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# Managerial ownership and incentive alignment : evidence from mandatory stock ownership plans

Phillip James Quinn  
*University of Iowa*

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MANAGERIAL OWNERSHIP AND INCENTIVE ALIGNMENT: EVIDENCE  
FROM MANDATORY STOCK OWNERSHIP PLANS

by

Phillip Quinn

A thesis submitted in partial fulfillment of the  
requirements for the Doctor of Philosophy  
degree in Business Administration  
in the Graduate College of  
The University of Iowa

May 2014

Thesis Supervisors: Professor Daniel Collins  
Professor Paul Hribar

Graduate College  
The University of Iowa  
Iowa City, Iowa

CERTIFICATE OF APPROVAL

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PH.D. THESIS

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This is to certify that the Ph.D. thesis of

Phillip Quinn

has been approved by the Examining Committee for the  
thesis requirement for the Doctor of Philosophy degree  
in Business Administration at the May 2014 graduation.

Thesis Committee: \_\_\_\_\_  
Daniel Collins, Thesis Supervisor

\_\_\_\_\_  
Paul Hribar, Thesis Supervisor

\_\_\_\_\_  
Erik Lie

\_\_\_\_\_  
David Mauer

\_\_\_\_\_  
Richard Mergenthaler

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## ABSTRACT

Mandatory stock ownership plans require executives to hold a minimum level of stock. I exploit these changes in managerial stock ownership to examine the relation between managerial ownership and manager-shareholder incentive alignment. In contrast to prior work that suggests equity incentives induce opportunistic managerial behavior, I find earnings management declines following the adoption of mandatory stock ownership plans relative to a propensity-matched control sample. I also posit and find a reduction in bid-ask spreads following plan adoptions, consistent with manager-shareholder incentive alignment improving market liquidity and decreasing information asymmetry. These findings are consistent with boards of directors contracting with managers to reduce the agency costs of equity.

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# CHAPTER 1

## MANAGERIAL OWNERSHIP AND INCENTIVE ALIGNMENT: EVIDENCE FROM MANDATORY STOCK OWNERSHIP PLANS

### 1.1 Introduction

Understanding corporate contracting is an important aim for both researchers and parties who contract with firms. Prior work provides mixed evidence on whether managerial incentive contracts are efficient. Jensen (1993) argues that management and board members tend to hold too little firm equity, and the lack of equity ownership gives rise to significant agency costs. Jensen's (1993) findings are consistent either with contracting costs substantially limiting optimal contracting or with boards contracting irrationally with managers. More recently, Jensen (2005) argues that equity incentives, which boards grant to align the interests of external owners and management, induce managers to make decisions detrimental to firm value. Conversely, Core, Guay, and Larcker (2003) argue it is unlikely that contracting with managers is systematically biased, and contracts are, on average, efficient. Morck, Shleifer, and Vishny (1988) note transaction costs keep firms from continuously recontracting, and Core and Larcker (2002) use the adoption of target ownership plans to capture this recontracting. Core and Larcker (2002) document that after the adoption of target ownership plans, firms exhibit increases in executive ownership and price performance. This paper extends Core and Larcker (2002) and examines how mandatory increases in ownership affect specific alignment mechanisms.

Prior work in accounting provides mixed evidence on the relation between



equity incentives and managerial incentive alignment. While a number of studies document a positive association between equity-based compensation and earnings management, studies differ in terms of which particular type of incentives are most highly associated with earnings management. Cheng and Warfield (2005) find a strong association between CEO ownership percentage and earnings management; Burns and Kedia (2006) report the propensity to misreport is most highly associated with stock options; and Efendi, Srivastava, and Swanson (2007) suggest the relation is strongest for firms with CEOs who have high deep-in-the-money options relative to salary. Other work fails to find a relation between misreporting and equity incentives (Baber, Kang, Liang, and Zhu 2009; Erickson, Hanlon, and Maydew 2006; Armstrong, Jagolinzer, and Larcker 2010), perhaps because manager-specific characteristics affect both the level of ownership and accounting choices (Warfield, Wild, and Wild 1995). Similarly, Demsetz and Lehn (1985) argue the optimal level of ownership will vary from firm to firm. In the framework of Demsetz and Lehn (1985), the general prescription to increase management equity holdings is inappropriate. A shortcoming and a likely cause of the mixed evidence is the endogenous nature of managerial ownership and earnings management. This study seeks to mitigate the endogeneity problem that plagues prior work in this area by examining changes in managerial incentive alignment following a mandatory increase in managerial ownership.

I use the adoption of mandatory stock ownership plans to examine the relation between equity incentives and earnings management. Mandatory stock ownership plans require executives to own a minimum level of firm stock by a specified

date, typically within three to five years of plan adoption. Examining target ownership plans provides a distinct advantage relative to examining levels of ownership or voluntary changes in ownership. Whereas levels of ownership are determined by managers and changes in ownership may reflect changes in executives' expectations of future firm performance, the adoption of mandatory stock ownership plans induces changes in ownership that are unlikely to be confounded by changes in managers' expectations (Core and Larcker 2002). While the decision to adopt a target ownership plan remains endogenous to the firm, the decision is less likely to be determined by executives. I assume that when firms adopt target ownership plans, the plans move executives closer to the optimal level of executive ownership.<sup>1</sup>

My research objective is to examine improvements in managerial incentive alignment around the adoption of mandatory stock ownership plans. Specifically, I investigate whether ownership plans decrease earnings management and manager-shareholder information asymmetry. I measure earnings management in three ways. First, I measure earnings management as the tendency to avoid a loss, meet or just beat prior-year earnings, or meet or just beat sell-side analysts' consensus earnings forecasts. Survey evidence in Graham, Harvey, and Rajgopal (2005) suggests earnings management to meet benchmarks is a ubiquitous form of value destruction, because 80 percent of surveyed managers would decrease discretionary spending and 55 percent

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<sup>1</sup>Firms use various names to refer to mandatory stock ownership plans, such as target ownership plans. I refer to these plans as "mandatory stock ownership plans" or simply "ownership plans" in the remainder of the paper. A minority of adoption firms exhibit high managerial ownership before the adoption of mandatory stock ownership plans, and I discuss these firms in Section 6.

would delay starting a new project to meet an earnings target. While the managers in the survey report several reasons for wanting to meet or beat targets, Bhojraj, Hribar, Picconi and McInnis (2009) present evidence that this short-term focus is detrimental to long-term shareholders. McVay, Nagar, and Tang (2006) document that managers' personal trading incentives contribute to the benchmark-beating behavior of managers. Second, I measure earnings management as the absolute value of discretionary accruals. I follow Owens, Wu, and Zimmerman (2013) and control for business model shocks in my analysis of discretionary accruals. Third, I measure earnings management as Roychowdhury's (2006) three measures of real activities management.

With higher levels of ownership after plan adoptions, managers will bear a larger share of any value-destroying earnings management. Consistent with Jensen and Meckling (1976) and Core and Larcker (2002), I posit that mandatory stock ownership plans will result in improved managerial incentive alignment in my sample. To test my conjectures, I examine inter-temporal changes in measures of managerial incentive alignment for a sample of treatment firms that adopt mandatory stock ownership plans relative to a propensity-matched control sample. The control sample consists of firms that exhibit similar characteristics related to the adoption of ownership plans as the treatment firms, but that did not actually adopt ownership plans. Consistent with efficient contracting and mandatory stock ownership plans improving manager-shareholder incentive alignment, I find firms that adopt mandatory stock ownership plans are approximately six percent less likely to meet

or just beat an earnings target after plan adoption. Consistent with firms using less accrual-based earnings management, I also document that the magnitude of abnormal accruals decreases by 1.2 percent of total assets after plan adoption. Next, I examine real activities management around mandatory stock ownership plan adoptions. Tests of real activities management fail to provide evidence of a change in discretionary expenditures or in overproduction subsequent to plan adoptions. Tests of real activities management through channel-stuffing suggest that managers engage in less channel-stuffing behavior subsequent to plan adoption.

I interpret meeting or just beating earnings benchmarks as managers using the discretion in GAAP to opportunistically meet benchmarks, rather than to reveal information. An alternative interpretation of benchmark beating, however, is managers using the discretion in GAAP to reveal private information about the firm (Badertscher, Collins, and Lys 2012). This alternative explanation predicts that the treatment firms, which exhibit a relatively low propensity to just meet benchmarks, will suffer reduced market liquidity after plan adoption relative to the control firms. Welker (1995) provides evidence that firms with better disclosure rankings enjoy better market liquidity. Welker's results suggest better corporate disclosures reduce information asymmetry and improve market liquidity. Consistent with information asymmetry decreasing subsequent to plan adoption, I find a reduction in bid-ask spreads after firms adopt mandatory stock ownership plans. Overall, my findings are consistent with mandatory stock ownership plans reducing earnings management and improving the information environment between managers and external shareholders.

This paper contributes to the literature in several ways. In the literature that examines equity incentives and earnings management, prior work finds equity incentives are either positively associated with or not associated with earnings management. I posit that the relation between equity incentives and earnings management is non-linear, and I examine a setting in which boards mandate that managers increase their ownership. I document that the adoption of mandatory stock ownership plans, which require managers with low levels of ownership to increase their ownership, leads to a reduction in earnings management. These findings are consistent with boards of directors contracting with managers to reduce the agency costs of equity.

This study also contributes to prior work that examines the relation between governance structures and firm value. Prior work in financial economics suggests the relation between managerial ownership and firm value is concave. Firms with executive ownership levels that are too high face entrenchment problems, and firms with executive ownership levels that are too low also face misalignment problems (Jensen 1993). Core and Larcker (2002) provide strong evidence that mandatory stock ownership plans increase firm stock performance, but leave unexamined the channels through which plans improve value. I document two channels through which optimal ownership improves firm value: a reduction in opportunistic earnings management and a decrease in manager-shareholder information asymmetry.

Finally, this study contributes to the literature on executive ownership and financial reporting by examining a setting in which boards required managers to increase their ownership. How executive ownership affects reporting is not well un-

derstood. Dechow, Ge, and Schrand (2010) note while “Some studies suggest that greater managerial ownership has an *entrenchment effect* – controlling shareholders extrapolate private benefits at the expense of minority shareholders through *accounting method choice* (Smith 1976; Dhaliwal, Salamon and Smith 1982)”, other studies “support an *incentive alignment effect* of managerial ownership based on *discretionary accruals* and *ERCs* (Warfield, Wild, and Wild 1995)”.

The remainder of the paper is organized as follows. Section 2 provides a background on mandatory stock ownership plans and reviews the literature on managerial ownership and earnings management. Section 3 develops the hypotheses regarding earnings management and information asymmetry. Section 4 describes sample selection procedures and provides descriptive statistics. Section 5 presents the empirical methods and results. Section 6 provides robustness tests and tests of alternative explanations. Section 7 concludes and describes limitations of my research.

## 1.2 Background and sample

### 1.2.1 Mandatory stock ownership plans

Mandatory stock ownership plans require executives to own a minimum amount of firm stock within a specified amount of time following plan adoption. In a survey of 440 companies, Ayco (2012) reports that approximately 80 percent of companies use a multiple-of-salary approach. This approach requires that the executives named in the plan own a multiple of their salary in company stock. The multiple is typically higher for the CEO than for the other executives. For companies with volatile returns,

a drawback of the multiple-of-salary approach is that the number of shares that an executive must own can vary drastically through time. The specific-number-of-shares approach addresses this drawback. This approach requires that the executives named in the plan own a specified number of shares, and the amount is typically higher for the CEO than for the other executives. Compaq Computer adopted this type of plan in 1995. Ayco (2012) reports that 13 percent of companies surveyed in 2012 require that their executives achieve stock ownership above a specified number of shares.

Mandatory stock ownership plans typically require different levels of ownership for different executives. Among firms that employ the multiple-of-salary approach, Ayco (2012) reports that plans require CEO's to retain stock ownership between 2 and 25 times their annual salary. Ownership requirements of 5 and 6 times salary are the most common, representing 42 and 16 percent of all plan requirements, respectively. The second tier of requirements, typically for executives such as the chief financial officer and the chief operating officer, range from 0.5 to 8 times annual salary. For this tier, 56 percent of plans set minimum ownership between 3 and 4 times salary (Ayco 2012).

Mandatory stock ownership plans provide an avenue for understanding formerly unaddressed questions in the earnings management literature. In the earnings management literature, researchers typically examine the association between earnings management and levels of equity incentives, while including linear controls for other determinants of earnings management. Warfield, Wild, and Wild (1995) note, however, that manager-specific characteristics affect both the level of ownership and

accounting choices, and the endogenous relation creates concern regarding inferences made from a levels analysis. In contrast, mandatory stock ownership plan adoptions provide an opportunity to reexamine the ownership-accounting choice relation in a setting that is largely free of such endogeneity concerns.<sup>2</sup>

### 1.2.2 Earnings management

This study is related to the literature that examines the effect of equity incentives on earnings management.<sup>3</sup> Prior work measures equity incentives using compensation mix, exercisable options, total options, and portfolio delta of the CEO or the named executive officers.<sup>4</sup> To measure earnings management, prior work uses meeting or just beating benchmarks (Cheng and Warfield 2005), total or discretionary accruals (Bergstresser and Philippon 2006), restatements (Burns and Kedia 2006), AAERs (Erickson, Hanlon, and Maydew 2006), and class-action lawsuits (Armstrong, Jagolinzer, Larcker 2010). Cheng and Warfield (2005) argue two conditions must hold for managers to have incentives to manage earnings: (1) the capital markets rely on

---

<sup>2</sup>While the decision to adopt mandatory stock ownership plans remains endogenous to the firm, the decision is less likely to be completely determined by the named executive officers. Therefore my setting represents a quasi-natural, rather than a natural, experiment.

<sup>3</sup>Schipper (1989) defines earnings management as “a purposeful intervention in the external financial reporting process, with the intent of obtaining some private gain.” Earnings management occurs through real-activities manipulation and through accruals-based manipulation. Examples of real activities management include overproduction and changes in discretionary expenditures, such as advertising or R&D (Roychowdhury 2006).

<sup>4</sup>Because this paper focuses on equity ownership and earnings management, my discussion places more emphasis on equity ownership and less emphasis on stock options. See Harris and Bromiley (2007) and Armstrong, Larcker, Ormazabal, and Taylor (2013) for work on earnings management and option incentives.



reported earnings when forming expectations of future earnings and (2) managers are able to exploit inflated stock prices that might result from earnings management. Examining the negative abnormal stock returns around announcements of accounting restatements, Hribar and Jenkins (2004) find evidence consistent with investors using accounting information to form expectations of future cash flows and cost of capital. The results of Hribar and Jenkins (2004) suggest that equity investors do rely on earnings when forming expectations and are unable to fully unravel earnings management.

Cheng and Warfield (2005) document that CEO net sales of firm shares are increasing in CEO option grants, CEO unexercisable options, and CEO ownership, and they present evidence that managerial stock ownership is positively related to the likelihood of meeting or beating analysts' forecasts as well as the level of abnormal accruals. These results suggest that managers with high stock ownership are able to exploit overvaluation of their firms' shares. Johnson, Ryan, and Tian (2009) find unrestricted stock holdings are positively associated with AAERs, but find no such association with restricted stock, unvested options, or vested options. Bergstresser and Philippon (2006) define the incentive ratio as portfolio delta scaled by the sum of portfolio delta, salary, and bonus. The authors follow Core and Guay (2002) and measure portfolio delta as the change in portfolio value for a one-percent change in stock price. Bergstresser and Philippon document a positive association between CEO incentive ratios and the absolute values of total accruals and discretionary accruals scaled by lagged total assets. After controlling for the high cash flow volatility inherent

in firms with large magnitudes of (discretionary) accruals, Hribar and Nichols (2007) find no significant relation between CEO incentive ratio and the absolute values of total accruals and discretionary accruals scaled by lagged total assets.

Conversely, Burns and Kedia (2006) argue the symmetric payoff of equity holdings causes managers to experience losses from earnings management, unless the managers are able to unwind their equity positions before the restatement occurs. The authors also argue large equity positions are difficult to unwind and may result in the loss of control benefits for managers. Thus, large equity positions may reduce incentives to misreport. Using a sample of restatements between 1995 and 2002, Burns and Kedia (2006) document that CEOs of firms with restatements for accounting irregularities exhibit higher median, but not mean, equity sensitivity to a one-percent change in stock price. After controlling for option sensitivity to stock price and other control variables, however, the authors find no significant relation between CEO equity sensitivity and the probability of a restatement or between CEO equity sensitivity and the magnitude of restatements.

Using a sample of restatements between 1997 and 2002, Baber, Kang, Liang, and Zhu (2009) also report no significant relation between the likelihood of a restatement and (1) the fraction of outstanding shares owned by CEOs, (2) CEOs' vested and exercisable options as a percent of shares outstanding, or (3) stock options and restricted stock awards as a percent of total compensation. Armstrong, Jagolinzer, and Larcker (2010) argue that prior work, which matches firms on the outcome variable, may be confounded by unrealistic assumptions about the functional form of the

relation between equity incentives and accounting irregularities. Using the propensity-score-matching procedure of Rosenbaum and Rubin (1983), Armstrong, Jagolinzer, and Larcker (2010) report evidence that is largely inconsistent with equity incentives changing the likelihood of current and one-year-ahead restatements, class-action lawsuits, and AAERs.

My study differs from prior literature in four important respects. First, prior work examines equity incentives and earnings management in settings in which managers are able to sell their shares to exploit overvaluation (Cheng and Warfield 2005). In contrast to these papers, I examine a setting in which ownership requirements constrain executives' ability to sell stock to benefit from earnings-management-induced overvaluation. Second, while most of the prior literature examines the equity incentives of CEOs, my analysis extends to the entire group of named executive officers.<sup>5</sup> This distinction is important because while CEOs are often the most important member of the executive team, chief financial officers and chief operating officers may be the executives who are most familiar with the details of financial reporting. Third, while prior literature focuses on infrequent forms of earnings management that results in restatements or AAERs, I focus on more common forms of earnings management that also capture within-GAAP earnings management (Graham, Harvey, and Rajgopal 2005). Finally, while prior work typically restricts the analysis to documenting a relation between equity incentives and earnings management, I reinforce my pri-

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<sup>5</sup>Erickson, Hanlon, and Maydew (2006) and Johnson, Ryan, and Tian (2009) are notable exceptions.

mary results by examining an implication of managerial ownership alignment with external shareholders, improved market liquidity.

### 1.3 Hypotheses

Bhojraj, Hribar, Picconi, and McNinnis (2009) document evidence consistent with managers focusing myopically on short-term targets at the expense of long-term value.<sup>6</sup> The authors examine firms that just beat analyst forecasts with low quality earnings and find these firms enjoy a short-term stock price benefit relative to firms that miss forecasts with high quality earnings. Consistent with myopic earnings management ultimately being detrimental to the firm, the authors document the price benefit reverses over a three-year horizon. The cost to managers of engaging in opportunistic activities varies inversely with managerial ownership. I predict that after the adoption of ownership plans, managers will reduce meeting-or-beating behavior. I state my first hypothesis (in alternative form) as follows:

**H1:** *Subsequent to ownership plan adoption, firms are less likely to just avoid a loss, meet or just beat prior-year earnings, or meet or just beat the consensus analyst*

---

<sup>6</sup>Fama (1980) argues that the managerial labor market constrains managers' use of discretion in financial reporting, because managers bear the full cost of failing to maximize firm value. This argument ignores the limited liability aspect of professional managers and is inconsistent with empirical evidence (Smith 1976; Dhaliwal, Salamon, and Smith 1982; Warfield, Wild, and Wild 1995).

*forecast.*

Prior research documents that accruals-based earnings management, and the associated restatements and AAERs, imposes significant costs on shareholders.<sup>7</sup> Hribar and Jenkins (2004) document restatements are followed by an increase in cost of equity capital ranging from 7 to 19 percent. Karpoff, Lee, and Martin (2008) estimate that when a firm artificially inflates its market value through inflated earnings, the firm destroys \$3.08 of market value per each dollar the market value was inflated. Karpoff, Lee, and Martin (2008) provide evidence that counterparties to firms with accounting misconduct respond to the misconduct with less favorable terms of trade. Because mandatory stock ownership plans increase managers' ownership in their companies, accruals-based earnings management will become more costly to managers as they incur a greater share of the costs. I state my second hypothesis (in alternative form) as follows:

**H2:** *Subsequent to ownership plan adoption, firms are less likely to engage in accruals-*

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<sup>7</sup>Prior work on earnings management and equity incentives uses AAERs and restatements to measure earnings management. The benefits of using external indicators of earnings management include having an unambiguous signal of earnings management (Dechow, Ge, and Schrand 2010). AAERs and restatements, however, are low-probability events and are subject to the selection criteria used by auditors and regulators. Given that only a fraction of firms adopt mandatory stock ownership plans and only a small fraction of firm-years are subject to AAERs or restatements, the statistical power of tests looking for changes in the incidence of external earnings management indicators will be insufficient for even treatment effects of large economic magnitude. Therefore, this study does not examine AAERs or restatements.

*based earnings management.*

Prior work suggests that managers alter real activities to improve short-term earnings performance. Dechow and Sloan (1991) find CEOs spend less on R&D during their final years in office. Consistent with ownership aligning managers' interests with shareholders' interests, Dechow and Sloan (1991) report executives with greater stock and options are less likely to reduce R&D expenditures. Roychowdhury (2006) provides evidence consistent with firms engaging in real activities management to avoid losses and failing to meet analyst forecasts, as well as evidence that real activities management is more consistent with value-destroying than with value-creating behavior.<sup>8</sup> The findings in Roychowdhury (2006) are consistent with the survey evidence from Graham, Harvey, Rajgopal (2005), who report 79.9 percent of executives surveyed would forgo a positive NPV project to meet an important earnings target. With increased manager-shareholder incentive alignment, I predict managers are less likely to engage in real activities management after the adoption of an ownership plan. I state my third hypothesis (in alternative form) as follows:

**H3:** *Subsequent to ownership plan adoption, firms are less likely to engage in real*

---

<sup>8</sup>Evidence is mixed on the relation between real activities management and firm value. Gunny (2010) examines the association between real activities management and future performance, and she finds real activities management to meet benchmarks is consistent with value-creating behavior.

*activities management.*

Next, I posit that following the adoption of mandatory stock ownership plans, firms enjoy an improvement in equity market liquidity. Welker (1995) documents that firms with better disclosure rankings enjoy better market liquidity, and Warfield, Wild, and Wild (1995) find that managerial ownership is positively related to earnings response coefficients and negatively related to the magnitude of discretionary accruals. Warfield, Wild, and Wild argue that contracts are written, often with accounting-based constraints, to restrict managers from engaging in value-destroying behavior. The existence of accounting-based constraints, in turn, encourages managers to exploit the discretion in accounting to relax these constraints. Managers' use of discretion produces accounting values that are not necessarily consistent with the economic nature of the underlying transactions.<sup>9</sup> Consistent with an improvement in firms' information environments subsequent to plan adoption, I predict a reduction in bid-ask spreads after firms adopt ownership plans. I state my fourth hypothesis (in alternative form) as follows:

**H4:** *Subsequent to ownership plan adoption, manager-shareholder information asym-*

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<sup>9</sup>Warfield, Wild, and Wild note their design is subject to endogeneity concerns because organizations might respond to low informativeness by increasing ownership. Relatedly, firms with low managerial ownership might lack the resources to create relevant and high-quality accounting numbers, but this effect of dispersed ownership would be mitigated by private information gathering.

*metry decreases.*

#### **1.4 Sample selection and matching**

To construct a sample of mandatory stock ownership plan adoptions, I begin with the S&P 1500 firms as of January 1, 1995. Using a web scraping program, I search for “ownership plan” within the 27,036 proxy statements that the firms filed on EDGAR through June of 2013. For each firm, I find the earliest proxy statement mention of an ownership plan. I then perform a number of checks to ensure I correctly identify the year of plan adoptions. For each firm’s first match, I read the proxy statement to ensure the ownership plan relates to named executive officers, rather than to directors or non-executive employees. This procedure eliminates false positive adoption events. Next, I read the proxy statement the year before the first match to ensure I have the correct adoption year. For firms that are classified as non-adopters, I read the most recent proxy to eliminate false negative classifications. Table 1.1 shows that from the initial sample of S&P 1500 firms, I lose 120 firms because of insufficient data to classify the year of mandatory stock ownership plan adoption. Among firms with sufficient EDGAR data, 624 firms do not adopt a mandatory adoption plan before 2013. Finally, 352 firms that adopted plans do not have sufficient COMPUSTAT, CRSP, or Execucomp data for the calculation of my variables, leaving 404 adopting firms in the final sample.

I use propensity-score matching and a difference-in-differences design to test



my hypotheses. For each firm that adopts a mandatory stock ownership plan, I identify the initial year the plan is in effect. I select all available observations in the four years prior to the initial year as the pre-adoption sample, and I select all available observations in the four years subsequent to the initial year as the post-adoption sample.<sup>10</sup> I select a control sample to control for inter-temporal changes in managerial alignment common to all firms. Rosenbaum and Rubin (1983) and Rosenbaum (2002) describe a propensity-score-matching procedure, which identifies control firms that share relevant dimensions with the treatment firms, except for the treatment itself.

I estimate propensity scores using a logistic model that contains variables that relate to the adoption of a mandatory stock ownership plan. In choosing the vector of covariates, I rely on prior empirical and theoretical work. Core and Larcker (2002) argue boards adopt mandatory stock ownership plans to mitigate a perceived governance problem. The authors also provide evidence that firms that adopt mandatory stock ownership plans exhibit low executive equity ownership prior to plan adoption, and I include variables that capture the level of CEO ownership and the level of ownership of other named executive officers. Large firms have greater resources to implement corporate governance reforms than small firms, and I include firm size and predict large firms are more likely to adopt plans than small firms. Demsetz and Lehn

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<sup>10</sup>I use a four-year window for the pre- and post-adoption years because mandatory stock ownership guidelines typically require managers to meet plan requirements within three to five years. The choice also reflects a trade-off between selecting a window long enough to capture the effects of the adoption and short enough to avoid noise from unrelated events.

(1985) argue that monitoring managers is more costly in firms that transact in volatile markets, which suggests a firm with high stock volatility may be more likely to adopt mandatory stock ownership plans. Nevertheless, a firm may be hesitant to adopt an ownership plan if the firm has recently experienced high stock price volatility. I include firms' stock volatility as an explanatory variable, but I make no directional prediction. The adoption of SOX, and the concurrent corporate governance changes around SOX, increased the external pressure on firms to make corporate governance reforms. I predict the likelihood of ownership plan adoption increased after SOX. Because managers with large cash flows may be prone to invest in value-destroying projects (Jensen 1986), I predict firms with substantial operating cash flows are more likely to adopt mandatory stock ownership plans. Finally, Core and Larcker (2002) provide evidence that firms that adopt mandatory stock ownership plans exhibit poor performance prior to plan adoption. Thus, I predict firms that adopt mandatory stock ownership plans exhibit poor stock price performance and a lower return on assets than their industry peers in the year leading up to mandatory stock ownership plans. Using this set of determinants, I estimate the following equation:

$$\begin{aligned}
 ADOPT_t = & \alpha_0 + \beta_1 CEO\_OWN\_PRCT_{t-1} + \beta_2 OTHER\_OWN\_PRCT_{t-1} \\
 & + \beta_3 SIZE_{t-1} + \beta_4 \sigma RET_{t-1} + \beta_5 SOX + \beta_6 CASH\_FLOW_{t-1} \quad (1.1) \\
 & + \beta_7 IND\_ADJ\_ROA_{t-1} + \beta_8 STOCK\_RETURN_{t-1} + \varepsilon_t
 \end{aligned}$$

where firm-specific subscripts are omitted for brevity. *CEO OWN PRCT* is the value of the CEOs' stock ownership scaled by market value of equity; the mean value of the other named executive officers' stock ownership scaled by market value of equity

is *OTHER OWN PRCT*; *SIZE* is the natural logarithm of total assets,  $\sigma(RET)$  is the standard deviation of daily stock returns measured over one year, *SOX* is an indicator variable equal to one after the enactment of the Sarbanes-Oxley Act of 2002, and zero otherwise; *CASH FLOWS* is cash flows from operations divided by total assets; *IND ADJ ROA* is income before special items divided by average total assets minus the 2-digit-SIC industry median ROA; and *STOCK RETURN* is the buy-and-hold stock returns measured over 12 months.

After controlling for other predicted determinants of stock ownership plan adoption, the coefficient estimate on *CEO OWN PRCT* is insignificantly different from zero, while the coefficient estimate on *OTHER OWN PRCT* is significantly less than zero. This result is consistent with the ownership of the entire named executive officer team, rather than just the ownership of the CEO, drives boards to adopt mandatory stock ownership plans.<sup>11</sup> Consistent with large firms being more likely to adopt ownership plans, the coefficient estimate on *SIZE* of 0.129 is positive and statistically significant at the one-percent level. Consistent with boards being hesitant to mandate ownership requirements at firms with highly volatile stock prices, the coefficient estimate on  $\sigma(RET)$  is  $-14.747$  and is statistically significant at the one-percent level. The coefficient estimate on *SOX* is 0.716 (p-value  $< 0.01$ ), which is consistent with firms being more likely to make governance reforms after the series

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<sup>11</sup>This result is also consistent with Core and Larcker (2002) who report on page 330 that “When we include both the CEO and the other executives’ stock value residuals in the same model (Column 3), the coefficient on the other executives’ stock residual is significant (p-value  $< 0.10$ ), but the coefficient on the CEO stock residual is insignificant. This evidence suggests that low ownership by executives other than the CEO is a more important determinant of the decision to adopt than is low ownership by the CEO.”

of market failures that culminated in the passage of SOX. Boards of directors also appear more likely to adopt mandatory stock ownership plans in the presence of large cash flows (coeff. est. = 1.415, p-value < 0.01) and when firms are performing worse than their industry peers (coeff. est. =  $-0.516$ ; p-value = 0.04). After controlling for other determinants of mandatory stock ownership plans, *STOCK\_RETURN* does not exhibit incremental explanatory power.

Using propensity scores, I select a matching firm for each firm with a plan adoption.<sup>12</sup> The matching procedure is performed by year and without replacement. For each control firm, I select all available observations in the four years prior to the adoption year as the pre-adoption control sample, and I select all available observations in the four years subsequent to the adoption year as the post-adoption control sample. Panel A of Table 1.3 presents the mean values for the adoption determinants for both the firms that adopted mandatory stock ownership plans (treatment) and the control firms. In the pre-adoption period, the treatment firms exhibit similar CEO ownership percentages, cash flow, and proportion of years that occurred after the adoption of SOX as control firms.<sup>13</sup> Control firms are slightly larger than the adoption firms, while the adoption firms are slightly more profitable than the control

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<sup>12</sup>In the context of this paper, propensity scores are conditional probabilities of adopting a stock ownership plan given a vector of observed covariates. An assumption of propensity-score matching is that neither the outcome of interest nor the treatment assignment depend on unobservable characteristics. While I cannot conclusively rule-out the existence of a time-variant unobservable variable, I have no reason to suspect such a variable is biasing my results.

<sup>13</sup>Because I perform the matching procedure by year, the SOX variable is exactly equal by construction.

firms. While the treatment and control firms exhibit a statistically significant difference in standard deviation of returns ( $\sigma(RET)$ ), the economic magnitude of the difference is small.

## 1.5 Empirical methods and results

### 1.5.1 Tests of H1

I use a composite measure of meeting or just beating benchmarks, which includes just avoiding a loss, meeting or just beating prior-year earnings, and meeting or just beating sell-side analyst consensus forecasts. Survey and empirical evidence suggests executives manage earnings to beat benchmarks (Graham, Harvey, and Rajgopal 2005; Burgstahler and Dichev 1997; Burgstahler and Chuk 2012). Burgstahler and Dichev (1997) present evidence that an abnormally large number of firms just meet or beat zero earnings and seasonally-adjusted earnings changes, while an abnormally small number of firms fail to just miss these benchmarks.<sup>14</sup> Degeorge, Patel, and Zeckhauser (1999) present evidence that managers also seek to meet or just beat analyst forecasts. My measure reflects survey evidence that executives manage earnings to meet multiple thresholds (Graham, Harvey, and Rajgopal 2005). My earnings management measure ( $MB3$ ) is equal to one when a firm meets or just beats any of the three earnings benchmarks, and zero otherwise. I examine my first hypothesis

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<sup>14</sup>Kinks in the distribution of earnings also arise as a result of scaling, survivorship bias, and tax reasons (Durtschi and Easton 2005), but I have no reason to suspect scaling, survivorship bias, or tax reasons will be systematically different for treatment firms in the post-adoption period.

with the following equation:

$$Pr(MB3_{it}) = \alpha_0 + \beta_1 TREAT_{it} + \beta_2 POST_{it} + \beta_3 TREAT * POST_{it} + \varepsilon_{it} \quad (1.2)$$

where *TREAT* is an indicator variable equal to one for the firms that adopt a managerial ownership plan, and zero otherwise. *POST* is an indicator variable equal to one for firm-years that occur subsequent to the adoption or pseudo-adoption, and zero otherwise. *TREAT \* POST* is an interaction term that is equal to the product of *TREAT* and *POST*. If mandatory stock ownership plans reduce managers' tendency to manage earnings to meet or just beat earnings benchmarks, I expect  $\beta_3$  to be negative and statistically significant.

Table 1.4 reports the results of testing the first hypothesis. Consistent with *H1*, the coefficient estimate on *TREAT \* POST* is statistically less than zero at the five-percent level and economically significant. After controlling for the level of earnings management for the treatment firms in the pre-adoption period and the change in the propensity to beat a benchmark for control firms, the coefficient estimate of  $-0.195$  represents an economically significant 6.1 percent decrease in the propensity to meet or just beat. Following the guidance of Ai and Norton (2003) and Greene (2010), I also examine the *z*-statistics of individual observations as well as graphical evidence.<sup>15</sup> Ruling out concerns that the direction of the interaction effect varies

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<sup>15</sup>Ai and Norton (2003) note that the interaction term in binary response models does not necessarily reflect the true effect of the interaction. The authors show that researchers must compute the cross-derivative of the interaction term coefficient to evaluate an interaction effect, and the authors provide evidence that the cross-derivative may be of a different sign than the interaction term coefficient. Norton, Wang, and Ai (2004) provide researchers with a method to compute the sign and statistical significance of interaction effects in binary-

with the predicted probability of benchmark beating, all  $z$ -statistics are of the same sign and 99.6 percent of  $z$ -statistics are statistically less than zero at the five-percent confidence level. Overall, intertemporal meet-or-beat results suggest that, relative to a set of control firms, the treatment firms decreased meet-or-beat tendencies in the post-adoption period. These results are consistent with mandatory stock ownership plans being an effective contracting mechanism that reduces managers' incentives to manage earnings.

### 1.5.2 Tests of H2

My second hypothesis predicts that firms are less likely to engage in accruals-based earnings management subsequent to mandatory stock ownership plan adoption. To test this prediction, I begin by estimating accruals from the forward-looking Jones model described in Dechow, Richardson, and Tuna (2003). The forward-looking Jones model is well suited to my setting for several reasons. While the original Jones (1991) model assumes changes in revenues are free from managerial discretion, the forward-looking Jones model follows DeFond and Subramanyam (1998) and assumes changes in cash sales are free from managerial discretion. Because assuming that all credit sales are discretionary induces a positive correlation between discretionary accruals and current sales growth, the forward-looking Jones model adjusts for expected increases in accounts receivable.<sup>16</sup> The forward-looking Jones model also includes

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response models, while Greene (2010) argues that graphical evidence is more informative than the statistical test provided by Norton, Wang, and Ai (2004).

<sup>16</sup>To estimate the portion of credit sales that result from current sales growth, Dechow, Richardson, and Tuna (2003) regress the change in receivables on the contemporaneous

lagged total accruals to capture the predictable component of accruals and future sales growth. A firm that anticipates future sales growth will rationally increase inventory balances, and including future sales growth reduces the misclassification of inventory increases as earnings management (Dechow, Richardson, and Tuna 2003).

I estimate the forwarding-looking Jones model as follows:

$$\frac{TAcc_t}{Av\_AT} = \alpha + \beta_1 \frac{(1+k)\Delta Sales_t - \Delta Rec_t}{Av\_AT} + \beta_2 \frac{PPE_t}{Av\_AT} + \beta_3 \frac{TAcc_{t-1}}{Av\_AT} + \beta_4 GR\_Sales + \epsilon_t \quad (1.3)$$

where  $TAcc$  is the difference between operating cash flows and income before extraordinary items;  $\Delta Sales$  is current year sales minus prior-year sales;  $\Delta Rec$  is current year receivables minus prior-year receivables,  $PPE$  is property plant and equipment; and  $GR\_Sales$  is the change in sales from  $t$  to  $t + 1$  scaled by sales at  $t$ . While sales growth is not known to financial statement readers until the following year, this is not problematic because my only objective is to identify discretionary accruals. I use the statement of cash flows to measure accruals, because Hribar and Collins (2002) document that non-articulation events, such as M&A and divestitures, induce measurement errors when researchers calculate accruals as the change in successive balance sheet accounts. All variables are scaled by average total assets, and I measure absolute abnormal accruals using the residuals from the two-digit industry-year regressions.

Recent work suggests that Jones-type models of discretionary accruals are

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change in sales by two-digit SIC-year. The coefficient estimate,  $k$ , on the contemporaneous change in sales for each two-digit SIC-year is used in the second stage estimation. Following Dechow, Richardson, and Tuna (2003), I reclassify negative values of  $k$  as zero.



poorly specified when differences in performance or growth exist between treatment and control samples. Kothari, Leone, and Wasley (2005) provide evidence that controlling for ROA in tests of earnings management reduces the probability of incorrectly rejecting a true null hypothesis (Type 1 error), and Collins, Pungaliya, and Vijh (2012) present evidence that differences in sales growth also confound measures of discretionary accruals. These findings are important in my setting because mandatory stock ownership plans may induce changes in performance and growth, and any changes in these firm characteristics may bias my tests. In untabulated tests I find statistically significant differences between treatment and control firms for performance (ROA), and accordingly, I control for ROA in my tests. While I find no statistically significant differences in growth between my treatment and control samples, the forward-looking Jones model nevertheless includes a control for future firm growth.

Owens, Wu, and Zimmerman (2013) document that the median firm in their sample exhibits unsigned abnormal accruals equal to 67 percent of unsigned net income. If auditors set a materiality threshold equal to five percent of net income, the signal-to-noise ratio is 1 part managerial discretion to 12 parts noise in abnormal accruals for the median firm ( $.62/.05=12$ ). Owens, Wu, and Zimmerman (2013) also document that business shocks are positively correlated with large unsigned abnormal accrual estimates, and the existence of business shocks will increase Type I and Type II errors in tests of earnings management that make predictions regarding signed abnormal accruals difficult. Reducing Type II errors is important in my setting given the evidence in prior work that models of abnormal accruals exhibit low

power for earnings management equal to five percent of total assets (Dechow, Sloan, and Sweeney 1995). To mitigate the confounding effects of business shocks, I follow Owens, Wu, and Zimmerman (2013) and remove observations that experience any of the following five proxies of business model shocks: (1) sales have been restated to reflect “a major merger or reorganization resulting in the formation of a new company”; (2) the absolute value of discontinued operations divided by sales exceeds five percent; (3) the four-digit SIC codes differs between years  $t - 1$  and  $t$ ; (4) the absolute value of restructuring charges divided by sales exceeds five percent; and (5) the absolute value of special items divided by sales exceeds five percent. I estimate the following interacted equation to test  $H2$ :

$$\begin{aligned}
 ABEM_{it} = & \alpha + \beta_1 TREAT_{it} + \beta_2 POST_{it} + \beta_3 TREAT_{it} * POST_{it} \\
 & + \beta_4 ROA_{it} + \beta_5 \sigma REV_{it} + \varepsilon_{it}
 \end{aligned}
 \tag{1.4}$$

where accrual-based earnings management ( $ABEM$ ) is equal to the absolute value of the residual from the forward-looking Jones model,  $\sigma REV$  is the lagged five-year volatility of revenues scaled by total assets, and other variables are as previously defined. I measure earnings management using unsigned accruals because it is unclear in what year subsequent to plan adoption that managers will decrease earnings management. By using the absolute value of abnormal accruals, the tendency of accruals to reverse adds power to my tests. Because I predict earnings management will decrease subsequent to the adoption of mandatory stock ownership plans, I predict a negative coefficient estimate on  $\beta_3$ . Table 1.5 provides evidence consistent with managers decreasing their use of accruals-based earnings management subsequent to

the adoption of a mandatory ownership plan, relative to a set of control firms. The coefficient estimate on  $TREAT * POST$  represents a statistically significant decrease in earnings management equal to 1.2 percent of total assets.<sup>17</sup> Overall, my tests provide evidence that accrual-based earnings management decreases subsequent to the adoption of mandatory stock ownership plans.

### 1.5.3 Tests of H3

To examine real activities management, I follow Roychowdhury (2006) and examine three measures of operational real activities management: cutting discretionary expenditures, raising production levels to decrease current-period cost of goods sold, and offering excessive discounts to boost current sales. If mandatory stock ownership plans lead to a reduction in real activities management, then subsequent to plan adoption, firms will be less likely to decrease discretionary spending, less likely to increase production spending, and less likely to artificially boost sales through discounts or channel stuffing.<sup>18</sup> Roychowdhury (2006) argues firms may reduce discretionary expenditures to avoid reporting annual losses. To measure abnormal discretionary expenditures, Roychowdhury (2006) runs regressions separately for each year and two-digit SIC code to control for differences in expenditures across industries and

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<sup>17</sup>In untabulated results, I examine the time-series pattern of the absolute value of abnormal accruals around ownership plan adoptions. Consistent with my expectation, I find a decrease in the absolute value of abnormal accruals after plan adoptions for firms that adopted mandatory stock ownership plans.

<sup>18</sup>My argument here presumes the existence of real activities management in the pre-adoption period for firms that adopt mandatory stock ownership plans. If firms that adopt mandatory stock ownership plans exhibit no real activities management prior to plan adoption, then I expect no decrease in real activities management.

through time. *Disc.Expenditures* equal the summation of R&D, advertising, and SG&A. The residuals from the year-industry regression are my measure of abnormal discretionary expenditures. Roychowdhury (2006) estimates abnormal discretionary expenditures (*ABN\_EXP*) as the residuals from the following regression:

$$\frac{Disc.Expenditures_t}{AT_{t-1}} = \alpha \left( \frac{1}{AT_{t-1}} \right) + \beta \left( \frac{Sales_t}{AT_{t-1}} \right) + \epsilon_t \quad (1.5)$$

By producing more goods than is optimal, managers have the ability to allocate fixed costs over goods that remain in inventory, thereby reducing costs of goods sold. Roychowdhury (2006) presents evidence that managers overproduce to avoid reporting annual losses. To measure overproduction, I run regressions separately for each year and two-digit SIC code to control for differences in production costs across industries and through time. I measure production costs as the sum of cost of goods sold and the change in inventory. Roychowdhury (2006) estimates abnormal production (*ABN\_PROD*) as the residuals from the following regression:

$$\frac{Prod.Costs_t}{AT_{t-1}} = \alpha \left( \frac{1}{AT_{t-1}} \right) + \beta_1 \left( \frac{Sales_t}{AT_{t-1}} \right) + \beta_2 \left( \frac{\Delta Sales_t}{AT_{t-1}} \right) + \beta_3 \left( \frac{\Delta Sales_{t-1}}{AT_{t-1}} \right) + \epsilon_t \quad (1.6)$$

Roychowdhury (2006) also argues managers may sell goods at a discount or engage in channel-stuffing to inflate current period profitability, which may harm long-run value. Following Roychowdhury (2006), I run regressions separately for each year and two-digit SIC code to control for differences in expenditures across industries and through time. To measure cash flows from operations, I add back R&D, advertising, and SG&A to operating cash flows (Cohen and Zarowin 2010), and I scale

operating cash flows by total assets. Adding discretionary expenditures to operating cash flows mitigates the concern that abnormal cash flows are confounded by managers' discretionary expenditure choices. Roychowdhury (2006) estimates abnormal CFO ( $ABN\_CFO$ ) as the residuals from the following regression:

$$\frac{CFO\_ADJ_t}{AT_{t-1}} = \alpha \left( \frac{1}{AT_{t-1}} \right) + \beta_1 \left( \frac{Sales_t}{AT_{t-1}} \right) + \beta_2 \left( \frac{Sales_{t-1}}{AT_{t-1}} \right) + \epsilon_t \quad (1.7)$$

Using these three measures of real activities management, I estimate the following difference-in-differences equation:

$$RAM_{it} = \alpha + \beta_1 TREAT_{it} + \beta_2 POST_{it} + \beta_3 TREAT_{it} * POST_{it} + \epsilon_{it} \quad (1.8)$$

where  $RAM_{it}$  represents the specific proxies for real activities management. In the first specification,  $RAM_{it}$  equals abnormal discretionary spending. Because I predict discretionary spending will increase subsequent to the adoption of mandatory ownership plans, relative to a set of control firms, I expect  $\beta_3$  will be positive in the first specification. In the second specification,  $RAM_{it}$  equals abnormal production costs. Because increasing production costs allows firms to allocate overhead to a greater number of goods, and thus decrease COGS in the current period, I expect  $\beta_3$  will be negative in the second specification. In the third specification,  $RAM_{it}$  equals abnormal CFO. When managers engage in channel stuffing and sell on credit to low-creditworthiness customers, firms' CFO will be less than their industry peers. Thus, I expect  $\beta_3$  will be positive in the third specification.<sup>19</sup>

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<sup>19</sup>Firms that adopt mandatory stock ownership plans typically have poor performance relative to their industry peers before adoption, and experience performance improvements

Table 1.6 reports the results. In the model of discretionary expenditures, I expect a positive coefficient estimate on  $TREAT * POST$ . The coefficient estimate of 0.019 on  $TREAT * POST$  is not statistically different from zero, which is inconsistent with firms that adopt mandatory stock ownership plans increasing discretionary expenditures subsequent to plan adoption, relative to the control sample. In the model of production costs, I expect a negative coefficient estimate on  $TREAT * POST$ . The coefficient estimate of  $-0.002$  on  $TREAT * POST$  is not statistically different from zero. Untabulated tests reveal that abnormal production costs were significantly less than zero for firms that adopted mandatory stock ownership plans before the adoption. Because I find no evidence that managers are overproducing to reduce cost of goods sold prior to plan adoption, it is not surprising the coefficient estimate on  $TREAT * POST$  is not statistically significant. In the model of abnormal cash flows, I expect a positive coefficient estimate on  $TREAT * POST$ . The coefficient estimate of 0.064 on  $TREAT * POST$  is statistically greater than zero, which is consistent with firms that adopt mandatory stock ownership plans decreasing channel-stuffing subsequent to plan adoption, relative to the control sample. Overall, my tests provide evidence that real activities management via channel-stuffing decreased subsequent to the adoption of mandatory stock ownership plans, but real activities management through discretionary expenditures and overproduction did not change subsequent to

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subsequent to plan adoption. Insofar as adopters increase production in anticipation of future sales, the abnormal production cost test may exhibit low power to capture real activities management.

plan adoption.<sup>20</sup>

#### 1.5.4 Tests of H4

The results so far are consistent with mandatory stock ownership plans aligning managers with external shareholders. An additional implication of the improved alignment is a reduction in information asymmetry between managers and shareholders. I predict in *H4* that the reduction in information asymmetry will occur subsequent to the adoption of mandatory stock ownership plans. To test the prediction, I control for other determinants of bid-ask spreads. Because larger firms tend to have more investors, I control for *SIZE*, and I also control for recent performance by including *ROA* and *LOSS*. Because firms with high debt may exhibit distress risk, I include *LEV* as a control. Finally, I follow Welker (1995) and control for differences in scaling of the dependent variable by including *PRICE* as a control variable. I estimate the following equation:

$$\begin{aligned}
 BidAskSpread_{it} = & \alpha_0 + \beta_1 TREAT_{it} + \beta_2 POST_{it} + \beta_3 TREAT_{it} * POST_{it} \\
 & + \beta_4 SIZE + \beta_5 ROA + \beta_6 LOSS + \beta_7 LEV + \beta_8 PRICE + \varepsilon_{it}
 \end{aligned}
 \tag{1.9}$$

where *LOSS* is an indicator variable equal to one when *ROA* is negative, and zero otherwise. *BidAskSpread* is measured two ways following Welker (1995). In the first model, I measure *BidAskSpread* as the yearly mean of daily bid price minus ask

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<sup>20</sup>Cohen, Pandit, Wasley, and Zach (2013) and Siriviriyakul (2013) present evidence that Roychowdhury's three proxies of real activities management are serially correlated, which may lead to mis-specified tests. Modifying my tests to incorporate the suggestions of Cohen, Pandit, Wasley, and Zach (2013) does not weaken my inferences.

price, scaled by price, times 100. In the second model, I measure bid-ask spread as the natural log of the product of 100 times the yearly mean of daily bid price minus ask price, scaled by price. *PRICE* is the firm's stock price as of the fiscal year-end. T-statistics are computed using OLS standard errors with year fixed effects, and all other variables are as previously defined. Because I expect that market liquidity improves subsequent to the adoption of mandatory stock ownership plans, I predict a negative coefficient estimate of  $\beta_3$ .

Table 1.7 reports the results of my market liquidity tests. All control variables are statistically significant in the predicted direction in both model 1 and model 2. Because of the similarity of results in Model 1 and Model 2, I only discuss Model 1 for brevity. As predicted, more profitable firms enjoy lower bid-ask spreads. The coefficient estimate on *ROA* is -0.661. Consistent with more leveraged firms exhibiting a higher bid-ask spread, the coefficient estimate on *LEV* is 0.107. Consistent with larger firms and firms with higher share prices exhibiting lower bid-ask spreads, the coefficient estimates on *SIZE* and *PRICE* are -0.101 and -0.007, respectively. The estimates on the coefficient on interest, *TREAT\*POST*, are negative and statistically significant. In Model 1, the coefficient estimate on *TREAT \* POST* is -0.055 and is statistically negative at the five-percent level. In Model 2, the coefficient estimate on *TREAT \* POST* is -0.068 ( $t$ -stat = -2.17). These results are consistent with improvements in firms' information environment subsequent to plan adoptions.



## 1.6 Falsification tests and robustness checks

### 1.6.1 Zero-correlation assumption

The difference-in-differences approach maintains a parallel trends, or zero-correlation, assumption. The parallel trends assumption requires that any non-zero coefficient estimate on  $TREAT * POST$  be the result of a treatment effect, rather than the effect of differences in the pre-treatment trends between treatment and control firms. When the trends of the outcomes of the control and treatment groups are not parallel in the pre-treatment period, incorrect inferences may result (Roberts and Whited 2012).<sup>21</sup> I conduct falsification tests to investigate whether a violation of the zero-correlation assumption biases my results. I repeat my analysis on pre-event years, and I find no evidence that trends in the pre-event period are favorably biasing my results.

### 1.6.2 High ownership adopters

A subset of firms that adopt stock ownership plans have managers with stock ownership in excess of the plan guidelines (Core and Larcker 2002). For this subset of firms, one might argue the named executive officers already hold substantial ownership in their firms, and thus, the adoption of managerial ownership plans is unlikely to cause a reduction in earnings management or an increase in alignment between managers and outside owners.<sup>22</sup> To examine whether the subset of firms with high

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<sup>21</sup>Section 4 of Roberts and Whited (2012) provides a thorough discussion of the difference-in-differences estimator.

<sup>22</sup>Two problems with this argument exist. First, for many firms, stock ownership plans mandate levels of ownership for more than just the named executive officers. While owner-

ex-ante managerial ownership is driving my results, I examine ownership guidelines for each adoption. Next, I identify firms for which the entire team of named executive officers meet or exceed plan requirements at the year of adoption. For each of my tests, I remove the high ownership adopting firms, and my results are qualitatively unchanged. Overall, the results support the conjecture that the results are not attributable to a subset of firms with high ex-ante managerial ownership.

### 1.6.3 Concurrent governance reforms

The results thus far suggest that mandatory stock ownership plans lead to a reduction in earnings management and an improvement in market liquidity. A potential concern is that the firms that adopted mandatory stock ownership plans also made concurrent governance improvements, and the concurrent governance improvements, rather than the adoption of mandatory stock ownership plans, are responsible for my findings. From my review of proxy statements, I am unaware of any governance reform that was commonly adopted concurrently with mandatory stock ownership plans. Nevertheless, I perform a change analysis to detect other improvements in corporate governance. Because the changes I observe are related to managerial ac-

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ship guidelines for non-executive officers is generally not provided in firms' proxy statements, another channel through which alignment may affect firms' operations is through mid-level and vice president level management. Second, mandatory stock ownership plans require managers to maintain a certain level of ownership. While managers with high ownership before the adoption will not be required by the plans to buy more stock, they will be prohibited from selling shares and dropping below the ownership requirement. Cheng and Warfield (2005) note that managers' ability to sell large amounts of shares is a necessary condition for managers to profit from earnings-management induced overvaluation. I maintain that with a restriction on the ability to sell shares, managers have less incentive to manage earnings.

tions, I investigate whether firms change their G-Score between two years before plan adoption to two years after plan adoption. The G-Score data comes from Gompers, Ishii, and Metrick (2003) and is publicly available on Andrew Metrick's web site. The authors use 24 governance rules that relate to the level of shareholder rights to construct the G-Score, and I identify 31 firms that experience an improvement in corporate governance approximately concurrent with the adoption of mandatory stock ownership plans. After eliminating these 31 firms, my inferences are qualitatively unaffected.

## 1.7 Conclusion

The decisions of managers of large publicly-traded companies affect shareholders, employees, suppliers, and customers around the world. When managers reduce spending on positive NPV projects and engage in accrual-based manipulations, they waste resources and divert their attention from maximizing firm value. While prior literature examines the effects of ownership on incentive alignment, a shortcoming and a likely cause of the literature's mixed evidence is the endogenous nature of ownership and earnings management. My research provides new evidence on the relation between ownership and earnings management by examining a setting that requires executives to increase their ownership levels: mandatory stock ownership plans.

Consistent with mandatory stock ownership plans increasing alignment, I find that after the adoption of mandatory stock ownership programs, managers reduce their tendency to manage earnings to meet or just beat benchmarks. I also document

that after the adoption of an ownership plan, managers use less accruals-based earnings management. Roychowdhury (2006) provides three empirical measures for discretionary expenditures, overproduction to cut cost of goods sold, and channel-stuffing. While I find no evidence that firms exhibit changes in discretionary expenditures or overproduction around mandatory stock ownership plan adoptions, I do find evidence that channel-stuffing decreased subsequent to plan adoption. To further investigate firms' information environments, I posit and find that market liquidity improves after plan adoption. My results are consistent with mandatory stock ownership plan adoptions improving firms' information environments.

My research is subject to limitations. In using the S&P 1500 as a starting point, my sample focuses on a combination of the largest public firms in the U.S. economy (S&P 500), mid-cap firms (S&P 400), and small-cap firms ((S&P 600), and my results may not be generalizable to micro-cap public firms, private firms, or firms outside the U.S. Also, while my tests suggest increases to managerial ownership reduces earnings management and information asymmetry in my sample, my results should not be generalized to mean that higher ownership always results in improved manager-shareholder alignment.

Table 1.1: Sample Construction

	<u>Count</u>
S&P 1500	1500
Insufficient EDGAR data	(120)
No adoption	(624)
Insufficient COMPUSTAT, CRSP, or Execucomp data	<u>(352)</u>
Final sample of adoption firms	<u>404</u>

Table 1.2: Propensity-Score Matching

	Dependent Var. = ADOPT Pred. Sign	Coeff.	PR > ChiSq
Intercept	+/-	-2.495	<0.01
CEO_OWN_PERCENT	-	-0.734	0.28
OTHER_OWN_PERCENT	-	-10.242	<0.01
SIZE	+	0.129	<0.01
$\sigma RET$	+/-	-14.747	<0.01
SOX	+	0.716	<0.01
CASH_FLOWS	+	1.415	<0.01
STOCK_RETURN	-	0.007	0.92
IND_ADJ_ROA	-	-0.516	0.03
Same Year Requirement		YES	
Percent Concordant		77.8%	

*CEO\_OWN\_PRCT* is the value of the CEOs stock ownership scaled by market value of equity; *OTHER\_OWN\_PRCT* is the mean value of the non-CEOs stock ownership scaled by market value of equity; *SIZE* is the natural logarithm of total assets;  $\sigma RET$  is the standard deviation of daily stock returns measured over one year; *SOX* is an indicator variable equal one after the 2002 enactment of the Sarbanes-Oxley Act of 2002, and zero otherwise; *CASH\_FLOWS* is cash flows (OANCF) divided by total assets, *LEV* is total liabilities divided by total assets, *IND\_ADJ\_ROA* is income before special items (IB) divided by average total assets minus the 2-digit-SIC industry median ROA; and *STOCK\_RETURN* is the buy-and-hold stock returns measured over 12 months.

Table 1.3: Descriptive Statistics

	Treatment	Control	Diff.	p-value
<b>Panel A: Covariate balance</b>				
<i>Adoption Determinants</i>				
CEO_OWN_PRCT	0.003	0.003	-0.000	0.775
OTHER_OWN_PRCT	0.003	0.006	0.003	0.012
SIZE	8.406	8.899	-0.493	<0.001
$\sigma RET$	0.022	0.020	0.002	0.022
SOX	0.593	0.593	0.000	1.000
CASH_FLOWS	0.109	0.111	-0.002	0.775
STOCK_RETURN	0.159	0.178	-0.019	0.472
IND_ADJ_ROA	0.034	0.020	0.014	0.050
<b>Panel B: Other variables</b>				
<i>Full sample</i>				
ABN_ACC	0.041	0.047	0.006	<0.001
ABN_CFO	0.035	0.030	0.005	0.750
ABN_DISC	-0.285	-0.097	0.188	0.043
ABN_PROD	-0.056	-0.050	-0.006	0.403
LEV	0.605	0.706	-0.101	<0.001
MB3	0.280	0.314	-0.033	0.004
ROA	0.075	0.053	0.022	<0.001
SIZE	8.385	8.863	-0.478	<0.001

*CASH\_FLOWS* is cash flows from operations divided by total assets; *CEO\_OWN\_PRCT* is CEOs' stock ownership value scaled by market value of equity; *IND\_ADJ\_ROA* is income before special items divided by average total assets minus the 2-digit-SIC industry median ROA; *OTHER\_OWN\_PRCT* is the mean value of the non-CEOs stock ownership scaled by market value of equity; *SIZE* is the natural logarithm of total assets; *SOX* is an indicator variable equal one after the 2002 enactment of the Sarbanes-Oxley Act of 2002, and zero otherwise;  $\sigma RET$  is standard deviation of daily stock returns measured over one year; *STOCK\_RETURN* is the buy-and-hold stock return measured over 12 months; *ABN\_ACC* is the residual from forward-looking Jones model, estimated by year and 2-digit SIC without firms with business model shocks, as defined by Owens, Wu, and Zimmerman (2013); *ABN\_CFO* is the residual from Roychowdhury's (2006) channel-stuffing model, estimated by year and 2-digit SIC; *ABN\_DISC* is the residual from Roychowdhury's (2006) discretionary expenditures model, estimated by year and 2-digit SIC; *ABN\_PROD* is the residual from Roychowdhury's (2006) overproduction model, estimated by year and 2-digit SIC; *LEV* is total liabilities divided by total assets; *LOG\_SPREAD* is the natural log of *MEAN\_SPREAD*; *MB3* is an indicator variable equal to one when the firm just avoids reporting a loss, meets or just beats prior-year earnings, or meets or just beats consensus analyst forecast; *MEAN\_SPREAD* is the mean of the daily bid minus ask price, scaled by price, times 100; and *ROA* is income before extraordinary items divided by total assets.

Table 1.4: Meeting or Just Beating

	Pred. Sign	MB3	
		Coeff.	z-value
Intercept	+/-	-1.798	-10.93***
TREAT	+/-	-0.161	-2.02**
POST	+/-	0.134	1.57*
<b>TREAT*POST</b>	-	<b>-0.195</b>	<b>-1.71**</b>
Marginal Effect	-	-0.061	-1.73**
Percent Concordant		3.7%	
Observations		6195	

The dependent variable, *MeetBeat3*, is equal to one when a firm just avoids a loss, meets or just beats prior-year earnings, or meets or just beats the consensus analyst forecast, and zero otherwise. Z-statistics are computed using standard errors with fixed year effects. The z-statistics for the interaction term are significantly negative at the five-percent level for 99.6 percent of observations. All z-statistics are less than zero.



Table 1.5: Accrual-Based Earnings Management

	Pred. Sign	Abnormal Accruals	
		Coeff.	t-stat
Intercept	+/-	0.027	3.35***
TREAT	+/-	0.002	0.46
POST	+/-	0.008	1.41
<b>TREAT*POST</b>	-	<b>-0.012</b>	<b>-1.88**</b>
ROA	+/-	0.000	0.01
$\sigma$ REV	+/-	0.005	2.28**
Adj. R <sup>2</sup>		2.3%	
Observations		3105	

The dependent variable is the absolute value of abnormal accruals from the forward-looking Jones model. I estimate the model for each two-digit SIC industry and year in my sample as follows:  $\frac{TAcc_t}{Av\_AT} = \alpha + \beta_1 \frac{(1+k)\Delta Sales_t - \Delta Rec_t}{Av\_AT} + \beta_2 \frac{PPE_t}{Av\_AT} + \beta_3 \frac{TAcc_{t-1}}{Av\_AT} + \beta_4 GR\_Sales + \epsilon_t$  where  $TAcc$  is the difference between operating cash flows and income before extraordinary items;  $\Delta Sales$  is current year sales minus prior-year sales;  $\Delta Rec$  is current year receivables minus prior-year receivables,  $PPE$  is property plant and equipment;  $GR\_Sales$  is the change in sales from the current year to next year scaled by current sales; and  $k$  is an adjustment for the change in receivables expected given the change in sales.  $ROA$  is income before extraordinary items divided by total assets. To avoid misspecification from business model shocks, I follow Owens, Wu, and Zimmerman (2013) and remove (1) sales have been restated to reflect “a major merger or reorganization resulting in the formation of a new company”; (2) the absolute value of discontinued operations divided by sales exceeds five percent; (3) the four-digit SIC codes differs between years  $t - 1$  and  $t$ ; (4) the absolute value of restructuring charges divided by sales exceeds five percent; and (5) the absolute value of special items divided by sales exceeds five percent. Fixed year effects are included.

Table 1.6: Real Activities Management

	Alternative Proxies for Real Activities Management					
	Abn.Disc.Expend.		Abn.Prod.Costs		Abn.CFO	
	Coeff.	<i>t</i> -stat	Coeff.	<i>t</i> -stat	Coeff.	<i>t</i> -stat
Intercept	0.152	0.55	-0.069	-2.87***	-0.077	-1.24
TREAT	-0.210	-1.72*	-0.000	-0.04	-0.049	-1.76**
POST	-0.018	-0.14	0.014	1.23	-0.032	-1.01
TREAT*POST	0.019	0.11	-0.002	-0.10	0.064	1.68**

In the first model, I measure abnormal discretionary expenditures as the residuals of regressions of  $\frac{Disc.Expenditures_t}{TA_{t-1}}$  on  $\left(\frac{1}{TA_{t-1}}\right)$  and  $\beta\left(\frac{Sales_t}{TA_{t-1}}\right)$ , estimated for each two-digit SIC industry-year. *Disc.Expenditures* equals R&D (Compustat item = XRD), advertising (Compustat item = XAD), and SG&A (Compustat item = XSGA). For the second model, I estimate abnormal production costs as the residuals of regressions of  $\frac{Prod.Costs_t}{TA_{t-1}}$  on  $\left(\frac{1}{TA_{t-1}}\right)$ ,  $\beta_1\left(\frac{Sales_t}{TA_{t-1}}\right)$ ,  $\beta_2\left(\frac{\Delta Sales_t}{TA_{t-1}}\right)$  and  $\beta_3\left(\frac{\Delta Sales_{t-1}}{TA_{t-1}}\right)$ , estimated for each industry-year. I measure *Prod.Costs* as the sum of cost of goods sold (Compustat item = COGS) and the change in inventory. In the third model, I measure abnormal cash flows from operations as the residuals of regressions of  $\frac{CFO_t}{TA_{t-1}}$  on  $\left(\frac{1}{TA_{t-1}}\right)$ ,  $\left(\frac{Sales_t}{TA_{t-1}}\right)$ , and  $\left(\frac{Sales_{t-1}}{TA_{t-1}}\right)$ , estimated for each industry-year. To measure CFO, I add cash flows (OANCF), scaled by lagged total assets, and discretionary expenditures. Statistical significance is calculated using OLS standard errors with year fixed effects.

Table 1.7: Market Liquidity

	Pred. Sign	MEAN_SPREAD		LOG_SPREAD	
		Coeff.	<i>t</i> -stat	Coeff.	<i>t</i> -stat
Intercept	+/-	2.355	37.54***	0.704	10.16***
TREAT	+/-	0.092	4.53***	0.139	6.31***
POST	+/-	0.035	1.58	-0.053	-2.22**
<b>TREAT * POST</b>	-	<b>-0.055</b>	<b>-1.91**</b>	<b>-0.068</b>	<b>-2.17**</b>
ROA	-	-0.661	-8.44***	-0.807	-8.23***
LEV	+	0.107	2.63***	0.701	15.82***
SIZE	-	-0.101	-17.70***	-0.157	-25.21***
PRICE	-	-0.007	-16.97***	-0.010	-22.38***
Adj. R <sup>2</sup>		54.4%		79.2%	
Observations		6099		6099	

In the first model, I measure bid-ask spread as the yearly mean of daily bid price minus ask price, scaled by price, times 100. In the second model, I measure bid-ask spread as the natural log of the yearly mean of daily bid price minus ask price, scaled by price. *SIZE* is the natural logarithm of total assets (*AT*); *ROA* is income before special items (*IB*) divided by average total assets; *LOSS* is an indicator variable equal to one when *ROA* is negative, and zero otherwise; *LEV* is total liabilities scaled by total assets; and *PRICE* is the firm's stock price as of the fiscal year-end. T-statistics are computed using OLS standard errors with fixed year effects.

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