THE IMPACTS OF RECENT TAX LEGISLATION ON DIVIDEND POLICY AND INVESTMENT

A Dissertation

by

GEORGE RYAN HUSTON

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2007

Major Subject: Accounting

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Approved by:

Chair of Committee, Michael Kinney
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Lynn Rees
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ABSTRACT

The Impacts of Recent Tax Legislation on Dividend Policy

and Investment. (May 2007)

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Chair of Advisory Committee: Dr. Michael Kinney

This dissertation examines firms' reactions to two changes in tax law intended to increase dividend payout and capital investment, the Job Creation and Worker Assistance Act (JCWAA) of 2002 and the Jobs Growth Tax Relief Reconciliation Act (JGTRRA) of 2003. Chapter IV assesses whether firms assuage agency conflicts between management and shareholders created by changes in individual-level taxes on dividends, focusing on the impact of board independence on changes in management compensation and dividend policies. Data analyses suggest that greater board independence mitigates the effects of both CEO stock and option holdings on dividend increases. Additionally, firms appear to implicitly dividend-protect options through increased cash compensation, effectively reimbursing CEOs for decreases in option value. Firms that did not increase dividends in the first year following the passage of JGTRRA decreased option grants to induce greater future dividend payouts.

Chapter V examines the relation between contemporary dividend increases and future earnings around JGTRRA. Specifically, I investigate whether firms increase dividends in response to shareholder demands, and I examine the market reaction to pre- and post-JGTRRA dividend changes. In addition, I focus on the dividend policies of

growth firms, testing between firm maturation (Grullon et al. 2002) and tax-based explanations. Results suggest that dividends are less explanatory as to future earnings in the post-JGTRRA period. Post-JGTRRA dividend increases by growth firms are consistent with tax motives rather than firm maturation because growth firms paying dividends have greater investment in the post-JGTRRA period.

Chapter VI examines the effects of JCWAA and JGTRRA provisions enacted to increase business capital expenditures through increased depreciation allowances. I develop a model to predict what firms' capital expenditures would have been in the absence of these acts, comparing the actual and predicted values. I find firms significantly increased purchases of qualified assets but decreased nonqualified asset purchases, netting only a marginal overall increase in capital expenditures. Finally, I examine the impact of these acts on leasing transactions, finding that low marginal tax rate firms significantly increased use of operating leases following the passage of JCWAA, whereas firms with higher MTRs decreased lease transactions.

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CHAPTER I

INTRODUCTION: IMPACT OF RECENT TAX LEGISLATION

In the past four years, the Bush Administration has signed into law two tax provisions that changed the landscape of corporate and individual taxation. First, the Job Creation and Worker Assistance Act (JCWAA) of 2002 created a 30 percent first-year bonus depreciation allowance for new property with a recovery life of at most 20 years acquired between September 10, 2001 and September 11, 2004. Second, the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) extended the JCWAA depreciation provisions, and more importantly, substantially reduced the individual tax rate for qualifying dividends. In this dissertation, I examine the impact of these changes in tax legislation on firms' dividend policy and investment decisions.

This dissertation is structured as three papers. Chapter IV examines the impact of reduced shareholder-level dividend taxes from JGTRRA on firms' dividend decisions. The act creates a natural setting for studying the effects of classic agency conflicts between shareholders and management resulting from the change in individual investors' demand for dividends and the impact of dividends on management stock options. The conflict arises specifically from the increase in option compensation over the past twenty years- stock options now account for more than half of total CEO compensation in the largest U.S. companies (Rappaport 1999), and increases in dividends diminish the value of these options. According to Jensen, Murphy and Wruck (2004, p. 30), "since well-designed management compensation policies cannot resolve

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This dissertation follows the style of *The Accounting Review*.

all conflicts of interest and agency problems between executives and the firm, well-designed corporate governance systems implemented by directors of high integrity must be in place to resolve those conflicts that cannot be handled by remuneration policies alone."

I attempt to determine whether and how firms attempt to assuage the agency conflicts between management and shareholders created by JGTRRA, specifically focusing on the impact of board independence. Holmstrom and Kaplan (2003) find that stock and option compensation for directors has increased over time; for this reason, I determine if increased equity and option compensation for directors aligns the financial interests of managers and directors, giving management a better chance to act opportunistically to the detriment of other shareholders. Opportunistic behavior in the case of JGTRRA could result in some firms increasing dividends too much (resulting in the expropriation of wealth from the firm) or not increasing dividends enough (resulting in the underutilization of shareholder tax benefits) depending on firms' and managers' particular characteristics. While many of the initial studies of JGTRRA look at firms increasing dividends following the act, I add to the stream of literature by also focusing on firms not increasing dividends after the passage of the act.

In addition to examining the impact of JGTRRA on dividend policy, I examine changes in management compensation schemes following the passage of the act. I specifically determine whether firms implicitly dividend-protect management option wealth through increased stock or cash (through bonuses) compensation. Next, I examine whether firms that did not initially increase dividends decreased option grants following JGTRRA to induce management to increase dividends and whether changes in compensation induce managers to increase dividends. After looking at the main effects of each type of compensation change, I look at the impact of board independence to determine if more independent boards are more likely to change compensation contracts to assuage the agency conflicts created by JGTRRA.

Chapter V examines the relation between contemporary dividend increases and future profitability. Signaling theory (Ross 1977; Bhattacharya 1979, 1980) argues that because dividends are costly, only strong firms with good future expectations can afford to pay them. Empirical evidence generally suggests that dividend increases coincide with strong past and current profits, but yields only mixed evidence as to whether firms also sustain future profitability levels (Healy and Palepu 1988; Bernatzi et al. 1997; Nissim and Ziv 2001). I provide a cleaner test between traditional signaling arguments and tax arguments for dividend payments by comparing past, concurrent, and future earnings levels for firms increasing dividend payments both before and after the passage of JGTRRA. The tax argument is supported if the correlation between dividends and earnings drops in the period after the passage of JGTRRA, as firms would be increasing dividends with fewer earnings to support these increases, taking advantage of the temporary tax benefits.

In this same context, past research has ignored contextual variables that are potentially important in interpreting the economic significance of dividend increases. For example, the literature does not differentiate between dividend increases for growth-oriented and mature firms. I extend this literature by testing the future earnings implications of dividend increases for firms of varying growth rates to determine if there is a firm maturation explanation inherent in dividend increases (Grullon et al. 2002).

Finally, I examine the market reaction to announcements of dividend increases to determine if JGTRRA changed the market interpretation of dividend payouts. If the market reaction to dividend increases diminishes after JGTRRA, this evidence might be consistent with a tax argument that dividend increases are based on tax benefits as opposed to expected future earnings. However, this evidence might also be consistent with a market expectation that dividend increases are transitory, as the tax-advantaged dividend provisions of JGTRRA end in 2008.

In Chapter VI, I study firms' responses to JCWAA, specifically looking at firms' expenditures on both advantaged and non-advantaged assets. In addition, I look at cross-sectional differences among firms' expenditures, examining the impacts of loss positions and international holdings. After determining whether the acts had their intended effects on advantaged asset purchases, I examine two potentially unintended side effects of the acts. First, I investigate whether firms increased capital asset purchases or simply shifted the categories of assets purchased to utilize the benefits of the acts. Second, I observe whether firms accelerated their intended first quarter 2003 investments into the fourth quarter of 2002 to take full advantage of the NOL carryback provisions that ended in 2002 and whether they increased fourth quarter 2004 spending before the bonus depreciation provisions ended. Kinney and Trezevant (1993) find that firms maximize the present value of investment-related tax shields by placing these investments in service during the fourth quarter of the current year rather than the first quarter of the following year, and I expect to find a similar effect for depreciable asset additions. Similarly, Maydew (1997) finds evidence of intertemporal income shifting by firms with NOL carrybacks in response to the Tax Reform Act of 1986.

After looking at the acts' impacts on depreciable asset spending, I examine the acts' impacts on firms' leasing transactions for firms in varying marginal tax rate classes. Conventional lease models predict that firms with low marginal tax rates use more leases relative to firms with high marginal tax rates (Graham, Lemmon and Schallheim, 1997). The provisions of JCWAA and JGTRRA could have two separate effects on leasing transactions. The provisions increase the tax benefits for the lessor on qualified purchases, potentially leading higher marginal tax rate firms to increase qualified purchases during the bonus depreciation period. According to Graham et al. (1997), "Leasing by the low tax-rate firm is favored when (i) the depreciation tax shield is received early in the lease term, (ii) the taxable gain on the sale of the asset is relatively small, (iii) larger lease payments occur later in the lease term, or (iv) the before-tax discount is high." While (ii) through (iv) are difficult to test, the increased depreciation provisions obviously move the depreciation tax shield forward in the lease term. However, the extended NOL carryback provisions in 2002 could lead firms with current-year losses (likely lower MTR firms) to decrease rental transactions in favor of purchasing assets outright.

I believe that this dissertation is of interest to many parties. First, this dissertation extends tax literature using the Scholes et al., (2002) framework. The Scholes et al. (2002) framework acknowledges that tax strategies do not always explain firms' decisions, as other costs may outweigh the tax benefits of a transaction. In the case that firms respond to the tax acts inconsistently with tax incentives, it is imperative to determine which other costs drive firm behavior. This dissertation is also of interest to researchers in finance, as a number of finance theories are inherent in the empirical tests (e.g. agency theory and signaling). In addition, these papers are of value to regulators, who are interested in understanding the implications of changes in tax law, and whether firms' responses are consistent with the intent of these laws.

This dissertation is structured as follows. Chapter II briefly describes the provisions of each of the two acts. Chapter III reviews the relevant literature for each of the three papers. In Chapters IV through VI, I outline the hypotheses, data, and methodology used in each of the three papers. In Chapter VII, I summarize the findings of this dissertation and conclude.

CHAPTER II

BACKGROUND: THE TWO ACTS

Figure A presents the timeline of events surrounding the passage of the two acts and the specific dates for firms to receive benefits under the acts. Congress passed JCWAA in March 2002, and its provisions were implemented retroactively to 2001 tax returns. Although the Act applied retroactively to 2001, firms had no knowledge of the Act in 2001. Thus, the first possible response to the provisions of JCWAA occurred in 2002. For this reason, I test for changes in 2002, using 2000 and 2001 as control years. To test the impact of JGTRRA's 50 percent allowance, I compare the increases from the JCWAA period to the JGTRRA period, which began in May 2003.

Before the passage of JCWAA, firms could carry tax losses back two years or forward fifteen years. Because of JCWAA provisions, firms could carry FY 2001 and FY 2002 tax losses as far back as five years. Firms continued to have the option to carry losses back two years or forward fifteen years based on their determination of the present value of the benefits of these losses.[1]

Appendix A outlines the criteria for firm expenditures to qualify for the 30 percent bonus depreciation allowance. Generally, any newly purchased property with a recovery life of less than 20 years (all property except land and buildings) placed in

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[1] A firm's decision as to whether it carries losses forward or backward is a function of three variables: first, the firm must determine its marginal tax rate in the year(s) to which it could carry back current losses. Second, it must estimate future marginal tax rates to which it could carry forward current losses. Finally, it must compare the present value of the losses carried forward to the benefits of carrying the losses back.

service between September 11, 2001 and September 10, 2004 that has at least 50 percent business usage qualifies for the 30 percent allowance.

On May 28, 2003, President Bush signed the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA) into law. The main provision of this law was the reduction of individual tax rates for qualifying dividends to the tax rate for long-term capital gains. The provisions of this act are effective from May 5, 2003 until December 31, 2010[2] when a sunset provision in the law will take effect.

This rate reduction alleviates one of the main costs associated with dividend payments and creates a scenario in which dividends could become tax-advantaged income sources.[3] Furthermore, the act creates an historic opportunity to study drivers of dividend policy because dividends and long-term capital gains have received equal tax treatment only one other time since the inception of the U.S. income tax.

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[2] The original JGTRRA provisions were effective until December 31, 2008; however the passage of the Tax Increase Prevention and Reconciliation Act of 2006 (TIPRA) extended these provisions for an additional two years.

[3] Under the JGTRRA provisions, dividends are taxed at long-term capital gain rates. They are tax advantaged relative to short-term (held less than one year) capital gains, which are treated as ordinary income. It is also important to note that the drawback of dividends relative to capital gains relates to the fact that an investor can choose not to sell the stock, delaying the taxable capital gain; dividends create taxable income when they are paid.

CHAPTER III

LITERATURE REVIEW

Miller and Modigliani (1961) derive the optimal firm-level dividend strategy under the assumptions of frictionless capital markets, rational investors, perfect investment certainty, and share price decreasing proportionally to per share dividend payout. Miller and Modigliani begin with a simple model that equates sources of funds (financing inflows and profits) to uses of funds (investment and dividends). In this stylized setting, Miller and Modigliani prove that dividend payout is irrelevant in the valuation of a firm. Much of the subsequent theoretical and empirical research on dividend policy has focused on the effects of relaxing the Miller and Modigliani assumptions.

There have been many arguments leading to the conclusion that firms should not pay dividends, including individual-level taxation and the opportunity costs associated with dividend payments. In this section, I discuss the prior literature providing reasons for paying dividends or making other interim payments to shareholders, (e.g., share repurchases). The reasons include agency costs, signaling or information asymmetries, and individual preferences and behavioral explanations for dividends.

Information Effects, Agency Costs and Signaling

The information effects and signaling theories of dividend policy have roots in the Miller and Modigliani (1961) irrelevance proposition. If dividends are irrelevant as the proposition suggests, researchers questioned why some firms consistently pay dividends and why markets react to those payments. The signaling or information content hypothesis contends that managers provide observable information that stockholders can use to make inferences about unobservable trends. Its reasoning is based on the administrative and financial cost of paying dividends, implying that only strong firms can use dividends to signal the market. Alternatively, management may create dishonest or distorted signals to dupe investors into overvaluing stock prices based on false expectations.

Ross (1977) relaxes the Miller and Modigliani (1961) dividend irrelevance proposition by assuming that management possesses information that outside investors do not possess. Management creates a signal through both capital structure and dividend policies to convey private information to the outside market. Bhattacharya (1979, 1980) extends the theoretical work in the area of dividend signaling, to explain why firms pay dividends in spite of the obvious tax disadvantages. Similar to Ross (1977), Bhattacharya (1979) assumes information asymmetry between management and outside shareholders. He also assumes that the value of the firm is a function of cash flows distributed by the firm in the form of dividends and a terminal liquidation value. From this assumption, Bhattacharya discusses the "bird in hand" explanation: investors prefer the surety of current dividend payments to the terminal or liquidating value of the firm. Bhattacharya (1980) models the "information content" hypothesis of dividends, demonstrating that corporate dividends are an *ex ante* signal of future earnings.

Miller and Rock (1985) also explain dividend policy under the assumption of asymmetric information between managers and outside shareholders, suggesting that the market uses dividend announcements to form new estimates of expected future earnings.

Gonedes (1978) and Charest (1978) provide empirical evidence on the signaling value of dividend changes and extraordinary components of accounting income to determine if investors behave as though these numbers were effective signals. They find evidence inconsistent with the view that the annual dividend signals reflect information beyond that reflected in contemporaneous annual income signals. Richardson, Sefcik, and Thompson (1986) also examine signaling theory using 192 firms announcing their first cash dividend and find an increase in trading volume and firm value around the announcement date. Bajaj and Vijh (1990) examine more than 8,500 dividend changes, determining that price reactions to dividend increases (decreases) are significantly more positive (negative) for higher yield stocks. Additionally, they find that the price reaction is larger for low-priced and small-firm stocks, and they hypothesize that this reaction is a result of the information environment of smaller firms.

The preceding papers generally focus on an empirical context of dividend increases, but the other side of the signaling hypothesis relates to firms' choices to decrease or omit dividend payments. Christie (1994) tests the theoretical view that dividend omissions will produce a larger average decline in stock price than will reductions of less than 100 percent. Christie's results suggest that omissions do not create the most severe price decreases, as prices fall an average of 4.95% for less than 20 percent reductions, whereas reductions over 60 percent cause average declines of only 8.78%. This relation between price drops and reductions in dividend payouts is similar to the penalties associated with missing analyst earnings targets or other benchmarks.

DeAngelo and DeAngelo (1990) examine a set of firms experiencing financial distress to identify reasons for dividend policy adjustments. They find that more than half of their sample faced binding debt covenants in the year they reduced dividends, consistent with the agency view that debt covenants impact dividend policy. DeAngelo et al. (1992) analyze the relation between dividend reductions and losses and find that an annual loss is a necessary but not sufficient condition for dividend reductions in firms with established earnings and dividend records. They find that dividend-decreasing firms tend to have continuing earnings difficulties as opposed to one-time earnings difficulties. DeAngelo et al. (1996) examine a subset of firms whose annual earnings decline after nine or more consecutive years of earnings growth, focusing on dividend decisions in the year of earnings decline. They find little support for the signaling hypothesis, lending support to the idea that management is overly optimistic about future growth prospects and mistakenly sends favorable dividend signals.

Easterbrook (1984) applies an agency-cost perspective to firms' dividend policies, assuming that managers are perfect agents of investors. Much of the agency theory literature focuses on aligning managers' interests with those of investors (Jensen and Meckling 1976). Easterbrook asks whether dividends are a method of aligning managers' interests with investors, contending that dividends exist because they influence firms' financing policies by disgorging cash and inducing firms to float new securities. This periodic return to the markets acts as a form of monitoring, as managers must continuously provide evidence of financial stability and growth to receive additional capital.

On the other hand, Myers (1984) extends the "pecking order" theory, stating that firms can optimize capital structure by financing investments through minimizing asymmetric information and other financing costs. To minimize these costs, firms should first use retained earnings, then safe debt, then risky debt, and finally equity financing. Myers does not address why firms pay dividends per se, but Fama and French (2000) argue that pecking order considerations are prominent in affecting firms' dividend decisions.

Easterbrook (1984) also discusses risk aversion by managers who have a large portion of their portfolios tied to the performance of the firm's stock. Managers can control the level of risk in their employer's stock by paying dividends and not choosing risky, low net present value projects.

Jensen (1986) argues that managers often improperly reinvest free cash flows in negative net present value (NPV) projects (empire building) rather than returning it to investors. Empirical evidence suggests that large cash reserves hinder firm performance (Harford 1999; Mikkelson and Partch 2003). Blanchard et al. (1994) examine a subset of firms receiving cash windfalls, finding that firms increase investment, frequently creating divestitures or other negative NPV projects, despite the fact that their investment opportunity set has not changed. The firm life cycle argument works with the agency free cash flow arguments, as Grullon et al. (2002) show that dividend changes are often a sign of firm maturity, consistent with diminished investment opportunities.

In summary, signaling and agency cost explanations for dividends provide intriguing arguments concerning the rationale for dividend payouts. However, empirical results show ambiguous support for these explanations.

Behavioral Finance and Shareholder Demands

Along with information effects, agency costs, and signaling, there are a number of other potential explanations for firms' payment of dividends. Shefrin and Statman (1984) utilize behavioral theories to explain dividend payments, specifically drawing upon the theory of self-control outlined by Thaler and Shefrin (1981) and prospect theory (Kahneman and Tversky 1979). Shefrin and Statman assert that dividends and capital gains, even in the absence of taxes and transactions costs, may not be perfect substitutes as investors may prefer having periodic dividend payments to large returns of capital in the form of capital gains because of self-control difficulties. Additionally, they set up a framing argument similar to Kahneman and Tversky, suggesting that investors prefer having $2 today and a 50-50 chance of $54 or $50 tomorrow over nothing today and a 50-50 chance of $56 or $52 tomorrow. Dong, Robinson, and Veld (2003) submit a questionnaire to Dutch investors to ascertain why individual investors want dividends. Their empirical results do not confirm the theory of Shefrin and Statman (1984) for cash dividends, as they indicate that investors tend not to consume a large part of their dividends. However, they find that transactions costs are an important reason for individuals to appreciate dividends because investors view dividends as a cost-efficient way to realize capital gains.

Brennan and Thakor (1990) create a theoretical model of choice between dividends and share repurchases. Their model suggests that despite preferential tax treatment for capital gains relative to dividends, a majority of shareholders may support a dividend payment for small distributions. However, for larger distributions, shareholders prefer an open market stock repurchase, with tender offer repurchases dominating the largest distributions.

Tax clientele theory (Scholes et al., 2002) suggests that taxpayers in higher tax brackets prefer tax-advantaged assets (i.e. municipal bonds), and taxpayers in lower tax brackets are more likely to invest in non-tax-advantaged assets. Dividend arbitrage theory assumes that the equilibrium price will leave buyers and sellers indifferent as to whether they buy or sell before or after the ex-dividend date.

Perez-Gonzalez (2002) examines the characteristics of firms' large shareholders, finding that dividend payouts increase when dividend income is less tax-disadvantaged relative to capital gains when the shift in tax regime is applicable to large shareholders. He also uses ex-dividend day analysis demonstrating that there are significant increases in the valuation of dividend income for those firms with individual large shareholders in periods when dividends are tax-advantaged. These results create an interesting perspective on the tax-clientele hypothesis, as they provide evidence that firms respond to the tax demands of large shareholders.

Graham and Kumar (2004) examine the investment accounts of more than 60,000 retail investors, finding that retail investors prefer non-dividend paying stocks to dividend paying stocks. However, older and lower-income investors prefer high dividend stocks, consistent with the life-cycle hypothesis outlined by Pettit (1977).

It is argued that large corporations prefer dividend-paying stocks because such corporations are allowed a significant tax deduction for dividends they receive. Barclay, Holderness and Sheehan (2003) use trades of large share blocks to determine if corporate shareholders truly prefer high-dividend paying stocks, consistent with clientele theory. They find no evidence that corporate shareholders buy higher-dividend paying stock and no evidence that dividend payouts increase after a corporation buys a large block of a company's stock, suggesting that dividend policy appears to be a secondary consideration for inter-corporate investment decisions. Similarly, Grinstein and Michaely (2003) and Jain (2003) find that institutions avoid stock of firms that pay no dividends, but they prefer stock of firms that pay fewer dividends and repurchase shares on a regular basis. These results also contradict clientele theory models suggesting that institutions, which pay no individual level taxes, prefer high dividend yield stocks.

Baker and Wurgler (2004) create a "catering theory" of dividends, assuming that (1) some investors have an uninformed or time-varying demand for dividend-paying stocks, (2) arbitrage fails to prevent this demand from driving apart the prices of payers and non-payers, and (3) managers rationally cater to investor demands, paying dividends when investors pay higher prices for payers and not paying when investors prefer non-payers. They suggest that dividends are relevant to share price but in different directions at different times, potentially consistent with tax clientele theory.

Additionally, a number of studies focus on the effects of managerial incentives on firms' dividend policies. Fenn and Liang (2001) find that management stock ownership is positively associated with higher dividend payments, but management stock options correlate negatively to dividend payout. This trend is especially likely for firms with the greatest potential for agency problems (i.e. few investment opportunities and high free cash flow). Nam, Wang, and Zhang (2004) find that managerial stock holdings have a positive effect on the likelihood and extent of dividend increases subsequent to JGTRRA.

In sum, the behavioral finance literature creates an interesting explanation for why firms pay dividends. However, the behavioral finance literature lacks a consensus as to whether these theories have any long-term predictive ability. The shareholder demand literature creates a number of potential implications, especially considering the impact of JGTRRA on individual level dividend taxes.

Trends in Dividend Policy Pre-JGTRRA

In this section, I outline research regarding trends in firms' dividend policies, which is dominated by studies documenting share repurchases as a substitute for paying cash dividends. Grullon and Michaely (2002) find that share repurchases have become an important form of earnings distribution for U.S. firms, as firms finance their share repurchases with funds that would have otherwise been used to increase dividends. In 1983, the SEC approved Rule 10b-18, which provided a safe harbor for corporate share repurchases, significantly increasing repurchase activity. Grullon and Michaely (2002) document that repurchases are the preferred form of disgorging cash, specifically for younger firms.

Jagannathan, Stephens, and Weisbach (2000) measure firms' usage of stock repurchases and dividends, finding they are used at different times and by firms with differing characteristics. Stock repurchases are pro-cyclical, whereas dividends tend to increase over time. Firms with higher permanent operating cash flows are more likely to pay dividends, whereas firms with higher temporary, non-operating cash flows are more likely to make stock repurchases, consistent with signaling theory. Firms tend to repurchase stock following downturns in stock price, but they increase dividends following good earnings performance.

There have been significant changes in the landscape of dividend payments over the past twenty years. Fama and French (2001) find that firms are less likely to pay dividends, reporting that the proportion of firms paying cash dividends has fallen from 66.5% in 1978 to 20.8% in 1999. Although this result is due in part to changing characteristics of publicly traded firms and the technology boom, they find that this result holds after controlling for firm characteristics. Fama and French also find that firms that have never paid dividends are more profitable than are former payers and that they have stronger growth opportunities. However, dividend payers are larger and more profitable than firms that have never paid dividends.

DeAngelo, DeAngelo, and Skinner (2000) document another recent trend: special, one-time dividends, once commonly paid by firms (almost as consistently as "regular dividends") are now rarely paid. One might suspect that share repurchases, which the literature suggests are a substitute for regular dividends, have taken the place of these special dividend payments as well.

In summary, share repurchases appear to substitute for dividends for many firms because of their flexibility and relative tax advantage. Yet, many firms continue to pay dividends today despite the apparent relative benefits of share repurchases. The newly enacted legislation, lowering dividend tax rates to the same level as rates for long-term capital gains, will provide a number of interesting tests of trends regarding the relative use of share repurchases, ordinary dividends, and special dividends to distribute wealth to shareholders.

Dividends and Earnings

Penman (1983) conducts one of the first tests of the Bhattacharya (1980) information content theory, comparing the information content of dividends to management earnings forecasts. Penman suggests, "If dividends function as signals of firms' values, then the information revealed in managements' earnings forecasts should also be reflected in their dividend decisions." To create these tests, Penman compares earnings forecast errors to prediction errors based on dividend announcements, judging the relative information content of the two predictors using the performance of investment strategies. The findings suggest that dividend-based forecasts are more accurate than management earnings forecasts for firms with significant dividend changes.

Healy and Palepu (1988) examine firms initiating and omitting dividend payments, specifically looking at earnings performance for five years before and five years after the initiation or omission. In addition to earnings performance, they test whether subsequent earnings changes are related to the information released at the dividend announcement and analyze the market's reaction to earnings announcements after the dividend policy change. Their results indicate that firms initiating (omitting) dividends have significant increases (decreases) in their annual earnings for at least one year before, the year of, and at least one year after the change in dividend policy. Finally, Healy and Palepu find that the market reacts less to unfavorable earnings announcements following dividend reductions and omissions than normal, indicating that these earnings changes are anticipated by the market at the time of the dividend announcement.

Bernatzi, Michaely, and Thaler (1997) also test the signaling theory of dividends. Their findings suggest that firms increasing dividends in year 0 have significant earnings increases for years -1 and 0, but that this does not translate into future earnings growth, regardless of the magnitude of dividend increases. Firms cutting dividends in year 0 experienced a reduction in earnings in years -1 and 0 but reported significant increases in earnings in year 1. Nissim and Ziv (2001) re-examine the relation between dividend changes and alternative measures of future profitability, finding that dividend changes correlate positively with future earnings changes, earnings levels, and abnormal earnings.

CHAPTER IV

DIVIDENDS AND AGENCY COSTS

The Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) of 2003 reduced individual level tax rates on dividends and created demand from individual investors for firms to raise dividend payouts (Blouin et al. 2004). Hence, the act creates a natural setting for studying the effects of classic agency conflicts between shareholders and management resulting from the change in individual investors' demand for dividends and the impact of dividends on management stock options. The conflict arises because increases in dividends diminish the value of stock options.[4] Jensen et al. (2004, 22) state that, "because well-designed management compensation policies cannot resolve all conflicts of interest and agency problems between executives and the firm, well-designed corporate governance systems implemented by directors of high integrity must be in place to resolve those conflicts that cannot be handled by remuneration policies alone."

In this paper, I attempt to determine whether and how firms assuage the agency conflicts between management and shareholders created by JGTRRA, specifically focusing on the impact of board independence. Core et al. (1999) find that firms with lower board independence have greater agency conflicts, leading to higher overall CEO compensation and weaker firm performance. Holmstrom and Kaplan (2003) find that

[4] Option compensation has increased dramatically over the past twenty years; stock options now account for more than half of total CEO compensation in the largest U.S. companies (Rappaport 1999). The payment of dividends causes a decrease in the value of the share price by an amount similar to the per share amount of the dividend, leading to a decrease in the value of any options held. While option compensation is not as high (mean 47% for the entire sample period, with the lowest annual mean at 42%), option compensation is still a significant part of CEOs' compensation mix.

stock compensation for directors has increased over time; for this reason, I determine if increased equity compensation for directors aligns the financial interests of managers and directors, giving management a better chance to act opportunistically to the detriment of outside shareholders. Theoretically, all directors have a "duty of loyalty" to perform in good faith and pursue the best interests of the corporation, avoiding conflicts of interest (Doty 2004; Monks and Minow 2004). However, inside directors have dual roles as both managers and directors that potentially create conflicts of interest. Because independent directors have only a monitoring role, they should be able to ensure that management acts in the best interest of shareholders, curbing opportunistic behavior of management. Opportunistic behavior in the case of this act could lead some firms to increase dividends so much as to expropriate wealth from the firm or so little as to grossly underutilize the potential shareholder tax benefits. This variation in response is likely related to firms' and managers' particular characteristics. For instance, firms with high management share ownership could increase dividends to the point that the growth and even the liquidity of such firms could be adversely affected. Conversely, firms with high insider option holdings could keep their individual investors from realizing the tax benefits of JGTRRA by not changing dividend payout because of the negative impact on their option values. While many of the initial studies of JGTRRA focus on firms increasing dividends following the act, I add to the stream of literature by also focusing on firms not increasing dividends after the passage of the act. The purpose of this analysis is not to determine an optimal dividend policy for every firm following

JGTRRA, but to examine the agency cost forces affecting dividend policy and the ability of board independence to mitigate these forces.

I create a metric for board independence comprised of relative shares held by directors, relative stock paid to directors as compensation, percentage of inside board members, percentage of affiliated or gray directors, and a dummy variable if the CEO is also a director. I use regression analysis to determine the impact of board independence on firms' dividend policies. Along with the metric for board independence, independent model variables include insider stock holdings, insider stock options, debt, and control variables for firm size, and idiosyncratic risk. In addition to main effect analysis of the impact of board independence, I examine the interactions between board independence and insider stock and option holdings.

Relating to changes in management compensation, I first examine whether dividend-increasing firms implicitly protect managers' option wealth by increasing bonuses or other cash compensation and whether firms with greater board independence impacts the level of dividend protection of CEO option wealth. Next, for firms that did not initially increase dividends, I determine whether sample firms change the compensation structure by increasing cash or stock compensation or decreasing option payouts, and I determine if board independence impacts this change in compensation structure.

Data analyses suggest that board independence appears to mitigate the effects of both CEO stock and option holdings on dividend increases, as the coefficients for CEO stock and option holdings become insignificant when board independence is included in the model. Firms with greater board independence pay lower dividends and increase dividends less than firms with less board independence. Additionally, firms with greater board independence pay their CEOs less both in bonuses and total cash compensation, consistent with the findings of Core et al. (1999).

Compensation analyses suggest that the cross-section of firms examined in this paper appear to implicitly dividend-protect CEO option wealth, as dividend-increasing firms with greater CEO option sensitivity (how sensitive CEO option portfolios are to changes in stock price) increase bonuses and total cash compensation to effectively reimburse CEOs for the decrease in option value, holding constant other variables commonly associated with compensation. Additionally, firms with greater board independence appear to protect options from increases in dividends through increases in bonuses and other cash compensation than better firms with lower board independence. Finally, I find that firms not increasing dividends in the first year following the passage of JGTRRA decrease option grants, specifically for firms with greater CEO option sensitivity. Although this is true of the cross-section of firms, firms with greater board independence decrease option grants more than firms with less board independence.

This paper is relevant to multiple streams of literature in both finance and accounting. First, this paper extends the agency cost literature by examining the tension between CEO stock and option holdings and shareholder demands for dividends. To my knowledge, this is the first paper to determine whether firms implicitly dividend-protect CEO stock option wealth. Second, this paper extends the compensation literature by examining the impact of various compensation metrics and their interactions with dividend policy. Additionally, this paper extends the dividend and tax literatures by examining the impacts of taxes in the context of agency costs by examining the reasons firms would not react to the change in tax policy. Finally, this paper extends the corporate governance literature by examining the ability of board independence to mitigate agency costs associated with dividend policy.

This paper is organized as follows: section II provides background about JGTRRA and previous literature examining the effects of the act. Section III develops hypotheses, section IV discusses the models used in the paper, section V describes the results found, and section VI concludes.

Background

On May 28, 2003, President Bush signed the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA) into law. The main provision of this law reduced individual tax rates for qualifying dividends to the tax rate for long-term capital gains in order to boost dividend payout, thereby spurring economic growth and reducing excessive earnings retention (Brown et al. 2005). Upon signing JGTRRA, President Bush hailed the act saying that, "This [act] will encourage more companies to pay dividends, which, in itself, will not only be good for investors, but will be a corporate reform measure because it is hard to pay dividends unless you actually have cash flow." The provisions of JGTRRA are effective from May 5, 2003 until December 31, 2010[5]; thereafter, dividend tax rates return to ordinary income rates. This rate reduction

[5] The original JGTRRA provisions were effective until December 31, 2008; however the passage of the Tax Increase Prevention and Reconciliation Act of 2006 (TIPRA) extended these provisions for an additional two years.

mitigates the tax costs associated with dividend payments creating an historic opportunity to study drivers of dividend policy because this is the first time that dividends and long-term capital gains have received equal tax rate treatment since the inception of the U.S. income tax.[6]

Preliminary evidence on firms' initial responses to JGTRRA indicates that firms increased regular and special dividends following the act (Blouin et al. 2004; Julio and Ikenberry 2004). Additionally, firms with greater insider ownership increased dividends relative to firms with less insider ownership (Nam et al. 2004; Brown et al. 2005). Conversely, insider option holdings have been associated with a lack of response to the act (Brown et al. 2005). All of the evidence showing that firms increased dividends to suit the interests of insiders is consistent with the pre-JGTRRA results of Fenn and Liang (2001), who find that management stock ownership is associated with higher payouts.

Hypotheses Development

I begin by determining whether firms implicitly dividend-protect options in both the pre-JGTRRA and post-JGTRRA periods. The main reason that managers with options are reluctant to increase dividends relates to the decrease in share price after the stock goes ex-dividend and the fact that stock options are not explicitly (stated in the management compensation contract) dividend-protected by most firms (Arnold and Gillenkirch, 2005). For this reason, I test whether firms increase bonuses or other cash

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[6] While there is equal treatment in the tax rates for dividends and capital gains, there remains a difference in the timing of taxable events, as it is possible to defer capital gains taxation by deferring the sale of the stock, whereas there is no deferral of tax on dividend income.

compensation to CEOs to implicitly dividend-protect their option wealth from the value decline associated with increases in dividends. A change in dividend policy may lead to an increase in cash compensation to reimburse CEOs for declines in option values associated with increases in dividends. After looking at the main effect to changes in compensation, I examine whether board independence impacts firms' usage of compensation changes to alleviate the agency conflict related to CEO option holdings, as board independence has been shown to alleviate agency conflicts in other compensation matters (Core et al., 1999). This leads to hypotheses 1a and 1b:

> **H1a:** Firms increase bonus or other cash compensation to protect CEO option wealth for increases in dividends when CEOs have option holdings that are highly sensitive to movements in stock price.

> **H1b:** Firms with greater board independence increase bonus or other cash compensation to protect CEO option wealth from increases in dividends.

My next set of hypotheses relates to firms' responses to the passage of JGTRRA both for firms that implicitly protect options and for firms that do not. Prior literature has shown that firms with greater insider ownership increased dividends relative to firms with less insider ownership (Nam et al. 2004; Brown et al. 2005). An increase in dividends for managers whose wealth is tied largely to company performance allows these managers additional portfolio diversification without a change in their ownership percentage in the firm. Conversely, firms with greater insider option holdings have been found to be less likely to increase dividends relative to firms with lower insider option holdings (Brown et al. 2005) due to the decrease in option value associated with dividend payouts. The impact of insider stock ownership could lead firms to increase dividends so much as to expropriate wealth from the firm, whereas the impact of option holdings could lead firms to smaller (or zero) increases, leading to the underutilization of potential shareholder tax benefits. For this reason, I attempt to determine whether board independence affects the dividend increase for firms with higher insider ownership in H2a; in H2b, I determine whether board independence affects the insensitivity of dividend policy to shareholder tax benefits for firms with greater option holdings. For both potential agency conflicts, I expect that board independence will mitigate the conflicts associated with the findings of the initial JGTRRA studies (Brown et al. 2005; Nam et al. 2004) related to stock and option holdings.

> **H2a:** As insider share ownership increases, firms with higher board independence increase dividends less than firms with lower board independence.

> **H2b:** As insider option holdings increase, firms with higher board independence have larger dividend increases relative to firms with lower board independence.

Next, I turn my attention to firms that did not increase dividends in the first year following the passage of JGTRRA. I examine firms not increasing dividends in the first year because the board of directors sets managerial compensation annually and because firms generally do not change dividend policy immediately due to board approval requirements.[7] Because insider options are thought of as one of the main reasons why management would be reluctant to increase dividends, I examine whether firms change management compensation, specifically decreasing option grants, as an incentive to increase dividend payments.[8] This is not to say that firms are decreasing overall CEO

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[7] Admittedly, using the first year following the act is arbitrary, but firms certainly have ample time to change dividend policy in the first year following the passage of JGTRRA.

[8] There are other factors besides insider option holdings that dissuade firms from changing dividend payouts, including a need to retain cash to fund growth opportunities, lack of cash, and debt covenants. All of these variables are included as model control variables. In addition, it is possible that firms decreased option grants in this period due to potential changes in accounting treatment of stock options

compensation, but merely shifting pay from option grants to either cash or stock compensation. A decrease in the number of options issued is a step that could reduce managerial resistance to a change in dividend policy, and a shift toward greater stock compensation could further reduce such resistance. While there are potential timing issues that add noise to this relationship, this noise only biases against finding results. Upon determining if there is a main effect associated with compensation structure changes, I determine whether board independence impacts the choice to change compensation policy, similar to the above impact of board independence on implicit dividend protection. As in H1b, H2a and H2b, I expect that board independence will assuage agency conflicts and lead firms to change compensation policy to encourage dividend increases. This leads to hypotheses 3a and 3b:

> **H3a:** Firms not increasing dividends in the first year following the passage of the JGTRRA decrease option grants to induce managers to increase dividends.

> **H3b:** Among firms not increasing dividends in the first year following the JGTRRA's passage, firms with greater relative board independence are more likely to decrease option grants to induce managers to increase dividends in the following year.

Data and Research Design

I gather data for this paper from a number of sources for the 2000 through 2004 sample period. Table 1, Panel A provides definitions for all variables used in the paper, and Table 1, Panel B outlines the data source for all variables. Dividend and stock return data are taken from the CRSP database. Executive compensation and option data

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(expensing) associated with FAS 123(R); Johnston and Rock (2006) find that firms voluntarily choosing to expense stock options early decrease stock option grants.

come from the Execucomp database. Board independence data come from the Board Analyst dataset from the Corporate Library. Other firm specific data come from the Compustat database. The Board Analyst dataset is the most limited, comprising 7,304 observations over the sample period. Among these 7,304 observations, 1,801 observations have ample data from the other datasets to create the dividend models used to test H2a and H2b, and 1,229 observations have enough data to create the compensation models used to test H1a and H1b.

I begin by creating a board independence metric from five separate measures of board independence: percentage of shares held by directors, shares received by directors annually for their service, percentage of inside directors on the board, percentage of affiliated gray directors on the board, and a dummy variable coded as a 1 for firms where the CEO serves as a director, and zero otherwise. I scale the two share variables by the maximum among all sample firms, similar to Clement and Tse (2003), creating a level between zero and one for both of these variables. I use the scaling method to create a continuous variable bounded by zero and one for each share measure to ensure that there is relatively equal weighting[9] for each of the five independence measures. Because a higher score for each of these variables is synonymous with less independence, I invert each of the continuous variables by subtracting the scaled value from one, such that a score of five would denote the highest possible board independence score. The calculation of the independence metric is shown in Model (1):

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[9] The inclusion of the dichotomous variable for CEO as director and the percentage of inside and gray directors, which are between zero and one, necessitate the scaling of the share variables. Otherwise, the size of the share variables would dominate the independence score. While the measure is somewhat arbitrary, the goal is to incorporate multiple measures of board independence to give a better picture of a firm's overall board structure.

$$Indep = f\,(sharesheld_{t-1},\ sharesreceived_{t-1},\ \%\ insiders_{t-1},\ \%gray_{t-1},\ CEO) \quad (1)$$

where:

Sharesheld	= 1 – (shares held by directors / total shares outstanding) / maximum sample value
Sharesreceived	= 1 – (annual shares paid to directors / total shares outstanding) / maximum sample value
%Insiders	= 1 – (# Inside Directors / # Total Directors)
%gray	= 1 – (# Gray or Affiliated Directors / # Total Directors)
CEO	= dummy variable assigned the value of 1 if CEO is not also a director, and zero otherwise

To determine whether firms implicitly dividend-protect CEO option wealth, I estimate ordinary least squares regression models of year-over-year compensation changes. The dependent variables include changes in bonus and changes in total cash compensation.[10] To control for alternative explanations of compensation increases, I use a number of economic determinant variables, similar to Core et al. (1999), including sales, investment opportunities, return on assets, stock returns, and the standard deviations of both return on assets and stock returns. The focus of these models is on insider option sensitivity (*Sense*)[11], which I define as the change in option value for a 1% change in stock price, changes in dividends (*Chg. Div*), and the interaction between option sensitivity and dividend changes[12], which determines if firms implicitly protect

[10] In addition to changes in bonus and total compensation, I examine a number of additional compensation variables, including changes in salary, restricted stock, stock option grants. As a sensitivity test, I also scale all compensation variables by total assets; results are qualitatively similar in both measures, but I use the unscaled dependent variables to be consistent with Core et al. (1999).

[11] In the compensation models, I use a measure of the sensitivity of option values to changes in stock price, as opposed to total number of CEO options, because option sensitivity better determines the wealth effect for CEOs associated with a change in stock price. Obviously, any dividend paid decreases the value of the stock price on the ex-dividend date, making this a better measure of how much CEOs lose from the payout of a dividend. Results are qualitatively similar when using either total options or the extent to which CEO options are in the money.

[12] To ensure a proper inference between the interaction of option sensitivity and dividend changes, I create categorical variables for high (greater than sample median) option sensitivity and for increases in

insider options. A positive coefficient for the interaction term (β_{11}) would support H1a.

Models (2) and (3) are as follows:

$$\begin{aligned} \textit{Chg. Bonus} = {} & \alpha + \beta_1 \textit{Sales} + \beta_2 \textit{InvOpp} + \beta_3 \textit{ROA} + \beta_4 \textit{Chg. ROA} + \beta_5 \textit{Ret} + \\ & \beta_6 \textit{StdROA} + \beta_7 \textit{StdRet} + \beta_8 \textit{Chg. Ops} + \beta_9 \textit{Chg. Div} + \\ & \beta_{10} \textit{Sense}_{t-1} + \beta_{11} \textit{Sense}_{t-1} * \textit{Chg. Div} + \varepsilon \end{aligned} \qquad (2)$$

$$\begin{aligned} \textit{Chg. Total Cash} = {} & \alpha + \beta_1 \textit{Sales} + \beta_2 \textit{InvOpp} + \beta_3 \textit{ROA} + \beta_4 \textit{Chg. ROA} + \\ & \beta_5 \textit{Ret} + \beta_6 \textit{StdROA} + \beta_7 \textit{StdRet} + \beta_8 \textit{Chg. Ops} + \beta_9 \textit{Chg. Div} + \\ & \beta_{10} \textit{Sense}_{t-1} + \beta_{11} \textit{Sense}_{t-1} * \textit{Chg. Div} + \varepsilon \end{aligned} \qquad (3)$$

where:

Chg. Bonus	= year-over-year changes in CEO bonus from Execucomp
Chg. Total Cash	= year-over-year changes in CEO total cash compensation from Execucomp
Sales	= log of net sales (Compustat Data Item #12)
InvOpp	= investment opportunities, calculated by Core et al. (1999) as the average of market to book ratio for the previous five years
ROA	= return on assets (earnings before interest and taxes [Compustat Data Item #18 + Compustat Data Item #15 + Compustat Data Item #16] divided by average total assets [Compustat Data Item #6])
Chg. ROA	= change in return on assets
Ret	= annual stock return from CRSP
Chg. Ops	= change in operating income before depreciation (Compustat Data Item #13)
StdROA	= standard deviation of ROA over the most recent five-year period
StdRet	= standard deviation of stock return over the most recent five-year period
Chg. Div	= change in common dividends in millions from CRSP, scaled by total assets (Compustat Data Item #6)[13]
Sense	= the sensitivity of CEO option value to a change in stock price, as created by Core and Guay (2002)[14]

dividends (classified as one for dividend increases, and zero otherwise). Sensitivity analyses yields qualitatively similar results regardless of whether changes in dividends or option sensitivity are classified as continuous or categorical variables in the interaction terms.

[13] To avoid improper inferences due to differences in sample firms' choices as to the number of shares outstanding, I use common dividends in millions and scale by assets to control for firm size. In sensitivity analyses, I use dividends per share and unscaled dividends, finding that results are qualitatively unchanged.

[14] Option sensitivity is calculated for the CEO's entire portfolio of option holdings, including option grants, unexercisable options, and in-the-money options. Please see the Appendix for the reproduction of Appendix A of Core and Guay (2002), which provides the calculation of option sensitivity.

Upon determining whether the cross-section of firms implicitly protect option wealth from dividend payments, I examine the impact of board independence on implicit dividend protection by adding the independence metric, *Indep*, created in equation (1). In addition to the main effect of board independence, I interact *Indep* with option sensitivity, changes in dividends, and the interaction of option sensitivity and changes in dividends. As in Models (2) and (3), I expect a positive coefficient on the interaction between option sensitivity and changes in dividends (β_{12}). In addition, a positive coefficient on the three-way interaction (β_{15}) between option sensitivity, changes in dividends, and board independence would be consistent with H1b. Models (4) and (5)[15] are as follows:

$$\begin{aligned} Chg.\ Bonus = {} & \alpha + \beta_1\ Sales + \beta_2\ InvOpp + \beta_3\ ROA + \beta_4\ Chg.\ ROA + \beta_5\ Ret + \\ & \beta_6\ StdROA + \beta_7\ StdRet + \beta_8\ Chg\ Ops + \beta_9\ Chg.\ Div + \\ & \beta_{10}\ Sense_{t-1} + \beta_{11}\ Indep + \beta_{12}\ Sense_{t-1} * Chg.\ Div + \\ & \beta_{13}\ Indep*Chg.\ Div + \beta_{14}\ Sense_{t-1}*Indep + \\ & \beta_{15}\ Sense_{t-1} *Chg.\ Div*Indep + \varepsilon \end{aligned} \tag{4}$$

$$\begin{aligned} Chg.\ Total\ Cash = {} & \alpha + \beta_1\ Sales + \beta_2\ InvOpp + \beta_3\ ROA + \beta_4\ Chg.\ ROA + \\ & \beta_5\ Ret + \beta_6\ StdROA + \beta_7\ StdRet + \beta_8\ Chg.\ Ops + \\ & \beta_9\ Chg.\ Div + \beta_{10}\ Sense_{t-1} + \beta_{11}\ Indep + \\ & \beta_{12}\ Sense_{t-1} * Chg.\ Div + \beta_{13}\ Indep*Chg.\ Div + \\ & \beta_{14}\ Sense_{t-1} * Indep + \beta_{15}\ Sense_{t-1} *Chg.\ Div*Indep + \varepsilon \end{aligned} \tag{5}$$

where:

Indep = board independence metric calculated in equation (1)

[15] As a sensitivity test, I run Models (2) through (5) only for firms increasing dividends, taking out the interactions between changes in dividends (*Chg. Div*) and *Indep* and *Sense*. Results are qualitatively similar using both measures.

Next, I estimate an ordinary least squares regression model to test H2a and H2b with dividend changes as the dependent variable.[16] I use cash, operating income, interest expense, firm size and market to book ratio as control variables[17], similar to Brown et al. (2005). I use cash as a control because firms often use dividend payments to decrease excessive cash positions. Because firms must have earnings in order to pay dividends and because dividend payments are expected to continue into future periods, I also control for operating income. Interest expense is a proxy for the level of debt that a firm carries on its balance sheet, as there are often restrictive dividend covenants attached to long-term debt. Market to book ratio controls for firm growth, as growth firms are less likely to pay dividends because they need all available cash to pay for future projects. The variables of interest in these models, however, are *Options*[18] and *Stock*; I expect a negative correlation between *Options* and *Chg. Div* and a positive correlation between *Stock* and *Chg. Div*., respectively, based on the findings of Brown et al. (2005). Model (6) is as follows:

$$Chg.\ Div = \alpha + \beta_1\ Cash + \beta_2\ Ops + \beta_3\ Intexp + \beta_4\ Options + \beta_5\ Stock + \beta_6\ Size + \beta_7\ MB + \varepsilon \quad (6)$$

where:

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[16] As a sensitivity test, I run these models with dividend levels on the left-hand side and the lagged dividend level on the right-hand side. Results are reported in Tables 5 and 7.

[17] Results are not sensitive to the inclusion of a number of other control variables to proxy for the ability to pay dividends, including idiosyncratic risk, growth, and net operating losses.

[18] I use total CEO options to be consistent with Brown et al. (2005) and other models looking at the impact of options on dividends. In addition, I rerun these models using option sensitivity, as calculated by Core et al. (1999), and the amount that CEO options are in the money. Results are qualitatively similar using any of the three measures.

Chg. Div	= change in common dividends, in millions of dollars, from CRSP, scaled by total assets (Compustat Data Item #6)
Cash	= cash and cash equivalents (Compustat Data Item #11), scaled by the maximum sample value
Ops	= operating income before depreciation (Compustat Data Item #13), scaled by the maximum sample value
Intexp	= interest expense (Compustat Data Item #15), scaled by the maximum sample value
Options	= CEO options held from Execucomp, as a percentage of shares outstanding
Stock	= CEO shares held from Execucomp, as a percentage of shares outstanding
Size	= total assets (Compustat Data Item #6)
MB	= market to book ratio (market value of equity [from CRSP] divided by book value [total assets, Compustat Data Item #6 – total liabilities, Compustat Data Item #181])

Upon determining that the main effects for *Stock* and *Options* are consistent with prior studies, I examine the relative impact of board independence on firms' dividend policies, adding the metric for board independence calculated in Model (1), along with the interactions between *Options* and *Stock* and *Indep* to Model (6). A negative coefficient for the interaction between *Indep* and *Stock* indicates that board independence mitigates CEOs ability to increase dividends based on personal share holdings, consistent with H2a. A positive coefficient for the interaction between *Indep* and *Options* would signify that board independence mitigates CEOs attempts to decrease dividend payments based on personal option holdings, consistent with H2b. Model (7) is as follows:

$$Chg.\ Div = \alpha + \beta_1\ Cash + \beta_2\ Ops + \beta_3\ Intexp + \beta_4\ Options + \beta_5\ Stock + \beta_6\ Size + \beta_7\ MB + \beta_8\ Indep + \beta_9\ Indep*Options + \beta_{10}\ Indep*Stock + \varepsilon \quad (7)$$

To test H3a and H3b, I estimate a regression model using changes in options granted, scaled by total assets[19], as the dependent variable. As in Models (2) through (5), I control for various economic factors associated with management compensation, including sales, investment opportunities, return on assets, stock return, operating income, and the volatility of stock returns and return on assets. The focus of Model (8) is on the variable indicating whether firms increased dividends in the preceding year, *LagDivDum*, and the interaction between *LagDivDum* and option sensitivity (*Sense*).[20] I expect a negative coefficient for both variables, consistent with the H3a notion that firms not paying dividends in the year following JGTRRA decrease option grants in an effort to give management the incentive to increase dividends. I interact *LagDivDum* with *Sense* because greater option sensitivity increases CEO option losses when dividends are increased, making these firms less inclined to increase dividends. To determine if firms decreasing option grants are also increasing other forms of compensation, I include two compensation variables, changes in total cash compensation (ChgTCC) and change in stock compensation (ChgStock). I expect negative coefficients for *ChgTCC* and *ChgStock* because I do not expect firms' changes in compensation to be punitive, but simply a change in the compensation mix. In Model (9), I include the impact of board independence on firms' option grant changes. The focus of Model (9) is on the three-way interaction between *LagDivDum*, *Sense*, and *Indep*. A negative coefficient for this term would support H3b, suggesting that firms with greater board independence

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[19] I use changes in option grants scaled by assets in this model to alleviate the effects of size associated with the other compensation variables, changes in cash compensation and changes in stock compensation, on the right-hand side.

[20] In addition to using *Sense*, I also use in-the-money options to proxy for firms whose CEOs are more likely to be impacted by dividend increases. Results are qualitatively similar for both measures.

decrease option grants to provide management with the incentive to increase dividends. Models (8) and (9) follow:

$$Chg.\ OptGrants = \alpha + \beta_1\ Sales + \beta_2\ InvOpp + \beta_3\ ROA + \beta_4\ Chg.\ ROA + \beta_5\ Ret + \beta_6\ StdROA + \beta_7\ StdRet + \beta_8\ Chg.\ Ops + \beta_9\ LagDivDum + \beta_{10}\ Sense_{t-1} + \beta_{11}\ Sense_{t-1} * LagDivDum + \beta_{12} ChgTCC + \beta_{13}\ ChgStock + \varepsilon \quad (8)$$

$$Chg.\ OptGrants = \alpha + \beta_1\ Sales + \beta_2\ InvOpp + \beta_3\ ROA + \beta_4\ Chg.\ ROA + \beta_5\ Ret + \beta_6\ StdROA + \beta_7\ StdRet + \beta_8\ Chg.\ Ops + \beta_9\ LagDivDum + \beta_{10}\ Sense_{t-1} + \beta_{11}\ Sense_{t-1} * LagDivDum + \beta_{12} ChgTCC + \beta_{13}\ ChgStock + \beta_{14}\ Indep + \beta_{15}\ Sense_{t-1} * LagDivDum + \beta_{16}\ Indep*Chg.\ Div + \beta_{17}\ Sense_{t-1} *LagDivDum*Indep + \varepsilon \quad (9)$$

where:

Chg. OptGrants	= changes in option grants from Execucomp
LagDivDum	= 1 if firms did not increase dividends in the year following the passage of JGTRRA
ChgTCC	= changes in total cash compensation from Execucomp, scaled by total assets (Compustat data item #6)
ChgStock	= changes in stock compensation, scaled by total assets (Compustat data item #6)

Results

Table 2, Panel A presents descriptive statistics for the entire sample period, while Table 2, Panel B contains descriptive statistics broken out into pre- and post-JGTRRA periods.[21] Both mean and median tests were conducted to determine differences in the pre- and post-JGTRRA periods. The most interesting finding in Panel A is that changes in dividends are, on average, negative in the sample period. This is consistent with previous literature (DeAngelo et al. 2002) suggesting that dividends are diminishing

[21] All sample periods ending after the passage of JGTRRA are considered part of the post-JGTRRA period. Under this classification scheme, the second quarter of 2003 for calendar-year firms is considered part of the post-Act period.

over time. Panel B shows that this effect is largely found in the pre-JGTRRA period, as changes in dividends are significantly greater in the post-JGTRRA period (to the point that post-JGTRRA dividend changes are positive). It is also interesting to note that changes in board independence, *Indep*, indicate boards are less independent in the post-JGTRRA period. This is consistent with previous literature that finds directors are being paid more in stock over time. Panel B also suggests that sample firms are growing over time, and they are significantly increasing cash compensation to their CEOs over the period. While CEO options increased slightly in the post-JGTRRA period, CEO stock holdings decreased in the post-JGTRRA period.

Table 3, Panel A presents bivariate correlations between variables used in the compensation models, Models (2) through (5); Panel B presents correlations between variables used in the dividend models, Models (6) and (7). Panel A reports a negative association between board independence and changes in bonus and total cash compensation, consistent with Core et al. (1999). Panel B reports a negative association between board independence and changes in dividends, stock compensation, and option compensation. For this reason, it is important to control for these factors and test for the effects of multicollinearity in multivariate analysis before making any conclusions as to the effects of board independence on firms' dividend policies.

Table 4 presents results for the compensation change models. Columns 1 and 2 present changes in bonuses as the dependent variable, as shown in Models (2) and (4), and Columns 3 and 4 present changes in total compensation as the dependent variable, as shown in Models (3) and (5). The explanatory variables used by Core et al. (1999), *Sales*, *Invopp*, *ROA*, *Ret*, *ROAStd*, *RetStd*, and *Ops* generally have similar coefficients as in their paper, albeit somewhat weaker for investment opportunities and operating income. The main effect for option wealth sensitivity, *Sense*, varies based on whether the board independence variables are included in the model, coming in significantly positive when the independence variables are excluded and significantly negative when these variables are included. However, the coefficient of interest in Models (2) and (3), the interaction between changes in dividends and option wealth sensitivity, is positive and significant, consistent with the H1a expectation that firms implicitly protect CEO options from increases in dividends by increasing bonuses and total cash compensation.

Columns 2 and 4 present the impact of board independence on changes in bonuses and total cash compensation as in Models (4) and (5). As in columns 1 and 3, the control variables used by Core et al. (1999) are significant in the expected direction. The negative coefficient on the main effect of board independence suggests that firms that are more independent make smaller increases in bonuses and total cash compensation. However, the positive coefficient on the three-way interaction term *Chg. Div* Sense*Indep* is consistent with the H1b expectation that more independent firms implicitly protect options from changes in dividends by increasing bonuses and total cash compensation. The results are not sensitive to the substitution of other option variables for *Sense*, such as total options or the amount that options are in the money. Untabulated sensitivity analysis finds that results are similar when the left-hand side variables are scaled by total assets, ensuring that size effects are not dominating the results. Additionally, results are qualitatively similar when the pre-JGTRRA and post-JGTRRA periods are examined separately.

In Table 5, I rerun the compensation models, using levels of bonus (total cash compensation) on the left-hand side, adding the lag of bonus (total cash compensation) as an additional control variable. Again, the Core et al. (1999) explanatory variables come in significant in their expected directions, and the lagged term is highly significant in all four models. As in Table 4, the interaction between *Chg. Div* and *Sense* is positive and significant, suggesting that firms with greater option value sensitivity to stock price changes that increase dividends pay higher cash compensation and bonuses. Additionally, board independence is negatively associated with these compensation levels, but firms with greater board independence appear to better protect CEO options from dividend increases by paying greater bonuses and cash compensation, holding other factors constant, as suggested by the positive coefficient on the three way interaction term, *Chg. Div*Sense*Indep*.

As an additional sensitivity test, I create a proxy for abnormal total cash compensation (TCC) to compare the amount of increase in compensation to the amount lost due to decreases in option values. The abnormal TCC variable is calculated by using the coefficients from a regression model using each of the Core et al. (1999) economic determinants over the entire 2000 through 2004 sample period, including sales, return on assets, stock returns, investment opportunities, and the volatility of stock returns and return on assets. The coefficients are multiplied by actual values of these economic determinant variables to create a predicted TCC and the predicted value is subtracted from actual TCC to create the abnormal TCC. I then divide abnormal TCC by the loss from a change in dividends, which is calculated by multiplying the change in ordinary dividends per share by the number of options (shares) held by the CEO. In untabulated results, I find that the median ratio of abnormal TCC to option loss from changes in dividends is approximately 1.2, which means that the median firm increases cash compensation by an amount slightly greater than the decrease in option value. This result also supports H1a, as it appears that firms are increasing cash compensation to compensate CEOs for option value decreases associated with increased dividends.

Table 6 presents the results for Models (6) and (7), for which changes in dividends represent the dependent variable. In Model (6), CEO stock holdings are positively associated with changes in dividends, while CEO option holdings are not significantly associated with changes in dividends, partially consistent with prior findings (Brown et al., 2005). However, the inclusion of board independence and the interactions between board independence and *Stock* and *Options* causes the effects of stock holdings to become insignificant. Firms with more independent boards of directors appear to make smaller dividend changes, whereas firms with less independent boards make greater dividend changes. While the results are not explicitly consistent with H2a and H2b, as the interactions between board independence (*Indep*) and *Stock* and *Options* are insignificant, the significance for *Indep* suggests that board independence impacts this agency relation between management share and option holdings and dividend policy. It is important to note that the insignificance of *Stock* and *Options* is not a function of multicollinearity, as no VIF score in the model exceeded ten.

These results are unchanged upon the inclusion of a number of other control variables, including idiosyncratic risk, growth, and net operating losses, and results are qualitatively similar in both the pre- and post-JGTRRA periods.

As a sensitivity test, I examine the impact of board independence, CEO stock and option holdings on dividend levels, controlling for lagged dividends and the other control variables used in Models (6) and (7). I report results in Table 7. Consistent with Brown et al. (2005), dividend levels are positively associated with *Stock* and negatively associated with *Options* when *Indep* is excluded from the model; however, the inclusion of *Indep* mitigates the explanatory power of *Stock* and *Options*, suggesting that firms with greater board independence not only make smaller dividend changes, but they also have lower dividend levels. As in Table 6, multicollinearity is not an explanation for the insignificance of *Stock* and *Options*, as VIF scores remain below ten in each model.

Table 8 presents the results for Models (8) and (9), which focus on post-JGTRRA changes in option grants for firms that did not increase dividends in the year following the act. In Model (8), *LagDivDum* is negative but insignificant; however, the interaction between *LagDivDum* and option sensitivity, *Sense*, is negative and significant, supporting the H3a assertion that firms with high option wealth sensitivity not increasing dividends in the year following JGTRRA decreased option grants. The negative coefficient for changes in total cash compensation (*ChgTCC*) suggests that firms decreasing option grants are simply changing the mix of compensation from options to cash. Results for Model (9) are qualitatively similar to Model (8); however, it is important to note that firms with greater board independence decrease option grants relative to other firms. This is particularly the case for firms with greater option value sensitivity, as evidenced by the negative coefficient on the three-way interaction between *LagDivDum*, *Sense*, and *Indep*. Overall, the results provide support for H3a and H3b. As an untabulated sensitivity test, I add a categorical variable for whether firms voluntarily adopted stock expensing early (McConnell et al. 2004) for FAS 123(R) to control for the alternative explanation for decreases in stock option grants found in Johnston and Rock (2006); untabulated results for H3a and H3b are unchanged, and the early adoption variable is insignificant in all models. Finally, I examine whether firms decreasing option grants subsequently increase dividends; however, these tests did not prove conclusive.

Discussion

The compensation models presented in Tables 4 and 5 suggest that firms assuage the agency costs associated with CEO options by increasing bonus and total cash compensation to reimburse CEOs for the reduction in option value associated with changing dividend payouts. Additionally, the inclusion of board independence in these models suggests that more independent boards better protect CEO options from the reduction in value associated with dividend increases through increases in cash compensation. The results found in Tables 4 and 5 potentially shed light on the reason why less independent boards increase dividends. Because firms appear to implicitly protect options, the negative impact of dividends for options is likely weaker than the positive impact of dividends for stock holdings. This, combined with the high stock ownership among board members (Holmstrom and Kaplan 2003) potentially aligns the motives of management and directors to increase dividends.

Based on the preceding results, boards of directors appear to have significant impact on firms' dividend and compensation policies, and they appear able to assuage agency costs associated with managers' desire to increase or to decrease dividend levels based on their stock or option holdings. Previous work has found that firms are more inclined to increase dividends based on higher management share ownership and are less inclined to increase dividends based on greater option holdings. However, the inclusion of board independence mitigates these effects and thereby impacts firms' dividend policies. The positive association between dividend increases and board shareholding, a key component of the board independence metric used in this paper, suggests that paying directors with shares ties the motivations of board members and management, leading to increased dividend payouts. For this reason, it appears that firms should exercise caution in paying directors in stock, as this might lead to the alignment of the financial interests of managers and directors in other circumstances, potentially changing the nature of the board's oversight of management actions. This is obviously beyond the scope of this paper, but it would be an interesting avenue for future governance research.

Conclusion

In this paper, I attempt to determine whether and how firms assuage the agency conflicts between management and shareholders regarding dividend policy, specifically focusing on the impact of board independence. I examine the impact of board independence on firms' changes in dividend policy, focusing on the impact of board independence on CEO option and share holdings. Holmstrom and Kaplan (2003) find that stock and option compensation for directors has increased over time. Increased equity compensation for directors could potentially align the financial interests of managers and directors, giving management a better chance to act opportunistically to the detriment of other shareholders. Opportunistic behavior in the case of JGTRRA could result in some firms increasing dividends too much (resulting in the expropriation of wealth from the firm) or not increasing dividends enough (resulting in the underutilization of shareholder tax benefits), depending on firms' and managers' particular characteristics. While many of the initial studies of JGTRRA look at firms increasing dividends following the act, I add to the stream of literature by also focusing on firms not increasing dividends after the passage of JGTRRA.

In addition to examining the impact of JGTRRA on dividend policy, I examine changes in management compensation schemes following the passage of the act. I specifically determine whether firms implicitly dividend-protect CEO option wealth through increased stock or cash (through bonuses) compensation. After looking at the main effects of each type of compensation change, I look at the impact of board independence to determine if more independent boards change compensation contracts to assuage the agency conflicts created by the act.

Data analyses suggest that the inclusion of board independence in common dividend models appears to mitigate the effects of both CEO stock and option holdings, as the coefficients for CEO stock and option holdings are considerably weaker when board independence is included. Firms with greater board independence pay lower dividends and increase dividends less than firms with less board independence. Additionally, firms with greater board independence pay their CEOs less both in bonuses and total cash compensation.

Relating to compensation, analyses suggest that the cross-section of firms used in this paper appear to implicitly dividend-protect CEOs' option wealth, as dividend-increasing firms with greater CEO option sensitivity increase bonuses and total cash compensation to reimburse CEOs for the decrease in option value, holding other variables commonly associated with compensation constant. Additionally, when breaking out firms with greater board independence, it appears that firms with greater board independence better protect options through increases in bonuses and other cash compensation than firms with less board independence. Finally, I find that firms not increasing dividends in the first year following the passage of JGTRRA decrease option grants, specifically for firms with greater CEO option sensitivity. While this is true of the cross-section of firms, firms with greater board independence decrease option grants more than firms with less board independence.

CHAPTER V

DIVIDENDS AND EARNINGS

The Jobs and Growth Tax Relief Reconciliation Act of 2003 (hereafter JGTRRA) reduced individual tax rates for qualifying dividends to the tax rate for long-term capital gains for the period beginning May 5, 2003 and ending December 31, 2010. The primary purpose of JGTRRA was to reduce excessive corporate earnings retention by encouraging higher dividend payouts (Brown et al. 2005), with the secondary expectation that an increase in dividends could help to reduce the incidence of corporate malfeasance illustrated by numerous recent corporate scandals. Upon signing JGTRRA, President Bush stated that, “This Act will encourage more companies to pay dividends, which, in itself, will not only be good for investors, but will be a corporate reform measure because it is hard to pay dividends unless you actually have cash flow” (Bush 2002).

To determine the impact of taxes on firms’ dividend policies, this paper examines the relation between contemporary dividend increases and earnings levels and changes around the passage of JGTRRA. Specifically, I investigate whether firms increase dividends in response to shareholder demands for dividends caused by short-term tax incentives or in response to favorable changes in the economic circumstances of the firm. The change in economic circumstance of the firm is central to the question of whether firms can sustain higher dividends. While some firms may have increased dividends to maximize the value of temporary tax advantages, other firms may have chosen to increase dividends only modestly so that the higher dividend could be maintained indefinitely. This latter strategy would provide a hedge against stock price effects associated with future dividend decreases or omissions (Christie 1994).

To determine whether firms' changes in dividend policy are a result of either increased shareholder demand for dividends or a favorable change in their economic circumstances, I begin by determining whether dividends can predict earnings equally well before and after JGTRRA. In addition to dividend-based forecasts, I examine the relative earnings persistence of dividend-increasing firms both before and after JGTRRA. A decline in the capacity of dividends to predict earnings and in earnings persistence for dividend-increasing firms following JGTRRA supports the proposition that firms temporarily increased dividends to take advantage of tax incentives. If a dividend change is temporary and implemented to exploit the new tax law, prior research suggests that a negative market price effect could follow a future dividend reduction (Christie 1994).[22]

I examine pre- and post-JGTRRA market reactions to dividend announcements to determine whether the market expects post-JGTRRA dividend increases to be temporary, as if associated with tax incentives or to reflect a change in firm economic status and outlook. A less positive market response to post-JGTRRA dividend announcements relative to pre-JGTRRA announcements would be consistent with the notion that the market interprets post-JGTRRA dividend increases to be in response to

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[22] The sunset provision attached to JGTRRA provides an interesting question as to how the market will react to dividend reductions when the JGTRRA benefits expire. Past research has shown that dividend reductions and omissions are viewed negatively by the market (Christie 1994); however, a tax-oriented rationale for dividend reductions associated with the end of temporary tax benefits could mitigate the market reaction. I do not speculate as to what the future market reaction will be, but I acknowledge that firms will be cognizant of the penalties associated with future dividend reductions when making dividend changes in the JGTRRA period.

shareholder demand associated with tax incentives rather than as a favorable change in the economic circumstances of the firm.

Next, I focus on the impact of dividend increases for growth firms before and after JGTRRA. Absent an exogenous stimulus such as JGTRRA, dividend increases by growth firms would likely be interpreted by the market as evidence of firm maturation (Grullon et al. 2002). Maturation occurs when firms experience a decrease in growth opportunities and use dividends as a means of reducing excessive free cash flow. However, growth firms may temporarily pay dividends in response to JGTRRA with no expectation of a decrease in future earnings, assuming growth opportunities are unchanged. I test whether dividend-increasing growth firms have a concurrent decrease in research and development (R&D) and capital expenditures in both the pre- and post-JGTRRA periods, consistent with a firm maturation argument. After testing whether there is a decrease in these expenditures, I examine the market reaction to dividend increases of growth firms before and after JGTRRA to determine if dividend increases are interpreted differently by the market.

Results generally support the notion that dividend increases were less predictive of future earnings in the post-JGTRRA period relative to the pre-JGTRRA period, consistent with a tax-oriented explanation for dividend increases. Overall, I find that earnings forecast errors are higher in the post-JGTRRA period and provide a more noisy prediction than in the pre-JGTRRA period, as forecast errors are more optimistically biased. Multivariate analyses suggest that firms increased dividends in response to tax incentives; however, the earnings response varies for growth and non-growth firms.

Non-growth firms that increase dividends have lower earnings to support them in the post-JGTRRA period, consistent with a tax-oriented explanation for dividend increases; however, growth firms that increase dividends have higher earnings in the post-JGTRRA period. Additionally, R&D and capital expenditures for dividend-increasing growth firms are significantly higher in the post-JGTRRA period, suggesting that post-JGTRRA dividend increases are in response to tax incentives as opposed to firm maturation.

Market reaction to dividend increases for both growth firms and non-growth firms in the post-JGTRRA period is consistently positive. The market views initiation and increases in ordinary dividends by growth firms negatively in the pre-JGTRRA period but more positively in the post-JGTRRA period. Sensitivity analyses provide evidence that small dividend increases by growth firms lead to the most positive market responses, lending support to the notion that these firms are responding to the tax benefits of JGTRRA but not losing growth opportunities. The market reacts to special dividends paid by growth firms positively in both the pre-JGTRRA and the post-JGTRRA periods.

This paper is relevant to lawmakers to determine how firms respond to tax incentives and whether firms' reactions to this specific act were consistent with Congressional intent. It is also of interest to researchers in accounting and finance, extending the dividend literature by adding to our understanding of the causal factors of dividend policy and more generally the impact of taxes on policy, providing evidence that individual-level taxes have a significant impact on firms' dividend policies, even for growth firms.

The paper is organized as follows: the next section develops hypotheses; the third section outlines the data and methodology used. The fourth section summarizes the univariate and multivariate results, and the final section concludes.

Hypotheses Development

Initial studies examining the effects of JGTRRA (Blouin et al., 2004 and Chetty and Saez, 2004) find that firms increase dividend payments in response to the reduced individual-level taxes; however, no attempt is made to determine whether post-JGTRRA dividend increases are simply temporary responses to tax incentives or based on improved earnings expectations that could be sustainable beyond the sunset period of tax benefits. To distinguish between these alternative explanations, I first determine whether dividend increases have the same predictive power regarding future earnings in the post-JGTRRA period as in the pre-JGTRRA period. Penman (1983) creates dividend-based earnings forecasts to suggest that dividend forecasts more accurately explain future earnings than management forecasts or naïve models, consistent with firms using dividends as signals. I estimate dividend-based earnings models' predictive ability for the pre-JGTRRA period and compare the results to model estimates in the post-JGTRRA period. A decline in the explanatory power of dividend-based earnings models following JGTRRA supports the proposition that firms have increased dividends to take advantage of tax incentives, despite the potential negative market price reaction that could result from future reversal of the dividend change (Christie 1994).

In addition to dividend-based forecasts, I also examine the relative earnings persistence of dividend-increasing firms before and after JGTRRA. In a pre-JGTRRA test of the information content of dividends, Skinner (2004) finds that reported earnings of dividend-paying firms are more persistent than firms not paying dividends. In this paper, I examine whether the act of increasing dividends is associated with greater earnings persistence, and whether this association deteriorates from the pre-JGTRRA to the post-JGTRRA period. Similar to the dividend-based earnings forecast tests, decreased earnings persistence for dividend-increasing firms following JGTRRA supports the proposition that firms have increased dividends to take advantage of tax incentives. Accordingly, H4a and H4b are as follow:

> **H4a:** Post-JGTRRA dividends are less informative as to future earnings levels and earnings changes than pre-JGTRRA dividend-based earnings forecasts.
>
> **H4b:** The earnings of dividend-increasing firms are less persistent in the post-JGTRRA period than the pre-JGTRRA period.

In addition to examining firms' earnings, I examine pre- and post-JGTRRA market responses to dividend announcements. Past research suggests that market responses are generally favorable to announcements of dividend increases (Healy and Palepu 1988), consistent with the market expectation of increased future earnings. A less positive market response to post-JGTRRA announcements of dividend increases relative to pre-JGTRRA announcements would imply that the market interprets post-JGTRRA dividend increases to be in response to tax-driven shareholder demands rather than a favorable change in the economic circumstances of the firm. My fifth hypothesis reflects this expectation and is as follows:

> **H5**: Market reaction is less positive to post-JGTRRA dividend increases than to pre-JGTRRA dividend increases.

Next, I focus on dividend increases of growth firms before and after JGTRRA. Absent an exogenous event such as JGTRRA, dividend increases by growth firms would likely be interpreted by the market as evidence of firm maturation (Grullon et al. 2002). Maturation occurs as growth firms experience a reduction in growth opportunities and use dividend payments as a means of reducing excessive free cash flow. However, growth firms may pay dividends in response to tax-driven shareholder demand for dividends following JGTRRA with no expectation of maturation, as firms' growth opportunities are unchanged. I test the maturation effect by examining R&D and capital expenditures of growth firms in the pre- and post-JGTRRA periods, expecting that R&D and capital expenditures are greater in the post-JGTRRA period than the pre-JGTRRA period for dividend-increasing growth firms. This leads to H6a and H6b:

> **H6a:** Research and development expenditures for dividend-increasing growth firms are higher in the post-JGTRRA period relative to the pre-JGTRRA period.
>
> **H6b**: Capital expenditures for dividend-increasing growth firms are higher in the post-JGTRRA period than in the pre-JGTRRA period.

If growth firms pay dividends in response to tax incentives provided by JGTRRA without the expectation of maturation following JGTRRA, dividend increases of growth firms before and after JGTRRA may be interpreted more positively by the market. After determining whether there are changes in dividend-increasing growth firms' R&D and capital expenditures following JGTRRA, I examine the market's reaction to announcements of dividend increases by growth firms before and after JGTRRA. This gauges whether the market reacts as if these firms have matured or simply responded to increased tax-driven demand for dividends following JGTRRA. A more positive market response to post-JGTRRA dividend announcements relative to pre-JGTRRA announcements would imply that the market interprets growth firms' post-JGTRRA dividend increases to be a response to tax-driven shareholder demands rather than a mechanism for paying out excessive free cash flow arising from firm maturation effects. My seventh hypothesis is as follows:

> **H7:** Market reaction to dividend increases for growth firms is more positive in the post-JGTRRA period than in the pre-JGTRRA period.

Data and Research Design

I gather data from a number of sources for the 2000 through 2004 sample period. Dividend and stock return data are taken from the CRSP database. Other firm-specific data come from the Compustat database. When the CRSP and Compustat databases are combined, there are 33,006 observations with sufficient data for the initial models including dividend and earnings levels. I then delete 4,012 observations that have missing values for either lagged dividends or earnings, along with observations which have values below the 1st percentile or greater than the 99th percentile for any of the continuous variables used in the models. This leaves a final sample of 28,994 observations for the main tests. Data limitations for R&D and capital expenditures decrease the number of observations from 28,994 to 14,904 for these tests.

Tests of H4a and H4b determine whether firms without an ability to sustain higher dividends nevertheless increase dividends to satisfy tax induced shareholder demands. To test H4a, I measure the explanatory value of dividend-based forecasts, loosely based on the Penman (1983) dividend expectation model for earnings.[23] To estimate the model, I combine pre-JGTRRA and post-JGTRRA observations. I first compare the quarterly pre-JGTRRA and post-JGTRRA earnings forecast errors calculated by the Penman (1983) model, using quarter-over quarter lagged terms for dividends and earnings, as presented in Model (10):

$$Earn_t = \alpha + \beta_1\, Div_t + \beta_2\, Div_{t-4} + \beta_3\, Earn_{t-4} + \varepsilon \qquad (10)$$

where:

Earn = Quarterly net income (Compustat data item #11 * data item #15)
Div = Quarterly ordinary dividends aggregated from CRSP

More negative post-JGTRRA forecast errors, relative to pre-JGTRRA forecast errors, would indicate that firms increased dividends without an expectation of higher future profitability. Additionally, greater absolute forecast errors would indicate that dividend-based earnings forecasts are noisier in the post-JGTRRA period. This combination could be interpreted as being consistent with firms increasing dividends in response to shareholder demands for higher dividends rather than favorable changes in the economic circumstances of the firm, hence less informative as to future earnings, consistent with H4a. In addition to simple tests of differences in forecast errors, I add a post-JGTRRA dummy (*Post*) to Model (10), along with the interaction between *Post* and dividend levels (changes), as presented in Model (11):

$$Earn_t = \alpha + \beta_1\, Div_t\, (Chg.\ Div_t) + \beta_2\, Earn_{t-4} + \beta_3\, Post + \beta_4\, Post^{*}\, Div_t\, (Chg.\ Div_t) + \varepsilon \qquad (11)$$

[23] Penman (1983) uses annual data and creates prediction models. To avoid contamination between predictions of pre- and post-Act observations, I compare the error terms of Model (1) to determine the difference between actual and predicted earnings. In additional analyses, I delete 2003 observations to ensure that there is not bias related to the year of the tax law change. Results are consistent based on both methods.

where:

Post = 1 for quarters following the passage of JGTRRA, and zero otherwise
Chg. Div = Change in quarterly ordinary dividends from CRSP

As in Penman (1983), I expect positive coefficients on concurrent dividends, along with lagged earnings. The coefficients of interest are the interactions between *Post* and concurrent dividends. Negative coefficients for each of these interaction variables would indicate that post-JGTRRA dividends are less positively correlated with earnings, consistent with the H4a argument that tax-driven shareholder demand for dividends influenced firms' post-JGTRRA dividend increases. To determine that firm size is not driving the results of Model (10), I scale both the earnings variables and the dividend variables by assets, tabulating both the scaled and unscaled results.[24]

In addition to earnings levels, I examine the ability of dividends to forecast earnings changes in both the pre-JGTRRA and post-JGTRRA periods. I modify Model (2) from Nissim and Ziv (2001), who examine changes in earnings as a function of both changes in dividends and return on equity. In addition to dividend changes, I also include dividend levels on the right-hand side in a separate model. I run both scaled and unscaled versions of the models to ensure that size does not drive the results. As in Model (2) above, I add the dichotomous variable (*Post*) for post-JGTRRA observations, along with the interaction between *Post* and dividend levels (changes). A negative coefficient for the interaction between *Post* and the dividend variable would suggest that

[24] As a sensitivity test, I also include categorical industry (one-digit SIC codes) variables to control for industry effects.

post-JGTRRA dividend increases are less positively correlated with concurrent earnings changes, consistent with the influence of tax incentives. Model (12) is as follows:

$$Chg.\ Earn_t = \alpha + \beta_1\ Div_t\ (Chg.\ Div_t) + \beta_2\ ROE_t + \beta_3\ Post + \beta_4\ Post*Div_t\ (Chg.\ Div_t) + \varepsilon \qquad (12)$$

where:

ROE = return on equity (Compustat data item $\#11_t$ * data item $\#15_t$)/ Compustat data item $\#60_{t-1}$

To test H4b, I examine whether dividend increases precipitate higher quality future earnings using traditional earnings persistence tests. In a pre-JGTRRA test of the information content of dividends, Skinner (2004) finds that reported earnings of dividend-paying firms are more persistent than firms not paying dividends. I compare earnings persistence before and after JGTRRA for dividend-increasing firms. Model (13) builds from Skinner's (2004) Model (7), using dummy variables for dividend changes and adding a dummy variable for post-JGTRRA dividend changes, and is as follows:

$$Earn_{t+1}/TA_t{}^{25} = \alpha + \beta_1\ DivChanger + \beta_2\ Earn_t/TA_{t-4} + \beta_3 DivChanger*\ Earn_t/TA_{t-4} + \beta_4\ Post + \beta_5\ Post*\ DivChanger + \beta_6\ Post*\ DivChanger*\ Earn_t/TA_{t-4} + \varepsilon \qquad (13)$$

where:

TA = total assets (Compustat quarterly data item #44)
DivChanger = 1 if firms increased dividends in the period, and zero otherwise

Consistent with the findings of Skinner (2004), I expect to find positive coefficients for *DivChanger*, lagged earnings, and the interaction between *Divchanger* and *Earn*. I make no prediction for *Post*; however, a negative coefficient on the interaction between *Post* and *DivChanger* would indicate that dividend-increasing firms

[25] To ensure consistency with Models (2) and (3), I also show Model (4) with unscaled earnings.

have lower return on assets following JGTRRA. A negative coefficient on the three-way interaction between *Post*, *DivChanger* and lagged earnings would indicate that there was a decrease in earnings persistence following JGTRRA among dividend-increasing firms, consistent with the H4b expectation that firms' dividend policies respond to shareholder demand for higher dividends associated with tax incentives or favorable changes in the economic circumstances of the firm.

To test H5, I regress size-adjusted three-day cumulative abnormal returns on changes in dividends and an indicator variable for post-JGTRRA dividend changes to determine if there was a change in the market's reaction to dividend increases after the passage of JGTRRA. Again, the focus is on the interaction between *Post* and the change in dividend variable, as a negative coefficient would indicate that the market concluded that dividend changes were influenced more by tax incentives and less by fundamental changes in the underlying earnings generation of the firm. Model (14) is as follows:

$$CAR_t = \alpha + \beta_1\, Div^{26}\, (Chg.\ Div_t) + \beta_2\, Post + \beta_3\, Post * Div\ (Chg.\ Div_t) + \varepsilon \quad (14)$$

where:

CAR = size-adjusted three-day cumulative abnormal returns surrounding firms' announcements of dividend increases

To test H6a and H6b, I examine the future growth implications of dividend increases by comparing R&D and capital expenditures[27] for growth firms increasing dividends before and after JGTRRA. As in previous models, I examine the R&D and

[26] I compare the market reaction to announcements of ordinary dividend and special dividend announcements, along with announcements of changes in dividends.
[27] Because R&D and capital expenditures are unpopulated for many firms in Compustat, I also test total cash flows from investing. Results for cash flows from investing are similar but somewhat weaker than for R&D and capital expenditures.

capital expenditure variables both scaled by assets and unscaled to ensure that results are not solely attributed to firm size effects. In both models, I add a proxy for relative growth rate, measured by changes in firm sales and scaled by the largest sample firm value to create a continuous variable bounded by zero and one (Clement and Tse 2003). I also interact the growth variable with dividend changes and the post-JGTRRA dummy variable. A negative coefficient for the interaction between changes in dividends and growth indicate support for the firm maturation hypothesis in the pre-JGTRRA period, as growth firms increasing dividends would suggest signs of maturity, choosing to pay dividends as a way to reduce free cash flow. A positive coefficient on the three-way interaction between *Post*, *Growth*, and *Chg. Div* lends support to the notion that growth firms responded to tax incentives associated with JGTRRA, rather than paying dividends as a mechanism to reduce excessive free cash flow, consistent with H6a and H6b. Models (15) and (16) are as follows:

$$Chg.\ R\&D_t = \alpha + \beta_1\ Chg.\ Div_t + \beta_2\ Post + \beta_3\ Post{*}\ Chg.\ Div_t + \beta_4\ Growth + \beta_5\ Growth{*}\ Chg.\ Div_t + \beta_6\ Post{*}Growth{*}\ Chg.\ Div_t + \varepsilon \qquad (15)$$

$$Chg.\ CAPX_t = \alpha + \beta_1\ Chg.\ Div_t + \beta_2\ Post + \beta_3\ Post{*}\ Chg.\ Div_t + \beta_4\ Growth + \beta_5\ Growth{*}\ Chg.\ Div_t + \beta_6\ Post{*}Growth{*}\ Chg.\ Div_t + \varepsilon \qquad (16)$$

where:

Chg. R&D	= changes in quarterly research and development expenditures (Compustat data item #4)
Chg. CAPX	= changes in quarterly capital expenditures (Compustat data item #90)
Growth	= changes in quarterly firm sales (Compustat data item #2), scaled by the largest sample firm value to create a continuous variable bounded by zero and one, consistent with Clement and Tse (2003).

As a sensitivity test to Models (11) and (12), I determine whether the earnings implications of dividends in the pre- and post-JGTRRA periods are different for growth and non-growth firms. I first look at earnings levels by adapting Model (11), and then I modify Model (12) to test changes in earnings. As in Models (11) and (12), I examine the earnings and dividend variables both scaled by assets and unscaled to ensure that results are not solely attributed to firm size effects. In both models, I add the proxy for relative growth rate, and I interact the growth variable with dividend levels and changes and the post-JGTRRA dummy variable. A negative coefficient for the interaction between dividends and *Post* indicates that dividends are less indicative of earnings in the post-JGTRRA period for non-growth firms, consistent with the tax argument made in H4a. A positive coefficient on the three-way interaction between *Post*, *Growth*, and dividends indicates that growth firms paying dividends after the passage of JGTRRA have stronger earnings. Models (17) and (18) are as follows:

$$Earn_t = \alpha + \beta_1\, Div_t\, (Chg.\ Div_t) + \beta_2\, Earn_{t-1} + \beta_3\, Post + \beta_4\, Post{*}\, Div_t\, (Chg.\ Div_t) + \beta_5\, Growth + \beta_6\, Growth{*}\, Div_t\, (Chg.\ Div_t) + \beta_7\, Post{*}Growth{*}\, Div_t\, (Chg.\ Div_t) + \varepsilon \qquad (17)$$

$$Chg.\ Earn_t = \alpha + \beta_1\, Div_t\, (Chg.\ Div_t) + \beta_2\, ROE_t + \beta_3\, Post + \beta_4\, Post{*}\, Div_t\, (Chg.\ Div_t) + \beta_5\, Growth + \beta_6\, Growth{*}\, Div_t\, (Chg.\ Div_t) + \beta_7\, Post{*}Growth{*}\, Div_t\, (Chg.\ Div_t) + \varepsilon \qquad (18)$$

where:

Growth = changes in quarterly firm sales (Compustat data item #2), scaled by the largest sample firm value to create a continuous variable bounded by zero and one, consistent with Clement and Tse (2003).

To test H7, I calculate size-adjusted three-day cumulative abnormal returns around the dividend announcements of growth firms to determine the market reaction to dividend increases. I build from Model (14), adding relative growth (*Growth),* and the interaction between *Growth*, *Chg. Div*[28] and *Post*. As illustrated in Models (15) and (16), a negative coefficient on the interaction between changes in dividends and growth is indicative of the market expecting that growth firms paying dividends have matured. However, a positive coefficient on the three-way interaction between *Post*, *Growth* and dividends provides evidence that the market concluded that growth firms increased dividends in response to tax incentives, as opposed to concluding that these firms matured, consistent with H7. Model (19) is as follows:

$$CAR_t = \alpha + \beta_1\, Chg.\ Div_t + \beta_2\, Post + \beta_3\, Growth + \beta_4\, Growth*Chg.\ Div_t + \beta_5\, Post * Chg.\ Div_t + \beta_6\, Post *Growth*Chg.\ Div_t + \varepsilon \quad (19)$$

Univariate Analysis

Table 9, Panel A presents descriptive statistics for the entire sample period, while Table 9, Panels B and C provide descriptive statistics for the pre- and post-JGTRRA periods.[29] Both mean and median tests were conducted to determine whether variables differed between the pre- and post-JGTRRA periods. The results of those tests are presented in Panel C. There was considerable growth for sample firms from the pre-JGTRRA to the post-JGTRRA period, as total assets (*TA*), sales (*Growth*), and net income (*Earn*) are all significantly greater in the post-JGTRRA period based on both

[28] In sensitivity analyses, I break out the change in dividend variable into small (less than five percent), medium, and large (greater than ten percent) changes to determine if there is a difference in the market reaction to dividends of varying sizes, as it is possible that investors could be disappointed with smaller than expected dividend changes in the post-Act period.

[29] All sample periods ending following the passage of JGTRRA are considered part of the post-Act period. Under this classification scheme, the second quarter of 2003 for calendar-year firms is considered part of the post-Act period. As previously discussed, in sensitivity analyses I have deleted 2003 observations to ensure that there are not issues in calculating pre- and post-Act observations.

mean and median tests. Additionally, mean change in dividends (*Chg. Div*) nearly doubled in the post-JGTRRA period. These univariate tests suggest that there are likely joint influences of tax incentives and improved earnings fundamentals for the increase in dividends. Additionally, I compare forecast errors in the pre- and post-JGTRRA periods to determine the explanatory value of dividend-based earnings forecasts by comparing the error terms from Model (10) in the pre- and post-JGTRRA period. I find that forecast errors (*Err*) are higher (t-value for difference = 5.42) in the post-JGTRRA period than in the pre-JGTRRA period and absolute forecast errors (*AbsErr*) are not significantly different between period. These results suggest that dividends are at least as informative as to future earnings in the post-JGTRRA period as in the pre-JGTRRA period, lending no univariate support to H4a. However, it is possible that earnings are simply stronger in the post-JGTRRA period due to macroeconomic circumstances, warranting multivariate analysis to test H4a.

Multivariate Analysis

Table 10 presents the results for earnings levels regressed on dividends before and after JGTRRA. As expected, earnings levels are positively associated with current dividends, dividend changes, and lagged earnings. Post-JGTRRA earnings are higher than pre-JGTRRA earnings, as evidenced by the positive coefficient for *Post*. This result likely reflects the economic upturn in the post-JGTRRA period. The variable of interest in Model (11) is the interaction between *Post* and *Div* (*Chg. Div*). A negative coefficient would suggest that post-JGTRRA dividends were less informative as to future earnings, consistent with tax-driven shareholder demands leading to increased dividends. The coefficient is marginally negative, suggesting limited support for the H4a. Results are generally similar between the scaled and unscaled models; however, the interaction between *Post* and *Div* is not significant in either of the scaled models, indicating a lack of support for H4a.

Table 11 presents the results for Model (12), which examines the predictive value of dividends for earnings changes. As expected, I find that both current dividend levels and changes are positively associated with changes in earnings. However, while the variable of interest, the interaction between *Post* and *Div* (*Chg. Div*), is in the predicted (negative) direction, it is not significant, suggesting that the fundamental earnings circumstance of firms continued to be the primary driver of dividend increases in the post-JGTRRA period as opposed to tax-driven shareholder demands. Unlike Model (11), however, results are stronger for the scaled models, as there is a marginally negative association between scaled earnings changes and the interaction between *Post* and *Div*, providing marginal support for H4a. Considering the results of all the univariate and multivariate tests of H4a, there is only limited support for the notion that dividends were less informative as to future earnings.

Table 12 presents the results for the H4b expectation that dividend-increasing firms have lower earnings persistence in the post-JGTRRA period relative to the pre-JGTRRA period. The variables of interest in Model (13) are the interaction between *Post* and *DivChanger* and the three-way interaction between *Post*, *DivChanger* and lagged earnings; negative coefficients for these variables would indicate that there was a decrease in earnings and earnings persistence, respectively, following JGTRRA among dividend-increasing firms, consistent with the explanation that firms increased dividends in response to the tax incentive independent of fundamental earnings effects on dividends. The coefficient for the interaction between *Post* and *DivChanger* is negative and significant, suggesting that dividend-increasing firms had lower earnings in the post-JGTRRA period than the pre-JGTRRA period; however, the coefficient for the three-way interaction between *Post*, *DivChanger* and earnings (*Earn/TA*) is positive, suggesting that dividend-increasing firms' had higher earnings persistence in the post-JGTRRA period. Thus, results generally do not support H4b. Additionally, it appears that size does not influence this relation, as results are quantitatively similar using the scaled and unscaled variables.

Table 13 examines the market reaction to dividend announcements using a three-day cumulative abnormal return calculation, both before and after JGTRRA. In this table, I separately consider the market reaction to announcements of ordinary dividends, special dividends, and changes in ordinary dividends. Results for each type of dividend are reported in separate columns. The coefficient of interest in each model is the interaction between *Post* and the dividend variable. A negative coefficient would imply that the market interpreted dividend increases were driven by increased shareholder demand for dividends because of tax incentives. For all three models, the interaction between *Post* and *Div* is positive, inconsistent with H5. This is potentially due to increased investor appreciation of dividends due to decreased shareholder-level taxes as opposed to the expectation that dividends were only temporary. The coefficient is higher for special dividends than for changes in ordinary dividends, suggesting that the positive reaction to dividend announcements reflects the lower tax costs for individual investors in the post-JGTRRA period. It is also of interest to note the consistently positive coefficient associated with *Post* in all three models. This coefficient is likely a refection of a generally stronger economy in the post-JGTRRA period relative to the pre-JGTRRA period.

Table 14 displays results of testing the H6a and H6b assertions related to growth firms' changes in R&D and capital expenditures following changes in dividends. A negative coefficient for the interaction between dividend changes and growth indicates support for firm maturation in the pre-JGTRRA period, as growth firms increasing dividends would have matured and chosen to pay dividends as a way to reduce free cash flow because of fewer growth opportunities. A positive coefficient on the three-way interaction between *Post*, *Growth*, and *Chg. Div* lends suggests that growth firms responded to tax incentives associated with JGTRRA, rather than paying dividends as a mechanism to reduce excessive free cash flow, consistent with H6a and H6b. Results in Table 14 are generally consistent with H6a and H6b, as the coefficient for pre-JGTRRA dividends paid by growth firms, *Post***Div* (*Chg. Div*), is negative and significant. Additionally, the coefficient for post-JGTRRA dividends and the three-way interaction between *Post*, *Growth*, and *Div* (*Chg. Div*) are positive and significant for both R&D and capital expenditures, suggesting that post-JGTRRA dividend payments by growth firms were not in lieu of investing activities to reflect slowed growth.[30] These results support

[30] While the results are somewhat weaker in the scaled models, there is continued support for H3a and H3b. Additionally, results are similar for increases in cash flows from investing (Compustat data item #91), as overall cash flows from investing are higher in the post-Act period for growth firms paying dividends.

a firm maturation argument in the pre-JGTRRA period and a tax argument in the post-JGTRRA period.

Tables 15 and 16 examine whether the earnings implications of dividends in the pre- and post-JGTRRA periods are different for growth and non-growth firms. Results in Table 15 suggest that the weaker results found in Table 10 for H4a are a result of differences in reactions by growth and non-growth firms, as the coefficient for *Post***Div* (*Chg. Div*) is negative and significant. This implies that non-growth firms increased dividends in the post-JGTRRA period despite lower earnings levels. The positive coefficient on the three-way interaction between *Post*, *Growth*, and *Div* (*Chg. Div*) suggests that growth firms increased dividends in the post-JGTRRA period but the increase was related to the level of earnings. Results in Table 16 are similar to Table 15, albeit somewhat weaker. The interaction between *Post* and *Div* (*Chg. Div*) is generally negative, and the three-way interaction between *Post*, *Growth* and *Div* (*Chg. Div*) is generally positive. Overall, these results suggest that growth firms paying dividends had stronger earnings, which adds strength to the tax argument for dividends paid by growth firms over the maturation argument, supporting H4a.

To test H7, I calculate three-day cumulative abnormal returns around dividend announcements, specifically focusing on growth firms, to determine the market reaction to these firms' dividend increases. I build from Model (14), adding the *Growth* variable and the interaction between *Growth*, *Chg. Div.* and *Post*. Similar to Models (17) and (18), a negative coefficient on the interaction between changes in dividends and growth is indicative of the market expecting that growth firms paying dividends have matured.

However, a positive coefficient on the three-way interaction between *Post*, *Growth* and *Div* provides evidence that the market interpreted that growth firms increased dividends in response to tax incentives, as opposed to the firm maturation effect, consistent with H7. The results in Table 17 generally support H7, as ordinary dividends paid by growth firms are interpreted negatively by the market before JGTRRA, but are interpreted more positively in the post-JGTRRA period. It is also interesting to note that sensitivity analyses suggest that small dividend (less than five percent) increases by growth firms lead to significantly more positive market reaction; this also supports the tax argument, as it appears that small dividend increases by growth firms were rewarded by the market for utilizing the tax benefits of JGTRRA without damaging future growth opportunities. Finally, market reaction to special dividends paid by growth firms is viewed positively in both the pre-JGTRRA and the post-JGTRRA periods with an insignificant difference between the two periods.

Conclusion

To determine the impact of taxes on firms' dividend policies, this paper examines the relation between contemporary dividend increases and future earnings around the passage of the Jobs and Growth Tax Relief Reconciliation Act of 2003. Specifically, I investigate whether firms increase dividends in response to shareholder demands for dividends caused by short-term tax incentives or in response to favorable changes in the economic circumstances of the firm, consistent with the ability to sustain dividend levels in the future. While some firms may have increased dividends to maximize the value of temporary tax advantages, other firms may have chosen to increase dividends only to a level that could be maintained after the expiration of JGTRRA, guarding against future dividend decreases or omissions (Christie 1994).

I determine whether dividend increases have the same explanatory value as to future earnings following JGTRRA as before JGTRRA. In addition to dividend-based forecasts, I also examine the relative earnings persistence of dividend-increasing firms both before and after JGTRRA. I observe whether firms increasing dividends have increased earnings persistence before and after the passage of JGTRRA. Results provide limited support for the notion that dividend increases were less explanatory as to earnings in the post-JGTRRA period, consistent with a tax-oriented explanation for dividend increases. Multivariate analysis also suggests that firms increased dividends in response to tax incentives; however, the earnings response varied for growth and non-growth firms. Non-growth firms that increase dividends have lower earnings to support them in the post-JGTRRA period consistent with a tax-oriented explanation for dividend increases; however, growth firms that increase dividends have higher earnings in the post-JGTRRA period. Additionally, I find that dividend-increasing growth firms have higher R&D and capital expenditures in the post-JGTRRA period relative to the pre-JGTRRA period, supporting the notion that post-JGTRRA dividends were in response to tax incentives rather than due to firm maturation effects.

Next, I focus on the earnings responses and market reactions to dividend increases of growth firms before and after JGTRRA. Market reaction to dividend increases for both growth firms and non-growth firms in the post-JGTRRA period is consistently positive. For non-growth firms, this potentially suggests that the market valued dividends taxed at a lower rate; for growth firms, this reaction suggests that the market did not interpret dividend payments as firm maturation in the post-JGTRRA period, but as satisfying increased shareholder demand for dividends. Ordinary dividends paid by growth firms are viewed negatively by the market in the pre-JGTRRA period, but they are seen more positively in the post-JGTRRA period. Additionally, small (less than five percent) dividend increases by growth firms are met with more positive market reaction in the post-JGTRRA period, consistent with the ability to both increase dividends and have future growth opportunities.

There is a great opportunity for future research examining the impact of JGTRRA on growth firms. While our results suggest that these firms' are not paying dividends as a result of poor growth opportunities and a reduction of free cash flow, there is not sufficient data to determine the future earnings impact of these dividend payments. It is possible that there will be an earnings decline, similar to the findings of DeAngelo et al. (1996) and Bernartzi et al. (1997); however, it is possible that these firms paid dividends under different circumstances due to tax incentives. This must be left to future research. Additionally, it will be interesting to determine whether firms will sustain these dividend increases after the expiration of sunset provisions and how the market will react to such reductions.

CHAPTER VI

TAXES AND INVESTMENTS

This study examines the effects of two tax laws enacted to increase business capital expenditures. First, the Job Creation and Worker Assistance Act (JCWAA) of 2002 created two significant business tax provisions in response to the terrorist attacks on September 11, 2001: (1) a 30 percent first-year bonus depreciation allowance for new asset purchases with recovery lives not more than 20 years, and (2) for firms with operating losses in fiscal years 2001 and 2002, the act extended the net operating loss (NOL) carryback period from two to five years, allowing firms to obtain refunds for taxes paid on income from as far back as 1996. Second, the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) of 2003 increased the 30 percent bonus depreciation allowance to 50 percent for qualified asset purchases from May 2003 until December 2004.

Congress passed these acts to create incentives for firms to increase capital asset spending to spur the lagging economy. Upon signing JCWAA, President Bush said that the law would “provide tax incentives for companies to expand and create jobs by investing in plant and equipment and stimulate economic growth by extending net operating loss rules” (Bush 2002). R. Glenn Hubbard, Chairman of the Council of Economic Advisers, advised the Senate Joint Economic Committee that “The key to transforming recovery into robust growth is the pace of business fixed investment. Only with robust business investment will labor markets firm and the economy return to robust job creation. The Job Creation and Worker Assistance Act of 2002 (the stimulus package) reduced disincentives to investment- technically 30 percent expensing" (Hubbard 2002). However, former Treasury Secretary Paul O'Neill dissented, stating that he "never made an investment decision based on the tax code, and good business people do not do things on the basis of tax code inducements" (Suskind 2004, 49). This paper investigates whether these two acts accomplished their intent as an economic stimulus and determines if there were unintended effects of the law.

Much of the empirical work related to the bonus depreciation provisions created by the acts has focused on the macroeconomic effects (Gale and Orszag 2004, Desai and Goolsbee 2004, and House and Shapiro 2005). These studies generally find that the bonus depreciation provisions led to only a marginal effect on capital expenditures, concluding that the acts failed to create the intended economic stimulus. I provide an incremental contribution to this stream of literature in three ways. First, I create an expectations model to predict the amount that capital expenditures would have been in the absence of the acts; second, I examine a subset of firms that provide additional detail in footnotes related to qualified and nonqualified asset purchases. For this subsample, I determine if firms increased total capital asset purchases or simply shifted the mix of qualified and non-qualified assets purchased to utilize the tax benefits of these acts. Finally, I examine the impact of bonus depreciation provisions on firms' capital and operating lease transactions for firms in varying marginal tax rate classes.

Additionally, I observe whether firms accelerated their intended first quarter 2003 investments into the fourth quarter of 2002 to take full advantage of the NOL carryback provisions that ended in 2002 and whether firms accelerated qualified asset purchases into the fourth quarter of 2004 before the bonus depreciation provisions ended. Kinney and Trezevant (1993) find that firms maximize the present value of investment-related tax shields by placing investments in service during the fourth quarter of the current year rather than the first quarter of the following year, and Maydew (1997) finds evidence of intertemporal income shifting by firms with NOL carrybacks in response to the Tax Reform Act of 1986. I predict and find a similar effect for depreciable asset additions. Finally, I look at cross-sectional differences among various firm-specific characteristics, including loss positions and international investment, to determine the impact of these characteristics on capital expenditures.

Capital structure theory provides a framework for examining capital investment incentives. Mackie-Mason's (1990) tax exhaustion hypothesis states that non-debt tax shields are less valuable as firms' taxable income levels decrease, implying that there is a limit to the benefit that firms may realize from depreciation expenses. The JCWAA extension of NOL carrybacks potentially mitigates the effects of tax exhaustion, as firms in current-year loss positions can recoup prior taxes paid. As a result, I posit and subsequently find that firms in current-year loss positions increase spending on capital expenditures in 2002 to use the NOL carrybacks which expired at the end of 2002.

I find that firms significantly changed their investment patterns as a result of these acts, increasing qualified asset purchases and decreasing nonqualified asset purchases, leading to a marginal increase in overall capital expenditures, consistent with the findings of prior research related to the act. In addition, I find that firms with current-year losses and positive income in the extended carryback periods increased depreciable asset spending in 2002 in order to utilize the NOL carryback provisions. Results also suggest that firms increase depreciable asset purchases less as a function of business need in the post-JCWAA period. I also find support for the notion that firms accelerated future capital asset spending to take advantage of expiring tax benefits, including firms that had less business need for the assets in the short term.

Finally, I examine the impact of these acts on firms' leasing transactions, finding that firms in low marginal tax rate (MTR) classes significantly increase operating lease transactions following the passage of JCWAA, whereas firms with higher MTRs decrease lease transactions. Results are consistent with the Graham et al. (1997) notion that leasing by low tax-rate firms is favored when the depreciation tax shield is received early in the lease term. Additionally, I find that there was little impact on low MTR firms' operating lease transactions in the 50 percent JGTRRA period relative to the 30 percent JCWAA period, but for higher MTR firms, this period led to further decreases in operating leases.

These findings are relevant to many different parties. First, legislators have an interest in determining whether the acts created the intended stimulus to investment spending and the extent to which there were unintended consequences of this legislation. Additionally, this research is of interest to researchers in taxation, as I provide further evidence of the influence of taxation on firms' business decisions. Finally, this paper extends the capital structure literature by examining the effects of non-debt tax shields and tax exhaustion.

The balance of this paper is organized into five sections. The next section provides background and details of the two acts, followed by the hypotheses, sample selection and methodology, test results, and conclusion.

Background

Figure A presents the timeline of events surrounding the passage of the two acts and the specific dates firms may receive benefits under the acts. Congress passed JCWAA in March 2002, and its provisions were implemented retroactively to 2001 tax returns. Although JCWAA applied retroactively to 2001, firms had no knowledge of the Act in 2001. Thus, the first possible response to the provisions of JCWAA occurred in 2002. For this reason, I test for changes in 2002 and beyond, using 2000 and 2001 as control years. To test the impact of JGTRRA's 50 percent allowance, I compare the increases from the JCWAA period to the JGTRRA period, which began in May 2003.

Before the passage of JCWAA, firms could carry tax losses back two years or forward fifteen years. Because of the JCWAA provisions, firms could carry FY 2001 and FY 2002 tax losses back as far as five years. Firms maintained the option to carry losses back two years or forward fifteen years based on their determination of the present value of the tax benefits of these losses.[31]

Appendix A outlines the criteria for firm expenditures to qualify for the 30 percent bonus depreciation allowance. Generally, any newly purchased property with a

[31] A firm's decision as to whether it will carry losses forward or backward is a function of three variables: First, firms must determine their marginal rate of taxation in the year(s) to which they could carry back current losses. Second, they must estimate future marginal tax rates prevailing for the period to which they could carry forward current losses. Finally, they must compare the present value of tax benefits for the losses carried forward to the tax benefits of carrying the losses back.

recovery life of less than 20 years (all property except land and buildings) placed in service between September 11, 2001 and September 10, 2004 that has at least 50 percent business usage qualifies for the allowance. Qualified assets consist of machinery and equipment, furniture and fixtures, and leasehold improvements, while nonqualified assets are comprised of buildings, land, and construction in progress.

Hypotheses Development

A number of studies examine firms' responses to changes in tax laws to determine if the law had its intended effect. Trezevant (1992) examines changes in firms' levels of investment tax shields and debt tax shields in response to the Economic Recovery Tax Act of 1981, specifically testing for the substitution effect outlined by DeAngelo and Masulis (1980). Scholes et al. (1992) and Givoly et al. (1992) consider the Tax Reform Act of 1986 to determine firms' responses to reduced maximum corporate tax rates. Plummer (2000) examines the effects of the Investment Tax Credit. The Congressional intent behind JCWAA and JGTRRA was to create incentives for firms to increase capital asset additions to spur the lagging economy. I test whether the acts' incentives led firms to increase purchases of qualified depreciable assets. It is important to note that the Congressional intent of the acts could be supported even in the event of a decrease in capital expenditures; for this reason, I determine whether firms made greater qualified expenditures because of the acts than they otherwise would have. H8a and H8b are as follow:

> **H8a:** Ceteris paribus, firms placed more qualified assets in service after the passage of JCWAA than they would have in the absence of the act.

H8b: Ceteris paribus, firms placed more qualified assets in service after the passage of JGTRRA than they would have in the absence of the act.

The intent of JCWAA and JGTRRA was to stimulate investment spending, but economic forces and firm-specific constraints[32] limit a firm's ability to purchase new depreciable assets. Relative to straight-line depreciation, the Modified Accelerated Cost Recovery System (MACRS) depreciation used for tax purposes allows firms to take more rapid depreciation deductions for assets with shorter useful lives. These are the same assets targeted by the acts, creating a larger gap in depreciation deductions between qualified and nonqualified asset classes. If firms have a fixed annual budget for capital expenditures, the expected increases in qualified asset purchases may force decreases in nonqualified asset purchases. My ninth hypothesis tests whether firms shifted the mix of qualified and nonqualified asset purchases[33] following the passage of JCWAA (including the JGTRRA period).

H9: Firms offset increases in qualified asset purchases with decreases in nonqualified asset purchases following the passage of JCWAA.

Mackie-Mason's (1990) tax exhaustion hypothesis states that non-debt tax shields, such as depreciation, are less valuable as firms' taxable income levels (hence marginal tax rates) decrease, leading to the expectation that there is an upper bound on the benefit firms realize from depreciation expenses. However, the extension of NOL carrybacks potentially attenuates the effects of tax exhaustion, because firms with

[32] Firms obviously have scare resources and budgetary or cash-flow limitations that may limit purchases of depreciable assets. In addition to firm-specific limitations, macroeconomic forces associated with a lagging economy could also lead to diminished purchases.
[33] This is not to say that qualified assets are substitutes for nonqualified assets. I am merely testing whether firms shifted the timing of asset purchases, accelerating purchases of qualified assets or delaying nonqualified asset purchases.

current-year losses can obtain refunds of previously paid taxes. I expect that firms in current-year loss positions and past profits will combine the extended NOL carryback and bonus depreciation provisions to obtain refunds on previously paid taxes. This leads to my tenth hypothesis:

> **H10:** Firms with current-year tax losses and positive income in the previous three to five years placed more qualified assets in service after the passage of the JCWAA than before the act, utilizing the extended NOL carryback provisions.

Curatola (2002) suggests, "A likely effect of the additional first-year depreciation provision is that many taxpayers will accelerate their capital acquisitions in 2004 before this deduction expires. A consequence of such an acceleration strategy could be that acquisitions in 2005 (and possibly later) will decrease, not necessarily a result intended by Congress" (p. 18). The sunset provisions related to NOL carrybacks and bonus depreciation could lead firms to accelerate future purchases into the period leading up to the sunset provision to maximize the tax benefits, similar to the findings of intertemporal shifting of investment-related tax shields by Kinney and Trezevant (1993). This leads to my final hypotheses:

> **$H11_a$:** Firms accelerated first quarter 2003 asset acquisitions for qualified property into the fourth quarter of 2002 to take advantage of the NOL carryback provisions that expired in 2002.

> **$H11_b$:** Fourth quarter 2004 qualified acquisitions exceeded other quarters in the JCWAA and JGTRRA periods due to the expiration of bonus depreciation provisions.

Data and Research Design

My sample consists of 104 firms that disaggregate depreciable asset purchases into various qualified and nonqualified categories from the first quarter of 2000 through the fourth quarter of 2004. I hand-collect quarterly footnote data for these firms from the EdgarScan database to identify qualified and nonqualified asset purchases. I begin with the universe of Compustat firms, and I delete 1,438 firms without tax EINs to remove foreign firms, 3,892 firms with SIC Codes greater than 6,000, and 1,752 firms without calendar year ends to avoid confounds with timing of asset purchases. Among the 3,334 remaining firms, I find required data for 104 firms that disaggregate property, plant and equipment data into qualified and nonqualified categories throughout the sample period.[34] In addition to the footnote data, I use the Compustat database for relevant control variables.

To determine firms' responses to the changes in tax law, I develop a model to predict the amount that capital expenditures would have been had the acts not been passed. Specifically, I create prediction models for post-JCWAA qualified additions, nonqualified additions, and total capital expenditures based on firms' levels of relevant control variables for the eight quarters preceding the passage of JCWAA. The three prediction models are as follow:

$$Qual_t = \alpha_0 + \alpha_1 Qual_{t-1} + \alpha_2 Cash_{t-1} + \alpha_3 ChSales_t + \alpha_4 ADCOST_{t-1} + \alpha_5 LTD_{t-1} + \alpha_6 PTI_{t-1} + \alpha_{7\text{-}10} \Sigma Econ_{t-1} + \alpha_{11\text{-}13} \Sigma Qtrdum + \varepsilon \quad (20)$$

$$NON_t = \alpha_0 + \alpha_1 NON_{t-1} + \alpha_2 Cash_{t-1} + \alpha_3 ChSales_t + \alpha_4 ADCOST_{t-1} + \alpha_5 LTD_{t-1} + \alpha_6 PTI_{t-1} + \alpha_{7\text{-}10} \Sigma Econ_{t-1} + \alpha_{11\text{-}13} \Sigma Qtrdum + \varepsilon \quad (21)$$

$$CAPX_t = \alpha_0 + \alpha_1 CAPX_{t-1} + \alpha_2 Cash_{t-1} + \alpha_3 ChSales_{t-1} + \alpha_4 ADCOST_{t-1} + \alpha_5 LTD_{t-1} + \alpha_6 PTI_{t-1} + \alpha_{7\text{-}10} \Sigma Econ_{t-1} + \alpha_{11\text{-}13} \Sigma Qtrdum + \varepsilon \quad (22)$$

where:

[34] There are potential data confounds related to both asset dispositions and merger activity. Dispositions decrease the levels of reported asset increases, and merger activity leads to an overstatement of firms' qualified asset purchases. While I made every effort to control for these issues in collecting the data, any uncontrolled dispositions or merger effects create noise and bias against finding results.

$Qual_t$	= log of qualified asset purchases in quarter t reported in quarterly footnotes
NON_t	= log of nonqualified asset purchases in quarter t reported in quarterly footnotes
$CAPX_t$	= log of capital expenditures in quarter t reported in quarterly footnotes
$Qual_{t-1}$	= log of qualified asset purchases in quarter t-1 reported in quarterly footnotes
NON_{t-1}	= log of nonqualified asset purchases in quarter t-1 reported in quarterly footnotes
$CAPX_{t-1}$	= log of capital expenditures in quarter t-1 reported in quarterly footnotes
LTD_{t-1}	= log of long-term debt (Compustat data item #9) in year t-1
$ChSales_{t-1}$	= annual net sales (Compustat data item #12) in year t less net sales in year t-1
$Cash_{t-1}$	= Cash (Compustat data item #1) held end of year t-1 scaled by total assets at t-1 (Compustat data item #6)
$ADCOST_{t-1}$	= 1 – (Accumulated Depreciation / Gross Property Plant and Equipment) reported by Compustat
PTI_{t-1}	= pretax income (Compustat data item #170) in year t-1[35]
ΣEcon	= a vector of macroeconomic variables, including inflation, unemployment, change in gross domestic product, and housing starts, reported by Research Insight
ΣQtrdum	= a vector of quarter dummies

I include a quarter-over-quarter lag of each capital expenditure variable (*Qual*, *CAPX*, and *NON*) to capture firms' tendencies to keep expenditures at similar levels through time. Long-term debt (*LTD*) is used as a control variable, as most firms incur debt to make capital expenditures; firms in high debt positions may be unable to increase capital expenditures following the passage of the acts. Change in sales (*ChSales*) is included as a proxy for a firm's rate of growth, and *ADCOST* is used to control for the relative age of firms' depreciable assets and proxies for a firm's business need for asset replacements. *Cash* controls for firms' relative ability to pay for expenditures, and pre-

[35] I do not transform changes in sales or pretax income using natural logarithms because of the impact of observations less than zero. As a sensitivity test, I re-run these models using percentage change in sales and pretax income scaled by assets. Results are qualitatively similar throughout the paper using either method.

tax income (*PTI*) controls for the tax exhaustion effect. Macroeconomic control variables, obtained from Research Insight, include inflation, unemployment, change in gross domestic product, and housing starts. Because these economic measures are leading indicators, I incorporate values at time t-1 to determine the effects on capital expenditures in year t. Finally, quarterly dummies are used to control for seasonal differences in firms' expenditures.

After creating the regression models for the pre-act period, I use the coefficients from these regression models and actual values of each explanatory variable in the post-JCWAA period to create a prediction for each capital expenditure variable in the post-JCWAA period. This predicted value yields an estimate of the amount of qualified or nonqualified asset additions expected had the act not been passed. To test H8a and H9, I run simple t-tests to determine firms' responses to JCWAA, comparing firms' levels of capital expenditures, qualified and nonqualified assets, along with the differences between actual and predicted values for each variable. To test H8b, I use t-tests to determine the differences between capital expenditures, qualified and nonqualified asset acquisitions between the 30% JCWAA period and the 50% JGTRRA period. I again use t-tests to test H11a and determine if firms accelerated 2003 additions into the fourth quarter of 2002 to take advantage of the NOL carryback provisions that expired at the end of 2002. To test H11b, I compare the fourth quarter of 2004 to all other quarters advantaged by the acts to determine if firms increase expenditures at the end of the sunset period.

To test H10, I create two separate multivariate models (Models (23) and (24)), focusing on observations from the post-JCWAA period, with the predicted errors from Models (20) and (21) as the dependent variables. I do not include a model for *NON* because nonqualified assets have small depreciation allowances and realize no incentives from either act, likely yielding little impact on firms' post-act tax strategies. The variable of interest in these models is the interaction between *CYLoss* and $PTI_{t3\text{-}t5}$. A positive coefficient on this interaction term would support H10, suggesting that loss firms with greater income in the extended carryback period had greater capital expenditures. Models (23) and (24) are as follows:

$$\text{DiffQual}_t = \alpha_0 + \alpha_1\text{CYLoss} + \alpha_2\text{Dum50} + \alpha_3\text{ Foreign} + \alpha_4\text{ PTI}_{t1\text{-}t2} + \alpha_5\text{ PTI}_{t3\text{-}t5} + \alpha_6\text{CYLoss} * \text{PTI}_{t3\text{-}t5} + \varepsilon \quad (23)$$

$$\text{DiffCAPX}_t = \alpha_0 + \alpha_1\text{CYLoss} + \alpha_2\text{Dum50} + \alpha_3\text{ Foreign} + \alpha_4\text{ PTI}_{t1\text{-}t2} + \alpha_5\text{ PTI}_{t3\text{-}t5} + \alpha_6\text{CYLoss} * \text{PTI}_{t3\text{-}t5} + \varepsilon \quad (24)$$

where:

DiffQual_t	= the difference between actual qualified asset acquisitions and their predicted values based on Model (20)
DiffCAPX_t	= the difference between actual capital expenditures and their predicted values based on Model (22)
CYLoss	= 1 if current year pretax income (Compustat data item #170) is less than zero
Dum50	= 1 if the observation occurs during the 50 percent bonus depreciation period, and zero otherwise
Foreign	= percentage of foreign assets, reported by Compustat
$\text{PTI}_{t1\text{-}t2}$	= sum of pretax income (Compustat data item #170) for years t-1 and t-2
$\text{PTI}_{t3\text{-}t5}$	= sum of pretax income (Compustat data item #170) for years t-3, t-4, and t-5

The difference variables include controls for the macroeconomic factors and other business factors in Models (20) and (22), so these controls are omitted from Models (23) and (24). In addition, I create a dummy variable for the post-JGTRRA period (*Dum50*) to examine differences in firms' reactions when the bonus depreciation provisions increase to 50 percent. Finally, I determine the impact of foreign assets on firms' reactions to the acts. I expect that foreign holdings would dampen the response to a change in domestic tax law[36], leading to a negative coefficient on Foreign.

After looking at the acts' impacts on depreciable asset spending, I examine the acts' impacts on firms' leasing transactions for firms in varying marginal tax rate classes. Conventional lease models predict that firms with low marginal tax rates use more leases relative to firms with high marginal tax rates (Graham, Lemmon and Schallheim, 1997). The provisions of JCWAA and JGTRRA could have two separate effects on leasing transactions. The provisions increase the tax benefits for the lessor on qualified purchases, potentially leading higher marginal tax rate firms to increase qualified purchases during the bonus depreciation period. According to Graham et al. (1997), "Leasing by the low tax-rate firm is favored when (i) the depreciation tax shield is received early in the lease term, (ii) the taxable gain on the sale of the asset is relatively small, (iii) larger lease payments occur later in the lease term, or (iv) the before-tax discount is high." While (ii) through (iv) are difficult to test, the increased depreciation provisions obviously move the depreciation tax shield forward in the lease term. However, the extended NOL carryback provisions in 2002 could lead firms with current-year losses (likely lower MTR firms) to decrease rental transactions in favor of purchasing assets outright.

[36] Qualified property does not include tangible property used predominantly outside the U.S. [I.R.C. §168(g)(1)(A)].

As in estimating the amount of firms' capital expenditures and qualified asset purchases in the absence of the act, I attempt to determine the impact of the acts on firms' capital and operating lease transactions. I first replicate the analyses of Graham et al. (1997) to determine firms' spending on capital and operating leases in the pre-act period, controlling for before-financing marginal tax rates (as calculated on John Graham's website), earnings, book value, financial distress, market-to-book ratio, property, plant and equipment levels, and size in the following models[37]:

$$CapLease_t = \alpha_0 + \alpha_1 MTRClassB + \alpha_2 MTRClassC + \alpha_3 ECOST_t + \alpha_4 ZSCORE_t + \alpha_5 OENEG_t + \alpha_6 MTB_t + \alpha_7 Collateral_t + \alpha_8 Size_t + \alpha_{9\text{-}13} SIC + \varepsilon \quad (25)$$

$$OpLease_t = \alpha_0 + \alpha_1 MTRClassB + \alpha_2 MTRClassC + \alpha_3 ECOST_t + \alpha_4 ZSCORE_t + \alpha_5 OENEG_t + \alpha_6 MTB_t + \alpha_7 Collateral_t + \alpha_8 Size_t + \alpha_{9\text{-}13} SIC + \varepsilon \quad (26)$$

where:

$CapLease_t$	= Capital leases divided by the market value of equity
$OpLease_t$	= Operating leases divided by the market value of equity
MTRClassB	= a categorical variable where before-financing marginal tax rate is between 10 percent and 30 percent, calculated on John Graham's website[38]
MTRClassC	= a categorical variable where before-financing marginal tax rate is greater than 30 percent, calculated on John Graham's website
$ECOST_t$	= the standard deviation of the first difference in the firm's earnings before depreciation, interest, and taxes divided by the mean level of the book value of total assets multiplied by the sum of research and development and advertising expenses divided by total assets
$ZSCORE_t$	= a modified version of Altman's (1968) Z-Score, consistent with Graham et al. (1997)

[37] While Graham et al. (1997) restrict their sample to firms with SIC codes between 2000 and 5999, I extend this sample to all firms with SIC codes less than 5999 to be consistent with other tests used in the paper. In addition, I do not remove firms in the telephone and utilities industries like Graham et al. (2002).

[38] While Graham et al. (1997) use the level of marginal tax rate, I calculate three dummy variables for low, medium, and high marginal tax rates to better determine the impact of the act for firms in various MTR classes. Low MTR is less than 10 percent and is denoted by the intercept, medium is between 10 and 30 percent, and high is greater than 30 percent.

$OENEG_t$	= 1 if the book value of common equity is negative, and zero otherwise
MTB_t	= market value of the firm divided by the book value of the firm
$Collateral_t$	= net property, plant and equipment divided by the book value of total assets
$Size_t$	= the natural log of the market value of the firm
SIC	= one-digit SIC code dummy variables

Next, I model the effects of the acts on firms' capital and operating lease transactions, examining observations in the pre-Act and post-Act periods to determine the impact of the acts on leasing decisions for firms in varying MTR classes. I create a variable (Post) for observations following the passage of JCWAA, and in sensitivity analyses, I break out observations into the separate JCWAA and JGTRRA periods. Models (27) and (28) are as follow:

$$CapLease_t = \alpha_0 + \alpha_1 MTRClassB + \alpha_2 MTRClassC + \alpha_3 ECOST_t + \alpha_4 ZSCORE_t + \alpha_5 OENEG_t + \alpha_6 MTB_t + \alpha_7 Collateral_t + \alpha_8 Size_t + \alpha_9 Post + \alpha_{10} Post*MTRClassB + \alpha_{11} Post*MTRClassC + \alpha_{12\text{-}16} SIC + \varepsilon \quad (27)$$

$$OpLease_t = \alpha_0 + \alpha_1 MTRClassB + \alpha_2 MTRClassC + \alpha_3 ECOST_t + \alpha_4 ZSCORE_t + \alpha_5 OENEG_t + \alpha_6 MTB_t + \alpha_7 Collateral_t + \alpha_8 Size_t + \alpha_9 Post + \alpha_{10} Post*MTRClassB + \alpha_{11} Post*MTRClassC + \alpha_{12\text{-}16} SIC + \varepsilon \quad (28)$$

where:

Post = 1 for observations following the passage of JCWAA, and zero otherwise[39]

Results

Table 18a displays descriptive statistics of quarterly capital expenditures for the period of 2000 through 2004. Table 18b presents annual capital expenditures and the related control variables for the same period, while Table 18c displays the annual capital expenditures by year. The descriptive statistics show an increase between pre-JCWAA

[39] In addition to using a single dummy variable for Post, I also include two separate dummy variables for the 30 percent JCWAA period and the 50 percent JGTRRA period, and the interactions between each variable and MTRClassB and MTRClassC.

and post-JCWAA qualified asset acquisitions and capital expenditures, with a decrease in nonqualified assets in the post-act period. In addition, there is an approximately five percent increase in the ratio of qualified assets to total expenditures. This difference is economically significant because a five percent increase in qualified asset acquisitions for a firm with $100 Million of new investment (approximate mean annual capital expenditure level) would create an additional $1.5 million ($2.5 million) in bonus depreciation expense in the 30 percent (50 percent) period, lowering tax expense by approximately $525,000 ($875,000) at the 35 percent corporate tax rate. In addition, the 2004 annual qualified asset mean purchases of $150 million, coupled with the decrease in median asset acquisitions, suggests that a number of firms significantly increased qualified asset purchases at the end of the bonus depreciation period.

Tables 19a through 19c present the levels of quarterly capital expenditures in each of the three periods (pre-JCWAA, JCWAA 30 percent bonus, and JGTRRA 50 percent bonus).[40] Again, the results are consistent with H8a and H9, as mean and median tests indicate that qualified asset purchases increased while non-qualified asset purchases decreased. However, there is no univariate support for H8b, as median tests indicate that qualified asset purchases decreased significantly in the 50 percent period. Tables 20a and 20b present the Pearson correlation matrices for qualified asset purchases and capital expenditures and the explanatory variables used in the multivariate models. All data to the right of the diagonal are for the pre-JCWAA period, and the data to the left of the

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[40] It is important to note that Qual and NON are reported on the balance sheet, whereas CAPX is reported on the statement of cash flows. For this reason, the sum of Qual and NON does not always equal overall CAPX.

diagonal are for the post-JCWAA (including the JGTRRA) period. Consistent with expectations, qualified expenditures are positively correlated with lagged expenditure values, growth (*ChSales*), and income ($PTI_{t1\text{-}t2}$ and $PTI_{t3\text{-}t5}$). It is also interesting to note that the correlation for the proxy for the relative age of assets (*ADCOST*) is considerably stronger in the pre-JCWAA period than in the post-JCWAA period, lending support to the notion that firms increased capital asset spending more as a function of increased depreciation allowances than as a function of relative business need.

Although the univariate evidence supports H8a and H9, I create multivariate prediction models for qualified assets, nonqualified assets, and total capital expenditures (Models (20) through (22)). The estimated coefficients are presented in Table 21. As one would expect, previous quarter-over-quarter expenditures, lagged cash, and growth are all positively correlated with capital expenditures. Consistent with the tax exhaustion effect, *PTI* is positively associated with capital expenditures; however, debt is found to be positively associated with capital expenditures, possibly because of the debt securability effect.[41] Additionally, the relative age of firms' depreciable assets also impacts capital expenditures, as firms with newer assets make fewer asset acquisitions. Finally, it is interesting to note that fourth quarter expenditures are significantly positive for qualified assets and capital expenditures in total but not for nonqualified assets.

The coefficients from the regression models in Table 21 are used to create predicted values for qualified assets, nonqualified assets, and total capital expenditures. It is important to note the explanatory power of the prediction models is very strong.

[41] Debt securability relates to the fact that banks often loan companies money with fixed assets as collateral. Therefore, firms with greater fixed assets have the ability to take on greater long-term debt.

The prediction errors are presented in Tables 22a through 22c. Table 22a suggests that in the period following the passage of JCWAA, firms significantly increased qualified assets while significantly decreasing nonqualified assets. This resulted in an economically small but statistically significant increase in total capital expenditures. Tables 22b and 22c outline an increase in qualified asset purchases from the 30 percent JCWAA period to the 50 percent JGTRRA period, but overall capital expenditures were higher in the JCWAA period than the JGTRRA period. Taken together, Tables 22a through 22c provide support for H8a, H8b, and H9.

Additionally, untabulated t-tests on prediction errors yield support for H11a and H11b. These tests indicate that firms increased qualified asset purchases in the fourth quarter of 2002 relative to the first quarter of 2003, and qualified additions in the fourth quarter of 2004 are significantly greater than the average across the entire post-act period. This supports the notion that firms accelerated expected future purchases to utilize the expiring sunset provisions relating to the NOL carryback period and the bonus depreciation period.

Table 23 presents results from regressions on prediction errors calculated in Models (20) and (21) in both the JCWAA period and the entire bonus depreciation period, including the 50 percent JGTRRA period. I do not run these models on nonqualified assets because of the minimal tax depreciation impact of nonqualified assets. Because all of the macroeconomic and other explanatory variables have been included in the prediction models, I specifically focus on the impact of the extended NOL carryback period. As predicted in H10, the coefficient for the interaction of *CYLoss* and PTI_{t3-t5} is significant and positive, offering support for the notion that loss firms with positive income in the extended carryback periods increased capital expenditures to obtain tax refunds. Additionally, there is moderate support for H8b because post-JGTRRA qualified asset purchases increased, as evidenced by the positive coefficient on *Dum50*. Finally, there is little support for the expectation that firms' foreign positions diminish the likelihood of a response to a change in domestic tax law, as the coefficient on Foreign is insignificant.

Table 24 displays results for Models (25) through (28). The pre-act period models (25 and 28) yield similar, albeit weaker, results than Graham et al. (1997). The main difference is in the two MTR class dummy variables, which are significantly positive in the operating lease model, implying that firms in higher MTR classes have greater operating leases. However, the post-JCWAA models suggest that firms in low MTR classes significantly increase operating lease transactions following the passage of JCWAA, whereas firms with higher MTRs decrease operating lease transactions, consistent with the Graham et al. (1997) notion that leasing by low tax-rate firms is favored when the depreciation tax shield is received early in the lease term. In a separate untabulated analysis, there was little impact on low MTR firms' operating lease transactions in the 50 percent JGTRRA period relative to the 30 percent JCWAA period, but for higher MTR firms, this period led to another decrease in operating leases.

Sensitivity Analyses

As a sensitivity test to the prediction error models, I create models for the entire sample period, using actual capital expenditures instead of prediction errors. As in

Models (20) through (22), I include firm specific variables such as long-term debt, growth, cash, the relative age of depreciable assets, pre-tax income, macroeconomic variables and quarterly dummies. I also include the explanatory variables from Models (23) and (24) such as *Foreign* and *CYLoss*. Also, as in Models (23) and (24), I do not use NON on the left-hand side for the full sample models. The variable of interest in Models (28) and (29) is the three-way interaction between *CYLoss*, *Dum30*, and $PTI_{t3\text{-}t5}$, which tests the H10 assertion that loss firms with greater income in the carryback period are more likely to increase capital expenditures. Models (29) and (30) are as follows:

$$\begin{aligned} Qual_t = {} & \alpha_0 + \alpha_1 Qual_{t-1} + \alpha_2 LTD_{t-1} + \alpha_3 ChSales_{t-1} + \alpha_4 Cash_{t-1} + \alpha_5 ADCOST_{t-1} \\ & + \alpha_6 PTI_t + \alpha_7 Dum30 + \alpha_8 Dum50 + \alpha_9 Foreign + \alpha_{10} PTI_{t1t2} + \alpha_{11} PTI_{t3\text{-}t5} \\ & + \alpha_{12} CYLoss + \alpha_{13} CYLoss{*}PTI_{t1\text{-}t2} + \alpha_{14} CYLoss{*}PTI_{t3\text{-}t5} + \\ & \alpha_{15} CYLoss{*}Dum30{*}PTI_{t3\text{-}t5} + \alpha_{16\text{-}20}\Sigma Econ_{t-1} + \alpha_{21\text{-}23}\Sigma Qtrdum + \varepsilon \qquad (29) \end{aligned}$$

$$\begin{aligned} CAPX_t = {} & \alpha_0 + \alpha_1 CAPX_{t-1} + \alpha_2 LTD_{t-1} + \alpha_3 ChSales_{t-1} + \alpha_4 Cash_{t-1} + \alpha_5 ADCOST_{t-1} \\ & + \alpha_6 PTI_t + \alpha_7 Dum30 + \alpha_8 Dum50 + \alpha_9 Foreign + \alpha_{10} PTI_{t1t2} + \alpha_{11} PTI_{t3\text{-}t5} \\ & + \alpha_{12} CYLoss + \alpha_{13} CYLoss{*}PTI_{t1\text{-}t2} + \alpha_{14} CYLoss{*}PTI_{t3\text{-}t5} + \\ & \alpha_{15} CYLoss{*}Dum30{*}PTI_{t3\text{-}t5} + \alpha_{16\text{-}20}\Sigma Econ_{t-1} + \alpha_{21\text{-}23}\Sigma Qtrdum + \varepsilon \qquad (30) \end{aligned}$$

where:

Qual	= log of quarterly qualified assets, reported in quarterly footnotes
CAPX	= log of quarterly capital expenditures, reported in quarterly footnotes
PTI_t	= pretax income (Compustat data item #170) for the current year
Dum30	= 1 if the observation occurs during the 30 percent bonus depreciation period, and zero otherwise

Table 25 presents regression models estimated for both the entire sample period and for the post-JCWAA period. For simplicity, I omit the coefficients on the macroeconomic variables and the quarterly dummy variables, but their coefficients are similar to those found in the prediction models in Table 4. As expected, lagged values of capital expenditures are significantly positive. Long-term debt remains positive and significant, contrary to the substitution effect. As in Table 23, there is support for H10, as the coefficient for loss firms with income in the carryback period (*CYLoss*Dum30*PTI*$_{t3\text{-}t5}$) is significantly positive. In addition, it is interesting to note the coefficients for the *ADCOST* variable, which measures the relative age of firms' assets. In the entire period, as in the pre-act period, the coefficient is negative and significant; however, in the post-act period, the coefficient is insignificant, leading to the supposition that firms increased capital expenditures more as a function of tax benefits than the necessity to replace existing assets.

In addition to running the natural logarithmic models, I also used variables scaled by total assets and the market value of equity. Results are similar using each scaling method. To determine that the results found in the paper are not confounded by merger and acquisition activity, I examined firms' statements of cash flows to determine if they had merger activity for the quarter, and deleted such firm-quarter observations from the sample. Separate regression analyses confirm that results are not sensitive to the deletion of these observations. I also estimate the models using annual capital expenditures as opposed to quarterly capital expenditures. Results for the annual models are qualitatively similar to the quarterly models; however, using quarterly data provides a cleaner test of the impact of the acts because of the mid-year passage of both JCWAA and JGTRRA.

Finally, to supplement analyses on the capital expenditure models for the smaller hand-collected sample, I also run similar models for a sample of firms with necessary data available on Compustat. While I cannot determine the effects of the acts on firms qualified and nonqualified purchases, I can make an assessment on the total capital expenditures for a larger sample of firms which increases generalizability of the study. My untabulated results for the larger sample of firms are comparable to the Gale and Orszag (2004), Desai and Goolsbee (2004), and House and Shapiro (2005) findings that the bonus depreciation provisions led to only a marginal effect on overall investment spending, as mean sample capital expenditures increased by approximately 3.5 percent in the JCWAA period and returned to pre-Act levels in the JGTRRA period.

Conclusion

In this paper, I determine firms' responses to two tax law changes that gave firms an incentive to increase spending on depreciable assets, specifically focusing on firms' additions of qualified and nonqualified asset classes. Firms significantly changed their investment patterns as a result of these acts, increasing qualified asset purchases and decreasing nonqualified asset purchases, yielding only a marginal increase in capital expenditures. In addition, I find that firms with current year losses and past positive income increased depreciable asset spending in the fourth quarter of 2002 in order to utilize the extended NOL carryback provisions of JCWAA. Finally, I find that firms with lower MTRs increased their use of operating leases to better use the increased depreciation allowances, whereas firms in higher MTR brackets decreased their use of operating leases. These results are consistent with tax clientele theory.

These findings are relevant to many different parties. First, legislators have an interest in determining whether the acts created the intended stimulus to investment spending and the extent to which there were unintended consequences of this legislation. Additionally, this research is of interest to researchers in taxation, as I provide further evidence of the influence of taxation on firms' business decisions. Finally, this paper extends the capital structure literature by examining the effects of substitution of debt and non-debt tax shields and tax exhaustion.

CHAPTER VII

SUMMARY AND CONCLUSIONS

In the past four years, the Bush Administration has signed into law two tax provisions that changed the landscape of corporate and individual taxation. First, the Job Creation and Worker Assistance Act (JCWAA) of 2002 created a 30 percent first-year bonus depreciation allowance for new property with a recovery life of at most 20 years acquired between September 10, 2001 and September 11, 2004. Second, the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) extended the JCWAA depreciation provisions, and more importantly, substantially reduced the individual tax rate for qualifying dividends. In this dissertation, I examine the impact of these changes in tax legislation on firms' dividend policy and investment decisions.

In Chapter IV, I examine the impact of reduced shareholder-level dividend taxes from JGTRRA on firms' dividend decisions. The act creates a natural setting for studying the effects of classic agency conflicts between shareholders and management resulting from the change in individual investors' demand for dividends and the impact of dividends on management stock options. The conflict arises specifically from the increase in option compensation over the past twenty years- stock options now account for more than half of total CEO compensation in the largest U.S. companies (Rappaport 1999), and increases in dividends diminish the value of these options. I attempt to determine whether and how firms attempt to assuage the agency conflicts between management and shareholders created by JGTRRA, specifically focusing on the impact of board independence.

Holmstrom and Kaplan (2003) find that stock and option compensation for directors has increased over time; for this reason, I determine if increased equity and option compensation for directors aligns the financial interests of managers and directors, giving management a better chance to act opportunistically to the detriment of other shareholders. Opportunistic behavior in the case of JGTRRA could result in some firms increasing dividends too much (resulting in the expropriation of wealth from the firm) or not increasing dividends enough (resulting in the underutilization of shareholder tax benefits) depending on firms' and managers' particular characteristics. While many of the initial studies of JGTRRA look at firms increasing dividends following the act, I add to the stream of literature by also focusing on firms not increasing dividends after the passage of the act.

Data analyses suggest that board independence appears to mitigate the effects of both CEO stock and option holdings on dividend increases, as the coefficients for CEO stock and option holdings become insignificant when board independence is included in the model. Firms with greater board independence pay lower dividends and increase dividends less than firms with less board independence. Additionally, firms with greater board independence pay their CEOs less both in bonuses and total cash compensation, consistent with the findings of Core et al. (1999).

In addition to examining the impact of JGTRRA on dividend policy, I examine changes in management compensation schemes following the passage of the act. I specifically determine whether firms implicitly dividend-protect management option wealth through increased stock or cash (through bonuses) compensation. Next, I examine whether firms that did not initially increase dividends decreased option grants following JGTRRA to induce management to increase dividends and whether changes in compensation induce managers to increase dividends. After looking at the main effects of each type of compensation change, I look at the impact of board independence to determine if more independent boards are more likely to change compensation contracts to assuage the agency conflicts created by JGTRRA.

Compensation analyses suggest that the cross-section of firms examined appear to implicitly dividend-protect CEO option wealth, as dividend-increasing firms with greater CEO option sensitivity (how sensitive CEO option portfolios are to changes in stock price) increase bonuses and total cash compensation to effectively reimburse CEOs for the decrease in option value, holding constant other variables commonly associated with compensation. Additionally, firms with greater board independence appear to protect options from increases in dividends through increases in bonuses and other cash compensation better than firms with lower board independence. Finally, I find that firms not increasing dividends in the first year following the passage of JGTRRA decrease option grants, specifically for firms with greater CEO option sensitivity. Although this is true of the cross-section of firms, firms with greater board independence decrease option grants more than firms with less board independence.

Chapter V examines the relation between contemporary dividend increases and future profitability. Signaling theory (Ross 1977; Bhattacharya 1979, 1980) argues that because dividends are costly, only strong firms with good future expectations can afford to pay them. Empirical evidence generally suggests that dividend increases coincide with strong past and current profits, but yields only mixed evidence as to whether firms also sustain future profitability levels (Healy and Palepu 1988; Bernatzi et al. 1997; Nissim and Ziv 2001). I provide a cleaner test between traditional signaling arguments and tax arguments for dividend payments by comparing earnings for firms increasing dividend payments both before and after the passage of JGTRRA. The tax argument is supported if the correlation between dividends and earnings drops in the period after the passage of JGTRRA, as firms would be increasing dividends with fewer earnings to support these increases, taking advantage of the temporary tax benefits.

In this same context, past research has ignored contextual variables that are potentially important in interpreting the economic significance of dividend increases. For example, the literature does not differentiate between dividend increases for growth-oriented and mature firms. I extend this literature by testing the future earnings implications of dividend increases for firms of varying growth rates to determine if there is a firm maturation explanation inherent in dividend increases (Grullon et al. 2002).

Results generally support the notion that dividend increases were less predictive of future earnings in the post-JGTRRA period relative to the pre-JGTRRA period, consistent with a tax-oriented explanation for dividend increases. Overall, I find that earnings forecast errors are higher in the post-JGTRRA period and provide a more noisy prediction than in the pre-JGTRRA period, as forecast errors are more optimistically biased. Multivariate analyses suggest that firms increased dividends in response to tax incentives; however, the earnings response varies for growth and non-growth firms. Non-growth firms that increase dividends have lower earnings to support them in the post-JGTRRA period, consistent with a tax-oriented explanation for dividend increases; however, growth firms that increase dividends have higher earnings in the post-JGTRRA period. Additionally, R&D and capital expenditures for dividend-increasing growth firms are significantly higher in the post-JGTRRA period, suggesting that post-JGTRRA dividend increases are in response to tax incentives as opposed to firm maturation.

Finally, I examine the market reaction to announcements of dividend increases to determine if JGTRRA changed the market interpretation of dividend payouts. If the market reaction to dividend increases diminishes after JGTRRA, this evidence might be consistent with a tax argument that dividend increases are based on tax benefits as opposed to expected future earnings. However, this evidence might also be consistent with a market expectation that dividend increases are transitory, as the tax-advantaged dividend provisions of JGTRRA end in 2008.

Market reaction to dividend increases for both growth firms and non-growth firms in the post-JGTRRA period is consistently positive. The market views initiation and increases in ordinary dividends by growth firms negatively in the pre-JGTRRA period but more positively in the post-JGTRRA period. Sensitivity analyses provide evidence that small dividend increases by growth firms lead to the most positive market responses, lending support to the notion that these firms are responding to the tax benefits of JGTRRA but not losing growth opportunities. The market reacts to special dividends paid by growth firms positively in both the pre-JGTRRA and the post-JGTRRA periods.

In Chapter VI, I study firms' responses to increased depreciation allowances created by JCWAA and JGTRRA, specifically looking at firms' expenditures on both advantaged and non-advantaged assets. In addition, I look at cross-sectional differences among firms' expenditures, examining the impacts of loss positions and international holdings. After determining whether the acts had their intended effects on advantaged asset purchases, I examine two potentially unintended side effects of the acts. First, I investigate whether firms increased capital asset purchases or simply shifted the categories of assets purchased to utilize the benefits of the acts. Second, I observe whether firms accelerated their intended first quarter 2003 investments into the fourth quarter of 2002 to take full advantage of the NOL carryback provisions that ended in 2002 and whether they increased fourth quarter 2004 spending before the bonus depreciation provisions ended. Kinney and Trezevant (1993) find that firms maximize the present value of investment-related tax shields by placing these investments in service during the fourth quarter of the current year rather than the first quarter of the following year, and I expect to find a similar effect for depreciable asset additions.

I find that firms significantly changed their investment patterns because of these acts, increasing qualified asset purchases and decreasing nonqualified asset purchases, leading to a marginal increase in overall capital expenditures, consistent with the findings of prior research related to the act. In addition, I find that firms with current-year losses and positive income in the extended carryback periods increased depreciable asset spending in 2002 in order to utilize the NOL carryback provisions. Results also suggest that firms increase depreciable asset purchases less as a function of business need in the post-JCWAA period. I also find support for the notion that firms accelerated future capital asset spending to take advantage of expiring tax benefits, including firms that had less business need for the assets in the short term.

Finally, I examine the impact of these acts on firms' leasing transactions, finding that firms in low marginal tax rate (MTR) classes significantly increased use of operating leases following the passage of JCWAA. However, firms with higher MTRs decreased use of leases, consistent with the Graham et al. (1997) notion that leasing by low tax-rate firms is favored when firms receive the depreciation tax shield early in the lease term. Additionally, I find that there was little impact on low MTR firms' operating lease transactions in the 50 percent JGTRRA period relative to the 30 percent JCWAA period, but for higher MTR firms, this period led to further decreases in operating leases.

I believe that this dissertation is of interest to many parties. First, this dissertation extends tax literature using the Scholes et al., (2002) framework. The Scholes et al. (2002) framework acknowledges that tax strategies do not always explain firms' decisions, as other costs may outweigh the tax benefits of a transaction. In the case that firms respond to the tax acts inconsistently with tax incentives, it is imperative to determine which other costs drive firm behavior. This dissertation is also of interest to researchers in finance, as a number of finance theories are inherent in the empirical tests (e.g. agency theory and signaling). In addition, these papers are of value to regulators, who are interested in understanding the implications of changes in tax law, and whether firms' responses are consistent with the intent of these laws.

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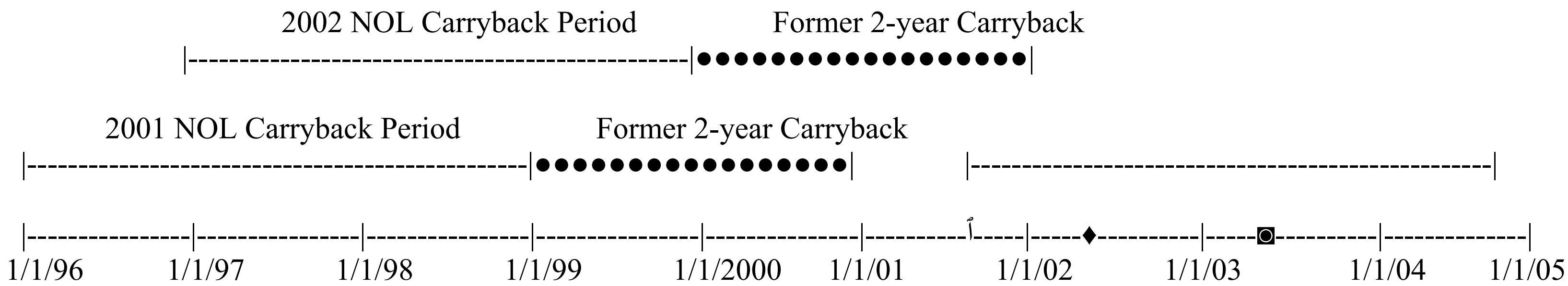
APPENDIX A

Figure A: Timeline of events relating to JCWAA of 2002 and JGTRRA of 2003



î September 11, 2001-December 31, 2004: Firms may take a bonus depreciation allowance for assets with 20-year (or shorter) recovery lives purchased during this period.

♦ March 9, 2002: JCWAA was passed. It is important to note that because the act was passed in 2002, calendar-year firms could not plan 2001 depreciable asset additions. However, firms with fiscal years ending in March or after had the ability to plan their fourth-quarter additions based on the new provisions.

◙ May 23, 2003: The Jobs and Growth Tax Relief Reconciliation Act of 2003 was passed, increasing the bonus depreciation amount from 30 percent to 50 percent.

●●● This denotes the two-year carryback period that firms could use prior to JCWAA. It is important to note that firms may still use the previous provisions, carrying losses back only two years or carrying them forward twenty years, if they determine that this is in their best interest.

APPENDIX B

Requirements to Qualify for Additional 30 percent Depreciation Allowance

In order to qualify for the additional 30 percent depreciation allowance, firms must adhere to the following requirements:

- The property must be computer software, water utility property, a qualified leasehold improvement property, or have a Modified Accelerated Cost Recovery System (MACRS) Recovery Period of 20 years or less. Original use of the property must have begun after September 10, 2001.
- The taxpayer must acquire the property between September 11, 2001 and September 10, 2004, and there must be no written binding contract for the property in effect before September 11, 2001.
- The taxpayer must place the property in service before January 1, 2005.
- Taxpayers required to use the alternative depreciation system may not take the 30 percent depreciation allowance.
- Acquired property may not be classified as listed property.
- The business use of the property must be greater than 50 percent.
- The 30 percent allowance is available to both regular tax and alternative minimum tax firms.

Note:

The 30 percent depreciation allowance is available to all organizational forms (self-employed, partnerships, S Corporations, etc.), but the focus of this paper is on C Corporations because C Corporations are the only organizational form with an entity-level tax.

The 30 percent depreciation allowance increased to 50 percent in 2003 for 2003 and 2004 advantaged asset additions. However, the increase was announced in the second quarter of 2003, outside the data range used in this paper.

Qualified leasehold property is defined as improvements to the interior portion of a nonresidential building made by the lessor or lessee, and the improvement may not be placed in service less than three years after the building was first placed in service.

APPENDIX C

Recreation of Appendix A from Core and Guay (2002): Calculating Black-Scholes Value and Sensitivities of Individual Stock Options

Estimates of a stock option's value or sensitivity to stock price or stock return volatility are calculated based on the Black-Scholes (1973) formula for valuing European call options, as modified to account for dividend payouts by Merton (1973).

$$\text{Option value} = [Se^{-dt} N(Z) - Xe^{-rt} N(Z - \sigma T^{(1/2)})]$$

where:
$Z = [\ln(S/X) + T\,(r\text{-}d + \sigma^2/ 2)] / \sigma T^{(1/2)}$
N = cumulative probability function for the normal distribution
S = Price of the underlying option
X = exercise price of the option
σ = expected stock-return volatility over the life of the option
r = natural logarithm of risk-free interest rate
T = time to maturity of the option in years
d = natural logarithm of expected dividend yield over the life of the option
The **sensitivity with respect to a 1% change in stock price** is defined as:
[d(option value) / d(price)] * (price / 100) = $e^{-dt} N(Z)$ * (price / 100)

APPENDIX D

Tables for Chapters IV through VI

Table 1: Variable Definitions and Data Sources

Panel A: Variable Definitions

Variable	Definition
Sales	Log of net sales (Compustat Data Item #12)
Invopp	investment opportunities, calculated by Core et al. (1999) as the average of market to book ratio for the previous five years
ROA	return on assets (earnings before interest and taxes [Compustat Data Item #18 + Compustat Data Item #15 + Compustat Data Item #16] divided by average total assets [Compustat Data Item #6])
Chg. ROA	Change in return on assets
Ret	Stock return from CRSP
ROAStd	Standard deviation of ROA, as calculated by Core et al. (1999)
RetStd	Standard deviation of stock returns, as calculated by Core et al. (1999)
Ops	Operating income before depreciation (Compustat Data Item #13), scaled by the maximum sample value
Div	Common dividends in millions from CRSP, scaled by total assets (Compustat Data Item #6)
Chg. Div	Change in common dividends in millions from CRSP, scaled by total assets (Compustat Data Item #6
Sense	CEO option sensitivity, as calculated by Core et al. (2002)
Cash	Cash and cash equivalents (Compustat Data Item #1), scaled by the maximum sample value
Intexp	Interest expense (Compustat Data Item #15), scaled by the maximum sample value
Options	CEO options held from Execucomp, as a percentage of shares outstanding
Stock	CEO shares held from Execucomp, as a percentage of shares outstanding
Size	Total assets (Compustat Data Item #6)
MB	Market to book ratio (Market value of equity divided by book value)
Indep	Board independence, as calculated in equation (1)
Bonus	Level of CEO bonus from Execucomp
Chg. Bonus	Change in CEO bonus from Execucomp
TCC	Level of CEO total cash compensation from Execucomp
Chg. TCC	Change in CEO total cash compensation from Execucomp
Chg. Ops	Change in operating income before depreciation (Compustat Data item #13)
Chg. OptGrants	changes in option grants
LagDivDum	1 if firms did not increase dividends in the year following the passage of JGTRRA

Panel B: Data Sources

Source	Variables
CRSP	Div, Chg. Div, Ret, RetStd
Board Analyst	Indep component: Sharesheld, %insiders, %gray, CEO
Execucomp	Bonus, Chg. Bonus TCC, Chg. TCC, Indep component: Sharesreceived, Stock, Options, Sense, InMoney (sensitivity)
Compustat	Sales, Invopp, ROA, Chg. ROA, ROAStd, Ops, Chg. Ops, Cash, Intexp, Size, MB
Fama French	Idiosyncratic risk (as a sensitivity test)

Table 2: Descriptive Statistics

Panel A: Descriptive Statistics for Entire Period

Variable	N	Mean	Median	Std. Dev.
Sales	2111	3,720.500	865.705	1,2042.94
Invopp	2111	2.205	2.715	116.131
ROA	2111	2.938	5.310	22.183
Chg. ROA	2111	0.006	0.000	0.405
Ret	2111	0.022	-0.002	0.184
ROAStd	1351	0.064	0.019	0.347
RetStd	2087	0.130	0.101	0.137
Ops	2111	411.800	103.400	1,192.69
Div	2111	0.176	0.000	0.33
Chg. Div	2111	-0.006	0.000	0.091
Sense	1503	234.310	57.278	1,257.53
Cash	2111	388.107	61.528	2,261.12
Intexp	1895	52.047	9.400	180.355
Options	2029	0.151	0.117	0.148
Stock	2008	0.279	0.037	0.643
Size	2111	2,800.250	758.659	8,497.3
MB	2090	6.996	2.635	99.363
Indep	2111	3.906	4.000	0.605
Bonus	2092	566.047	280.905	1,001
Chg. Bonus	2089	295.442	133.000	2,816.79
TCC	2092	1,135.510	800.000	1,142.18
Chg. TCC	2089	562.791	405.266	2,856.39

Table 2: (Continued)

Panel B: Pre- vs. Post-JGTRRA Descriptive Statistics

		Means			Medians	
Variable	**Pre**	**Post**	**Difference**	**Pre**	**Post**	**Difference**
Sales	3,652.19	4,369.430	717.240	856.171	870.565	14.394
Invopp	1.96	3.229	1.273	2.899	2.167	-0.732***
ROA	3.09	2.306	-0.786	5.452	4.793	-0.659*
Chg. ROA	0.01	0.000	-0.007	0.000	0.002	0.002**
Ret	0.03	-0.008	-0.037***	0.001	-0.022	-0.023***
ROAStd	0.07	0.045	-0.027*	0.019	0.019	0.000
RetStd	0.13	0.118	-0.015**	0.104	0.090	-0.014***
Ops	392.39	491.345	98.951	102.616	106.781	4.165
Div	0.18	0.166	-0.012	0.000	0.000	0.000
Chg. Div	-0.01	0.014	0.025***	0.000	0.000	0.000***
Sense	247.94	194.746	-53.189	51.292	72.660	21.368***
Cash	343.26	571.958	228.703	53.791	102.752	48.961***
Intexp	53.74	45.088	-8.648	9.579	8.071	-1.508
Options	0.15	0.158	0.008	0.114	0.129	0.015**
Stock	0.30	0.198	-0.101***	0.038	0.029	-0.009*
Size	2,697.66	3,220.760	523.100	730.738	865.184	134.446***
MB	7.86	3.299	-4.559	2.627	2.671	0.044
Indep	4.04	3.36	-0.679***	4.000	3.185	-0.815***
Bonus	533.65	705.233	171.583***	265.881	375.000	109.119***
Chg. Bonus	245.73	508.646	262.918***	105.432	234.378	128.946***
TCC	1,078.17	1,381.830	303.660***	765.000	990.877	225.877***
Chg. TCC	494.30	856.536	362.239***	370.569	532.982	162.413***

Note: variables are defined in Table 1, Panel A
* Significant at the 0.1 level (one-tailed)
** Significant at the 0.05 level (one-tailed)
*** Significant at the 0.01 level (one-tailed)

Table 3: Bivariate Correlations

Panel A: Compensation Variables

Variable	Chg. TCC	Chg. Bonus	Sales	Invopp	ROA	Chg ROA	Ret	ROA Std	RetStd	Chg. Ops	Chg. Div	Sense	Indep
Chg. TCC	**1.000**	0.995	0.081	-0.008	0.444	-0.003	-0.033	-0.008	-0.048	0.015	0.006	0.046	-0.089
		<0.001	<0.001	0.718	<0.001	0.900	0.127	0.776	0.029	0.489	0.771	0.078	<0.001
Chg. Bonus	0.846	**1.000**	0.066	-0.007	0.446	-0.004	-0.033	-0.009	-0.043	0.011	0.004	0.051	-0.057
	<0.001		0.003	0.762	<0.001	0.854	0.130	0.748	0.053	0.613	0.858	0.050	0.009
Sales	0.240	0.152	**1.000**	0.009	0.041	-0.004	-0.026	-0.031	-0.067	0.464	0.111	0.077	-0.063
	<0.001	<0.001		0.686	0.059	0.838	0.241	0.257	0.002	<0.001	<0.001	0.003	0.004
Invopp	0.028	0.063	0.009	**1.000**	-0.005	-0.908	-0.011	-0.545	-0.052	-0.006	0.007	-0.02	0.003
	0.195	0.004	0.674		0.821	<0.001	0.624	<0.001	0.018	0.786	0.742	0.433	0.894
ROA	0.102	0.156	0.042	0.543	**1.000**	0.043	-0.031	-0.017	-0.120	0.067	0.009	0.105	0.023
	<0.001	<0.001	0.053	<0.001		0.049	0.152	0.523	<0.001	0.002	0.700	<0.001	0.301
Chg. ROA	0.015	0.050	0.027	0.190	0.254	**1.000**	0.023	0.511	0.048	0.060	-0.009	0.050	0.018
	0.499	0.022	0.213	<0.001	<0.001		0.287	<0.001	0.274	0.006	0.677	0.053	0.400
Ret	0.006	0.028	-0.041	0.086	0.027	0.042	**1.000**	-0.009	0.100	-0.047	-0.012	0.052	0.052
	0.789	0.198	0.058	<0.001	0.208	0.052		0.743	<0.001	0.032	0.582	0.045	0.017
ROAStd	-0.162	-0.122	-0.304	0.187	-0.001	-0.056	0.036	**1.000**	0.121	0.052	-0.008	0.075	0.025
	<0.001	<0.001	<0.001	<0.001	0.984	0.041	0.186		<0.001	0.054	0.777	0.008	0.361
RetStd	-0.059	-0.035	-0.206	0.048	-0.120	-0.094	0.110	0.348	**1.000**	-0.038	-0.007	0.040	0.034
	0.008	0.116	<0.001	0.028	<0.001	<0.001	<0.001	<0.001		0.081	0.761	0.122	0.116
Chg. Ops	0.100	0.103	0.352	0.403	0.310	0.393	-0.021	-0.047	-0.082	**1.000**	-0.002	0.140	0.030
	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.330	0.080	<0.001		0.944	<0.001	0.163
Chg. Div	0.072	0.049	0.092	0.008	0.089	0.031	-0.040	-0.170	-0.177	0.018	**1.000**	-0.006	-0.031
	0.001	0.025	<0.001	0.724	<0.001	0.158	0.066	<0.001	<0.001	0.409		0.809	0.158
Sense	0.406	0.366	0.355	0.454	0.338	0.132	0.060	-0.031	-0.014	0.329	0.052	**1.000**	0.004
	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.020	0.281	0.585	<0.001	0.043		0.882
Indep	-0.359	-0.240	-0.202	0.110	0.044	0.093	0.037	0.138	0.084	0.058	-0.083	-0.115	**1.000**
	<0.001	<0.001	<0.001	<0.001	0.042	<0.001	0.092	<0.001	<0.001	<0.001	<0.001	<0.001	

Table 3: (Continued)

Panel B: Dividend Variables

Variable	Chg. Div	Cash	Ops	Intexp	Options	Stock	Size	MB	Indep
Chg. Div	**1.000**	0.059 0.006	0.007 0.734	-0.040 0.080	-0.015 0.506	0.027 0.218	0.011 0.599	0.001 0.974	-0.069 0.002
Cash	0.001 0.966	**1.000**	0.006 0.800	-0.472 <0.001	0.071 0.001	-0.013 0.553	-0.049 0.026	0.015 0.497	0.050 0.021
Ops	0.070 0.001	0.050 0.022	**1.000**	-0.176 <0.001	-0.093 <0.001	0.097 <0.001	-0.020 0.356	0.046 0.034	0.050 0.022
Intexp	-0.024 0.304	-0.577 <0.001	-0.189 <0.001	**1.000**	0.059 0.012	-0.053 0.025	0.063 0.007	0.058 0.013	-0.015 0.516
Options	-0.101 <0.001	0.048 0.030	-0.162 <0.001	0.002 0.944	**1.000**	0.063 0.005	-0.174 <0.001	-0.010 0.669	-0.098 <0.001
Stock	0.043 0.053	-0.063 0.005	0.025 0.265	0.047 0.046	0.214 <0.001	**1.000**	-0.043 0.057	-0.008 0.736	-0.049 0.027
Size	0.091 <0.001	-0.269 <0.001	-0.010 0.635	0.228 <0.001	-0.342 <0.001	-0.174 <0.001	**1.000**	-0.005 0.804	-0.032 0.138
MB	0.022 0.322	0.245 <0.001	0.412 <0.001	-0.229 <0.001	-0.117 <0.001	-0.0117 0.436	-0.011 0.630	**1.000**	0.013 0.553
Indep	-0.080 <0.001	0.093 <0.001	0.062 0.004	-0.045 0.051	-0.104 <0.001	-0.586 0.009	-0.202 <0.001	0.082 <0.001	**1.000**

Table 4: Implicit Dividend Protection Measured by Changes in Compensation, Along with the Impact of Board Independence

$$Chg.\ Bonus = \alpha + \beta_1\ Sales + \beta_2\ InvOpp + \beta_3\ ROA + \beta_4\ Chg.\ ROA + \beta_5\ Ret + \beta_6\ StdROA + \beta_7\ StdRet + \beta_8\ Chg.\ Ops + \beta_9\ Chg.\ Div + \beta_{10}\ Sense_{t-1} + \beta_{11}\ Sense_{t-1} * Chg.\ Div + \varepsilon \quad (2)$$

$$Chg.\ Total\ Cash = \alpha + \beta_1\ Sales + \beta_2\ InvOpp + \beta_3\ ROA + \beta_4\ Chg.\ ROA + \beta_5\ Ret + \beta_6\ StdROA + \beta_7\ StdRet + \beta_8\ Chg\ Ops + \beta_9\ Chg.\ Div + \beta_{10}\ Sense_{t-1} + \beta_{11}\ Sense_{t-1} * Chg.\ Div + \varepsilon \quad (3)$$

$$Chg.\ Bonus = \alpha + \beta_1\ Sales + \beta_2\ InvOpp + \beta_3\ ROA + \beta_4\ Chg.\ ROA + \beta_5\ Ret + \beta_6\ StdROA + \beta_7\ StdRet + \beta_8\ Chg\ Ops + \beta_9\ Chg.\ Div + \beta_{10}\ Sense_{t-1} + \beta_{11}\ Indep + \beta_{12}\ Sense_{t-1} * Chg.\ Div + \beta_{13}\ Indep*Chg.\ Div + \beta_{14}\ Sense_{t-1}*Indep + \beta_{15}\ Sense_{t-1} *Chg.\ Div*Indep + \varepsilon \quad (4)$$

$$Chg.\ Total\ Cash = \alpha + \beta_1\ Sales + \beta_2\ InvOpp + \beta_3\ ROA + \beta_4\ Chg.\ ROA + \beta_5\ Ret + \beta_6\ StdROA + \beta_7\ StdRet + \beta_8\ Chg.\ Ops + \beta_9\ Chg.\ Div + \beta_{10}\ Sense_{t-1} + \beta_{11}\ Indep + \beta_{12}\ Sense_{t-1} * Chg.\ Div + \beta_{13}\ Indep*Chg.\ Div + \beta_{14}\ Sense_{t-1} * Indep + \beta_{15}\ Sense_{t-1} *Chg.\ Div*Indep + \varepsilon \quad (5)$$

		Chg Bonus	Chg. Bonus	Chg. TCC	Chg. TCC
Variable	**Prediction**	**Model (2)**	**Model (4)**	**Model (3)**	**Model (5)**
Intercept	?	354.699	165.547	662.462***	487.356***
Sales	+	0.011***	0.013***	0.016***	0.016***
Invopp	-	-0.206	0.218	-0.13	0.177
ROA	+	1.773*	2.657***	2.38	2.984**
Chg. ROA	+	-25.078	86.683*	-2.823	80.874
Ret	+	54.212	47.845	63.72	80.565
ROAStd	?	-2.960	47.231	33.999	41.205
RetStd	?	-523.292*	-82.277	-748.263**	-573.152*
Chg. Ops	+	-0.045	-0.149	-0.135	-0.047
Chg. Div	?	410.124	-296.522	1576.335	405.259
Sense	?	0.235***	-0.141*	0.25***	-0.081
*Sense * Chg. Div*	+	1.071***	1.684***	1.305***	2.437**
Indep	?		-93.801***		-213.9**
*Indep * Chg. Div*	?		-24.668		-71.455
*Indep * Sense*	?		-0.226***		-0.311**
*Sense *Chg. Div * Indep*	+		0.510***		0.77**
Adjusted R-square		0.096	0.301	0.119	0.226
No. Observations		1,229	1,195	1,229	1,195

Note: variables are defined in Table 1, Panel A

* Significant at the 0.1 level (one-tailed)

** Significant at the 0.05 level (one-tailed)

*** Significant at the 0.01 level (one-tailed)

Table 5: Implicit Dividend Protection Measured by Compensation Levels, Along with the Impact of Board Independence

$$Bonus = \alpha + \beta_1\ LagBonus + \beta_2\ Sales + \beta_3\ InvOpp + \beta_4\ ROA + \beta_5\ Chg.\ ROA + \beta_6\ Ret + \beta_7\ StdROA + \beta_8\ StdRet + \beta_9\ Chg.\ Ops + \beta_{10}\ Chg.\ Div + \beta_{11}\ Sense_{t-1} + \beta_{12}\ Sense_{t-1} * Chg.\ Div + \varepsilon \quad (2a)$$

$$Total\ Cash = \alpha + \beta_1\ Lag\ Total\ Cash + \beta_2\ Sales + \beta_3\ InvOpp + \beta_4\ ROA + \beta_5\ Chg.\ ROA + \beta_6\ Ret + \beta_7\ StdROA + \beta_8\ StdRet + \beta_9\ Chg.\ Ops + \beta_{10}\ Chg.\ Div + \beta_{11}\ Sense_{t-1} + \beta_{12}\ Sense_{t-1} * Chg.\ Div + \varepsilon \quad (3a)$$

$$Bonus = \alpha + \beta_1\ LagBonus + \beta_2\ Sales + \beta_3\ InvOpp + \beta_4\ ROA + \beta_5\ Chg.\ ROA + \beta_6\ Ret + \beta_7\ StdROA + \beta_8\ StdRet + \beta_9\ Chg\ Ops + \beta_{10}\ Chg.\ Div + \beta_{11}\ Sense_{t-1} + \beta_{12}\ Indep + \beta_{13}\ Sense_{t-1} * Chg.\ Div + \beta_{14}\ Indep*Chg.\ Div + \beta_{15}\ Sense_{t-1}*Indep + \beta_{16}\ Sense_{t-1} *Chg.\ Div*Indep + \varepsilon \quad (4a)$$

$$Total\ Cash = \alpha + \beta_1\ Lag\ Total\ Cash + \beta_2\ Sales + \beta_3\ InvOpp + \beta_4\ ROA + \beta_5\ Chg.\ ROA + \beta_6\ Ret + \beta_7\ StdROA + \beta_8\ StdRet + \beta_9\ Chg.\ Ops + \beta_{10}\ Chg.\ Div + \beta_{11}\ Sense_{t-1} + \beta_{12}\ Indep + \beta_{13}\ Sense_{t-1} * Chg.\ Div + \beta_{14}\ Indep*Chg.\ Div + \beta_{15}\ Sense_{t-1}*Indep + \beta_{16}\ Sense_{t-1} *Chg.\ Div*Indep + \varepsilon \quad (5a)$$

		Bonus	Bonus	Total Cash	Total Cash
Variable	**Prediction**	**Model (2a)**	**Model (4a)**	**Model (3a)**	**Model (5a)**
Intercept	?	307.689***	165.550***	726.788***	473.728***
LagBonus	+	0.612***	0.611***		
LagTCC	+			0.589***	0.599***
Sales	+	0.013***	0.013***	0.018***	0.018***
Invopp	-	0.215	0.218	0.345	0.354*
ROA	+	2.652***	2.656***	3.524***	3.436***
Chg. ROA	+	88.098*	86.683*	122.947*	127.834*
Ret	+	21.186	47.845	73.826	82.804
ROAStd	?	41.824	47.231	80.58	84.27
RetStd	?	-189.872	-82.277	-473.058***	-322.615*
Chg. Ops	+	-0.155	-0.149	-0.323	-0.242
Chg. Div	?	374.887	-296.522	1410.243	-272.055
Sense	?	0.096***	-0.141*	0.153***	-0.173*
*Sense * Chg. Div*	+	0.887***	1.684***	1.275***	2.459***
Indep	?		-93.801***		-178.599***
*Indep * Chg. Div*	?		24.668		72.177
*Indep * Sense*	?		-0.226***		-0.279***
*Sense *Chg. Div * Indep*	+		0.510***		0.889***
Adjusted R-sq		0.437	0.454	0.469	0.495
No. Observations		1,200	1,200	1,200	1,200

Note: variables are defined in Table 1, Panel A

* Significant at the 0.1 level (one-tailed)

** Significant at the 0.05 level (one-tailed)

*** Significant at the 0.01 level (one-tailed)

Table 6: Changes in Dividends Related to CEO Stock and Option Holdings and the Impact of Board Independence

$$Chg.\ Div = \alpha + \beta_1\ Cash + \beta_2\ Ops + \beta_3\ Intexp + \beta_4\ Options + \beta_5\ Stock + \beta_6\ Size + \beta_7\ MB + \varepsilon \quad (6)$$

$$Chg.\ Div = \alpha + \beta_1\ Cash + \beta_2\ Ops + \beta_3\ Intexp + \beta_4\ Options + \beta_5\ Stock + \beta_6\ Size + \beta_7\ MB + \beta_8\ Indep + \beta_9\ Indep*Options + \beta_{10}\ Indep*Stock + \varepsilon \quad (7)$$

Variable	**Prediction**	**Model (6)**	**Model (7)**
Intercept	?	-0.0004	-0.0009*
Cash	+	0.0008**	0.0008**
Ops	+	0.0001	0.0002
Intexp	-	-0.0003	-0.0003
Options	-	0.000	-0.000
Stock	+	0.00002**	0.000
Size	?	0.000	0.000
MB	-	0.000	0.000
Indep	?		-0.0004*
*Indep*Options*	+		-0.000003
*Indep*Stock*	-		-0.000005
Adjusted R-sq		0.001	0.004
No. Observations		1,801	1,801

Note: variables are defined in Table 1, Panel A
* Significant at the 0.1 level (one-tailed)
** Significant at the 0.05 level (one-tailed)
*** Significant at the 0.01 level (one-tailed)

Table 7: Dividend Levels Related to CEO Stock and Option Holdings and the Impact of Board Independence

$$Div = \alpha + \beta_1\ LagDiv + \beta_2\ Cash + \beta_3\ Ops + \beta_4\ Intexp + \beta_5\ Options + \beta_6\ Stock + \beta_7\ Size + \beta_8\ MB + \varepsilon \quad (6a)$$

$$Div = \alpha + \beta_1\ LagDiv + \beta_2\ Cash + \beta_3\ Ops + \beta_4\ Intexp + \beta_5\ Options + \beta_6\ Stock + \beta_7\ Size + \beta_8\ MB + \beta_9\ Indep + \beta_{10}\ Indep{*}Options + \beta_{11}\ Indep{*}Stock + \varepsilon \quad (7a)$$

Variable	**Prediction**	**Model (6a)**	**Model (7a)**
Intercept	?	-0.0003	-0.0004
LagDiv	+	0.909***	0.908***
Cash	+	0.0001	0.0001
Ops	+	0.001***	0.002***
Intexp	-	-0.0007*	0.0007*
Options	-	-0.00001**	-0.00001
Stock	+	0.00003**	0.000001
Size	?	0.000	0.000
MB	-	-0.000	-0.000
Indep	?		-0.00006**
*Indep*Options*	+		-0.000003
*Indep*Stock*	-		0.000001
Adjusted R-sq		0.914	0.914
No. Observations		1,801	1,801

Note: variables are defined in Table 1, Panel A
* Significant at the 0.1 level (one-tailed)
** Significant at the 0.05 level (one-tailed)
*** Significant at the 0.01 level (one-tailed)

Table 8: Changes in Stock Option Grants Related to Whether Firms Increased Dividends in the First Year Following the Passage of JGTRRA

$$Chg.\ OptGrants = \alpha + \beta_1\ Sales + \beta_2\ InvOpp + \beta_3\ ROA + \beta_4\ Chg.\ ROA + \beta_5\ Ret + \beta_6\ StdROA + \beta_7\ StdRet + \beta_8\ Chg.\ Ops + \beta_9\ LagDivDum + \beta_{10}\ Sense_{t-1} + \beta_{11}\ Sense_{t-1} * LagDivDum + \beta_{12} ChgTCC + \beta_{13}\ ChgStock + \varepsilon \quad (8)$$

$$Chg.\ OptGrants = \alpha + \beta_1\ Sales + \beta_2\ InvOpp + \beta_3\ ROA + \beta_4\ Chg.\ ROA + \beta_5\ Ret + \beta_6\ StdROA + \beta_7\ StdRet + \beta_8\ Chg.\ Ops + \beta_9\ LagDivDum + \beta_{10}\ Sense_{t-1} + \beta_{11}\ Sense_{t-1} * LagDivDum + \beta_{12} ChgTCC + \beta_{13}\ ChgStock + \beta_{14}\ Indep + \beta_{15}\ Sense_{t-1} * LagDivDum + \beta_{16}\ Indep * Chg.\ Div + \beta_{17}\ Sense_{t-1} * LagDivDum * Indep + \varepsilon \quad (9)$$

Variable	**Prediction**	**Model (8)**	**Model (9)**
Intercept	?	0.03327	0.31051**
Sales	+	-0.00001	-0.00001
Invopp	-	-0.009	-0.0006
ROA	+	0.006***	0.006***
Chg. ROA	+	-0.289	-0.236
Ret	+	0.043	0.034
StdROA	?	0.193	0.206
StdRet	?	1.700***	1.706***
Chg. Ops	+	0.0001	-0.0001
LagDivDum	?	-0.092	-0.437
Sense	?	-0.0003***	-0.002***
*Sense * LagDivDum*	-	-0.0004**	-0.002***
ChgTCC	-	-0.051**	-0.036*
ChgStock	-	0.027	0.013
Indep	?		0.179***
*LagDivDum * Indep*	?		0.196
*Indep * Sense*	?		-0.001***
*LagDivDum * Sense *Indep*	-		-0.001***
Adjusted R-sq		0.070	0.138
No. Observations		383	383

Note: variables are defined in Table 1, Panel A

* Significant at the 0.1 level (one-tailed)

** Significant at the 0.05 level (one-tailed)

*** Significant at the 0.01 level (one-tailed)

Table 9: Descriptive Statistics

Panel A: Descriptive Statistics for Entire Sample Period

Variable	N	Mean	Median	Std. Dev.
Earn	28,994	15.248	1.441	61.471
Div	28,994	22.636	0	82.802
Chg. Earn	28,994	6.160	0.514	40.872
Chg. Div	28,994	1.977	0	11.039
ROE	28,994	-0.002	0.019	0.124
TA	28,994	2,594.970	404.820	8,204.23
Growth	28,994	24.129	1.248	101.954
Err	28,994	0	-0.085	277.99
AbsErr	28,994	32.870	2.380	276.043

Panel B: Descriptive Statistics for Pre-Act Period

Variable	N	Mean	Median	Std. Dev.
Earn	14,744	12.780	1.126	58.206
Div	14,744	21.472	0	81.097
Chg. Earn	14,744	6.063	0.508	42.331
Chg. Div	14,744	1.338	0	9.561
ROE	14,744	-0.007	0.164	0.124
TA	14,744	2,434.780	379.050	7,941.910
Growth	14,744	17.749	0.585	98.032
Err	14,744	-8.189	0.152	474.916
AbsErr	14,744	44.682	3.534	472.880

Table 9: (Continued)

Panel C: Descriptive Statistics for Post-Act Period

Variable	N	Mean	Median	Std. Dev.
Earn	14,150	17.821***	1.836***	64.602
Div	14,150	23.849**	0***	84.530
Chg. Earn	14,150	6.260***	0.520	39.296
Chg. Div	14,150	2.642***	0***	12.358
ROE	14,150	0.003***	0.022***	0.124
TA	14,150	2,761.880***	436.480***	8,465.980
Growth	14,150	30.777***	2.214***	105.479
Err	14,150	13.090	0.409	186.559
AbsErr	14,150	35.984	3.727	183.523

where:

Earn = quarterly net income (Compustat data item #11 * data item #15) in millions of dollars
Div = quarterly ordinary dividends aggregated from CRSP, in millions of dollars
Chg. Div = change in quarterly ordinary dividends from CRSP, in millions of dollars
Post = 1 for quarters following the passage of the Act, and zero otherwise
ROE = return on equity (Compustat data item $\#11_t$ * data item $\#15_t$)/ Compustat data item $\#60_{t-1}$
TA = total assets (Compustat data item #44), in millions of dollars
Growth = changes in quarterly firm sales, in millions of dollars
Err = residual term from Model (1)
AbsErr = absolute value of the residual term from Model (1)

Note:
* Significant at the 0.1 level (one-tailed)
** Significant at the 0.05 level (one-tailed)
*** Significant at the 0.01 level (one-tailed)

Table 10: Current Earnings Explained by Current and Lagged Dividends in the Pre-Act and Post-Act Periods

$$Earn_t = \alpha + \beta_1\, Div_t\, (Chg.\ Div_t) + \beta_2\, Earn_{t-4} + \beta_3\, Post + \beta_4\, Post^{*}\, Div_t\, (Chg.\ Div_t) + \varepsilon \quad (11)$$

Variable	Prediction	Dividend Levels	Dividend Changes	Scaled Levels	Scaled Changes
Intercept	?	3.188***	6.613***	-0.012***	-0.010***
Div_t	+	0.267***	0.818***	0.234***	0.103***
$Earn_{t-1}$	+	0.573	0.755***	0.169***	0.175***
Post	?	1.635***	0.460	0.006***	0.006***
$Post^{*}Div_t$	-	-0.0003	-0.055*	-0.002	0.290
Adjusted R^2		0.671	0.609	0.164	0.145
No. of Observations		28,894	28,894	28,894	28,894

where:

Earn = Quarterly net income (Compustat data item #11 * data item #15)
Div = Quarterly ordinary dividends aggregated from CRSP
Chg. Div = Change in quarterly ordinary dividends from CRSP
Post = 1 for quarters following the passage of the Act, and zero otherwise

Note:
* Significant at the 0.1 level (one-tailed)
** Significant at the 0.05 level (one-tailed)
*** Significant at the 0.01 level (one-tailed)

Table 11: Changes in Earnings Explained by Changes in Dividends in the Pre-Act and Post-Act Periods

$$Chg.\ Earn_t = \alpha + \beta_1\ Div_t\ (Chg.\ Div_t) + \beta_2\ ROE + \beta_3\ Post + \beta_4\ Post{*}Div_t\ (Chg.\ Div_t) + \varepsilon \quad (12)$$

Variable	Prediction	Dividend Levels	Dividend Changes	Scaled Levels	Scaled Changes
Intercept	?	4.558***	5.848***	0.019***	0.018***
Div_t	+	0.079***	0.311***	-0.044	0.211***
ROE	+	27.231***	30.338***	0.080***	0.078***
Post	?	-0.173	-0.459	-0.009***	-0009***
$Post*Div_t$	-	-0.004	-0.018	0.067	-0.106*
Adjusted R^2		0.034	0.016	0.004	0.006
No. of Observations		28,894	28,894	28,894	28,894

where:

Earn	= Quarterly net income (Compustat data item #11 * data item #15)
Div	= Quarterly ordinary dividends aggregated from CRSP
Chg. Div	= Change in quarterly ordinary dividends from CRSP
Post	= 1 for quarters following the passage of the Act, and zero otherwise
ROE	= return on equity (Compustat data item $\#11_t$ * data item $\#15_t$)/ Compustat data item $\#60_{t-1}$

Note:
* Significant at the 0.1 level (one-tailed)
** Significant at the 0.05 level (one-tailed)
*** Significant at the 0.01 level (one-tailed)

Table 12: Earnings Persistence for Dividend-Increasing Firms in the Pre-Act and Post-Act Periods

$$Earn_{t+1}/TA_{t-1} = \alpha + \beta_1\ DivChanger + \beta_2\ Earn_t/TA_{t-4} + \beta_3 DivChanger*\ Earn_t/TA_{t-4} + \beta_4\ Post + \beta_5\ Post*\ DivChanger + \beta_6\ Post*\ DivChanger*\ Earn_t/TA_{t-4} + \varepsilon \quad (13)$$

Variable	**Prediction**	**Model (13)**	**Model (13) unscaled**
Intercept	?	-0.018***	4.435***
DivChanger	+	0.021***	6.474***
$Earn_t/TA_{t-1}$	+	0.164***	0.580***
*DivChanger** $Earn_t/TA_{t-1}$	+	0.743***	0.318***
Post	?	0.008***	1.018**
Post DivChanger*	-	-0.009***	-3.421***
Post DivChanger** $Earn_t/TA_{t-1}$	-	0.034	0.112
Adjusted R^2		0.166	0.628
No. of Observations		28,894	28,894

where:

Earn	= Quarterly net income (Compustat data item #11 * data item #15)
Post	= 1 for quarters following the passage of the Act, and zero otherwise
TA	= total assets (Compustat data item #44)
DivChanger	= 1 if firms increased dividends in the period, and zero otherwise

Note:
* Significant at the 0.1 level (one-tailed)
** Significant at the 0.05 level (one-tailed)
*** Significant at the 0.01 level (one-tailed)

Table 13: Three-Day Cumulative Abnormal Returns around Dividend Announcements in the Pre-Act and Post-Act Periods

$$CAR_t = \alpha + \beta_1\ Chg.\ Div_t + \beta_2\ Post + \beta_3\ Post * Chg.\ Div_t + \varepsilon \quad (14)$$

Variable	Prediction	Ord	Spec	Chg. Div
Intercept	?	0.006***	0.006***	0.005***
Div	+	0.002*	0.002***	-0.001**
Post	?	-0.004***	-0.003***	-0.004***
*Post*Div*	?	0.003*	0.008***	0.007***
Adjusted R^2		0.002	0.004	0.006
No. of Observations		78,156	78,156	22,591

where:

CAR	= size-adjusted three-day cumulative abnormal returns surrounding firms' announcements of dividend increases
Div	= Quarterly ordinary dividends aggregated from CRSP
Chg. Div	= Change in quarterly ordinary dividends from CRSP
Post	= 1 for quarters following the passage of the Act, and zero otherwise

Note:
* Significant at the 0.1 level (one-tailed)
** Significant at the 0.05 level (one-tailed)
*** Significant at the 0.01 level (one-tailed)

Table 14: Research and Development and Capital Expenditures Impact of Dividend Changes for Growth Firms in the Pre-Act and Post-Act Periods

$$Chg.\ R\&D_t = \alpha + \beta_1\ Chg.\ Div_t + \beta_2\ Post + \beta_3\ Post^*\ Chg.\ Div_t + \beta_4\ Growth + \beta_5\ Growth^*\ Chg.\ Div_t + \beta_6\ Post^*Growth^*\ Chg.\ Div_t + \varepsilon \quad (15)$$

$$Chg.\ CAPX_t = \alpha + \beta_1\ Chg.\ Div_t + \beta_2\ Post + \beta_3\ Post^*\ Chg.\ Div_t + \beta_4\ Growth + \beta_5\ Growth^*\ Chg.\ Div_t + \beta_6\ Post^*Growth^*\ Chg.\ Div_t + \varepsilon \quad (16)$$

Variable	**Prediction**	**Chg. R&D**	**Chg. CAPX**	**Scaled Chg. R&D**	**Scaled Chg. CAPX**
Intercept	?	-0.172	-6.152***	-0.007***	-0.010***
Chg. Div$_t$	?	0.144***	0.174	0.0001***	0.0002***
Post	?	0.772***	6.571***	0.005***	0.008***
*Post*Chg. Div*$_t$	-	-0.112***	-0.183*	-0.0001*	-0.0001**
Growth	+	3.310***	15.974***	0.017***	0.037***
*Growth*Chg. Div*$_t$	-	-8.624***	-2.404*	-0.002**	-0.001
*Post*Growth* Chg. Div*$_t$	+	9.039***	9.702***	0.002**	0.001
Adjusted R^2		0.028	0.010	0.009	0.029
No. of Observations		14,904	14,904	14,904	14,904

where:

Chg. R&D = changes in quarterly research and development expenditures (Compustat data item #4)
Chg. CAPX = changes in quarterly capital expenditures (Compustat data item #90)
Div = Quarterly ordinary dividends aggregated from CRSP
Chg. Div = Change in quarterly ordinary dividends from CRSP
Post = 1 for quarters following the passage of the Act, and zero otherwise
Growth = changes in quarterly firm sales (Compustat data item #2), scaled by the largest sample firm value to create a continuous variable bounded by zero and one, consistent with Clement and Tse (2003).

Note:
* Significant at the 0.1 level (one-tailed)
** Significant at the 0.05 level (one-tailed)
*** Significant at the 0.01 level (one-tailed)

Table 15: Earnings Impact of Dividend Changes for Growth Firms in the Pre-Act and Post-Act Periods

$$Earn_t = \alpha + \beta_1\, Div_t\, (Chg.\, Div_t) + \beta_2\, Earn_{t-1} + \beta_3\, Post + \beta_4\, Post^*\, Div_t\, (Chg.\, Div_t) + \beta_5\, Growth + \beta_6\, Growth^*\, Div_t\, (Chg.\, Div_t) + \beta_7\, Post^*Growth^*\, Div_t\, (Chg.\, Div_t) + \varepsilon \qquad (17)$$

Variable	Prediction	Dividend Levels	Dividend Changes	Scaled Levels	Scaled Changes
Intercept	?	2.563***	6.252***	-0.016***	-0.014***
Div_t	+	0.261***	0.873***	0.252***	-0.028
$Earn_{t-1}$	+	0.573***	0.755***	0.169***	0.174***
Post	?	1.472***	0.385	0.006***	0.006***
$Post*Div_t$	-	-0.024***	-1.054***	-0.024*	0.206
Growth	+	11.014***	6.870***	0.072***	0.069***
$Growth*Div_t$	-	0.323	-0.132***	-0.064***	0.350
$Post*Growth*Div_t$	+	0.673***	1.591***	0.051*	0.101
Adjusted R^2		0.674	0.609	0.174	0.158
No. of Observations		28,894	28,894	28,894	28,894

where:

Earn = Quarterly net income (Compustat data item #11 * data item #15)
Div = Quarterly ordinary dividends aggregated from CRSP
Chg. Div = Change in quarterly ordinary dividends from CRSP
Post = 1 for quarters following the passage of the Act, and zero otherwise
Growth = changes in quarterly firm sales (Compustat data item #2), scaled by the largest sample firm value to create a continuous variable bounded by zero and one, consistent with Clement and Tse (2003).

Note:
* Significant at the 0.1 level (one-tailed)
** Significant at the 0.05 level (one-tailed)
*** Significant at the 0.01 level (one-tailed)

Table 16: Impact of Dividends on Changes in Earnings for Growth Firms in the Pre-Act and Post-Act Periods

$$Chg.\ Earn_t = \alpha + \beta_1\ Div_t\ (Chg.\ Div_t) + \beta_2\ ROE + \beta_3\ Post + \beta_4\ Post{*}\ Div_t\ (Chg.\ Div_t) + \beta_5\ Growth + \beta_6\ Growth{*}\ Div_t\ (Chg.\ Div_t) + \beta_7\ Post{*}Growth{*}\ Div_t\ (Chg.\ Div_t) + \varepsilon \quad (18)$$

Variable	Prediction	Dividend Levels	Dividend Changes	Scaled Levels	Scaled Changes
Intercept	?	4.276***	5.597***	0.016***	0.015***
Div_t	+	0.065***	0.312***	-0.158	0.217***
ROE	+	25.941***	29.673***	0.074***	0.071***
Post	?	-0.220	-0.522	-0.010***	-0.009***
$Post{*}Div_t$	-	-0.021***	-0.063*	0.102	-0.301***
Growth	+	3.809**	4.722**	0.067***	0.068***
$Growth{*}Div_t$	-	0.585	-0.0004	0.288	-0.061
$Post{*}Growth{*}Div_t$	+	0.400***	1.037***	-0.077	0.452***
Adjusted R^2		0.039	0.017	0.008	0.008
No. of Observations		28,894	28,894	28,894	28,894

where:

Earn	= Quarterly net income (Compustat data item #11 * data item #15)
Div	= Quarterly ordinary dividends aggregated from CRSP
Chg. Div	= Change in quarterly ordinary dividends from CRSP
Post	= 1 for quarters following the passage of the Act, and zero otherwise
ROE	= return on equity (Compustat data item $\#11_t$ * data item $\#15_t$)/ Compustat data item $\#60_{t-1}$
Growth	= changes in quarterly firm sales (Compustat data item #2), scaled by the largest sample firm value to create a continuous variable bounded by zero and one, consistent with Clement and Tse (2003).

Note:
* Significant at the 0.1 level (one-tailed)
** Significant at the 0.05 level (one-tailed)
*** Significant at the 0.01 level (one-tailed)

Table 17: Three-Day Cumulative Abnormal Returns around Dividend Announcements of Growth Firms in the Pre-Act and Post-Act Periods

$$CAR_t = \alpha + \beta_1 \, Chg.\, Div_t + \beta_2 \, Post + \beta_3 \, Growth + \beta_4 \, Growth*Chg.\, Div_t + \beta_5 \, Post * Chg.\, Div_t + \beta_6 \, Post *Growth*Chg.\, Div_t + \varepsilon \quad (19)$$

Variable	**Prediction**	**Ord**	**Spec**	**Chg. Div**
Intercept	?	0.006***	0.006***	0.005***
Div	+	0.003**	0.002***	-0.001***
Post	?	-0.003***	-0.003***	-0.004***
Growth	+	0.041***	0.030***	0.022***
*Growth*Div*	-	-0.114***	0.065*	0.059***
*Post*Div*	?	0.002*	0.008***	0.006***
*Post*Growth*Div*	+	0.082*	-0.094	0.014
Adjusted R^2		0.002	0.004	0.01
No. of Observations		78,185	78,185	22,591

where:

Div = Quarterly ordinary dividends aggregated from CRSP
Chg. Div = Change in quarterly ordinary dividends from CRSP
Post = 1 for quarters following the passage of the Act, and zero otherwise
Growth = changes in quarterly firm sales (Compustat data item #2), scaled by the largest sample firm value to create a continuous variable bounded by zero and one, consistent with Clement and Tse (2003).

Note:
* Significant at the 0.1 level (one-tailed)
** Significant at the 0.05 level (one-tailed)
*** Significant at the 0.01 level (one-tailed)

Table 18: Descriptive Statistics

Panel A: Descriptive Statistics- Quarterly Capital Expenditure Variables

Variable	Mean	25% Quartile	Median	75% Quartile	Std. Dev.
Qual	16.687	0	0.196	2.240	263.189
NON	6.586	0	0	0.471	74.551
CAPX	15.786	0.050	0.888	5.198	98.266
Ratio	0.753	0.559	0.977	1	0.346

where:

Qual = qualified asset additions, reported in quarterly footnotes
NON = nonqualified asset additions, reported in quarterly footnotes
CAPX = total capital expenditures, reported in quarterly footnotes
Ratio = qualified asset additions divided by the sum of qualified and nonqualified additions, as reported in quarterly footnotes

Panel B: Descriptive Statistics- Annual Capital Expenditure Variables

Variable	Mean	25% Quartile	Median	75% Quartile	Std. Dev.
Qual	66.746	0.222	2.858	12.530	551.214
NON	26.344	0	0.276	4.719	164.887
CAPX	93.090	0.255	4.213	20.795	701.271
Ratio	0.783	0.659	0.872	1	0.259
Cash	84.443	1.054	8.105	39.781	289.382
Sales	979.086	13.378	92.655	340.745	21,044
ChSales	0.181	-0.074	0.052	0.191	1.107
ADCost	0.509	0.394	0.507	0.610	0.182
CYLoss	0.527	0	1	1	0.499
LTD	373.822	0.009	4.33	100.0	11,236
PTI	127.056	-2.383	1.325	32.863	603.193
Foreign	11.383	0	0	18.007	19.778

where:

Qual = qualified asset additions, in millions, aggregated from quarterly footnotes
NON = nonqualified asset additions, in millions, aggregated from quarterly footnotes
CAPX = total capital expenditures, in millions, aggregated from quarterly footnotes
Cash = cash and cash equivalents (Compustat data item #1), in millions
Sales = annual net sales (Compustat data item #12), in millions
ChSales = sales in year t less Sales in year t, in millions
ADCOST = 1 – (Accumulated Depreciation / Gross Property Plant and Equipment), reported by Compustat
CYLOSS = 1 if current year pretax income is less than zero, and zero otherwise
LTD = Long-Term Debt (Compustat data item #9) in year t-1, in millions
PTI = pretax income (Compustat data item #170), in millions
Foreign = percentage of foreign assets, reported by Compustat
Ratio = qualified asset additions divided by the sum of qualified and nonqualified additions, as reported in quarterly footnotes

Table 18: (Continued)

Panel C: Annual Capital Expenditure Variables by Year

Variable	Mean	25% Quartile	Median	75% Quartile	Std. Dev.
Qual 2000	65.704	0.264	3.096	13.818	242.650
Qual 2001	31.991	0.129	2.298	12.095	139.264
Qual 2002	47.685	0.255	2.367	13.328	207.879
Qual 2003	38.940	0.146	3.035	12.232	146.556
Qual 2004	150.244	0.267	2.672	16.971	1,178.07
NON 2000	33.865	0	0.214	4.301	175.951
NON 2001	12.203	0	0.324	4.575	37.794
NON 2002	21.206	0	0.300	5.623	90.343
NON 2003	18.793	0	0.208	4.973	67.952
NON 2004	45.925	0	0.248	8.046	303.073
CAPX 2000	99.569	0.444	4.962	23.869	379.392
CAPX 2001	44.195	0.222	3.987	17.950	171.140
CAPX 2002	68.891	0.269	4.636	20.795	277.225
CAPX 2003	57.733	0.192	4.021	18.136	199.714
CAPX 2004	196.168	0.300	4.317	24.832	1,479.13
Ratio 2000	0.800	0.721	0.893	1.0	0.255
Ratio 2001	0.744	0.597	0.840	1.0	0.300
Ratio 2002	0.783	0.620	0.878	1.0	0.251
Ratio 2003	0.796	0.669	0.872	1.0	0.243
Ratio 2004	0.791	0.627	0.886	1.0	0.244

where:

Qual = qualified asset additions, in millions, aggregated from quarterly footnotes
NON = nonqualified asset additions, in millions, aggregated from quarterly footnotes
CAPX = total capital expenditures, in millions, aggregated from quarterly footnotes
Ratio = qualified asset additions divided by the sum of qualified and nonqualified additions, as reported in quarterly footnotes

Table 19: Descriptive Statistics

Panel A: Quarterly Capital Expenditure Variables in the Pre-JCWAA Period

Variable	Mean	25% Quartile	Median	75% Quartile	Std. Dev.
Qual	11.791	0	0.207	2.019	70.923
NON	5.820	0	0	0.322	46.136
CAPX	14.398	0.057	0.903	5.196	60.329

Panel B: Quarterly Capital Expenditure Variables in the JCWAA (30 Percent) Period

Variable	Mean	25% Quartile	Median	75% Quartile	Std. Dev.
Qual	12.305	0.001	0.233	2.727	62.489
NON	4.677	0	0	0.802	19.738
CAPX	20.125	0.053	0.988	5.092	170.451

Panel C: Quarterly Capital Expenditure Variables in the JGTRRA (50 Percent) Period

Variable	Mean	25% Quartile	Median	75% Quartile	Std. Dev.
Qual	27.721	0	0.129	2.254	469.873
NON	9.339	0	0	0.497	122.712
CAPX	14.231	0.039	0.756	5.251	49.492

where:

Qual = qualified asset additions, in millions, reported in quarterly footnotes
NON = nonqualified asset additions, in millions, reported in quarterly footnotes
CAPX = total capital expenditures, in millions, reported in quarterly footnotes

Table 20: Bivariate Correlations

Panel A: Correlation Matrices for Qualified Asset Additions

	$Qual_t$	$Qual_{t-1}$	LTD_{t-1}	$ChSales_{t-1}$	$ADCost_{t-1}$	PTI_{t1-t2}	PTI_{t3-t5}	*ForPct*
$Qual_t$	1.000	0.029 (0.497)	0.355 (<.001)	0.259 (<.001)	-0.055 (0.102)	0.330 (<.001)	0.228 (<.001)	0.463 (0.168)
$Qual_{t-1}$	0.312 (<.001)	1.000	0.547 (0.104)	0.034 (0.312)	0.001 (0.979)	0.033 (0.335)	0.013 (0.737)	0.084 (0.012)
LTD_{t-1}	0.295 (<.001)	0.625 (<.001)	1.000	0.657 (<.001)	-0.140 (<.001)	0.242 (<.001)	0.132 (<.001)	0.043 (0.201)
$ChSales_{t-1}$	0.335 (<.001)	0.409 (<.001)	0.487 (<.001)	1.000	-0.180 (<.001)	0.130 (<.001)	0.028 (0.455)	0.027 (0.426)
$ADCost_{t-1}$	-0.015 (0.611)	-0.080 (0.008)	-0.139 (<.001)	-0.053 (0.159)	1.000	-0.065 (0.058)	-0.701 (0.007)	0.018 (0.586)
PTI_{t1-t2}	0.103 (<.001)	0.514 (<.001)	0.344 (<.001)	0.475 (<.001)	-0.092 (0.002)	1.000	0.936 (<.001)	0.230 (<.001)
PTI_{t3-t5}	0.065 (0.041)	0.484 (<.001)	0.308 (<.001)	0.400 (<.001)	-0.110 (<.001)	0.948 (<.001)	1.000	0.261 (<.001)
Foreign	-0.003 (0.933)	0.075 (0.014)	0.046 (0.128)	0.118 (0.002)	-0.082 (0.007)	0.152 (<.001)	0.199 (<.001)	1.000

Panel B: Correlation Matrices for Total Capital Expenditures

	$CAPX_t$	$CAPX_{t-1}$	LTD_{t-1}	$ChSales_{t-1}$	$ADCost_{t-1}$	PTI_{t1-t2}	PTI_{t3-t5}	*ForPct*
$CAPX_t$	1.000	0.548 (<.001)	0.603 (<.001)	0.388 (<.001)	-0.085 (0.011)	0.559 (<.001)	0.408 (<.001)	0.082 0.014
$CAPX_{t-1}$	0.260 (<.001)	1.000	0.567 (<.001)	0.250 (<.001)	-0.056 (0.097)	0.406 (<.001)	0.254 (<.001)	0.091 (0.007)
LTD_{t-1}	0.393 (<.001)	0.425 (<.001)	1.000	0.657 (<.001)	-0.140 (<.001)	0.242 (<.001)	0.132 (<.001)	0.430 (0.201)
$ChSales_{t-1}$	0.226 (<.001)	0.149 (<.001)	0.487 (<.001)	1.000	-0.180 (<.001)	0.130 (<.001)	0.028 (0.455)	0.027 (0.426)
$ADCost_{t-1}$	-0.054 (0.073)	-0.057 (0.061)	-0.139 (<.001)	-0.053 (0.159)	1.000	-0.065 (0.058)	-0.101 (0.007)	0.018 (0.586)
PTI_{t1-t2}	0.369 (<.001)	0.337 (<.001)	0.344 (<.001)	0.475 (<.001)	-0.092 (0.002)	1.000	0.936 (<.001)	0.230 (<.001)
PTI_{t3-t5}	0.312 (<.001)	0.359 (<.001)	0.308 (<.001)	0.400 (<.001)	-0.110 (<.001)	0.948 (<.001)	1.000	0.261 (<.001)
Foreign	0.023 (0.456)	0.021 (0.486)	0.046 (0.128)	0.118 (0.002)	-0.082 (0.007)	0.152 (<.001)	0.199 (<.001)	1.000

where:

CAPX = Capital expenditures, reported in quarterly footnotes
LTD_{t-1} = Long-Term Debt (Compustat data item #9) in year t-1
$ChSales_{t-1}$ = Sales (Compustat data item #12) in year t-1 less Sales in year t-2
$Cash_{t-1}$ = Cash (Compustat data item #1) held end of year t-1
$ADCOST_{t-1}$ = 1– (accumulated depreciation (Compustat data item #7 – Compustat data item #8) /gross property plant and equipment (Compustat data item #7)
PTI_{t1-t2} = Sum of Pretax Income (Compustat data item #170) for Years t-1 and t-2
PTI_{t3-t5} = Sum of Pretax Income (Compustat data item #170) for Years t-3, t-4, and t-5
Foreign = Percent of foreign assets, reported in Research Insight

* Note: data to the right of the diagonal are for the pre-JCWAA period; data to the left are for the post-JCWAA period

Table 21: Regression Results for Three Prediction Models

$$Qual_t = \alpha_0 + \alpha_1\, Qual_{t-1} + \alpha_2\, Cash_{t-1} + \alpha_3\, ChSales_t + \alpha_4\, ADCOST_{t-1} + \alpha_5\, LTD_{t-1} + \alpha_6\, PTI_{t-1} + \alpha_{7\text{-}10}\, \Sigma Econ_{t-1} + \alpha_{11\text{-}13}\, \Sigma Qtrdum + \varepsilon \quad (20)$$

$$NON_t = \alpha_0 + \alpha_1\, NON_{t-1} + \alpha_2\, Cash_{t-1} + \alpha_3\, ChSales_t + \alpha_4\, ADCOST_{t-1} + \alpha_5\, LTD_{t-1} + \alpha_6\, PTI_{t-1} + \alpha_{7\text{-}10}\, \Sigma Econ_{t-1} + \alpha_{11\text{-}13}\, \Sigma Qtrdum + \varepsilon \quad (21)$$

$$CAPX_t = \alpha_0 + \alpha_1\, CAPX_{t-1} + \alpha_2\, Cash_{t-1} + \alpha_3\, ChSales_{t-1} + \alpha_4\, ADCOST_{t-1} + \alpha_5\, LTD_{t-1} + \alpha_6\, PTI_{t-1} + \alpha_{7\text{-}10}\, \Sigma Econ_{t-1} + \alpha_{11\text{-}13}\, \Sigma Qtrdum + \varepsilon \quad (22)$$

Variables	**Prediction**	**$Qual_t$**	**NON_t**	**$CAPX_t$**
Intercept	?	-2.319 (-0.33)	11.137 (0.81)	-0.247 (-0.05)
Qual (NON, CAPX)$_{t-1}$	+	0.163*** (4.52)	0.265*** (4.31)	0.211*** (8.02)
$Cash_{t-1}$	+	0.325*** (8.19)	0.202*** (3.04)	0.297*** (10.04)
$ChSales_{t-1}$	+	0.0005 (1.52)	0.001*** (3.83)	0.00008 (0.51)
$ADCOST_{t-1}$	-	-1.660*** (-3.18)	-2.215** (1.99)	-1.807*** (-4.53)
LTD_{t-1}	?	0.365*** (11.78)	0.328*** (4.20)	0.399*** (17.06)
PTI_{t-1}	+	0.0005*** (3.69)	0.0006*** (3.00)	0.0004*** (3.72)
Qtr2dum	?	0.503 (1.61)	0.349 (0.62)	0.232 (0.98)
Qtr3dum	?	0.361 (0.99)	0.204 (0.31)	0.382 (0.158)
Qtr4dum	?	0.512* (1.80)	0.234 (0.51)	0.582*** (2.82)
(Adjusted R^2)		0.648	0.565	0.708

Note:
* Significant at the 0.1 level.
** Significant at the 0.05 level.
*** Significant at the 0.01 level.

where:

$Qual_t$ = log of qualified asset purchases in quarter t, reported in quarterly footnotes
NON_t = log of nonqualified asset purchases in quarter t, reported in quarterly footnotes
$CAPX_t$ = log of capital expenditures in quarter t, reported in quarterly footnotes
$Qual_{t-1}$ = log of qualified asset purchases in quarter t-1, reported in quarterly footnotes

NON_{t-1}	= log of nonqualified asset purchases in quarter t-1, reported in quarterly footnotes
$CAPX_{t-1}$	= log of capital expenditures in quarter t-1, reported in quarterly footnotes
LTD_{t-1}	= log of long-term debt (Compustat data item #9) in year t-1
$ChSales_{t-1}$	= Sales (Compustat data item #12) in year t-1 less Sales in year t-2
$Cash_{t-1}$	= log of cash (Compustat data item #1) held end of year t-1
$ADCOST_{t-1}$	= 1– (accumulated depreciation (Compustat data item #7 – Compustat data item #8) /gross property plant and equipment (Compustat data item #7)
PTI_{t-1}	= pretax income in year t-1(Compustat data item #170)
$\Sigma Econ$	= a vector of macroeconomic variables, including inflation, unemployment, change in gross domestic product, and housing starts, reported by Research Insight
$\Sigma Qtrdum$	= a vector of quarter dummies

Table 22: Descriptive Statistics

Panel A: Descriptive Statistics for Prediction Errors from Models (1) through (3) Following the Passage of JCWAA (Entire Post-Act Period, Including JGTRRA)

Variable	Mean	25% Quartile	Median	75% Quartile	Std. Dev.
DiffQual	0.576***	-0.099	0.696	1.487	1.349
DiffNON	-0.545***	-1.204	-0.376	0.698	1.930
DiffCAPX	0.147**	-0.530	0.143	0.783	1.112

Panel B: Descriptive Statistics for Prediction Errors from Models (1) through (3) in the JCWAA (30 Percent) Period

Variable	Mean	25% Quartile	Median	75% Quartile	Std. Dev.
DiffQual	0.492***	-0.247	0.472	1.312	1.343
DiffNON	-0.646***	-1.358	-0.454	0.608	1.924
DiffCAPX	0.200***	-0.477	0.146	0.887	1.119

Panel C: Descriptive Statistics for Prediction Errors from Models (1) through (3) in the JGTRRA (50 Percent) Period

Variable	Mean	25% Quartile	Median	75% Quartile	Std. Dev.
DiffQual	0.803***	0.062	0.898	1.522	1.350
DiffNON	-1.244	-1.054	-0.036	0.809	1.944
DiffCAPX	0.024	-0.756	0.126	0.627	1.091

where:

DiffQual = difference between the natural log of post-act qualified asset additions and predicted values calculated from Model (20)

DiffNON = difference between the natural log of post-act nonqualified asset additions and predicted values calculated from Model (21)

DiffCAPX = difference between the natural log of post-act capital expenditures and predicted values calculated from Model (22)

Note:
* Student's t-statistic significant at the 0.1 level.
** Student's t-statistic significant at the 0.05 level.
*** Student's t-statistic significant at the 0.01 level.

Table 23: Regression Models for Prediction Errors of Qualified Asset Additions and Capital Expenditures

$$DiffQual_t = \alpha_0 + \alpha_1\, CYLoss + \alpha_2\, Dum50 + \alpha_3\, Foreign + \alpha_4\, PTI_{t1\text{-}t2} + \alpha_5\, PTI_{t3\text{-}t5} + \alpha_6\, CYLoss{*}PTI_{t3\text{-}t5} + \varepsilon \qquad (23)$$

$$DiffCAPX_t = \alpha_0 + \alpha_1\, CYLoss + \alpha_2\, Dum50 + \alpha_3\, Foreign + \alpha_4\, PTI_{t1\text{-}t2} + \alpha_5\, PTI_{t3\text{-}t5} + \alpha_6\, CYLoss{*}PTI_{t3\text{-}t5} + \varepsilon \qquad (24)$$

Variable	Expected Sign	DiffQual post	DiffCAPX post	DiffQual 30%	DiffCAPX 30%
Intercept	(?)	0.616*** (5.43)	0.240** (3.01)	0.613*** (4.97)	0.232*** (2.73)
CYLoss	(-)	0.153 (0.56)	0.410** (2.14)	0.131 (0.27)	0.308 (1.31)
Dum50	(+)	0.319* (1.80)	-0.215* (-1.84)	--	--
Foreign	(?)	-0.002 (-0.52)	0.001 (0.51)	-0.001 (-0.22)	0.003 (0.80)
$PTI_{t1\text{-}t2}$	(+)	0.00002 (0.10)	-0.00006 (-0.57)	0.00002 (0.11)	0.00005 (0.37)
$PTI_{t3\text{-}t5}$	(?)	-0.00008 (-0.58)	-0.00003 (-0.35)	-0.0001 (-0.53)	-0.0001 (-1.14)
$CYLoss{*}PTI_{t3\text{-}t5}$	(+)	0.011** (2.34)	0.010*** (3.15)	0.012** (2.36)	0.011*** (3.12)
(Adjusted R^2)		0.029	0.072	0.021	0.063

Note:
* Significant at the 0.1 level.
** Significant at the 0.05 level.
*** Significant at the 0.01 level.

where:

$DiffQual_t$	= difference between the natural log of post-act qualified asset additions and predicted values calculated from Model (20)
$DiffCAPX_t$	= difference between the natural log of post-act capital expenditures and predicted values calculated from Model (22)
CYLoss	= 1 if current year pretax income (Compustat data item #170) is less than zero, and zero otherwise
Dum50	= 1 if the observation occurs during the 50 percent bonus depreciation period, and zero otherwise
Foreign	= percentage of foreign assets, reported by Research Insight
$PTI_{t1\text{-}t2}$	= Sum of Pretax Income (Compustat data item #170) for Years t-1 and t-2
$PTI_{t3\text{-}t5}$	= Sum of Pretax Income (Compustat data item #170) for Years t-3, t-4, and t-5

Table 24: Regression Models for Capital and Operating Leases in the Pre- and Post-JCWAA Periods

$$CapLease_t = \alpha_0 + \alpha_1 MTRClassB + \alpha_2 MTRClassC + \alpha_3 ECOST_t + \alpha_4 ZSCORE_t + \alpha_5 OENEG_t + \alpha_6 MTB_t + \alpha_7 Collateral_t + \alpha_8 Size_t + \alpha_{9\text{-}13} SIC + \varepsilon \quad (25)$$

$$OpLease_t = \alpha_0 + \alpha_1 MTRClassB + \alpha_2 MTRClassC + \alpha_3 ECOST_t + \alpha_4 ZSCORE_t + \alpha_5 OENEG_t + \alpha_6 MTB_t + \alpha_7 Collateral_t + \alpha_8 Size_t + \alpha_{9\text{-}13} SIC + \varepsilon \quad (26)$$

$$CapLease_t = \alpha_0 + \alpha_1 MTRClassB + \alpha_2 MTRClassC + \alpha_3 ECOST_t + \alpha_4 ZSCORE_t + \alpha_5 OENEG_t + \alpha_6 MTB_t + \alpha_7 Collateral_t + \alpha_8 Size_t + \alpha_9 Post + \alpha_{10} Post{*}MTRClassB + \alpha_{11} Post{*}MTRClassC + \alpha_{12\text{-}16} SIC + \varepsilon \quad (27)$$

$$OpLease_t = \alpha_0 + \alpha_1 MTRClassB + \alpha_2 MTRClassC + \alpha_3 ECOST_t + \alpha_4 ZSCORE_t + \alpha_5 OENEG_t + \alpha_6 MTB_t + \alpha_7 Collateral_t + \alpha_8 Size_t + \alpha_9 Post + \alpha_{10} Post{*}MTRClassB + \alpha_{11} Post{*}MTRClassC + \alpha_{12\text{-}16} SIC + \varepsilon \quad (28)$$

Variable	Expected Sign	CapLease Pre	OpLease Pre	CapLease Entire	OpLease Entire
Intercept	(?)	0.002 (0.50)	0.108*** (5.87)	0.001 (0.17)	0.108*** (7.81)
MTRClassB	(-)	0.0001 (0.06)	0.014*** (3.32)	-0.0001 (-0.06)	0.013*** (3.20)
MTRClassC	(-)	-0.001 (-0.78)	0.013*** (3.68)	-0.001 (-1.20)	0.011*** (3.35)
ECOST	(+)	-0.0004 (-0.83)	-0.003 (-1.42)	-0.0001 (-0.50)	-0.001 (-1.09)
ZSCORE	(+)	0.000001 (0.26)	0.000001 (0.08)	0.000006 (0.12)	0.000001 (0.09)
OENEG	(?)	-0.003** (-2.18)	-0.169*** (-3.62)	-0.002*** (-2.88)	-0.023*** (-7.29)
MTB	(-)	-0.00001 (-0.31)	-0.00003 (-0.60)	-0.000002 (-0.30)	-0.000003 (-0.10)
Collateral	(+)	0.014*** (8.26)	0.025*** (3.93)	0.014*** (12.78)	0.014*** (3.09)
Size	(-)	-0.001*** (-7.12)	-0.011*** (-20.69)	-0.001*** (-9.11)	-0.011*** (-28.40)
Post	(+)			0.0001 (0.07)	0.007** (1.98)
Post*MTRClassB	(-)			-0.002 (-1.40)	-0.015*** (-2.71)
Post*MTRClassC	(-)			-0.0002 (-0.17)	-0.005 (-1.24)
(Adjusted R^2)		0.041	0.275	0.041	0.279

Note: SIC dummy variables are suppressed for presentation purposes.

where:

$CapLease_t$	= Capital leases divided by the market value of equity
$OpLease_t$	= Operating leases divided by the market value of equity
MTRClassB	= a categorical variable where before-financing marginal tax rate is between 10 percent and 30 percent, calculated on John Graham's website
MTRClassC	= a categorical variable where before-financing marginal tax rate is greater than 30 percent, calculated on John Graham's website
$ECOST_t$	= the standard deviation of the first difference in the firm's earnings before depreciation, interest, and taxes (Compustat data item #18 + Compustat data item #17 + Compustat data item #16 + Compustat data item #14) divided by the mean level of the book value of total assets (Compustat data item #6) multiplied by the sum of research and development (Compustat data item #46) and advertising (Compustat data item #45) expenses divided by total assets (Compustat data item #6)
$ZSCORE_t$	= a modified version of Altman's Z-Score
$OENEG_t$	= 1 if the book value of common equity (Compustat data item #6 – Compustat data item #181) is negative, and zero otherwise
MTB_t	= market value (Ending share price from CRSP * shares outstanding (Compustat data item #25) of the firm divided by the book value (Compustat data item #6 – Compustat data item #181) of the firm
$Collateral_t$	= net property, plant and equipment (Compustat data item #8) divided by total assets (Compustat data item #6)
$Size_t$	= the natural log of the market value (Ending share price from CRSP * shares outstanding (Compustat data item #25) of the firm
SIC	= one-digit SIC code dummy variables
Post	= 1 for observations following the passage of JCWAA, and zero otherwise

Table 25: Regression Models for Entire Period and Post-JCWAA Periods for Qualified Asset Additions and Capital Expenditures

$$Qual_t = \alpha_0 + \alpha_1 Qual_{t-1} + \alpha_2 LTD_{t-1} + \alpha_3 ChSales_{t-1} + \alpha_4 Cash_{t-1} + \alpha_5 ADCOST_{t-1} + \alpha_6 PTI_t + \alpha_7 Dum30 + \alpha_8 Dum50 + \alpha_9 Foreign + \alpha_{10} PTI_{t1t2} + \alpha_{11} PTI_{t3\text{-}t5} + \alpha_{12} CYLoss + \alpha_{13} CYLoss{*}PTI_{t1\text{-}t2} + \alpha_{14} CYLoss{*}PTI_{t3\text{-}t5} + \alpha_{15} CYLoss{*}Dum30{*}PTI_{t3\text{-}t5} + \alpha_{16\text{-}20}\Sigma Econ_{t-1} + \alpha_{21\text{-}23}\Sigma Qtrdum + \varepsilon \quad (29)$$

$$CAPX_t = \alpha_0 + \alpha_1 CAPX_{t-1} + \alpha_2 LTD_{t-1} + \alpha_3 ChSales_{t-1} + \alpha_4 Cash_{t-1} + \alpha_5 ADCOST_{t-1} + \alpha_6 PTI_t + \alpha_7 Dum30 + \alpha_8 Dum50 + \alpha_9 Foreign + \alpha_{10} PTI_{t1t2} + \alpha_{11} PTI_{t3\text{-}t5} + \alpha_{12} CYLoss + \alpha_{13} CYLoss{*}PTI_{t1\text{-}t2} + \alpha_{14} CYLoss{*}PTI_{t3\text{-}t5} + \alpha_{15} CYLoss{*}Dum30{*}PTI_{t3\text{-}t5} + \alpha_{16\text{-}20}\Sigma Econ_{t-1} + \alpha_{21\text{-}23}\Sigma Qtrdum + \varepsilon \quad (30)$$

Variable	Expected Sign	DiffQual entire	DiffCAPX entire	DiffQual post	DiffCAPX Post
Intercept	(?)	-3.353 (-1.11)	-2.248 (-1.04)	44.363** (2.52)	0.363 (0.03)
$CAPX(Qual)_{t-1}$	(+)	0.2444*** (7.98)	0.297*** (12.97)	0.549*** (11.01)	0.713*** (18.87)
LTD_{t-1}	(?)	0.285*** (11.52)	0.297*** (15.70)	0.148*** (4.22)	0.085*** (3.14)
$ChSales_{t-1}$	(+)	0.0002 (0.78)	0.0001 (0.64)	-0.00009 (-0.17)	0.0002 (0.46)
$Cash_{t-1}$	(+)	0.277*** (9.03)	0.249*** (10.62)	0.203*** (5.07)	0.079** (2.51)
$ADCOST_{t-1}$	(-)	-1.876*** (-4.74)	-1.963*** (-6.49)	-0.622 (-1.21)	-0.228 (-0.59)
PTI_t	(+)	0.0004* (1.91)	0.00009 (0.63)	-0.00002 (-0.04)	0.00001 (0.05)
Dum30	(+)	-0.031 (-0.09)	-0.071 (-0.30)	--	--
Dum50	(+)	-0.396 (-0.59)	-0.374 (-0.77)	3.084** (2.04)	-0.307 (-0.31)
Foreign	(-)	0.008** (2.46)	0.008*** (3.52)	0.007* (1.70)	0.004 (1.43)
$PTI_{t1\text{-}t2}$	(+)	0.0002 (1.43)	0.0003*** (2.95)	0.0003 (1.19)	0.0001 (0.91)
$PTI_{t3\text{-}t5}$	(?)	-0.0002* (-1.94)	-0.0002** (-2.38)	-0.0002 (-0.90)	-0.00007 (-0.47)
CYLoss	(-)	-0.772*** (5.63)	-0.949*** (-9.44)	-0.914*** (-5.07)	-0.524 (-4.05)
$CYLOSS{*}Dum30{*}PTI_{t3t5}$	(+)	0.005** (2.05)	0.003 (1.60)	0.004** (2.10)	0.002 (1.15)
(Adjusted R^2)		0.684	0.745	0.763	0.817

Note:

* Significant at the 0.1 level.
** Significant at the 0.05 level.
*** Significant at the 0.01 level.

where:

CAPX	= log of total capital expenditures, reported in quarterly footnotes
Qual	= log of qualified assets, reported in quarterly footnotes
LTD_{t-1}	= log of long-term debt (Compustat data item #9) in year t-1
$ChSales_{t-1}$	= sales (Compustat data item #12) in year t-1 less Sales (Compustat data item #12) in year t-2
$Cash_{t-1}$	= log of cash (Compustat data item #1) held end of year t-1
$ADCOST_{t-1}$	= 1– (accumulated depreciation (Compustat data item #7 – Compustat data item #8) /gross property plant and equipment (Compustat data item #7)
PTI_t	= pretax income (Compustat data item #170) in year t
Dum30	= 1 if the observation occurs during the 30 percent bonus depreciation period, and zero otherwise
Dum50	= 1 if the observation occurs during the 50 percent bonus depreciation period, and zero otherwise
Foreign	= percentage of foreign assets, reported by Research Insight
PTI_{t1-t2}	= Sum of Pretax Income (Compustat data item #170) for Years t-1 and t-2
PTI_{t3-t5}	= Sum of Pretax Income (Compustat data item #170) for Years t-3, t-4, and t-5
CYLoss	= 1 if current year pretax income (Compustat data item #170) is less than zero, and zero *otherwise*
ΣEcon	= a vector of macroeconomic variables, including inflation, unemployment, change in gross domestic product, and housing starts, reported by Research Insight (not shown in table)
ΣQtrdum	= a vector of quarter dummies (not shown in table)

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Cook, Kirsten A., G. Ryan Huston, and Thomas C. Omer. "Earnings Management through Effective Tax Rates: The Effects of Tax Planning Investment and the Sarbanes-Oxley Act of 2002." American Accounting Association National Meeting Washington, D.C., August 2006

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