JATA
Vol. 35, No. 2
Fall 2013
pp. 33–63

American Accounting Association
DOI: 10.2308/atax-50493

Did the 2003 Tax Act Increase Capital Investments by Corporations?

John L. Campbell, James A. Chyz, Dan S. Dhaliwal, and William C. Schwartz, Jr.

ABSTRACT: On May 28, 2003, the Jobs and Growth Tax Relief Reconciliation Act of 2003 (2003 Tax Act) reduced shareholder-level taxes on dividends and capital gains. One of the goals of the 2003 Tax Act was to encourage capital investment by corporations. We investigate whether firms increased investment in response to the Act. We first document that capital expenditures increase after the 2003 Tax Act. We then use a difference-in-differences research design to show that this increase in capital expenditures varies predictably with two shareholder-level tax-motivated hypotheses. First, we find that the increase in investment is smaller for firms largely held by investors that are less sensitive to shareholder-level taxes. Second, we find that the increase in investment is larger for firms most likely to fund investment from new equity issuances rather than internal funds. Additional analysis suggests that while the majority of firms increase investment after the tax cut, a small subset of larger, older, and cash-rich firms increased dividend payout instead. Overall, our results suggest that, consistent with the intent of policymakers, the shareholder-level tax rate reductions set forth in the 2003 Tax Act increased corporate investment.

Keywords: investment; cost of capital; institutional ownership; shareholder taxes.

JEL Classifications: G12; G31; G32; G24.

INTRODUCTION

Prior to its enactment, U.S. Treasury Secretary John Snow stated that the Jobs and Growth Tax Relief Reconciliation Act of 2003 (2003 Tax Act) "lowers the cost of business expansion by [reducing the taxation on] capital," so "the tax cuts will spur business

John L. Campbell is an Assistant Professor at The University of Georgia, James A. Chyz is an Assistant Professor at The University of Tennessee, Dan S. Dhaliwal is a Professor at The University of Arizona and Korea University, and William C. Schwartz, Jr. is an Assistant Professor at Oklahoma State University.

We thank two anonymous reviewers, Ben Ayers, Andy Call, Lisa Eiler, Fabio Gaertner, Stacie Laplante, Oliver Li, Janice Loftus, John Phillips (editor), Santhosh Ramalingegowda, Casey Schwab, Charles Shi, Logan Steele, conference participants at the 2010 American Accounting Association Annual Meeting, the doctoral students in Professor Dhaliwal's tax seminar at The University of Arizona, participants in The University of Georgia's tax readings group, and workshop participants at the University of Adelaide, INSEAD, National University of Singapore, The Ohio State University, and Singapore Management University for helpful comments and suggestions.

Submitted: September 2011
Accepted: April 2013
Published Online: April 2013

investment" (Snow 2003). Thus, a goal of the 2003 Tax Act was to increase corporate capital investments (White House 2003).[1] The 2003 Tax Act reduced the maximum long-term capital gains tax rate applicable to individual shareholders from 20 percent to 15 percent, and reduced the maximum dividend tax rate from 38.1 percent to 15 percent. The changes made by the 2003 Tax Act provide a quasi-natural experiment in which to examine whether a reduction to shareholder-level taxes generates additional corporate-level investment.

Prior research finds that the 2003 Tax Act increased firms' share prices (Auerbach and Hassett 2006). In addition, Dhaliwal et al. (2007) find that the 2003 Tax Act, on average, reduced firms' cost of equity by 1.02 percentage points, and that the reduction was smaller for firms with investors that are less sensitive to shareholder-level taxes. However, prior research does not examine whether the Act increased corporate-level investment.

Despite a reduction in their cost of capital and, thus, an incentive to increase capital investment, many firms increased their dividend payout in response to the 2003 Tax Act (Chetty and Saez 2005; Brown et al. 2007; Blouin et al. 2011). Thus, firms may have responded to the shareholder-level tax cuts by increasing shareholder distributions rather than corporate-level investment. Additionally, firms may not have a feasible set of continuous, positive net present value projects in which to invest, or may not take advantage of the cost of equity reduction because they finance their investments with internal funds. Ultimately, whether and how the 2003 Tax Act stimulated corporate investment is an open empirical question.

We first examine whether firms increase their capital expenditures following the 2003 Tax Act. An important caveat to this examination is that the economy was coming out of a recession around the 2003 Tax Act, and aggregate macroeconomic variables, such as gross domestic product and capital expenditures, tend to move together over business cycles (Hassett and Hubbard 2002). As a result, an aggregate increase in investment might be due more generally to the economic recovery (and firms catching up from prior years' underinvestment), as opposed to the tax law changes. Although we perform several sensitivity tests to rule out macroeconomic factors, we cannot fully attribute an overall increase in firm investment to the 2003 Tax Act. To better link our findings to the Act, we use a difference-in-differences research design and examine whether any investment increase varies with two tax-motivated differences in our sample firms. First, we address whether any increase in investment is smaller for firms largely held by investors that are less sensitive to shareholder-level taxes. Second, we examine whether any increase in investment is larger for firms most likely to finance investments with new equity issuances, as these firms would be more sensitive to shareholder-level taxes.

Our analyses yield three main results. First, we document that aggregate capital expenditures increase after the 2003 Tax Act. We then find that this increase in capital expenditures is smaller (i.e., less positive) for firms largely held by investors that are less tax sensitive. We use total institutional ownership as our proxy for the tax sensitivity of a firm's investors because these investors are either tax-exempt or tax-favored and, as such, do not benefit as much from reductions in shareholder-level tax rates.[2] Finally, we show that this increase in investment is larger (i.e., more positive) for firms more likely to finance investment with new equity, as theory suggests that these

[1] According to the White House (2003), the 2003 Tax Act had three main goals: (1) encourage consumer spending, (2) promote investment by individuals and businesses, and (3) deliver critical help to unemployed citizens.

[2] In untabulated results, we use two alternative measures that are designed to capture specific institutions that are tax-favored or tax-exempt (as developed in Chetty and Saez [2005] and Moser and Puckett [2009]), and our results are unchanged. Recent research argues that the percentage of a firm's shareholders that are taxable may not affect the relation between shareholder-level taxes and firm value, after controlling for non-tax reasons that taxable investors own shares in a firm. We address these issues further in the "Research Design and Empirical Results" section.

firms receive the most direct benefit from the 2003 Tax Act's reduction in the cost of equity. We use three different measures to proxy for firms likely to finance investment with new equity: (1) firms with low cash reserves, (2) firms that undertook large net equity issuances around the Act, and (3) firms that undertook large net equity issuance around the Act and also paid no dividends around the Act. Our findings hold across all three of these proxies.

Our results are not only statistically significant, but are also economically meaningful. Given the change in cost of capital documented by Dhaliwal et al. (2007a),[3] a benchmark neoclassical investment model would predict an average increase in investment of 10.6 percent. We find that, on average, capital expenditures increase between 8.5 and 10.2 percent, and this magnitude increases if the firm is largely owned by tax-sensitive shareholders and/or finances investment with external equity. The fact that our economic significance ties so closely to Dhaliwal et al. (2007a) provides support that our results are, at least in part, due to the shareholder-level tax changes set forth in the 2003 Tax Act.

Our research makes several significant contributions. First, we contribute to the literature on shareholder-level taxes and firm investment. Prior studies have shown that the 2003 Tax Act increased the level of dividends that firms pay (Chetty and Saez 2005; Brown et al. 2007; Blouin et al. 2011). This might lead to the conclusion that, rather than make new investment and directly stimulate economic growth, the 2003 Tax Act encouraged firms to simply return funds to investors through dividend payments. However, Auerbach and Hassett (2006) argue that firms that are less mature and are likely to issue new shares are less likely to pay large dividends to their shareholders. For this set of firms, the 2003 Tax Act most likely resulted in an increase in investment rather than an increase in dividend payments. Consistent with Auerbach and Hassett's (2006) theoretical arguments,[4] we find that the effect of the Act on firm investment is larger for firms that are most likely to issue new equity to fund investment. Thus, taken together with prior studies, our results suggest that the ultimate impact of shareholder-level tax rate reductions on a firm's economic decisions (i.e., distribute "cheaper" dividends versus make new investment) hinges critically on whether the firm's primary source of funds is new equity or the firm's existing internal funds.

Second, we contribute to the literature on shareholder-level taxes and firm value. Prior studies find that shareholder-level taxes affect proxies for firm value, such as stock price and cost of capital (Lang and Shackelford 2000; Cloyd et al. 2006; Dhaliwal et al. 2007a, 2007b; Dai et al. 2008). However, these studies do not examine investment, which is a fundamental component of firm value (Hanlon and Heitzman 2010). Establishing a link between shareholder-level taxes and firm investment provides further assurance that shareholder-level taxes affect firm value.

Finally, our results are likely to be of interest to regulators who form macroeconomic tax policies. Treasury Secretary John Snow stated that one of the goals of the 2003 Tax Act was to increase corporate investment. Our results suggest that the 2003 Tax Act was effective in increasing corporate investment for firms with a high tax-sensitive investor base and for firms that finance investment with new equity issuances. In contrast, we find that a subset of older and larger firms

[3] While Dhaliwal et al. (2007a) report a 1.02 percentage point increase in the cost of capital, the actual *percentage increase* in the cost of equity is 1.02 percent/9.59 percent (mean cost of equity in their sample) = 10.6 percent. See the "Research Design and Empirical Results" section for additional discussion of economic significance.

[4] We discuss the "traditional view" and the "new view" effect of dividend taxes on firm investment in the "Background and Prior Literature" section. However, as noted by Auerbach and Hassett (2006), neither of these views considers the case where a firm does not pay dividends. Non-dividend-paying firms are a large and growing portion of the economy (Brav et al. 2007). Auerbach and Hassett (2006) provide a richer set of theories that incorporates non-dividend-paying firms, and reaches two conclusions regarding the 2003 Tax Act relevant for our study: (1) for firms that pay dividends, the 2003 Tax Act most likely had a stronger effect on dividend payouts than on firm investment, and (2) for firms that do not pay dividends, the 2003 Tax Act most likely had a stronger effect on firm investment.

that finance investment with internal funds did not increase capital investments subsequent to the 2003 Tax Act. Instead, these firms elected to increase payout to shareholders. These results are particularly timely, as the tax cuts are scheduled to expire this year (2013) and Congress is currently debating whether and for how long the tax cuts should continue. Our results suggest that if the tax cuts are not extended, investment for some firms may decrease.

BACKGROUND AND PRIOR LITERATURE

Institutional Setting and Background on the 2003 Tax Act

Background on the Act

On May 23, 2003, Congress approved the 2003 Tax Act, and on May 28, President George W. Bush signed the bill into law. The Act had two major provisions. First, the maximum tax rate on long-term capital gains recognized by individual shareholders was reduced from 20 percent to 15 percent. Second, the maximum tax rate on dividends received by individual shareholders was reduced from 38.1 percent to 15 percent. The House Ways and Means Committee's rationale for the 2003 Tax Act was that tax policy should be conducive to economic growth, because reducing individual-level taxes on capital gains and dividends lowers the cost of capital, which leads to corporate investment and the creation of jobs (U.S. Congress 2003). Thus, if the 2003 Tax Act achieved its intended goal of increasing firm investment, we should observe an increase in capital investment following its passage.

The likelihood that the 2003 Tax Act would become law was highly uncertain until it was passed by the House and Senate. The president first announced his intention to lower dividend tax rates in January 2003. However, the merits of the proposal were intensely debated for several months until it was ultimately passed by the House and Senate in May 2003. As evidence of how uncertain it was that the 2003 Tax Act would ultimately become law, the bill passed the Senate on May 23, 2003, with the narrowest possible margin—a 51–50 vote.[5]

The timing of the 2003 Tax Act's passage has two key implications to our research design. First, the 2003 Tax Act was unexpected prior to 2003, and there was considerable uncertainty surrounding its passage. This uncertainty suggests that managers and market participants were unlikely to fully anticipate the shareholder-level tax rate reductions prior to the Act's passage in May 2003. As a result, the 2003 Tax Act provides a good experimental setting to examine the effects of an unexpected reduction in shareholder-level taxes. Second, given that significant capital investment decisions must be approved by a firm's Board of Directors and creditors (Garrison and Noreen 1997; Nini et al. 2009), any significant effect on capital expenditures might not immediately occur in the last half of 2003.[6] Approval for capital expenditures is usually obtained after an annual budgeting process that occurs at or near the end of the fiscal year (Garrison and Noreen 1997; Murphy 1999; Horngren et al. 2006). Since the 2003 Tax Act was not anticipated at the end of 2002 and not passed until the middle of 2003, it is unlikely that managers fully responded to the legislation by altering their investment decisions for either 2002 or 2003. Thus, our tests are designed to capture the change in investment levels in calendar year 2004 compared to 2002, as well as the cross-sectional variation in that change in investment.

[5] The Tax Act of 2003 passed the House of Representatives on May 9, 2003, by a vote of 222 to 203.

[6] For example, the Coca-Cola Company's Finance Committee charter requires that "all capital expenditures of the Company shall be reviewed . . . and recommended for approval by the Board of Directors." Similarly, Nini et al. (2009) find that 32 percent of private debt agreements contain an explicit restriction, such that if a firm spends more than a certain dollar amount for capital expenditures in a particular year, the firm must obtain permission from its lenders before doing so.

FIGURE 1
Shareholder-Level Tax Rates from 1987 to 2010, by Category

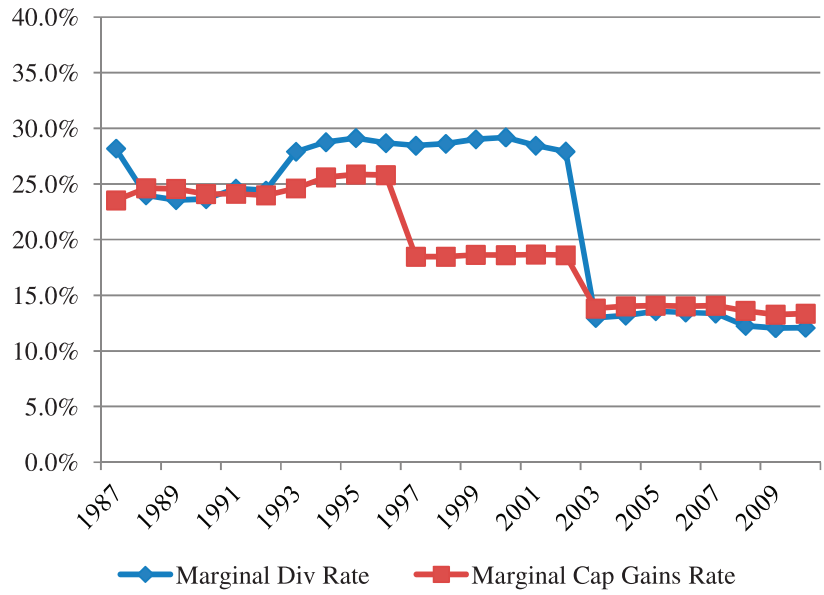


Figure 1 is constructed using data taken from the NBER TaxSIM database. It presents time-series micro-level tax return data that represent the average marginal tax rate separately paid by the average taxpayer on either dividends or capital gains income.

Why the 2003 Tax Act?

Since 1986, there have been three legislative changes that substantively affected shareholder-level tax rates—in 1993, in 1997, and in 2003. Data from the National Bureau of Economic Research (NBER) suggest that the 2003 Tax Act is the largest and most dramatic shift in shareholder-level taxes among these three. Specifically, in Figures 1 and 2, we present time-series micro-level tax return data that represent the average marginal tax rate paid by the average taxpayer on a given source of income from the NBER's TaxSIM database. Figure 1 shows the marginal rate paid on dividends and capital gains by year, while Figure 2 shows the overall shareholder-level tax rate by averaging the two. The percentage change in the average marginal shareholder-level tax rate is most dramatic around the 2003 Tax Act (a 42 percent decrease), compared to a 13.9 percent decrease in 1997 and an 8.5 percent increase in 1993. In addition, unlike 1993 and 1997, the 2003 Tax Act changed the tax rates on *both* dividend and capital gains, and these rates changed to a historically low level. Therefore, we examine the 2003 Tax Act because it represents the setting with the most powerful statistical tests of whether firms increased capital investments in response to changes in shareholder-level taxes.[7]

[7] In untabulated analysis, we replicate our tests using 1993 and 1997 rather than 2003 as the test period. Our results are consistent with the strength of the tax rate change. That is, the results using 2003 (where there was a 42 percent decrease) show the strongest cross-sectional support for shareholder-level tax rates affecting firm investment, the results using 1997 (a 13.9 percent decrease) provide some cross-sectional support, and the results using 1993 (an 8.5 percent increase) provide no cross-sectional support.

FIGURE 2
Average Shareholder-Level Tax Rates from 1987 to 2010

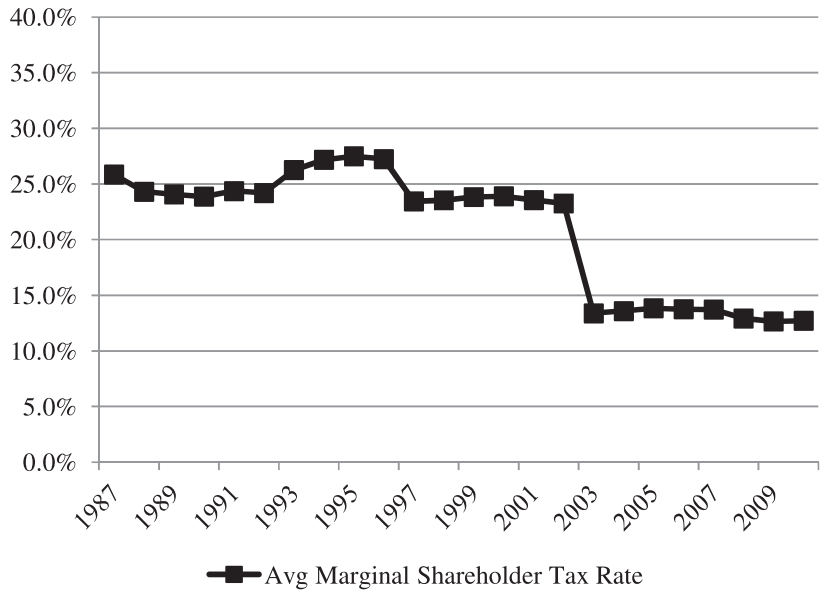


Figure 2 is constructed using data taken from the NBER TaxSIM database. It uses the same data as Figure 1, but averages the dividend and capital gains tax rates to construct a composite rate.

Prior Research on Taxes, Valuation, and Investment

Prior Research on the Effects of the 2003 Tax Act

Due to the historic magnitude of the tax rate reductions and the intensity of the congressional debate surrounding the 2003 Tax Act, several studies use the 2003 Tax Act to examine classic research topics, such as payout policy (Chetty and Saez 2005; Brown et al. 2007; Blouin et al. 2011), ex-dividend returns (Cloyd et al. 2006), capital structure (Dhaliwal et al. 2007b), and taxes and valuation (Dhaliwal et al. 2007a). The literature finds that firms increased their dividend payments after the 2003 Tax Act. Chetty and Saez (2005) provide evidence that the amount of special (non-recurring) dividends more than tripled in the second half of 2003. They also document that the increase in dividends (both recurring and non-recurring) was less significant for firms with higher levels of selected institutional ownership, as these shareholders are less sensitive to shareholder-level taxes and so the 2003 Tax Act is less likely to affect them.

Dhaliwal et al. (2007a) examine the effects of the 2003 Tax Act on firms' *ex ante* cost of equity capital. They regress three *ex ante* implied cost of equity capital estimates on a dummy variable equal to 1 for time periods after the 2003 Tax Act and traditional cross-sectional determinants of the cost of equity capital. Their results suggest that the cost of equity capital decrease, on average, by 1.02 percent after the 2003 Tax Act. They also find that this effect was attenuated for firms largely owned by institutional investors, which should be less sensitive to the decreases in shareholder-level taxation set forth by the 2003 Tax Act. In all, these results are consistent with the 2003 Tax Act reducing firms' cost of equity capital. However, ours is the first study to directly examine the effect of the 2003 Tax Act on firm investment levels.

Prior Research on Shareholder-Level Taxes and Investment

Prior research examines the relationship between shareholder taxes (mostly in the form of dividend taxes) and firm-level investment, both theoretically and empirically. With respect to capital gains taxes, Lang and Shackelford (2000) show that a firm's share price is negatively associated with capital gains tax rates. However, they do not consider the effect of this share price increase on firm investment (i.e., whether it lowers the cost of capital).

With respect to the effect of dividend taxes on firm-level investment, theoretical approaches fall into two related, but distinct, streams (Hanlon and Heitzman 2010). The first stream, which is referred to as the "traditional" view, predicts that the marginal source of finance is new share issuance, and that a dividend tax rate reduction reduces a firm's cost of capital and stimulates firm investment (Poterba and Summers 1983, 1984). Specifically, "under the 'traditional' view, reductions in dividend tax rates . . . increase investment incentives . . . because they lower the pre-tax required rate of return" (Hanlon and Heitzman 2010, 161). Holding constant the after-tax returns that a firm must provide its shareholders, a reduction in shareholder taxes reduces the required pre-tax return an investment must yield and, thus, allows the firm to invest in projects it otherwise would have rejected.[8] The "traditional" view also predicts that a reduction in the dividend tax lowers the marginal cost of paying dividends and, therefore, encourages firms to increase their dividends.[9] However, the "traditional" view provides no guidance as to which response will dominate (i.e., investment or dividends); rather, firms have increased incentives for both.

The second stream of research, referred to as the "new" view, predicts that the marginal source of finance is "retained earnings" (i.e., internal funds available for investment) and a dividend tax rate reduction is incorporated into a firm's share price, but has no effect on firms' cost of capital or investment (Zodrow 1991; Chetty and Saez 2005). Zodrow (1991) provides detailed theoretical models for both the "traditional" and "new" views, and shows how the different assumptions made under each lead to their differing predictions. Empirical studies have found mixed evidence regarding which of these two views prevails (Hanlon and Heitzman 2010).

Auerbach and Hassett (2006, 2007) provide theoretical arguments that combine and refine these seemingly opposing "new" and "traditional" views. They argue that many firms do not pay any dividends at all, and neither of these two theories directly applies to these firms. Additionally, they note that one literature stream rigidly assumes that all firms finance investment from internal funds, while the other literature stream rigidly assumes that new equity issuances are an ongoing activity of all firms. Thus, they present a theoretical argument that relaxes these rigid assumptions and applies to all firms in the economy (not just dividend-paying firms). In doing so, they offer guidance as to which firms are likely to respond to the 2003 Tax Act with increased investment and which firms are likely to increase dividends. They conclude their modeling and empirical analyses by noting: "Among firms that pay dividends and [among firms that] rarely issue shares, the main impact of the [2003 Tax Act] appears to have been to boost share prices and encourage . . . dividend payment, rather than to reduce the cost of capital," while "firms that have yet to pay dividends and . . . firms expecting to issue more shares may well have experienced some reduction in their cost of

[8] Intuitively, investors require a specific *after*-tax return on their investment, and firms add back all taxes (both corporate-level and shareholder-level) to any investment project when determining whether the required *pre*-tax return is sufficient for undertaking the investment. Holding the required after-tax return constant, a reduction in shareholder taxes reduces the required pre-tax return an investment must yield, and so it allows the firm to invest in projects it otherwise would have rejected.

[9] The intuition is that managers set dividends at the point where the marginal benefit of an extra dollar of dividends equals the marginal tax costs. Reducing tax costs shifts the equilibrium upward, resulting in higher dividends (Hanlon and Heitzman 2010).

finance and hence an investment stimulus, consistent with the traditional view of dividend taxation" (Auerbach and Hassett 2006, 123).[10] Finally, they make a call for future research to explore whether the 2003 Tax Act increased investment the most for firms that are more likely to issue new shares.

HYPOTHESIS DEVELOPMENT

The Effects of the 2003 Tax Act on Firms' Investment

One of the goals of policymakers was that the 2003 Tax Act increase corporate capital investment (Snow 2003). As just discussed in the previous section, academic theory by Auerbach and Hassett (2006) predicts that a subset of firms (i.e., firms with investment opportunities and firms likely to issue new shares of equity) will experience a decrease in their cost of capital and, thus, respond to the 2003 Tax Act by increasing investment, while another subset of firms (i.e., mature firms and firms that finance investments with internal funds) will not experience a change in their cost of capital and will respond to the Act by increasing dividends rather than investment. However, they make no prediction as to which of these effects will dominate, on average, across all firms. Dhaliwal et al. (2007a) directly test whether, on average, the implied cost of equity decreases after the 2003 Tax Act, and conclude that the Act reduced the average firm's cost of equity by 1.02 percentage points. Taken together, these results suggest that capital investment will increase, on average, after the 2003 Tax Act.

However, it is important to note that—even if we find an overall increase in investment during time periods after the 2003 Tax Act—aggregate macroeconomic variables tend to move together over business cycles, and this makes it difficult to convincingly attribute *time-series* changes in aggregate investment to tax policy (Hassett and Hubbard 2002). Therefore, although we examine whether, as intended by policymakers, aggregate investment increases after the 2003 Tax Act, we do not consider this as a formal hypothesis due to this potential confound. To more directly conclude whether the Act encouraged firm investment, we use a difference-in-differences research design to combine the *time-series* variation from the 2003 Tax Act regime shift with two tax-motivated *cross-sectional* hypotheses.

The Effects of the 2003 Tax Act on Firms' Investment When Largely Owned by Investors that are Less Tax Sensitive

Our first hypothesis examines whether the extent to which a firm is owned by investors that pay shareholder-level taxes affects the association between the 2003 Tax Act and firm investment. Tax clientele theory predicts that the impact of shareholder-level tax rate changes on a given firm will depend on the tax rate faced by that firm's investors (Miller and Modigliani 1961; Scholes et al.

[10] The prior theory on dividend taxes and investment (including Auerbach and Hassett 2006) assumes that firms invest optimally. However, implications can still be extended to firms that under- or over-invest. Firms that under-invest have higher levels of leverage and investment opportunities, and are unlikely to finance their investments with internal funds (Myers 1977). Therefore, these firms fit the profile of firms that Auerbach and Hassett (2006) predict would experience an increase in investment. The effect of a dividend tax cut on the investment of firms that over-invest is less clear because of the agency problems that exist in such firms (Jensen and Meckling 1976; Jensen 1986). On the one hand, these firms are likely to be mature firms that finance investment with internal funds, leading to the prediction that they do not increase investment after the 2003 Tax Act. On the other hand, these managers could use the tax cut and its associated reduction in the cost of capital as an excuse to over-invest even further. Regardless, as in prior theory, we do not expect these "off-equilibrium" cases to dominate our sample.

2009). Consistent with this theory, prior empirical studies find that firms owned largely by institutional investors (who are less sensitive to shareholder-level taxes, as they are either tax-exempt or tax-favored) are less affected by changes in shareholder-level tax rates (Ayers et al. 2002, 2004, 2007; Chetty and Saez 2005; Dhaliwal et al. 2003, 2005, 2007a, 2007b; Moser and Puckett 2009). Thus, if the 2003 Tax Act encourages firms to increase investment, the increase should be smaller (i.e., less positive) for firms with a less tax-sensitive investor base:

H1: The increase in capital expenditures from before to after the 2003 Tax Act became effective will be less positive (or more negative) for firms largely owned by investors that are less tax sensitive.

The Effects of the 2003 Tax Act for Firms Likely to Finance Investment Using New Equity

Our second hypothesis relates to the extent to which a firm uses new equity to fund its investments, which prior literature suggests affects how shareholder-level tax rate reductions map into firm investment decisions. Chetty and Saez (2005, 798) argue that if a firm is financing investment with internal funds (and is, thus, likely a mature firm with limited investment opportunities), "the dividend tax cut is irrelevant for corporate [investment] decisions and simply benefits individual investors by reducing their tax burden." That is, these firms have "trapped equity" (i.e., excess internal funds) and are likely to respond to the 2003 Tax Act's reduced shareholder-level taxes by increasing dividends rather than investment. Auerbach and Hassett (2006) make the converse of this argument, arguing that if a firm finances its investment through new equity (and is likely a younger firm with additional investment opportunities), the new equity issuance allows the firm to directly benefit from the Act's reduction in the cost of equity capital (Auerbach and Hassett 2006; Dhaliwal et al. 2007a). Thus, we predict that the change in firm investment will be more positive for firms that finance investment with new equity issuances rather than internal funds:

H2: The increase in capital expenditures from before to after the 2003 Tax Act will be more positive (or less negative) for firms financing investments with new equity than for firms using internal funds.

RESEARCH DESIGN AND EMPIRICAL RESULTS

Empirical Research Design

To examine the effect of the 2003 Tax Act on firm investment, we follow prior research and use a difference-in-differences research design (Dhaliwal et al. 2007a; Daske et al. 2008; Li 2010; McInnis and Collins 2011). This research design uses a post-regime dummy variable (i.e., the baseline difference or change), and an interaction of that dummy variable with various cross-sectional attributes (i.e., the difference in differences). With this design, the coefficient on the post-regime dummy variable represents the baseline *change* in investment across time periods (i.e., the intercept shift in the post-regime period for firms where the cross-sectional attributes take the value of zero), and the coefficient on the various interactions with the post-regime dummy variable represent *how that change varies* cross-sectionally for subsets of our sample (where the attributes are nonzero).

We model capital expenditures based on prior literature as a function of internal cash flows, Tobin's Q, and other firm and industry characteristics (Fazzari et al. 1988, 2000; Kaplan and Zingales 1997, 2000; Rauh 2006; Bushman et al. 2011). To test whether aggregate investment

increases during time periods after the 2003 Tax Act, we include a dummy variable (*REGIME*) equal to 1 for time periods just after the passage of the Act:[11]

$$CAPX = \beta_0 + \beta_1 REGIME + \beta_2 CF + \beta_3 TOBINSQ + \beta_4 DIV + Industry\ Effects + \varepsilon, \quad (1)$$

where the variables are defined as follows:

CAPX = capital expenditures from the statement of cash flows scaled by prior year book value of assets (data item #128/lagged value of data item #6);

REGIME = indicator variable equal to 1 for time periods after the 2003 Tax Act, and 0 otherwise;

CF = cash flow from operations calculated as earnings before depreciation less working capital accruals, based on Bushman et al. (2011) (data item #18 + data item #14 − (change in data item #4 − change in data item #1 − change in data item #5 − change in data item #34 − change in data item #71)/lagged value of data item #6);

TOBINSQ = Tobin's Q, beginning of the year market value of assets scaled by book value of assets (data item #6 − data item #60 + (data item #25 ∗ data item #199))/lagged value of data item #6); and

DIV = annual cash dividends paid from the statement of cash flows scaled by prior year book value of assets (data item #127/lagged value of data item #6).

Our primary analysis uses two years of data, where the pre-regime period is 2002 and the post-regime period is 2004. We focus on two years of data to isolate the effects of the 2003 Tax Act (Dhaliwal et al. 2007a).[12] Additionally, we do not include 2003 in the analysis, since prior academic and anecdotal evidence suggests that capital expenditures require a significant lead time (Garrison and Noreen 1997; Nini et al. 2009). To control for macroeconomic factors that affect investment across industry, we include industry fixed effects. The coefficient on *REGIME* will be positive ($\beta_1 > 0$) if capital expenditures increase after the 2003 Tax Act. Throughout the paper, when testing whether overall investment levels increase after the Act, we do not include cross-sectional interactions with *REGIME* so that β_1 represents the change for *all* firms (rather than the change for firms where the cross-sectional attributes have a value of zero).

To test H1, we include ownership by less tax-sensitive investors (*TAX_SENS*), as well as an interaction term between tax sensitive ownership and *REGIME*. To test H2, we include a proxy for firms most likely to finance investment from new equity (*EXT_FIN*) and interact that proxy with the *REGIME* indicator. That is, to test H1 and H2, we use the following regression model:

[11] In alternative tests, we considered whether to use changes in firms' cost of equity and/or weighted average cost of capital (WACC) from 2002 to 2004, rather than the *REGIME* indicator that is required by a difference-in-differences research design. It is important to note that we can only observe the entire change in firms' cost of capital. This would mechanically pick up *all* changes in the cost of capital from 2002 to 2004, including changes that have nothing to do with taxes, and would likely bias in favor of finding results. Nevertheless, when we follow prior literature that defines how to calculate cost of equity (Dhaliwal et al. 2007a) and WACC (Campbell et al. 2012), we are only able to calculate these measures for 693 and 43 firms, respectively. These samples are limited to firms that are covered by I/B/E/S and SDC, which prior literature shows are larger and non-generalizable to the overall population of firms (Durtschi and Easton 2005). Thus, due to data constraints, we are unable to examine whether firms' change in investment is associated with the change in their cost of capital.

[12] As with any event study, we must ensure that the event window is (1) long enough to capture the effects of the event in question, and (2) not so long that it weakens the test by picking up events other than the one in question. We chose our event window to be consistent with Dhaliwal et al. (2007a), who study the effect of the 2003 Tax Act on the cost of equity and use 2002 to 2004. If we extend this event window by using three years on either side of 2003, our results do not change.

$$CAPX = \beta_0 + \beta_1 REGIME + \beta_2 TAX\_SENS + \beta_3 REGIME{*}TAX\_SENS + \beta_4 EXT\_FIN + \beta_5 REGIME{*}EXT\_FIN + \beta_6 CF + \beta_7 TOBINSQ + \beta_8 DIV + Industry\ Effects + \varepsilon, \quad (2)$$

where:

TAX_SENS = the magnitude of investor tax sensitivity (higher values indicate less tax sensitivity) calculated as the ratio of total shares held by institutional investors as of the beginning of the calendar year to the number of shares outstanding at the beginning of the calendar year (Dhaliwal et al. 2007a, 2007b);[13] and

EXT_FIN = estimated marginal source of investment financing based on one of three proxies: (1) *P25_CASH*, (2) *P75_EQ_ISSUE*, or (3) *P75_EQ_NODIV*. *P25_CASH* is an indicator variable equal to 1 if the firm's cash balance (data item #1) divided by total assets is in the lowest quartile of firms in that year, and 0 otherwise. *P75_EQ_ISSUE* is an indicator variable equal to 1 for firms in the highest quartile of changes in net equity issuances from time periods before the 2003 Tax Act to time periods after the 2003 Tax Act, and 0 otherwise. Therefore, *P75_EQ_ISSUE* has the same coding for firms in 2002 as in 2004. Net equity issuance is equal to the sale of common and preferred stock (data item #108) less the purchase of common and preferred stock (data item #115), minus the change in redemption value of preferred stock (data item #56), all scaled by the lagged value of firm assets (data item #6) (as in Jagannathan et al. [2000] and Grullon and Michaely [2002]). *P75_EQ_NODIV* is an indicator equal to 1 for firms in the highest quartile of changes in new equity issuances from time periods before the 2003 Tax Act to time periods after the 2003 Tax Act that also paid no dividends in either time period, and 0 otherwise.

The coefficient on *REGIME* $*$ *TAX_SENS* will be negative ($\beta_3 < 0$) if the increase in capital expenditures is due to the 2003 Tax Act's reduction in shareholder-level taxes (as these investors are impacted less by shareholder-level taxes), as predicted by H1. Finally, if the increase in investment after the 2003 Tax Act is stronger for firms that are likely to be financing investment from new equity rather than from internal funds (H2), we should find that the coefficient on *REGIME* $*$ *EXT_FIN* is positive ($\beta_5 > 0$).[14]

Sample and Descriptive Statistics

Because we are interested in the investment effects of the 2003 Tax Act, we examine changes in the level of capital expenditures from the first full year before the Act to the first full year after the Act. We focus on annual periods for three reasons. First, prior literature on capital expenditures utilizes annual time periods (e.g., Fazzari et al. 1988). Second, firms generally set their capital expenditure budgets annually during the budgeting process, which is typically done at or near the

[13] Total institutional ownership may be a noisy proxy for tax sensitivity. In untabulated results, we use two additional measures that refine institutional ownership into those groups that are most likely to be tax-exempt or tax-favored. Specifically, Moser and Puckett (2009) only consider shares held by banks and the "other institution" classification on the Thomson Financial database to be tax-exempt or tax-favored, while Chetty and Saez (2005) only consider shares held by insurance companies and certain of the "other institution" classification to be tax-exempt or tax-favored. Our results are unchanged if we use either of these measures.

[14] As previously mentioned, the increase in investment due to the 2003 Tax Act should be strongest for firms with a continuous set of feasible, positive net present value (NPV) projects. However, this is difficult to test empirically due to the fact that firms' investment set is a latent variable. If we assume that firms are most likely to have a continuous set of feasible, positive NPV projects when they are raising external funds (*EXT_FIN*), then H2 can be viewed as a test of this point. In untabulated tests, we assume that firms with more growth opportunities (*TOBINSQ*) and firms with the worst credit ratings are most likely to have a continuous investment set and, thus, partition the sample on these variables. Indeed, we find the investment increase is stronger for these firms.

end of the fiscal year. Third, despite being budgeted annually, investments do not occur evenly throughout the year, and annual periods smooth out these distortions when making time-series comparisons. Thus, our primary sample includes the 2002 and 2004 years.[15] We use Compustat North American firms with valid data for our regression models.[16] Table 1, Panel A provides details concerning our sample selection.

Panel B of Table 1 presents an industry breakdown of our sample firms into 12 industry groupings from the Fama and French classifications (French 2011). Panel B also reports the industry groupings for the overall universe of Compustat firms. Our sample contains a larger proportion of capital-intensive manufacturing firms than the overall Compustat universe, and a smaller proportion of industries that are not capital-intensive. We control for differences in industry in all of our regressions with industry fixed effects.

Table 2 presents descriptive statistics for our sample. Panel A shows that, on average, firms invest approximately 5.9 percent of total assets in capital expenditures. We also find significant variation in capital expenditures, cash flows, and growth opportunities. Finally, the average level of less tax-sensitive ownership (as measured by total institutional ownership) in our sample of 39.6 percent is consistent with prior research on institutional holdings (Jiambalvo et al. 2002).

Panels B and C of Table 2 highlight differences between firm-year observations before and after the 2003 Tax Act. Specifically, Panel B presents descriptive statistics for 2002, while Panel C presents descriptive statistics for 2004. Panel B also provides the results of our tests for statistical differences (mean) between the two time periods. At the mean, firms have reliably larger (p-value < 0.01) investment in capital expenditures in 2004 compared to 2002. This is consistent with the firms responding to the 2003 Tax Act by increasing investment. We also find larger dividend payments in 2004 relative to 2002, consistent with prior studies that find increased dividends after the 2003 Tax Act (Chetty and Saez 2005; Blouin et al. 2011). Finally, Table 3 provides a correlation matrix for all of the variables used in our primary regression analysis.[17]

---

[15] In untabulated results, we examine quarterly data and find support for H1 and H2 during the last part of 2003, but relative to our results comparing 2004 to 2002, the results and economic significance are statistically weaker and are sensitive to the inclusion of risk controls. Specifically, we examine the last two quarters of 2003 relative to the last two quarters of 2002 and find support for H1 and H2 across all of our proxies, suggesting that despite budgeting investments annually, some firms were able to at least partially respond to the tax cuts during 2003.

[16] We do not restrict our sample to U.S.-domiciled firms because we are interested in the effects of shareholder-level taxes, not corporate-level taxes. Thus, the location (and tax jurisdiction) of the firm is less relevant than the location (and tax jurisdiction) of its investors. By using the Compustat North American database, our sample is comprised of firms that are either domiciled in the U.S. or have cross-listed in the U.S. to obtain access to U.S. capital markets and investors. In untabulated results, we restrict our sample to U.S.-domiciled firms. While our sample size decreases slightly, our results continue to hold.

[17] In Table 3, one of our three proxies for firms likely to finance investment through new equity (*P25_CASH*) is negatively correlated with the other two proxies (i.e., −0.0686 with *P75_EQ_ISSUE* and −0.0828 with *P75_EQ_NODIV*). Although any particular proxy is likely to have inherent noise, this negative correlation is somewhat surprising because these three proxies are intended to capture the same construct. We performed two additional tests to better understand this correlation. First, it is important to note that if a firm raises significant equity from 2002 to 2004, then it is possible that its cash balance would be mechanically higher in 2004 and, thus, in that year, there would be negative relation between *P25_CASH* and our other two proxies. To mitigate this possibility, we redefine *P25_CASH* as equal to 1 in both 2002 and 2004 if the firm's cash balance in 2002 is in the bottom quartile of all sample firms. However, we still find a negative correlation between this alternative measure and our other two proxies for *EXT_FIN*, suggesting that any mechanical relationship between our proxies is unlikely to be driving the negative correlation. Second, we create a composite variable that captures the overlap between *P25_CASH* and our other two proxies. Our results continue to hold with this composite variable, suggesting that all of our proxies affect investment the same way due to the commonality between them (despite being negatively correlated individually), and that they are capturing the same construct.

TABLE 1

Sample Firms by Industry Classification

Panel A: Sample Construction

Compustat North American Firms in 2002 and 2004 with Non-Missing *CAPX*	16,084
Less:	
Financial Services firms (6000 $\leq$ SIC $\leq$ 6900)	(1,724)
Firms missing data to construct lagged assets	(635)
Firms missing data to construct cash flow	(6,539)
Firms missing data to construct lagged Tobin's Q	(380)
Firms missing dividend information	(112)
Firms missing data to calculate tax sensitivity	(514)
Firms before truncation	6,180
Truncate at 1% and 99% of all explanatory variables	(403)
Firms in sample	5,777

Panel B: Industry Classification—Fama-French 12

	Compustat Universe		Sample		
	Number	**Percent**	**Number**	**Percent**	**Percent Diff.**
Consumer Nondurables	842	5.8	429	7.4	−1.6
Consumer Durables	402	2.8	197	3.4	−0.7
Manufacturing	1,550	10.6	890	15.4	−4.8
Oil, Gas, and Coal Extraction and Products	698	4.8	301	5.2	−0.4
Chemicals and Allied Products	379	2.6	168	2.9	−0.3
Business Equipment	3,445	23.6	1,042	18.0	5.6
Telephone and Television Transmission	727	5.0	364	6.3	−1.3
Utilities	627	4.3	165	2.9	1.4
Wholesale, Retail, and Some Services	1,464	10.0	744	12.9	−2.8
Healthcare, Medical Equipment, and Drugs	1,859	12.8	568	9.8	2.9
Other	2,584	17.7	909	15.7	2.0
	14,577		5,777		

Graphical Evidence for Investment Response to the 2003 Tax Act

Figure 3 plots average annual capital expenditures for sample firms, and partitions the sample by tax-sensitive ownership quintile. Quintile 1 (5) represents firms with the lowest (highest) level of *TAX_SENS*. Consistent with H1, Figure 3 shows that the increase in capital expenditures is concentrated in firms with lower levels of institutional ownership. In fact, the increase in capital expenditures from 2002 to 2004 is monotonically decreasing in institutional ownership.

Figure 4 plots average annual capital expenditures for firms in our sample, and partitions the sample by the level of cash holdings. If a firm is in the *P25_CASH* subsample, then its cash holdings are below the 25th percentile in the sample. Consistent with H2, Figure 4 shows that the change in capital expenditures is concentrated in firms with lower cash balances. Figure 4 is unchanged when we partition the sample using our alternative measures for marginal financing source (i.e., *P75_EQ_ISSUE*, *P75_EQ_NODIV*).

TABLE 2

Descriptive Statistics

Panel A: All Sample Firms Used In Main Regression Testing

	Obs.	Mean	Std. Dev.	25%	Median	75%
CAPX	5,777	0.059	0.062	0.021	0.040	0.073
TAX_SENS	5,777	0.396	0.303	0.092	0.392	0.659
P25_CASH	5,777	0.249	0.433	0.000	0.000	0.000
P75_EQ_ISSUE	4,882	0.241	0.428	0.000	0.000	0.000
P75_EQ_NODIV	4,882	0.150	0.357	0.000	0.000	0.000
P25_EQ_DIV	4,882	0.085	0.279	0.000	0.000	0.000
CF	5,777	0.055	0.138	0.011	0.074	0.130
TOBINSQ	5,777	1.734	1.079	1.050	1.367	2.013
DIV	5,777	0.007	0.014	0.000	0.000	0.010

Panel B: Pre-*REGIME* Sample Firms Used In Main Regression Testing

	Obs.	Mean	Std. Dev.	25%	Median	75%
CAPX	3,006	0.055***	0.056	0.019	0.037	0.069
TAX_SENS	3,006	0.401	0.312	0.091	0.384	0.673
P25_CASH	3,006	0.249	0.433	0.000	0.000	0.000
P75_EQ_ISSUE	2,413	0.239	0.427	0.000	0.000	0.000
P75_EQ_NODIV	2,413	0.149	0.356	0.000	0.000	0.000
P25_EQ_DIV	2,413	0.086	0.280	0.000	0.000	0.000
CF	3,006	0.044***	0.145	−0.005	0.070	0.126
TOBINSQ	3,006	1.685***	1.123	0.993	1.287	1.942
DIV	3,006	0.006***	0.012	0.000	0.000	0.007

Panel C: Post-*REGIME* Sample Firms Used In Main Regression Testing

	Obs.	Mean	Std. Dev.	25%	Median	75%
CAPX	2,771	0.064	0.067	0.023	0.042	0.076
TAX_SENS	2,771	0.392	0.293	0.093	0.397	0.648
P25_CASH	2,771	0.249	0.433	0.000	0.000	0.000
P75_EQ_ISSUE	2,469	0.243	0.429	0.000	0.000	0.000
P75_EQ_NODIV	2,469	0.151	0.358	0.000	0.000	0.000
P25_EQ_DIV	2,469	0.084	0.277	0.000	0.000	0.000
CF	2,771	0.066	0.128	0.021	0.077	0.135
TOBINSQ	2,771	1.788	1.026	1.118	1.447	2.077
DIV	2,771	0.009	0.017	0.000	0.000	0.012

*, **, *** Indicate a 10 percent, 5 percent, and 1 percent, respectively, significant difference between pre- and post-*REGIME* time periods using a two-tailed test.

Variable Definitions:
Marginal source of investment is defined in three ways:
P25_CASH = an indicator variable equal to 1 for firms in the lowest quartile of balance sheet cash to total assets, and 0 otherwise;
P75_EQ_ISSUE = an indicator variable equal to 1 for firms in the highest quartile of changes in net equity issuances from 2002 to 2004, and 0 otherwise;
P75_EQ_NODIV = an indicator variable equal to 1 for firms in the highest quartile of changes in net equity issuances from 2002 to 2004 that also did not pay dividends;

(continued on next page)

TABLE 2 (continued)

CAPX (capital expenditures) = the annual capital expenditures listed on the statement of cash flows in the current year scaled by lagged total assets;
TAX_SENS (our measure for tax sensitivity) = the ratio of total shares held by institutional investors as of the beginning of the calendar year to the number of shares outstanding at the beginning of the calendar year;
P25_EQ_DIV = an indicator variable equal to 1 for firms in the lowest quartile of changes in net equity issuances from and 2002 to 2004 that also pay dividends;
CF = defined as earnings before depreciation less working capital accruals scaled by lagged total assets;
TOBINSQ = the market value of equity plus book value of liabilities at the end of the previous year, all scaled by book value of total assets at the end of the previous year; and
DIV = the annual cash dividends paid listed on the statement of cash flows in the current year scaled by lagged total assets.

Overall, the data from Table 2 and Figures 3 and 4 show three important results. First, capital expenditures increase in the first full year after the 2003 Tax Act. Second, the increase in capital expenditures is smaller for firms with higher levels of less tax-sensitive ownership. Finally, the increase in capital expenditures is larger for firms most likely to fund investment with new equity issuances. All of these findings are consistent with our expectations.

Regression Results

We first examine whether investment increased using Equation (1), consistent with the intent of the 2003 Tax Act. In Column 1 of Panel A of Table 4, we find a positive association between *CAPX* and *REGIME* ($\beta_1 = 0.006$, t-statistic = 5.12).[18] In fact, we find a positive and significant association between *CAPX* and *REGIME* in the first two columns and throughout Table 4. This evidence supports the notion that capital expenditures increased after the 2003 Tax Act.

Next, we test our two tax-motivated hypotheses using the difference-in-differences model from Equation (2).[19] H1 predicts that the increase in investment after the 2003 Tax Act was attenuated for firms with shareholders that are less tax-sensitive, while H2 predicts the effect of the 2003 Tax Act on firms' investment should be larger for firms financing investment through new equity than for firms using internal funds.

Results are presented in Table 4. In Column 3, we find a negative association between *CAPX* and *REGIME* $*$ *TAX_SENS* ($\beta_3 = -0.022$, t-statistic = −5.26). This is consistent with H1, which predicts that the increase in capital expenditures will be decreasing in the level of institutional ownership if the increase is due to a change in shareholder-level taxes. Additionally, in Column 3, the coefficient on the interaction of *REGIME* $*$ *EXT_FIN* is positive and significant ($\beta_5 = 0.010$, t-statistic = 3.57). This result holds across all three proxies for *EXT_FIN* in Table 4.[20] These results are consistent with H2 and suggest that the increase in investment following the 2003 Tax Act is stronger for firms that are most likely to finance investment through new equity rather than internal funds.

It is important to note that our third proxy for external finance (*P75_EQ_NODIV*) combines firms' equity issuance activity with their dividend payout policies. This alternative way to test H2 is

[18] To examine whether our results are subject to multi-collinearity issues, we estimate variance inflation factors (VIFs) for each of the regressions in Table 4. None of the VIFs are greater than ten. Kutner et al. (2004) indicate that multi-collinearity is not a problem when VIFs are less than ten. Thus, we do not discuss these results in the body of the paper.

[19] An econometric equivalent to the difference-in-differences research design is a changes model, where there is one observation per firm and all of the variables are in changes rather than levels. Our results are unchanged using this alternative design.

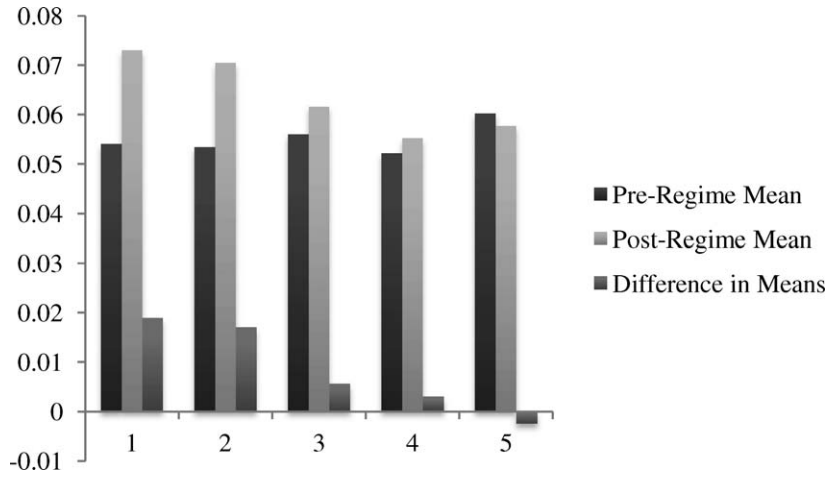
[20] Recent work in finance suggests that cash balances can be a noisy indication of a firm's ability to fund investment with internal cash flows (Hadlock and Pierce 2010). Thus, we consider the totality of the evidence across all three of our proxies for this construct. In untabulated results, we also consider a fourth proxy for the ability to fund investment with internal cash flows—firms' credit ratings. Our results are unaffected when using this alternative proxy for *EXT_FIN*.

TABLE 3

Correlation Matrix

	REGIME	*TAX_ SENS*	*P75_EQ_ ISSUE*	*P25_ CASH*	*P75_EQ_ NODIV*	*P25_EQ_ DIV*	*CF*	*TOBINSQ*	*DIV*	*BETA*	*VOLT*	*SIZE*
CAPX	0.056	−0.0433	0.0337	0.0285	0.0247	0.0020	0.2834	0.0871	0.0305	−0.0540	−0.0854	0.0457
	0.0001	0.0024	0.0184	0.0459	0.0832	0.8842	0.0001	0.0001	0.0328	0.002	0.0001	0.0014
REGIME	—	−0.0340	0.0050	0.0128	0.0026	−0.0034	0.0506	0.0349	0.0902	0.0145	−0.2369	0.0722
		0.0176	0.7258	0.3731	0.8541	0.8073	0.0004	0.0147	0.0001	0.3241	0.0001	0.0001
TAX_SENS		—	0.0266	−0.0383	−0.0153	0.0832	0.1067	0.1971	−0.0206	−0.0019	−0.2442	0.4008
			0.0631	0.0074	0.2850	0.0001	0.0001	0.0001	0.1497	0.9001	0.0001	0.0001
P75_EQ_ISSUE			—	−0.0686	0.7453	−0.1716	−0.0058	0.1245	−0.0326	0.0427	0.0530	−0.0390
				0.0001	0.0001	0.0001	0.6877	0.0001	0.0228	0.0037	0.0003	0.0064
P25_CASH				—	−0.0828	0.0072	−0.0086	−0.2208	−0.0071	−0.1351	−0.0975	−0.0912
					0.0001	0.6113	0.5475	0.0001	0.6197	0.0001	0.0001	0.0001
P75_EQ_NODIV					—	−0.1279	−0.0734	0.1272	−0.2226	0.1058	0.1442	−0.1229
						0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
P25_EQ_DIV						—	0.1178	0.0289	0.2451	−0.0896	−0.1747	0.2284
							0.0001	0.0429	0.0001	0.0001	0.0001	0.0001
CF							—	0.1007	0.2493	−0.1830	−0.2754	0.1931
								0.0001	0.0001	0.0001	0.0001	0.0001
TOBINSQ								—	0.0976	0.1031	0.0089	0.3234
									0.0001	0.0001	0.5472	0.0001
DIV									—	−0.1527	−0.3110	0.3190
										0.0001	0.0001	0.0001
BETA										—	0.2856	−0.0068
											0.0001	0.6425
VOLT											—	−0.4139
												0.0001

FIGURE 3
Average Annual Capital Expenditures (*CAPX*) for Sample Firms over Tax Regimes by Less Tax-Sensitive Ownership Quintile



Amounts represent the average of *CAPX* by regime across all 5,777 sample firms, but partitioned into quintiles based on the level of tax sensitivity. Quintile 1 represents firms with the highest level of tax sensitivity, and Quintile 5 represents firms with the lowest level of tax sensitivity.
All items presented are defined in Table 2.

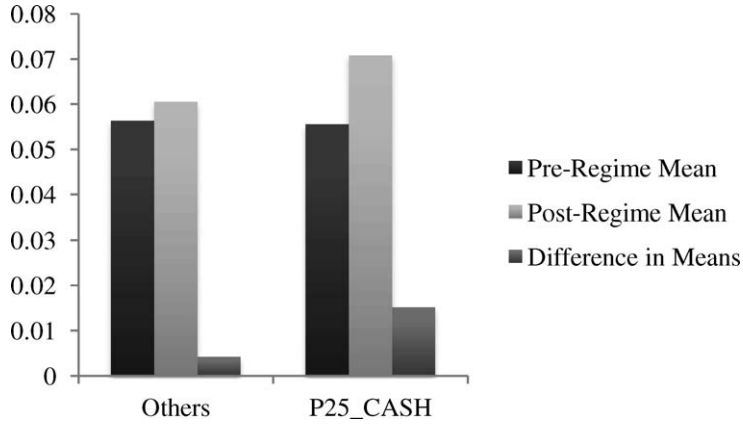
motivated by Auerbach and Hassett (2006), who argue that the investment response to the 2003 Tax Act should be stronger for firms that pay no dividends and finance with external funds, and weaker for firms that were paying dividends prior to the Act and finance with internal funds. Thus, our final proxy for *EXT_FIN* is *P75_EQ_NODIV*, which is an indicator variable for firms that pay no dividends *and* are in the highest quartile of net equity issuance over the sample period (i.e., firms that should experience a stronger investment response). Furthermore, we add *P25_EQ_DIV*, an indicator variable for firms that pay dividends *and* are in the lowest quartile of net equity issuance over the sample period (i.e., firms that should experience a weaker investment response). Consistent with Auerbach and Hassett's (2006) expectation, in Column 7 of Table 4, we find a positive and significant association between *CAPX* and *REGIME* $*$ *P75_EQ_NODIV* ($\beta_5 = 0.008$, t-statistic $=$ 2.00), suggesting that the increase in investment is stronger for firms that pay no dividends *and* finance investment with external funds. We also find a negative and significant association between *CAPX* and *REGIME* $*$ *P25_EQ_DIV* ($\beta_7 = -0.006$, t-statistic $= 1.78$). This is consistent with Auerbach and Hassett's (2006) argument that for firms that pay dividends *and* finance investment with internal funds, the 2003 Tax Act was less likely to encourage investment.[21]

Investor Risk Tolerances and the Dividend Tax Penalty

In all of our tables, we present two columns of regression analysis. The first column presents our base model from either Equation (1) or (2). The second column extends this model by including additional controls for firm risk, including beta, stock return volatility, and size. We include this extended

[21] In untabulated results, we test our third proxy for H2 by only including in our regressions *P75_EQ_NODIV* and its interaction with *REGIME* (i.e., we do not include *P25_EQ_DIV* or its interaction with *REGIME*). All of the results are unchanged.

FIGURE 4
Average Annual Capital Expenditures (*CAPX*) for Sample Firms over Tax Regimes by External Financing Source



Amounts represent the average of *CAPX* by regime partitioned on the marginal source of external financing as measured using the variable *P25_CASH*. Results using the alternative proxies for external financing source (*P75_EQ_ISSUE* and *P75_EQ_NODIV*) produce similar inferences and are available upon request.
All items presented are defined in Table 2.

specification because some prior literature suggests that the fraction of a firm's stock held by institutional investors may reflect differences in institutions' risk tolerances for firms, rather than tax differences among institutions.[22] Thus, for each model, we modify our equations to include the same variables that this prior literature suggests could reflect differences in institutions' risk tolerances: size, growth, beta, and stock return volatility (Guenther and Sansing 2010). Our results are unchanged throughout.[23,24]

[22] Specifically, Brennan (1970) examines an after-tax capital asset pricing model that implicitly includes a risk factor (beta) and shows that when investors are subject to different tax rates, the relevant tax parameter is the weighted average of the tax rates of *all* investors in the economy, *not* the tax rates of investors in each firm. Guenther and Sansing (2010) extend Brennan (1970) by examining a theoretical model that considers multiple risk factors. In their model, tax-exempt ownership is a function of the relative risk tolerance of taxable investors and the dividend tax penalty. Their model shows that the existence of tax-exempt investors lowers the relative risk tolerance of the taxable investors, which results in a lower dividend tax penalty. Guenther and Sansing (2010) also present empirical evidence of a statistically significant relation between institutional ownership and four risk factors examined extensively by prior research (size, book-to-market, stock return volatility, and beta). They use these four factors to estimate a proxy for the relative risk tolerances of taxable investors (RRTTI) and present evidence that after controlling for RRTTI, the relation between institutional ownership and dividend yield becomes statistically insignificant. They conclude that the association between the dividend tax penalty and institutional ownership documented in the prior literature is due to the correlation between RRTTI and institutional ownership. That is, they argue that their results suggest that the fraction of a firm's stock held by institutional investors may reflect differences in investors' risk tolerances for firms, rather than tax effects.

[23] Our findings for H1 are consistent with the more traditional view that tax-sensitive ownership levels affect the relation between shareholder-level taxes and firm value (Scholes et al. 2009). Guenther and Sansing's (2010) argument is that such association is due to risk-related reasons that institutions invest rather than tax reasons. However, given that we control for the risk-related reasons identified by Guenther and Sansing (2010), and in our setting the results continue to hold, it must be that either (1) the more traditional view has more empirical validity, or (2) our multiple proxies for tax-insensitive ownership are capturing something other than tax status and risk preferences, and it is not clear what that might be. This presents a challenge for future research.

[24] Although these additional risk variables identified by Guenther and Sansing (2010) also proxy for the age of the firm, in untabulated results, we include firm age as an additional risk control and our results are unaffected.

TABLE 4

Regression of Capital Expenditures on Post-Tax Act Dummy Variable, Tax Sensitivity and External Financing Source

			External Financing Source					
			P25_CASH		*P75_EQ_ISSUE*		*P75_EQ_NODIV*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
REGIME	0.006	0.005	0.010	0.010	0.012	0.011	0.013	0.012
	(5.12)***	(3.79)***	(4.79)***	(3.60)***	(5.27)***	(4.36)***	(5.60)***	(4.72)***
TAX_SENS			−0.007	−0.007	−0.005	−0.005	−0.006	−0.006
			(−2.22)**	(−2.07)**	(−1.59)	(−1.38)	(−1.63)	(−1.49)
*REGIME * TAX_SENS*			−0.022	−0.020	−0.023	−0.023	−0.022	−0.022
			(−5.26) ***	(−4.48)***	(−5.26)***	(−4.83)***	(−5.07)***	(−4.66)***
EXT_FIN			−0.005	−0.005	−0.002	−0.004	−0.002	−0.003
			(−2.65)***	(−2.44)**	(−1.03)	(−1.57)	(−0.53)	(−1.02)
*REGIME * EXT_FIN*			0.010	0.010	0.008	0.009	0.008	0.008
			(3.57)***	(3.44)***	(2.85)***	(2.99)***	(2.00)**	(1.96)**
P25_EQ_DIV							−0.000	0.001
							(−0.10)	(0.21)
*REGIME * P25_EQ_DIV*							−0.006	−0.004
							(−1.78)**	(−1.43)*
CF	0.090	0.093	0.095	0.095	0.107	0.105	0.107	0.105
	(12.26)***	(11.73)***	(12.84)***	(12.02)***	(12.11)***	(10.93)***	(12.09)***	(10.91)***
TOBINSQ	0.010	0.011	0.011	0.011	0.009	0.009	0.008	0.009
	(9.46)***	(9.39)***	(9.98)***	(9.67)***	(7.35)***	(7.24)***	(7.30)***	(7.20)***
DIV	−0.219	−0.172	−0.252	−0.244	−0.257	−0.244	−0.227	−0.227
	(−3.93)***	(−2.92)***	(−4.55)***	(−4.05)***	(−4.37)***	(−3.84)***	(−3.81)***	(−3.55)***

(continued on next page)

TABLE 4 (continued)

			External Financing Source					
			P25_CASH		*P75_EQ_ISSUE*		*P75_EQ_NODIV*	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
BETA		0.000		0.000		0.001		0.000
		(0.57)		(0.74)		(0.81)		(0.76)
VOLT		−0.024		−0.064		−0.073		−0.070
		(−0.61)		(−1.74)*		(−1.88)*		(−1.80)*
SIZE		−0.002		−0.001		−0.001		−0.001
		(−3.76)***		(−2.27)**		(−2.21)**		(−2.09)**
Adj. R^2	0.6179	0.6178	0.6228	0.6221	0.6236	0.6211	0.6236	0.6210
No. Obs.	5,777	5,377	5,777	5,377	4,882	4,597	4,882	4,597

*, **, *** Indicate a 10 percent, 5 percent, and 1 percent, respectively, significance level using one-tailed tests if a prediction is made, and two-tailed tests otherwise .
Amounts in parentheses are t-statistics based on White's (1980) standard errors clustered by firm.
All items presented using data items as defined in Table 2.
All regressions include industry fixed-effects based on the 12 industry classifications defined by Fama and French (French 2011).

Variable Definitions:
REGIME = an indicator variable equal to 1 if the observation year is after 2003, and 0 if the observation is from periods before 2003;
BETA = a measure of the firm's market beta measured over the 48 months preceding the beginning of calendar year using monthly value-weighted market returns;
VOLT = a measure of stock return volatility defined as the standard deviation of daily stock returns over the preceding calendar year; and
SIZE = a measure of firm size defined as the natural logarithm of the market value of equity capitalization as of the end of the preceding calendar year.

Economic Significance

Our results are not only statistically significant, but they are also economically meaningful. As previously mentioned, Dhaliwal et al. (2007a) find that firms' cost of capital decreased by 1.02 percentage points after the 2003 Tax Act, or a 10.6 percent decrease over the pre-Act cost of capital. Under a benchmark neoclassical investment model, the elasticity of investment with respect to user cost is one (Gravelle 1994; Fuchs et al. 1998; Hassett and Hubbard 2002). Thus, the expected overall increase in investment is 10.6 percent. However, this is not directly comparable to Dhaliwal et al. (2007a) because they examine cost of equity (rather than weighted average cost of capital) and their sample requires firms to be covered by I/B/E/S, while ours does not.

Our evidence suggests that, on average, investment increases between 8.5 percent (based on Table 4, Column 2) and 10.2 percent (Table 4, Column 1). If the proportion of tax-sensitive investors increases by one standard deviation, this economic effect increases to between 17.7 and 19.7 percent. Similarly, if a firm is likely to fund its investment with external equity, this significance increases to between 18.2 and 19.1 percent.[25] Overall, the evidence suggests we are capturing economically meaningful increases in investment, and these increases appear quite reasonable given prior theoretical and empirical evidence.

ADDITIONAL ANALYSIS

We also perform additional analyses based on our primary tests, as well as a number of sensitivity and robustness tests. For brevity, we only tabulate the results using one of our three proxies for the funding source for investment (i.e., *P75_EQISSUE*). However, it is important to note that the inferences throughout this section are unchanged if we use any of our proxies.

Dividend Payout Policy

As previously mentioned, shareholder-level tax cuts can provide firms with incentives to increase both investment *and* dividends (Hanlon and Heitzman 2010). Prior research shows that firms increased dividends in response to the 2003 Tax Act (Chetty and Saez 2005; Blouin et al. 2011), and we show that firms increase investment. Three natural questions emerge: (1) how are these two results related, (2) does a firm's payout policy affect how it responds, and (3) on average, which effect dominates? In this section, we provide further analysis on how a firm's payout policy affects its investment response to the 2003 Tax Act.

First, we partition the sample into non-dividend payers and dividend payers. In Table 5, Panel A, we report the results from examining whether dividend-paying firms have a smaller increase in capital investment after the 2003 Tax Act. The first four columns present results for non-dividend payers ($DIV\_PAYER = 0$), while the last four columns present results for dividend payers ($DIV\_PAYER = 1$). The results hold in both subsamples of firms, suggesting that the 2003 Tax Act led both groups to increase investment. To assess whether one group experienced a larger increase than another, we compare their economic significance. The evidence suggests that dividend payers experience a smaller increase in investment—by about 50 percent—relative to non-dividend payers. Specifically, comparing the first columns in each subsample, we find that investment increases for dividend payers by 5.00 percent, while investment increases for non-dividend payers by 10.17

[25] Specifically, we calculate economic significance for Table 4, Column 2, as the coefficient on *REGIME* (β_1) = 0.006 divided by the sample's average capital expenditures of 0.059 (or 10.2 percent), and for Column 1 as *REGIME* (β_1) = 0.005 divided by the sample's average capital expenditures of 0.059 (or 8.5 percent). All of the cross-sectional economic significance calculations are based on the coefficients and data in Table 4.

TABLE 5

Effect of Dividend Payout on Capital Expenditures after the 2003 Tax Act

Panel A: Partition Regression on the Subsample of Non-Dividend Payers (*DIV_PAYER* = 0) Compared to the Subsample of Dividend Payers (*DIV_PAYER* = 1)

	DIV_PAYER = 0				*DIV_PAYER* = 1			
	Total Investment		H1 and H2		Total Investment		H1 and H2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
REGIME	0.006	0.005	0.016	0.013	0.003	0.003	0.006	0.007
	(3.50)***	(2.35)**	(4.54)***	(3.39)***	(2.14)**	(2.17)**	(1.95)**	(2.03)**
TAX_SENS			−0.001	−0.005			−0.010	−0.007
			(−0.17)	(−0.82)			(−2.19)**	(−1.37)
*REGIME * TAX_SENS*			−0.029	−0.027			−0.011	−0.014
			(−4.56)***	(−3.88)***			(−2.15)**	(−2.39)***
EXT_FIN			−0.005	−0.007			0.001	0.001
			(−1.50)	(−2.04)**			(0.41)	(0.16)
*REGIME * EXT_FIN*			0.008	0.009			0.007	0.007
			(1.99)**	(2.20)**			(1.73)**	(1.84)**
CF	0.089	0.088	0.093	0.091	0.164	0.165	0.163	0.161
	(8.57)***	(7.77)***	(8.91)***	(8.01)***	(9.90)***	(9.40)***	(10.10)***	(9.36)***
TOBINSQ	0.009	0.010	0.010	0.010	0.003	0.004	0.003	0.005
	(6.15)***	(5.76)***	(6.34)***	(5.67)***	(1.97)*	(2.67)***	(2.36)**	(2.80)***
BETA		0.000		0.000		−0.000		0.000
		(0.52)		(0.64)		(−0.10)		(0.04)
VOLT		−0.034		−0.066		0.022		−0.041
		(−0.73)		(−1.50)		(0.23)		(−0.45)
SIZE		−0.002		−0.000		−0.002		−0.001
		(−1.73)*		(−0.39)		(−2.35)**		(−1.78)*
Adj. R^2	0.5737	0.5678	0.5788	0.5727	0.7063	0.7067	0.7103	0.7099
No. Obs.	2,695	2,506	2,695	2,506	2,187	2,091	2,187	2,091
Economic Significance:								
δCAPX/δREGIME	10.17%	8.47%	11.74%	7.21%	5.00%	5.00%	4.39%	3.58%

(continued on next page)

TABLE 5 (continued)

Panel B: Partition Regressions Based on Dividend Changes from 2002 to 2004

	INCR_DIVPS = 0				*INCR_DIVPS* = 1			
	Total Investment		H1 and H2		Total Investment		H1 and H2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
REGIME	0.005	0.005	0.008	0.011	0.001	0.001	0.003	0.003
	(2.21)**	(2.05)**	(2.02)**	(2.13)**	(0.62)	(1.00)	(0.70)	(0.75)
TAX_SENS			−0.013	−0.008			−0.006	−0.006
			(−2.08)**	(−1.02)			(−0.97)	(−0.86)
*REGIME * TAX_SENS*			−0.018	−0.024			−0.005	−0.005
			(−2.31)**	(−2.66)***			(−0.74)	(−0.68)
EXT_FIN			−0.004	−0.005			0.005	0.004
			(−0.96)	(−1.12)			(1.00)	(0.84)
*REGIME * EXT_FIN*			0.016	0.017			−0.000	0.000
			(2.49)***	(2.65)***			(−0.07)	(0.04)
CF	0.131	0.124	0.131	0.119	0.216	0.218	0.214	0.215
	(6.31)***	(5.17)***	(6.45)***	(5.14)***	(8.78)***	(8.78)***	(8.75)***	(8.72)***
TOBINSQ	0.008	0.012	0.009	0.012	−0.001	−0.001	−0.001	−0.001
	(3.06)***	(3.90)***	(3.30)***	(3.82)***	(−0.65)	(−0.53)	(−0.40)	(−0.40)
BETA		−0.002		−0.001		0.000		0.000
		(−0.46)		(−0.21)		(0.08)		(0.03)
VOLT		−0.088		−0.168		0.133		0.090
		(−0.74)		(−1.47)		(0.79)		(0.53)
SIZE		−0.003		−0.002		−0.000		−0.000
		(−3.29)***		(−2.29)**		(−0.25)		(−0.04)
Adj. R^2	0.6819	0.6843	0.6914	0.6923	0.7307	0.7310	0.7321	0.7321
No. Obs.	995	907	995	907	1,192	1,184	1,192	1,184
Economic Significance:								
δCAPX/δREGIME	8.93%	8.93%	6.74%	6.77%	1.56%	1.56%	1.16%	1.14%

*, **, *** Indicate a 10 percent, 5 percent, and 1 percent, respectively, significance level using one-tailed tests if a prediction is made, and two-tailed tests otherwise.
Amounts in parentheses are t-statistics based on White's (1980) standard errors clustered by firm.
This table presents regression results using *P75_EQ_ISSUE* as the proxy for investment financing source (*EXT_FIN*). Our inferences are unaffected if we use any of our alternative proxies for *EXT_FIN*, and for brevity, these regressions are not tabulated. *DIV_PAYER* is an indicator variable equal to 1 if the firm paid a dividend in the sample period, and 0 otherwise. *INCR_DIVPS* is an indicator variable equal to 1 for firms that increased their dividends per share from 2002 to 2004. Dividends per share are based on total dividends paid each year from the CRSP daily events file. All other items presented using data items as defined in Table 2 and Table 3.
All regressions include industry fixed effects based on the 12 industry classifications defined by Fama and French (French 2011).

percent. This pattern holds across the other three columns.[26] Overall, the results reported in Panel A of Table 5 confirm our earlier results reported in Table 4, Panel C, and the predictions of Auerbach and Hassett (2006): the increase in investment is larger for firms that do not pay dividends.

Panel B of Table 5 reports the results of examining whether—for the subset of firms that pay dividends—firms that increased their dividend payouts after the 2003 Tax Act ($INCR\_DIVPS = 1$) experience a smaller increase in investment than firms that did not ($INCR\_DIVPS = 0$). As expected, the evidence suggests that there is a smaller increase in investment for firms that increased payout after the Act. In fact, the change in investment for these firms is statistically indistinguishable from zero, suggesting that for these firms, the main effect of the shareholder-level tax reductions is increased dividends rather than increased capital investment. Interestingly, for the subset of dividend payers that do not increase their payout after the Act, the economic significance of the investment increase (i.e., 6.77 percent in Column 4 of Panel B) is strikingly similar to the non-dividend payers (i.e., 7.21 percent in Column 4 of Panel A).

Taken together, the results reported in Table 5 show a statistical increase in investment for the firms in our sample who did not increase dividends in response to the Act (75.6 percent of the sample), while there is no such increase in investment for the subset of firms that responded to the Act by increasing dividends (24.4 percent of the sample). Untabulated analysis confirms that the types of firms that fall into each category are consistent with the predictions of Auerbach and Hassett (2006). Specifically, firms that increased investment are statistically smaller, younger, and more likely to finance investment with external equity. Alternatively, firms that increased dividends are statistically larger, older, and more likely to finance investment with internal funds.

Other Macroeconomic Events, Including Bonus Depreciation Rule Changes

Bonus Depreciation

During our sample period, two new tax provisions were enacted as part of larger tax reform bills in an effort to stimulate investment in capital expenditures by reducing *corporate-level* taxes through increased depreciation deductions on new asset purchases.[27] Therefore, it is necessary that we test whether our results are being driven by reductions in *corporate-level* taxes (through increased corporate depreciation deductions), rather than by reductions in *shareholder-level* taxes (through decreased dividend and capital gains taxes).

It is important to note that H1 and H2 should not hold if the results are driven by reductions in corporate-level taxes. That is, the mechanism that motivates H1 and H2 is *shareholder-level* tax changes only. Nevertheless, we perform additional empirical tests to ensure that our results are not due to the corporate-level bonus depreciation tax rule changes. In untabulated analysis, we change our post-*REGIME* period from 2004 to 2005. Dhaliwal et al. (2007a) document that the 2003 Tax Act's reduction in the cost of capital persisted for three years. Accordingly, we should find that our hypotheses continue to hold when we examine the increase in investment in 2005 relative to 2002. More importantly, this evidence would be more directly attributable to a reduction in shareholder-level taxes rather than the corporate-level bonus depreciation tax provisions, because the bonus

[26] Unlike in Table 4, where we show pooled regressions and discuss economic significance in the "Research Design and Empirical Results" section, we list the economic significance directly in Table 5 to help readers compare across the partition regressions. In untabulated results, we also test whether the coefficients are statistically different across the subsamples, and find evidence that the coefficient on *REGIME* is statistically larger for non-dividend payers at the 10 percent significance level.

[27] The Job Creation Worker Assistance Act of 2002 (JCWAA) was passed in March 2002 and was applied retroactively to 2001 tax returns. The JCWAA created a 30 percent first-year bonus depreciation allowance for new asset purchases with recovery lives not more than 20 years. The 2003 Tax Act increased the 30 percent bonus depreciation allowance to 50 percent for qualified asset purchases from May 2003 until December 2004.

depreciation provisions expired in 2004. We continue to find support for an overall increase in investment, as well as for H1 and H2.

In Table 6, we report the results of examining whether investment other than capital expenditures—which were not subject to corporate-level tax incentives during our sample period—also increased in response to the 2003 Tax Act.[28] That is, we reestimate Equation (2), but change the dependent variable from capital expenditures to one of three alternative forms of investment: (1) working capital, (2) intangible assets, and (3) R&D expenses. When we investigate working capital and intangible assets (Columns 1 and 2), we find support for an increase in investment, as well as for H1 and H2. When we investigate R&D (Column 3), we do not find support for our hypotheses. However, in Column 4, we reduce the sample to only include high-tech and non-capital-intensive industries, because R&D expenses are likely to be concentrated in these firms, and we find support for H1 (but not H2).[29,30] Overall, the evidence in this section provides assurance that our results are not driven by corporate-level bonus depreciation changes.

Other Macroeconomic Events

The U.S. economy was coming out of a recession during 2003. It is possible that macroeconomic conditions unrelated to taxes caused investment to increase. However, if such events are driving our results, investment should increase for *all* firms, regardless of the tax status of the firm's investors (H1) or the source of a firm's investment (H2). That is, our difference-in-differences research design and our focus on two shareholder-level tax-motivated, cross-sectional hypotheses ensure that our results are, at least in part, driven by the 2003 Tax Act.

As mentioned earlier, the fact that aggregate macroeconomic variables tend to move together makes it difficult to ascribe causality to our finding that overall investment levels increase after the 2003 Tax Act. However, in this section, we consider whether this finding is likely the result of macroeconomic events unrelated to taxes. First, Dhaliwal et al. (2007a) control for other macroeconomic factors and show that the economic significance of their cost of equity results is consistent with the magnitude one would predict given the size of the shareholder-level tax cuts from the 2003 Tax Act. The fact that the economic significance of our results so closely conforms to that which would be predicted by the cost of equity decrease in Dhaliwal et al. (2007a) provides some assurance that our documented increase in investment is at least plausible given the size of the 2003 Tax Act reductions in shareholder-level taxes.

To further examine whether other macroeconomic events affect our finding that aggregate investment increased after the 2003 Tax Act, we add additional control variables to our regression models. Specifically, in separate analyses, we include controls for corporate write-offs and goodwill impairments (Muller et al. 2009), the unemployment rate, and the yield on the ten-year treasury note (Dhaliwal et al. 2007a). In all cases, our results continue to hold. Nevertheless, although we do our best to control for the effects of macroeconomic factors unrelated to taxes, the fact that aggregate macroeconomic variables move together over business cycles prevents us from solely

---

[28] For Table 6, we start with the firms from Table 4 and, thus, require that they have a valid *CAPX* amount to be included in the sample. In untabulated results, we remove this restriction, and although our sample size increases, our results are unchanged.

[29] Specifically, we use industry group six of the Fama-French 12 classification, which is labeled "Business Equipment—Computers, Software, and Electronic Equipment."

[30] The lack of results for H2 could be due to the fact that in this reduced subsample, there is not a large variation in whether firms are funding investment internally or externally (i.e., technology firms that heavily invest in R&D are unlikely to fully fund investment from external funds), particularly since prior research finds that R&D is typically funded with internal funds. Untabulated results confirm this to be the case, as these firms had larger cash balances and fewer net equity issuances (as well as less standard deviation for both measures) relative to the overall population of firms.

TABLE 6

Regression of Alternative Forms of Investment on Post-Tax Act Dummy Variable, Tax Sensitivity, and External Financing Source

	Working Capital (1)	Intangible Assets (2)	R&D Full Sample (3)	R&D High Tech (4)
REGIME	0.021	0.026	0.001	0.029
	(3.22)***	(4.04)***	(0.31)	(3.99)***
TAX_SENS	0.012	0.041	0.001	0.043
	(1.51)	(3.67)***	(0.47)	(3.79)***
*REGIME * TAX_SENS*	−0.023	−0.042	0.004	−0.024
	(−2.14)**	(−3.25)***	(1.37)	(−1.88)**
EXT_FIN	−0.027	0.009	−0.000	0.023
	(−5.24)***	(1.38)	(−0.21)	(3.41)***
*REGIME * EXT_FIN*	0.074	0.014	0.000	−0.006
	(9.51)***	(1.53)*	(0.15)	(−0.84)
CF	0.160	0.061	−0.083	−0.039
	(7.39)***	(2.99)***	(−8.88)***	(−1.99)**
TOBINSQ	0.012	0.011	0.014	0.018
	(4.49)***	(4.72)***	(12.09)**	(7.55)***
DIV	−0.221	−0.530	−0.005	−0.128
	(−1.95)*	(−4.51)***	(−0.11)	(−0.44)
BETA	−0.001	−0.002	0.002	0.009
	(−0.41)	(−1.23)	(1.17)	(3.65)***
VOLT	−0.051	−0.326	0.072	0.331
	(−0.59)	(−2.49)**	(1.86)*	(2.58)**
SIZE	−0.002	0.000	−0.001	−0.004
	(−2.31)**	(0.38)	(−1.64)	(−3.13)***
Adj. R^2	0.1148	0.0848	0.6019	0.6869
No. Obs.	4,533	4,509	4,588	841

*, **, *** Indicate a 10 percent, 5 percent, and 1 percent, respectively, significance level using one-tailed tests if a directional prediction is made, and two-tailed tests otherwise.
All regressions include industry fixed effects based on the 12 industry classifications defined by Fama and French (French 2011). Amounts in parentheses are t-statistics based on White's (1980) standard errors clustered by firm.
This table presents regression results using *P75_EQ_ISSUE* as the proxy for investment financing source (*EXT_FIN*). Our inferences are unaffected if we use any of our alternative proxies for *EXT_FIN*, and for brevity, these regressions are not tabulated. Working Capital is the one-year change in working capital scaled by lagged total assets, where working capital is defined as current assets minus current liabilities. Intangible Assets is the one-year change in intangible assets scaled by lagged total assets, where intangible assets is defined as intangible assets plus other intangibles. R&D is research and development expense for the year scaled by lagged total assets. The sample in Column (4) is restricted to firms in the Fama French 12 classification, which is labeled "Business Equipment—Computers, Software and Electronic Equipment."
All other items presented using data items as defined in Table 2 and Table 3.

attributing the increase in aggregate investment to the shareholder-level tax rate reductions set forth in the 2003 Tax Act.

Institutional Ownership

As discussed, prior literature suggests that institutional investors may invest in different ways than individuals for reasons that do not relate to taxes. Although in our primary tables, we include risk controls to mitigate this concern, in this section, we perform two additional sensitivity tests.

First, to further ensure that our results related to institutional ownership are due to taxes and not some other effect (i.e., risk, firm life cycle, etc.), we reestimate Equation (2) on three subsequent time periods: 2004 to 2005, 2005 to 2006, and 2006 to 2007, where the later year is the *REGIME* = 1 year. Because in each of these alternative time periods, there were no changes in shareholder-level tax rates between the "pre" and "post" years (as there were in our main tests), we would not expect to find support for H1 (or H2). In each of these alternative time periods, we find no instances where the interaction *REGIME* ∗ *TAX_SENS* is negative and significant.[31] This suggests that our results related to institutional ownership from 2002 to 2004 are more likely related to taxes rather than some other effect, such as risk or firm life cycle.

Second, we identify an alternative group of investors to which the tax rate reduction did not apply. This helps ensure that our finding regarding H1 is due to tax reasons (and not other reasons that institutions invest). Withholding tax rates for foreign owners in U.S. firms did not change during our sample period. Thus, we examine whether the increase in investment around the 2003 Tax Act is lower for firms with high levels of foreign ownership.

Using a unique dataset of foreign ownership in U.S. equities, Cai and Warnock (2006) model the percentage of foreign ownership at the firm level. We estimate the percentage of foreign ownership for our sample firms by using the fitted values from their regression results. The amount of data requirements for *FOR_OWN* results in a significant decline in sample observations.[32] The results are presented in Table 7.

We find a negative association between *CAPX* and *REGIME* ∗ *FOR_OWN*, which is consistent with H1, which predicts that the change in investment should be decreasing in the level of foreign ownership if the change is driven by shareholder-level taxes. These results are robust to the inclusion of firm risk factors. Additionally, the coefficient on *REGIME* is positive across all four columns, which again supports the argument that overall investment levels increase after the 2003 Tax Act. Last, the coefficients on external financing sources are (marginally) positive in Columns 3 and 4, supporting H2. Overall, the results in this section help provide further evidence that our previous findings related to institutional ownership are consistent with being driven by tax factors.[33]

CONCLUSIONS

The 2003 Tax Act reduced shareholder-level taxes on dividends and capital gains. If reductions in shareholder-level taxation reduce firms' overall cost of capital, then corporate investment should increase after the 2003 Tax Act. We regress capital expenditures on an indicator variable equal to 1 for time periods after the Act and controls for cross-sectional differences in capital expenditures. Our analyses yield three main results. We first document that capital expenditures increased after the 2003 Tax Act. Second, the increase in capital expenditures after the 2003 Tax Act is less positive for firms largely held by investors that are less tax-sensitive. Finally, the increase in capital expenditures after the 2003 Tax Act is more positive for firms that are likely to finance investment from new equity issuances. In additional analysis, we find that the investment increase is driven by the majority of firms, while a subset of larger, more mature firms with higher levels of internal

[31] We also fail to find consistent support for H2 across these alternative time periods using our three proxies for *EXT_FIN*, in contrast to our 2003 Tax Act results, where we find the H2 predicted relation across all three of our proxies.

[32] Specifically, based on the results from Table 4 of Cai and Warnock (2006), we estimate the percentage of foreign ownership in U.S. equities as $0.0038 * SIZE + 0.0084 * TURNOVER + 0.016 * S\&P + 0.0018 * BTM - 0.3309 * YIELD - 0.0002 * LEVERAGE - 0.0007 * MOMENTUM + 0.0277 * FOREIGN\_SALES + 0.0007 * BETA + 0.0255 * VOLATILITY$, and we must delete firms without necessary items available to calculate this estimate.

[33] In untabulated results, we reestimated the regressions from Table 4 using the reduced sample for which a valid estimate of foreign ownership is available, and find that all of our results continue to hold.

TABLE 7

Regression of Capital Expenditures on Post-Tax Act Dummy Variable, Foreign Ownership, and External Financing Source

Panel A: Multivariate Regressions with Foreign Ownership as a Proxy for Tax Sensitivity

	H1 Only		With H2	
	(1)	(2)	(3)	(4)
REGIME	0.015	0.016	0.014	0.016
	(2.83)***	(3.17)***	(2.71)***	(3.06)***
FOR_OWN	−0.225	−0.108	−0.221	−0.098
	(−2.88)***	(−1.12)	(−2.84)***	(−1.02)
REGIME ∗ FOR_OWN	−0.155	−0.200	−0.161	−0.207
	(−2.27)**	(−2.90)***	(−2.34)***	(−2.99)***
EXT_FIN			−0.006	−0.006
			(−2.03)**	(−2.13)**
REGIME ∗ EXT_FIN			0.005	0.005
			(1.37)*	(1.47)*
CF	0.111	0.112	0.112	0.113
	(8.84)***	(8.19)***	(8.85)***	(8.22)***
TOBINSQ	0.009	0.010	0.009	0.010
	(5.64)***	(5.64)***	(5.69)***	(5.69)***
DIV	−0.414	−0.372	−0.416	−0.371
	(−4.98)***	(−4.39)***	(−4.98)***	(−4.37)***
BETA		0.001		0.001
		(0.82)		(0.81)
VOLT		−0.162		−0.163
		(−2.15)**		(−2.18)**
SIZE		−0.002		−0.002
		(−2.23)**		(−2.31)**
Adj. R^2	0.6448	0.6456	0.6452	0.6461
No. Obs.	2,722	2,722	2,722	2,722

Panel B: Descriptive Statistics for *FOR_OWN*

	Obs.	Mean	Std. Dev.	25%	Median	75%
FOR_OWN	2,722	0.069	0.021	0.056	0.067	0.081

*, **, *** Indicate a 10 percent, 5 percent, and 1 percent, respectively, significance level using one-tailed tests if a directional prediction is made, and two-tailed tests otherwise.

All regressions include industry fixed effects based on the 12 industry classifications defined by Fama and French (French 2011). Amounts in parentheses are t-statistics based on White's (1980) standard errors clustered by firm.

This table presents regression results of capital expenditures on foreign ownership (*FOR_OWN*). *FOR_OWN* is an estimate of the percentage of foreign ownership determined using fitted values output from the model results in Cai and Warnock (2006). Regression results are presented using *P75_EQ_ISSUE* as the proxy for investment financing source (*EXT_FIN*). Our inferences are unaffected if we use any of our alternative proxies for *EXT_FIN*, and for brevity, these regressions are not tabulated.

All other items presented using data items as defined in Table 2 and Table 3.

funds increased dividend payout instead. Taken together, these results suggest that, consistent with the intent of policymakers, firms responded to the 2003 Tax Act by increasing capital investments, and add further evidence to the question of whether taxes impact valuation and firms' investment.

A few caveats are in order. First, as with any event study, we do not explore the social welfare implication of the 2003 Tax Act (Gonedes and Dopuch 1974; Watts and Zimmerman 1986). It could be that the magnitude of the investment increase and its benefits on the broader economy do not outweigh the costs associated with the regulation, such as increasing public debt levels or encouraging firms to make inefficient investments. Similarly, there could be alternative ways to spur business investment that are more efficient and/or less costly from a public policy perspective. Our study does not consider these questions. Second, our study does not suggest that investment increases for *every* firm in the economy, as the results suggest that there are some firms that did not increase capital investments. In particular, investment does not increase for firms with very high levels of institutional ownership that finance new investment with internal funds, nor does investment increase for older, larger, and financially unconstrained firms that increase their payout in response to the 2003 Tax Act. Third, as with any event study of the passage of legislation, our findings should be interpreted with caution due to the difficulty of identifying the precise timing of when firms reacted to the Act, and while we do the best we can, other events occurring simultaneously with the Act may influence our results (Zhang 2007; Campbell et al. 2010). Our tests suggest that the increase in investment during our sample period is, at least partly, due to the reductions in shareholder-level taxes set forth in the 2003 Tax Act.

Finally, our study finds that the shareholder-level tax rate reduction of 42 percent set forth by the 2003 Tax Act (see Figure 2) led to an aggregate increase in firm investment of between 8.5 and 10.2 percent. A natural question to ask is whether reductions in corporate-level taxes (as opposed to shareholder-level taxes) would be more effective as an investment stimulus. Future research may wish to comprehensively examine whether corporate-level or shareholder-level taxes are more effective in stimulating additional corporate investment.

REFERENCES

Auerbach, A., and K. Hassett. 2006. Dividend taxes and firm valuation: New evidence. *American Economic Review* 96: 119–123.

Auerbach, A., and K. Hassett. 2007. The 2003 dividend tax cuts and the value of the firm: An event study. In *Taxing Corporate Income in the 21st Century*, edited by Auerbach, A., and J. Slemrod. New York, NY: Cambridge University Press.

Ayers, B. C., C. B. Cloyd, and J. R. Robinson. 2002. The effect of shareholder-level dividend taxes on stock prices: Evidence from the Revenue Reconciliation Act of 1993. *The Accounting Review* 77: 933–947.

Ayers, B. C., C. Lefanowicz, and J. R. Robinson. 2004. The effect of shareholder-level capital gains taxes on acquisition structure. *The Accounting Review* 79: 859–884.

Ayers, B. C., C. Lefanowicz, and J. R. Robinson. 2007. Capital gains taxes and acquisition activity: Evidence of the lock-in effect. *Contemporary Accounting Research* 24: 315–344.

Blouin, J., J. Raedy, and D. Shackelford. 2011. Dividends, share repurchases, and tax clienteles: Evidence from the 2003 reductions in shareholder taxes. *The Accounting Review* 86: 887–914.

Brav, A., J. Graham, C. Harvey, and R. Michaely. 2007. Payout policy in the 21st century. *Journal of Financial Economics* 77: 483–527.

Brennan, M. 1970. Taxes, market valuation and corporate financial policy. *National Tax Journal* 23: 417–427.

Brown, J., N. Liang, and S. Weisbenner. 2007. Executive financial incentives and payout policy: Firm responses to the 2003 dividend tax cut. *Journal of Finance* 62: 1935–1965.

Bushman, R., A. Smith, and F. Zhang. 2011. *Investment-Cash Flow Sensitivities Really Reflect Related Investment Decisions*. Working paper, The University of North Carolina at Chapel Hill.

Cai, F., and F. Warnock. 2006. *International Diversification At Home and Abroad*. Working paper, National Bureau of Economics Research.

Campbell, J., D. Dhaliwal, and W. Schwartz, Jr. 2010. Equity valuation effects of the Pension Protection Act of 2006. *Contemporary Accounting Research* 27: 469–536.

Campbell, J., D. Dhaliwal, and W. Schwartz, Jr. 2012. Financing constraints and the cost of capital: Evidence from the funding of corporate pension plans. *Review of Financial Studies* 25: 868–912.

Chetty, R., and E. Saez. 2005. Dividend taxes and corporate behavior: Evidence from the 2003 dividend tax cut. *Quarterly Journal of Economics* 120: 791–833.

Cloyd, C. B., O. Li, and C. Weaver. 2006. Tick and tax: The effects of price discreteness and taxation on ex-dividend day returns. *The Journal of the American Taxation Association* 28: 23–46.

Dai, Z., E. Maydew, D. Shackelford, and H. Zhang. 2008. Capital gains taxes and asset prices: Capitalization or lock-in? *Journal of Finance* 63: 709–742.

Daske, H., L. Hail, C. Leuz, and R. Verdi. 2008. Mandatory IFRS reporting around the world: Early evidence on the economic consequences. *Journal of Accounting Research* 46: 1085–1142.

Dhaliwal, D., L. Krull, and O. Li. 2007a. Did the 2003 tax act reduce the cost of equity capital? *Journal of Accounting and Economics* 43: 121–150.

Dhaliwal, D., M. Erickson, and L. Krull. 2007b. Incremental financing decisions and time-series variation in personal taxes on equity income. *The Journal of the American Taxation Association* 29 (1): 1–26.

Dhaliwal, D., L. Krull, O. Li, and W. Moser. 2005. Dividend taxes and implied cost of equity capital. *Journal of Accounting Research* 43: 675–708.

Dhaliwal, D., O. Li, and R. Trezevant. 2003. Is a dividend tax penalty incorporated into the return on a firm's common stock? *Journal of Accounting and Economics* 35: 155–178.

Durtschi, C., and P. Easton. 2005. Earnings management? The shapes of the frequency distributions of earnings metrics are not evidence ipso facto. *Journal of Accounting Research* 43: 557–592.

Fazzari, S., G. Hubbard, and B. Petersen. 1988. Financing constraints and corporate investment. *Brookings Papers on Economic Activity* 1: 141–195.

Fazzari, S., G. Hubbard, and B. Petersen. 2000. Investment-cash flow sensitivities are useful: A comment on Kaplan-Zingales. *Quarterly Journal of Economics* 115: 695–705.

French, K. 2011. 12 Industry Portfolio Classifications. Available at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_i

Fuchs, V., A. Krueger, and J. Poterba. 1998. Economists' views about parameters, values, and policies: Survey results in labor and public economics. *Journal of Economic Literature* 36: 1387–1425.

Garrison, R., and E. Noreen. 1997. *Managerial Accounting*. 8th edition. New York, NY: Irwin Publishing.

Gonedes, N. J., and N. Dopuch. 1974. Capital market equilibrium, information production and selecting accounting techniques: Theoretical framework and review of empirical work. *Journal of Accounting Research* 14: 89–137.

Gravelle, J. 1994. *The Economic Effects of Taxing Capital Income*. Cambridge, MA: MIT Press.

Grullon, G., and R. Michaely. 2002. Dividends, share repurchases, and the substitution hypothesis. *Journal of Finance* 57: 1649–1684.

Guenther, D., and R. Sansing. 2010. The effect of tax-exempt investors and risk on stock ownership and expected returns. *The Accounting Review* 85: 849–875.

Hadlock, C., and J. Pierce. 2010. New evidence on measuring financial constraints: Moving beyond the KZ index. *Review of Financial Studies* 23: 1909–1940.

Hanlon, M., and S. Heitzman. 2010. A review of tax research. *Journal of Accounting and Economics* 50: 127–178.

Hassett, K., and R. G. Hubbard. 2002. Tax policy and business investment. In *Handbook of Public Economics*, Edition 1, Volume 3, edited by Auerbach, A., and M. Feldstein. Amsterdam, the Netherlands: Elsevier Science.

Horngren, C., S. Datar, and G. Foster. 2006. *Cost Accounting: A Managerial Emphasis*. 12th edition. New York, NY: Prentice Hall.

Jagannathan, M., C. Stephens, and M. Weisbach. 2000. Financial flexibility and the choice between dividends and stock repurchases. *Journal of Financial Economics* 57: 355–384.

Jensen, M. 1986. Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review* 76: 323–329.

Jensen, M., and W. H. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3: 305–360.

Jiambalvo, J., S. Rajgopal, and M. Venkatachalam. 2002. Institutional ownership and the extent to which stock prices reflect future earnings. *Contemporary Accounting Research* 19: 117–145.

Kaplan, S., and L. Zingales. 1997. Do investment-cash flow sensitivities provide useful measures of financing constraints? *Quarterly Journal of Economics* 112: 169–215.

Kaplan, S., and L. Zingales. 2000. Investment-cash flow sensitivities are not valid measures of financing constraints. *Quarterly Journal of Economics* 115: 707–712.

Kutner, M. H., C. J. Nachstein, and J. Neter, ed. 2004. *Applied Linear Statistical Models*. 5th edition. New York, NY: McGraw-Hill Irwin.

Lang, M., and D. Shackelford. 2000. Capitalization of capital gains taxes: Evidence from stock price reactions to the 1997 rate reduction. *Journal of Public Economics* 76: 69–85.

Li, S. 2010. Does mandatory adoption of international financial reporting standards in the European Union reduce the cost of equity capital? *The Accounting Review* 85: 607–636.

McInnis, J., and D. Collins. 2011. The effect of cash flow forecasts on accrual quality and benchmark beating. *Journal of Accounting and Economics* 51: 219–239.

Miller, M. H., and F. Modigliani. 1961. Dividend policy, growth and the valuation of shares. *Journal of Business* 34: 411–433.

Moser, W., and A. Puckett. 2009. Dividend tax clienteles: Evidence from tax law changes. *The Journal of the American Taxation Association* 31: 1–22.

Muller, K., M. Neamtiu, and E. Riedl. 2009. *Insider Trading Preceding Goodwill Impairment*. Working paper, The Pennsylvania State University.

Murphy, K. 1999. *Executive Compensation*. Working paper, University of Southern California.

Myers, S. 1977. The determinants of corporate borrowing. *Journal of Financial Economics* 5: 147–175.

Nini, G., D. C. Smith, and A. Sufi. 2009. Creditor control rights and firm investment. *Journal of Financial Economics* 92 (3): 400–420.

Poterba, J., and L. Summers. 1983. Dividend taxes, corporate investment, and "Q." *Journal of Public Economics* 22: 135–167.

Poterba, J., and L. Summers. 1984. The economic effects of dividend taxation. In *Recent Advances in Corporate Finance*, edited by Altman, E., and M. Subrahmanyam, 227–284. Homewood, IL: Richard D. Irwin Publishers.

Rauh, J. 2006. Investment and financing constraints: Evidence from the funding of corporate pension plans. *Journal of Finance* 61: 33–71.

Scholes, M., M. Wolfson, M. Erickson, E. Maydew, and T. Shevlin. 2009. *Taxes and Business Strategy*. 4th edition. New York, NY: Prentice Hall Publishing.

Snow, J. 2003. United States Treasury Secretary's statement to the house ways and means committee. Available at: http://www.gpo.gov/fdsys/pkg/CHRG-108hhrg91630/html/CHRG-108hhrg91630.htm

U.S. Congress. 2003. 108th Congress Report, Committee on Ways and Means. Available at: http://www.intelligence.senate.gov/pub108thcongress.html

Watts, R., and J. Zimmerman (eds.) 1986. *Positive Accounting Theory*. Upper Saddle River, NJ: Prentice Hall.

White, H. 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 48: 817–838.

White House. 2003. Bush offers tax-cutting economic stimulus plan (January 7). Available at: http://usgovinfo.about.com/library/weekly/aastimulus.htm

Zhang, I. 2007. Economic consequences of the Sarbanes-Oxley Act of 2002. *Journal of Accounting and Economics* 44: 74–115.

Zodrow, G. R. 1991. On the "traditional" and "new" views of dividend taxation. *National Tax Journal* 44: 497–509.