Available online at www.sciencedirect.com
ScienceDirect
Journal of Banking & Finance 31 (2007) 1771–1794
Journal of BANKING & FINANCE
www.elsevier.com/locate/jbf

The impact of institutional ownership on corporate operating performance

Marcia Millon Cornett [a,*], Alan J. Marcus [b,1], Anthony Saunders [c,2], Hassan Tehranian [d,3]

[a] College of Business and Administration, Southern Illinois University, Carbondale, IL 62901, United States
[b] Wallace E. Carroll School of Business, Boston College, Chestnut Hill, MA 02467, United States
[c] Salomon Center, Stern School of Business, New York University, New York, NY 10020, United States
[d] Wallace E. Carroll School of Business, Boston College, Chestnut Hill, MA 02467, United States

Received 4 April 2005; accepted 11 August 2006
Available online 25 January 2007

Abstract

This paper examines the relation between institutional investor involvement in and the operating performance of large firms. We find a significant relation between a firm's operating cash flow returns and both the percent of institutional stock ownership and the number of institutional stockholders. However, this relation is found only for a subset of institutional investors: those less likely to have a business relationship with the firm. These results suggest that institutional investors with potential business relations with the firms in which they invest are compromised as monitors of the firm.

JEL classification: G30; G34

Keywords: Corporate governance; Financial performance; Institutional ownership

* Corresponding author. Tel.: +1 618 453 1417.
E-mail addresses: mcornett@cba.siu.edu (M.M. Cornett), alan.marcus@bc.edu (A.J. Marcus), asaunder@stern.nyu.edu (A. Saunders), hassan.tehranian@bc.edu (H. Tehranian).
[1] Tel.: +1 617 552 2767.
[2] Tel.: +1 212 998 0711.
[3] Tel.: +1 617 552 3944.

0378-4266/$ - see front matter
doi:10.1016/j.jbankfin.2006.08.006

1. Introduction

The spate of corporate scandals in the last five years points to a failure of corporate governance. Reforms proposed and passed as a result of such scandals focus on the quality of monitoring of management decisions. For example, Sarbanes-Oxley requires independent financial experts to serve on audit committees, while Nasdaq and the NYSE have called for boards of directors composed of "independent" agents. These reforms reflect a growing consensus that boards have not been sufficiently diligent in monitoring management, and that they need to be composed of unaffiliated agents not beholden to management.

In contrast to boards of directors, institutional investors have become increasingly willing to use their ownership rights to pressure managers to act in the best interest of the shareholders. As these investors have increased their ownership share in firms, there has been an increased focus by regulators and researchers alike on their role in the monitoring, disciplining, and influencing of corporate managers. To date, research on the role of institutional investors in corporate monitoring has focused mainly on institutional investor activism (e.g., corporate governance proposals or forced CEO turnover). Less evidence has been presented on the impact of institutional ownership and monitoring on a firm's financial performance, and results of these few studies have been mixed, as discussed below. In this paper, we look at the relation between institutional investor involvement, via stock ownership and board membership, and the operating cash flow returns of firms. We examine whether institutional investor involvement affects operating cash flow returns as well as how institutional investor monitoring interacts with other corporate governance mechanisms (e.g., insider stock ownership or independent outside directors on boards).

Several recent studies suggest that not all institutional investors are equal (see Brickley et al., 1988; Almazan et al., 2005; Chen et al., 2005). These papers hypothesize that some institutional investors (e.g., insurance companies or banks through their trust departments) have either existing or potential business relations with firms, and, in order to protect those relations, might be less willing to challenge management decisions. These investors are therefore labeled *pressure-sensitive*. In contrast, institutions such as investment companies and independent investment advisors may be less subject to pressure from the firms in which they invest and therefore are better suited to monitor, discipline, and impose controls on corporate managers. These institutional investors are labeled *pressure-insensitive*. Using this classification, Almazan et al. (2005) show that greater share ownership by pressure-insensitive investors is associated with greater discipline on executive compensation. Using the same classification, Chen et al. (2005) find that pressure-insensitive ownership is associated with better acquisition decisions. We investigate whether this classification also is useful in predicting the impact of institutional ownership on overall financial performance.

The empirical results in the paper lead us to confirm a positive relation between measures of institutional investor involvement and a firm's operating cash flow returns. We also find that the type of institutional investor (pressure-insensitive versus pressure-sensitive) matters. For example, while we document a positive relation between both the number and ownership share of institutional investors holding stock and the operating cash flow returns of a firm, closer inspection reveals that this relationship seems to exist only for pressure-insensitive institutional investors.

The rest of the paper is organized as follows. Section 2 discusses the relation between institutional investor ownership and large firm operating performance and presents our

hypotheses. Section 3 discusses other internal corporate governance mechanisms used by firms to influence operating performance which are included as control variables in this study. Section 4 presents information regarding our data and methodology. Section 5 presents empirical results and Section 6 concludes the paper.

2. Institutional investors and firm performance

A considerable body of research has focused on the role of institutional investors as corporate monitors. The rationale is that due to the high cost of monitoring, only large shareholders such as institutional investors can achieve sufficient benefits to have an incentive to monitor (see, for example, Grossman and Hart, 1980). Indeed, Shleifer and Vishny (1986) note that large shareholders may have a greater incentive to monitor managers than members of the board of directors, who may have little or no wealth invested in the firm. Moreover, large institutional investors have the opportunity, resources, and ability to monitor, discipline, and influence managers. McConnell and Servaes (1990), Nesbitt (1994), Smith (1996) and Del Guercio and Hawkins (1999) all have found evidence consistent with the hypothesis that corporate monitoring by institutional investors can result in managers focusing more on corporate performance and less on opportunistic or self-serving behavior.

On the other hand, Maug (1998) notes that institutions' use of their ability to influence corporate decisions is partially a function of the size of their shareholdings. If institutional investor shareholdings are high, shares are less marketable and are thus held for longer periods. In this case, there is greater incentive to monitor a firm's management. However, when institutional investors hold relatively few shares in a firm, they can easily liquidate their investments if the firm performs poorly, and therefore have less incentive to monitor. Several studies conclude that institutional investors' goal of maintaining the liquidity of their holdings and their desire for short-term profit outweighs the benefits of monitoring management in the hope of eliciting higher long-term profitability (see Coffee, 1991; Bhide, 1994; Demirag, 1998; Maug, 1998).

On balance, however, it seems clear that large stockholders and institutional investors have become increasingly active in corporate governance, especially in underperforming firms. Gillan and Starks (2000) find that corporate governance proposals sponsored by institutional investors receive more favorable votes than those sponsored by independent individuals or religious organizations. Hartzell and Starks (2003) show that institutional ownership is negatively associated with the level of executive compensation and positively associated with pay-for-performance sensitivity. Chung et al. (2002) find that large institutional shareholdings in a firm deter managers from pursuing opportunistic earnings management through discretionary accrual choices. Finally, Parrino et al. (2003) show that institutional selling is associated with forced CEO turnover and that these CEOs are more likely to be replaced with an outsider. Thus, institutional investors can effectively "vote with their feet" when dissatisfied with a firm's management.

In addition to institutional investor activism, a number of papers have looked for a direct impact of institutional investor ownership on firm performance. McConnell and Servaes (1990) find that the percent of institutional investor ownership is positively related to a firm's Tobin's q. Nesbitt (1994), Smith (1996) and Del Guercio and Hawkins (1999) also find a positive relation between institutional investor ownership and various measures of firm performance. However, Agrawal and Knoeber (1996), Karpoff et al. (1996), Duggal and Millar

(1999) and Faccio and Lasfer (2000) find no such significant relation. Thus, the impact of institutional investor stock ownership on firm performance is still unclear.

This paper adds to the literature on institutional investor ownership and firm performance by examining this relation for the S&P 100 firms in the 1990s. Unlike most past research, we measure firm performance using cash flow return on assets and control for other, internal corporate governance mechanisms (discussed below). We also consider several measures of effective institutional investment in the firm: the fraction of institutional investor ownership, the number of institutional owners,[4] membership on the board of directors, and, most significantly, the type of institutional investor.

We follow recent research on the impact of ownership composition by focusing on the type of institutional investor. This line of research began with Brickley et al. (1988), who note that pressure-insensitive institutional investors are more likely to discipline and/or vote against management than pressure-sensitive ones. Borokhovich et al. (2006) find that the relative holdings of these two groups of institutional investors affect the market reactions to announcements of anti-takeover amendments. As noted, Almazan et al. (2005) show that the impact of institutional ownership on executive compensation documented in Hartzell and Starks (2003) is in fact far stronger for pressure-insensitive institutional investors. We adopt the classification scheme used in these papers and look at firm performance as a function of the type of institutional investor (pressure-sensitive versus pressure-insensitive) holding stock in the firm. We hypothesize that the greater the ownership of pressure-insensitive institutional investors, the better the performance of the firm.

3. Control variables: Internal corporate governance mechanisms

Our primary focus is on the impact of institutional ownership on firm performance through its ability to discipline management. However, there are other internal corporate governance mechanisms that serve to limit managerial discretion and mitigate manager–shareholder conflict. These are necessary control variables for our analysis. Internal corporate governance variables that have been examined in other contexts include director and executive officer stock ownership, board of director characteristics, CEO age and tenure, and CEO pay-for-performance sensitivity. We discuss these in turn.

3.1. Director and executive officer stock ownership

Several studies argue that stock and/or option ownership by board members and executive officers gives them an incentive to monitor managers carefully to ensure that the firm is run efficiently (see, for example, Brickley et al., 1988; Brown and Maloney, 1999). Thus, the higher the stock ownership of directors and executive officers, the better should be the firm's operating performance.

[4] The bulk of research examining the impact of institutional investors measures influence solely by their percentage ownership of the firm. Some papers, however, suggest that the *number* of institutional investors may better capture the impact of such shareholders. Sias et al. (2001) find that stock returns are more strongly related to the number of institutional investors than to the fraction of a firm's shares held by them. Chen et al. (2002) use the number of mutual funds holding stock in a particular firm as a predictor of stock returns. Foster and Viswanathan (1996) and Back et al. (2000) show that information on firms is revealed more rapidly when there are greater numbers of institutional investors. We examine both the percentage ownership as well as the absolute number of institutional investors and find that both matter.

3.2. Board of director characteristics

3.2.1. Percent of independent outside directors on the board

There is considerable literature regarding the effect of the composition of the board of directors (i.e., inside versus outside directors). Boards dominated by outsiders are arguably in a better position to monitor and control managers (Dunn, 1987). Outside directors are independent of the firm's managers, and in addition bring a greater breadth of experience to the firm (Firstenberg and Malkiel, 1980). Weisbach (1988), Bryd and Hickman (1992) and Bhagat et al. (1994) show that outsider-dominated boards are, in fact, more likely than insider-dominated boards to respond to poor performance by replacing the CEO. A number of studies have linked the proportion of outside directors to financial performance and shareholder wealth (see Brickley et al., 1994; Bryd and Hickman, 1992; Subrahmanyan et al., 1997; Rosenstein and Wyatt, 1990). These studies consistently find better stock returns and operating performance when outside directors hold a significant percentage of board seats.

3.2.2. CEO/Chair duality

In about 80% of US companies, the CEO is the chairman of the board (Brickley et al., 1997). CEO/Chair duality concentrates power with the CEO, potentially making disagreement on the part of outsiders costlier, which can exacerbate potential conflicts of interest. The dual office structure also permits the CEO to effectively control information available to other board members and thus impedes effective monitoring (Jensen, 1993).

3.2.3. Board size

Jensen (1993) argues that small boards are more effective in monitoring a CEO's actions, as large boards have a greater emphasis on "politeness and courtesy" and are therefore easier for the CEO to control. Yermack (1996) finds an inverse relation between board size and Tobin's q in a sample of industrial companies, and concludes that large boards are less effective than small ones. These studies suggest that the size of a firm's board is inversely related to firm operating performance.

3.3. Age and tenure of CEO

Some studies suggest that top officials with little experience have limited effectiveness because it takes time to gain an adequate understanding of the company (see Bacon and Brown, 1973; Alderfer, 1986). In fact, increased experience has been linked to resistance to paying greenmail (Kosnik, 1987, 1990) as well as to better financial performance (Brown and Maloney, 1999). These studies suggest that the older or the longer the tenure of the firm's CEO, the greater the understanding of the firm and its industry, and the better the performance of the firm.

3.4. CEO's pay-performance sensitivity

The relation between managerial compensation and shareholder wealth is well-documented. For example, Jensen and Murphy (1990a) find that CEO wealth increases by $3.25 per $1000 increase in shareholder wealth. Jensen and Murphy (1990b) argue that the strength of the pay-performance relation rather than the level of pay is the key to

mitigating agency problems. We measure pay-performance sensitivity by the ratio of the dollar value of stock options held by executives (estimated using the Black–Scholes formula) to the dollar value of total compensation. This measure implicitly assumes that the sensitivity of option value to operating performance is substantially greater than the sensitivity of salary and bonus. Both Jensen and Murphy (1990a) and Hubbard and Palia (1995) present evidence supporting this.

3.5. Firm size

Firm size is not a corporate governance variable, but we nevertheless include it as a control variable because it is associated with performance in many other studies. We measure size as the log of total assets.

4. Data and methodology

4.1. Data

We examine the impact of institutional investor ownership on firm performance and the relative impact of pressure-sensitive versus insensitive institutional investors over the period 1993 through 2000. Our sample consists of the firms included in the S&P 100 (obtained from Standard & Poor's) as of November 1993. We use S&P 100 firms because their size would command interest among institutional investors. Moreover, since these firms are also prominent in equity indexes, they will be of particular interest to large institutional investors that either manage indexed portfolios or use such portfolios as performance benchmarks. While institutional ownership is most prevalent in large firms such as these, even in this group, there is considerable variation in such ownership. The cross-sectional standard deviation of the proportion of firm shares owned by institutions is 14.7 percentage points.

Firms that were dropped from the S&P 100 after 1993, but that remained publicly traded and continued to operate, remain in the sample. Removing these firms would introduce sample selection bias as firm performance is associated with ongoing inclusion in the S&P index. However, some firms are lost due to non-performance related events. Eleven of the 1993 S&P 100 firms were eventually acquired by other firms over the sample period and are dropped from the sample in the year of the merger. Another nine firms were lost by the year 2000 due to the unavailability of proxy or institutional investor ownership data. After these adjustments to the data, we are left with a sample of 676 firm-years.

Following Healy et al. (1992), who examine performance of firms after mergers, operating performance is measured as operating cash flow return on assets (i.e., annual earnings before interest and taxes plus depreciation divided by total assets at the end of the year), which we denote ROA. This measure of performance is effectively independent of financial leverage. The financial statement data needed to calculate ROA are obtained from the Compustat database for each year.

Cash flow ROA offers several advantages over Tobin's q as a measure of firm performance. Tobin's q reflects growth opportunities (and, more generally, expectations of the firm's prospects in future years) through the impact of these factors on market value, while cash flow ROA is a more focused measure of current performance. For example, the Tobin's q of a poorly performing firm might be inflated by expectations of a bid premium in a corporate takeover. These sorts of considerations do not affect cash flow ROA.

Finally, regressions of Tobin's q on institutional ownership would be more susceptible to endogeneity problems if institutions are attracted to growth stocks or chase recent stock-market winners. In contrast, operating performance is not tied to stock prices, does not rely on a specific model of expected returns, and does not reflect a common measure of growth opportunities.

Both levels and changes in ROA may be affected by extraneous industry effects. Therefore, we industry-adjust firm performance in each year. The industry-adjusted ROA (IAROA) equals firm cash-flow return on assets minus industry-average cash flow return on assets in that year. Industry-adjusted comparisons allow us to examine firm-specific performance irrespective of any industry-wide factors that may affect ROA. We define the industry comparison group for each firm as all firms listed on Compustat with the same 3-digit SIC code.[5] The number of firms in each industry group ranges from a minimum of 2 to a maximum of 357. Industry ROA is calculated as the total asset-weighted average ROA of all firms in the industry.

Institutional investor ownership data for the period 1993–2000 are obtained from the CDA Spectrum data base, which compiles information contained in quarterly 13-f filings of institutional investors holding more than $100 million in the equity of any firm. Institutional investors file their holdings as the aggregate investment in each firm regardless of the number of individual fund portfolios they manage.

Our measures of institutional investor ownership follow those used in Hartzell and Starks (2003). We calculate the proportion of total institutional investor ownership in each firm.[6] We also follow Brickley et al. (1988) and Almazan et al. (2005) by examining whether the type of institutional investor (pressure sensitive versus pressure insensitive) has an impact on firm performance. Specifically, we use CDA Spectrum coding to divide the data on institutional investor ownership into a relatively pressure-insensitive group (investment companies and independent investment advisors, primarily pension fund advisors) and a potentially more pressure-sensitive group (bank trust departments and insurance companies). To be conservative, we also follow these papers in grouping institutional investors that CDA classifies as "other" (for example, endowment funds, foundations, or ESOPs) with the pressure-sensitive group. If the "other" investors are in fact similar in impact to the pressure-insensitive ones, such a classification will weaken differences between the two groups, reducing the likelihood that we would observe significantly different impacts of the two groups on firm performance.[7]

Thus, from the CDA Spectrum data base we collect the following information for each firm for each year over the period 1993–2000: total shares outstanding, number of shares owned by all institutional investors, number of shares owned by investment companies and independent investment advisors (pressure-insensitive institutional investors), number of shares owned by banks, insurance companies, and others (pressure-sensitive institutional investors), and number of pressure-insensitive, pressure-sensitive, and all institutional investors holding shares in each firm.

[5] We remove all sample firms from any industry comparison groups. For example, General Motors and Ford (both S&P 100 firms) are not included in any industry comparison groups.

[6] In alternative specifications, we also investigate the impact of the leading institutional investors in each firm by using the proportion of ownership accounted for by the top-five institutional investors. The results are unaffected by this choice. The results are available from the authors on request.

[7] After 1998, the CDA classifications of investor type are known to be affected by data errors. Therefore, we use the pre-1998 CDA classification of institutional type for 1998 and beyond.

As discussed above, several studies have found that CEO compensation, board composition, and director and executive officer stock ownership affect a firm's performance. Accordingly, we use proxy statements for each year 1993–2000 to obtain director and officer stock ownership, board size, independent outsiders on the board,[8] CEO/chair duality, CEO age, CEO tenure, and CEO compensation (salary, bonus, options, stock grants, long-term incentive plan payouts, and other).[9]

We trim extreme data points, eliminating the top and bottom 1% of observations for each right-hand side variable. While there are 676 firm-years in our sample, the empirical tests are conducted from 662 observations. Further, as we discuss below because we lag many of the right-hand side variables, we lose observations at the beginning of the sample period. Thus, while there are 662 firm-years in the sample, the number of regression observations is 573.

Table 1 presents descriptive statistics for the sample of 573 observations used in the regression analysis. While the mean cash-flow ROA is 18.37%, mean industry-adjusted ROA is, as expected, nearly zero, 0.76%. Thus, the financial performance of our sample firms is, on average, nearly identical to their industry competitors. We report two standard deviations in Table 1. The within-firm or time-series (T-S) standard deviation of a variable is the average of the standard deviations for each firm for that variable calculated over the sample period. The cross-sectional standard deviation (X-S) is the standard deviation of the sample-average value of each variable across firms. While the cross-sectional standard deviation of raw cash-flow ROA is 10.05%, the cross-sectional standard deviation of industry-adjusted ROA is only 0.89%, indicating that most variation in financial performance is due to industry effects, and that industry averages should be quite effective for benchmarking performance.

On average, 414 institutional investors, of which 240 are pressure-sensitive and 174 are pressure-insensitive, hold stock in each firm in our sample. Institutional ownership is significant; the mean value of percentage ownership averaging across all firms in all years is 59.4% of the outstanding shares in each firm. Pressure-sensitive institutional investors own, on average, 34.3% of total shares, while pressure-insensitive institutional investors hold, on average, 25.1% of total shares. In contrast, directors and executive officers hold, on average, only 3.2% of the outstanding shares in their firms.

While institutional investors hold a large fraction of outstanding shares, they do not often sit on the board of directors. On average, the boards of directors seat 12.34 members. Less than 1 of these are filled by representatives of either pressure-insensitive (0.30) or pressure-sensitive (0.42) institutional investors. Instead, these seats are filled, on average, by 2.31 inside directors, 1.59 affiliated outside directors, and 8.12 independent outside directors. The maximum number of institutional investors on the board is 4. Thus, the majority of the directors are independent outsiders (albeit not institutional investors).

The average age of the firms' CEOs is 57 years (ranging from 40 to 69) and, on average, the CEOs have been in place for seven years (ranging from 2 to 27). These CEOs are paid an

[8] Specifically, independent outside directors are directors listed in proxy statements as managers in an unaffiliated non-financial firm, managers of an unaffiliated bank or insurance company, retired managers of another company, lawyers unaffiliated with the firm, and academics unaffiliated with the firm.

[9] The proxies report the total stock options held by the CEO. This includes the value of total option holdings awarded since the CEO was appointed as well as any other stock options held by the CEO, net of past exercises. Stock option holdings are awarded as part of the compensation package of the CEO, but are not included in the CEO's annual salary or cash bonus.

Table 1
Descriptive Statistics for S&P 100 Firms, 1993–2000

Variable	Mean	Median	Standard deviation T-S	X-S	Minimum	Maximum
ROA	0.1837	0.1802	.0573	0.1005	−0.0785	0.2253
Industry-adjusted ROA	0.0076	0.0045	0.0052	0.0089	−0.0073	0.0143
Fraction of shares owned by						
Institutional investors	0.594	0.613	0.092	0.151	0.251	0.749
Pressure-sensitive	0.343	0.297	0.109	0.188	0.073	0.626
Pressure-insensitive	0.251	0.278	0.092	0.162	0.044	0.543
Fraction director + executive officer stock ownership	0.032	0.017	0.028	0.049	0.004	0.282
Number of						
Institutional investors	414	359	158	252	92	798
Pressure-sensitive	240	196	128	215	37	552
Pressure-insensitive	174	126	99	154	15	318
Number of directors on board						
Total	12.34	12	1.8	2.7	8	20
Inside directors	2.31	2	0.97	1.76	1	9
Affiliated outside	1.59	1	0.87	1.58	0	6
Independent outside	8.12	8	1.37	2.31	2	14
Institutional investors	0.74	1	0.65	0.99	0	4
Pressure-sensitive investors	0.42	0	0.46	0.73	0	4
Pressure-insensitive investors	0.30	0	0.47	0.70	0	2
Fraction of independent outside directors	0.658	0.686	0.089	0.059	0.176	0.826
Total assets ($ billions)	39.73	19.32	32.12	53.21	3.7	517.11
Analysts covering firm	22.3	22.08	4.17	7.36	3	44
CEO profile						
Age (years)	57	57	3	6	40	69
Tenure (years)	7	5	4	7	2	27

(*continued on next page*)

Table 1 (*continued*)

Variable	Mean	Standard deviation				
		Median	T-S	X-S	Minimum	Maximum
CEO compensation (\$000)						
Salary and bonus	2349	1827	1353	2643	648	15656
Option holdings	4069	4648	7691	13,051	32	187,931
Options as a fraction of total compensation	0.378	0.361	0.188	0.291	0.100	0.668

ROA is annual operating cash flow return on assets (earnings before interest and taxes plus depreciation over a year divided by total assets at the end of the year). Financial statement data needed to calculate ROA are obtained from the Compustat database for each year, 1993–2000. For each S&P 100 firm, we classify industry comparison firms as all firms listed on Compustat with the same 3-digit SIC code. Industry-adjusted ROA is then measured as a sample firm's ROA minus the (total asset) weighted average industry ROA. Data on institutional investor ownership for the period 1993–2000 are obtained from the CDA Spectrum data base. These data include total shares outstanding, number of shares owned by all institutional investors, number of shares owned by the top five institutional investors, number of shares owned by investment companies and independent investment advisors (pressure-insensitive institutional investors), number of shares owned by banks, insurance companies, and others (pressure-sensitive institutional investors), and the number of pressure-insensitive, pressure-sensitive, and all institutional investors. We use proxy statements for the sample firms for each year 1993–2000 to collect data on the fraction of director and officer stock ownership, board size, the fraction of independent outsiders on the board, CEO/chair duality, CEO age, CEO tenure, and CEO compensation (salary, bonus, options, stock grants, long-term incentive plan payouts, and others). These statistics are based on the data included in the regression analysis, i.e., excluding observations purged as extreme outliers. Time series (T-S) standard deviation is the average within-firm standard deviation for each variable. Cross-section (X-S) standard deviation is the standard deviation of average values of each variable across firms. This table is based on the 573 firm-year observations used in our regression analysis (first-year observations are lost due to the use of lagged right-hand side variables).

average of $2.349 million in salary and bonus annually and hold $4.069 million in options.[10] CEO compensation from all sources averages $8.39 million. A natural measure of the sensitivity of CEO wealth to firm performance would compare the value of option holdings to other compensation. Because option holdings are so skewed, however, the ratio of option holdings to other compensation would contain some extreme outliers. Therefore, we normalize this variable by computing the ratio of option holdings to the sum of these holdings plus other compensation. This ratio is constrained to lie between 0 and 1. Its mean value is 0.378, and it ranges from 0.100 to 0.668.

4.2. Methodology

We estimate multivariate regressions in which the firm's industry-adjusted ROA in each year is a function of various governance and ownership variables. Our particular focus is the impact of institutional ownership on performance. However, this relationship is subject to a potential simultaneity bias. If institutions are attracted to firms with superior operating performance, then a positive association between institutional ownership and performance may be observed even if that ownership is not directly beneficial to performance. Moreover, if operating performance and institutional share ownership are both persistent over time, lagging ownership relative to performance will not eliminate the bias.

We employ several tools to eliminate this potential simultaneity bias. First and foremost, we employ instrumental variables. We use the number of analysts covering the firm as an instrument for institutional share ownership. Analyst coverage in any year will be correlated with institutional share ownership, but unlike share ownership, is not subject to reverse feedback from short-term variations in expected operating performance. We also include as a right-hand side variable the lagged market-adjusted return of the firm (i.e., annual firm return minus the return on the S&P 500 Index). Increased expectations for improvements in future operating performance will result in a positive market-adjusted return. Thus, this variable helps control for already-anticipated changes in performance. We also include firm size (log of total assets) as a control variable for operating performance.

We lag all measures of institutional ownership and institutional board membership by one year. This lag allows for the effect of any change in governance structure to show up in firm performance. This also mitigates simultaneity issues: without the lag on institutional ownership, it would be hard to distinguish between the hypothesis that institutional investors improve firms' decisions and cash flows versus the hypothesis that they simply increase holdings in firms with better recent performance. If institutions do affect management decisions, they presumably would do so prior to the year of better performance, which is consistent with the use of a lag.

The lag on executive compensation eliminates a simpler form of reverse causality. Because bonuses are tied to firm performance, and the value of options is linked to the stock price, management compensation is a direct function of contemporaneous operating performance. Using lagged compensation enables us to measure pay-for-performance incentive structures that are uncontaminated by the impact of current performance on compensation.

[10] Results reported in the paper are based on option values using the dividend-adjusted Black–Scholes formula. This follows Hartzell and Starks (2003) who find that this is a better measure of ex ante value than option compensation given in the proxy statement, which reflects exercises in any year. We look at both measures, however, and find them to be highly correlated in our sample.

We might also have lagged other explanatory variables involving board membership. However, endogeneity concerns are not as significant here. As Hermalin and Weisbach (1988) find, board turnover is often a result of *past* performance, especially for poorly performing firms, rather than anticipated changes in the future prospects of the firm. Board turnover is also often related to CEO turnover. Thus, in contrast to institutional investment, there is far less danger that board composition will be causally affected by the near-term prospects of the firm. Moreover, to the extent that the firm has control over board membership, board composition is less subject to the endogeneity problem that might affect institutional investment.[11]

Industry-adjusting firm performance eliminates another potential source of simultaneity bias that might exist at an industry level. Suppose for example that institutional investors prefer more stable but lower average return industries. This preference would result in a link between average ROA and institutional holdings. However, normalizing firm ROA by the industry-average ROA eliminates any relation between relative performance and industry characteristics. Further, we estimate all regressions allowing for firm fixed effects. This controls for any differences in firm-specific average performance that might remain after industry adjustment, and allows us to identify the marginal impact of the regression variables on the dependent variable for that firm.[12] (While not a concern for simultaneity, we also allow for year fixed effects in the regression analysis.)

Finally, our concerns over simultaneity are mitigated by the fact that we find an association between firm performance and institutional investment only for pressure-insensitive investors, which supports a straightforward monitoring hypothesis. The alternative hypothesis would have to be that only one class of institutional investors is attracted by good operating performance. While some papers have focused on idiosyncratic motives that might differentiate investment behavior across classes of institutional investors [for example, a focus on prudence for banks (Del Guercio, 1996) or visibility and low transaction costs for mutual funds (Falkenstein, 1996)], it is harder to motivate differential preference regarding operating performance.[13]

Observations across firms are pooled in one regression. Variations of the following equation are estimated:

$$\begin{aligned}\mathrm{IAROA}_{it} = {} & a_1 + b_1\mathrm{FIISOWN}_{it-1} + b_2\ln(\mathrm{NII}_{it-1}) + b_3\ln(\mathrm{NIIOB}_{it-1}) + b_4\mathrm{FIIOB}_{it-1} \\ & + b_5\mathrm{DOSOWN}_{it} + b_6\mathrm{FINDDIR}_{it} + b_7\mathrm{AR}_{it-1} + b_8\mathrm{CEOCHD}_{it} \\ & + b_9\ln(\mathrm{BRDSZE}_{it}) + b_{10}\ln(\mathrm{CEOAGE}_{it}) + b_{11}\ln(\mathrm{CEOTEN}_{it}) \\ & + b_{12}\ln(\mathrm{SIZE}_{it-1}) + b_{13}\mathrm{CEOCOMP}_{it-1} + e_{it}\end{aligned}$$

where variable definitions are given in Table 2. Because we lag many of the right-hand side variables, we lose observations at the beginning of the sample period. Thus, while there are 662 firm-years in the sample, the number of regression observations is 573.

[11] Nevertheless, we experiment with lags on the board membership variables and find that such lags make virtually no difference in our regression results. Results are available from the authors on request.

[12] The firm fixed effect is econometrically equivalent to measuring each right-hand side variable as the deviation from the mean value for that firm, so we can interpret the regression coefficient as the incremental impact of an increase in that variable. By effectively taking deviations from firm mean, we also implicitly control for differences across firms in average values of right-hand side variables such as use of options. In other (unreported) regressions, we experiment with changes instead of fixed effects and obtain similar results.

[13] Hotchkiss and Strickland (2003) also look at patterns of investment styles for institutional investors, but they classify such investors along dimensions of momentum, aggressive growth, or turnover. They find that such a breakdown shows little correlation with the Spectrum classifications used in this study.

Table 2
Variable definitions

Explanatory variable	Symbol	Variations employed in regression analysis
Fraction of shares of the firm owned by institutional investors (lagged one year)	FIISOWN	• Fractional ownership of all institutional investors • Fractional ownership of pressure-insensitive institutional investors • Fractional ownership of pressure-sensitive institutional investors
ln(the number of institutional investors holding stock in firm) (lagged one year)	ln(NII)	• Number of all institutional investors holding stock • Number of pressure-insensitive institutional investors holding stock • Number of pressure-sensitive institutional investors holding stock
ln(1 + the number of institutional investors on the board of directors) (lagged one year)[a]	ln(NIIOB)	• Number of institutional investors on the board • Number of pressure-insensitive institutional investors on the board • Number of pressure-sensitive institutional investors on the board
Fraction of board of directors composed of institutional investors (lagged one year)	FIIOB	• Fraction of board of directors composed of all institutional investors • Fraction of board of directors composed of pressure-sensitive institutional investors • Fraction of board of directors composed of pressure-insensitive institutional investors
Fraction of board of directors composed of independent outside directors	FINDDIR	
Fraction of shares in firm owned by directors and officers	DOSOWN	
Market-adjusted return on stock (lagged one year)	AR	
CEO/Chair duality dummy: equals 1 if the CEO is also the chair of the board of directors, and 0 otherwise	CEOCHD	
ln(size of the board of directors)	ln(BRDSIZE)	
ln(CEO age)	ln(CEOAGE)	
ln(CEO tenure)	ln(CEOTEN)	
ln(assets of firm) (lagged one year)	ln(SIZE)	
CEO pay-for-performance compensation (re-scaled)	CEOCOMP	• $\frac{\text{CEO option holdings}}{\text{option holdings} + \text{other compensation}}$

This table lists and defines the right-hand-side variables used in the regression analysis.

[a] There are many firms with no institutional investors on the board of directors. Therefore, we must take log of 1 plus the number of such investors. In contrast, there are many institutional investors in each firm (median = 359), so adding 1 to that number would be irrelevant.

5. Regression results

Table 3 presents regression results examining whether various governance and compensation variables are associated with industry-adjusted ROA. These regressions are estimated using ordinary least squares. Table 4 reports the same specifications using

Table 3
Industry-adjusted ROA as a function of governance and compensation variables

Explanatory variable	Regression 1	Regression 2
Fraction of shares owned by all institutional investors (lagged one year)	0.03406	0.02827
	(2.87)***	(2.91)***
ln(Number of institutional investors) (lagged one year)	0.02491	
	(2.76)***	
ln(Number of pressure-insensitive institutional investors) (lagged one year)		0.02209
		(3.08)***
ln(Number of pressure-sensitive institutional investors) (lagged one year)		0.00103
		(0.36)
ln(1 + number of institutional investors on board) (lagged one year)	0.00217	0.00129
	(0.51)	(0.65)
Fraction of board composed of institutional investors (lagged one year)	0.04711	0.03501
	(1.05)	(1.02)
Fraction of firm owned by directors plus executive officer (lagged one year)	0.02639	0.01804
	(1.25)	(1.02)
Fraction of board composed of independent outside directors (lagged one year)	0.10874	0.11005
	(3.37)***	(3.42)***
Market-adjusted returns (lagged one year)	0.00532	0.00506
	(0.59)	(0.68)
CEO duality dummy	−0.00204	−0.00192
	(−0.56)	(−0.44)
ln(Board size)	−0.00883	−0.00924
	(−0.89)	(−0.99)
ln(CEO age)	0.01053	0.01194
	(0.79)	(0.73)
ln(CEO tenure)	−0.01318	−0.01237
	(−1.01)	(−0.81)
ln(Size) (lagged one year)	0.00149	0.00155
	(0.99)	(0.95)
Option compensation as a fraction of total compensation (lagged one year)	0.11294	0.10833
	(8.87)***	(7.98)***
R-squared (adjusted)	39.3%	39.9%
Firm effects *F*-value	6.97***	7.12***
Year effects *F*-value	1.79	1.95

The dependent variable is industry-adjusted ROA for firm *j* in year *t*. Regressions are estimated as a pooled time-series cross-section for S&P 100 firms, with fixed firm effects. The sample period is 1993 – 2000. *t*-statistics are in parentheses. The number of observations is 573. Regressions are estimated using OLS.

* Significant at better than the 10% level.

** Significant at better than the 5% level.

*** Significant at better than the 1% level.

instrumental variables. Regression 1 indicates that institutional ownership, outsider board membership, and performance-related pay all have a significant impact on firm financial performance. The coefficient on the fraction of shares owned by all institutional investors is positive, 0.03406, and significant at better than a 1% level (*t*-statistic = 2.87). Moreover, the economic impact of percentage institutional ownership is relatively important. For example, the regression coefficient implies that an increase of one within-firm (time series) standard deviation in institutional ownership (i.e., using Table 1, an increase in fractional ownership of 0.092 or 9.2 percentage points) would increase industry-adjusted ROA by $0.092 \times 0.03406 = 0.0031$ or 0.31 percentage points. This is more than half the sample time

Table 4
Industry-adjusted ROA as a function of governance and compensation variables

Explanatory variable	Regression 1	Regression 2
Fraction of shares owned by all institutional investors (lagged one year)	0.03201	0.02683
	(3.04)***	(2.88)***
ln(Number of institutional investors) (lagged one year)	0.02442	
	(2.72)***	
ln(Number of pressure-insensitive institutional investors) (lagged one year)		0.02362
		(3.29)***
ln(Number of pressure-sensitive institutional investors) (lagged one year)		0.00089
		(0.25)
ln(1 + number of institutional investors on board) (lagged one year)	0.00325	0.00134
	(0.62)	(0.66)
Fraction of board composed of institutional investors (lagged one year)	0.04189	0.03154
	(0.95)	(0.88)
Fraction of firm owned by directors plus executive officer (lagged one year)	0.03092	0.02137
	(1.33)	(1.21)
Fraction of board composed of independent outside directors (lagged one year)	0.11044	0.11517
	(3.25)***	(3.68)***
Market-adjusted returns (lagged one year)	0.00496	0.00406
	(0.64)	(0.60)
CEO duality dummy	−0.00253	−0.00218
	(−0.66)	(−0.53)
ln(Board size)	−0.00831	−0.00894
	(−0.92)	(−1.09)
ln(CEO age)	0.01125	0.01303
	(0.85)	(0.82)
ln(CEO tenure)	−0.01215	−0.01202
	(−0.87)	(−0.71)
ln(Size) (lagged one year)	0.00135	0.00142
	(0.81)	(0.88)
Option compensation as a fraction of total compensation (lagged one year)	0.12169	0.11023
	(8.99)***	(8.25)***
R-squared (adjusted)	38.7%	39.6%
Firm effects *F*-value	7.18***	7.71***
Year effects *F*-value	2.02	2.15

The dependent variable is industry-adjusted ROA for firm *j* in year *t*. Regressions are estimated as a pooled time-series cross-section for S&P 100 firms, with fixed firm effects. The sample period is 1993–2000. *t*-statistics are in parentheses. The number of observations is 573. Equations are estimated using the number of analysts covering the firm is used as an instrumental variable for the fraction of shares owned by institutional investors.
* Significant at better than the 10% level.
** Significant at better than the 5% level.
*** Significant at better than the 1% level.

series standard deviation of IAROA (0.52%) and more than one-third the cross-sectional standard deviation (0.89%).

The log of the number of institutional investors holding stock in the firm is even more influential on ROA: the coefficient is positive, 0.02491, and significant at better than the 1% level ($t = 2.76$). An increase of one within-firm standard deviation in the number of institutional investors starting from the mean level of 414 (i.e., an increase from 414 to 572) increases ln(institutional investors) by 0.323. Thus, ROA increases by $0.323 \times 0.02491 = 0.0080$ or 0.80 percentage points. This is more than twice the impact of the

one standard deviation increase in institutional stock ownership. These results confirm that higher institutional investment is in fact associated with better operating performance and are consistent with the notion that institutional ownership enhances monitoring of corporate managers. Thus, the results provide support for the importance of both the aggregate institutional ownership in the firm as well as the number of institutional investors with ownership stakes.

The coefficients on the number of institutional investors on the board and the percent of institutional investors on the board are insignificant. However, given that so few representatives of institutional investors sit on boards of directors, it is not surprising that we find no significance for these variables.

Notice also the coefficients on the control variables in Regression 1. The coefficient on the fractional stock ownership of directors and executive officers, 0.02639, is insignificant (t-statistic = 1.25). This result is contrary to many previous papers (e.g., Brown and Maloney, 1999) and may reflect the fact that our sample includes only S&P 100 firms. For these firms, it would be hard for directors and officers to have anything but minimal fractional stock holdings in the firm (the mean for the sample is 3.2%). Accordingly, the insignificant regression coefficients are not entirely surprising.[14] Alternatively, when stock ownership by institutional investors is high, giving these investors a strong incentive to monitor, share ownership by directors and executive officers may on the margin be less important and contribute less to incremental firm performance. We look directly at interactive effects between these variables below.

The coefficient on the percent of the board composed of independent outside directors, 0.10874, is significant at the 1% level ($t = 3.37$). Such outside supervision is surprisingly potent in enhancing performance. An increase of one independent outside director increases ROA by an average of 0.88%. Thus, independent directors appear to align the interests of managers and shareholders, thereby reducing agency conflicts and enhancing ROA. Other characteristics of the board of directors have no significant impact on industry-adjusted ROA. The coefficients on the CEO/Chair duality dummy, board size, and CEO age and tenure are all insignificant. These results are not surprising in the presence of firm fixed effects since these variables have little within-firm variation. The coefficients on firm size also are not significant in these or any of the following regressions. This also may reflect the firm fixed effects and the fact that all of the firms in the sample are extremely large: variation in size at this scale may have no incremental impact on performance.

The other control variables also are insignificant. Market-adjusted returns show no significant predictive power for future operating performance after controlling for the other right-hand side variables. This is consistent with the notion that levels of institutional ownership are not dictated solely by forecasts of improved performance, but may instead or in addition, directly contribute to performance.

Finally, the coefficient on option compensation is positive, 0.11294, and significant at better than the 1% level (t-statistic = 8.87). The economic impact of option-based compensation on industry-adjusted ROA is dramatic. An increase of one time-series standard deviation in option-based compensation as a fraction of total compensation (i.e., an increase of 0.188 or 18.8 percentage points) increases ROA by 2.12 percentage points.

Regression 2 splits the number of institutional investors holding stock in each firm into two components: pressure-insensitive and pressure-sensitive investors, respectively. As dis-

[14] This raises a general caveat concerning this study. Specifically, our results may apply only to large firms.

cussed above, the split using the pressure-sensitive and insensitive grouping is motivated by other studies which find that institutional ownership across these two groups has different impacts on firm behavior (e.g., Brickley et al., 1988; Almazan et al., 2005; Chen et al., 2005). We test whether the type of institutional investor has an impact on financial performance. In Regression 2, the coefficient on the number of pressure-insensitive institutional investors is 0.02209 (t-statistic = 3.08), while the coefficient on the number of pressure-sensitive institutional investors is effectively zero, 0.00103, respectively (t-statistic = 0.36). Thus, it appears that only the number of pressure-insensitive institutional investors is related to firm performance. This finding is consistent with the hypothesis that pressure-sensitive institutional investors, who risk damaging potential business relations if they vote against management, are less effective at monitoring management to improve ROA.

In Table 4 we repeat Table 3 regressions, but now use instrumental variables for institutional share ownership. These specifications employ the number of analysts covering the firm as an instrument for the fraction of shares owned by institutional investors. Despite the use of instruments, the regressions in this table result in highly similar coefficient estimates and standard errors as their Table 3 counterparts. The near-equivalency of these results suggests that endogeneity problems surrounding share ownership are not severe.[15]

To further explore the difference between the impact of pressure-insensitive and pressure-sensitive institutional investors, we estimate variations of the regression specifications considered so far. In Table 5, we re-estimate Regression 1 from Table 3, separating the right-hand side institutional investor variables into pressure-insensitive or pressure-sensitive components. Specifically, Regression 1 in Table 5 uses only pressure-insensitive institutions on the right-hand side, Regression 2 uses only pressure-sensitive institutions, and Regression 3 includes both types of institutions, but allows different coefficients for each. Regression 1 in Table 3 in effect imposes the constraint that these coefficients are equal.

Broadly speaking, the estimates in Regression 1 of Table 5 are highly similar to those in its Table 3 counterpart. The coefficient on the fraction of shares owned by pressure-insensitive investors is positive, 0.03714, significant at better than the 1% level, and of roughly the same magnitude as the coefficient on total institutional ownership in Table 3. The number of pressure-insensitive institutional investors is also significant at better than the 1% level and has a similar coefficient estimate (0.02593) as that on the total number of institutional owners from Table 3. Thus, as in Table 3, both the number of institutional investors holding stock, as well as the percent of stock owned by institutional investors, seem to be positively related to firm performance. In contrast, and consistent with Table 3, board membership by the pressure-insensitive group is insignificant. This is most likely due to the fact that these institutional investors seldom sit on the boards of directors of the firms in which they own stock.

Regression 2 in Table 5 repeats Regression 1, but uses the pressure-sensitive rather than pressure-insensitive institutional investors as explanatory variables. The point estimates of the coefficients on the percent of shares owned by this group as well as on the number of pressure-sensitive institutional investors are less than half those on pressure-insensitive ownership (0.01229 and 0.00658 in Regression 2 versus 0.03714 and 0.02593, respectively

[15] When we regress the fraction of shares owned by institutions on the instrument and the other right-hand side variables, we obtain an R-square of 58.9%. The similarity between the OLS and instrumental variable regressions therefore does not seem to be caused by overfitting of institutional ownership.

Table 5
Regressions for pressure-sensitive versus pressure-insensitive institutional investors

Explanatory variable	Regression 1	Regression 2	Regression 3
Fraction of shares owned by pressure-insensitive investors (lagged one year)	0.03714 (2.89)***		0.05621 (3.11)***
Fraction of shares owned by pressure-sensitive investors (lagged one year)		0.01229 (1.47)	0.00609 (0.66)
ln(Number of pressure-insensitive investors) (lagged one year)	0.02593 (2.98)***		0.03602 (3.12)***
ln(Number of pressure-sensitive investors) (lagged one year)		0.00658 (0.81)	0.00797 (0.85)
ln(1 + number of pressure-insensitive institutional investors on board) (lagged one year)	0.00252 (0.47)		0.00221 (0.44)
ln(1 + number of pressure-sensitive institutional investors on board) (lagged one year)		0.00438 (0.63)	0.00372 (0.42)
Fraction of board composed of pressure-insensitive investors (lagged one year)	0.04087 (1.14)		0.03861 (0.78)
Fraction of board composed of pressure-sensitive investors (lagged one year)		0.05312 (1.17)	0.05197 (1.16)
Fraction of firm owned by directors plus executive director (lagged one year)	0.01483 (1.26)	0.01812 (1.35)	0.01890 (1.39)
Fraction of board composed of independent outside directors (lagged one year)	0.12057 (3.41)***	0.12383 (3.29)***	0.12794 (3.68)***
Market-adjusted return (lagged one year)	0.00425 (0.68)	0.00396 (0.63)	0.00418 (0.66)
CEO/Chair duality dummy	−0.00182 (−0.51)	−0.00194 (−0.67)	−0.00189 (−0.62)
ln(board size)	−0.01201 (−0.92)	−0.01346 (−0.89)	−0.01129 (−0.84)
ln(CEO age)	0.01492 (0.70)	0.01753 (0.75)	0.01522 (0.73)
ln(CEO tenure)	−0.01453 (−0.78)	−0.01284 (−0.83)	−0.01069 (−0.80)
ln(Size) (lagged one year)	0.00188 (0.75)	0.00191 (0.93)	0.00189 (0.81)
Option holdings as fraction of total compensation (lagged one year)	0.10608 (8.42)***	0.12456 (9.04)***	0.12953 (9.25)***
R-square (adjusted)	43.2%	37.1%	42.9%
Firm effects *F*-value	7.86***	7.11***	7.97***
Year effects *F*-value	2.11	1.91	2.08

The dependent variable is industry-adjusted ROA for firm *j* in year *t*. Regressions are estimated as a pooled time-series cross-section for S&P 100 firms, with fixed firm effects. The sample period is 1993 – 2000. *t*-statistics are in parentheses. The number of observations is 573.

* Significant at better than the 10% level.

** Significant at better than the 5% level.

*** Significant at better than the 1% level.

in Regression 1) and are statistically insignificant. We conclude from these results that ownership by pressure-sensitive institutional investors is not related to performance.

Finally, Regression 3 in Table 5 includes separate coefficients for both the pressure-sensitive and pressure-insensitive variables. Consistent with the results in Regressions 1 and 2, the overwhelming pattern is that pressure-sensitive ownership variables are insignificant. In

fact, the coefficient estimates and significance levels on pressure-insensitive variables increase when the pressure-sensitive ownership variables are added to the regression. The impacts of option compensation and other control variables are broadly the same in all regressions in Table 5. It appears that the significance of institutional investors on firm performance documented in Table 3 is in fact due to the pressure-insensitive institutions.

A potential difference between pressure-sensitive and insensitive investors surrounds their proclivity to sell shares in periods of poor performance. If the "pressure" that pressure-sensitive investors perceive makes them less inclined to sell shares already held, there might be less of relationship between performance and holdings. On the other hand, the performance versus share holding relationship for pressure-insensitive firms may be non-linear if they are prone to bail out in hard times, but do not engage in short sales. We examine these potential asymmetries by re-estimating Table 5 regressions, changing the dependent variable to max(0, IAROA). This variation allows for the possibility of different responses for good versus bad performance. The regression results (not shown here) are highly similar to Table 5 regressions. Precisely, the same variables are significant, with slightly higher point estimates. As a further robustness check, we investigate the potential impact of lagged industry-adjusted performance (to control for mean reversion) as well as the level of industry performance (to control for institutional taste for particular industries with current high performance). Lagged IAROA is uniformly insignificant in expanded Table 5 regressions (all *t*-statistics below 1); industry-average ROA is significant but of economically negligible impact (an increase of 1% in industry-average ROA contributes only about 5 basis points to IAROA).[16]

One potential problem with the results reported above is the possibility of within-firm autocorrelation, which would bias the standard errors and therefore the *t*-statistics of the regressions. To investigate this possibility, we estimate Regression 3 of Table 5 as a cross-sectional regression for each year of the sample independently. Year-by-year and autocorrelation-corrected Fama and MacBeth (1973) estimates are reported in Table 6. The regression estimates are exceptionally stable and nearly identical in both point estimate and overall significance to the full-sample results (which are repeated for convenience in the last column of Table 6). The Fama–Macbeth estimates are adjusted for autocorrelation using a method suggested by Pontiff (1996). Specifically, year-by-year coefficients for each variable are regressed on a constant, but the error term is estimated as a moving average process. The intercept and its standard error in this regression are then autocorrelation-consistent estimates of the mean and standard error for that coefficient. We employ an MA2 (moving average) process for the error term.

The results are so stable that the Fama and MacBeth (1973) estimates result in far higher significance levels than Table 5 regressions. These results also address another potential concern, i.e., whether the substantial increase in institutional ownership in the last decade might have affected our results. The consistency of these estimates provides support against this possibility.

Finally, in Table 7 we investigate potential interactions between the right-hand side variables of our regression equation. In light of the preceding discussion (and to limit the number of right-hand side variables), we use variations of Regression 1 from Table 5, which

[16] We are grateful to anonymous referees for these suggestions. These regression results are available upon request.

Table 6
Year-by-year regressions and Fama–MacBeth estimates

Explanatory variable	1994	1995	1996	1997	1998	1999	2000	Fama–MacBeth	Full Sample
% shares	0.0493	0.0453	0.0611	0.0527	0.0553	0.0667	0.0600	0.0558	0.0562
insensitive	2.77	2.71	3.39	2.92	3.02	3.61	3.15	16.09	3.11
% shares sensitive	0.0080	0.0058	0.0085	0.0068	0.0081	0.0091	0.0047	0.0073	0.0061
	0.72	0.40	0.80	0.72	0.87	0.90	0.55	26.09	0.66
# insensitive	0.0322	0.0341	0.0381	0.0308	0.0333	0.0430	0.0391	0.0358	0.0360
investors	2.61	2.70	3.11	2.47	2.61	3.43	3.32	25.42	3.12
# sensitive	0.0072	0.0102	0.0072	0.0063	0.0091	0.0124	0.0078	0.0086	0.0080
investors	0.75	1.03	0.73	0.61	0.94	1.11	0.88	17.07	0.85
# board	0.0030	0.0029	0.0019	0.0040	0.0042	0.0035	0.0022	0.0031	0.0022
insensitive	0.43	0.45	0.28	0.50	0.53	0.44	0.33	10.24	0.44
# board sensitive	0.0047	0.0032	0.0047	0.0037	0.0048	0.0063	0.0034	0.0044	0.0037
	0.40	0.34	0.45	0.36	0.46	0.57	0.38	16.29	0.42
% board	0.0327	0.0429	0.0413	0.0332	0.0459	0.0365	0.0454	0.0397	0.0386
insensitive	0.79	0.99	0.85	0.55	1.14	0.58	1.08	39.87	0.78
% board sensitive	0.0489	0.0589	0.0428	0.0591	0.0646	0.0408	0.0419	0.0510	0.0520
	0.88	1.14	0.86	1.33	1.42	0.78	0.80	21.16	1.16
% shares	0.0200	0.0199	0.0187	0.0128	0.0260	0.0307	0.0126	0.0201	00.0190
direc + exec	1.33	1.30	1.16	0.90	1.50	1.57	0.86	14.51	1.39
% directors	0.1154	0.1202	0.1452	0.1174	0.1356	0.1413	0.1202	0.1279	0.1280
outsiders	2.96	3.06	4.12	3.04	3.93	4.01	3.02	46.14	3.68
Market-adjusted	0.0040	0.0032	0.0063	0.0035	0.0050	0.0057	0.0052	0.0047	0.0042
retn	0.50	0.35	0.87	0.47	0.70	0.77	0.72	11.94	0.66
CEO/chair	−0.0017	−0.0023	−0.0019	−0.0016	−0.0028	−0.0037	−0.0021	−0.0023	−0.0019
duality	−0.46	−0.67	−0.49	−0.41	−0.73	−0.86	−0.60	−7.42	−0.62
ln(board size)	−0.0094	−0.0137	−0.0101	−0.0129	−0.0148	−0.0088	−0.0094	−0.0113	−0.0113
	−0.77	−0.98	−0.86	−0.97	−1.12	−0.69	−0.83	−17.38	−0.84
ln(age)	0.0141	0.0219	0.0132	0.0113	0.0100	0.0288	0.0246	0.0177	0.0152
	0.59	0.95	0.44	0.30	0.28	1.22	1.11	6.12	0.73
ln(CEO	−0.0117	−0.0086	−0.0141	−0.0269	−0.0099	−0.0093	−0.0105	−0.0130	−0.0107
tenure)	−0.87	−0.70	−1.09	−1.33	−0.76	−0.74	−0.80	−7.19	−0.80
ln(size)	0.0026	0.0021	0.0025	0.0020	0.0018	0.0026	0.0025	0.0023	0.0019
	0.87	0.83	0.85	0.80	0.77	0.90	0.93	9.46	0.81
% option	0.1117	0.1156	0.1369	0.1216	0.1167	0.1433	0.1369	0.1261	0.1295
compensation	9.03	8.21	10.39	9.74	8.83	11.15	10.64	31.45	9.25

The dependent variable is the industry-adjusted ROA for firm j in year t. Regressions for each year are estimated in a cross-section. The Fama–MacBeth results are adjusted for serial correlation using the methodology described in Pontiff (1996). t-statistics appear below coefficient estimates.

employs only pressure-insensitive institutions as explanatory variables. The results in Table 7 offer considerable evidence of complementarity among several of the variables with respect to their impact on industry-adjusted ROA. The coefficient on the product of share ownership of pressure-insensitive institutions with director and executive ownership is positive, 0.01397, and significant ($t = 2.01$). Further, the coefficients on the product of share ownership with independent outside board membership (0.02483; $t = 2.77$) and with option compensation (0.02542; $t = 4.30$) are both positive, and statistically significant at better than a 1% level. Therefore, higher values of the variables in either of these pairs indicate a greater marginal contribution of the other variable to industry-adjusted ROA. For example, the higher the percentage of shares owned by pressure-insensitive institu-

Table 7
Regressions allowing interaction among explanatory variables

Explanatory variable	
Fraction of shares owned by pressure-insensitive investors (lagged one year)	0.09072
	(2.97)***
ln(Number of pressure-insensitive investors) (lagged one year)	0.04785
	(2.78)**
ln(1 + number of pressure-insensitive institutional investors on board) (lagged one year)	0.00330
	(0.46)
Fraction of board composed of pressure-insensitive investors (lagged one year)	0.02798
	(0.66)
Fraction of firm owned by directors plus executive director (lagged one year)	0.03215
	(1.35)
Independent outside directors as fraction of total board (lagged one year)	0.12729
	(3.01)***
Market-adjusted return (lagged one year)	0.00612
	(0.87)
CEO/Chair duality dummy	−0.00118
	(−0.39)
ln(board size)	−0.00319
	(−0.82)
ln(CEO age)	0.01915
	(0.84)
ln(CEO tenure)	−0.01536
	(−0.79)
ln(Size) (lagged one year)	0.00207
	(0.46)
Option compensation as fraction of total compensation	0.11247
	(8.17)***
Interaction: [Pressure-insensitive share ownership] × [director & executive share ownership] (both interaction variables lagged one year)	0.01397
	(2.01)**
Interaction: [Pressure-insensitive share ownership] × [independent outside directors as fraction of total board] (both interaction variables lagged one year)	0.02483
	(2.77)**
Interaction: [Pressure-insensitive share ownership] × [option holdings as fraction of total compensation] (both interaction variables lagged one year)	0.02542
	(4.30)***
Interaction: [ln(Number of pressure-insensitive investors)] × [option holdings as fraction of total compensation] (both interaction variables lagged one year)	0.01117
	(2.78)***
R-square (adjusted)	42.5%
Firm effects *F*-value	9.89***
Year effects *F*-value	1.94

The dependent variable is industry-adjusted ROA for firm *j* in year *t*. Regressions are estimated as a pooled time-series cross-section for S&P 100 firms, with fixed firm effects. The sample period is 1993 – 2000. *t*-statistics are in parentheses. The number of observations is 573.

* Significant at better than the 10% level.

** Significant at better than the 5% level.

*** Significant at better than the 1% level.

tional investors, the greater is the positive impact of independent outside directors on industry-adjusted ROA. The interaction terms between option compensation and the *number* of pressure-insensitive investors is likewise positive and significant at better than 1% (coefficient = 0.01117; $t = 2.78$). Thus, the higher the number of pressure-insensitive institutional investors on the board, the greater is the positive impact of CEO option-based compensation on industry-adjusted ROA.

One might interpret these positive interactions as evidence that the actions of each monitor are more effective when the other potential monitors are "on the same page". A "coalition of value maximizers" might be formed of (pressure-insensitive) institutional investors, outside directors, and managers with strong pay-for-performance compensation. The actions of each type of monitor are more effective when the other monitors pull in the same direction.

Interestingly, the coefficients on the other key explanatory variables increase substantially when the interaction terms are added to the regression. The coefficients on both fractional ownership of pressure-insensitive investors (0.09072) and the number of these investors (0.04785) are higher in these interaction regressions than they are in the corresponding Regression 1 of Table 5.

6. Conclusions

Institutional investors are the majority owners of most large corporations in the US. These investors have been increasingly willing to use their ownership rights to pressure firm managers to act in the best interest of the shareholders. The results presented in this paper confirm a relation between institutional investor involvement in a firm and operating cash flow returns. Specifically, we find a significant positive relation between the percent of institutional stock ownership and operating cash flow returns and, even more significantly, between the number of institutional investors holding stock in a firm and operating cash flow returns. However, the positive relation between the number of institutional investors holding stock and operating cash flow returns is found only for pressure-insensitive institutional investors (those with no business relation with the firm). The number of pressure-sensitive institutional investors (those with an existing or potential relation with the firm) in a firm has no impact on operating cash flow returns, suggesting that these institutional investors are compromised as monitors by their interests in protecting business relations with the firm. We also find that institutional investors rarely hold seats on the boards of the firms in which they invest. Thus, at least in our sample, this type of involvement by institutional investors has no measurable impact on a firm's operating cash flow returns.

Acknowledgements

The authors are grateful to Ying Duan, Alex Fayman, Victoria Ivashina, and Mark Liu for their research assistance. We thank Jim Booth, Rich Evans, Wayne Ferson, Edith Hotchkiss, Jeff Pontiff, Jun Qian, and seminar participants at Boston College and Southern Illinois University for helpful comments.

References

Agrawal, A., Knoeber, C.R., 1996. Firm performance and mechanisms to control agency problems between managers and shareholders. Journal of Financial and Quantitative Analysis 31, 377–397.

Alderfer, C.P., 1986. The invisible director on corporate boards. Harvard Business Review 64, 38–52.

Almazan, A., Hartzell, J., Starks, L.T., 2005. Active institutional shareholders and cost of monitoring: Evidence from managerial compensation. Working paper, University of Texas at Austin.

Back, K.H., Cao, H.H., Willard, G.A., 2000. Imperfect competition among informed traders. Journal of Finance 55, 2117–2155.

Bacon, J., Brown, J.K., 1973. Corporate Directorship Practices: Role, Selection and Legal Status of the Board. The Conference Board, New York.
Bhagat, S., Brickley, J.A., Coles, J.L., 1994. The costs of inefficient bargaining and financial distress: Evidence from corporate lawsuits. Journal of Financial Economics 35, 221–247.
Bhide, A., 1994. Efficient markets, deficient governance: US securities regulations protect investors and enhance market liquidity. But do they alienate managers and shareholders? Harvard Business Review 72, 128–140.
Borokhovich, K., Brunarski, K., Harman, Y., Parrino, R., 2006. Variation in the monitoring incentives of outside blockholders. Journal of Law and Economics 49, 651–680.
Brickley, J., Lease, R., Smith, C., 1988. Ownership structure and voting on antitakeover amendments. Journal of Financial Economics 20, 267–292.
Brickley, J.A., Coles, J.L., Terry, R.L., 1994. Outside directors and the adoption of poison pills. Journal of Financial Economics 35, 371–390.
Brickley, J.A., Coles, J.L., Jarrell, G., 1997. Leadership structure: Separating the CEO and Chairman of the Board. Journal of Corporate Finance 3, 189–220.
Brown, W.O., Maloney, M.T., 1999. Exit, voice, and the role of corporate directors: Evidence from acquisition performance. Claremont Colleges Working Paper.
Bryd, J., Hickman, K., 1992. Do outside directors monitor managers? Evidence from tender offer bids. Journal of Financial Economics 32, 195–222.
Chen, J., Hong, H., Stein, J.C., 2002. Breadth of ownership and stock returns. Journal of Financial Economics 66, 171–205.
Chen, X., Harford, J., Li, K., 2005. Monitoring: Which institutions matter? University of British Columbia Working Paper, July.
Chung, R., Firth, M., Kim, J., 2002. Institutional monitoring and opportunistic earnings management. Journal of Corporate Finance 8, 29–48.
Coffee, J., 1991. Liquidity versus control: The institutional investor as corporate monitor. Columbia Law Review 91, 1277–1368.
Del Guercio, D., 1996. The distorting effect of the prudent-man laws on institutional equity investments. Journal of Financial Economics 40 (January), 31–62.
Del Guercio, D., Hawkins, J., 1999. The motivation and impact of pension fund activism. Journal of Financial Economics 52, 293–340.
Demirag, I.S., 1998. Corporate Governance, Accountability, and Pressure to Reform: An International Study. JAI Press, Stamford, CT.
Duggal, R., Millar, J.A., 1999. Institutional ownership and firm performance: The case of bidder returns. Journal of Corporate Finance 5, 103–117.
Dunn, D.J., 1987. Directors aren't doing their jobs. Fortune (March), 117–119.
Faccio, M., Lasfer, M.A., 2000. Do occupational pension funds monitor companies in which they hold large stakes? Journal of Corporate Finance 6, 71–110.
Falkenstein, E.G., 1996. Preferences for stock characteristics as revealed by mutual fund portfolio holdings. Journal of Finance 51 (March), 111–135.
Fama, E., MacBeth, J., 1973. Risk, return, and equilibrium: Empirical tests. Journal of Political Economy 81 (March), 607–636.
Firstenberg, P.B., Malkiel, B.G., 1980. Why corporate boards need independent directors. Management Review (April), 26–38.
Foster, D.F., Viswanathan, S., 1996. Strategic trading when agents forecast the forecasts of others. Journal of Finance 51, 1437–1478.
Gillan, S., Starks, L., 2000. Corporate governance proposals and shareholder activism: The role of institutional investors. Journal of Financial Economics 57, 275–305.
Grossman, S., Hart, O., 1980. Takeover bids, the free rider problem, and the theory of the corporation. Bell Journal of Economics 11, 42–64.
Hartzell, J.C., Starks, L.T., 2003. Institutional investors and executive compensation. Journal of Finance 58 (6), 2351–2375.
Healy, P.M., Palepu, K.G., Ruback, R.S., 1992. Does corporate performance improve after mergers? Journal of Financial Economics 31 (2), 135–175.
Hermalin, B.E., Weisbach, M.S., 1988. The determinants of board composition. Rand Journal of Economics 19 (4), 589–606.

Hotchkiss, E.S., Strickland, D., 2003. Does shareholder composition matter? Evidence from the market reaction to corporate earnings announcements. Journal of Finance 58, 1469–1498.
Hubbard, G.R., Palia, D., 1995. Executive pay and performance evidence from the US banking industry. Journal of Financial Economics 39, 105–130.
Jensen, M., 1993. The modern industrial revolution, exit, and the failure of internal control systems. Journal of Finance 48, 831–880.
Jensen, M., Murphy, K., 1990a. Performance pay and top-management incentives. Journal of Political Economy 98, 225–264.
Jensen, M., Murphy, K., 1990b. CEO incentives it's not how much you pay, but how. Journal of Applied Corporate Finance 3, 36–49.
Karpoff, J.M., Malatesta, P.H., Walkling, R.A., 1996. Corporate governance and shareholder initiatives: Empirical evidence. Journal of Financial Economics 42, 365–395.
Kosnik, R.D., 1987. Greenmail: A study of board performance in corporate governance. Administrative Science Quarterly 32, 163–185.
Kosnik, R.D., 1990. Effects on board demography and directors' incentives on corporate greenmail. Academy of Management Journal 33, 129–150.
Maug, E., 1998. Large shareholders as monitors: Is there a trade-off between liquidity and control? Journal of Finance 53, 65–98.
McConnell, J.J., Servaes, H., 1990. Additional evidence on equity ownership and corporate value. Journal of Financial Economics 27, 595–612.
Nesbitt, S.L., 1994. Long-term rewards from shareholder activism: A study of the 'CalPERS effect'. Journal of Applied Corporate Finance 6, 75–80.
Parrino, R., Sias, R.W., Starks, L.T., 2003. Voting with their feet: Institutional ownership changes around forced CEO turnover. Journal of Financial Economics 68, 3–46.
Pontiff, J., 1996. Costly arbitrage: Evidence from closed-end funds. Quarterly Journal of Economics 111 (4), 1135–1151.
Rosenstein, S., Wyatt, J.G., 1990. Outside directors, board independence, and shareholder wealth. Journal of Financial Economics 26, 175–191.
Shleifer, A., Vishny, R., 1986. Large shareholders and corporate control. Journal of Political Economy 94, 448–461.
Sias, R., Starks, L.T., Titman, S., 2001. The price impact of institutional trading. Washington State University and University of Texas at Austin Working Paper.
Smith, M., 1996. Shareholder activism by institutional investors: Evidence from CalPERS. Journal of Finance 51, 227–252.
Subrahmanyan, V., Rangan, N., Rosenstein, S., 1997. The role of outside directors in bank acquisitions. Financial Management 26, 23–36.
Weisbach, M.S., 1988. Outside directors and CEO turnover. Journal of Financial Economics 20, 431–460.
Yermack, D., 1996. Higher market valuation of companies with a small board of directors. Journal of Financial Economics 40, 185–211.