Does Corporate Governance Induce Earnings Management? Evidence from Bonus Depreciation and the Fiscal Cliff*

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December 2014

Abstract

Corporate governance mechanisms can improve managerial performance, but may encourage managers to focus on current financial statement earnings at the expense of long-run profits. This unintended effect is revealed by reactions to "bonus depreciation," a U.S. tax policy that reduces tax expense without improving reported earnings. During 2000–2010, investment by better-governed firms responded less to bonus depreciation than did firms with less effective governance. Similarly, share prices of poorly governed firms reacted most strongly to the surprise 2013 extension of bonus depreciation. Taken together, these results suggests that high-powered managerial incentives encourage earnings management behavior.

Keywords : Corporate governance, earnings management, bonus depreciation

JEL Codes: H25, G31, G30

*I thank my dissertation committee James Hines, Christopher House, Joel Slemrod, and Justin Wolfers; as well as Jesse Edgerton, Max Farrell, John Friedman, Michael Gideon, Jason Hall, Kevin Hassett, Pawel Krolikowski, Tom Neubig, Amiyatosh Purnanandam, Nathan Seegert, and Bryan Stuart; for very useful feedback. I am also grateful to seminar participants at the University of Michigan for helpful suggestions. All errors are my own.

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1 Introduction

Economists have long understood that the actions of publicly traded corporations are greatly influenced by a separation of firm ownership and control. Shareholders, the owners of the firm, hire professional managers to control firm operations and make decisions on their behalf. This separation can give rise to a principal–agent problem if the objectives of the professional managers differ from those of the shareholders. These problems can be difficult to solve because shareholders cannot perfectly observe and evaluate the managers' decisions.

However, firm ownership can look towards corporate governance mechanisms, such as threat of takeover, discretionary payments, or equity packages, to align the objectives of the managers with their own. While strong corporate governance has the ability to align objectives and move the firm towards actions that are optimal for the shareholders, it may also generate an unintended and counterproductive side effect; strong corporate governance places pressure on managers to signal their value to shareholders by manipulating performance metrics that are easily observable to shareholders.

Evidence indicates that in the corporate context there is a single most salient performance metric: "accounting earnings" or the bottom line number on a firm's income statement.[1] Because investors fixate on accounting earnings, managers facing strong corporate governance pressure are incentivized to manipulate accounting earnings possibly at the cost of long-term real economic benefits to the firm, a behavior known as "earnings management."[2]

The canonical example of earnings management behavior is the delay or cancellation of positive net present value investments because the project may adversely affect accounting earnings. In addition to investment, earnings management may distort firm financing and payout decisions, thereby depressing firm values and significantly impacting welfare for the economy as a whole.[3] Thus, while strong corporate governance may move the firm towards optimal behavior, it does so at the cost of increasing earnings management.

Despite the strong intuition, theoretical underpinnings, and anecdotal evidence that corporate governance induces earnings management, empirical analyses have not been able to confirm the hypothesis for two reasons. First, identifying instances in which managers choose to increase current accounting earnings by altering firm behavior is difficult. Second, levels of corporate governance and earnings management behavior are potentially simultaneously determined.

I rely on a corporate tax policy, "bonus depreciation," to address these issues and formally

[1] Publicly traded firms in the United States are required to prepare income statements under Generally Accepted Accounting Principles (GAAP). Audited income statements appear on firms' annual 10K financial reports.

[2] The accounting literature distinguishes two types of earnings management. Managers that manipulate discretionary information on financial statements, such as loan loss provisions, engage in "accruals management." Managers that alter firm behaviors to manipulate financial reporting engage in "real earnings management." In this research, I focus on the relationship between corporate governance and real earnings management.

[3] Stein (1989) shows that earnings management behavior can exist even in the context of efficient capital markets.

test whether corporate governance induces earnings management behavior. Bonus depreciation is a largely counter-cyclical corporate tax incentive that has been the primary investment stimulus tool in use in the US over the last decade. Bonus depreciation decreases the net present value cost of investment projects by accelerating the deduction for the costs of newly installed capital from taxable income.

While bonus depreciation effectively increases the economic value of investment projects, it leaves the accounting earnings associated with any potential project unchanged. Under Generally Accepted Accounting Principles (GAAP), the cost of new investments appears on the earnings statement only as the new capital investment is used up or economically depreciates over the life of the investment. Because the rate at which new capital economically depreciates is unaffected by tax depreciation rules, bonus depreciation does not affect the cost of investment on the earnings statement and therefore leaves accounting earnings unchanged.[4] This accounting treatment of bonus depreciation provides exogenous variation that can be used to identify earnings management behavior and test the governance hypothesis.

If managers seek to maximize only accounting earnings, then bonus depreciation has no effect on their objective function and does not alter their behavior. Alternatively, for managers that seek to maximize the economic value of the firm, bonus depreciation provides strong incentives for increased investment. The absence of response (or under-response)to the policy is evidence of earnings management. If the investment behavior of strongly governed firms is less responsive to bonus depreciation, then it can be interpreted as evidence that earnings management is a side effect of corporate governance practices. This research design avoids the simultaneity complications under the plausible assumption that corporate governance decisions are not made based on investment response to the tax policy.

Exploring heterogeneity of response among firms with varying levels of governance is exciting not only in that it may confirm earnings management as an unintended consequence of strong corporate governance but also from a tax policy perspective. Use of bonus depreciation and the design of the policy itself may have to be reconsidered in light of heterogeneous response especially considering the staggering magnitude of the policy: estimates suggest that in 2011 alone bonus depreciation stimulated approximately $50 billion in new investment.

2 Related Literature

2.1 Corporate Governance

Since the 1970's, an active literature has developed that addresses the role of corporate governance in solving principal–agent problems of the firm. The first papers in the literature detailed how

[4]The discrepancy between the timing of expenses for tax and financial reporting purposes is recorded as the "temporary book-tax difference" on financial statements.

the separation of ownership and control within the firm affects firm behavior. Jensen and Meckling (1976) examined the impact of the agency problem on the method of finance. Grossman and Hart (1980) described its effects on takeover bids. Easterbrook (1984) formalized how dividend policy was altered in an agency setting. Later research examined possible solutions to these agency problems. Jensen (1986) suggested that the use of debt financing may discipline suboptimal investment behavior arising from abuse of free cash flows by self-interested managers. Shleifer and Vishny (1986) argued that large minority shareholder can overcome freeriding problems in effective monitoring of management and thereby mitigate agency problems. Jensen and Murphy (1990) empirically explored pay-for-performance incentives and their ability to align the incentives of top executives with those of the owners. The general conclusions of these studies were that agency costs were high and various governance mechanisms such as debt financing, strong monitoring, and incentive pay can and should be increased.

More recent empirical evidence has reinforced these conclusions. Bertrand and Mullainathan (2003) used exogenous decreases in corporate takeover probability to show that when managers are less subject to the threat of takeover, they prefer to "live the quiet life" and decrease effort-intensive investment behavior. Gompers, Ishii and Metrick (2003) combined 24 governance provisions into an index that proxies for the strength of shareholder rights and found that equity returns for firms in the top decile of the index are larger than for firms in the bottom decile, suggesting that, over time, firms with better corporate governance perform better. Bebchuk, Cohen and Ferrell (2009) reduced the Gompers et al. (2003) index to the six provisions that truly matter from a legal perspective and found that Tobin's Q, a measure of firm performance, monotonically decreases when managers are subject to less strict shareholder governance. [5]

While the majority of empirical results have highlighted the benefits of stronger governance, Jensen (2004) suggested that equity incentives may lead to unintended, counterproductive consequences. Jensen (2004) considered the effect of high managerial equity incentives when analysts project high earnings and stock prices are overvalued. Overvaluation places pressure on managers to increase accounting earnings often at the cost of real economic value. Jensen pointed out that the pressure to engage in earnings management behaviors to artificially inflate earnings to hit targets increases as management owns a larger portion of outstanding equity.

2.2 Earnings Management

Healy and Wahlen (1999) defined earnings management as "when managers use judgment in financial reporting to alter financial reports to either mislead stakeholders about the underlying economics performance of the company, or to influence contractual outcomes that depend on reported numbers." In their review they conclude that empirical evidence is consistent with firms altering

[5] I will make use of both the Gompers et al. (2003) "G Index" and the Bebchuk et al. (2009) "Entrenchment Index" in the empirical analysis presented in Section 6 and Section 7.

financial statements via discretionary accountings of loan loss provisions and abnormal accruals prior to public securities offerings, to avoid violating contracts and increase corporate managers' compensation and job security (For an additional review of the earnings management literature, see Dechow and Skinner (2000)). In short, managers alter earnings by the use of discretionary accounting exactly when earnings mean the most to the firm.

While discretionary accounting may mislead investors, a more concerning type of earnings management is detailed in survey evidence by Graham, Harvey and Rajgopal (2005). The authors survey more than 400 corporate financial executives on the relationship between equity performance and real business decisions. The responses show that the majority of financial managers believe the key metric in evaluating firms' performance is earnings (especially earnings per share), not cash flows. Additionally, they find the majority of respondents would not initiate a positive net present value project if it meant falling short of the current quarters' earnings projection and would give up economic value in exchange for smooth earnings performance. The respondents described a general trade-off between the need to "deliver earnings" and the making of long-run value-maximizing decisions. This survey evidence suggests not only that managers might use discretionary accounting practices to mislead shareholders, but also that they are pressured to distort real firm behaviors in order to manipulate short term accounting earnings. If the need to deliver accounting earnings affects real business decisions, then earnings management behaviors may have significant consequences for the long-run firm values and by extension for the economy as a whole.

Empirical evidence from the stock market supports the beliefs and actions of the corporate managers included in the survey. Sloan (1996) investigated the relationship between stock prices and movement in different financial indicators. He found that stock prices move in patterns that suggest that investors "fixate" on accounting earnings; stock prices do not reflect information contained in accruals or cash flows that impact only future earnings. Given this fixation on accounting earnings relative to other measures of future profitability, it is not surprising that corporate managers manipulate earnings via changes in discretionary accruals and long-run profit-maximizing behavior.

Erickson, Hanlon and Maydew (2004) provided an example of firms sacrificing real economic value to increase accounting earnings. They examined a sample of 27 firms that paid a total of $320 million dollars of real cash taxes on earnings that were later alleged to be fraudulent. Shackleford, Slemrod and Sallee (2011) noted several other empirical explorations of real earnings management behavior and have taken the first steps towards modeling a firm that alters real economic activity to maximize a function of accounting earnings.

2.3 Governance and Earnings Management

Stein (1989) suggested that earnings management can exist in an efficient capital market and may be a function of governance. Stein suggests that short-run earnings manipulation at the cost of

long-run real economic benefits can be viewed as the Nash Equilibrium outcome of a game between managers and the stock market. To induce the market to predict higher future earnings, managers engage in costly behaviors to improve short-term accounting earnings. In equilibrium, the market is not fooled by the enhanced short-run earnings, but the behavior persists because deviating from the equilibrium is strictly dominated from the perspective of the manager. Furthermore, the weight the manager places on short-term accounting earnings *increases* in the threat of takeover and the proportion of managerial compensation that is derived from equity incentives: two governance mechanisms. Crucially, as corporate governance measures are increased, the incentives for unintended counter-productive earnings management behavior are stronger.

A limited empirical literature has tested theories related to the Stein (1989) hypothesis that corporate governance increases focus on short-run accounting earnings. Meulbroek, Mitchell, Mulherin, Netter and Poulsen (1990) tested this hypothesis by examining research and development activity, a behavior which reduces short-term earnings but may lead to increased future profits. They found that anti-takeover measures reduce R & D spending, an empirical result that contradicts Stein's model but may be driven by the "quiet life" theory of governance addressed in Bertrand and Mullainathan (2003). More recent evidence also contradicts Stein's hypothesis. Klein (2002) found that when audit committees or boards are independent of executive management, abnormal accruals are smaller. Xie, Davidson III and DaDalt (2003) and Zhao and Chen (2008) find that audit committee expertise in accounting, the frequency at which the board and audit committees meet, and staggered boards, another takeover defense, all decrease use of discretionary accruals.

2.4 Investment and Taxation

To test for earnings management behavior, I will rely on the theoretical and empirical tools developed to explore the impact of tax policy on investment behavior. Summers (1981), Poterba and Summers (1985), and Desai and Goolsbee (2004) built on the seminal Hall and Jorgenson (1967) paper and estimate models which measure investment as a function of marginal Q and a term that combines corporate income taxation, investment tax credits, the rate of tax depreciation, interest rates, and real rates of economic depreciation into a single "user cost of capital" measure. I utilize a modified user cost model to test the relationship between corporate governance and earnings management behavior.

2.5 Accelerated and Bonus Depreciation

When a firm invests in new capital, it can deduct the purchase price of the investment from its taxable income, thereby reducing its tax bill. In most cases, the firm cannot deduct the entire amount immediately. Under US law, the schedule of depreciation deductions is specified by the Modified Accelerated Cost Recovery System (MACRS). For each type of property, MACRS spec-

ifies a recovery period and a depreciation method that specifies how quickly and over what time frame the purchase price is to be deducted. When the rate of depreciation for tax purposes is faster than the true rate of economic depreciation on capital investments, depreciation is said to be "accelerated."[6] Accelerated depreciation decreases the user cost of capital and effectively creates a tax subsidy on new equipment purchases.[7] While the US Government has used accelerated depreciation to encourage investment for more than 50 years, it has only recently employed the policy in a counter-cyclical manner (Gravelle (2013)).[8] "Bonus depreciation," the counter-cyclical manifestation of accelerated depreciation, is unique in its magnitude and its temporary nature. Under bonus depreciation, businesses can write off a specified percentage of new purchases immediately, thereby further accelerating depreciation and increasing the investment tax subsidy. Bonus depreciation was used to combat both the 2001 and the 2008 recessions and has been the primary tool used to stimulate business investment during the last decade. The White House estimates that bonus depreciation saved businesses approximately 55 billion present value dollars in corporate income taxes in each of the years 2010 and 2011.[9]

Much evidence suggests that business investment does respond to bonus depreciation, although as noted by House and Shapiro (2008), investment elasticity estimates are surprisingly small, given the temporary nature of the policy. The authors note that with price elasticity of supply and adjustment costs equal to zero, the elasticity of investment with respect to the changes in investment cost via temporary bonus depreciation should be infinite. Finding limited investment and supply price response, House and Shapiro conclude that convex adjustment costs within the firm must mute the investment response.

The notion that bonus depreciation can identify earnings management behavior and can be used to test for the relationship between corporate governance and earnings management began with Neubig (2006), which suggested an alternative explanation for the tempered investment response to the policy. Neubig pointed out that, due to GAAP, bonus depreciation does not affect accounting earnings. If firms, as the earnings literature suggests, seek to maximize accounting earnings as opposed to net present value of cash flows (real economic value), their investment behavior will be unresponsive to bonus depreciation. Therefore, unresponsiveness in the face of the policy is evidence of earnings management behavior; firms focusing on accounting earnings do not increase investment despite a substantial subsidy.

[6]The "true" rate of economic depreciation is how quickly the new capital actually deteriorates or is "used up."

[7]In order for bonus depreciation to decrease NPV costs of investment, the firm must have positive taxable income. Heterogeneous response by firms with different tax statuses is examined in Appendix J. Results continue to exhibit strong heterogeneous investment response across governance levels.

[8]In 1954, depreciation rules were liberalized explicitly "to maintain the present high level of investment in plant and equipment" (Senate Finance Committee, quoted in Brazell, Dworin and Walsh (1989)). Legislation has changed the depreciation rules several times since then, but the intention to encourage investment through accelerated depreciation has persisted.

[9]In 2010, businesses could immediately deduct 50% of the cost of new investments; in 2011, 100%. When all equipment is immediately fully deductible, it is known as "expensing."

Edgerton (2012) formalized Neubig's intuitive and elegant explanation for the relatively small elasticity and constructed a model of a firm that focuses attention on both true economic value and accounting earnings. By observing investment responses to different types of investment tax incentives that both do and do not affect accounting earnings, Edgerton estimateed that the average firm focuses 45% of their attention on accounting earnings and 55% of their attention on cash flows when making investment decisions.[10]

3 Modeling Governance and Investment Response to Bonus Depreciation

In this section, I build governance into the formal model of investment behavior presented in Edgerton (2012), in which managers make investment decisions to maximize a weighted sum of cash flows and accounting earnings. The key innovation of the model is that the weight placed on accounting earnings is a function of the strength of governance faced by management. The formal model generates a linear estimating equation that embodies the intuitive prediction that managers under strong corporate governance face high pressure to maximize accounting earnings and are therefore less responsive to bonus depreciation.

3.1 Model Preliminaries

Firms maximize a weighted average of their current and future present value net-of-tax cash flows (CF_t) and their accounting earnings (AE_t). Investment is financed using retained earnings.[11] The definition of cash flows is

$$CF_t = (1-\tau)[F(K_t) - p\psi(I_t, K_t)] + \tau\delta^T K_t^T - pI_t,$$

where τ is the corporate tax rate and p is the unit price of capital. $F(\cdot)$ is the net operating income function and is a function of K_t, the firm's capital stock. $\psi(\cdot)$ is the adjustment cost of investment, which is a function of I_t, investment, and capital stock. The firm's capital stock evolves according to the law of motion,

$$\dot{K}_t = I_t - \delta K_t \tag{1}$$

[10] Also see Edgerton (2012) for a comprehensive explanation and examples of how and why bonus depreciation effectively decreases net present value but leaves the accounting earnings associated with any given investment project unchanged.

[11] The model can be extended to include debt finance with relative ease. Investment policy is identical when the firm invests with retained earnings or a combination of retained earnings and debt.

where δ is the real depreciation rate of the capital stock.[12] The cost of new investment, I_t, is pI_t.[13,14]

In addition to investment tax credits, the depreciation deductions permitted for tax purposes enter into the cash flow definition and may encourage investment behavior. These deductions are a function of the stock of the firm's past capital expenditures that have not been depreciated for tax purposes, K_t^T, and the statutory tax rate of depreciation, δ^T. I will refer to K_t^T as the "tax capital" of the firm. Tax capital evolves according to the law of motion,

$$\dot{K_t^T} = pI_t - \delta^T K_t^T. \tag{2}$$

The tax savings afforded by these deductions appears in the cash flows equation as $\tau\delta^T K_t^T$. The policy parameter δ^T determines the extent to which depreciation is accelerated for tax purposes and embodies the bonus depreciation policy.[15]

The firm's accounting earnings are defined as

$$AE_t = (1-\tau)[F(K_t) - p\psi(I_t, K_t) - \delta^B K_t^B].$$

Revenues $F(K_t)$ and adjustment costs $p\psi(I_t, K_t)$ enter into both after-tax cash flows and accounting earnings identically. However, the cost of investment, pI_t, and cash tax savings, $\tau\delta^T K_t^T$, do not appear in the accounting earnings equation at all. Instead, there appears a book measure of

[12]This law of motion formulation assumes geometric capital stock depreciation. In reality, capital stock may depreciate at non-geometric patterns. This assumption is made for mathematic simplicity and does substantively influence the predictions of the model.

[13]If investment tax credits were offered, the investment would generate investment tax credits of $pI_t ITC$. These credits would enter into accounting earnings identically and, therefore, investment response to ITCs will not be a function of α.

[14]The model abstracts from investment tax credits (ITCs) because they are not available to businesses during the estimation period. However, ITCs can be easily incorporated into the model. ITCs affect both cash flows and accounting earnings identically and therefore investment response to investment tax credits does not depend on α or determinants of α. This observation provides another test that the observed empirical findings are generated by the accounting treatment of bonus depreciation and is evidence of earnings management behavior. If investment response to ITCs is not heterogeneous across governance levels then evidence of the corporate governance–earnings management is reinforced.

Unfortunately, ITCs were last used in 1985 and corporate governance data is not available prior to 1991, so tests of this secondary hypothesis are challenging. However, in Appendix L, I use 1991 governance data in an attempt to measure the degree of heterogeneous investment response to both ITCs and depreciation tax allowances in years surrounding the ITC repeal. The analysis finds no heterogeneity of response across governance levels to the ITC repeal. The absence of heterogeneity could be the result of either changes in within-firm governance between years 1985 and 1991 or support of the ITC hypothesis. The analysis presented in Appendix L also finds no differences in investment response to changes in tax depreciation allowances. Again, this could be due to the poor measurement of mid 1980s governance using 1991 data. Alternatively, this result could be due to the fact that changes in depreciation were not nearly as salient as changes in bonus depreciation and were not the preeminent investment tax stimulus used during the 1980s, which were investment tax credits.

[15]This parameter is also assumed to be constant, and thus tax depreciation allowances are assumed to decline at a geometric rate. In reality, this is not the case. However, this abstraction does not substantively alter the predictions of the theory.

depreciation deductions, $\delta^B K_t^B$, and their associated tax savings, $\tau\delta^B K_t^B$. The cost of new investment only depresses accounting earnings as the capital depreciates for book purposes. Book capital evolves according to its own law of motion,

$$\dot{K_t^B} = pI_t - \delta^B K_t^B. \tag{3}$$

Thus, bonus depreciation, which increases δ^T and decreases the cash flow cost of investment, does not alter accounting earnings.

I assume the firm places a weight α on book earnings (AE) and a weight $(1-\alpha)$ on after-tax cash flows (CF) when choosing its investment. The firms solves

$$\max_{I_t} \int_0^\infty e^{-rt}[\alpha AE_t + (1-\alpha)CF_t]$$

subject to constraints (1), (2), (3), and (4).[16]

3.2 Corporate Governance and Accounting Earnings

To introduce the role of governance in earnings management behavior, I model the weight placed on accounting earnings, α, as a function of the governance in the firm, G,[17]

$$\alpha = f(G).$$

By taking the firm's first order condition with respect to investment and totally differentiating, I can solve for the derivative of investment with respect to tax depreciation allowances.[18]

$$\frac{\partial I}{\partial z^T} = [1 - f(G)]\frac{\tau}{1-\tau}\frac{1}{\psi_{II}}$$

[16]The model and by extension the following empirical analysis does not consider the possible anticipatory effects of the policy; managers make investment decisions in response to contemporaneous depreciation tax policies. Of course, managers who place a positive weight on cash flows and anticipate the introduction of, or increase in, bonus depreciation would decrease current investment at low bonus levels and increase future investment at high bonus levels. If managers anticipate future decreases in bonus depreciation, they would act in reverse.

Anticipatory effects may impact estimates of the over-all effect of the policy on investment. The policy may look more effective than it if changes in the policy were impossible to predict and lasted indefinitely. However, anticipation should not affect the empirical test of the corporate governance–earnings management hypothesis. If information about the policy is uniform across different levels of governance, as is most plausible, then both low governance and high governance firms will change investment behavior in anticipation of policy changes in the same way and the anticipatory effects will be "differenced out."

[17]In Stein (1989), the manager makes a slightly different trade-off: short-run accounting earnings at the expense of long-run accounting earnings. This model is reconciled with Stein's trade-off by recognizing that investment increases long-run cash flows at the expense of long-run cash flows. When managers are more accounting earnings focused, they are less willing to make this trade-off and long-run firm value suffers as a consequence.

[18]The derivation of this condition is contained in Appendix A.

where z^T, a transformation of δ^T, is the present value of future depreciation allowances for tax purposes.[19] When bonus depreciation is introduced or increased and tax depreciation allowances are accelerated, z^T increases. ψ_{II} is the second derivative of the adjustment cost function with respect to investment. The investment response to the bonus depreciation decreases as more weight is placed on accounting earnings. If $f(G)$ is an increasing function of G, then investment response to bonus depreciation decreases as the firm is more heavily governed.

3.3 Estimation

I approximate $f(\cdot)$ as a linear function,

$$\alpha = \gamma_G G, \tag{4}$$

where γ_G defines how governance affects the accounting focus parameter α. Under the assumption of quadratic adjustment costs,[20] the investment ratio may be expressed as a linear function,

$$\frac{I_0}{K_0} = a + c\frac{\frac{\lambda_0}{p_0} - 1}{1-\tau} + c\frac{\tau z^T}{1-\tau} - c\frac{\gamma_G G \tau z^T}{1-\tau} + c\frac{(1-\tau z^B)\gamma_G G}{1-\tau},$$

which can be estimated using ordinary least squares regression of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 \frac{\tau z_{it}^T}{1-\tau_t} + \beta_2 \frac{G_{it}}{1-\tau_t} + \beta_3 \frac{G_{it}\tau z_{it}^T}{1-\tau_t} + \beta_4 \frac{\frac{\lambda_{it}}{p_{it}}}{1-\tau_t} + \epsilon_{it}.$$

During the sample period that I examine, the corporate income tax rate τ does not change. Under these conditions, I can drop the corporate tax rates from the estimating equation and estimate

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 z_{jt}^T + \beta_2 G_{it} + \beta_3 G_{it} z_{jt}^T + \beta_4 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}. \tag{5}$$

The regression equation contains a tax term that describes the impact of the bonus depreciation z^T, a governance term, G, and their interaction as well as marginal Q (λ_{it}/p_{it}). In order to account for firm-level unobserved determinants of investment behavior and the endogenity of tax policy, I add firm and year fixed effects to the regression.

Estimates from this linear regression can be used to test the corporate governance–earnings management hypothesis. From (5), γ_G defines the relationship between governance and accounting

[19] See Appendix A for more details.

[20] The canonical quadratic adjustment equation employed by Desai and Goolsbee (2004) and others is

$$\psi(I_t, K_t) = \frac{1}{2c}\left[\frac{I_t}{K_t} - a\right]^2 K_t,$$

where c is an adjustment cost parameter.

earnings focus. This parameter of interest can be constructed by taking a ratio of coefficients from the regression, $\gamma_G = -\beta_3/\beta_1$. In intuitive terms, β_1 is the response by firms with a "zero" level of governance. β_3 is the amount that the β_1 coefficient changes when an additional unit of governance is added. It follows that γ_G is the fraction that the investment response decreases when governance increases by one unit relative to the response of the "zero" governance firms.

If γ_G is estimated to be positive, investment response to bonus depreciation is decreasing in the corporate governance measure, and empirical evidence indicates that the weight placed on accounting earnings is larger at higher levels of corporate governance. This result would strongly support the hypothesis that corporate governance induces earnings management behavior consistent with the evidence presented in Section 2.[21]

3.4 Endogenous α

One simple and plausible extension of the model would allow α to be a function of depreciation tax benefits in addition to governance. The logic behind this assumption is that managers, knowing that accounting earnings do not reflect the tax benefits of accelerated depreciation, may shift their focus towards cash flows when bonus depreciation is enacted or increased to better take advantage of the policy. With this extension, investment response to depreciation tax incentives would be positive, but would decrease more slowly in the level of governance. Thus, if α is a function of depreciation tax allowances, then the estimated γ_G from equation (5) would underestimate the impact of governance on the accounting earnings weight α.

4 Data Construction and Descriptive Statistics

In order to examine the investment response to bonus depreciation across firms with different levels of corporate governance, I collect data from the RiskMetrics Governance Legacy Database, from the Standard and Poor's Execucomp database, from Internal Revenue Service documentation, from Bureau of Economic Analysis Capital Flows tables, and from Standard and Poor's Compustat CRSP combined database. The remainder of this section outlines the construction, measurement, and descriptive statistics of key variables.

4.1 Governance Index

Following Gompers et al. (2003), I construct a firm level measure of governance based on the 24 governance provisions contained in the RiskMetrics Governance Legacy Database. The majority of

[21] The investment equation implies that changes in marginal Q (λ/p) should have the same impact on the investment ratio as the Z Tax Term. Unfortunately, because proxies for marginal Q are often mismeasured, this result is typically not present in Q-theory empirical studies. See Cummins, Hassett and Hubbard (1994) and Cummins, Hassett and Oliner (2006) for potential solutions to the mismeasurement problem.

provisions recorded by Riskmetrics protect the manager from disciplinary actions on the part of the shareholders or protect the firm from takeovers. Gompers et al. (2003) construct a "G Index" in a simple, straightforward manner: for every firm, a point is added for every provision that restricts shareholder rights. I transform the "G Index" in an effort to make its interpretation more intuitive. To construct the "Governance" variable that I will use in the empirical analysis, I subtract "G Index" for each firm and year from the maximum "G Index" observed in the data.

The transformed "Governance" variable has the advantage over the "G Index" that it is increasing in proportion to the level of governance placed on the manager by the shareholders of the firm. A one point increase in the Governance variable means that the firm has one fewer provision in place to protect managers from shareholder discipline. For further ease of interpretation, I scale Governance by its standard deviation over the sample period, so that a one point increase in the standardized variable corresponds to a one standard deviation increase in governance relative to the average level of governance observed in the data.[22][23]

Bebchuk et al. (2009) constructed an "Entrenchment Index" from 6 of the original 24 provisions that they found most important from a legal and operational standpoint.[24] I transform and scale their index in the same manner as the "G Index" to create "Entrenchment." I use this measure as a robustness check in Appendix D and in the fiscal cliff analysis because data necessary to construct the Governance variable are unavailable.

Figure 1 presents a histogram of the Governance variable overlaid with a normal distribution. The governance variable is normally distributed with a median value of 9 and standard deviation of 2.557. Figure 2 compares Governance and Entrenchment across firms. The figure confirms that firms with high Governance measures, on average, have high Entrenchment measures of corporate governance.

4.2 Managerial Equity Percentage, "Shares"

The third measure of governance that I consider is the percentage of total shares held by the firm's highest-paid executive, which I label "Shares." I use this measure for two reasons. First, it is used in other papers, making my results comparable to an earlier literature. Second, results from Jensen and Murphy (1990) suggest that fractional ownership is a close proxy for pay–performance sensitivity for CEOs with non-negligible stockholdings. I follow Chetty and Saez (2005) in constructing this

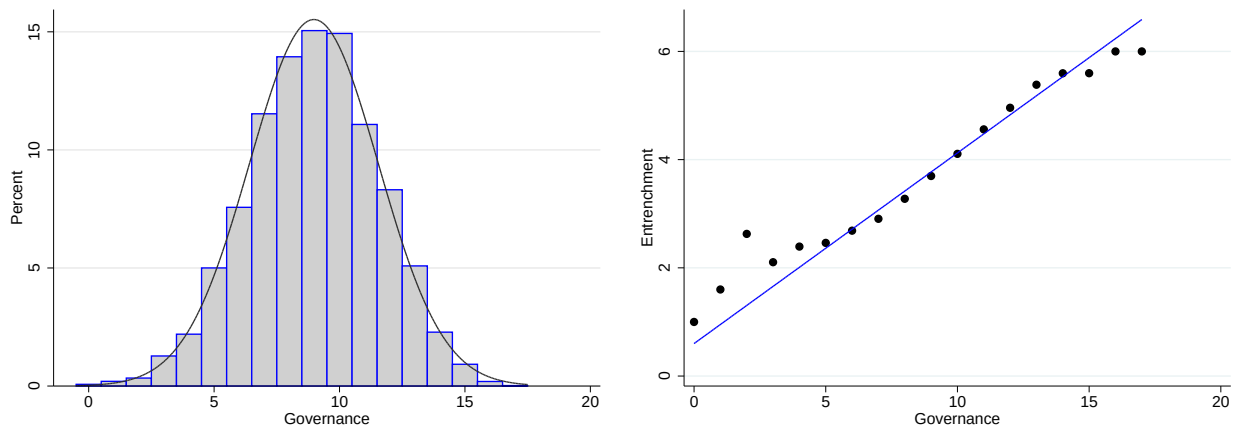
[22]The G Index is available only for years 2000, 2002, 2004, and 2006. The Governance variable for years 2001, 2003, and 2005 is imputed as the value of the G Index for the previous year. The Governance variable for years 2007–2010 is constructed from the 2006 G Index. Appendix E presents several robustness checks to confirm that this simple imputation does not strongly influence empirical results. As Gompers et al. (2003) noted, there is little within-firm change in the index over time, so it is unsurprising that these checks do not strongly influence results.

[23]Data on corporate governance provisions has been collected by RiskMetrics for years 2007 to 2011. However, these data do not contain the full swath of provisions examined in Gompers et al. (2003) and thus the exact G Index cannot be constructed for these years.

[24]The Entrenchment Index focuses on 6 provisions: (1) Staggered Board, (2) supermajority to approve mergers, (3) limited ability to amend charter, (4) limited ability to amend bylaws, (5) poison pill, and (6) golden parachute.

Figure 1: Governance

(a) Distribution (b) Governance and Entrenchment



Notes: Figure 1(A) presents a histogram of the Governance variable overlaid with a normal distribution. Panel (B) presents the linear fit relationship between the Government and Entrenchment variables as well as a binned scatter plot of their relationship. The Governance variable is split into 17 equal-sized bins. For each bin, the average Entrenchment is plotted. The linear fit is predicted over unbinned data.

measure using the following method: (1) for each firm, the top executives are ordered by total compensation, then (2) the shares owned by highest-paid executive are divided by the total shares of the firm to find the percentage of the firm held by the top executive.[25] Shares owned by the executive is defined as the number "shares owned excluding options" plus the "number of shares vested" plus the "number of unexercised exercisable options."[26,27]

Figure 4 presents the relationship between Governance and Shares. The figure provides interesting insight into the use of governance provisions versus equity incentives to generate corporate control. Over the majority of governance measures, excluding the extremes, there is a strong positive linear relationship between the Governance variable and the managerial equity percentage. This suggests that for the majority of firms, governance provisions and equity incentives are complements in generating corporate control. The empirical analysis will consider investment response as a function of both measures of governance. Figure 4 suggests results should be similar, as Shares is a proxy for Governance and vice versa for the majority of firms.

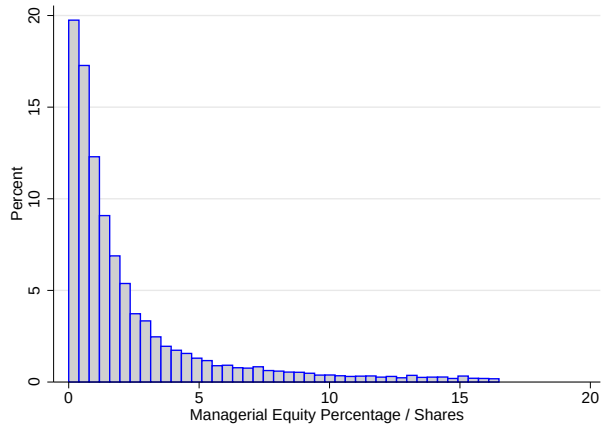
[25] Managerial equity percentage is only determined correctly using this method if the highest-paid executive is the manager. Empirically and anecdotally, this seems to be an accurate assumption.

[26] Due to reporting error, I observe 16 firm-year observations in which the"Shares" variable is greater than 100%. These observations are excluded from the analysis.

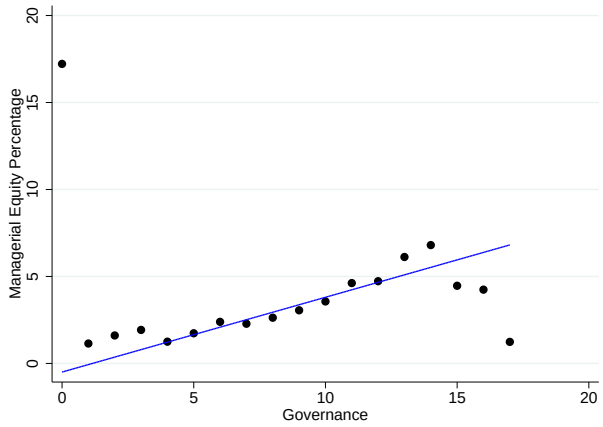
[27] Data on both managerial equity percentage and shareholder governance covers only approximately one-third of the companies listed in the Compustat CRSP Combined Database. The firms for which the data are available are not a random sample of publicly traded firms; Execucomp and Governance Legacy tend to cover only larger firms (Fortune 1500 firms). These large firms do the lion's share of investment, and thus the empirical results describe the majority of investment behavior by publicly traded firms. The applicability of the empirical results to the universe of publicly traded firms depends on how much the largest firms resemble and act like other publicly traded entities.

Figure 2: Shares

(a) Distribution



(b) Governance and Shares Measures



Notes: Figure 2(A) presents a histogram of the Shares variable censored at the 99th percentile. Figure 2(B) presents the linear fit relationship between Shares and Governance as well as the binned scatter plot of their relationship. The Governance variable is split into 20 equal-sized bins. For each bin, the average of the Shares variable is plotted. The linear fit is predicted over unbinned data.

However, for firms with very low levels of governance, managerial equity percentage is relatively high, in contrast to the overall positive relationship. The high managerial equity percentages suggest that relatively low-governance firms may have owner-managers, those who own a large voting block of shares and are also the firm's highest-paid employee. The owner-managers may at low cost insulate themselves from discipline or takeover from other shareholders via provisions. As a result, one might expect owner-managers to work at firms with low governance. For these owner-managers, principal–agent problems may not exist and predictions about earnings management and investment response to bonus depreciation may not be accurate. The visual evidence suggests that analysis should be limited to smaller values of managerial equity percentage in an effort to exclude owner-managers from the analysis.

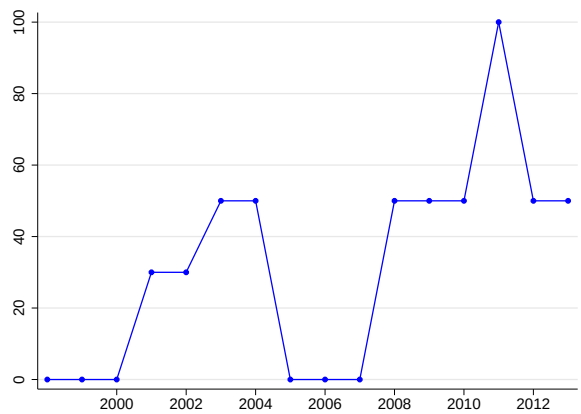
The highest levels of governance do not correspond to high levels of managerial equity percentage. This suggests that, while over the majority of the governance distribution equity, incentives may be a complement to governance, at the highest levels of governance, where salaries are at the discretion of shareholders and the management is subject to takeover, equity incentives may be redundant in providing discipline.

Figure 3: Bonus Percentage

(a) Bonus Rates

For Qualifying Assets Purchased		Bonus
After	Before	
09/10/2001	05/06/2003	30%
05/05/2003	01/01/2005	50%
12/31/2004	01/01/2008	0%
12/31/2007	09/09/2010	50%
09/08/2010	01/01/2010	100%
12/31/2011	01/01/2013	50%

(b) Over Time



4.3 Z Tax Term

Investment tax policy during this period affected only the present value of tax depreciation allowances, which I will label the "Z Tax Term."

$$z_t = b_t + (1 - b_t) \sum_{i=1}^{\infty} \frac{d_i}{(1+r)^i}$$

where z_t is the present value of tax depreciation allowances on \$1 of investment. It is composed of MACRS statutory depreciation allowances d_i and bonus depreciation b_t.

The Z Tax Term varies both over time and across different types of assets. Variation over time and within asset types is driven by "bonus depreciation" legislation.[28] The policy generally applies to all property with MACRS depreciation schedules of less than 20 years. Table 1 and Figure 5 display the bonus depreciation rates during the years 2000 to 2012. Variation in the Z Tax Term across asset types is driven by differences in tax depreciation rates and recovery periods for different types of capital. [29]

Ideally, firm-level investment data by asset type for each year would be available and a firm-specific weighted tax depreciation rate and Z Tax Term could be constructed. Unfortunately, firm-

[28] Items of legislation that include bonus depreciation and their effect on the level of bonus depreciation are detailed in Appendix C.

[29] IRS Publication 946 details how different types of assets may be depreciated. Assets may be depreciated using either the straight line method or the double declining balance method. Within each method, a recovery time period of 5 through 35 years may be applied. Generally, investment assets that have a longer service life must be recovered over a longer time period. Longer recovery results in lower present value of tax depreciation allowances. Both the system and length of recovery are specified for each type of investment in the IRS publication. For an extended discussion of the MACRS, see House and Shapiro (2008).

level data on investment by asset types are not available. In lieu of micro-level tax depreciation rates, I follow Cummins et al. (1994) and Desai and Goolsbee (2004) and construct industry-level present value tax depreciation rates using the Capital Flows table from the Bureau of Economics Analysis, which records industry-level investment by asset types.[30]

To construct industry-level rates, I (1) construct present value tax depreciation rates for each asset type in the BEA table. (2) For each industry, I weight the asset-level depreciation rates by the amount of investment made by each asset category for each industry. The industry-level BEA rates are matched to firms using the NAICS classification system. The industry-level tax depreciation rates are constructed only for equipment.[31] Once the present values of tax depreciation allowances are constructed at the industry-level, they are combined with bonus depreciation rates over time and the statutory tax rate to form the Z Tax Term.

For interpretability, I scale the Z Tax Term by the change in the present value of tax depreciation allowances when bonus depreciation varies from 0% to 100% for the firm with average-lived investment assets. As a result of this scaling, the coefficient on the Z Tax Term in regression can be interpreted as the increase in I_t/K_{t-1} for the average firm when the bonus goes from 0% to 100%.

4.4 Investment and Control Variables

The dependent variable in all regressions is the investment during the current period scaled by the stock of capital in place at the beginning of the period. This ratio is measured using Compustat data,

$$\frac{I_t}{K_{t-1}} = \frac{\text{capx}_t}{\text{ppent}_{t-1}}$$

where capx is capital expenditures and ppent is property, plant, and equipment.

In all investment regressions, I control for marginal Q. Additional possible determinants of investment, a measure of cash flows and a measure of financial distress, are included in select regressions. Appendix B details the construction of these variables. Following Desai and Gooslbee (2004) and others, I winsorize the investment, marginal Q, and control variables at the 1st and 99th percentiles to minimize the effects of misreported data.

[30] The BEA classifies investment into 51 categories; 28 are equipment and 23 are structures. Equipment categories include Computers and Peripheral Equipment, Mining and Oilfield Machinery, and Autos. Structures categories include Industrial Buildings, Residential Buildings, and Farm Nonresidential Structures. The BEA classifies firms into 123 industries which can be matched to 3-digit NAICS codes.

[31] Bonus depreciation cannot be applied the purchase of structures. A separate Z Tax Term can be constructed for structures, however, because the term does not vary within industries over time, when firm and year fixed effects are included in regression, a coefficient on the structures tax term cannot be separately identified.

Because bonus depreciation cannot be applied to the purchase of structures, the percentage of capital investment in structures as a fraction of total investment may also influence stock prices reactions to the bonus depreciation policy. Firms that invest a larger percentage in structures should have smaller abnormal returns after the extension of the policy. The event study results are unchanged when industry-level structures tax rates are included.

4.5 Descriptive Statistics

Table 1 presents descriptive statistics on capital expenditure, the Z tax term, cash flow, marginal Q, cash flows and the financial constraint measure, both for the full sample and then separately for governance sample (those firms for which governance and managerial equity data are available). Table 1 also presents descriptive statistics for the measures of corporate governance, Governance, Entrenchment, and Shares.

Firm-level data on investment, cash flows, financial constraints, and marginal Q are similar to the prior literature. The governance sample is composed of more mature firms. Consistent with their maturity, firms in the governance sample are less financially constrained, have larger cash flows, invest less relative to their stock of capital, and have lower values of marginal Q than the full sample. The average investment as a fraction of existing capital observed is 0.255 in the governance sample, meaning that in each year the average firm invests an amount approximately equal to one-quarter of their existing capital stock.

The average firm in the governance sample has a Governance score of 9, meaning that the average firm has 9 fewer provisions protecting managers from shareholder discipline than the firm with the maximum number of these such provisions. The average value of Entrenchment is 3.758, meaning that the average firm has approximately 2.24 provisions protecting management from shareholders.

The average value of Shares is 3.66% and the distribution is skewed to the left; the modal managerial equity percentage is only 1.3%. 58% of top executives hold more than 1%, 27 hold more than 3%, and only 17.9 hold more than 5%.

5 Estimation Strategy

The estimating equation implied by the model in Section 3 is

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 z_{jt}^T + \beta_2 G_{it} + \beta_3 G_{it} \tau z_{jt}^T + \beta_4 \left[\frac{\lambda_{it}}{p_{it}} - 1 \right] + \epsilon_{it}.$$

The Z Tax Term varies both across industries, due to MACRS regulations, and over time, due to bonus depreciation. With firm and year fixed effects, identification of the β_1 coefficient comes from how changes in bonus depreciation differentially affect industries. Industries that invest in longer-lived equipment benefit more from the policy than industries that invest in equipment that depreciates quickly for tax purposes.

The Governance variable varies across firms and over time. With firm fixed effects, the β_2 parameter is identified off of within-firm variation in the Governance variable. This variable is potentially endogenous to within firm variation in investment behavior. Shareholders could conceivably choose to significantly increase governance when the firm increases investment behavior.

Table 1: Descriptive Statistics Years 2000-2010

	Median	Mean	Std. Dev.	Obs.
Full Sample				
Cap Exp / Prop Plant Equip	0.197	0.357	0.544	76,497
Z Tax Term	0.487	0.483	0.036	92,311
Q/(1-τ)	2.130	4.482	10.074	93,823
Cash Flow / PPE	0.205	-1.403	8.295	71,659
HP Financial Constraint	-4.244	-4.161	1.946	80,013
Governance Sample				
Cap Exp / Prop Plant Equip	0.185	0.255	0.274	11,606
Z Tax Term	0.488	0.484	0.031	13,196
Q/(1-τ)	2.242	2.873	2.123	12,113
Cash Flow / PPE	0.409	0.599	2.572	11,314
K-Z Financial Constraint	-6.172	-6.071	1.077	12,478
Governance, Equity				
Governance	9	8.966	2.557	15,422
Bebchuk	4	3.758	1.277	15,422
Shares	1.302	3.661	6.726	19,976

Note: The investment and tax variables are provided for both the full sample and for the governance sample. The governance sample are firms for which both governance and managerial equity incentive data are available.

However, because the parameter of interest is constructed as a ratio of β_1 and β_3, any impact of within-firm variation of investment on governance should not compromise testing of the primary empirical hypothesis. The crucial assumption is not that the level of governance is exogenous to investment, but that the level of governance is exogenous to investment response to bonus depreciation, which is a plausible assumption.

Because the Governance variable is relatively stable within firms over time (see Gompers et al. (2003)), identification of the β_3 parameter comes from variation in the mean governance level and variation across industries in how much bonus depreciation decreases the present value cost of investment.[32] The variable is larger when bonus depreciation hits firms with high levels of governance.

A potential threat to identification would arise if firms with low-governance levels invested primarily in long-lived assets, which would increase the impact of bonus depreciation on investment. If this were the case, then estimation would inaccurately attribute investment response to low levels of governance when only differential impacts of the tax policy across industries are driving investment behavior. One observation that mitigates this threat is that there appears to be significant variation in Governance levels within industries. As a result, there exists within industry variation in the interaction term. In Appendix I, I add industry-year fixed effects to baseline regression to further alleviate this concern. With industry-year fixed effects, the β_3 coefficient is identified from within-industry variation in the interaction term, coming only from across firm differences in Governance levels. The drawback of using industry-year fixed effects is that the β_1 coefficient can no longer be estimated. However, the sign and magnitude of the interaction coefficient are similar to baseline results, suggesting that baseline results are not driven by a correlation of low governance and long-lived assets.

6 Investment Response to Bonus Depreciation

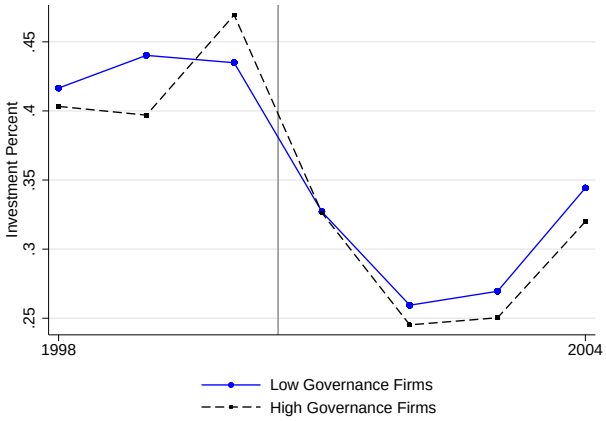
6.1 Visual Analysis of Investment Responsiveness to Bonus Depreciation

Figure 4 presents the effect of bonus depreciation on investment for firms with different level of governance. In all four panels, firms are split according to Governance levels. Firms with Governance levels more than 1 standard deviation below the mean are classified as "Low Governance;" others are classified as "High Governance." Panels (A) and (B) show the impact of the 2001 and 2008 bonus episodes on firms with generous MACRS statutory depreciation allowances (d_i) – those firms which should be unaffected by the policy. Panels (C) and (D) limit the analysis to firms with high d_i – the firms "treated" by the policy.

[32] Regressions that use mean Governance levels are presented in Appendix E. Coefficients on the interaction parameter have magnitudes similar to baseline results, confirming that identification of β_3 is not driven by within-firm changes in Governance.

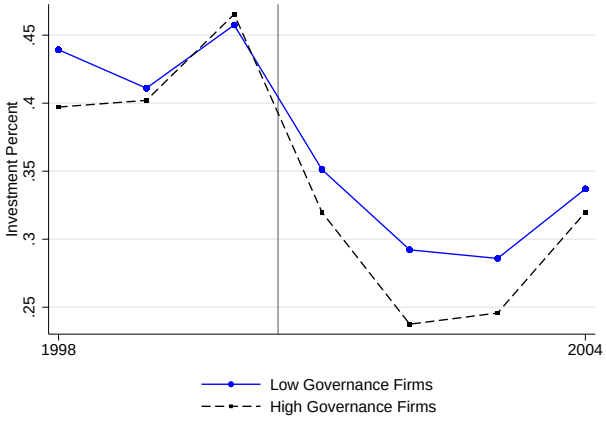
Figure 4: Investment Response to Bonus Depreciation by Governance Levels

(a) Bonus 1: "Untreated" Firms



(b) Bonus 2: "Untreated Firms"

(c) Bonus 1:"Treated Firms"



(d) Bonus 2: "Treated Frims"

Notes: Figures 4(A) - 4(D) plots the mean investment percent for groups sorted by their governance levels and present values of statutory depreciation allowances. (A) and (B) show "untreated" firms – those with above median depreciation allowances. (C) and (D) show "treated firms" – those with below median depreciation allowances. Panels (A) and (C) examine years around the first bonus episode (2001-2004). Panels (B) and (D) examine years during the second bonus episode (2005-2011). In all panels, firms are split by governance levels. Low Governance firms are with G Indices more than one standard deviation below the mean. High Governance firms have governance scores higher than one standard deviation above the mean. Group averages are derived through the following procedure: cross-sectional regression of investment percent on controls for marginal Q, cash flow, and the HP Index are run separately for each year. Residual group means are then calculated for the Low and High Governance groups. Finally, to normalize investment behavior prior to policy implementation group means are equalized in years 1999-2000 and 2006-2007 to ease the comparison of trends. All means are count weighted.

Figure 4 presents compelling visual evidence that investment is less responsive to bonus depreciation for firms with high levels of governance. This pattern of response is consistent with the hypothesis that corporate governance induces earnings management behavior. For the Untreated group, when the policy is enacted in 2001 and again in 2008, the behaviors of the Governance groups are not differentially affected. But for the treated firms, the response is heavily concentrated among the least governed firms. The intuitive explanation for this unresponsiveness by High Governance firms is that the managers of these firms are highly incentivized to focus on maximizing accounting earnings, the most salient measure of corporate performance. Because accounting earnings are unaffected by bonus depreciation, firms with high levels of governance are unresponsive.

6.2 Replicating Previous Literature

The first four columns of Table 2 replicate prior empirical studies of bonus depreciation both for all Compustat firms and for the smaller Governance sample. Specification (1) regresses I_t/K_{t-1} on the Z Tax Term and marginal Q, and includes year and firm fixed effects. Specification (2) repeats the regression from the first specification, but includes cash flow and financial distress controls. The Z Tax Term coefficient is interpreted as the increase in I_t/K_{t-1} that results from an increase in bonus depreciation from 0 to 100% for the firm with average MACRS statutory depreciation rates.

Without additional controls for investment, a 100% increase in bonus depreciation is associated with an increase in I_t/K_{t-1} of 0.04, approximately an 11% increase in investment as a percentage of installed capital. When additional controls are added to the regression, the effect of a 100% increase in bonus depreciation is approximately a 4% increase relative to the mean investment level, suggesting that the controls are correlated with the tax policy. Specification (2) results are in line with the bonus depreciation literature and demonstrate the empirical puzzle, addressed by House and Shapiro (2008) and Edgerton (2012), that investment is not strongly responsive to bonus depreciation, despite the temporary nature of the policy and the policy's potential to significantly decrease the net present value costs of investment.

Specifications (3) and (4) repeat the regressions of specifications (1) and (2), but limit the sample to firms for which governance data was available. Specification (4) shows that the effect of moving from 0 to 100% bonus depreciation has an impact on investment that is very similar for the full sample and for the governance sub-sample.

6.3 Baseline Results

Baseline results presented in Specifications (5) and (6) of Table 2 show a strong heterogeneous response across different levels of governance. Consistent with the governance–earnings management hypothesis, firms with high levels of governance are less responsive to bonus depreciation. Specification (5) fits the linear estimating equation implied by the theoretical model to the data;

specification (6) adds additional controls for cash flows and financial distress. In these regressions, the Z Tax Term can now be interpreted as the effect of increasing the bonus depreciation from 0 to 100% for the firm with the average MACRS statutory tax depreciation rates and a Governance score of 0. The regression predicts that for the hypothetical zero governance firm , increasing bonus depreciation from 0 to 100% results in an increase of I_t/K_{t-1} by 0.177 or an increase by 69% increase relative to mean investment levels. This effect is large and can viewed as how firms would respond to the policy if they placed the minimal amount of focus on accounting earnings. This effect is nearly 10 times as large as the effect for the firm with the mean level of governance.

The investment response to bonus depreciation decreases as the level of governance increases. The coefficient on the interaction term in (5) and (6) is interpreted as the change in the Z Tax Term coefficient resulting from a one standard deviation increase in Governance relative to the mean level. Each one standard deviation increase in Governance decreases the I_t/K_{t-1} response by 0.046 (approximately 27%). The γ_G presented in Table 2 is the percentage decrease in investment response to bonus depreciation that results from a one standard deviation increase in governance. γ_G is approximately 0.27 in specification (6), meaning that a one standard deviation increase in governance makes firms 27% less responsive to bonus depreciation. These results strongly support the theoretical hypothesis that more strongly governed managers focus their attention on accounting earnings. Strongly governed firms are less responsive to bonus depreciation and demonstrate more earnings management behavior. [33]

Marginal effects of bonus depreciation on investment at different levels of Governance are presented in Table 3. As a result of bonus depreciation going from 0 to 100%, investment percentage increases by 0.097 or 28% compared to average levels for firms with Governance level two standard deviations below the mean level. For firms with Governance levels one standard deviation below the mean, bonus depreciation increases investment percentage by 16%. Investment responses for firms at the mean level of Governance and with Governance one standard deviation higher than the mean are not statistically different from zero.

Note that the estimates suggest that investment responds *negatively* to bonus depreciation for firms with very high levels of governance. This result is not consistent with the behavior of economically rational actors or with the tax policy itself. Investment response to the policy should be bounded below by zero, because not only do firms not have to respond to bonus depreciation, but they can also choose not to take bonus depreciation and, instead, write off investment using statutory MACRS schedules.[34] Therefore, there must be other factors driving the negative estimated

[33] Gompers et al. (2003) broke down the "G Index" into 5 categories: (1) tactics for delaying hostile takeovers, (2) voting rights, (3) director/officer protection, (4) other takeover defenses, and (5) state laws. The baseline regression is presented separately for each category and then for all the categories together in Appendix G. The results indicate that no one category fully determines the heterogeneous investment response to bonus depreciation, suggesting that the Governance variable is an adequate measure of the overall level of governance faced by firm managers.

[34] Knittle (2007) noted that only 55–63% of corporate investment actually claimed bonus depreciation during the 2002 to 2004 episode. The paper suggested that the low take-up rate was a product of three factors: the temporary

Table 2: Baseline Analysis, Governance Index

Dependent Variable	Capital Expenditure / Property Plant Equipment					
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Z Tax Term	0.040***	0.015	0.027*	0.013	0.177***	0.172***
	(0.010)	(0.010)	(0.015)	(0.014)	(0.033)	(0.033)
Governance					0.357***	0.396***
					(0.056)	(0.059)
Gov x Z TT					-0.043***	-0.046***
					(0.008)	(0.008)
γ_G					0.244***	0.268***
					(0.033)	(0.034)
Firms	12,932	12,047	1,944	1,915	1,944	1,915
Firm x Years	78,506	71,773	14,261	13,531	14,261	13,531

Notes: Specifications (1) through (4) present coefficients from regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 z_{it}^T + \beta_2 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}.$$

Specifications (5) and (6) include governance measures and present regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 \tau z_{it}^T + \beta_2 G_{it} + \beta_3 G_{it} \tau z_{it}^T + \beta_4 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}.$$

Specifications (2), (4), and (6) include additional controls for financial distress and cash flows. All specifications include firm and year fixed effects and marginal Q. Standard errors are clustered at the firm level and are robust to heteroskedasticity. *** indicates statistical significance at the 1% level, ** at 5%, and * at 10%.

Table 3: Investment Response Marginal Effects

Governance Level Std. From Mean	-2	-1	0	+1	+ 2
$d(I_t/K_{t-1})$	0.103***	0.057***	0.011	-0.035	-0.082***
$/d$ Z TT	(0.024)	(0.019)	(0.016)	(0.018)	(0.023)
% of mean (I_t/K_{t-1})	28%	16%	3.1%	-9.8%	-23%

Notes: Table 3 provides marginal effects estimates of the change in I_t/K_{t-1} from an increase in bonus depreciation from 0 to 100% for firms at different levels of Governance. Marginal effects are provided for firms with mean level Governance and firms with Governance ± 1 and ± 2 standard deviations from the mean. Marginal effects are derived from the regression presented in specification (6) of Table 3. *** indicates statistical significance at the 1% level.

response.

One possible explanation is that this estimation strategy may not sufficiently control for general equilibrium effects of the policy. As noted by Goolsbee (1998), investment tax incentives can affect the purchase price of capital, thereby depressing investment response to the policy. In the theoretical model, the price of investment goods should be reflected in marginal Q. Marginal Q may not sufficiently control for these general equilibrium effects. For the strongly governed firms, the tax policy does not increase the tax benefit of investment because managers care only to maximize accounting earnings. Strongly governed firms may, however, experience price increases in investment goods as a result of the policy. For strongly governed firms, there is no upside to the policy, only downside. Because governance varies significantly within industries, price increases in investment goods should not be a function of the governance level and should not effect the estimation of heterogeneous response to the policy or the relationship between corporate governance and earnings management behavior.[35]

However, due to the accounting treatment of the cost of investment, these general equilibrium effects may be unable to explain the negative responsiveness phenomena. Recall that the purchase price of new capital does not affect accounting earnings; the cost of new investment is subtracted from accounting earnings only as the newly installed capital depreciates for book purposes. Thus, firms with high levels of governance that place a large weight on accounting earnings should not benefit from the tax policy nor be as significantly affected by potential investment price shocks as firms that place less emphasis on accounting earnings.

Another possibility is that the severity of the 2008 and 2009 recession is not sufficiently captured by the model. The model does not account for supply-side financing constraints, which were significant during the height of the recession. To test this explanation, I estimate specification (6) from Table 2 using only data prior to year 2008. Marginal effects from this temporally adjusted regression are presented in Table 4. During years prior to 2008, investment was more responsive to the tax policy. Firms with mean-level Governance increased investment as a percentage of installed capital by nearly 10%. Furthermore, the investment response of the most strongly governed firms was not statistically different from zero, suggesting that financing constraints, which were the largest when bonus depreciation was at its highest level (during the sample period), may be driving the negative responsiveness among the most highly governed firms.

Overall, the baseline analysis supports the hypothesis that corporate governance induces earnings management behavior. Consistent with the hypothesis, more strongly governed firms are less responsive to bonus depreciation. Using the heterogeneous response to the policy, I estimate that

nature of the policy, significant tax losses which mitigated the policy's impact, and the non-conformity of some state tax systems to the federal policy.

[35] While Goolsbee (1998) found that investment prices increase 3.5 to 7% when investment tax credits are increased by 10%, House and Shapiro (2008) found that investment prices were unresponsive to bonus depreciation in 2001 through 2004.

Table 4: Investment Response Marginal Effects, 2000–2007

Governance Level Std. From Mean	-2	-1	0	+1	+ 2
$d(I_t/K_{t-1})$	0.103***	0.067***	0.031	0.004	-0.040
$/d$ Z TT	(0.034)	(0.028)	(0.025)	(0.026)	(0.030)
% of mean (I_t/K_{t-1})	29%	18%	10%	-1.1%	-11%

Notes: Table 4 provides marginal effects estimates of the change in I_t/K_{t-1} from an increase in bonus depreciation from 0 to 100% for firms at different levels of Governance. Marginal effects are provided for firms with mean-level Governance and firms with Governance $\pm$ 1 and $\pm$ 2 standard deviations from the mean. Marginal effects are derived from the regression presented in specification (6) of Table 3. *** indicates statistical significance at the 1% level.

a one standard deviation increase in Governance results in a nearly 27% increase in accounting earnings focus and by extension a 27% increase in earnings management behavior.

6.4 Equity Incentive Analysis

Table 5 presents estimation results using Shares as the measure of corporate governance. This additional analysis has the advantage that the Shares variable is a cardinal measure of governance and a given value of Shares means the exact same thing for two different firms.

Specifications (1) and (2) fit the linear estimating equation derived in Section 3 to the data with and without additional controls from cash flows and financial distress. The Shares x Z Tax Term coefficient can be interpreted as how much less responsive an additional percentage of ownership makes I_t/K_{t-1} to bonus depreciation. Specifications (1) and (2) suggest that Shares has no impact on investment responsiveness, and therefore managerial equity incentives have no impact on investment response to taxation, a conclusion inconsistent with the hypothesis. However, as discussed in Section 4, the managers that hold a very high percentage of equity are more likely to be owner-managers of firms and therefore face no principal–agent problems nor the need to maximize accounting earnings to signal their value. To limit biases in the results created by potential owner-managers, in specifications (3) through (6), I progressively limit the sample to managers that hold less than 20, 15, 10 and 5% of total equity.

When the sample is limited to managers who own less than 20% of total equity, an additional percentage of ownership makes managers approximately 22% less responsive to bonus depreciation. When the sample is limited further to 10%, each additional percentage of firm ownership makes managers approximately 34% less responsive to bonus depreciation. All in all, these results provide strong evidence of heterogeneous investment response to bonus depreciation and identify a potential impact of governance on earnings management behavior; the firms most responsive to bonus

Table 5: Managerial Equity Percentage Analysis

Dependent Variable	Capital Expenditure / Property Plant Equipment					
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Shares Restriction			$< 20\%$	$< 15\%$	$< 10\%$	$< 5\%$
Z Tax Term	0.032**	0.021	0.033**	0.025	0.028*	0.029
	(0.016)	(0.016)	(0.016)	(0.016)	(0.017)	(0.019)
Shares	0.009	0.014*	0.053***	0.045**	0.068***	0.109**
	(0.008)	(0.007)	(0.017)	(0.018)	(0.025)	(0.047)
Shares x Z TT	-0.001	-0.002*	-0.007***	-0.006**	-0.009**	-0.015**
	(0.001)	(0.001)	(0.003)	(0.003)	(0.004)	(0.007)
γ_S	0.041	0.090	0.222*	0.251	0.338*	0.520*
	(0.035)	(0.075)	(0.120)	(0.157)	(0.195)	(0.300)
Firms	2,348	2,300	2,263	2,234	2,189	2,080
Firm x Years	17,352	16,422	15,807	15,491	14,935	13,545

Notes: Table 5 presents regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 \tau z_{it}^T + \beta_2 S_{it} + \beta_3 S_{it} \tau z_{it}^T + \beta_4 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}.$$

Specifications (2) through (6) include additional controls for financial distress and cash flows. All specifications include firm and year fixed effects and marginal Q. Standard errors are clustered at the firm level and are robust to heteroskedasticity. *** indicates statistical significance at the 1% level, ** at 5%, and * at 10%.

depreciation are those in which the managers are the least governed and have the least strong incentives to focus on earnings instead of cash flow maximization.

As Figure 2 demonstrates, Shares and Governance are strongly correlated. Thus the Shares results do not necessarily capture a different channel of governance, but rather reinforce the Governance analysis. As Shares and Governance increase together or as the general level of shareholder discipline increases, investment response to bonus depreciation decreases. In this setting, it seems reasonable to run an empirical horse race to determine which type of governance is driving the results. Appendix F presents specifications including both Governance and Shares. The Governance variable generates a large heterogeneous investment response, while the Shares variable does not impact investment or its response. This horse race indicates that management exposure to potential shareholder discipline is more important than equity incentives in motivating accounting earnings focus and earnings management behavior.

6.5 Investment Response Summary

Investment response to bonus depreciation is heterogeneous across different levels of Governance and managerial equity percentage. A one standard deviation increase in the Governance variable results in a 27% decrease in investment response to bonus depreciation. Professional managers that own an additional one percentage point of total firm equity are 22% less responsive to bonus depreciation. This heterogeneity of investment response to bonus depreciation is in line with the intuitive theory that stronger corporate governance forces managers to focus on the most salient measure of corporate performance, accounting earnings, perhaps at a large long-term cost to shareholders.

7 Stock Price Response to Extension of Bonus Depreciation

The American Taxpayer Relief Act of 2012 (ATRA) was passed by the United States Congress on January 1, 2013, and signed into law by President Barack Obama the next day. The act partially resolved the United States "fiscal cliff" by addressing certain provisions of the Economic Growth and Tax Relief Reconciliation Act of 2001 and the Jobs and Growth Tax Relief Reconciliation Act of 2003 (known together as the "Bush tax cuts"), which had been temporarily extended by the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 but were set to expire on December 31, 2012. In a surprise move, the ATRA extended bonus depreciation at a rate of 50% through the end of 2013.[36] The fact that the extension of bonus depreciation was largely

[36] In September 2012, Gary Guenther of the Congressional Research Service published a report on bonus depreciation that concluded, Evidence indicates that the expensing allowances probably have no more than a minor effect on business investment. Citing the probable expiration of the policy, finance websites proclaimed, Buying equipment this month, rather than next, could save you on taxes (finance-commerce.com) Dont wait on those fixed asset acquisitions (www.forbes.com/sites/anthonynitti). When the provision was extended leasing and industry websites took notice. Congress also surprised many by extending the Bonus Depreciation allowance on qualified new equipment

unexpected creates a natural experiment that can be used to corroborate investment results that indicate strong corporate governance induces earnings management behavior.

To examine the impact of the surprise extension of bonus depreciation, I rely on event study methodology. To use the ATRA event study to examine the impact of governance and earnings management, I empirically address two questions. First: are abnormal returns higher for firms that, on average, invest in longer lived equipment assets, (those with on-average slower statutory depreciation rates) i.e. those who stand to gain the most from the extension of bonus depreciation? Second: are abnormal returns to the policy relatively higher for firms with weaker corporate governance? If both questions are answered in the affirmative, then the ATRA event study provides additional support that governance encourages earnings management behavior. In light of the investment response to bonus depreciation, the answers to these questions also address whether, at least in the context of bonus depreciation, the market values low governance, which allows managers to respond to the policy.

7.1 Cumulative Abnormal Returns

In order to perform an event study, abnormal returns are computed for each firms for the days after the event occurs and are multiplicatively compiled to produce cumulative abnormal returns that describe by how many percentage points a stock over- or under-performs its expected return t days after the event. I rely on the Fama-French Value Weighted Three Factor Model (Fama and French (1992), Fama and French (1993)) to generate expected returns and then compare this prediction against the actual observed stock returns to generate the abnormal and cumulative abnormal returns.[37] The cumulative abnormal return, CAR_{it}, will be the dependent variable in the fiscal cliff event study. It is defined as the Cumulative Abnormal Return for firm i, t days after

(www.teqlease.com/2013/01/08/the-fiscal-cliff-deal-saves-bonus-depreciation/) One major surprise was a generous renewal of Sec. 179 and bonus depreciation rules that have allowed high-income farm operations to shelter sizable incomes in recent years. (http://www.dtnprogressivefarmer.com). The surprise is confirmed empirically. See Figures 9 and 10.

[37]More precisely: using daily stock data from CRSP for the month prior to the passage of the ATRA, I regress the return for each firm above the risk free rate, $R_{it} - R_{ft}$, on three factors: (1) the market return over the risk-free rate $R_{mt} - R_{ft}$, (2) the value-weighted return on small firms over the value-weighted return on large firms SMB, and (3) the value-weighted return on high book-to-market value firms minus the return on low book-to-market value firms HML. The regressions produce coefficients β, γ, and δ for each firm. I then use these coefficients to predict each individual firm's performance after the passage of the ATRA. How much the firm over or underperforms this prediction during a trading day is the firm's abnormal performance, a;

$$a_{it} = \underbrace{[R_{it} - R_{ft}]}_{\text{actual}} - \underbrace{[\hat{\beta}_i(R_{mt} - R_{ft}) + \hat{\gamma}_i(\text{SMB}) + \hat{\delta}_i(\text{HML})]}_{\text{estimated}}.$$

Once the abnormal returns have been estimated, I construct Cumulative Abnormal Returns for each firm t days after the passage of ATRA 2012, CAR_{it}. The multiplicative cumulative abnormal returns are often referred to as Buy-and-Hold Abnormal Returns or BHARS. In constructing traditional CARS, one simply adds abnormal returns together. This procedure, however, is not appropriate when abnormal returns are defined in percentage points above or below predicted returns.

the passage of the ATRA. The unit of CAR_{it} is percentage points.

7.2 Dependent Variables

7.2.1 Z Tax Term

The Z Tax Term is modified slightly in this context to capture the increase in the Z Tax Term that firms experience when bonus depreciation is extended at a rate of 50%. For each industry, the Z Tax Term is now defined as

$$\text{Z Tax Term}_j = .5 + .5(\text{Deprec}_j) - \text{Deprec}_j$$

where Deprec is the present value of tax allowances under MACRS and in absence of the extension. In the regression analysis, this variable is scaled by its standard deviation for ease of interpretation. The Z Tax Term is larger when firms stand to gain more from the tax policy. The sign of the coefficient on this variable will depend on whether investors value only accounting earnings or a combination of accounting earnings and real economic value (cash flow, in the model). If investors care only about accounting earnings, then the tax policy will not benefit them, and cumulative abnormal returns should be unrelated to the Z Tax Term variable. If, however, investors value real economic earnings, then returns should be higher for firms with higher Z Tax Terms and the coefficient should be positive in the days after the passage of ATRA 2012.

7.2.2 Entrenchment

I use Entrenchment as defined in Section 4 as the governance measure in the fiscal cliff event study. Entrenchment is used in this analysis because the data necessary to construct the Governance variables is not available in recent years.[38] The mean level of Entrenchment is 3.61. There is no reason that the level of governance within the firm should have any effect on cumulative abnormal returns after the passage of ATRA 2012.

7.2.3 Z Tax Term x Entrenchment

The interaction term specifies the heterogeneity of stock price response to the surprise extension across firms with varying levels of governance. If investors place value on real economic profits, then

[38] How the IRRC records these 6 provisions changed in 2007, so the Entrenchment index that I construct for the event study analysis is not directly comparable the Entrenchment variable from years prior to 2007. Median and mean Entrenchment measures are similar between the 2000–2010 sample and the 2011 sample. Percentages of each provision are also comparable, despite the changes in IRRC reporting standards. The Entrenchment measure as I have constructed it here is one point higher if the firm does not have a provision specifying staggered appointment of board members, if the firm does not need a supermajority to amend the charter, does not need a supermajority to amend firm bylaws, does not need a supermajority to approve mergers, does not have poison pills, or does not have golden parachutes.

they should value not only the policy itself, but also low governance levels, which allow managers to respond to the policy. Again, the sign on the coefficient depends on whether or not investors value only accounting earnings or a combination of accounting earnings and cash flow. If investors value only accounting earnings, then the coefficient on the interaction term should be zero. If, however, investors place some value on cash flows, then investors would prefer managers that are able to respond to the policy, i.e., those in firms with low governance levels. If this is the case, then investors value high Z Tax Terms and low Entrenchment, and cumulative abnormal returns should be negatively related to the interaction variable.

7.3 Event Study Results

Table 7 presents the event study results.[39] Each column represents a separate regression as the dependent variable evolves from cumulative abnormal returns 1 day after passage ATRA 2012 to 6 days after the passage of ATRA 2012. The dependent CAR variable is regressed on the governance measure, Entrenchment, the present value of statutory tax depreciation allowances, Deprec, and the interaction of the two variables.[40] Looking across the table from left to right, the reader can see how the effect of governance, potential benefit from the extension of bonus depreciation, and the interaction of the two are related to cumulative abnormal returns over time.

The event study results suggest that investors value not only bonus depreciation, but also low levels of governance, which allow firms to respond to the tax policy. The Z Tax Term coefficient is positive and statistically different from zero 2, 3, and 4 days after the passage of ATRA 2012. These results indicate that abnormal returns are higher for firms with lower MACRS depreciation rates – those firms that stand to benefit from the extension from a cash flow perspective. Cumulative abnormal returns after the passage of ATRA 2012 indicate that investors value bonus depreciation.

The coefficient on the interaction of the Z Tax Term and Entrenchment is negative and statistically different from zero 2, 3, 4, and 5 days after the passage of ATRA 2012, suggesting that for firms that stand to gain from bonus depreciation, those with low values of governance, are valued by investors. Consistent with our hypothesis, abnormal returns are the highest for firms that should respond to bonus depreciation (those with high Z Tax Terms) and for those that do respond to the policy (those with low governance measures). Taken together, this evidence suggests that, in the context of bonus depreciation, strong governance, which places managerial focus on accounting earnings and limits the firms ability to respond to the extension of the policy, is value decreasing. An alternative way to view these results is that investors do not value strong governance, in

[39] Appendix M presents two placebo event studies. Using the estimated parameters from the Fama French Value-Weighted Three Factor Model, I produce CARs beginning on December 10, 2012, and then again for January 15, 2013. No coefficients from either event study are estimated to be statistically different from 0 at the 95% level. In the December 10 placebo, the Deprec coefficient does have a positive coefficient different from zero at the 90 percent level.

[40] Cash flows are included in all regressions to control for firms' ability to respond to bonus depreciation.

Table 6: American Taxpayer Relief Act 2012 Event Study Results

Dependent Variable	CAR_1	CAR_2	CAR_3	CAR_4	CAR_5	CAR_6
Entrenchment	-0.049	-0.043	-0.031	-0.095	-0.075	-0.031
	(0.102)	(0.096)	(0.118)	(0.127)	(0.147)	(0.176)
Z TT	0.000	0.448**	0.644***	0.429**	0.361	0.095
	(0.322)	(0.187)	(0.168)	(0.176)	(0.222)	(0.292)
Entrenchment x Z TT	-0.251	-0.411***	-0.457**	-0.465**	-0.320	-0.186
	(0.211)	(0.149)	(0.183)	(0.177)	(0.214)	(0.248)
Observations	1,189	1,189	1,189	1,189	1,189	1,189

Table 6 presents results for regressions of the form

$$CAR_t = \beta_0 + \beta_1 \text{ [Entrenchment]} + \beta_2 \text{ [Deprec Rate]} + \beta_3 \text{ [Entrenchment X Deprec Rate]}$$

CAR_t is the cumulative abnormal return t trading days after the American Taxpayer Relief Act of 2012 was signed into law on January 1, 2013. Controls for cash flow are included in each regression. Standard errors are robust to heteroskedasticity. *** indicates statistical significance at the1 % level, ** at 5%, and * at 10%.

the context of bonus depreciation, because it induces earnings management behavior and limits response to the tax policy; earnings management behavior is this setting is value decreasing.

I focus on the third column of Table 6 to examine the magnitude of the point estimates. Three days after the passage of ATRA 2012, a one standard deviation decrease in the present value of Z Tax Term results in a 0.644 percentage point over-performance. The coefficient on the interaction term is equal to -0.457. The interpretation of this estimate is that for a firm whose benefit from the policy is one standard deviation above the mean, a one standard deviation decrease in governance increases cumulative abnormal return by an additional 0.457 percentage points. These estimates are consistent with back-of-the envelope calculations that utilize results from the investment response analysis; details are provided in Appendix K.

Marginal effects of an additional standard deviation Z Tax Term are presented across various levels of governance in Table 7. When governance levels are low and the firm is responsive to bonus depreciation (as determined in the investment analysis), the extension of the bonus has a large impact on abnormal returns. However, when governance measures are high, the effect of the bonus on abnormal returns is not statistically different from zero. Again, bonus depreciation is valued by

Table 7: Cumulative Abnormal Returns Marginal Effects

Governance Level Std. From Mean	-2	-1	0	+1	+ 2
$d(CAR_3)$	1.558***	1.101***	0.644***	0.187	-0.267
$/d$(Z TT)	(0.466)	(0.305)	(0.181)	(0.190)	(0.321)

Notes: Table 7 provides marginal effects estimates of the change in cumulative abnormal returns 3 days after the passage of ATRA 2012 resulting from a one standard deviation increase in depreciation rates. Marginal effects are provided for firms with mean level Governance and firms with Governance ± 1 and ± 2 standard deviations from the mean. Marginal effects are derived from the regression presented in column 3 of Table 7. *** indicates statistical significance at the 1% level.

the market, and the value of the policy is larger among those firms with low levels of governance, who will potentially be most responsive to the policy.

7.4 Visual Representation of Event Study Results

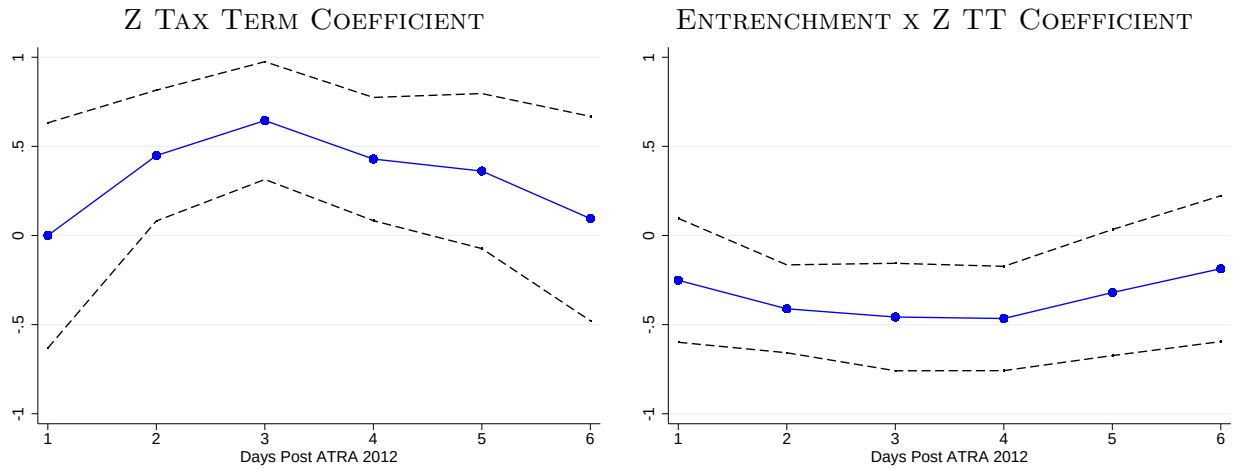
Figure 5 presents the event study results from Table 7 visually. Each data point represents a coefficient from a different regression where the CAR dependent variable is changing over time. The dotted lines represent lower and upper bounds predicted with 95% confidence. From the visual representation of the regression results, one may observe that the Deprec coefficient is negative and statistically different from zero 2, 3, and 4 days after the passage of ATRA 2012. Figure refeventstudy shows that the interaction coefficient is positive and statistically different from zero 2, 3, 4, and 5 days after the passage of ATRA 2012.

One concern with these results in that they are driven by pre-trends and not a product of the event. To address these concerns, Figures 6 presents CARs that are constructed beginning 5 days prior to the passage of ATRA 2012. The disadvantage of constructing CARs that begin prior to the event is that additional variation unrelated to the event is introduced.

Cumulative abnormal returns are close to zero (and not statistically different from zero) in the days prior to the event, confirming that the event was a surprise. Upon impact, the Z Tax Term Deprec coefficient increases and the interaction coefficient decreases substantively. The magnitude of the point estimates in the days after the event is very close to coefficients depicted in Figure 5. Pre-trends are not driving the event study results.

While the Z Tax Term coefficient remains statistically different from zero 1, 2, and 3 days after passage of ATRA 2012, the interaction coefficient does not. Again, the decrease in the precision of the estimate is due to increased variance in the CARs. Because abnormal returns are uncorrelated with the interaction term in days prior to the event, additional variance is introduced into the

Figure 5: Event Study Coefficients



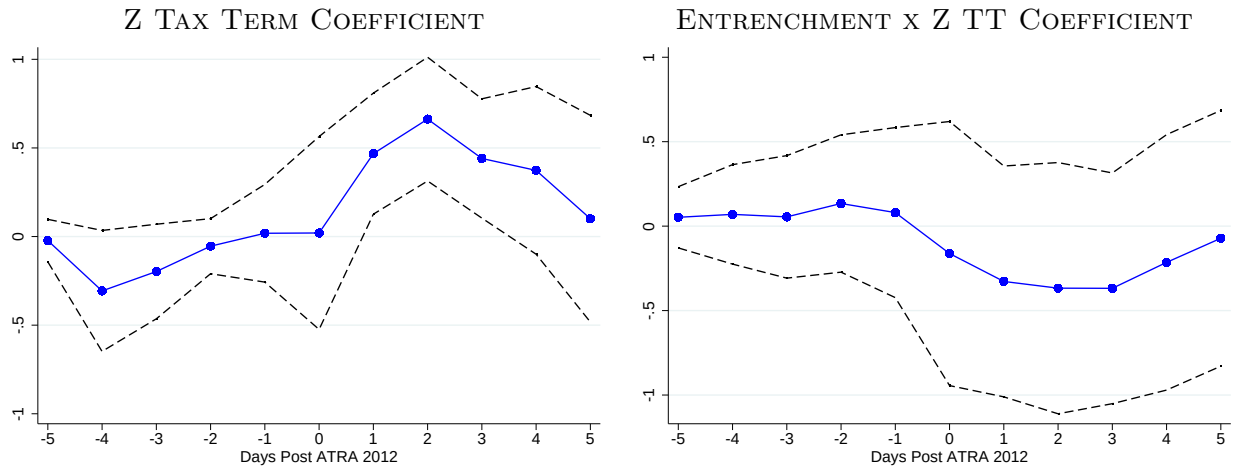
Note: Figure 5 graph regression coefficients on Deprec and Entrenchment x Deprec. Each data point is from a different regression where the dependent variable, cumulative abnormal return, changes with the number of days after the passage of ATRA 2012. 95% confidence bands are shown in blue. The Deprec coefficient can be interpreted as how much higher the cumulative abnormal return is in percentage points when a firm's statutory tax depreciation rates increase by one standard deviation relative to the average. The Entrenchment x Deprec coefficient can be interpreted as how much larger the Deprec coefficient is when the governance measure increases by one standard deviation relative to mean.

construction of CARs in days after the event and as a result the standard errors increase. Due to this increased variance unrelated to the event itself, CARs constructed beginning only on the date of the event are typically used to estimate the impact of the policy.

7.5 Fiscal Cliff Event Study Summary

Firms that invest in longer-lived equipment assets and stand to gain the most from bonus depreciation have higher than average cumulative abnormal returns following passage of ATRA 2012. A one standard deviation decrease in statutory tax depreciation rates results in more than a one-half percentage point higher cumulative returns 3 days after passage. Cumulative abnormal returns are relatively higher for firms with low levels of governance. The event study results suggest that investors value bonus depreciation and firms that have traditionally been most responsive to the policy, those with low levels of governance with low incentives to focus on accounting earnings or engage in earnings management behavior. In the context of bonus depreciation, earnings management behavior, a product of aggressive corporate governance, is value decreasing.

Figure 6: Event Study Coefficients with Pre-Trends



Note: Figure 6 graphs regression coefficients on Deprec and Entrenchment x Deprec. Each data point is from a different regression where the dependent variable, cumulative abnormal return, changes with the number of days after the passage of ATRA 2012. 95% confidence bands are shown in blue. The Deprec coefficient can be interpreted as how much higher the cumulative abnormal return is in percentage points, when a firm's statutory tax depreciation rates increase by one standard deviation relative to the average. The Entrenchment x Deprec coefficient can be interpreted as how much larger the Deprec coefficient is when the governance measure increases by one standard deviation relative to mean.

8 Conclusion and Implications for Governance and Policy

The accounting treatment of bonus depreciation makes possible the identification of earnings management behavior, in which managers distort firm activities in order to manipulate accounting earnings. Inaction in the face of bonus depreciation is consistent with the type of earnings management documented by Graham et al. (2005), in which managers may sacrifice positive NPV investment projects in order to meet earnings targets. This research has documented that this earnings management behavior is concentrated among firms with strong corporate governance and is the first to confirm that, as hypothesized by Stein (1989), stronger corporate governance forces managers to focus on maximizing current accounting earnings at the expense of long-run real economic benefit. Stock price responses to the passage of The American Taxpayer Relief Act of 2012 suggest that earnings management behavior is both concentrated among strongly governed firms and is value decreasing in the context of bonus depreciation.

These findings have potential implications for the role of corporate governance and for the use of bonus depreciation. Shareholders should be aware that equity incentives or the threat of takeover may induce earnings management and should take this cost into effect when making governance decisions. Trends in corporate governance suggest that perhaps shareholders are already aware of these costs and are insulating managers to avoid them. Gompers et al. (2003) documented a slow-moving trend towards less corporate governance as a result of the firms enacting provisions

that limit the reach of shareholders. If shareholders choose to enact these policies optimally, then the benefits of these policies must outweigh the costs. The cost of these provisions is that they may exacerbate principal–agent problems. The benefits are less clear. However, this research has identified that lower levels of governance and less shareholder discipline may allow managers to focus on economic value maximization, as opposed to accounting earnings. If shareholders understand this connection and its potentially large distortionary consequences, then the need to limit earnings management may be driving trends towards managerial entrenchment.

The documented heterogeneous investment response among firms with varying levels of governance explains why bonus depreciation has been less effective than many had believed it would be. Firms with low levels of shareholder oversight and lower incentives for earnings management behavior are very responsive to the policy. This indicates that the policy would have been more effective were it not for the accounting treatment of tax depreciation allowances.

That the policy was less effective at increasing investment during the recessions of 2001 and 2008 is unfortunate. This heterogeneous response may be extra unfortunate from a welfare perspective. The firms that have been observed to be the most responsive to the policy are those with low levels of shareholder control. These are also the firms with the most significant separation of ownership and control. Previous research has shown that weakly governed managers are most likely to make decisions that are not in the best interests of shareholders with respect to financing, payout policy, and merger behavior. If the least-efficient firms are the most responsive, the macroeconomic stimulus aspect of the policy is doubly dubious: for the average firm, bonus depreciation is relatively ineffective at stimulating investment; and the subpopulation of firms that is responsive is composed of corporations that may make investment decisions not in the best interest of shareholders.

On the other hand, the heterogeneous investment response uncovered in this paper may provide evidence that the policy is more effective than previously believed and may have an unintended progressivity born of its accounting treatment. Given that the most responsive firms are those that focus the least on earnings management, then private firms, which have no reason to engage in earnings management, may be more responsive to bonus depreciation than the publicly traded firms under study in this research. This possibility, if true, would have three important implications. First, if private firms are more responsive to bonus depreciation, then estimates of the effect of bonus depreciation on investment using only publicly traded firms may underestimate the true impact of the policy.[41] Second, private firms have ostensibly less separation of ownership and control (or at least have large block holding owners) and therefore may make more efficient investment decisions than the poorly governed but very responsive publicly traded firms. Finally, because private firms tend to be smaller, the policy may have an aspect of built-in progressivity, perhaps making the policy extra appealing from an equity standpoint.

[41] Zwick and Mahon (2014) document that small, financially constrained firms are, indeed, more responsive to bonus depreciation.

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Appendix A Derivation of Investment Behavior Equation

The firm solves,

$$\max_{I_t} \int_0^\infty e^{-rt}[\alpha AE_t + (1-\alpha)CF_t]$$

subject to

$$\begin{aligned}
\dot{K}_t &= I_t - \delta K_t \\
\dot{K_t^T} &= pI_t - \delta^T K_t^T \\
\dot{K_t^B} &= pI_t - \delta^B K_t^B.
\end{aligned}$$

The Hamiltonian:

$$\begin{aligned}
\mathcal{H} = \int_0^\infty e^{-rt}[&\alpha[(1-\tau)[F(K_t) - p\psi(I_t, K_t) - \delta^B K_t^B]] \\
&+ (1-\alpha)(1-\tau)[F(K_t) - p\psi(I_t, K_t)] + \tau\delta^T K_t^T - pI_t]]dt \\
&- \int_0^\infty \lambda_t(\dot{K}_t - I_t + \delta K_t)dt \\
&- \int_0^\infty \lambda_t^B(\dot{K_t^T} - pI_t + \delta^T K_t^T)dt \\
&- \int_0^\infty \lambda_t^T(\dot{K_t^B} - pI_t + \delta^B K_t^B)dt. \qquad (6)
\end{aligned}$$

The first order conditions are:

$$0 = \frac{\partial \mathcal{H}}{\partial I_t} = e^{-rt}pITC - e^{-rt}(1-\tau)p\psi_I I_t, K_t + \lambda_t + p\lambda_t^B + p\lambda_t^T, \qquad (7)$$

$$0 = \frac{\partial \mathcal{H}}{\partial K_t} = e^{-rt}(1-\tau)[F_K(K_t) - p\psi_K(I_t, K_t)] + \dot{\lambda}_t - \lambda_t\delta, \qquad (8)$$

$$0 = \frac{\partial \mathcal{H}}{\partial K_t^B} = e^{-rt}\alpha(\tau-1)\delta^B + \dot{\lambda_t^B} - \lambda_t^B\delta^B, \qquad (9)$$

$$0 = \frac{\partial \mathcal{H}}{\partial K_t^T} = e^{-rt}(1-\alpha)\tau\delta^T + \dot{\lambda_t^T} - \lambda_t^B\delta^T. \qquad (10)$$

Solving for the shadow value of an additional dollar's worth of book and tax capital respectively in the steady state yields:

$$\lambda_t^B = \alpha(\tau-1)e^{-rt}\frac{\delta^B}{r+\delta^B} \text{ and} \qquad (11)$$

$$\lambda_t^T = (1-\alpha)\tau e^{-rt}\frac{\delta^T}{r+\delta^T}. \qquad (12)$$

For ease of notation, I define z^B and z^T as the present values of future depreciation allowances for book and tax purposes, respectively,

$$z^B = \int_0^\infty e^{-rs}\delta^B e^{-\delta^B s}\frac{\delta^B}{r+\delta^B}$$
$$z^T = \int_0^\infty e^{-rs}\delta^T e^{-\delta^T s}\frac{\delta^T}{r+\delta^T}.$$

Plugging (8) and (9) into (4) and solving for the derivative of the adjustment cost function, λ_I, yields the investment behavior equation,

$$\psi_I = \frac{\frac{\lambda_0}{p_0} - ((1-\alpha) + \alpha z^B - \tau[(1-\alpha)z^T + \alpha z^B] - ITC}{1-\tau}.$$

Appendix B Investment Control Variables

The marginal value of an additional dollar of investment (marginal Q), is measured as the ratio of the market value of equity plus the book value of liabilities excluding deferred taxes, divided by the book value of assets,

$$Q_t = \frac{\text{prcc}_t \times \text{csho}_t + \text{at}_t - \text{ceq}_t + \text{txdb}_t}{\text{at}_t},$$

Where prcc is the price of outstanding shares, csho is the number of outstanding shares, at is total assets, ceq is outstanding equity and txdbt is the differed tax liabilities.

Measures of cash flow and financial distress are constructed following Kaplan and Zingales (1997). "Cash Flow/PPE" is defined as

$$\text{Cash Flow}_t = \frac{\text{ib18}_t + \text{dp14}_t}{\text{ppent8}_{t-1}}.$$

This ratio is the income before extraordinary items plus depreciation and amortization, scaled by the capital stock at the beginning of the year.

The HP Index (Hadlock and Pierce (2010)) measures financial constraint as

$$\text{HP Index} = -0.737 * \text{size} + 0.043 * \text{size}^2 - 0.04 * \text{age}$$

where size $= \min\{\text{assets in 2004 dollars}, \$4.5 \text{ billion}\}$ and
age $= \min\{\text{years on Compustat tapes}, 37\}$.

Appendix C Bonus Depreciation Legislation

- The Job Creation and Workers Assistance Act of 2002 enacted 30% bonus depreciation for property placed into service after September 10, 2001.
- The Jobs and Growth Tax Relief Reconciliation Act of 2003 increased the bonus level to 50% for property placed into service after May 5, 2003, and before January 1, 2005.
- Bonus depreciation expired December 31, 2004.
- The Economic Stimulus Act of 2008 reintroduced the bonus depreciation at a 50% rate for capital placed into service after January 1, 2008.
- American Recovery and Reinvestment Act of 2009 extended the bonus at the 50% rate through 2009.
- The Small Business Jobs and Credit Act of 2010 further extended the depreciation at the same rate through 2010. However, SBJCA was not signed into law until September 27, 2010, so for the majority of 2010 businesses may have been under the impression that the bonus depreciation might not be available on new capital expenditure.
- The Tax Relief and Unemployment Insurance Reauthorization and Job Creation Act of 2010 (signed on December 17, 2010) raised the bonus rate to 100% for property placed into service after September 8, 2010, and before January 1, 2012. Property placed into service during 2012 garnered the 50% bonus.
- The American Taxpayer Relief Act of 2012 extended bonus depreciation at a rate of 50% for 2013.

Appendix D Entrenchment Investment Analysis

Appendix C presents key results using "Entrenchment" as defined in Section 5.1.2. During the full sample of years, firms with the lowest measures of governance and average rates of statutory tax depreciation increase their investment percentage by 7.5 percentage points when bonus depreciation increases from 0 to 100%. A one standard deviation increase in Bebchuk decreases investment responsiveness by 27%. Results are similar when the sample is restricted to years 2000–2006.

Table 8: Entrenchment Investment Analysis

Dependent Variable	Capital Expenditure / Property Plant Equipment					
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Z Tax Term	0.027*	0.013	0.077***	0.069**	0.123***	0.123***
	(0.015)	(0.014)	(0.028)	(0.028)	(0.034)	(0.034)
Entrench			0.161***	0.171***	0.236***	0.258***
			(0.052)	(0.055)	(0.063)	(0.064)
Entrench x Z TT			-0.019**	-0.020**	-0.030***	-0.032***
			(0.008)	(0.008)	(0.009)	(0.009)
γ_B			0.239***	0.267***	0.203***	0.203***
			(0.044)	(0.056)	(0.051)	(0.055)
Firms	1,944	1,915	1,619	1,594	1,576	1,547
Firm x Years	14,261	13,531	12,364	11,746	8,122	7,695

Notes: Specifications (1) and (2) present coefficients from regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 z_{it}^T + \beta_2 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}$$

for the governance subsample. Specifications (3) through (6) include governance measures and present regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 z_{it}^T + \beta_2 E_{it} + \beta_3 E_{it} z_{it}^T + \beta_4 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}.$$

Specifications (2), (4), and (6) include additional controls for cash flows and financial distress. The time period for specifications (1) through (4) is the years 2000–2010. Specifications (5) and (6) focus on years 2000–2006. γ_G represents how much less responsive a firm is to the bonus depreciation when the Entrenchment measure of governance is increased one standard deviation relative to the mean. All specifications include marginal Q and firm and year fixed effects. Standard errors are clustered at the firm level and are robust to heteroskedasticity. *** indicates statistical significance at the 1% level, ** at 5%, and * at 10%.

Appendix E Investment Analysis Robustness to Interpolation

Appendix E addresses Governance imputation concerns. In (1) analysis is limited to years prior to 2007, when the method of interpolation used to construct the governance measure is least likely to skew results. In (2), Governance measures for 2001, 2003, and 2005, are interpolated by average Governance in the two closest years. 2007, 2008, 2009, and 2010 data are extrapolated from 2000 to 2006 trends in the observed measure. (3) limits analysis using average interpolation to years 2000–2006 to allay concerns that data imputation using trends are driving results. In (4) the average Governance measure is used. Heterogeneous investment response to bonus depreciation is present and of similar magnitude in all results.

Table 9: Robustness to Interpolation

Dependent Variable	Cap Ex / PPE			
Specification	(1)	(2)	(3)	(4)
Z Tax Term	0.197***	0.160***	0.197***	0.124***
	(0.050)	(0.031)	(0.050)	(0.026)
Governance	0.358***	0.342***	0.358***	
	(0.076)	(0.054)	(0.076)	
Gov x Z TT	-0.042***	-0.041***	-0.042***	
	(0.011)	(0.008)	(0.011)	
$\overline{\text{Gov}}$ x Z TT				-0.036***
				(0.006)
γ_G	0.212***	0.314***	0.194***	0.290
	(0.031)	(0.067)	(0.063)	(0.027)
Firms	1,873	1,972	1,932	1,917
Firms x Years	9,257	13,131	8,684	16,859

Notes: Specifications (1) through (3) present coefficients from regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 z_{it}^T + \beta_2 G_{it} + \beta_3 G_{it} z_{it}^T + \beta_4 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}.$$

Specification (1) uses the Governance variable as defined in Section 5.1.1, but limits the analysis to years 2000 to 2006. Specifications (2) and (3) use Governance constructed by interpolating the measure for year 2001, 2003, 2005, and years 2007–2010. Specification (2) uses data for years 2000 to 2010; the time period is limited to years 2000–2006 in Specification (3). γ_B represents how much less responsive a firm is to the bonus depreciation when the Governance measure of governance is increased one standard deviation relative to the mean. All specifications include controls for marginal Q, cash flows, and financial distress and firm and year fixed effects.

Appendix F Governance and Shares Analysis

Appendix F presents specifications with both Governance and Shares variables and their interactions with the Z Tax Term. Specifications (2) through (6) progressively limit analysis to firms that are more likely to have professional managers.

Table 10: Baseline Analysis 2000–2010, Managerial Equity Percentage

Dependent Variable	Capital Expenditure / Property Plant Equipment					
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Shares Restriction			< 20%	< 15%	< 10%	< 5%
Z Tax Term	0.155***	0.150***	0.159***	0.152***	0.166***	0.153***
	(0.031)	(0.031)	(0.032)	(0.032)	(0.034)	(0.036)
Governance	0.315***	0.321***	0.324***	0.323***	0.334***	0.310***
	(0.054)	(0.056)	(0.057)	(0.058)	(0.060)	(0.064)
Gov x Z TT	-0.039***	-0.040***	-0.040***	-0.040***	-0.042***	-0.040***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Shares	-0.000	-0.003	0.023	0.008	0.041*	0.070
	(0.006)	(0.006)	(0.016)	(0.018)	(0.024)	(0.044)
Shares x Z TT	0.000	0.000	-0.003	-0.001	-0.006	-0.010
	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)	(0.007)
Firms	1,619	1,592	1,571	1,557	1,526	1,453
Firms x Years	12,364	11,926	11,535	11,348	10,992	10,071

Notes: Table 5 presents regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 \tau z_{it}^T + \beta_2 G_{it} + \beta_3 G_{it} \tau z_{it}^T + \beta_3 S_{it} + \beta_4 S_{it} \tau z_{it}^T + \beta_5 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}.$$

Specifications (2) through (6) include additional controls for financial distress and cash flows. All specifications include firm and year fixed effects. Standard errors are clustered at the firm level and are robust to heteroskedasticity. *** indicates statistical significance at the 1% level, ** at 5%, and * at 10%.

Appendix G Decomposing the Governance Index

In Appendix G, the effect of Governance Sub-Indexes are analyzed separately.

Table 11: Decomposing the Governance Index

Dependent Variable	Capital Expenditure / Property Plant Equipment					
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Z Tax Term	0.050	-0.013	0.117***	0.118***	0.221***	0.379***
	(0.043)	(0.018)	(0.023)	(0.029)	(0.042)	(0.061)
Voting	0.062					0.092
	(0.059)					(0.059)
Voting x ZTT	-0.009					-0.013
	(0.008)					(0.008)
Delay		-0.108*				-0.213***
		(0.057)				(0.066)
Delay x ZTT		0.016**				0.030***
		(0.008)				(0.009)
Protection			0.400***			0.319***
			(0.059)			(0.059)
Protection x ZTT			-0.052***			-0.041***
			(0.008)			(0.008)
State				0.148***		0.118***
				(0.034)		(0.034)
State x ZTT				-0.022***		-0.018***
				(0.005)		(0.005)
Other					0.524***	0.454***
					(0.088)	(0.103)
Other x ZTT					-0.065***	-0.056***
					(0.012)	(0.014)

Notes: Specifications (1) through (5) present coefficients from regressions of the form:

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 z_{it}^T + \beta_2 G_{it} + \beta_3 G_{it} u z_{it}^T + \beta_4 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}.$$

Specification (6) includes all sub-indexes and their interaction with the Z Tax Term. All specifications include marginal Q and firm and year fixed effects. Standard errors are clustered at the firm level and are robust to heteroskedasticity. *** indicates statistical significance at the 1% level, ** at 5%, and * at 10%. $i = 1,911$, $i \times t = 13,704$.

Appendix H Standard Errors Clustered On Industry

In Appendix H, the baseline analysis is repeated with standard errors clustered by industry to alleviate concerns that correlation in errors is at the industry, and not the firm level.

Table 12: Baseline Analysis SE clusered by Industry

Dependent Variable	Capital Expenditure / Property Plant Equipment					
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Z Tax Term	0.040**	0.015	0.027	0.017	0.177***	0.160***
	(0.018)	(0.016)	(0.023)	(0.021)	(0.033)	(0.052)
Governance					0.357***	0.342***
					(0.056)	(0.092)
Gov x Z TT					-0.043***	-0.041***
					(0.008)	(0.012)
γ_G					0.244***	0.259***
					(0.033)	(0.034)
Firms	12,932	12,047	1,944	1,911	1,944	1,911
Firms x Years	78,506	71,773	14,261	13,704	14,261	13,704

Notes: Specifications (1) and (2) present coefficients from regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 z_{it}^T + \beta_2 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}$$

for the governance subsample. Specifications (3) through (6) include governance measures and present regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 z_{it}^T + \beta_2 G_{it} + \beta_3 G_{it} z_{it}^T + \beta_4 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}.$$

Specifications (2), (4), and (6) include additional controls for cash flows and financial distress. The time period for specifications (1) through (4) is the years 2000–2010. Specifications (5) and (6) focus on years 2000–2006. γ_G represents how much less responsive a firm is to the bonus depreciation when the Governance is increased by one standard deviation relative to the mean. All specifications include marginal Q and firm and year fixed effects. Standard errors are clustered at the firm level and are robust to heteroskedasticity. *** indicates statistical significance at the 1% level, ** at 5%, and * at 10%.

Appendix I Industry x Year Fixed Effects

One concern in identifying the heterogeneous investment response to bonus depreciation is that Governance levels may be higher for the least responsive industries, those with the fastest statutory tax depreciation rates. To alleviate concerns, I include industry-year fixed effects to identify heterogeneous response within industries. Because the Z Tax Term is identified exclusively from differences across industries over time, it is perfectly collinear with the industry-year fixed effects and is dropped when industry-year fixed effects are included for the 123 BEA industries as in specifications (1) and (2). In specifications (3) and (4) industry-year fixed effects are included for industries defined by 2-digit NAICS codes. Heterogeneous investment response to bonus depreciation is present in all specifications.

Table 13: Including Industry-year Fixed Effects

Dependent Variable	Cap Ex / PPE			
Specification	(1)	(2)	(3)	(4)
Z Tax Term			0.108***	0.094***
			(0.034)	(0.033)
Governance	0.192***	0.183***	0.288***	0.282***
	(0.040)	(0.040)	(0.055)	(0.054)
Governance x ZTT	-0.020***	-0.018***	-0.033***	-0.033***
	(0.005)	(0.005)	(0.008)	(0.008)
$Q/(1-\tau)$	0.020***	0.017***	0.028***	0.024***
	(0.006)	(0.005)	(0.006)	(0.005)
Additional Controls		✓		✓
Firms	1,944	1,911	1,944	1,911
Firms x Years	14,261	13,704	14,261	13,704

All specifications present regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 z_{it}^T + \beta_2 G_{it} + \beta_3 G_{it} z_{it}^T + \beta_4 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}.$$

All specifications include firm and year fixed effects. Specifications (1) and (2) include Industry x Year FE for the BEA Industries. Specifications (3) and (4) include Industry x Year FE for the industries defined by 2 digit NAICS industries. Additional controls include Cash Flows and Financial Distress. Standard errors are clustered at the firm level and are robust to heteroskedasticity. *** indicates statistical significance at the 1% level, ** at 5%, and * at 10%.

Appendix J Taxable Status and Investment Response

Firms that have tax loss carry-forwards should be unresponsive to bonus depreciation. If firms are strongly governed because they have performed poorly in the past, then the most strongly governed firms are likely to have tax loss-carry-forwards and should be unresponsive to bonus depreciation. In this case, empirical analysis excluding measures of tax status would show that strongly governed firms are less responsive to bonus depreciation. To alleviate concerns of this nature, I include three different measures of tax status and tax status interacted with the Z Tax Term to baseline regressions.

$\mathbb{1}$(TLCF) The first measure of taxable status is an indicator for whether the firm has any tax loss carry-forwards. The variable is equal to 1 when the firm reports a positive number of tax loss carry-forwards. The indicator is equal to zero if the firm reports 0 tax loss carry forwards or if the value is missing but the firm reports a positive number for Property Plant and Equipment. When the indicator is turned on, firms should be less responsive to bonus depreciation.

TLCF The second measure of taxable status is the level of tax loss carry-forwards reported by the firm. The variable is set equal to zero if the value is missing but the firm reports a positive number for Property Plans and Equipment. When firms have more tax loss carry-forwards, they should be less responsive to bonus depreciation. I scale this variable to be a number between 0 and 100.

MTR The third measure of taxable status is a simulated marginal tax rate constructed by Blouin, Core and Guay (2010). I use the marginal tax rate after interest deductions have been accounted for. When this number is higher, firms should be more responsive to bonus depreciation. The simulated tax rates take on values between 0 and 1.

I perform analysis using both contemporaneous taxable status measure and once-lagged measures to control for potential endogenous. Odd-numbered specifications reported below use the contemporaneous tax status measure. Even-numbered specifications use the lagged tax status.

The results of the tax-status analysis continue to show substantial heterogeneity in investment response to bonus depreciation. The magnitude of the heterogeneity is similar to the magnitude of the heterogeneity in the baseline results. The regression analysis also indicates that taxable status plays a role in determining investment response to bonus depreciation. Specification (1) results suggest that firms that have tax loss carry-forwards are more than 50% less responsive to bonus depreciation. Specification (5) results suggest that a 10% increase in simulated marginal tax rates makes firms approximately 50% more responsive to bonus depreciation.

Appendix K Reconciling Investment and Event Study Results

This appendix uses investment response results to predict stock market price responses to the 50% bonus deprecation extension analyzed in Section 7.

- Using results from the investment response analysis, the effect extension of bonus depreciation at a rate of 50% can be calculated. According the the investment response results, for a firm with the average level of governance, investment does not respond to bonus depreciation. For the average firm, the benefit of bonus depreciaiton comes exclusively from decreases in the net present value costs of investment. For a firm with mean Deprec, 50% bonus decreases NPV investment price by \$0.21. For the average firm in the sample, this amounts to a decrease of \$6.573 million and results in a net income of 2.08%. For a firm that invests in longer-lived equipment and has Deprec one standard deviation below the mean, the cost of investment decreases by \$0.035 per dollar which decreases the cost of investment by \$10.995 million and increases income by 3.47%. Under the overly-simple assumption that income is a perfect proxy for firm value, upon announcement of 50% bonus depreciation, the value of firms that have one standard deviation lower Deprec should increase by 1.39% more than firms with mean Deprec levels. This is the exact interpretation of the Deprec coefficient in the event study analysis. The event study analysis found this number to be 0.644%.

- As the level of governance decreases, bonus depreciation is more effective at stimulating investment. While the firm with mean levels of governance does not increase investment in response to bonus deprecation, a firm with governance one standard deviation below the mean increases investment percent by 2.85% in response to 50% bonus depreciation. This increase is equivalent to \$8.921 million in additional investment. Using marginal Q to translate investment into firm value, this investment response increases the value of the less-governed firm by \$25.38 million or 0.46% of the value of the average firm in the sample. The event study analysis concludes firm values with governance levels one standard deviation below the mean experience abnormal returns of 0.457 % more than firms with mean governance levels.

Appendix L Investment Impact of ITC Repeal

In this section, I test a secondary hypothesis of the theoretical model presented in Section 4. The model predicts that while investment response should be heterogeneous to bonus depreciation via the Z Tax Term, investment should not be heterogeneous in response to investment tax credits, which affect both flows and accounting earnings;

$$\frac{\partial I/K}{\partial ITC} = \frac{1}{1-\tau} \qquad \frac{\partial I/K}{\partial \tau z^T} = \frac{1-\alpha}{1-\tau}.$$

If, in fact, investment response to ITC is not heterogeneous across firms with varying levels of governance, then there is additional evidence that bonus depreciation take-up is limited due to its accounting interactions and that bonus depreciation is a nice natural experiment to test for the relationship between governance and earnings management.

To test the theory, I will run regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 \frac{ITC_{it}^T}{1-\tau_t} + \beta_2 \frac{\tau z_{it}^T}{1-\tau_t} + \beta_3 \frac{G_{it} ITC_{it}^T}{1-\tau_t} + \beta_4 \frac{G_{it} \tau z_{it}^T}{1-\tau_t} + \beta_5 \frac{\frac{\lambda_{it}}{p_{it}} - 1}{1-\tau_t}$$

on data that includes changing tax depreciation rates and investment tax credits. If the coefficient β_3 is equal to zero, then the subsidiary model prediction is confirmed. Coefficient β_4 should be greater than zero if investment response to changes in statutory depreciation rates is heterogeneous in the governance measure. However, I expect to find no heterogeneous response, because statutory tax depreciation rates were not the primary investment stimulus tool used during the new sample period; the ITC was.

The ITC was retroactively repealed in 1985 by The Tax Reform Act of 1986. This analysis will focus on the period around the repeal, years 1981 to 1987, three years prior to and three years after repeal. During this time, top statutory tax rates and statutory depreciation rates were also in flux. The analysis accounts for these changes.

Governance Data: The IRRC began collecting corporate governance data in 1990. This data will be projected back to the time sample of interest. This presents possible measurement error into the analysis. However, as Gompers et al. (2003) pointed out, governance variables are relatively stable over time. I will test both the Governance and Entrenchment measures in the following analysis.

Tax Variables: I construct the Z Tax Term as in Section 4. The construction of the investment tax credit variable,

$$\text{ITC Tax Term} = \frac{ITC_i t}{1-\tau_t},$$

is similar. Dale Jorgenson provides ITC data on 44 different types of assets. For each asset class, both the ITC rate, which varies over time, and the ITC basis (whether the type of asset qualified for the tax credit) is provided. Using the 1982 BEA Capital Flow Table, the percentage of investment in each asset type by each industry is constructed. These weights are combined with ITC rates and bases to create industry-level ITC rates that vary over time. Variation over time in the ITC is driven by reforms in 1982 and 1985, when the ITC was ultimately (and retroactively) repealed. Variation across industries is driven by the percentage of investment eligible for the tax credit in each industry. The impact of the investment tax credit is identified by industry-level differences in the percentage of capital expenditures that are eligible for the investment tax credit. When the credit is repealed in 1985, it is most detrimental to the industries where a large percentage of capital expenditure used to be eligible for the credit.

Other Data: All other variables are constructed as in Section 5.

Table L1 provides descriptive statistics for the 1981-1987 analysis. The Governance sample are larger firms for which the governance variables are available. These firms tend to invest less as a percentage of capital. They also have larger cash flows. The investment tax credit ranges from 0 to 10% over the sample, 0 to 0.187 when scaled by the top statutory tax rate.

Results: Table L2 provides regression results for the 1981–1987 ITC analysis. Specifications (1) and (2) examine the effect of the ITC Tax Term and the Z Tax Term for the full sample with and without additional controls. The results suggest that the general population of firms is very responsive to changes in both investment tax credits and depreciation allowances. When the sample is limited to the Governance Sample in specifications (3) and (4), the results are less extreme and not statistically different from zero. This is most likely due to the small sample size.

In specification (5), Governance, Governance interacted with the ITC Tax Term, and Governance interacted with the Z Tax Term are added to the regression. The coefficients on the interaction terms are not statistically different from zero for either tax variable, suggesting no heterogeneity in response to changes in either type of investment tax incentives. Specification (6) repeats the analysis using the Entrenchment governance variable. Results are similar, again suggesting no heterogeneity of response.

While this analysis is plagued by a relatively small sample size and possible mismeasurement of the governance variables, it does not strongly contradict the main results presented in this paper. If this analysis found that strongly governed firms decreased their investment behavior the least when the investment tax credit was repealed, it would call into question the heterogeneity that supports the connection between governance and earnings management.

Table 14: Investment Responsiveness and Tax Status

Dependent Var	Capital Expenditure / Property Plant Equipment					
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Z Tax Term	0.165***	0.161***	0.182***	0.156***	0.055	0.054
	(0.032)	(0.032)	(0.042)	(0.040)	(0.056)	(0.057)
Gov x Z TT	-0.041***	-0.040***	-0.043***	-0.040***	-0.038***	-0.039***
	(0.008)	(0.007)	(0.010)	(0.009)	(0.007)	(0.008)
$\mathbb{1}$(TLCF)	0.168*	0.143				
	(0.098)	(0.104)				
$\mathbb{1}$(TLCF) x Z TT	-0.025*	-0.022				
	(0.014)	(0.015)				
TLCF			0.006	-0.002		
			(0.004)	-0.002		
TLCF x Z TT			-0.001*	-0.000		
			(0.001)	(0.001)		
MTR					-1.390	-1.285
					(1.004)	(0.968)
MTR x ZTT					0.263*	0.256*
					(0.145)	(0.140)
Firms	1,911	1,911	1,471	1,479	1,809	1,810
Firms x Years	13,704	13,692	8,505	8,534	13,080	13,113

Notes: All specifications present coefficients from regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 z_{it}^T + \beta_2 G_{it} + \beta_3 G_{it} z_{it}^T + \beta_4 \text{TAX}_{it} + \beta_5 \text{TAX}\tau z_{it}^T + \beta_6 \frac{\lambda_{it}}{p_{it}} + \epsilon_{it}.$$

Where TAX is an indicator for tax loss carry-forwards in specifications (1) and (2), is the level of tax loss carry-forwards in (3) and (4), and is the Blouin et al. (2010) estimated marginal tax rate in (5) and (6). Specifications (2), (4), and (6) use the lagged tax variable to avoid endogeneity concerns. All specifications control for marginal Q, financial distress, and cash flows and include firm and year fixed effects. Standard errors are clustered at the industry level and are robust to heteroskedasticity. *** indicates statistical significance at the 1% level, ** at 5%, and * at 10%.

Table 15: Descriptive Statistics Years 1981-2987

	Median	Mean	Std. Dev.	Obs.
Full Sample				
Cap Exp / Prop Plant Equip	0.204	0.433	0.765	36,977
Z Tax Term	0.715	.0696	0.066	50,104
ITC Tax Term	0.167	0.109	0.082	50.104
Q/(1-τ)	1.212	1.817	1.866	34,675
Cash Flow / PPE	0.204	-0.040	2.758	37,405
K-Z Financial Constraint	0.463	0.373	2.135	40,158
Governance Sample				
Cap Exp / Prop Plant Equip	0.206	0.311	0.424	5,783
Z Tax Term	0.714	0.690	0.071	6,979
ITC Tax Term	0.167	0.111	0.082	6,979
Q/(1-τ)	1.197	1.567	1.100	5,811
Cash Flow / PPE	0.302	0.500	0.944	5,751
K-Z Financial Constraint	0.138	0.118	1.398	6,594
Governance, Equity Incentives				
Goernance	8	8.085	2.897	8,027
Entrenchment	4	4.066	1.363	8,027

Note: Table L1 provides descriptive statistics for the 1981–1987 analysis. The investment and tax variables are provided for both the full sample and for the governance sample. The governance sample are firms for which data are available. Table X also provides governance data for years 1981–1987.

Table 16: Investment Tax Credit Analysis 1981–1987

Dependent Variable	Capital Expenditure / Property Plant Equipment					
Specification	(1)	(2)	(3)	(4)	(5)	(6)
ITC Tax Term	3.794***	3.730***	1.143	0.770	0.336	0.297
	(1.347)	(1.238)	(1.386)	(1.367)	(1.369)	(1.352)
Z Tax Term	4.060***	3.407***	1.620*	0.943	1.029	0.963
	(0.981)	(0.941)	(0.942)	(0.908)	(1.410)	(1.361)
Gov x ITC TT					0.049	
					(0.069)	
Gov x Z TT					0.002	
					(0.181)	
Entrench x ITC TT						0.097
						(0.114)
Entrench x Z TT						0.009
						(0.308)
$Q/(1-\tau)$	0.024***	0.026***	0.077***	0.039*	0.039**	0.038*
	(0.006)	(0.007)	(0.023)	(0.020)	(0.020)	(0.020)
Additional Controls		✓		✓	✓	✓
Firms	7,497	7,280	988	950	950	950
Observations	30,126	29,299	5,340	5,222	5,222	5,222

Notes: Specifications (1) through (4) present regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 \frac{ITC_{it}^T}{1-\tau_t} + \beta_2 \frac{\tau z_{it}^T}{1-\tau_t} + \beta_3 \frac{\frac{\lambda_{it}}{p_{it}}}{1-\tau_t}.$$

Specifications (5) and (6) include governance measures and present regressions of the form

$$\frac{I_{it}}{K_{i,t-1}} = \beta_0 + \beta_1 \frac{ITC_{it}^T}{1-\tau_t} + \beta_2 \frac{\tau z_{it}^T}{1-\tau_t} + \beta_3 \frac{G_{it} ITC_{it}^T}{1-\tau_t} + \beta_4 \frac{G_{it} \tau z_{it}^T}{1-\tau_t} + \beta_5 \frac{\frac{\lambda_{it}}{p_{it}} - 1}{1-\tau_t}.$$

All specifications include the structures tax term. Specifications (2) and (4) through (6) include additional controls for cash flow and financial distress.

All specifications include firm and year fixed effects. Standard errors are clustered at the firm level and are robust to heteroskedasticity. *** indicates statistical significance at the 1% level, ** at 5%, and * at 10%.

Appendix M Event Study Placebo Tests

Table 17: Event Study Placebos

Event Study Placebo 1: December 10, 2012						
Dependent Variable	CAR_1	CAR_2	CAR_3	CAR_4	CAR_5	CAR_6
Bebchuk	0.049	-0.001	0.042	0.046	0.085	0.128
	(0.042)	(0.058)	(0.073)	(0.079)	(0.072)	(0.084)
Deprec	-0.030	0.217*	0.345*	0.382	0.203	0.168
	(0.108)	(0.129)	(0.206)	(0.260)	(0.180)	(0.194)
Bebchuk x Deprec	-0.063	0.012	0.152	0.121	0.149	-0.063
	(0.088)	(0.117)	(0.137)	(0.146)	(0.126)	(0.137)
Observations	1,189	1,189	1,189	1,189	1,189	1,189
Event Study Placebo 2: January 15, 2013						
Dependent Variable	CAR_1	CAR_2	CAR_3	CAR_4	CAR_5	CAR_6
Bebchuk	0.017	0.095	0.055	0.037	0.030	0.024
	(0.048)	(0.066)	(0.097)	(0.111)	(0.135)	(0.157)
Deprec	-0.143	-0.157	-0.238	-0.331	-0.339	-0.214
	(0.213)	(0.424)	(0.411)	(0.528)	(0.516)	(0.577)
Bebchuk x Deprec	-0.054	-0.012	0.145	0.244	0.305	0.214
	(0.065)	(0.097)	(0.110)	(0.152)	(0.193)	(0.204)
Observations	1,189	1,189	1,189	1,189	1,189	1,189

Nottes: CAR_t is the cumulative abnormal return t trading days after Pacebo Dates December 10, 2012 and January 15, 2013. Results include industry fixed effects and control for Cash Flow. Standard errors are clustered at the firm level and are robust to heteroskedasticity. *** statistical significance 1% level, ** at 5%, and * at 10%.