtain similar but noisier (higher standard deviation) results using cumulative abnormal returns, which are adjusted both for overall market returns and for firm-specific β.

OLS Regression: *MAR* on Board Independence and Ownership Structure

Ordinary least squares regression results for market-adjusted returns (*MAR*) on board independence and stock ownership for 928 large U.S. public companies for 1988-1990 and 1991-1993. *MAR 88-90* means average *MAR* during 1988-1990 and similarly for other periods. Board and stock ownership variables are based on early 1991 data. Industry control for each regression is the mean of the dependent variable for that regression for each firm's industry group; 302 industry groups are constructed on the basis of 4-digit SIC codes from Compustat. Sample size varies from 552 to 684 because of missing data. *t*-statistics are in parentheses. Significant results ($p < .05$) are in **boldface** (not shown for firm size or industry control).

Dependent Variables	Independent Variables							Adj. R^2
	INDEP	**Board size**	**CEO ownership**	**Outside director ownership**	**No. of Outside 5% Holders**	**Log(firm size)**	**Industry control**	
MAR 88-90	**-.19 (-2.60)**	.001 (.05)	.003 (1.44)	-.001 (-.28)	**-.08 (-4.80)**	.01 (.35)	.23 (.66)	.055
MAR 91-93	.09 (1.24)	.009 (1.34)	**.005 (2.08)**	.004 (1.20)	.02 (1.20)	.01 (.83)	1.00 (6.64)	.087

3SLS Regressions: *MAR* on Board Independence and Ownership Structure

Simultaneous equations (three stage least squares) regression results for market-adjusted returns (*MAR*) on board independence and stock ownership for 928 large U.S. public companies for 1988-1990 and 1991-1993. *MAR 8*8-90 means average *MAR* during 1988-1990 and similarly for other periods. Board and stock ownership variables are based on early 1991 data. Industry control for each regression in Panel *A* is the mean of the dependent variable for that regression for each firm's industry group; 302 industry groups are constructed on the basis of 4-digit SIC codes from Compustat. Sample size varies from 552 to 684 because of missing data. *t*-statistics are in parentheses. Significant results ($p < .05$) are in **boldface** (not shown for firm size or industry control).

Panel *A*: Equation 5.1 (Firm Performance as Dependent Variable)

Dependent Variable:	Independent Variables							Adj. R^2
	INDEP	Board Size	CEO Ownership	Outside Director Ownership	No. of Outside 5% Holders	Log (firm size)	Industry Control	
MAR 88-90	**-.19 (-2.33)**	-.001 (-.03)	.003 (.97)	-.001 (-.39)	**-.08 (-5.03)**	.01 (.77)	-.17 (-.20)	.0561
MAR 91-93	.13 (1.55)	.011 (1.24)	.006 (1.94)	.005 (1.35)	.03 (1.82)	.03 (1.63)	.70 (1.30)	.0189

Panel *B*: Equation 5.2 (Board Independence as Dependent Variable)

Dependent Variable	Independent Variables						Adj. R^2
	Firm Performance Measure	Firm Performance	CEO Ownership	Outside Director Ownership	No. of Outside 5% Holders	Log (firm size)	
INDEP	*MAR* 88-90	**-.45 (-5.31)**	**-.01 (-5.52)**	-.002 (-.91)	-.008 (-.55)	.03 (2.49)	.134
	MAR 91-93	**3.17 (2.64)**	**-.03 (-2.59)**	-.018 (-1.33)	-.084 (-1.25)	-.12 (-1.57)	.008

Panel *C*: Equation 5.3 (CEO Ownership)

Dependent Variable	Independent Variables				Adj. R^2
	Firm Performance Measure	Firm Performance	Outside Director Ownership	Log(firm size)	
CEO Ownership	*MAR* 88-90	**9.64 (5.02)**	.11 (1.55)	-1.47 (-4.89)	.066
	MAR 91-93	**35.6 (3.44)**	-.17 (-1.07)	**-2.51 (-3.69)**	.023