THE IMPACT OF INVESTOR-LEVEL TAXATION ON
MERGERS AND ACQUISITIONS

Eric Ohrn* Nathan Seegert†‡

Abstract

This paper investigates corporate payout and acquisition decisions accounting for investor-level taxes. We show that managers of dividend-paying firms have an incentive to make additional lower-quality acquisitions instead of paying additional dividends when dividends are taxed more heavily than capital gains. We exploit a quasi-natural experiment created by the Jobs and Growth Tax Relief Reconciliation Act of 2003 that substantially lowered the dividend tax rate. We find that dividend-paying firms performed fewer acquisitions and their post-acquisition performance increased due to the reform. This evidence helps explain corporate payout and acquisition decisions and the observed increase in dividend payments after 2003.

Keywords: Mergers and Acquisitions, Business Taxes.
JEL Classification: G34, G28, H25

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1 Introduction

A fundamental decision for firms is whether to distribute retained earnings to shareholders or increase investment, either internally or through acquisitions. To understand this tradeoff, financial economists have focused on deviations from the original Miller and Modigliani (1961) irrelevance propositions. For example, information frictions, agency concerns, and taxes, have been investigated to explain why some firms pay dividends and others do not (Fama and French, 2001; Allen and Michaely, 2003; DeAngelo et al., 2004, 2006; DeAngelo and DeAngelo, 2006; Denis and Osobov, 2008).\(^1\) We extend this literature by demonstrating that the tradeoff between dividend payments and acquisitions can be distorted by investor-level taxes. An implication of this mechanism is that investor-level taxes can cause otherwise inefficient acquisitions to be profitable from a firm’s perspective. Said differently, an important but not obvious place the deadweight loss of investor-level taxes might show up is in encouraging firms to undertake lower value acquisitions.

Consider a manager’s choice between paying a dividend and making an acquisition. Paying a dividend will trigger dividend tax liabilities for the firm’s shareholders. The acquisition will trigger capital gains taxes for the target firm’s shareholders, which will affect the price of the acquisition. When the dividend tax is larger than the capital gains tax, this causes a de facto tax discount on the acquisition price. This discount means that some acquisitions may be profit maximizing from the perspective of both the acquiring and target firms involved, but may be inefficient for the economy as a whole. For example, we will show that if dividends are taxed at a rate of 38.6 percent and capital gains are taxed at 20 percent, then acquisitions which destroy up to 23 percent of value of the target firm may be profit maximizing.\(^2\)

We make use of a quasi-natural experiment created by the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA or the reform). Before the 2003 reform, dividends and capital gains were taxed at 38.6 percent and 20 percent, respectively, for individuals in the top income-tax bracket. The reform decreased both rates to 15 percent for individuals in the top income-tax

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\(^1\)For other papers investigating information frictions, agency concerns, and taxes see (Blanchard and Wyplosz, 1981; Summers et al., 1981; Poterba and Summers, 1983a; Abel, 1986; Whited, 1992; Phillips, 1995; Graham, 1996; Kovenock and Phillips, 1997; Graham, 2000; MacKay and Phillips, 2005).

\(^2\)The tax discount was first described in a model where acquisitions allow target firm shareholders to free their trapped equity providing an opportunity and tax discount for acquiring managers (Kraakman, 1988; Harris et al., 2001).
bracket. This reform is an ideal quasi-natural experiment because it focused on lowering investor-level taxes and few other changes were made, and none are likely to impact the tradeoff between dividend payments and acquisitions.\textsuperscript{3} This variation in investor-level taxes provides a unique opportunity to test whether firms tradeoff paying dividends and making acquisitions.

We test several implications of the tradeoff between dividend payments and acquisitions. First, we hypothesize that firms that paid dividends before the reform will undertake fewer acquisitions after the reform. Second, we hypothesize that firms that paid dividends before the reform will conduct better acquisition after the reform, causing their post-acquisition performance to be higher after the reform.\textsuperscript{4} Third, we hypothesize that firms that have more taxable shareholders (those with fewer institutional shareholders) will be more affected by the reform. Finally, our model predicts firms that paid dividends before the reform will pay more dividends after the dividend tax rate is decreased. This last implication is consistent with Chetty and Saez (2005) who find that in response to the reform dividend payments increased by $5 billion per quarter, an increase of 20 percent.

We use variation in how firms distribute retained earnings and the share of investors that are tax-exempt to control for potentially correlated events. This approach allows us to exploit the unique feature that firms that distribute earnings by repurchasing shares are not subject to the dividend tax and, as will be shown, have similar acquisition behavior. In general, firms that pay dividends are larger and more established than firms that do not pay dividends—because of this we do not use these as our groups of firms. Instead, we focus on firms that only pay dividends and do not repurchase shares and firms that repurchase shares and do not pay dividends; for

\textsuperscript{3}Several studies have used the JGTRRA to study changes in firm behavior because it was such a large change to investor-level taxes with few other changes. None of these other studies, however, look at the impact on acquisitions—the focus of this paper.

\textsuperscript{4}We measure post-acquisition performance using buy-and-hold abnormal returns 24 months after an acquisition. The difference-in-differences empirical design mitigates some of the concern about biases in long-run buy-and-hold abnormal returns because it allows for different biases between firms that pay dividends and firms that repurchase shares and between firms making acquisitions before and after 2003. There is an important literature that discusses the best practices of calculating long-run abnormal returns to avoid misspecification. Long-run abnormal returns may be biased due to survivor, rebalancing, or skewness bias if they are not accounted for (Lyon et al., 1999). Mitchell and Stafford (2000) suggest using the calendar portfolio approach suggested by Fama (1998) to avoid biases due to positive cross-correlations for acquirers. Harford (2005) suggests controlling for industry because of biases due to the clustering of mergers and the mean-reversion in industry-adjusted operating performance noted by Barber and Lyon (1996). Loughran and Ritter (2000) indicate that monthly returns should be equally weighted rather than value-weighted. The implications for our context are discussed further in section 4.
expositional ease we simply refer to these groups as dividend-paying firms and share-repurchasing firms. These two groups of firms are similar in size, age, and other observable characteristics.\(^5\) The difference-in-differences empirical design we employ controls for differences between groups of firms (dividend-paying, share-repurchasing, firms with taxable shareholders, and firms with tax-exempt shareholders) and between time periods (before and after 2003). For example, we use within dividend-paying firm variation by exploiting variation in the share of taxable shareholders, and we balance our sample using entropy weights. Taken together, these tests allow us to isolate the causal impact of the reform on firms’ acquisition decisions.

We find that dividend-paying firms decreased the quantity of acquisitions they undertook in response to the reform. The probability that a dividend-paying firm made an acquisition fell by roughly 17.5 percent after 2003, while we observe almost no decrease for firms that repurchase shares. Similarly, we observe a 29 percent decrease in the number of acquisitions made per year for dividend-paying firms after 2003, and we observe almost no change for firms that repurchase shares. The stark contrast in the change in probability and number of acquisitions between dividend-paying and share-repurchasing firms suggests that other conflating market or macroeconomic factors are unlikely to be able to explain the decrease observed for dividend-paying firms.

We find that dividend-paying firms increased the quality of acquisitions they undertook in response to the reform. In the full sample, the post-acquisition performance of dividend-paying firms increased by 3.4 percentage points after 2003. In the most taxable 50 and 25 percentiles subsamples, the post-acquisition performance of dividend-paying firms increased by 6.9 and 11.1 percentage points, respectively. Using our triple difference specification, we find that the post-acquisition performance of dividend-paying firms with 100 percent taxable shareholders increased by 11.2 percentage points while dividend-paying firms with zero percent taxable shareholders did not experience an increase in performance. Using our entropy balanced specification, the post-acquisition performance of dividend-paying firms with 100 percent taxable shareholders increased by 12.4 percentage points. In each of these specifications using different types of variation and methods, post-acquisition performance increased in the way predicted by the model where firms

\(^5\)We exclude firms that repurchase shares and pay dividends and firms that do neither. The reasons firms choose to distribute earnings in different ways is uncorrelated with their acquisition responses to JGTTTRA (see Denis and Osobov (2008) for our best understanding of why firms pay dividends).
tradeoff dividend payments and acquisitions.

Taken together, this series of evidence supports the model that firms tradeoff dividend payments and acquisitions. In addition, it is difficult to find an alternative mechanism that explains all of this evidence.

The key identifying assumption for our difference-in-differences empirical approach is the common trend assumption. This assumption plausibly holds in our context because our groups of firms look similar on observable characteristics and acquisition behavior of our firm groups look similar before 2003.\(^6\) We perform a battery of tests which lend confidence that this assumption holds. First, we perform a pretrend test and fail to reject that the post-acquisition performance trends are the same for our treatment and control groups. Second, we perform a triple differences analysis that uses within treatment group variation to ensure that our results are not due to differences in trends between our treatment and control firms. Third, we show that the results are consistent with buy-and-hold abnormal returns one month through 24 months after an acquisition. Finally, we find similar and stronger results when we use entropy balancing to match the covariate moments of the treatment and control groups. Taken together, this evidence suggests that our empirical strategy isolates the effect of decreasing the dividend tax rate on the quality and quantity of acquisitions dividend-paying firms undertake.

This evidence adds to a corporate finance literature that aims to understand the frictions that impact corporate investment decisions (Fazzari et al., 1988; Phillips, 1995; Graham, 1996; Kovenock and Phillips, 1997; Kaplan and Zingales, 1997; Graham, 2000; Erickson and Whited, 2000; Alti, 2003; Almeida and Campello, 2007; Giroud and Rauh, 2015). This evidence also adds to a literature that considers how financial frictions, including taxes, affect acquisitions (Jensen and Ruback, 1983; Auerbach and Reishus, 1987; Hayn, 1989; Dai et al., 2008). Most of the literature on tax-related distortions to acquisitions has focused on the ability of acquirers to increase leverage or use a target firm’s net operating losses.\(^7\) We focus on a different, often ignored, tax friction that distorts

\(^{6}\)Our empirical strategy is unable to control for shocks that differentially impact the acquisition behavior of dividend-paying firms with taxable shareholders after 2003 relative to dividend-paying firms with taxable shareholders before 2003 and dividend-paying firms with tax-exempt shareholders and share-repurchase firms before and after 2003. We test for this type of shock before 2003 and find no evidence of the existence of these shocks.\(^{7}\)For example, Hayn (1989) finds that acquisitions of target firms with beneficial tax characteristics, such as net operating losses, led to higher abnormal returns from 1970-1985. However, many of these tax advantages were modified or eliminated in the Tax Reform Act of 1986.
a firm’s tradeoff between dividend payments and acquisitions, first described by Auerbach and Reishus (1987) in a capitalization model.

We also add to a literature that investigates how taxes influence firm decisions, such as how much debt and equity to use, how much to invest, and how much to distribute to shareholders (Gordon and MacKie-Mason, 1990; Mackie-Mason, 1990; Graham, 1996; Shyam-Sunder and Myers, 1999; Fama and French, 1998; Graham, 2000; Graham et al., 2013; Faulkender and Smith, 2016; Doidge and Dyck, 2015). This literature finds evidence that taxes also affect leasing decisions (Graham et al., 1998), pension plans (Black, 1980), and methods of distributing capital (Brav et al., 2005).

Our paper takes the next step in understanding the impacts of JGTRRA. Recent paper have explored the impacts of JGTRRA on firm payout policies (Chetty and Saez, 2005; Brown et al., 2007), ex-dividend returns (Cloyd et al., 2006; Chetty et al., 2007), and firm valuation (Auerbach and Hassett, 2007). From these studies, we have gained several insights. First, the cost of equity capital decreased with the decrease in the dividend and capital gains tax rates (Lang and Shackelford, 2000; Ayers et al., 2002; Dhaliwal et al., 2003, 2005; Blouin et al., 2003; Dhaliwal et al., 2007). Second, total dividend payouts rose by 20 percent after the dividend tax decrease and were concentrated in firms that had large accumulated assets (Chetty and Saez, 2010). Third, Hanlon and Hoopes (2014) provides strong evidence, free of many other confounding factors, that dividend payments do respond to expected individual-level tax changes, using the expected increase in 2010 and 2012 due to the expiration of JGTRRA that never occurred. Fourth, Blouin et al. (2011) find that regular dividends as a percentage of total payouts increased after JGTRRA.

The next natural question in this literature is, how did firms pay for the increase in dividend payments. We provide substantial evidence that one-way firms paid for the increase in dividend payments is through undertaking fewer acquisitions. This suggests that investor-level taxes distort firms' decisions on whether to conduct an acquisition—adding to the deadweight loss caused by

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8 A recent paper by Faulkender and Smith (2016) considers how leverage is impacted by the benefit multinational companies have in deferring taxes, effectively lowering their effective tax rate. Comprehensive surveys of this literature are given by Auerbach (2002) and Graham (2008).

9 Several studies have provided alternative explanations for the increase in dividend payments after 2003. Edgerton (2013) provides convincing evidence that dividends increased because of non-tax concerns because of real estate investment trusts (REITs), which did not receive the dividend tax cut, experienced a similar increase in dividends as corporations. The observed increase could also be due to a change in firm composition (Julio and Ikenberry, 2004) or increased profitability (Floyd et al., 2015).
The paper proceeds as follows. Section 2 provides a simple numerical example of the tax discount and develops our hypotheses. Section 3 provides background on the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA) that lowered the dividend tax rate and provides a detailed description of the data we use. Section 4 describes our empirical strategy and the tests we perform to validate our identifying assumption. Section 5 reports evidence on the change in performance and quantity of acquisitions after the 2003 dividend tax rate decrease. Section 6 concludes.

2 Simple Examples of the Tax Discount

This section presents three simple examples which illustrates the intuition behind the tax discount and develops our hypotheses. The fundamental difference between internal investment and investment through acquisitions is that the expected cash flows of the target firm in an acquisition are currently owned by shareholders that face investor-level taxes on those cash flows. When there is a difference in the dividend and capital gains tax rates, there exists a tax discount for acquisitions because through an acquisition the target firm’s shareholders will be subject to the capital gains tax rather than the dividend tax. Kraakman (1988) and Harris et al. (2001) suggest that this tax discount motivates managers to pursue acquisitions that allow target firm shareholders to “free” their trapped equity.

2.1 Example One: Firms that Pay Dividends

Consider an acquiring firm, denoted Firm 1, purchasing a target firm, denoted Firm 2, with the latter having assets worth $100 in present value before any investor-level taxation. Assume that dividends are taxed at 38.6 percent ($\tau_d$) and capital gains at 20 percent ($\tau_{cg}$), which correspond to

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10 The empirical evidence on the effects of taxation on investment have been mixed (Hall and Jorgenson, 1967; Harberger, 1962; Feldstein, 1970; King, 1977; Auerbach, 1979; Bradford, 1981; Giroud and Rauh, 2015). This literature has been reinvigorated by several recent tax policy changes that have been aimed at increasing investment. A recent paper by Giroud and Rauh (2015) investigates the geographic distortion of taxation. See also Poterba and Summers (1985, 1983b, 1984); Shleifer and Vishny (1986); Poterba et al. (1987); Bagwell and Shoven (1989); Boulder and Summers (1989); Gordon and MacKie-Mason (1990); Poterba (1991); Cummins et al. (1994); Lease et al. (1999); La Porta et al. (2000); Bell and Jenkinson (2002); Graham (2003); Auerbach and Hassett (2003); Poterba (2004); Desai and Dharmapala (2011) and Dharmapala (2009).

11 The difference between the capital gains and dividend tax rates also provides a puzzle as to why firms pay dividends rather than repurchase shares.
the tax rates in the United States in 2002. The acquisition is value maximizing from the perspective of the acquiring firm’s shareholders if the benefits are greater than the costs.

Consider the cost to Firm 1 when purchasing Firm 2. First, determine the lowest price Firm 1 can offer Firm 2’s shareholders. The value of the assets in Firm 2 depend on the dividend tax because eventually profits must be paid as dividends. Therefore the value of the $100 in assets in Firm 2 to its shareholders is $61.40 = (1 − 0.386)$100. The price Firm 1 pays must leave Firm 2’s shareholders at least $61.40 after they pay the capital gains tax from the sale. Thus Firm 1 can pay Firm 2’s shareholders as little as $76.75 = $61.40/(1 − 0.2). Second, instead of acquiring Firm 2, Firm 1 could have used that money to pay a dividend with an after-tax value of $47.1245 = (1 − 0.386) * 76.75. Therefore, the cost of acquiring Firm 2 is $47.1245.

Consider the benefits to Firm 1 of buying Firm 2. Let σ capture the synergies, net of adjustment costs, for Firm 1. Specifically, we assume Firm 1 manages Firm 2’s assets such that before tax the assets are worth $100σ. When σ = 1 there are no synergies and the assets are managed equally well by either firm. When σ > 1 there are positive synergies and the assets are better utilized by Firm 1. When σ < 1 the adjustment costs are greater than the synergies and the assets are better utilized by Firm 2. Therefore, after tax, the assets are worth $61.40σ = (1 − 0.386)$100σ, because the profits are taxed at the dividend tax rate.

The acquisition is value maximizing from the perspective of the acquiring firm’s shareholders if the benefits are greater than the costs, $61.40σ > $47.1245, which occurs when

$$\sigma_{d,2002} \geq \frac{0.7675}{0.2} = \frac{1 − 0.386}{1 − 0.2} = \frac{1 − \tau_d}{1 − \tau_{cg}}.$$

All acquisitions with a synergy parameter less than one are socially inefficient; however, they are value maximizing as long as the synergy parameter is greater than the ratio $(1 − \tau_d)/(1 − \tau_{cg})$. In this example, this implies acquisitions where Firm 1 manages Firm 2’s assets above 76.75 percent efficiency are value maximizing. Thus, when the dividend tax rate is greater than the capital gains tax rate, there is a tax discount and firms accept socially inefficient acquisitions.

Consider how firms’ acquisition behavior changes with the synergy threshold. A higher synergy threshold suggests firms will undertake fewer acquisitions and the marginal acquisition will be of
higher quality.

Now consider how the synergy threshold changes with investor-level tax rates. The previous example shows that with the dividend and capital gains tax rates from 2002, the threshold synergy level is $\sigma_{2002} = 0.7675$. With the dividend and capital gains tax rates from 2003, the threshold synergy level is

$$\sigma_{d,2003} \geq 1 = \frac{1 - 0.15}{1 - 0.15} = \frac{1 - \tau_d}{1 - \tau_{cg}}.$$ 

This leads us to our first two hypotheses,

**H1:** All else equal, the average acquisition dividend-paying firms undertake will be of higher quality after 2003.

**H2:** All else equal, dividend-paying firms will perform fewer acquisitions after 2003.

The tax discount is clarified further by considering firms that repurchase shares or issue equity instead of paying fewer dividends to make an acquisition.

### 2.2 Example Two: Firms that Repurchase Shares

Consider the cost and benefits of making an acquisition when Firm 1 repurchases fewer shares to acquire Firm 2. The benefit of acquiring Firm 2 is the same as before, $61.40\sigma$. The cost of acquiring Firm 2 is fewer share repurchases that have an after tax value of $61.40 = \$76.75(1 - 0.2)$, because share repurchases are taxed at the capital gains tax rate. Acquiring Firm 2 is value maximizing if $61.40\sigma > \$61.40$, which occurs only if socially efficient mergers take place,

$$\sigma_r \geq 1.$$ 

The threshold synergy level for firms that repurchase shares does not depend on investor-level taxes. This implies that their acquisition behavior is unaffected by the tax change in 2003, which makes
them an ideal control group.\textsuperscript{12}

\subsection*{2.3 Example Three: Firms that Issue Equity}

Consider the cost and benefits of making an acquisition when Firm 1 must issue more equity to acquire Firm 2. The benefit of acquiring Firm 2 is the same as before, $61.40\sigma$. The cost of acquiring Firm 2 is issuing more equity at a cost of $76.50. The acquisition is value maximizing if the benefits are larger than the costs, $61.40\sigma > 76.75$, or, equivalently, when

\[ \sigma_{e} \geq 1.25 = \frac{1}{1 - 0.2} = \frac{1}{1 - \tau_{cg}}. \]

For an acquisition to be value-maximizing in this case, Firm 1 must manage Firm 2’s assets at 125 percent efficiency or greater. In this case Firm 1 makes too few acquisitions, in contrast to the case where Firm 1 pays a dividend and makes too many.

The threshold synergy level decreased for firms that issue equity after 2003, when the capital gains tax rate decreased from 20 percent to 15 percent. After 2003, firms that issue equity to make an acquisition performed more acquisitions and the marginal acquisition was of lower quality than before 2003. These changes suggest these firms are not a good control group and they are not used in our empirical analysis.

\subsection*{2.4 Taxable and Tax-exempt Shareholders}

The previous examples have shown that investor-level taxes can distort the acquisitions a firm undertakes. \textbf{H1} suggests that the post-acquisition performance of dividend-paying firms will increase after 2003 when the dividend tax is lower. The tax discount is larger for firms with a higher percentage of taxable shareholders. This implies our third hypothesis.

\textsuperscript{12}Our difference-in-differences specification compares firms that pay dividends with firms that repurchase shares. The examples in Section 2 demonstrate that firms that repurchase shares are a natural control group for firms that pay dividends because they are unaffected by the policy change in 2003. However, this comparison would not be appropriate if the reason firms pay dividends or repurchase shares is dependent on some factor that affects their acquisition behavior and also experiences a change in 2003. Previous research suggests that firms choose different payout methods because of asymmetric information, incomplete contracts, and institutional constraints which are independent of their acquisition behavior (Black and Scholes, 1973, 1974; Fama, 1974; Fama and French, 2001; Fenn and Liang, 2001; Grullon and Michaely, 2002; Allen and Michaely, 2003; Bliss et al., 2015). We also provide a battery of tests that support using firms that repurchase shares as a control group.
If the substitution from acquisitions to dividends due to the dividend tax decrease in 2003 is causing post-acquisition performance of dividend-paying firms to increase after 2003, then the effect should be largest for firms that have a higher percentage of shareholders that are subject to the dividend tax.

**H3:** All else equal, after 2003, the post-acquisition performance of dividend-paying firms will increase more for firms with a higher percentage of taxable shareholders.

Previous studies have suggested that firms may differ in the percentage of shareholders that are subject to the dividend tax, making them more or less sensitive to it. Specifically, Allen et al. (2000) uses the percentage of shares owned by institutions as a measure of firms that are more or less sensitive to the dividend tax because institutions are taxed less heavily and are often exempt from the dividend tax. We test H3 using subsamples of firms with different percentages of taxable shareholders and by using a triple differences specification.

These simple examples demonstrate that the magnitude of the distortion from investor-level taxes can be substantial. The first example demonstrates firms that pay dividends substitute away from acquisitions and toward paying more dividends after 2003 when the dividend tax decreases. The second example demonstrates firms that repurchase shares act as a natural control group because they are unaffected by the policy change in 2003. The third example demonstrates that firms that do not repurchase shares cannot be a control group for firms that pay dividends because they are affected by the policy change in 2003. Finally, the effect of the tax discount demonstrated in the first example should be larger for firms with a higher percentage of taxable shareholders.

3 Background, Data, and Preliminary Evidence

3.1 Background on The Jobs and Growth Tax Relief Reconciliation Act of 2003

Earnings are distributed to shareholders through dividends and share repurchases. While both methods transfer cash from a corporation to its shareholders, they trigger different tax implications. Dividend payments to shareholders trigger an income tax liability for all individual shareholders.
In contrast, when a firm repurchases shares, the owners of the shares repurchased owe taxes on the realized capital gains and, to the extent that the share price increases, the other shareholders will realize more gains and owe taxes on those gains when they sell their shares. In 1982, the Securities and Exchange Commission (SEC) clarified the conditions for distributions to be classified as a share repurchase, which is not subject to dividend taxation, and not a dividend payment (Grullon and Michaely, 2002). This ruling, and the fact that capital gains were taxed less than dividend income led to an increased use of share repurchases as a method of distributing earnings. A number of theories have been proposed to explain why dividend payments persisted after this ruling, given the favorable tax treatment of share repurchases (Allen and Michaely, 2003; Denis and Osobov, 2008).

The Jobs and Growth Tax Relief Reconciliation Act of 2003 in the United States (hereafter JGTRRA) decreased the tax liability of qualified dividend payments and eliminated the differential tax treatment between dividends and share repurchases. Specifically, before the reform, dividends were taxed as ordinary income with a top marginal tax rate of 38.6 percent in 2002, while capital gains were taxed at 20 percent for individuals in the top ordinary income tax bracket. After the reform, individuals in the top ordinary income tax bracket paid the same 15 percent tax on qualified dividends and capital gains, the tax rates differ slightly by tax bracket. This meant that an individual in the top income tax bracket receiving dividend payments in 2002 and 2003 experienced a decrease in their marginal tax rate from 38.6 percent to 15 percent.

13 A dividend is a qualified dividend if 1) it was paid after December 31, 2002, 2) paid by a U.S. corporation or other entity that qualifies for benefits under U.S. tax laws and treaties, and 3) the stock had been held 60 days during the 121-day period that begins 60 days before the ex-dividend date.

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3.2 Data

3.2.1 Acquisitions and Firm Characteristics

To test whether firms substituted away from acquisitions after the reform, we use data on acquisitions from the Bureau Van Dijk Amadeus Zephyr database, with the permission of Zephyr. We restrict the sample window to acquisitions that occur between January 1, 1998, and December 31, 2008, five years before and after the 2003 tax reform. The sample is further restricted in several ways. First, acquisitions made by private companies not listed on the NYSE or NASDAQ are excluded because they do not have stock price data by which to measure performance. Second, to avoid acquisition-type effects, firms that own less than 100 percent of the target firm after the acquisition are excluded. Finally, acquisitions made by firms with more than twenty acquisitions in the sample are excluded.\(^\text{14}\)

We use data from the Center for Research in Security Prices (CRSP) and the Compustat North American Fundamentals Quarterly database to match stock price and financial statement data to acquiring firms; such as dividend payments, share repurchases, assets, sales, cash flows, marginal Q, the Hadlock-Pierce Financial Distress measure (Hadlock and Pierce, 2010), and retained earnings.\(^\text{15}\) These variables control for correlation between acquiring behavior, payout behavior, firm size, financial distress, and productivity. For each acquisition, the characteristics of the acquiring firms are averaged over the two years before the acquisition.

3.2.2 Taxable Shareholders

The impact of the dividend tax decrease in JGTRRA should be the largest for firms with shareholders that are subject to the dividend tax. To identify firms that have a larger percentage of taxable shareholders, we use the level of institutional holdings constructed from the 13f files in the Thomson Reuters Institutional Holdings database. Previous studies have used this variation in institutional investors to identify firms that are more sensitive to dividend tax rates (Allen et al.,

\(^{14}\)The results are robust to setting other limits on the maximum number of mergers per firm. This exclusion limits the effects from overlapping mergers and excludes mostly large banking firms from the sample.

\(^{15}\)Compustat provides data on shares repurchased starting with the first quarter of 2004. The procedure outlined by Stephens and Weisbach (1998), which approximates shares repurchased as the dollar value of decreases in shares outstanding, is used to construct repurchases before 2004. This method is internally valid as it closely approximates repurchase behavior in years when Compustat records actual repurchase data.
3.2.3 Measuring Post-Acquisition Performance

To measure the quality of acquisitions, a firm undertakes, we measure a firm’s performance as the buy-and-hold abnormal returns (BHARs) 24 months after an acquisition. We use the two-year event horizon because synergies produced from acquisitions often take up to two years to become realized. We use BHARs to provide a market valuation of the firm relative to its predicted value in the absence of the acquisition. This measure also allows us to directly compare our results with previous studies documenting the post-merger performance puzzle. There is considerable debate, however, on the appropriate measure of performance (Fama, 1998; Lyon et al., 1999; Kothari and Warner, 2006). Fama (1970) emphasizes all tests that use abnormal returns are also a test of the model producing those abnormal returns, and these models are all incomplete, leading to bad-model problems.

Our empirical strategy mitigates these bad-model problems and controls for the possible (and perhaps likely) misspecification from abnormal returns. Specifically, we use a difference-in-differences approach (discussed in section 4) that nets out performance across firms that pay dividends and firms that repurchase shares and acquisitions made before and after the dividend tax rate decrease in 2003. This approach controls for misspecification of the performance measure and controls for differences (implicit biases) in the performance measure across payout strategies. Therefore, while there may be concerns of bad-model problems generally, in our context, it seems unlikely that our results would be affected because there would have to be a systematic bias between firms with different payout strategies that systematically and differentially changes in 2003.

3.2.4 Descriptive Statistics

Table 1 highlights the similarity of firms that only pay dividends and firms that only repurchase shares. Firms are characterized as dividend-paying firms if they paid a dividend before the acquisition and did not repurchase shares. Similarly, firms are characterized as share repurchasing

Allen et al. (2000) suggests that firms may use dividends to attract institutional investors that face a lower tax burden from these dividends.
firms if they repurchased shares before the acquisition and did not pay a dividend. These dividend-paying and share-repurchasing firms looks similar across all categories. Firms that did not pay dividends or repurchase shares or that did both look substantially different and are excluded from the analysis. The similarity of these groups is one of many pieces of evidence that supports the use of share-repurchasing firms as a control for dividend-paying firms; sections 4.3 and 5.1 provide additional evidence.

To test whether our results are driven by differences between dividend-paying and share-repurchasing firms we perform several other tests. First, we employ a triple differences method separating firms by the percentage of their stock held by institutions—the most taxable firms being those least held by institutions. This method uses variation within dividend-paying firms and within share-repurchasing firms and nets out time variation across dividend-paying firms and share-repurchasing firms. Columns (3) and (4) provide descriptive statistics for the most taxable and least taxable firms within the subset of dividend-paying firms.

Second, we also run specifications using entropy weighting, described more in section 5.3. Columns (5) and (6) provide descriptive statistics for our control variables after entropy weighting techniques have been used to equalize characteristics of treated (acquisitions by dividend-paying firms after 2003) and control acquisitions (acquisitions by dividend-paying firms before 2003 and acquisitions by share-repurchasing firms before and after 2003).

3.3 Preliminary Evidence

3.3.1 Raw Changes in Post-Acquisition Performance

Panel B of Table 1 reports a nonparametric difference-in-differences analysis. This analysis compares the differences in performance of firms that pay dividends before and after the 2003 dividend tax decrease with the differences in performance of firms that repurchase shares. In the full sample (columns 1 and 2), the post-acquisition performance of dividend-paying firms increased 4.8 percentage points after the 2003 dividend tax decrease. In contrast, the post-acquisition performance of share-repurchasing firms increased by only 0.4 percentage points. This suggests that the difference in performance observed for dividend-paying firms is not due to other time-varying
Table 1: Merger Performance Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>Full Sample</th>
<th>Dividend Only</th>
<th>Entropy Weighted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DI</td>
<td>RR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Panel A: Descriptive Statistics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retained Earnings</td>
<td>479.7</td>
<td>336.4</td>
<td>441.0</td>
</tr>
<tr>
<td>(Thousands)</td>
<td>(1548.4)</td>
<td>(3115.0)</td>
<td>(1398.3)</td>
</tr>
<tr>
<td>Total Assets</td>
<td>2625.0</td>
<td>2010.5</td>
<td>2190.5</td>
</tr>
<tr>
<td>(Thousands)</td>
<td>(4172.2)</td>
<td>(3480.3)</td>
<td>(4281.0)</td>
</tr>
<tr>
<td>Cash Flow</td>
<td>0.162</td>
<td>0.230</td>
<td>0.117</td>
</tr>
<tr>
<td>(Thousands)</td>
<td>(0.345)</td>
<td>(0.500)</td>
<td>(0.340)</td>
</tr>
<tr>
<td>Marginal Q</td>
<td>2.200</td>
<td>2.200</td>
<td>2.100</td>
</tr>
<tr>
<td>(1.426)</td>
<td>(1.422)</td>
<td>(1.405)</td>
<td>(1.441)</td>
</tr>
<tr>
<td>(1.18)</td>
<td>(1.21)</td>
<td>(1.11)</td>
<td>(1.20)</td>
</tr>
</tbody>
</table>

Panel B: Nonparametric Difference-in-Differences

<table>
<thead>
<tr>
<th></th>
<th>BHAR Pre 2003</th>
<th>BHAR Post 2003</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.217</td>
<td>-0.185</td>
<td>-0.215</td>
</tr>
<tr>
<td></td>
<td>-0.169</td>
<td>-0.182</td>
<td>-0.156</td>
</tr>
<tr>
<td>Difference</td>
<td>0.048</td>
<td>0.003</td>
<td>0.059</td>
</tr>
</tbody>
</table>

Notes: Panel A provides descriptive statistics and Panel B performs a nonparametric difference-in-differences test. Columns (1) and (2) provide descriptive statistics for the full sample, where an observation is an acquisition. The acquisitions are split according to the payout characteristics of the acquiring firm. Dividend only firms are firms that paid dividends but did not repurchase shares before the acquisition. Repurchase only firms are those firms that repurchased shares but did not pay dividends before the acquisition. Firms that neither paid dividends or repurchased shares or firms that did both are excluded from our sample and look different on observable characteristics. Columns (3) and (4) repeat the analysis for the subset of firms that paid dividends. The most taxable firms, defined as those in the bottom quartile of the institutional holding distribution, are reported in Column (3), and the least taxable firms, defined as those in the top quartile of the institutional holding distribution, are reported in column (4). Columns (5) and (6) provide descriptive statistics for control variables once entropy weighting techniques have been used to equalize characteristics of treated (acquisitions by dividend only firms post 2003) and control acquisitions (acquisitions by dividend only firms prior to 2003 and acquisitions by repurchase only firms during the entire period).
factors, which would have also affected share-repurchasing firms. The nonparametric difference-in-differences estimate in the full sample suggests that post-acquisition performance of dividend-paying firms increased by 3.6 percentage points due to the reform.

Columns (3) and (4) use variation in the institutional holdings of dividend-paying firms to proxy for the level of taxable shareholders. The dividend tax change should affect the most taxable firms more than the least taxable firms. The post-acquisition performance of the most taxable firms increased 5.9 percentage points after the reform. In contrast, the post-acquisition performance of the least taxable firms increased by only 2.9 percentage points after the reform. This variation is within dividend-paying firms and is used in our triple differences specifications.

Columns (5) and (6) use variation across dividend-paying and share-repurchasing firms after they have been weighted to look the same. The post-acquisition performance of the treated group (weighted dividend-paying firms) increased 5.7 percentage points after the reform. In contrast, the post-acquisition performance of the control group (weighted share-repurchase firms) decreased by 0.1 percentage points after the reform.

In all three nonparametric difference-in-differences specifications, we find the post-acquisition performance of dividend-paying firms increased after the reform.

### 3.3.2 Raw Changes in the Quantity of Acquisitions

Figure 1 presents evidence on the differences in the quantity of acquisitions undertaken before and after the reform in 2003. Panel A of Figure 1 states the probability a firm makes an acquisition in a given year for four different groups; dividend-paying firms before and after 2003 and share-repurchasing firms before and after 2003. The probability that a dividend-paying firm made an acquisition fell by roughly 17.5 percent, from 32.5 percent to 26.8 percent, after 2003. In contrast, the probability that a share-repurchasing firm made an acquisition experienced almost no change after 2003.

Panel B reports the number of acquisitions a firm undertakes each year. The number of acquisitions a dividend-paying firm made dropped nearly 29 percent from 0.51 to 0.36 acquisitions per year. In contrast, the number of acquisitions a share-repurchasing firm made stayed nearly constant at 0.41. The evidence in Figure 1 is consistent with firms that paid dividends before 2003
shifting resources away from acquisitions to pay additional dividends after the dividend tax rate decreased.

The raw differences presented in Panel B of Table 1 and Figure 1 are consistent with the hypothesis that dividend taxes distort acquisition behavior. Taken together, it is difficult to find an alternative explanation that reconciles all of these differences. The following section describes our empirical tests, the identifying assumptions, and our tests of those identifying assumptions.

4 Empirical Design

Section 4.1 defines the baseline difference-in-differences empirical specification used to test the hypothesis that the tax discount is empirically large enough to cause distortions in acquisitions. Section 4.2 provides a triple difference empirical specification using variation in institutional holdings. Finally, section 4.3 discusses the key identifying assumption of the difference-in-differences empirical specification.
4.1 Difference-in-Differences (DD) Empirical Specification

The differential impact of the dividend tax reform of 2003 (JGTRRA) across firms with different payout strategies naturally suggests a difference-in-differences (DD) empirical strategy. The policy change affects the acquisition incentives for dividend-paying firms after 2003 but not share-repurchasing firms (see the simple example in section 2).\textsuperscript{17} In addition, share-repurchasing firms resemble dividend-paying firms (as discussed in section 3).\textsuperscript{18} For these reasons, firms that repurchase shares act as a natural control group.

The baseline difference-in-differences empirical specification uses as the dependent variable post-acquisition performance, $P_{i,t}$, measured by the buy-and-hold abnormal return (BHAR) 24 months after an acquisition announcement, where $i$ denotes the acquiring firm and $t$ denotes the year. The specification also controls for differences across firms and years with firm and year fixed effects, $\lambda_t$ and $\eta_i$.\textsuperscript{19} The difference-in-differences (DD) estimate is given by the coefficient on an indicator variable $DD_{i,t}$, which equals one if the acquisition is made by a dividend-paying firm and the acquisition is made after the policy change and zero otherwise, giving the specification,

$$P_{i,t} = \beta_0 + \beta_1 DD_{i,t} + z_{i,t} \gamma + \eta_i + \lambda_t + \varepsilon_{i,t}. \quad (1)$$

The baseline specification includes year and firm fixed effects $\lambda_t$ and other controls for firm characteristics, $z_{i,t}$, described in section 3.2 and 3.2.4. The policy effect is captured by the DD term, $\beta_1$, which estimates the effect of the policy change on the post-acquisition performance of firms that pay dividends. The DD coefficient is predicted to be positive because decreasing the dividend tax creates an incentive for firms that are paying dividends to pay more dividends, do fewer acquisitions, and, as a result, perform higher quality acquisitions on average causing their post-acquisition performance to increase.

\textsuperscript{17} Appendix B provides a full model of acquisition behavior that demonstrates the hypotheses discussed in section 2.

\textsuperscript{18} Firms that pay dividends and repurchase shares are excluded because their value of $\tau_i$ is unclear, and, on average, they are much larger than firms that solely pay dividends or repurchase shares. Firms that do not repurchase shares or pay dividends are excluded because they are generally younger and growing faster than firms that pay out retained earnings to shareholders.

\textsuperscript{19} To include acquisitions in our sample that are made by firms that make only one acquisition, our baseline estimates use an indicator for whether a firm is a dividend-paying firm or not in the place of firm fixed effects.
We address concerns about bias in the estimation of the standard errors in two ways: multi-way clustering and a triple difference (Bertrand et al., 2004). The standard errors in Table 2 are two-way clustered robust standard errors and resemble those in Acemoglu and Pischke (2003) and follow methods presented in Cameron et al. (2011), Petersen (2009), and Thompson (2011).

4.2 Variation In Tax-Exempt Shareholders

The effect of the tax discount on acquisitions should be larger for firms with a higher percentage of taxable shareholders. Therefore, using variation across firms in the percentage of the firm owned by institutions, which are often tax exempt, provides an additional test of the empirical importance of the tax discount. We update the DD specification in two ways to use this additional variation. First, we estimate the DD specification in two subsamples: the 50 and 25 percent of acquisitions done by firms with the highest percent of taxable shareholders (lowest percentage of institutional shareholders). The DD coefficient from these subsamples is predicted to be positive and larger than the coefficient for the full sample.

Second, a triple difference (DDD) empirical specification can be used to capture the heterogeneity in the effect of the tax discount on acquisitions across firms with varying levels of tax-exempt shareholders. The DDD empirical specification interacts the DD indicator with the percentage of the firm held by institutions, $I_{i,t}$, which is a continuous variable, $DDD_{i,t} = DD_{i,t}I_{i,t}$. The DDD specification also includes, as controls in $z_{i,t}$, the interaction between the percentage of the firm held by institutions and an indicator for being a firm that pays dividends and an indicator for being after 2003, giving the specification,

$$P_{i,t} = \beta_0 + \beta_1 DD_{i,t} + \beta_2 DDD_{i,t} + z_{i,t}\gamma + \eta_i + \lambda_t + \varepsilon_{i,t}. \quad (2)$$

The theory predicts the coefficient on the triple interaction, $\beta_2$, to be negative, because the impact of the dividend tax rate decrease is smaller for firms with more tax-exempt shareholders, given by the percentage owned by institutions.

We use the percent of a firm held by institutions instead of the percent taxable shareholders to be able to compare the DD coefficient in the triple difference specification with the other DD
coefficients. Specifically, the policy effect for firms with 100 percent taxable firms (zero percent institutional shareholders) is given by the DD coefficient, $\beta_1$. The DDD coefficient, $\beta_2$, is the difference in policy effects between firms with 100 and zero percent institutional ownership. The triple difference specification provides a particularly strong test of the implications of the model because it uses three layers of variation to isolate the policy effect.

4.3 Identifying Assumption: Common Trends

The key identifying assumption in the difference-in-differences empirical design is that changes in post-acquisition performance by firms that repurchase shares capture the unobserved changes in performance for firms that pay dividends in the absence of the policy change. This common trend assumption is not directly testable across periods with the policy change but can be tested in the years before the policy change. Intuitively, this pretrend test determines whether firms’ performance is significantly affected by year- and firm-group-specific idiosyncratic shocks that could be correlated with the dividend tax policy change. The empirical test regresses performance (BHARs 24 months after an acquisition announcement) on year fixed effects $\lambda_t$ and the interaction between year fixed effects and an indicator variable $d_{iD}^D$ of whether the acquiring firm pays dividends,

$$P_{i,t} = \beta_0 + d_{iD}^D + \lambda_t + \lambda_t d_{iD}^D + \varepsilon_{i,t}. \quad (3)$$

The coefficients on the year fixed effects estimate the common trend among firms that pay dividends and firms that repurchase shares. The coefficients on the year fixed effects interacted with the dividend firm indicator estimate the difference in trend between firms that pay dividends and firms that repurchase shares.

In support of our identifying assumption, we fail to reject the common trend assumption holds in all of our specifications above the 10 percent level. Specifically, we fail to reject the joint F-test that all of the coefficients on the interactions, $d_{iD}^D \lambda_t$, are zero. The p-values for all of our specifications are reported in Section 5.1. In addition to this evidence in support of the identifying assumption, Section 5.3 tests for the sensitivity of this assumption by using entropy weighting to balance the control and treatment groups. These additional tests corroborate the common trend test results.
that our control groups in each specification are valid.

5 Empirical Results

5.1 Merger Performance Analysis

Table 2 reports the impact of lowering the dividend tax rate on the performance of dividend-paying firms after an acquisition, denoted as (DD) and (DDD) and measured as the buy-and-hold abnormal return (BHARs) 24 months after an acquisition. First we report the difference-in-differences specification from equation (1) for the full sample of acquisitions. Column (1) reports that lowering the dividend tax increased post-acquisition performance of dividend-paying firms by 3.4 percentage points. Next we report the difference-in-differences specification for subsamples of firms that have the highest percentage of shareholders that are subject to the dividend tax, determined by having a low percentage of institutional ownership. Columns (2) and (3) provide evidence that the firms with the highest percentage of taxable shareholders were impacted the most. Specifically, there was a 6.9 and 11.1 percentage point increase in post-acquisition performance for dividend-paying firms in the subset of the 50 and 25 percent most taxable firms, respectively.

Finally we use the full sample of firms and the triple difference (DDD) specification in equation (2) to isolate the impact of lowering the dividend tax rate on the post-acquisition performance of firms with shareholders that pay the dividend tax. Column (4) of Table 2 reports the change in post-acquisition performance for dividend-paying firms with different percentages of tax-exempt shareholders; \( \Delta P_{i,t} = 11.2 - (18.2 \times \text{(percent tax-exempt)}) \). Dividend-paying firms with only taxable shareholders, (percent tax-exempt) = 0, experienced an 11.2 percentage point increase in post-acquisition performance after 2003, the DD estimate. Dividend-paying firms with only tax-exempt shareholders, (percent tax-exempt) = 1, did not experience an increase in post-acquisition performance after 2003.

The triple difference estimate has several advantages. First, it provides an estimate focused on the firms that are most impacted by the dividend tax rate decrease. Second, it provides a third level of controls. The difference-in-differences estimate controls for unobservable level differences between firms that pay dividends and repurchase shares and between post-acquisition performance
Table 2: Merger Performance Analysis

<table>
<thead>
<tr>
<th>Specification</th>
<th>24 Month BHARs</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DD (1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Low Tax $\times$ DIV Firm (DD)</td>
<td>0.034*</td>
<td>0.069**</td>
<td>0.111**</td>
<td>0.112**</td>
</tr>
<tr>
<td></td>
<td>(1.949)</td>
<td>(2.944)</td>
<td>(5.117)</td>
<td>(5.592)</td>
</tr>
<tr>
<td>Low Tax $\times$ DIV Firm $\times$ Exempt% (DDD)</td>
<td>-0.182**</td>
<td></td>
<td></td>
<td>(7.400)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Full Sample</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>Most Taxable 50%</strong></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Most Taxable 25%</strong></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PreTrend F-Test</strong></td>
<td>0.241</td>
<td>0.128</td>
<td>0.749</td>
<td>0.268</td>
</tr>
<tr>
<td><strong>Adj. R-Square</strong></td>
<td>0.168</td>
<td>0.176</td>
<td>0.208</td>
<td>0.137</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>2,634</td>
<td>1,139</td>
<td>547</td>
<td>2,103</td>
</tr>
</tbody>
</table>

Notes: The dependent variable in all specifications is the 24-month buy-and-hold abnormal return. Specifications (1)–(3) present coefficients from the DD model (equation (1)). Specification (4) presents coefficients from the DDD model (equation (2)). Specifications in Columns (1) and (4) estimate coefficients using the full sample. Specification (2) limits the analysis to mergers performed by firms in the bottom half of the tax exempt distribution. Specification (3) limits the analysis to mergers performed by firms in the bottom quartile of the tax exempt distribution. All specifications include year fixed effects as well as firm level controls for marginal Q, financial distress, total assets, retained earnings, and cash flow. Standard errors in all specifications are two-way clustered by firm and year. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *. Before and after 2003. The triple difference estimate also controls for unobservable level differences between firms with different percentages of taxable shareholders within dividend-paying and share-repurchasing firms.

For each specification in Table 2, we report a test of the identifying assumption that the pretrends of the groups are the same. We fail to reject the null in all specifications that the pretrends are the same. Specifically, we fail to reject at the 24 percent level in the full sample and the 75 percent level in the 25 percent most taxable subsample. We provide additional robustness tests using entropy weighting in section 5.3. Taken together we provide a battery of evidence that our estimates isolate the impact of lowering the dividend tax rate on post-acquisition performance.
To put the DDD estimates in context, consider the magnitude of the change in performance predicted by the model with a simple uniform distribution of synergy levels between \([0, x]\). The average synergy level of an acquisition is given by \((x + \bar{\sigma})/2\), where \(\bar{\sigma}\) is the lowest synergy acquisition a firm is willing to make. If the threshold synergy level changes, the average synergy level of an acquisition will change by, \((x + \bar{\sigma}_1)/2 - (x + \bar{\sigma}_2)/2 = (\bar{\sigma}_1 - \bar{\sigma}_2)/2\). The model using the thresholds from the simple example in section 2 and the tax rates before and after 2003 predicts a change in average performance of

\[
\left(\frac{1 - \tau_{d,2003}}{1 - \tau_{d,2002}} - \frac{1 - \tau_{d,2002}}{1 - \tau_{d,2002}}\right)/2 = \left(1 - \frac{1 - 0.386}{1 - 0.2}\right)/2 = 0.11625.
\]

The model predicts that this change in synergy levels in a simple model, where acquisition opportunities are uniformly distributed, would lead to an increase of 11.625 percentage points in post-acquisition performance. This calculation is based on fully taxable shareholders and is comparable, and remarkably similar, to the 11.208 DD estimate in the triple difference specification reported in Table 2.

### 5.2 Graphical Analysis

Panels A and B of Figure 2 present a graphical implementation of the DD research design with the outcome variable evolving over the 24 months after an acquisition. Panel A demonstrates the post-acquisition performance of dividend-paying firms increased after 2003. In contrast, Panel B demonstrates the post-acquisition performance of firms that repurchase shares remained the same or decreased after 2003. The patterns in Panels A and B are consistent for each month between one and 24 months after an acquisition.

Panels A–D of Figure 3 present a graphical implementation of the DDD research design with the outcome variable evolving over the 24 months after an acquisition. Figure 3 graphs the performance of dividend-paying firms (Panels A and C) and share-repurchasing firms (Panels B and D). Panels A and B graph firms with a high percentage of taxable shareholders and Panels C and D graph firms with a high percentage of tax-exempt shareholders. Comparing these panels demonstrates that dividend-paying firms with taxable shareholders (Panel A) experience the largest increase in
Notes: Figure 2 presents a graphical interpretation of the DD merger performance analysis. Each panel presents BHARs averaged over mergers performed prior to and after the 2003 tax rate decreases for groups of firms. Other determinants of abnormal returns are controlled for in the following manner: for each month post merger, the BHAR is regressed on controls for marginal Q, cash flow, assets, retained earnings, and financial constraint. The residuals are then averaged across groups and by time period. Mean residuals are added to population averages in each post merger month. All means are count weighted.

performance after the policy change. The other groups, depicted in Panels B–D, act as placebo tests and control for other possible factors that may affect performance differentially before and after 2003. In contrast to Panel A, these panels demonstrate that the average performance before and after 2003 is similar, or slightly better before 2003, for all months after an acquisition. This analysis reinforces the evidence in Table 2 that, in response to the dividend tax decrease, firms that paid a dividend and had taxable shareholders undertook higher quality acquisitions.
Figure 3: Post-Acquisition Performance With Tax-Exempt Variation

(a) Dividend and Taxable Firms

(b) Repurchase and Taxable Firms

(c) Dividend and Tax-Exempt Firms

(d) Repurchase and Tax-Exempt Firms

Notes: Figure 3 graphs the evolution of buy-and-hold abnormal returns (BHARs) for the twenty-four months after an acquisition is completed. Each panel presents BHARs averaged over mergers performed prior to and after the 2003 tax rate decreases for groups of firms. Other determinants of abnormal returns are controlled for in the following manner: for each month post merger, the BHAR is regressed on controls for marginal Q, cash flow, assets, retained earnings, and financial constraint. The residuals are then averaged across groups and by time period. Mean residuals are added to population averages in each post merger month. All means are count weighted.
5.3 Robustness

Our estimation strategy relies on the assumption that firms that repurchase shares are a valid control for firms that pay dividends in terms of acquisition behavior and performance. In section 5.1 we provide evidence that supports the validity of this assumption through pretrend tests, described in section 4.3. We further test the sensitivity of our results to this assumption by employing entropy weighting, which is a generalized version of propensity score weighting that balances treatment and control groups based on a set of sample moments, first described by Hainmueller (2012). Columns (5) and (6) in Table 1 provide descriptive statistics for control variables after entropy weighting techniques have been used to equalize characteristics of treated (acquisitions by dividend-paying firms after 2003) and control acquisitions (acquisitions by dividend-paying firms before 2003 and acquisitions by share-repurchasing firms before and after 2003).

The estimates reported in Table 3 provide empirical evidence of the effect of lowering the dividend tax rate on post-acquisition performance when control groups have been weighted to look similar to the treated group. The DD estimate in the 25 percent most taxable subset of firms is 11.1 percentage points for the baseline estimate and 14.5 percentage points for the entropy weighted estimate. Similarly, the DD estimate in the triple difference specification is 11.2 percentage points for the baseline estimate and 12.4 percentage points for the entropy weighted estimate, both statistically significant at the 5 percent level. These estimates provide additional evidence that the decrease in dividend tax rate had a positive impact on post-acquisition performance for firms that paid a dividend, and that the baseline estimates may understate the impact.
Table 3: Entropy Weighted Merger Performance Analysis

<table>
<thead>
<tr>
<th>Specification</th>
<th>DD 1</th>
<th>DD 2</th>
<th>DD 3</th>
<th>DDD 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Tax × DIV Firm (DD)</td>
<td>0.037</td>
<td>0.097***</td>
<td>0.145***</td>
<td>0.124**</td>
</tr>
<tr>
<td></td>
<td>(0.022)</td>
<td>(0.030)</td>
<td>(0.049)</td>
<td>(0.061)</td>
</tr>
<tr>
<td>Low Tax × DIV Firm × Exempt% (DDD)</td>
<td>-0.201**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.092)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Full Sample | ✓   | ✓   |       |
| Most Taxable 50% |       | ✓   |       |
| Most Taxable 25% |       |       | ✓   |

| Adjusted R-Square | 0.072 | 0.104 | 0.115 | 0.102 |
| Observations      | 2,326 | 1,139 | 547   | 2,103 |

Notes: The dependent variable in all specifications is the 24-month buy-and-hold abnormal return. Specifications (1)–(3) present coefficients from the DD model (equation (1)). Specification (4) presents coefficients from the DDD model (equation (2)). Specifications in Columns (1) and (4) estimate coefficients using the full sample. Specification (2) limits the analysis to mergers performed by firms in the bottom half of the tax exempt distribution. Specification (3) limits the analysis to mergers performed by firms in the bottom quartile of the tax exempt distribution. All specifications include year fixed effects. Observations in all specifications are entropy weighted to make control mergers similar to treatment mergers in terms of observable characteristics (Hainmueller, 2012). Standard errors in all specifications are two-way clustered by firm and year. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *. 
5.4 Merger Quantity Analysis

This far our analysis has found support for H1 and H3, which focus on merger quality. We now turn to evidence using the quantity of acquisitions firms undertake to provide further supporting evidence that investor-level taxes distort acquisition decisions.

This section reports two measures of changes in the quantity of mergers a firm undertakes after the dividend tax decreases in 2003. The first measure predicts whether a firm will make an acquisition in a given year. The second measure predicts the average number of acquisitions a firm will undertake. Both measures are conditioned on the dividend tax rate, whether the firm redistributes retained earnings through share repurchases or dividends, and other control variables.

Table 4 reports the difference-in-differences coefficients. Specifications (2) and (5) restrict the sample to firms that make more than one acquisition. Specifications (3) and (6) restrict the sample to firms that make more than one acquisition and have an above median percentage of taxable shareholders. Across all specifications, the DD estimate is negative and statistically significant suggesting that firms that paid a dividend were less likely to make an acquisition (specifications 1–3) and on average made fewer acquisitions (specifications 4–6) than firms that repurchased shares.
Table 4: DD Merger Quantity Analysis

<table>
<thead>
<tr>
<th>Specification</th>
<th>Merger Probability</th>
<th>Mergers per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Low Tax ×</td>
<td>-0.024**</td>
<td>-0.044***</td>
</tr>
<tr>
<td>Div Firm (DD)</td>
<td>(0.011)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>≥ 1 Merger</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Most Taxable</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

R-Squared: 0.006 0.016 0.018 0.007 0.023 0.018
Observations: 37,498 16,251 1,605 37,498 16,251 1,605

Notes: Table 4 presents results from the Merger Activity analysis. Specifications (1) through (6) present coefficients from DD specifications as in equation (1). In Specifications (1)–(3), the dependent variable is a firm-year indicator that is equal to 1 for years in which the firms performed a merger and 0 in years when no merger was performed. In Specifications (4)–(6), the dependent variable is the number of mergers performed by each firm in each year. All specifications in include controls for assets, cash, sales, retained earnings, and book-to-market as well as firm and year fixed effects. Standard errors are reported in parentheses and are two-way clustered at the acquiring firm and year level and are robust to heteroskedasticity. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *.

6 Conclusion

This paper provides new insights into firms’ decision on whether to pay dividends to shareholders or increase investment through acquisitions. We demonstrate that investor-level taxes can distort the tradeoff between dividend payments and acquisitions. This implies that investor-level taxes could cause firms to undertake marginal acquisitions, creating deadweight loss in the economy.

Using the quasi-natural experiment created by the Jobs and Growth Tax Relief Reconciliation Act of 2003, we test several implications of the tradeoff between dividend payments and acquisitions. This reform provides a unique opportunity because it substantially lowered the dividend tax rate and set the capital gains and dividend tax rates equal. To control for conflating macro factors, we exploit variation in how firms distribute retained earnings and the share of investors that are tax-exempt. This allows us to isolate the causal impact of the reform on firms’ acquisition decisions.

Through a series of tests, we a battery of evidence supporting our model where firms tradeoff dividend payments and acquisitions. First, after the reform, the probability a dividend-paying firm
makes an acquisition decreases by 16 to 18 percent. Second, the number of acquisitions a dividend-paying firm made dropped nearly 29 percent per year after 2003. In contrast, the probability and the number of acquisitions a share-repurchasing firm made stayed nearly constant before and after 2003. Third, we consistently find that post-acquisition performance of taxable dividend-paying firms increased by 11 to 13 percentage points across a series of specifications.

The empirical findings in this paper may also help to explain, at least in part, two other puzzles in corporate finance: (1) the poor post-merger performance of acquiring firms, and (2) the uptick in dividend payments after 2003.

A series of prominent studies have shown that the average firm underperforms by nearly 19 percent after an acquisition (Franks et al., 1991; Agrawal and Madelker, 1990; Agrawal et al., 1992; Agrawal and Jaffee, 2000; Loughran and Vijh, 1997; Myers and Majluf, 1984; Gregory, 1997). Our results indicate that lowering the dividend tax in 2003 improved the post-acquisition performance of dividend-paying firms by roughly 11 percentage points. Given that roughly 52 percent of acquisitions are made by firms that pay dividends, the tax discount could explain approximately five percentage points or 25 percent of the post-merger performance puzzle before 2003.

Our findings also provide insights into the observed increase in dividend payments after the reform. Our results suggest that firms substituted away from acquisitions to pay for increased dividend payments after the dividend tax rate was reduced in 2003. This implies that investor-level taxes distort acquisition decisions, creating deadweight loss in the economy.

In sum, this paper provides evidence that firms substitute between dividend payments and acquisitions and that this tradeoff is distorted by investor-level taxes. The evidence from this mechanism is consistent with and may, in fact, partially explain two empirical trends that have not yet been fully explained.
References


Appendix A  Additional Empirical Evidence

Appendix A.1  Performance by Method of Payment

There is a large literature that considers misvaluation of acquisitions due to payment methods (Dong et al., 2006; Martin, 1996; Rhodes-Kropf and Viswanathan, 2004; Rhodes-Kropf et al., 2005; Shleifer and Vishny, 2003). To investigate how payment method and the tax discount interact, we run our baseline estimates using different subsamples based on method of payment and size. Column (1) in Table 5 runs the baseline estimates in the sample of firms we have payment method data on. Column (2) runs the estimate for non-cash deals. Columns 3–5 run the estimates for acquisitions paid for with cash broken into all cash deals (Column 3), large cash deals (Column 4), and small cash deals (Column 5).

If there is a substitution from marginal acquisitions to dividend payments after 2003, then we would expect a positive and larger DD estimate for acquisitions paid for with cash and larger cash deals. Table 5 provides some evidence of the interaction between the method of payment and the tax discount. In particular, the DD estimate is smaller in the non-cash deals than the cash deals, Columns (2) and (3), and the DD is larger for the large cash deals relative to the small cash deals, Columns (4) and (5). However, none of these estimates are statistically different from zero and we fail to reject that the coefficients in Columns (2)–(5) are the same.

Appendix A.2  Monitoring and Acquisition Behavior

The model and the empirical evidence suggest the heterogeneity in returns before and after 2003 is due to changes in the dividend tax rate. This section tests an alternative hypothesis that the heterogeneity is due to changes in monitoring. Intuitively, firms that are more heavily monitored should undertake better acquisitions. If the decrease in the dividend tax rate caused dividend payers to be more heavily monitored, this could explain the results presented in the paper. To test this hypothesis, this section uses variation across firms in the percentage of the firm owned by the largest institutional shareholders, which have the most incentive to monitor the firm.

The empirical specifications reported in Table 6 resemble those in Table 2, except Table 6 splits the data based on firms that have a higher percentage owned by their largest investors. If monitoring explains the empirical results, we would expect the specifications in Table 6 to resemble the results in Table 2. In contrast, the estimates in Columns (2), (3), and (4) have the opposite sign as the benchmark model, and the estimate in Column (1) is not statistically significant. These empirical results are inconsistent with the shareholder monitoring model but are consistent with the tax mechanism.
Table 5: Performance Analysis by Payment Method and Size

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>24 Month Buy-and-Hold Abnormal Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payment Type</td>
<td>All</td>
</tr>
<tr>
<td>Size</td>
<td>(1)</td>
</tr>
<tr>
<td>Low Tax × DIV Firm (DD)</td>
<td>2.170</td>
</tr>
<tr>
<td></td>
<td>(2.058)</td>
</tr>
<tr>
<td>Equality Test</td>
<td>P = 0.369</td>
</tr>
<tr>
<td>Adj. R-Square</td>
<td>0.197</td>
</tr>
<tr>
<td>Observations</td>
<td>1,459</td>
</tr>
</tbody>
</table>

Notes: Table 5 presents DD model estimates from subsamples of mergers based on merger payment and size characteristics. The dependent variable in all of the regressions is the buy-and-hold abnormal return twenty-four months after an acquisition. Specification (1) focuses on all mergers for which payout information is available. The subsample in specification (2) are all non-cash mergers. Specification (3) presents results for all cash mergers. Specification (4) focuses on all large cash mergers while specification (5) focuses on all small cash mergers. Here, large and small mergers are those with above/below median values of deal value divided by the acquiring firm’s assets. The equality test measures whether the DD coefficient on the interaction (Low Tax × DIV Firm) is different across the largest institutional holdings subsamples. All specifications include controls for marginal Q, financial distress, total assets, retained earnings, cash flow, and year fixed effects. Standard errors are reported in parenthesis and are clustered at the acquiring firm and year level and are robust to heteroskedasticity. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *. 
Table 6: Merger Performance Analysis; Monitoring Mechanism

<table>
<thead>
<tr>
<th></th>
<th>24 Month Buy-and-Hold Abnormal Return</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large Shareholder Sample</td>
<td>50% Largest (1)</td>
<td>50% Smallest (2)</td>
<td>25% Largest (3)</td>
</tr>
<tr>
<td>DIV Firm</td>
<td></td>
<td>-4.473 (2.887)</td>
<td>0.854 (1.960)</td>
<td>0.787 (4.296)</td>
</tr>
<tr>
<td>Low Tax X DIV Firm</td>
<td></td>
<td>1.464 (3.332)</td>
<td>3.352 (2.619)</td>
<td>-1.896 (4.810)</td>
</tr>
</tbody>
</table>

Equality Test

<table>
<thead>
<tr>
<th></th>
<th>P = 0.209</th>
<th>P = 0.129</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adj. R-Square</td>
<td>0.094</td>
<td>0.180</td>
</tr>
<tr>
<td>Observations</td>
<td>1,134</td>
<td>1,192</td>
</tr>
</tbody>
</table>

Notes: Table 6 presents coefficients from DD specifications where samples are according to the percentiles of largest single institutional shareholder. The dependent variable in all of the regressions is the buy-and-hold abnormal return 24 months after an acquisition. The equality test measures whether the DD coefficient on the interaction (Low Tax × DIV Firm) is different across the largest institutional holdings subsamples. All specifications include controls for marginal Q, financial distress, total assets, retained earnings, cash flow, and year fixed effects. Standard errors are reported in parenthesis and are robust to heteroskedasticity. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *. 
Appendix B  Model

This section uses a neoclassical two-period model to show how the tax discount generated by the differential tax treatment of dividends and capital gains may induce value maximizing, but socially inefficient, acquisitions.

Appendix B.1 Shareholder Decisions

Consider a single firm, denoted Firm 1, with one shareholder. At the beginning of period 1, Firm 1 has an opportunity to acquire a randomly selected target firm, owned by one shareholder, denoted Firm 2. The acquisition is characterized by the target firm’s retained earnings, $C$, production technology, $g(\cdot)$, and a synergy parameter, $\sigma \in [0, \infty)$. Firm 1’s value of Firm 2’s assets is $\sigma(g(C)+C)$, where the synergy parameter captures the ability of Firm 1 to manage Firm 2’s assets. If $\sigma = 1$, then Firm 1 manages Firm 2’s assets as well as Firm 2. However, if $\sigma > 1$ (conversely $\sigma < 1$), then Firm 1 manages Firm 2’s assets better (worse) than Firm 2, increasing (destroying) social benefit.

Given the acquisition opportunity, $(C, g(\cdot), \sigma)$, Firm 1 decides whether to make the acquisition, $Y = 1$, or not, $Y = 0$. Whether taxation creates a distortion in acquisition behavior depends on whether firms have an incentive to make acquisitions that are socially inefficient ($\sigma < 1$).

Firm 1 begins with retained earnings, $X$. In period 1, Firm 1 decides the amount of retained earnings to distribute ($D \geq 0$) and the amount of equity ($E \geq 0$) to issue. Earnings can be distributed in one of two ways: through dividend payments, which are taxed at the dividend tax rate $\tau_d$, or through share repurchases, which are taxed at the capital gains tax rate $\tau_{cg}$. We consider these cases separately. In period 2, Firm 1’s distribution and equity issuance choices implicitly define its level of investment for the next period, $I = X + E - D$.

In period 2, investment generates net profits $f(I)$, where $f(\cdot)$ is a strictly concave function. In addition to equity, shareholders may hold government bonds with an untaxed rate of return of $r > 0$. At the end of period 2, Firm 1 liquidates, returning its principle and profits, which are taxed at the dividend tax rate $\tau_d$, to shareholders.

Appendix B.2 Shareholder Payoffs

If Firm 1 does not make an acquisition, $Y = 0$, its value depends on its choices of distributions and equity $D_0$ and $E_0$,

$$V_0 = (1 - \tau_i)D_0 - E_0 + \frac{(1 - \tau_d)[f(X + E_0 - D_0) + X - D_0] + E_0}{1 + r},$$

where $\tau_i = \tau_d$ if the firm distributes retained earnings through dividends and $\tau_i = \tau_{cg}$ if the firm distributes retained earnings through share repurchases.

---

20 In the model, firms would always choose to distribute retained earnings through share repurchases rather than dividends. However, dividends are frequently observed for numerous reasons including tax rules that tax share repurchases as dividend payments if they resemble dividend payments. Both cases are considered separately.

21 The net profits function is defined as $f(I) = F(I) - \delta I$, where $F(I)$ is the gross production function, which includes the depreciation of capital used for production. The functional form of the net profits function is left general in the text of the paper; however, a parametric example where $f(I) = \frac{1}{1+e} AI + e$ can be used.

22 The analysis abstracts from general equilibrium effects on the rate of return to government bonds by assuming it is exogenous to the model.
If Firm 1 does make an acquisition, \( Y = 1 \), its value depends on the acquisition value \( \sigma (g(C) + C) \) and the amount it pays Firm 2’s shareholder, defined as \( M \). The market for acquisitions is assumed to be competitive such that Firm 2’s shareholder is indifferent between selling the firm and receiving \((1 - \tau_{cg})M \) and keeping the firm and receiving the principle and profits net the dividend tax when the firm liquidates in the second period. The cost of the acquisition is therefore given by

\[
M = \frac{1 - \tau_d}{1 - \tau_{cg}} \frac{g(C) + C}{1 + r}. \tag{5}
\]

The value of the firm when an acquisition is made is

\[
V_1 = (1 - \tau_i)D_1 - E_1 + \frac{(1 - \tau_d)[f(I) + \sigma(g(C) + C) + I - E_1] + E_1}{1 + r}, \tag{6}
\]

which includes the assets of the target firm and the updated levels of equity and distributions. Comparing equations (4) and (6) reveals that the equilibrium level of investment, \( I \), is the same regardless of the acquisition decision. Therefore, Firm 1 can issue more equity \( (E_1 = E_0 + M) \), make fewer distributions \( (D_1 = D_0 - M) \), or do some of both \( (D_0 > D_1 \text{ and } E_1 > E_0) \) to pay for the acquisition.

### Appendix B.3 Equilibrium Behavior

This section derives the equilibrium behavior of the firm. An equilibrium is characterized by a set \((E^*, D^*, Y^*)\), Firm 1’s choices of equity issuances, distribution payments, and acquisition decision. The analysis focuses on a subset of illustrative cases.

The analysis focuses on the cases in which Firm 1 has has scarce cash \(((1 - \tau_i)f'(X) > r)\) and issues equity or has an abundance of cash \((f'(X - M) < r)\) and distributes earnings. Optimally a firm will never simultaneously issue equity and distribute earnings because, in this case, the firm’s value could be increased by reducing both equity and distributions by \$1\, lowering its tax bill by \$\tau_d r / (1 + r)\.

The equilibrium levels of equity issuances and distribution payments are derived from the first order conditions of equations (4) and (6). When Firm 1 has an abundance of cash, it distributes earnings such that \( D_1^* = D_0^* - M > 0 \). When Firm 1 has scarce cash, it issues equity such that \( E_1^* = E_0^* + M > 0 \). The equilibrium level of investment is greater when Firm 1 has an abundance of cash because the internal cost of capital is lower. However, if the firm has an abundance of cash, the equilibrium level of investment is undistorted by the distribution tax rate.

In equilibrium, the firm accepts an acquisition opportunity if the value of the firm with the acquisition, given in equation (6), is greater than the value of the firm without the acquisition, given in equation (4). The difference in the value of the firm, with and without an acquisition, can be written as

\[
V_1 - V_0 = \begin{cases} 
(1 - \tau_{cg})\sigma M - (1 - \tau_i)M, & \text{if } D_1 > 0 \text{ and } E_1 = 0 \\
(1 - \tau_{cg})\sigma M - (1 - \tau_d / (1 + r))M, & \text{if } E_1 > 0 \text{ and } D_1 = 0.
\end{cases} \tag{7}
\]

\(^{23}\)The assumption that synergies do not affect the level of investment in the firm does not fundamentally affect the results.

\(^{24}\)The assumption that the market for acquisitions is competitive does not affect the results.

\(^{25}\)Investment does not change with the acquisition by construction. The results are robust to the case where synergies augment Firm 1’s technology, causing equilibrium investment levels to differ with acquisition behavior.
The benefit of an acquisition is the value of the assets and synergy net of taxes, given by the first term \((1 - \tau_{cg})\sigma M\). The cost of the acquisition differs based on whether the firm distributes retained earnings through dividend payments \((D_1 > 0 \text{ and } \tau_i = \tau_d)\), distributes retained earnings through repurchasing shares \((D_1 > 0 \text{ and } \tau_i = \tau_{cg})\), or issues equity \(E_1 > 0\). The cost of the acquisition, if the firm distributes earnings, is \(M\) forgone distributions in the first stage, with an after-tax value of \((1 - \tau_i)M\). The cost of the acquisition, if the firm issues equity, is the opportunity cost of the equity, \((1 - \tau_d/(1 + r))M\). These differences in costs lead to differences in the set of acquisitions Firm 1 accepts, characterized by a threshold synergy level \(\sigma^*\).

The threshold synergy value is determined by the values of \(\sigma\) such that the difference in firm values, given in equation (7), are greater than zero

\[
\sigma^* = \begin{cases} 
\frac{1 - \tau_i}{1 - \tau_{cg}}, & \text{if } D_1 > 0 \text{ and } E_1 = 0 \\
1, & \text{if } E_1 > 0 \text{ and } D_1 = 0.
\end{cases}
\]  

Firm 1 is said to over-acquire (respectively under-acquires) if \(\sigma^* < 1\) (respectively \(\sigma^* > 1\)). Firm 1 is said to acquire efficiently if \(\sigma^* = 1\).

**PROPOSITION 1** When Firm 1 has limited cash (e.g., \(r < f'(X)\)) it under-acquires. In contrast, when Firm 1 has abundant cash (e.g., \(r > (1 - \tau)f'(X - M)\)), it over-acquires if the tax rate on distributions is greater than the capital gains tax rate (e.g., dividend payments where \(\tau_i = \tau_d > \tau_{cg}\)) and acquires efficiently if the tax rate on distributions equals the capital gains tax rate (e.g., share repurchases \(\tau_i = \tau_{cg}\)).

**PROOF:**

\[
\begin{align*}
\tau_i > \tau_{cg} & \Rightarrow 1 - \tau_{cg} > 1 - \tau_i \Rightarrow 1 > \frac{1 - \tau_i}{1 - \tau_{cg}} = \sigma^* \\
\tau_i = \tau_{cg} & \Rightarrow 1 - \tau_{cg} = 1 - \tau_i \Rightarrow 1 = \frac{1 - \tau_i}{1 - \tau_{cg}} = \sigma^* \\
0 < \tau_{cg} & \Rightarrow 1 - \tau_{cg} < 1 \Rightarrow 1 < \frac{1}{1 - \tau_{cg}} = \sigma^* \quad \blacksquare
\end{align*}
\]

Proposition 1 provides two testable implications. First, the model predicts in response to the dividend tax decrease in 2003 that firms should make fewer acquisitions and increase their dividend payments. Second, the model predicts firms that pay dividends accepted lower quality acquisitions before 2003.
### Table 1: Merger Performance Descriptive Statistics

<table>
<thead>
<tr>
<th>Sample</th>
<th>Full Sample</th>
<th>Dividend Only</th>
<th>Entropy Weighted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Dividend Only</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repurchase</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Retained Earnings</td>
<td>479.7</td>
<td>336.4</td>
<td>441.0</td>
</tr>
<tr>
<td>(Thousands)</td>
<td>(1548.4)</td>
<td>(3115.0)</td>
<td>(1398.3)</td>
</tr>
<tr>
<td>Total Assets</td>
<td>2625.0</td>
<td>2010.5</td>
<td>2190.5</td>
</tr>
<tr>
<td>(Thousands)</td>
<td>(4172.2)</td>
<td>(3480.3)</td>
<td>(4281.0)</td>
</tr>
<tr>
<td>Cash Flow</td>
<td>0.162</td>
<td>0.230</td>
<td>0.117</td>
</tr>
<tr>
<td>(Thousands)</td>
<td>(0.345)</td>
<td>(0.500)</td>
<td>(0.340)</td>
</tr>
<tr>
<td>Marginal Q</td>
<td>2.200</td>
<td>2.200</td>
<td>2.100</td>
</tr>
<tr>
<td>(Thousands)</td>
<td>(1.426)</td>
<td>(1.422)</td>
<td>(1.405)</td>
</tr>
<tr>
<td>Financial Distress</td>
<td>-5.10</td>
<td>-4.90</td>
<td>-4.90</td>
</tr>
<tr>
<td></td>
<td>(1.18)</td>
<td>(1.21)</td>
<td>(1.11)</td>
</tr>
<tr>
<td>BHAR Pre 2003</td>
<td>-0.217</td>
<td>-0.185</td>
<td>-0.215</td>
</tr>
<tr>
<td>BHAR Post 2003</td>
<td>-0.169</td>
<td>-0.182</td>
<td>-0.156</td>
</tr>
<tr>
<td>Difference</td>
<td>0.048</td>
<td>0.003</td>
<td>0.059</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.029</td>
</tr>
</tbody>
</table>

**Panel A: Descriptive Statistics**

Columns (1) and (2) provide descriptive statistics for the full sample, where an observation is an acquisition. The acquisitions are split according to the payout characteristics of the acquiring firm. Dividend only firms are firms that paid dividends but did not repurchase shares before the acquisition. Repurchase only firms are those firms that repurchased shares but did not pay dividends before the acquisition. Firms that neither paid dividends or repurchased shares or firms that did both are excluded from our sample and look different on observable characteristics. Columns (3) and (4) repeat the analysis for the subset of firms that paid dividends. The most taxable firms, defined as those in the bottom quartile of the institutional holding distribution, are reported in Column (3), and the least taxable firms, defined as those in the top quartile of the institutional holding distribution, are reported in column (4). Columns (5) and (6) provide descriptive statistics for control variables once entropy weighting techniques have been used to equalize characteristics of treated (acquisitions by dividend only firms post 2003) and control acquisitions (acquisitions by dividend only firms prior to 2003 and acquisitions by repurchase only firms during the entire period).

Notes: Panel A provides descriptive statistics and Panel B performs a nonparametric difference-in-differences test.
Table 2: Merger Performance Analysis

\[ P_{i,t} = \beta_0 + \beta_1 DD_{i,t} + z_{i,t} \gamma + \eta_i + \lambda_t + \varepsilon_{i,t} \]

\[ P_{t,t} = \beta_0 + \beta_1 DD_{i,t} + \beta_2 DDD_{i,t} + z_{i,t} \gamma + \eta_i + \lambda_t + \varepsilon_{i,t} \]

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>24 Month BHARs</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DD</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>LOW TAX × DIV FIRM (DD)</td>
<td>0.034*</td>
<td>0.069**</td>
<td>0.111**</td>
<td>0.112**</td>
</tr>
<tr>
<td></td>
<td>(1.949)</td>
<td>(2.944)</td>
<td>(5.117)</td>
<td>(5.592)</td>
</tr>
<tr>
<td>LOW TAX × DIV FIRM × EXEMPT% (DDD)</td>
<td>-0.182**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(7.400)</td>
</tr>
<tr>
<td>FULL SAMPLE</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>MOST TAXABLE 50%</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOST TAXABLE 25%</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>PRETREND F-TEST</td>
<td>0.241</td>
<td>0.128</td>
<td>0.749</td>
<td>0.268</td>
</tr>
<tr>
<td>ADJ. R-SQUARE</td>
<td>0.168</td>
<td>0.176</td>
<td>0.208</td>
<td>0.137</td>
</tr>
<tr>
<td>OBSERVATIONS</td>
<td>2,634</td>
<td>1,139</td>
<td>547</td>
<td>2,103</td>
</tr>
</tbody>
</table>

Notes: The dependent variable in all specifications is the 24-month buy-and-hold abnormal return. Specifications (1)-(3) present coefficients from the DD model (equation (1)). Specification (4) presents coefficients from the DDD model (equation (2)). Specifications in Columns (1) and (4) estimate coefficients using the full sample. Specification (2) limits the analysis to mergers performed by firms in the bottom half of the tax exempt distribution. Specification (3) limits the analysis to mergers performed by firms in the bottom quartile of the tax exempt distribution. All specifications include year fixed effects as well as firm level controls for marginal Q, financial distress, total assets, retained earnings, and cash flow. Standard errors in all specifications are two-way clustered. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *. 
Table 3: Entropy Weighted Merger Performance Analysis

\[ P_{i,t} = \beta_0 + \beta_1 DD_{i,t} + z_{i,t}\gamma + \eta_i + \lambda_t + \varepsilon_{i,t} \]

\[ P_{i,t} = \beta_0 + \beta_1 DD_{i,t} + \beta_2 DDD_{i,t} + z_{i,t}\gamma + \eta_i + \lambda_t + \varepsilon_{i,t} \]

<table>
<thead>
<tr>
<th>Specification</th>
<th>24 Month BHARs</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DD</td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td>Low Tax × DIV Firm (DD)</td>
<td>0.037</td>
<td>0.097***</td>
<td>0.145***</td>
</tr>
<tr>
<td></td>
<td>(0.022)</td>
<td>0.030</td>
<td>0.049</td>
</tr>
<tr>
<td>Low Tax × DIV Firm × Exempt%</td>
<td></td>
<td></td>
<td>-0.201**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.092)</td>
</tr>
<tr>
<td>Full Sample</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Most Taxable 50%</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Most Taxable 25%</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Adj. R-Square</td>
<td>0.072</td>
<td>0.104</td>
<td>0.115</td>
</tr>
<tr>
<td>Observations</td>
<td>2,326</td>
<td>1,139</td>
<td>547</td>
</tr>
</tbody>
</table>

Notes: The dependent variable in all specifications is the 24-month buy-and-hold abnormal return. Specifications (1)–(3) present coefficients from the DD model (equation (1)). Specification (4) presents coefficients from the DDD model (equation (2)). Specifications in Columns (1) and (4) estimate coefficients using the full sample. Specification (2) limits the analysis to mergers performed by firms in the bottom half of the tax exempt distribution. Specification (3) limits the analysis to mergers performed by firms in the bottom quartile of the tax exempt distribution. All specifications include year fixed effects. Observations in all specifications are entropy weighted to make control mergers similar to treatment mergers in terms of observable characteristics. Standard errors in all specifications are two-way clustered. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *. 
Table 4: Merger Quantity Analysis

<table>
<thead>
<tr>
<th>Dependent Var:</th>
<th>Merger Probability</th>
<th>Mergers per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification</td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Low Tax ×</td>
<td>-0.024**</td>
<td>-0.044***</td>
</tr>
<tr>
<td>Div Firm (DD)</td>
<td>(0.011)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>≥ 1 Merger</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Most Taxable</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.006</td>
<td>0.016</td>
</tr>
<tr>
<td>Observations</td>
<td>37,498</td>
<td>16,251</td>
</tr>
</tbody>
</table>

Notes: Table 4 presents results from the Merger Activity analysis. Specifications (1) through (6) present coefficients from DD specifications as in equation (1). In Specifications (1)–(3), the dependent variable is a firm-year indicator that is equal to 1 for years in which the firms performed a merger and 0 in years when no merger was performed. In Specifications (4)–(6), the dependent variable is the number of mergers performed by each firm in each year. All specifications in include controls for assets, cash, sales, retained earnings, and book-to-market as well as firm and year fixed effects. Standard errors are reported in parentheses and are two-way clustered and are robust to heteroskedasticity. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *.
Table 5: DD Performance Analysis by Payment Method and Size

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>24 Month Buy-and-Hold Abnormal Returns</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PAYMENT TYPE</td>
<td>ALL</td>
<td>NON-CASH</td>
<td>CASH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>Low Tax × DIV Firm (DD)</td>
<td>2.170</td>
<td>-1.216</td>
<td>4.275</td>
<td>7.085</td>
<td>1.477</td>
</tr>
<tr>
<td></td>
<td>(2.058)</td>
<td>(4.418)</td>
<td>(3.156)</td>
<td>(5.123)</td>
<td>(2.766)</td>
</tr>
<tr>
<td>Equality Test</td>
<td>P = 0.369</td>
<td>P = 0.238</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj. R-Square</td>
<td>0.197</td>
<td>0.223</td>
<td>0.159</td>
<td>0.151</td>
<td>0.135</td>
</tr>
<tr>
<td>Observations</td>
<td>1,459</td>
<td>497</td>
<td>962</td>
<td>523</td>
<td>439</td>
</tr>
</tbody>
</table>

Notes: Table 5 presents DD model estimates from subsamples of mergers based on merger payment and size characteristics. The dependent variable in all of the regressions is the buy-and-hold abnormal return twenty-four months after an acquisition. Specification (1) focuses on all mergers for which payout information is available. The subsample in specification (2) are all non-cash mergers. Specification (3) presents results for all cash mergers. Specification (4) focuses on all large cash mergers while specification (5) focuses on all small cash mergers. Here, large and small mergers are those with above/below median values of deal value divided by the acquiring firm’s assets. The equality test measures whether the DD coefficient on the interaction (Low Tax × DIV Firm) is different across the largest institutional holdings subsamples. All specifications include controls for marginal Q, financial distress, total assets, retained earnings, cash flow, and year fixed effects. Standard errors are reported in parenthesis and are clustered at the acquiring firm and year level and are robust to heteroskedasticity. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *. 
Table 6: DD Performance Analysis; Monitoring Mechanism

<table>
<thead>
<tr>
<th>Dependent Var:</th>
<th>24 Month Buy-and-Hold Abnormal Return</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50% Largest</td>
<td>50% Smallest</td>
<td>25% Largest</td>
<td>75% Smallest</td>
</tr>
<tr>
<td>LOW TAX × DIV FIRM (DD)</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td></td>
<td>1.464</td>
<td>3.352</td>
<td>-1.896</td>
<td>4.209*</td>
</tr>
<tr>
<td></td>
<td>(3.332)</td>
<td>(2.619)</td>
<td>(4.810)</td>
<td>(2.359)</td>
</tr>
<tr>
<td>Equality Test</td>
<td>P = 0.209</td>
<td>P = 0.129</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj. R-Square</td>
<td>0.094</td>
<td>0.180</td>
<td>0.058</td>
<td>0.155</td>
</tr>
<tr>
<td>Observations</td>
<td>1,134</td>
<td>1,192</td>
<td>521</td>
<td>1,805</td>
</tr>
</tbody>
</table>

Notes: Table 6 presents coefficients from DD specifications where samples are according the percentiles of largest single institutional shareholder. The dependent variable in all of the regressions is the buy-and-hold abnormal return 24 months after an acquisition. The equality test measures whether the DD coefficient on the interaction (Low Tax × DIV Firm) is different across the largest institutional holdings subsamples. All specifications include controls for marginal Q, financial distress, total assets, retained earnings, cash flow, and year fixed effects. Standard errors are reported in parenthesis and are robust to heteroskedasticity. Statistical significance at the 1 percent level is denoted by ***, the 5 percent by **, and the 10 percent by *. 
Figure 1: DD Merger Quantity Analysis

(A) Merger Probability

<table>
<thead>
<tr>
<th></th>
<th>Repurchasing Firms</th>
<th>Dividend Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>0.295</td>
<td>0.325</td>
</tr>
<tr>
<td>After Tax Cut</td>
<td>0.293</td>
<td>0.268</td>
</tr>
</tbody>
</table>

(B) Mergers per Year

<table>
<thead>
<tr>
<th></th>
<th>Repurchasing Firms</th>
<th>Dividend Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>0.416</td>
<td>0.411</td>
</tr>
<tr>
<td>After Tax Cut</td>
<td>0.412</td>
<td>0.364</td>
</tr>
</tbody>
</table>

Notes: Panel A averages the annual merger probability indicator for four groups: share-repurchasing firms before and after the tax reform and dividend-paying firms before and after the tax returns. Panel B averages the mergers per year for the same four groups of firms. Dividend-paying (share-repurchasing) firms are those firms that paid a dividend (repurchased shares) but never repurchased shares (paid a dividend) prior to an observed merger. The sample is limited to firms that performed at least one merger during the years 1998-2008.

Figure 2: Post-Acquisition Performance

(A) Dividend-Paying Firms

(B) Share-Repurchasing Firms

Notes: Figure 2 presents a graphical interpretation of the DD merger performance analysis. Each panel presents BHARs averaged over mergers performed prior to and after the 2003 tax rate decreases for groups of firms. Other determinants of abnormal returns are controlled for in the following manner: for each month post merger, the BHAR is regressed on controls for marginal Q, cash flow, assets, retained earnings, and financial constraint. The residuals are then averaged across groups and by time period. Mean residuals are added to population averages in each post merger month. All means are count weighted.
Figure 3: Post-Acquisition Performance With Tax-Exempt Variation

(a) Dividend and Taxable Firms

(b) Repurchase and Taxable Firms

(c) Dividend and Tax-Exempt Firms

(d) Repurchase and Tax-Exempt Firms

Notes: Figure 3 graphs the evolution of buy-and-hold abnormal returns (BHARs) for the twenty-four months after an acquisition is completed. Each panel presents BHARs averaged over mergers performed prior to and after the 2003 tax rate decreases for groups of firms. Other determinants of abnormal returns are controlled for in the following manner: for each month post merger, the BHAR is regressed on controls for marginal Q, cash flow, assets, retained earnings, and financial constraint. The residuals are then averaged across groups and by time period. Mean residuals are added to population averages in each post merger month. All means are count weighted.