

The Impact of Investor-Level Taxation on Mergers and Acquisitions

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Abstract

Investor-level taxation may distort merger and acquisition decisions when capital gains are taxed at a preferable rate, relative to dividends. The intuition is that the value of a target's assets depends on whether the target is acquired. If it is acquired, then the firm's equity is taxed at the capital gains rate. If, instead, the target is not acquired, then eventually the equity will be distributed as dividends and taxed at the dividend tax rate. This tax discount means acquisitions have a tax preference, relative to dividend payments, for potential acquiring firms that pay dividends. As a result, the tax discount distorts the mergers and acquisitions of dividend-payers, leading them to do more and lower quality deals. To test for the existence and effects of this tax discount on merger and acquisition behavior, we exploit quasi-experimental variation created by the Jobs Growth and Tax Relief Reconciliation Act of 2003, which equalized dividend and capital gains rates, eliminating the tax discount. We find that acquiring firms with larger tax discounts before 2003 made higher quality acquisitions after the discount was eliminated. These results support the existence of a tax discount prior to 2003 and suggest that re-implementing the same wedge between dividend and capital gains rates would cause lower quality acquisitions that would destroy approximately \$59 billion of the value of mergers and acquisitions in the United States annually.

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1 Introduction

Corporate investment is a key determinant of economic growth. Therefore understanding the factors that distort corporate investment decisions is an important topic of research with direct policy implications. To that end, for more than 30 years, economists have sought to understand whether and to what extent taxes on dividends and capital gains affect capital investments.¹ Few studies, however, have considered the impact of shareholder taxation on mergers and acquisitions (M&A)—a particularly large component of corporate investment. This study begins to fill this gap by identifying, both theoretically and empirically, how investor-level taxes affect M&A decisions.

The potential distortions to M&A from investor-level taxes were first discussed during the merger wave of the 1980s. [Auerbach and Reishus \(1987\)](#) and [Kraakman \(1988\)](#) investigate how investor-level taxation may distort M&A when capital gains are taxed at a preferable rate, relative to dividends. The intuition builds on a dynamic model of corporate taxation, where dividend taxes discount future assets because eventually firms pay dividends to shareholders. Proceeds from acquisitions, on the other hand, are generally taxed as capital gains. As a result of this discrepancy, target shareholders may be willing to sell their assets at a discount to unlock their capital gains at the preferred rate. The decision for acquiring firms to make an acquisition or increase payouts to shareholders through dividends or share repurchases may therefore be distorted. Critically, we show that, as a result of the difference in tax rates, the acquisition decisions of dividend-paying acquirers will be distorted but the decisions of share-repurchasers will not. Specifically, dividend-payers will have an incentive to acquire more and lower quality assets, which decreases the return on acquired assets. This distortion may be especially costly given the magnitude of M&A in the U.S. economy, which totaled \$16.32 trillion over the last 10 years ([Institute for Mergers and Alliances, 2019](#)).

We model this tax discount and test for its effect on M&A. We exploit quasi-experimental variation between dividend and capital gains tax rates created by the Jobs and Growth Tax Relief Reconciliation Act of 2003. Before the 2003 reform, top tax rates on dividend and capital gains were 38.6% and 20%, respectively. The reform equalized the rates on dividends and capital gains

¹See [King \(1977\)](#), [Auerbach \(1979a\)](#), [Bradford \(1981\)](#), [Poterba and Summers \(1985\)](#), [Auerbach and Hassett \(2002\)](#), [Alstadsæter et al. \(2015\)](#), [Yagan \(2015\)](#).

at 15%, eliminating the tax discount on M&A. The model suggests that, before 2003, the price of acquisitions may have been discounted by up to 23%.² We use the nuance that the tax discount distorts the behavior of dividend-payers but not share-repurchasers in a difference-in-differences framework. Specifically, we compare the quality and rate of return on acquired assets of acquisitions made by dividend-payers to those made by share-repurchasers before and after the reform.

To sharpen our empirical strategy, we leverage the fact that many shareholders are exempt from dividend and capital gains taxes. Specifically, institutional shareholders, such as charities, are exempt and therefore do not have a tax discount (Blouin et al., 2017). We use a triple-differences estimator that isolates the effect of the tax discount by comparing acquisitions made by dividend-payers with a higher percentage of taxable shareholders to those made by dividend-payers with a lower percentage before and after the reform.

We find that the return on acquired assets increased after the tax discount was eliminated. Our difference-in-differences estimates suggest a 5.8 percentage point increase in the return on acquired assets for dividend-payers, relative to share-repurchasers, after the reform. When we exploit the additional variation in the percentage of taxable acquiring-firm shareholders, we find that eliminating the tax discount improves the return on acquired assets by 18 percentage points. This triple-differences estimate implies that re-instating the tax discount would encourage lower quality acquisitions that would destroy over \$59 billion dollars of the value in the United States annually.

To measure the return on acquired assets, we follow a vast literature that uses long-run abnormal stock returns, following the announcement of 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). We calculate buy-and-hold abnormal returns for all mergers between 1998 and 2008 (five years before and after the reform) in the Zephyr database from Bureau Van Dijk Amadeus. We also use firm financial statement data from the Compustat and Thomson Reuters 13f filings to identify whether acquiring firms pay dividends or repurchase shares and the percentage of shareholders that are taxable (Blouin et al., 2017).

²Section 2 provides the simple math behind this calculation.

We extend our model in several ways to show that the tax discount distorts behavior under a set of weak assumptions. In particular, we show that the tax discount depresses the return on acquired assets as long as (1) there is trapped equity within targets (said differently, target shareholders have capital gains) and (2) acquiring firms gain some of the surplus from the tax discount.

We perform a battery of tests to reinforce our main empirical results. We find that our results are stable across several different outcomes (return on assets and shorter outcome buy-and-hold abnormal return windows) and when we select control variables using machine learning techniques. Graphical equivalents to our difference-in-difference and triple-differences results show no differential pre-trends and, after the reform, a level shift in the return on acquired assets. Consistent with our model, we find evidence that the tax discount has a larger impact on the return on acquired assets for larger deals and those paid in cash. We consider the number of acquisitions undertaken and find that dividend-payers with taxable shareholders decreased their number of acquisitions after the reform.

We also investigate how our tax discount theory complements the agency model of dividend taxation presented by [Chetty and Saez \(2010\)](#). In particular, the agency model predicts that firms with large and active shareholders will increase monitoring when the dividend tax decreases. The tax discount theory suggests that shareholders of dividend-payers will have an incentive to make fewer acquisitions and increase the average quality as a result of the reform. We find that the quality of acquisitions increased most for dividend-payers with large and active shareholders. This evidence supports both the agency model ([Chetty and Saez, 2010](#)), the tax discount model (that we propose), and suggests a positive interaction between the two models.

In addition to providing new empirical support for the [Chetty and Saez \(2010\)](#) model, we also provide the first empirical test of the logic of [Auerbach and Reishus \(1987\)](#). Specifically, we test whether differences in dividend and capital gains taxes can lower the quality of acquisitions and lower the rate of return on acquired assets. We also show how the distortion to acquisitions from investor-level taxes can reconcile the predictions of the new view of corporate taxation and the observed increase in dividend payments after the tax reform in 2003. Specifically, we show, in a new view model, that firms may increase dividend payments, as they substitute away from lower

quality acquisitions performed before the tax reform in 2003 when there was a tax discount. Our empirical evidence therefore supports the new view model of corporate taxation ([Auerbach, 1979b](#); [King, 1977](#)).

We also contribute to a large literature that spans economics, finance, and accounting that investigates how investor-level taxes affect M&A. Investor-level taxes have been shown to affect organizational form, headquarters location ([Desai and Hines Jr., 2002](#); [Huizinga and Voget, 2009](#); [Voget, 2011](#)), and M&A financing ([Ayers, Cloyd and Robinson, 2002](#); [Dhaliwal, Li and Trezevant, 2003](#); [Hanlon, Myers and Shevlin, 2003](#); [Lang and Shackelford, 2000](#); [Ayers, Lefanowicz and Robinson, 2004](#); [Faccio and Masulis, 2005](#)). Previous work has also investigated whether target or acquiring firms pay investor-level taxes triggered by M&A ([Plummer and Robinson, 1990](#); [Hayn, 1989](#); [Ayers, Lefanowicz and Robinson, 2000](#); [Erickson and Wang, 2000](#); [Ayers, Lefanowicz and Robinson, 2003](#)). The two papers closest to ours are by [Huizinga, Voget and Wagner \(2012\)](#) and [Ayers, Lefanowicz and Robinson \(2004\)](#). [Huizinga, Voget and Wagner \(2012\)](#) find that target-firm shareholders pay the additional investor-level taxes triggered by cross-border M&A. [Ayers, Lefanowicz and Robinson \(2004\)](#) find that higher capital gains tax rates are associated with an increased use of tax-free stock-for-stock acquisitions. We add to this evidence that the tax discount caused by investor-level taxes can affect average merger quality and the rate of return on acquired assets.

Our results suggest that, before 2003, the return on acquired assets was diminished, due to investor-level taxes. This evidence provides a new partial explanation for the general finding—and puzzle—that average long-run abnormal returns after acquisitions are negative ([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](#)). This literature finds that firms underperform by nearly 19 percentage points after acquisitions (measured by abnormal long-run returns). Our estimates suggest that the tax discount can explain 5.9 percent of the 19 percentage point underperformance before 2003.

Finally, our paper also adds to a large literature on how taxation distorts M&A ([Auerbach and Reishus, 1987, 1988](#); [King, 1989](#); [Hayn, 1989](#)) and corporate behavior more broadly ([Hall and](#)

Jorgenson, 1967; Auerbach, 1979b; Summers, 1981).³

In the following section, we formalize the tax discount in a dynamic neoclassical corporate investment model. We then use the model to generate empirically testable predictions. Section 3 presents our data sources and descriptive statistics. We present our empirical analysis in section 4. Section 5 presents several supporting analyses. In section 6, we discuss how our results add to active debates on the effect of shareholder taxes on investment and payout and on the reasons acquisitions fail. Section 7 concludes.

2 Modeling the Effect of Shareholder Taxation on M&A

This section develops our tax discount theory within a dynamic neoclassical model following Chetty and Saez (2010) and Poterba and Summers (1983). The key insight is that trapped equity within targets can create a tax discount that causes firms to make more acquisitions, which yield lower returns. The tax discount is created when the personal tax rate of an acquiring firm’s shareholders (on payouts in the form of dividends and share repurchases) differs from the capital gains tax rate target shareholders pay. The tax discount distorts merger and acquisition behavior as long as (1) there is trapped equity within targets and (2) acquiring firms gain some of the surplus from the tax discount. From our model, we derive a proposition and predictions, which we can test empirically using the variation in the payout tax rate faced by acquiring firm shareholders.

2.1 The Acquiring Firm’s Objective

Consider a two-period model of an acquiring firm. The acquirer begins period 1 with retained earnings, X . The firm decides to split X between internal capital investment, I , acquisitions, A , and payouts, P .⁴ Payouts made in period 1 may be in the form of dividends or share repurchases. We take as given a firm’s choice of payout method (see Allen et al. (2000), Allen and Michaely

³See also King (1977); Bradford (1981); Poterba and Summers (1985); Mackie-Mason (1990); Cummins et al. (1994); Graham (1996); Goolsbee (1998); House and Shapiro (2008); Djankov et al. (2010); Edgerton (2010); Patel et al. (2017); Devereux et al. (2014); Giroud and Rauh (2015) and Zwick and Mahon (2017).

⁴Here, we assume the marginal source of finance is retained earnings because the activities we seek to understand—payout and M&A—are concentrated in larger and older firms that are less likely to be forced to rely on debt or new equity financing.

(2003), Brav et al. (2005), Denis and Osobov (2008), and Crane et al. (2016) for a discussion of this choice).⁵ In our extended model in Appendix A, we generalize to a setting in which firms make this choice based on nontax costs.

Following Chetty and Saez (2010), we assume the firm liquidates in period 2 and shareholders pay the dividend tax.⁶ The present value of combined payouts in periods 1 and 2 is

$$V = (1 - \tau_p)P + (1 - \tau_d) \left(\frac{(1 - \tau_c)[F(I) + G(A)]}{1 + r} \right), \quad (1)$$

where τ_p is either the dividend or capital gains tax rate, depending on the payout choice of the firm. If firms choose to pay dividends, τ_p is equal to the dividend tax rate. Share repurchases are taxed at the capital gains tax rate τ_{cg} . Gross investment is given by the concave production function $F(I)$. The discount rate is given by r . The corporate income tax rate is given by τ_c . The payout, P , is the difference between the retained earnings and the equilibrium level of the sum of internal investment and acquisitions: $P = X - (I + qA)$, where q is the price of acquired assets. We focus on large, mature firms for whom $P > 0$. For simplicity, we assume A is a continuous variable, meaning there is a large set of potential targets.

The acquisition production function, $G(A)$, is concave, which captures the fact that firms engage in the highest quality acquisitions first. $G'(A)$ is the return on the *acquired* assets for the acquirer. We assume $G'(0) = \infty$ and $G'(\infty) = 0$.

$G'(A)$ measures how efficiently the acquirer operates the assets purchased from targets. When few acquisitions are made $G'(A) > 1$, and the acquirer operates the marginal dollar of target assets more efficiently than did the target. When $G'(A) = 1$, the marginal dollar of acquired assets is operated equally efficiently by the acquirer and target. When many acquisitions are made $G'(A) < 1$, and the marginal dollar of acquired assets are operated less efficiently after they have

⁵The literature identifies several possible reasons firms pay dividends, despite the tax disadvantage: (1) because shareholders believe they constrain managerial excess (Easterbrook, 1984), (2) because they cater to certain investor clienteles (Miller and Modigliani, 1961), and (3) because dividends were initiated in the past and investors punish firms that do not continue to deliver regular dividends.

⁶By law, shareholders of firms that are liquidated are subject to the dividend tax rate. The modeling choice of liquidation of assets in the second period made by Chetty and Saez (2010) is meant to represent the continuation value in an infinite time model where eventually firms pay dividends (Auerbach, 1979a).

changed hands.

2.2 The Target's Objective

If a potential target is not acquired ($y = 0$), its profits are paid out to shareholders in the second period,

$$v_{y=0} = (1 - \tau_d) \frac{(1 - \tau_c)A}{1 + r}. \quad (2)$$

If instead a potential target is acquired ($y = 1$), the proceeds from the acquisition are taxed at the capital gains tax rate, τ_{cg} .⁷ In this case, the value to a target's shareholders is the proceeds from the acquisition, qA , minus the taxes owed, which depend on the amount of basis the target's shareholders have in the firm, ξ ,

$$v_{y=1} = qA - \tau_{cg}(qA - \xi). \quad (3)$$

The difference between the proceeds from the acquisition and the basis in the firm, $qA - \xi$, is equity trapped in the target (King, 1974; Kraakman, 1988).⁸ As long as there is some trapped equity, there is the potential for a tax discount, because the equity can be unlocked at the capital gains rate. In the remainder of this section, we assume that all target equity is trapped. This assumption is made for expositional ease. The more general model in Appendix A shows our results hold without this assumption.

2.3 The Target's Optimization

A target accepts an acquisition as long as the proceeds exceed the value to a target's shareholders when the firm is not acquired,

$$v_{y=1} > v_{y=0}. \quad (4)$$

⁷Here, we are assuming a cash transaction. However, mergers and acquisition can also be made with stock. These transactions are either taxable at the capital gains rate or, in certain instances, not taxable at all (Auerbach and Reishus, 1987; Ayers et al., 2004). In all cases, the tax treatment of the acquisition is preferable to dividend taxes (when $\tau_d > \tau_{cg}$) and the predictions of the model hold. We do, however, focus our empirical analysis on cash deals in subsection 5.2 and find our results are concentrated among this sample of acquisitions.

⁸Auerbach and Reishus (1987), Landsman and Shackelford (1995), and Erickson (1998) have examined whether the amount of trapped equity influences M&A.

We assume the equilibrium proceeds, which come from a bargaining process, are given by

$$qA = \phi \frac{1 - \tau_d}{1 - \tau_{cg}} \frac{(1 - \tau_c)A}{1 + r}, \quad (5)$$

where $\phi \geq 1$ represents a premium received by the target's shareholders. The tax discount distorts acquirer behavior as long as some of the surplus it generates is captured by the acquirer (ϕ sufficiently small). For expositional ease, we assume that $\phi = 1$, meaning that acquirers have all of the bargaining power. The more general model in Appendix A, again, shows our results hold without this assumption.

2.4 The Acquiring Firm's Optimization

The acquiring firm chooses its level of capital investment I and acquisition A to maximize shareholder value

$$\max_{A, I} (1 - \tau_p)(X - I - qA) + (1 - \tau_d) \left(\frac{(1 - \tau_c)[F(I) + G(A)]}{1 + r} \right). \quad (6)$$

For firms with sufficiently large X , the first-order condition for internal capital produces the familiar Jorgenson formula,

$$F'(I) = \frac{1 + r}{1 - \tau_c} \frac{1 - \tau_p}{1 - \tau_d}. \quad (7)$$

This formula states that the rate of return on internal capital equals one plus the risk-free rate of return divided by the corporate net-of-tax rate adjusted for potential differences between period 1 and period 2 payout methods.⁹

The first-order condition for acquisitions produces the condition

$$\begin{aligned} G'(A) &= \frac{1 + r}{1 - \tau_c} \frac{1 - \tau_p}{1 - \tau_d} q \\ &= \frac{1 + r}{1 - \tau_c} \frac{1 - \tau_p}{1 - \tau_d} \frac{1 - \tau_d}{1 - \tau_{cg}} \frac{1 - \tau_c}{1 + r} \\ &= \frac{1 - \tau_p}{1 - \tau_{cg}}. \end{aligned} \quad (8)$$

⁹We maintain the assumption that X is sufficiently large such that internal capital is not distorted.

This condition differs from condition 7 because the price of acquisitions includes the tax discount.

2.5 Distortions From the Tax Discount

We define the tax discount as one minus the ratio of the payout net-of-tax rate and the capital gains net-of-tax rate,

$$\text{Tax Discount} = 1 - \frac{1 - \tau_p}{1 - \tau_{cg}}. \quad (9)$$

For firms that pay the capital gains tax rate on their payouts (share-repurchasers), the tax discount is zero. For firms that pay the dividend tax rate (dividend-payers), the tax discount is greater than zero and distorts the equilibrium level of acquisitions when $\tau_d > \tau_{cg}$.

We define the acquirer's return on acquired assets as $r(A) \equiv G'(A)$. The first-order condition for acquisitions in equation (8) relates the return on acquired assets with the tax discount. In particular, $r(A) = 1 - \text{tax discount}$. As the tax discount increases, the return on acquired assets decreases because acquirers are willing to make more and less valuable acquisitions.

Proposition 1 *A firm's return on acquired assets, $r(A)$, is decreasing in a firm's tax discount.*

The proof follows immediately from the first-order condition for acquisitions in equation (8) and the definition of the tax discount in equation (9). We provide this proof in our more general model in Appendix A. This general model allows for three things: (1) acquirers can choose their method of period 1 payouts; (2) there is a limited amount of trapped target equity; and (3) the target can have more bargaining power.

The following section uses proposition 1 and the tax reform to generate empirically testable predictions.

2.6 Empirically Testable Predictions

The payout tax rate, τ_p , depends on an acquirer's payout method and the tax regime. $\tau_p \in \{\tau_{d,0}, \tau_{cg,0}, \tau_{d,1}, \tau_{cg,1}\}$, which are the dividend and capital gains tax rates (τ_d or τ_{cg}) before and after the tax reform (denoted 0 for before and 1 for after).

Before the tax reform, dividends were taxed as ordinary income, with a top marginal tax rate

of 38.6 percent, and capital gains were taxed at 20 percent. After the tax reform, dividends and capital gains were taxed at the same 15 percent rate, for individuals in the top ordinary income tax bracket with qualified dividends.¹⁰ The tax discount therefore is 23.25 percentage points for dividend-payers before the tax reform and zero percentage points after the tax reform and zero percentage points for share repurchase firms before and after the tax reform.

Because these firms have different tax discounts, proposition 1 implies that they will also have different returns on acquired assets, as a firm's return on acquired assets depends on one minus its tax discount. Before the tax reform, the return on acquired assets made by share-repurchasers is

$$r(A|\tau_p = \tau_{cg,0}, t = 0) = \frac{1 - \tau_{cg,0}}{1 - \tau_{cg,0}} = 1. \quad (10)$$

After the tax reform, the return on assets acquired by share-repurchasers also equals one,

$$r(A|\tau_p = \tau_{cg,1}, t = 1) = \frac{1 - \tau_{cg,1}}{1 - \tau_{cg,1}} = 1. \quad (11)$$

The tax discount before and after the tax reform is zero for share-repurchasers. Therefore the tax reform has no effect on $r(A)$ for share-repurchasers.

In contrast, the assets acquired by firms that pay dividends before the tax reform have a return equal to

$$r(A|\tau_p = \tau_{d,0}, t = 0) = \frac{1 - \tau_{d,0}}{1 - \tau_{cg,0}} = 0.7675. \quad (12)$$

Before the tax reform, when the dividend tax rate was greater than the capital gains tax rate, there was a tax discount on acquisitions for dividend-payers. This discount encouraged firms to acquire

¹⁰A dividend is a qualified dividend if (1) it was paid after December 31, 2002, (2) it was 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.

Dividend Tax Rate Change			
Income Level 2002	Tax Rate 2002	Income Level 2003	Tax Rate 2003
0 - \$6,000	10	0 - \$7,000	5
\$6,000 - \$27,950	15	\$7,000 - \$28,400	5
\$27,950 - \$67,700	27	\$28,400 - \$68,800	15
\$67,700 - \$141,250	30	\$68,800 - \$143,500	15
\$141,250 - \$307,050	35	\$143,500 - \$311,950	15
over \$307,050	38.6	over \$311,950	15

more assets and acquire some assets that have lower returns. After the tax reform,

$$r(A|\tau_p = \tau_{d,1}, t = 1) = \frac{1 - \tau_{d,1}}{1 - \tau_{cg,1}} = 1. \quad (13)$$

The tax reform eliminated the difference between the dividend and capital gains tax rates, eliminated the tax discount, and increased the return on assets acquired by dividend-payers. The return on assets, $r(A)$, increases by 23.25 percent points, the size of the tax discount for dividend-paying firm before the return. Our first empirical prediction follows naturally.

Prediction 1 *After the tax reform, dividend-payers experienced a larger increase in the return from acquisitions than share-repurchasers.*

Our second empirical prediction incorporates the fact that not all shareholders are subject to dividend or capital gains tax rates. In particular, pension funds and other institutional investors do not pay these taxes on distributions. In the extreme case where an acquirer is completely owned by tax-exempt shareholders, we would not expect to see any impact from investor-level taxes. Said differently, firms with a higher percentage of taxable investors will have a higher effective payout tax rate than those with a lower percentage of taxable investors. Equation 9 demonstrates that firms with higher payout tax rates have a larger tax discount. This leads us to our second prediction.

Prediction 2 *After the tax reform, dividend-payers with a high percentage of taxable investors experienced a larger increase in the return from acquisitions than dividend-payers with a low percentage of taxable investors.*

3 Data

To test our empirical predictions and to quantify the impact of taxes on dividends and capital gains on acquisitions, we compile data from the Bureau Van Dijk Amadeus Zephyr database, the Center for Research in Security Prices (CRSP), Compustat, and Thomson Reuters 13f databases. Our unit of observation is an acquisition. Data from the Zephyr database has comprehensive information on acquisitions, including public firms acquiring private firms, and as such has been used extensively

to study mergers and acquisitions (see [Huizinga and Voget, 2009](#); [Dischinger and Riedel, 2011](#); [Voget, 2011](#); [Feld et al., 2016](#)). For our sample years, 1998–2008, Zephyr has 15,274 deals made by publicly listed firms on the NYSE or NASDAQ. We restrict attention to deals in which the acquirer purchased 100% of the target (9,972) and exclude those made by firms with more than 20 acquisitions in the sample period (reducing our sample to 8,217).¹¹ We have the necessary stock price, payout, institutional holding, and control variable data for 6,788 of these deals. Finally, we limit the sample to the 1,998 acquisitions that were made by firms that only paid dividends or only repurchased shares.¹² This choice follows directly from our theoretical model. Appendix Table [A1](#) details this sample selection process.

3.1 Measuring the Return on Acquired Assets

To measure the return on acquired assets, we follow a large literature that uses long-run abnormal stock returns, following 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](#); [Harford et al., 2019](#)). To calculate long-run abnormal returns, we use stock prices from the Center for Research in Security Prices (CRSP) and construct monthly buy-and-hold abnormal returns using the Fama-French Three-Factor Model ([Fama and French, 1992](#)) for each acquisition, beginning in the month the acquisition was announced.

In the absence of an acquisition, we expect the abnormal returns to be zero. Changes in abnormal returns after an acquisition therefore capture the returns on newly acquired assets. Based on this logic, abnormal returns have become a standard measure of changes in firm value due to an event because it controls for all other factors.¹³ In our setting, the long-run abnormal return after an acquisition announcement captures the return on acquired assets, because the measure controls

¹¹The 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.

¹²The details on the definition of dividend-paying and share-repurchasers is given below in section [3.2](#)

¹³There are numerous ways of calculating abnormal returns, and there is considerable debate on the appropriate method ([Fama, 1998](#); [Lyon et al., 1999](#); [Kothari and Warner, 2006](#)). [Fama \(1998\)](#) emphasizes that all tests that use abnormal returns are also a test of the model producing those abnormal returns, which is a problem if the model is misspecified. Our empirical strategy mitigates this potential problem, by comparing firms that pay dividends to share-repurchasers both before and after dividend and capital gains tax rates were equalized in 2003. Therefore, as with any time-invariant differences between acquisitions by dividend-payers versus share-repurchasers, any average differences stemming from the calculation of the abnormal returns are differenced out.

for the return on previously installed assets.

The literature typically uses a 24-month buy-and-hold abnormal returns to measure the return on acquired assets because these returns often take up to two years to materialize (Agrawal and Madelker, 1990; Agrawal et al., 1992; Agrawal and Jaffee, 2000). To allow for comparisons with this literature, we report our main results using 24-month buy-and-hold abnormal returns and show our results are robust to using any number of months after an acquisition. Following this literature, we winsorize the 24-month buy-and-hold abnormal returns and all other non-indicator variables at the 1st and 99th percentiles. All results are robust to other sample trimming and winsorizing choices.

The literature finds that, on average, returns on acquired assets are 19 percentage points lower than those on assets in place. We find similarly negative post-acquisition buy-and-hold abnormal returns for both dividend-paying and share-repurchasers. We report these averages and additional descriptive statistics in Table 1.

3.2 Acquisition Classification

Our empirical design relies on variation from three sources: (1) before and after the 2003 tax reform, (2) across payout strategies (dividends and share repurchases), and (3) in the percentage of shareholders that are taxable. Acquisition announced before 2003 are classified as pre-reform. Acquisitions made after 2003 are classified as post-reform.¹⁴ Firms pay dividends, repurchase shares, do both, or do neither. To use variation in payout strategy, we limit our scope to acquisitions made by firms that either exclusively paid dividends or repurchased shares prior to the acquisition.¹⁵ We classify a merger as being performed by a dividend-paying firm if, before the tax reform (1998–2002), the firm paid dividends and did not repurchase shares. Similarly, we classify a merger as being performed by a share-repurchasing firm if, before the tax reform (1998–2002), the firm repurchased shares and did not pay a dividend.¹⁶

¹⁴Due to the timing of the reform, in mid-2003, we omit from our main analysis acquisitions performed in 2003. We show in Table 3 that our preferred results are insensitive to treating 2003 acquisitions as post-reform.

¹⁵Firms that pay dividends and repurchase shares are excluded because their tax rate 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 also excluded because, again, it is unclear how to measure the tax rate on their payouts and because they are generally younger and growing faster than firms that make payouts to shareholders.

¹⁶Compustat 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

Within the set of acquisitions performed by firms that pay dividends or repurchase shares, we exploit additional variation in the percentage of shareholders subject to taxation on dividends or repurchased shares. In particular, institutions, such as universities, public pension funds, foundations, and other corporations, are largely exempt from dividend and capital gains taxation. To exploit this variation, we follow [Ayers et al. \(2003\)](#), [Dhaliwal et al. \(2003\)](#), [Dai et al. \(2008\)](#), and others in using 13f files from the Thomson Reuters Institutional Holdings database to measure the percentage of the acquirer’s shares held by institutional shareholders. We define the percentage of taxable shareholders as the percentage of the acquirer’s shares held by non-institutional shareholders (those more likely to be taxable). [Blouin et al. \(2017\)](#) affirm the use of this simple measure, showing that (1) roughly half of all institutional investors are tax insensitive to dividend and capital gains tax rates and (2) that tax insensitivity is uniform across various types of institutional investors. Following this logic, acquisitions made by firms with fewer institutional investors—regardless of their type—are more likely to be tax sensitive.

3.3 Acquiring Firm Control Variables

We construct acquiring firm control variables for firm size, return on assets, debt ratio, cash flow, and financial distress from Compustat financial statement data. Each control is averaged over the two years prior to the acquisition. We describe the construction of these variables as well as several variables that we use to split the sample in [Table 1](#).

[[Table 1](#) about here]

4 Empirical Analysis

4.1 Evidence of the Tax Discount Using Variation in Payout Strategies

We begin by providing evidence of the distortion created by the tax discount, using variation across payout strategies and tax regimes. These two sources of variation allow for a difference-in-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.

differences specification that controls for differences across time (e.g., macroeconomic fluctuations) and across payout strategies. In particular, we include indicator variables for being post-2003 and being an acquisition performed by a dividend-paying firm. The difference-in-differences estimate is an indicator variable equal to one for acquisitions performed by dividend-payers after the tax reform and zero otherwise. Some specifications control for other characteristics $\mathbf{X}_{i,t}$.

The dependent variable is the return on acquired assets, which we measure as the buy-and-hold abnormal return 24 months after an acquisition announcement (BHAR24). To implement the difference-in-differences methodology, we estimate coefficients from an OLS regression of the form:

$$\text{BHAR24}_{i,t} = \beta_0 + \beta_1 \text{DIV}_i + \beta_2 \text{POST}_t + \beta_3 [\text{DIV} \times \text{POST}]_{i,t} + \gamma \mathbf{X}_{i,t} + \varepsilon_{i,t}, \quad (14)$$

where an observation is an acquisition i in year t and $\varepsilon_{i,t}$ is the acquisition-level error term. Coefficient β_1 captures how acquired assets of dividend-payers perform, relative to those made by share-repurchasers. Coefficient β_2 describes the average change in the return on acquired assets for both groups after the reform. Coefficient β_3 is the difference-in-differences estimate that captures how the return on assets acquired by dividend-payers changes, relative to the return on assets acquired by share-repurchasers after 2003. Prediction 1 suggests that the sign on β_3 is positive, meaning that, after the reform, the return on assets acquired by dividend-payers increased, relative to the return on assets acquired by share-repurchasers. Table 2 presents the difference-in-differences estimates.

Table 2 reports that the returns on assets acquired by dividend-payers increased by between 3.8 percentage points (Column 1, without controls) and 5.8 percentage points (Column 2, with controls), relative to assets acquired by share-repurchasers. This evidence suggests that the tax discount created by investor-level taxes lowers the average quality of acquisition taking place. The difference-in-differences specification relies on variation in the tax discount of acquisitions made by firms that pay dividends and repurchase shares. Within these groups, however, there is considerable variation in the tax discount, due to differences in how much of the firm is owned by institutional investors that are insensitive to investor-level taxes (Blouin et al., 2017). The following section uses

this variation to provide our preferred estimates of the tax discount.

[Table 2 about here]

4.2 Evidence of the Tax Discount Using Variation in Taxable Shareholders

To sharpen the evidence presented in the previous section and to test Prediction 2, we exploit variation in the percentage of shares in acquiring firms held by taxable investors. First, we estimate the model within the subset of firms with the highest percentage of taxable investors (columns 3 and 4 of Table 2).¹⁷ This estimate suggests that the return on acquired assets increased by 11.2 percentage points for firms with the most taxable investors (reported in column 3), in comparison to 3.8 percentage points in the full sample (reported in column 1). The estimate is similar when we include controls (reported in column 4). This finding suggests that the results are, as expected, concentrated among the subset of acquisitions made by firms whose shareholders are most sensitive to tax rates on payouts.

We make further use of this variation by estimating a triple differences specification. This specification interacts the percentage of taxable shares in the acquiring firm, which is a continuous measure that varies from 0 to 1, with our difference-in-differences specification. We estimate the triple-differences specification of the form:

$$\begin{aligned}
 \text{BHAR24}_{i,t} = & \beta_0 + \beta_1 \text{DIV}_i + \beta_2 \text{POST}_t + \beta_3 [\text{DIV} \times \text{POST}]_{i,t} \\
 & + \beta_4 \text{Taxable \%}_i + \beta_5 [\text{DIV} \times \text{Taxable \%}]_{i,t} + \beta_6 [\text{POST} \times \text{Taxable \%}]_{i,t} \\
 & + \beta_7 [\text{DIV} \times \text{POST} \times \text{Taxable \%}]_{i,t} + \gamma \mathbf{X}_{i,t} + \varepsilon_{i,t},
 \end{aligned} \tag{15}$$

where an observation is an acquisition i in year t and $\varepsilon_{i,t}$ is the acquisition-level error term. The coefficient β_7 is the triple differences parameter of interest and describes how the return on assets acquired by dividend-payers with fully taxable shareholders changes, relative to the return on assets acquired by dividend-payers with fully non-taxable shareholders after the reform. Prediction

¹⁷We define the most taxable sample, $\mathbf{I}(\text{Most Taxable})$, as acquisitions made by firms in the top 50% of the percentage of taxable shareholder distribution.

2 suggests that the β_7 coefficient will be positive.

Relative to the difference-in-differences estimates in columns (3) and (4), the triple differences has four distinct advantages. First, it uses the full set of acquisitions in our sample. Second, it accounts for differences in the tax discount within dividend-payers. Third, it uses within-dividend-paying firm variation to identify the effect of shareholder taxes on acquisitions, thereby alleviating some concerns that differences between dividend and share-repurchasers are driving the results. Fourth, as recommended by [Bertrand et al. \(2004\)](#), using an additional source of variation to isolate the difference-in-differences effects results in more accurate standard error estimates.

Columns (5) and (6) of [Table 2](#) present our baseline triple differences estimates with and without acquiring firm control variables, respectively. The triple differences estimate with controls suggests the return on acquired assets made by dividend-payers with fully taxable shareholders increased by 18.06 percentage points, relative to the return on assets acquired by dividend-payers with investors that are not subject to taxes on payouts. This coefficient is close to the simple prediction from our theoretical model that the elimination of the tax discount in 2003 would improve the return on acquired assets by 23.25 percentage points.

To further contextualize these estimates, consider the effect of re-implementing the pre-2003 wedge between the dividend and capital gains tax rates on the current market for mergers and acquisitions. In 2017, mergers and acquisitions in the United States amounted to a staggering \$1.4 trillion. Our [Column \(6\), Table 2](#) triple differences results suggest that, for dividend-payers with the average percentage of taxable shareholders, the return on acquired assets increases by 6.94%. Of all mergers and acquisitions, 52% are performed by firms that pay some dividend, so the return on acquired assets increased by 3.61% for the average deal. As a result, returning to pre-2003 rates could destroy approximately \$59 billion of the value of mergers and acquisitions in the United States annually.¹⁸

¹⁸This calculation relies on the fact that the average acquiring firm has 33% non-institutional investors. Therefore the [Column \(6\), Table 2](#), triple differences estimates suggest the effect for the dividend-payers with 33% taxable shareholders is $18.06 \times 0.33 + 0.984\% = 6.94\%$. If 52% of acquisitions are undertaken by firms that pay dividends, then the return on acquired assets increases by 3.61% ($= .52 \times 6.94\%$) for the average acquisition: $0.0361 \times \$1.4 \text{ trillion} = \50.5 billion .

4.3 Sensitivity of the Triple Differences Estimates

In Table 3, we test the sensitivity of the triple differences estimates to alternative specification choices. In column (1), we two-way cluster standard errors by acquiring-firm and year to allow for correlations within-firm and over time in the error term (see [Acemoglu and Pischke, 2003](#); [Petersen, 2009](#); [Thompson, 2011](#); [Cameron et al., 2011](#)).¹⁹ The triple differences coefficients become larger when we include year fixed effects (column 2), and they also increase when we include 2003 acquisitions as members of the post-reform group (column 3). In column (4), we use entropy balancing ([Hainmueller, 2012](#)) to re-weight acquisitions made by share-repurchasers to match the acquiring firm characteristics of acquisitions made by dividend-payers. In column (5), we use the lasso method ([Tibshirani, 1996](#)) to select control variables from a more exhaustive list of potential controls, including acquiring firm size, return on assets, debt ratios, cash flow, financial constraint, Tobin’s Q, whether a firm has a large institutional investor, and interactions between each of these controls. Column (6) reports estimates using the lasso method and including year fixed-effects, instead of a post-reform indicator. Across all six alternative specifications, we continue to find that elimination of the tax discount has a large and positive effect on the return on acquired assets for dividend-payers with fully taxable shareholders.

[Table 3 about here]

4.4 Graphical Analysis

In this section, we present a graphical analysis that shows how the difference-in-differences and triple differences effects we estimate evolve. The advantage of these difference-in-differences- and triple differences-in-time estimates is that we can visually evaluate pre-trends and the shift in the return on acquired assets in the post-period, compared to the pre-period.

To provide graphical evidence approximating the difference-in-differences estimates in columns

¹⁹Standard errors can also be calculated following a randomization inference method proposed by [Bertrand et al. \(2004\)](#). In our setting, this method is implemented by randomly assigning payout methods and shareholder tax statuses to acquisitions and then calculating the probability that this randomly assigned treatment and control status generates estimates at least as large as those that we find. In Appendix C, we use this randomization inference method to calculate p -values specific to our empirical context. We find p -values very similar to those calculated in our baseline analyses.

(3) and (4) of Table 2, we replace $\text{DIV} \times \text{POST}$ with an interaction between DIV and an indicator for each year 1998–2008, excluding 2003 in equation (14). We plot the difference-in-differences-in-time coefficients and 90% confidence intervals estimated without acquiring firm controls in panel (a) and with controls in panel (b) of Figure 1.²⁰

[Figure 1 about here]

Both panels (a) and (b) show no clear diverging trends between the return on acquired assets made by dividend-paying and share-repurchasers before the tax reform. This pattern suggests that the difference-in-differences estimates focusing on an acquisition made by firms with the highest percentage of taxable shareholders (columns 3 and 4 of Table 2) exhibit parallel pre-trends. The panels also provide visual evidence of a shift in return on acquired assets after the reform; four of the post-reform coefficients in panel (a) and three of the post-reform coefficients in panel (b) are larger than the largest pre-reform coefficient. While these patterns are broadly apparent, we do recognize that not every year fits this narrative. Misfits are likely due to the limited number of acquisitions observed in each year (about 200) and the high variance in long-run buy-and-hold-abnormal returns.

To provide graphical evidence approximating the triple differences estimates in columns (5) and (6) of Table 2, we replace the post-reform indicator in the difference-in-differences and triple differences terms in equation (15) with indicators for years 1998–2008, excluding 2003. Panels (c) and (d) of Figure 1 depict the triple differences-in-time coefficients, which represent the difference in the return on assets acquired by dividend-payers with taxable shareholders, relative to the return on assets acquired by dividend-payers with nontaxable shareholders in each year. Panel (c) estimates are made without controls, and panel (d) estimates are made with controls for acquiring firm characteristics.

Like panels (a) and (b), the triple differences-in-time estimates presented in panels (c) and (d) show no diverging pre-trends and an apparent increase in the coefficient in years after the reform. The return on acquired assets increases more in panels (c) and (d) than in (a) and (b), because

²⁰We subtract the average difference-in-differences-in-time estimate from the pre-period to eliminate level differences in the return on acquired assets between control and treatment groups.

panels (c) and (d) take into account additional variation in the tax discount. In particular, the increase in the returns on acquired assets in panels (a) and (b) are between 5% and 10%, and the increases in panels (c) and (d) are between 20% and 25%. The difference in magnitudes between the two analyses mirrors the differences between the difference-in-differences and triple differences estimates in columns (3)–(6) of Table 2.

Overall, both the difference-in-differences- and triple differences-in-time graphical analyses show parallel trends between treatment and control groups in the pre-period and an increase in the return on acquired assets after the reform. These findings support the baseline analysis presented in Table 2.

5 Testing Additional Predictions

In this section, we test several additional predictions that build on our theoretical framework. First, we look for an interaction between our tax discount model and the agency model of dividend taxation proposed by [Chetty and Saez \(2010\)](#). Second, in the spirit of [Ayers et al. \(2004\)](#) and [Faccio and Masulis \(2005\)](#), we explore heterogeneity in the effects of the tax discount by deal financing and size. Finally, we show that our results are robust to alternate outcome measures. The particular alternative outcomes we explore are (1) shorter-run buy-and-hold abnormal returns, (2) changes in acquiring firm ROA, and (3) the quantity of acquisitions made per year.

5.1 Chetty and Saez (2010) Agency Model of Dividend Taxation

[Chetty and Saez \(2010\)](#) propose an agency model of dividend taxation in which large and active shareholders increase their monitoring intensity when tax rates on dividends or capital gains decrease. This theory implies that, after the 2003 tax reform, the return on assets acquired by firms with large and active shareholders should increase, relative to the return on assets acquired by firms without large and active shareholders. We extend this insight to test whether there is an interaction between monitoring and the tax discount. In particular, we examine whether the tax discount effect is larger among firms with large and active shareholders.

To explore this prediction empirically, we follow [Chetty and Saez \(2005\)](#) in using large institutional shareholders as a proxy for large, active monitors. We rank acquisitions, according to the percentage of outstanding shares held by the single largest institutional shareholder of the acquiring firm. We then create an indicator, $\mathbf{I}(\text{Big Owner})$, equal to 1 if an acquisition is in the top half of this ranking. As a first-pass and to test whether the tax discount effect is distinct from the monitoring effect, we add the big owner indicator and the indicator interacted with the post-reform dummy to our triple differences specification. Column (1) of [Table 4](#) reports that our triple differences coefficient is similar in magnitude to our baseline estimate and relatively precisely estimated. This evidence suggests that the tax discount effect is distinct from the monitoring effect.

[[Table 4 about here](#)]

In column (2), we interact our large, active shareholder indicator with all of the terms in equation (15), except controls, to test whether there is an interaction between the tax discount and monitoring effects. Column (2) reports a large coefficient on the interaction of the triple differences and the big owner indicator. This estimate suggests that there is a positive interaction between the tax discount and monitoring effects. These results provide additional support for both the tax discount model we propose and the [Chetty and Saez \(2010\)](#) agency model of dividend taxation. The results also suggest a positive interaction between the two models.

5.2 Deal Characteristics

There is a large literature that demonstrates that taxes can influence how acquisitions are financed ([Ayers, Cloyd and Robinson, 2002](#); [Dhaliwal, Li and Trezevant, 2003](#); [Hanlon, Myers and Shevlin, 2003](#); [Lang and Shackelford, 2000](#); [Ayers, Lefanowicz and Robinson, 2004](#); [Faccio and Masulis, 2005](#)). Based on this literature, we would expect the effect of the tax discount to be greatest for large cash acquisitions, because these types of deals represent more trapped equity and force target shareholders to pay capital gains taxes on acquired assets immediately, as opposed to in the future when they liquidate their holdings.

In column (3) of [Table 4](#), we limit the triple differences analysis to the sample of cash deals

(755 of the 1,121 acquisitions for which we have a method of payment data). The triple differences estimate is more than 50% larger than our baseline estimate and statistically significant at the 5% level. In column (4), we interact an indicator for cash deals with all of the terms in our triple differences specification, except for controls. Here, we find that the triple differences coefficient is now small and insignificant, while the interaction between the triple differences term and the cash deal indicator is large but imprecisely estimated, likely due to the smaller sample size. Together, columns (3) and (4) provide additional support for the tax discount effect and show that its impact depends on the method of payment.

In column (5), we limit the sample to the largest third of acquisitions based on deal value. Among this limited sample, we find a triple differences coefficient very similar in magnitude to our baseline result, though the coefficient is not statistically different from 0 at conventional levels. In column (6), we interact an indicator for large deals with the triple differences terms. Again, we find that the tax discount is greater in magnitude for large deals, but the standard errors on these estimates are large, again likely due to the limited sample size. In sum, the estimates across the method of financing and deal size provide suggestive evidence that the triple differences effects are concentrated among large cash deals. These results are consistent with our tax discount predictions and reinforce findings from the acquisition financing literature.

5.3 Alternative Outcome Measures

5.3.1 Shorter-run Returns on Acquired Assets

Figure 2 provides a second visual representation of the difference-in-differences and triple differences estimation strategies and simultaneously shows that our baseline results are robust to shorter-run estimates of the return on acquired assets. Each line in the panels show the buy-and-hold abnormal return on acquired assets at every monthly interval from 0 to 24 months post-acquisition announcement. The black dotted line represents the buy-and-hold abnormal returns prior to the reform and the solid blue line represents returns after the reform. The four panels depict buy-and-hold abnormal returns separately for dividend-paying and share-repurchasing acquirers and for acquiring firms with the highest and lowest percentages of taxable shareholders.

[Figure 2 about here]

Panel (a) of Figure 2 shows that the return on assets acquired by the most taxable dividend-payers improves at every time interval. Panel (b) shows that the return on assets acquired by the most taxable share-repurchasers declines at every time interval. Panels (c) and (d) show that at 16 or more months, the return on assets acquired by the least taxable firms—regardless of payout method—is unchanged. Comparing panel (a) to panel (b), it is clear that, at every month from 0 to 24, the reform increases the return on assets acquired by the most taxable dividend-payers, relative to the return on assets acquired by the most taxable share-repurchasers. This comparison is equivalent to the difference-in-differences focused on acquisitions made by the most taxable firms in columns (3) and (4) of Table 2.

In contrast to the effects in panels (a) and (b), panels (c) and (d) show that the reform had little effect on the return on assets acquired by firms without taxable shareholders. Comparing the difference between the improvements in panels (a) and (b), which is large and positive always, to the difference between the improvements in panels (c) and (d), which is more or less zero, provides the visual equivalent to the large and positive triple differences estimates in columns (5) and (6) of Table 2.²¹

Overall, the visual evidence presented in Figure 2 supports the Table 2 findings and shows that our the results are robust to calculating buy-and-hold abnormal returns over shorter time horizons.

5.3.2 Using Changes in Return on Assets to Measure Return on Acquired Assets

The analysis thus far has used long-run abnormal stock returns to measure the return on acquired assets. The change in an acquiring firm’s financial statement ROA is a plausible alternative outcome, because acquired assets constitute a percentage of the acquiring firm’s total assets. In

²¹Interestingly, the visual analysis presented in panel (b) of Figure 2 suggests that portions of the difference-in-differences and triple differences estimates presented in Table 2 are driven by a decline in the return on assets acquired by share-repurchasers after the reform. Note that, as we derive in Section 2, the return on acquired assets of share-repurchasers should be unaffected by the reform as the harmonization of tax rates in 2003 eliminates both the tax advantage of share-repurchases and the tax discount on acquisitions. Therefore the change in the return on acquired assets exhibited by these acquisitions captures changes in the market for acquisitions after 2003, relative to pre-2003, and suggests that, in the absence of the reform, we would have expected the return on acquired assets to decrease for dividend-payers, not increase.

Appendix Table A2, we repeat the analysis performed in Table 2 and use the change in the acquiring firm's ROA as the outcome variable.²² The results are remarkably similar to our baseline results. For the difference-in-differences estimates focused on acquisitions made by firms with the highest percentage of taxable shareholders, we see a positive and significant increase in changes in ROA after an acquisition for dividend-payers, relative to share-repurchasers, after the 2003 reform. Like the baseline results, the triple differences estimates based on ROA also suggest an even larger difference in the return on acquired assets between acquisitions made by dividend-payers with taxable shareholders than those made by dividend-payers with nontaxable shareholders after the reform. These estimates support predictions 1 and 2 and give us added confidence that our findings are not spurious and that our buy-and-hold abnormal return outcome accurately measures the return on acquired assets.

5.3.3 Acquisition Quantity

An additional prediction of our model is that the number of acquisitions made by dividend-payers will decrease, relative to share-repurchasers, after the reform. Furthermore, this decrease in acquisitions will be concentrated among firms with the largest percentage of taxable shareholders. To test this prediction, use the number of acquisitions undertaken by a firm in a given year as the outcome variable. We then estimate coefficients from our difference-in-differences and triple differences models, using this acquisitions-per-year outcome.²³

[Table 5 about here]

Column (1) of Table 5 presents our baseline difference-in-differences estimate.²⁴ The difference-in-differences point estimate suggests that acquisitions per year for the average dividend-payers do not decrease, relative to acquisitions per year for average share-repurchasers, after the reform.

²²We calculate this outcome, Δ ROA, as the change in ROA from the average of the two years before the acquisition to the ROA the year after the acquisition.

²³Ideally, we would measure the dollar value of acquisitions performed by a firm in a given year. However, because the value of acquisitions is not recorded in our data for a large portion of deals, we are forced to rely on this more primitive measure of acquisition quantity. Appendix Table A3 presents descriptive statistics for acquisitions-per-year as well as for other variables in the acquisition quantity sample.

²⁴All specifications in Table 5 include controls for firm size, return on assets, debt ratio, cash flow, and financial distress as well as firm and year fixed effects.

However, when we limit the analysis to acquiring firms with the highest percentage of taxable shareholders, we do see a decrease of 0.122 acquisitions per year by dividend-payers, relative to share-repurchasers, after the reform. Because the average acquisitions per year are approximately 0.33, this reduction is a substantial decrease in acquisition activity.

Column (3) presents the baseline triple differences estimate. The triple differences term is similar in magnitude to the difference-in-differences estimate from column (2) but is not statistically significant. The triple differences null result may be due to the fact that many firms perform only one or two acquisitions during the sample period. Therefore, in column (4), we limit the sample to firms that performed at least two acquisitions before the reform. When we focus the analysis on firms that perform the most acquisitions, the triple differences estimate is large and statistically significant at the 5% level. In column (5), we interact an indicator variable equal to 1 if the firm performed at least three acquisitions in the pre-period with triple differences terms. We find a negative and marginally significant effect on the triple differences interaction, which suggests that the triple differences effect is concentrated among the firms that performed the most acquisitions.

Our model predicts that firms substitute between acquisitions and payouts (dividends and share repurchases). We expect therefore that our results will be strongest for the firms that increase their payouts the most. In column (6), we test for this substitution by investigating whether the triple differences effect is concentrated among firms that increased their payouts after 2003.²⁵ To do so, we interact an indicator variable for an increase in total payouts from 1998–2002 to 2004–2008 with the triple differences terms. The coefficient on the interaction is negative and larger in magnitude than the triple differences coefficient in column (3) but is not statistically significant.

Overall, the acquisitions-per-year analysis provides suggestive evidence that the number of acquisitions per year decreased for dividend-payers with the most taxable shareholders, relative to the number of acquisitions per year made by dividend-payers with few taxable shareholders. This pattern is most apparent for firms that perform three or more acquisitions in the years before 2003.

²⁵We measure payouts as the sum of total dividend and share repurchases during the year.

6 Discussion

Our results contribute directly to two broad debates in the literature. We provide a new explanation for the merger performance puzzle and new evidence supporting the new view and agency models of dividend taxation.

6.1 Merger Performance Puzzle

We add to a large and established literature that finds that mergers and acquisitions, on average, fail (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). This finding poses a puzzle, often referred to as the “merger performance puzzle.” The literature attempts to explain why firms perform mergers and acquisition that appear to falter. Estimates from this body of work suggest that the average firm underperforms its benchmark returns by nearly 19 percentage points after an acquisition. In our sample, we similarly find the average firm underperforms by roughly 19 percentage points.

Estimates from specification (2) of Table 2 suggest that the quality of the average acquisition for dividend-payers improved by 5.8 percentage points. Acquisitions performed by firms that paid a dividend make up roughly 52% of the full set of acquisitions, including those made by firms that make no payout and those that pay dividends and repurchase shares. Therefore our estimates suggest that the tax discount diminished the quality of the average acquisition by 3.02 ($= 5.8 \times 0.52$) percentage points prior to the 2003 reform. Relative to the literature’s 19 percentage point benchmark, our findings shows that the tax discount can explain 16% ($= 3.02 / 19$) of the merger performance puzzle prior to 2003.

6.2 Models of Corporate Taxation and the 2003 Tax Reform

Chetty and Saez (2005) and Yagan (2015) find that total payouts increased as a result of the 2003 decrease in payout tax rates. It is hard to reconcile these findings with a new view model of corporate taxation in which permanent changes in payout taxes should not affect payouts or

internal investment levels.²⁶ Chetty and Saez (2005) also find that the increases in payouts were concentrated in firms with active shareholders. Motivated by these findings, Chetty and Saez (2010) propose an agency model of the firm that can explain the observed behavior.

This paper contributes two new pieces of evidence to the discussion on corporate models. First, we find that the effects of eliminating the tax discount in 2003 are concentrated among acquiring firms with large and active shareholders. Chetty and Saez (2010) predict these are the firms that will increase their monitoring intensity most after the reform. Therefore our results provide additional evidence that the Chetty and Saez (2010) agency model of dividend taxation accurately describes how monitoring intensity responds to changes in tax rates on payouts.

Second, we provide an example of a modified new view model, in which payout tax rates *do not* affect internal investment but *do* lead to increased payouts after 2003. Our section 2 model shows that, if we include acquisitions and there is a tax discount, as was the case prior to 2003, then firms will shift away from acquisitions and pay more dividends after the reform. The model suggests that some of the documented increase in payouts, following the reform, may be due to this substitution. Although quantifying this substitution pattern was not the goal of the paper, our most direct empirical test of this behavior (Table 4, column(6)) provides some support. Thus, while our empirical results support the agency model, we also demonstrate that a new view model that incorporates acquisition behavior predicts increases in payouts, following the 2003 reform.

7 Conclusion

We investigate the role of dividend and capital gains taxation on the quality of acquisition investment. Building on the insights of Auerbach and Reishus (1987), we demonstrate how investor-level taxes can create a tax discount that distorts acquisition behavior within a new view model, where investor-level taxes do not distort internal investment. This distortion encourages firms to acquire more assets, which decreases the return on acquired assets and the average quality of acquisitions.

Using variation in investor-level tax rates created by the 2003 reform, variation in acquiring firm

²⁶King (1977), Auerbach (1979a), and Bradford (1981) argue that the new view best describes corporate responses to payout taxation. Harberger (1962), Harberger (1966), Feldstein (1970) and Poterba and Summers (1985) support the old view in which payout taxes depress payouts and increase internal investment.

payout strategies, and variation in the percentage of acquiring firm shareholders that are subject to investor-level taxes, we test for the effects of the tax discount on the return on acquired assets. We find the return on acquired assets increased by 18 percentage points for acquisitions made by firms that pay dividends and have fully taxable shareholders after the tax reform in 2003. This estimate is close to our model's equivalent prediction of a 23 percentage point prediction increase in the return on acquired assets.

Our results have direct implications for the applied design of tax policy. Our results show that differential tax rates on dividend and capital gains induce inefficient, value-destroying mergers and acquisitions. We estimate that re-imposing the pre-2003 tax discount would decrease the value of aggregate M&A by more than \$59 billion. While the tax rates on capital gains and dividends have remained equal since 2003, a number of proposals have suggested increasing the tax rate on dividends but not on capital gains. In addition, a number of countries throughout the world continue to impose different tax rates on dividends and capital gains.

We hope this research generates future explorations of the effects of investor-level taxation on mergers and acquisitions. As a first pass, evidence from other countries can be used to confirm, expand upon, and tailor our results. An additional avenue for future work might lead researchers to test how the payout strategies of targets affect merger and acquisition behavior.

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8 Tables

Table 1: Descriptive Statistics

(a) Acquisitions by dividend-payers (DIV = 1)					(b) Acquisitions by share-repurchasers (DIV = 0)				
	mean	std dev	median	obs		mean	std dev	median	obs
<i>Outcome</i>					<i>Outcome</i>				
24 Month BHAR	-20.801	18.477	-17.849	332	24 Month BHAR	-19.015	17.659	-16.137	1,666
<i>Tax Status</i>					<i>Tax Status</i>				
Taxable %	0.387	0.247	0.336	332	Taxable %	0.321	0.293	0.264	1,666
I(Most Taxable)	0.572	0.495	1.000	332	I(Most Taxable)	0.455	0.498	0.000	1,666
<i>Controls</i>					<i>Controls</i>				
Ln(Assets)	6.997	1.620	6.807	332	Ln(Assets)	6.555	1.629	6.587	1,666
ROA	0.031	0.099	0.043	332	ROA	0.030	0.097	0.043	1,666
Debt Ratio	0.565	0.191	0.577	332	Debt Ratio	0.483	0.231	0.464	1,666
Cash Flow	0.746	1.684	0.503	332	Cash Flow	1.140	2.144	0.727	1,666
Financial Distress	-5.423	1.238	-5.300	332	Financial Distress	-5.152	1.209	-5.221	1,666
<i>Sample Splits</i>					<i>Sample Splits</i>				
I(Big Owner)	0.458	0.499	0.000	332	I(Big Owner)	0.498	0.500	0.000	1,666
I(Cash Deal)	0.605	0.490	1.000	157	I(Cash Deal)	0.685	0.465	1.000	964
I(Big Deal)	0.576	0.496	1.000	191	I(Big Deal)	0.485	0.500	0.000	994

Notes: Table 1 presents descriptive statistics for all variables used in the return on acquired assets analysis (Tables 2–4 and Figures 1–2). The observational unit is an acquisition. Panel (a) presents summary statistics for acquisitions made by dividend-payers. Panel (b) presents summary statistics for acquisitions made by share-repurchasers. 24 month BHAR is the 24-month post-acquisition buy-and-hold abnormal returns of the acquiring firm. Taxable % is the percentage of the firm not held by institutional investors. I(Most Taxable) is an indicator equal to 1 for firms in the top half of the Taxable % distribution. Ln(Assets) is the log of the acquiring firm’s total assets. ROA is the acquiring firm’s return on assets. Cash Flow is an acquiring firm’s income before extraordinary items plus depreciation and amortization divided by lagged property, plant, and equipment. Financial Distress is the [Hadlock and Pierce \(2010\)](#) measure of financial distress. I(Big Owner) is an indicator equal to 1 if an acquiring firm is in the top half of the largest single institutional shareholder distribution. I(Cash Deal) is an indicator equal to 1 if deal method of payment is defined as cash and 0 if deal method of payment is neither cash nor missing. I(Big Deal) is an indicator equal for the largest third of deals.

Table 2: Effect of the Tax Discount on the Return on Acquisition Assets

	(1)	(2)	(3)	(4)	(5)	(6)
	BHAR24	BHAR24	BHAR24	BHAR24	BHAR24	BHAR24
DIV	-3.764** (1.533)	-5.564*** (1.503)	-4.020* (2.081)	-6.113*** (1.977)	-3.627 (2.882)	-3.356 (2.931)
POST	-1.741* (0.919)	-0.718 (0.923)	-7.129*** (1.471)	-2.459 (1.506)	0.582 (1.496)	2.351 (1.473)
DIV \times POST (DD)	3.795* (2.228)	5.800*** (2.173)	11.21*** (3.156)	9.100*** (3.013)	-1.726 (3.804)	-0.984 (3.737)
Taxable %					-3.045 (2.763)	4.125 (2.691)
POST \times Taxable %					-12.52*** (3.604)	-9.447*** (3.494)
DIV \times Taxable %					-1.541 (6.391)	-4.873 (6.296)
DD \times Taxable % (DDD)					20.80** (9.028)	18.06** (8.493)
Observations	1998	1998	948	948	1998	1998
Adjusted R ²	0.00221	0.106	0.0242	0.138	0.0349	0.110
I(Most Taxable)			✓	✓		
Controls		✓		✓		✓

Notes: Table 2 presents coefficient estimates from regressions in the form of equation (14). The dependent variable in all specifications is the 24 month the buy-and-hold abnormal return calculated 24 months post acquisition announcement. DIV is an indicator equal to 1 if the acquisition is made by a firm that only pays dividends and 0 if the acquisition is made by a firm that only repurchases shares. POST is equal to 1 if the acquisition is made in 2004 or later and equal to 0 if the acquisition is made in 2002 or earlier. Taxable% is the percentage of shares owned by non-institutional investors. Specifications (3) and (4) are limited to the 50% of acquisitions in the top half of the Taxable% distribution. Specifications (2), (4), and (6) include controls for acquiring firm size, return on assets, debt ratio, cash flow, and financial distress. Standard errors are presented in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Effect of Tax Discount on Return on Acquired Assets; Sensitivity Analysis

	(1)	(2)	(3)	(4)	(5)	(6)
	BHAR24	BHAR24	BHAR24	BHAR24	BHAR24	BHAR24
DIV \times POST (DD)	-0.984 (3.715)	-7.927** (3.765)	-3.407 (3.830)	-1.247 (3.855)	-0.695 (3.781)	-7.266* (3.783)
DD \times Taxable % (DDD)	18.06** (8.370)	24.54*** (8.206)	23.57*** (9.065)	21.28** (9.136)	17.69** (8.571)	24.20*** (8.293)
Observations	1998	1998	1998	1998	1997	1997
Adjusted R ²	0.110	0.153	0.0358	0.0246		
Controls	✓	✓	✓	✓	✓	✓
Two-way Clustering	✓					
Year FE		✓				✓
2003 Acquisitions			✓			
E-Balanced				✓		
Lasso-selected Controls					✓	✓

Notes: Table 3 shows the robustness of our baseline triple differences result (specification (6) from Table 2) to a host of alternative specifications. Specification (1) two-way clusters standard errors accounting for correlations within firms and over time. Specification (2) includes year fixed effects as opposed to an indicator for years after 2003. Specification (2) includes 2003 as part of the post period. Specification (4) uses the entropy balancing technique introduced in Hainmueller (2012) to create comparable samples of acquisitions by dividend-paying and share-repurchasers based on acquiring firm size, return on assets, debt ratios, cash flow, financial constraint, and percentage of taxable shareholders. Specification (5) uses machine learning (lasso method) to choose control variables from a more exhaustive list of potential confounders including acquiring firm size, return on assets, debt ratios, cash flow, financial constraint, Tobin's Q, whether a firm has a large institutional investor, and interactions between each of these controls. Specification (6) includes year fixed effects as in (2) and uses the lasso method to select control variables as in (5). Standard errors are presented in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Effect of Tax Discount on Return on Acquired Assets; Heterogeneity Analysis

	(1)	(2)	(3)	(4)	(5)	(6)
	BHAR24	BHAR24	BHAR24	BHAR24	BHAR24	BHAR24
DIV \times POST (DD)	-0.729 (3.724)	9.793 (5.969)	-7.664 (5.729)	-0.108 (8.519)	3.045 (7.030)	-2.349 (6.038)
DD \times Taxable % (DDD)	17.48** (8.504)	0.317 (11.43)	30.47** (14.14)	-0.0492 (20.81)	19.66 (15.77)	-2.316 (17.99)
Big Owner	0.848 (1.447)	1.470 (2.825)				
POST \times I(Big Owner)	-1.146 (1.698)	-2.341 (3.037)				
DD \times I(Big Owner)		-20.60*** (7.787)				
DDD \times I(Big Owner)		50.02*** (19.28)				
DD \times I(Cash Deal)				-9.030 (9.877)		
DDD \times I(Cash Deal)				33.06 (24.65)		
DD \times I(Big Deal)						3.457 (8.640)
DDD \times I(Big Deal)						25.38 (23.65)
Observations	1998	1998	755	1121	593	1185
Adjusted R ²	0.110	0.115	0.128	0.137	0.177	0.125
Controls	✓	✓	✓	✓	✓	✓
Sample	All Deals	All Deals	Cash Deals	All Deals	Big Deals	All Deals

Notes: Table 4 examines whether Table 2 results are heterogeneous across various subgroups All specifications are based on specification (6) from Table 2. Specification (1) includes an indicator for a large institution shareholder owning more than 9% of shares and this indicator interacted with the post-reform indicator. Specification (2) includes interactions between the large institution shareholder indicator and the triple differences terms as subsidiary controls. Specification (3) limits the analysis to cash deals. Specification (4) interactions the triple differences terms with an indicator for cash deals. Specification (5) limits the analysis to the largest deals. Specification (6) includes interactions between the triple differences terms with an indicator for large deals. All specifications include controls for acquiring firm size, return on assets, debt ratio, cash flow, and financial distress. Standard errors are presented in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

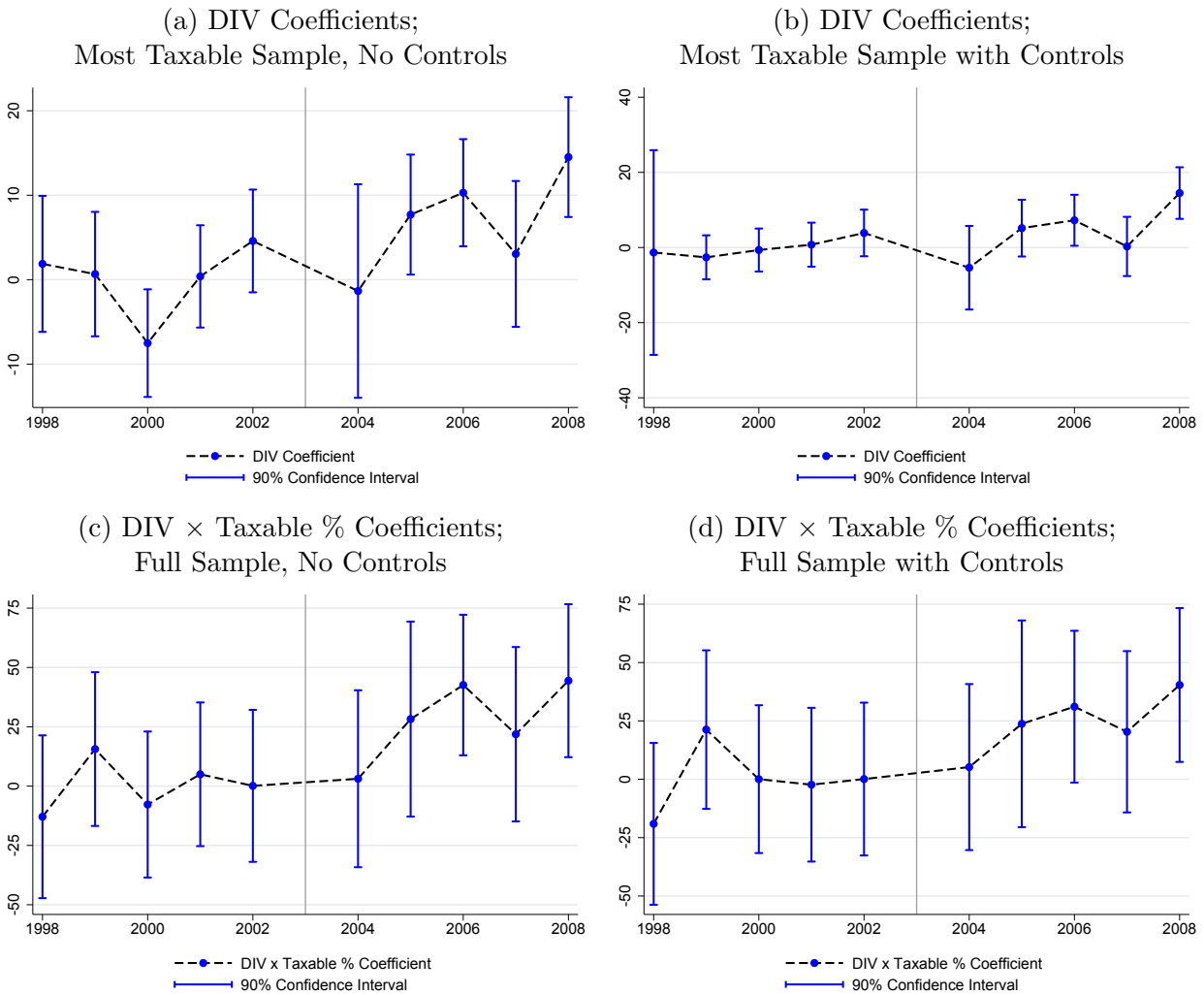
Table 5: Effect of Tax Discount on Acquisition Quantity

	(1)	(2)	(3)	(4)	(5)	(6)
	Acq/Year	Acq/Year	Acq/Year	Acq/Year	Acq/Year	Acq/Year
DIV \times POST (DD)	-0.0391 (0.0255)	-0.122*** (0.0403)	0.0215 (0.0654)	0.171 (0.153)	-0.0536 (0.0687)	-0.0866 (0.0891)
DD \times Taxable % (DDD)			-0.143 (0.0944)	-0.516** (0.236)	-0.0336 (0.0983)	-0.0473 (0.127)
DD \times I(Most Acquisitions)					0.217 (0.165)	
DDD \times I(Most Acquisitions)					-0.462* (0.255)	
DD \times I(Payout Increase)						0.239* (0.132)
DDD \times I(Payout Increase)						-0.194 (0.192)
Observations	5593	2602	5593	1067	5593	5593
Adjusted R ²	0.0352	0.0583	0.0407	0.151	0.0543	0.0411
Most Taxable Sample		✓				
Most Acquisitions Sample				✓		

Notes: Table 5 presents estimates of the effect of eliminating the tax wedge on acquisition quantity. Specification (1) presents the baseline difference-in-differences model. Specification (2) limits the difference-in-differences model to firms with a high percentage of taxable shareholders. Specification (3) presents the triple differences model. Specification (4) limits the triple differences model to firms that made more than three acquisitions during the pre-period. Specification (5) adds interactions triple differences terms and an indicator equal to 1 if the firms made more than three acquisitions during the pre-period. Specification (5) interacts the triple differences terms with an indicator equal to 1 if the firm increased total payouts after the tax reform. All specifications include firm and year fixed effects and control for firm size, return on assets, debt ratio, cash flow, and financial distress. Standard errors are clustered at the firm level and presented in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

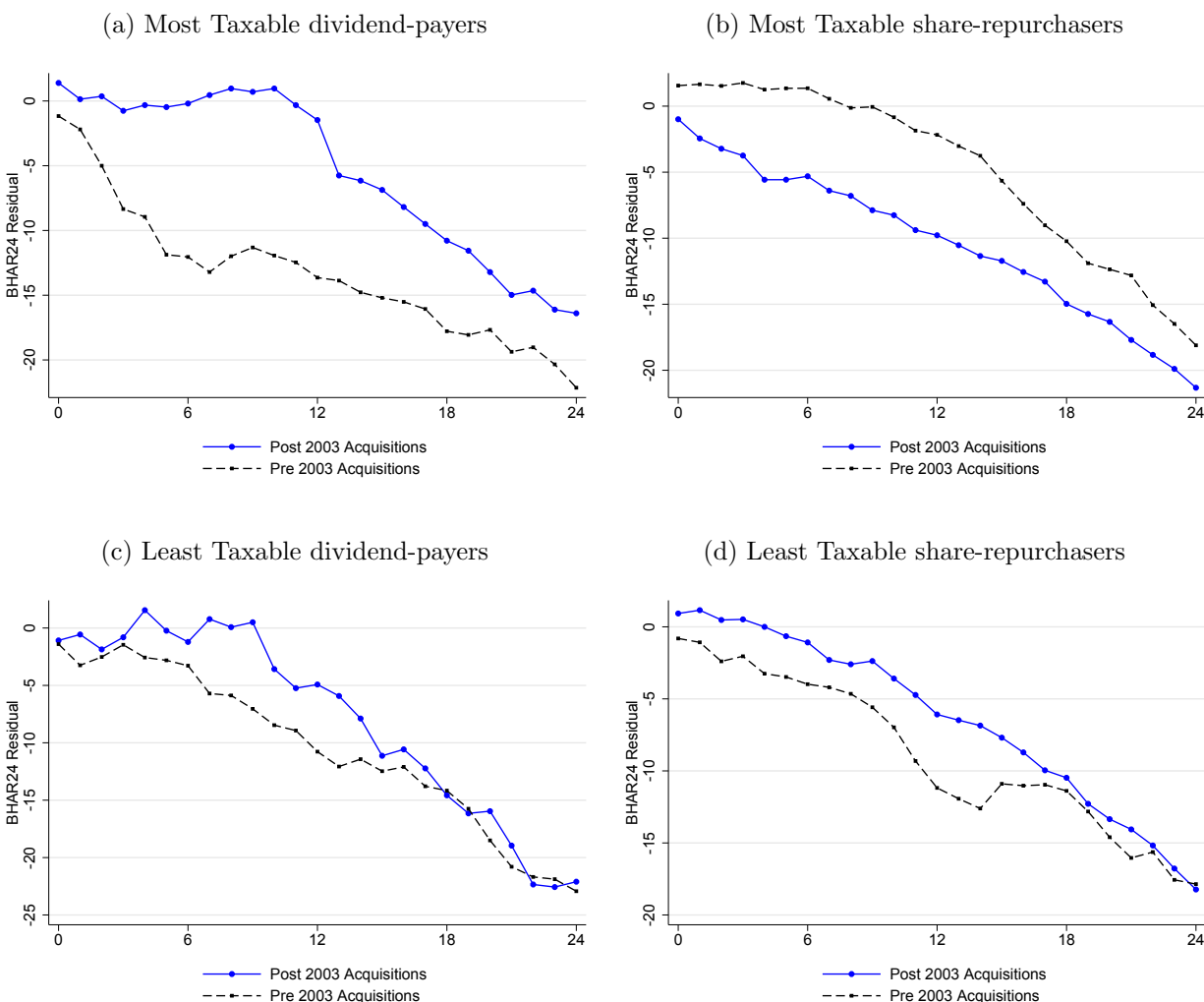
9 Figures

Figure 1: Effect of Tax Discount on Return on Acquired Assets; Graphical Analysis



Notes: Figure 1 presents graphical representations of the main difference-in-differences and triple differences empirical results. To produce the coefficients and 90% confidence intervals in Panels (a) and (b), the $\text{DIV} \times \text{POST}$ in equation (14) is replaced with an interaction between DIV and indicators for each year 1998–2008, excluding 2003. To produce the coefficients and confidence intervals in Panels (c) and (d), we replace the POST indicator in the difference-in-differences and triple differences terms in equation (15) with indicators for years 1998–2008, excluding 2003. Coefficients in panels (b) and (d) are estimated in the presence of acquiring firms controls.

Figure 2: Evolution of Return on Acquired Assets



Notes: Figure 2 presents a visual representation of the triple differences estimates over the 24-month post-acquisition period. Panel (a) presents averaged residualized BHARs (after raw BHARs were regressed on control variables) for acquisitions made by most taxable dividend-payers pre and post 2003. Panel (b) presents the same data for acquisitions made by the least taxable dividend-payers pre and post 2003. Panel (c) presents the same data for acquisitions made by most taxable share-repurchasers pre and post 2003. Panel (d) presents the same data for acquisitions made by the least taxable share-repurchasers pre and post 2003. The difference between the blue and black lines at any month interval 0 to 24 in each panel is the improvement in acquisition quality after the reform. Comparing the difference between the improvements in panels (a) and (b) to the the difference between the improvements in panels (c) and (d) provides a visually equivalent to the triple differences estimate.

A Appendix Model

This appendix extends our model in three ways. First, we allow for the target to receive a premium in the acquisition, which allows for a general model of bargaining between the target and acquiring firm. Second we generalize the amount of trapped equity within the target. Finally, we include a firm specific cost to distributing retained earnings as share repurchases rather than dividends, which helps to explain why some firms choose different payout strategies. These extensions make the derivations of the model more complex, but, as we show, do not change the predictions of the model.

A.1 The Targets' Optimization

To incorporate a general bargaining model and to generalize the amount of trapped equity, we first update the target's optimization. targets accept an acquisition as long as the proceeds exceed the value to a target's shareholders when the firm is not acquired,

$$\begin{aligned}
 qA - \tau_{cg}(qA - \xi) &\geq (1 - \tau_d) \frac{(1 - \tau_c)A}{1 + r} \\
 (1 - \tau_{cg})qA &\geq (1 - \tau_d) \frac{(1 - \tau_c)A}{1 + r} - \tau_{cg}\xi \\
 qA &\geq (1 - \tau_d) \frac{(1 - \tau_c)A}{(1 - \tau_{cg})(1 + r)} - \frac{\tau_{cg}}{1 - \tau_{cg}}\xi
 \end{aligned} \tag{16}$$

We assume that the equilibrium proceeds, which come from a bargaining process, is given by

$$qA = \phi(1 - \tau_d) \frac{(1 - \tau_c)A}{(1 - \tau_{cg})(1 + r)} - \phi \frac{\tau_{cg}}{1 - \tau_{cg}}\xi \tag{17}$$

where $\phi \geq 1$ represents a premium the target's shareholders receive.

There are several interesting notes about the generalized price of acquisitions in equation (17). First, the capital gains tax rate is in the price as long as there is trapped equity $qA > \phi\xi$. Second, the price decreases as the basis increases. This occurs because targets are more willing to sell and pay a lower capital gains tax on a lower amount rather than liquidate and pay the dividend tax on the full value. Third, the price increases with the surplus parameter ϕ .

A.2 Payout Decisions

The acquiring firm's payouts, P , may be made as a dividend or as a share repurchase. Repurchasing shares in period 1 has the advantage of avoiding dividend taxes in period two because share repurchases are taxed as long-term capital gains at a rate τ_{cg} . However, it is an empirical fact that even when τ_d has been substantially larger than τ_{cg} , firms often pay dividends but do not repurchase shares (Farre-Mensa et al., 2014). As a result, share repurchases must have non-tax costs relative to dividends. The costs may exist for many reasons but a few examples are (1) because the information content of share repurchases may significantly reduce share prices, (2) because share repurchases may be used to artificially inflate earnings per share numbers, or (3) because, in order to benefit, shareholders must relinquish ownership.

Our model takes as given that some firms pay dividends and others repurchase shares. We can loosen this assumption by explicitly modeling the non-tax costs of different payout choices. In particular, let ψ capture the non-tax costs of share repurchases relative to dividends. This modeling choice follows similar models in [Bond et al. \(2005\)](#) and [Hausch and Seward \(1993\)](#). With this cost, the after-tax value of a dollar of dividends is $(1 - \tau_d)$ and the value of a dollar of share repurchases is $(1 - \psi\tau_{cg})$.²⁷ Firms choose to make period 1 payouts as dividends if

$$(1 - \tau_d) \geq (1 - \psi\tau_{cg}) \Rightarrow \psi \leq \tau_d/\tau_{cg}$$

and choose to make period 1 payouts as share repurchases if

$$(1 - \tau_d) \leq (1 - \psi\tau_{cg}) \Rightarrow \psi \geq \tau_d/\tau_{cg}.$$

The effective payout tax rate (that incorporates non-tax costs) can then be written as, $\tau_p = \tau_d$ for firms that pay dividends or $\tau_p = \psi\tau_{cg}$ for share-repurchasers.

A.3 Acquiring Firm's Optimization

The objective function and first-order conditions remain the same with our three extensions. The condition for the rate of return on acquired assets, however, is updated with a different acquisition price, q , from a target's optimization. In particular, equation (8) is now given by,

$$\begin{aligned} G'(A) &= \frac{1+r}{1-\tau_c} \frac{1-\tau_p}{1-\tau_d} q \\ &= \frac{1+r}{1-\tau_c} \frac{1-\tau_p}{1-\tau_d} \phi (1-\tau_d) \frac{(1-\tau_c)}{(1-\tau_{cg})(1+r)} - \frac{1+r}{1-\tau_c} \frac{1-\tau_p}{1-\tau_d} \phi \frac{\tau_{cg}}{1-\tau_{cg}} \frac{\xi}{A} \\ &= \frac{1-\tau_p}{1-\tau_{cg}} \phi - \frac{1+r}{1-\tau_c} \frac{1-\tau_p}{1-\tau_d} \phi \frac{\tau_{cg}}{1-\tau_{cg}} \frac{\xi}{A} \\ &= \frac{1-\tau_p}{1-\tau_{cg}} \phi \left(1 - \frac{1+r}{1-\tau_c} \frac{\tau_{cg}}{1-\tau_d} \frac{\xi}{A} \right) \end{aligned}$$

A.4 Distortions from the Tax Discount

Proposition 1 states that a firm's return from acquisitions is decreasing in the firm's tax discount. This proposition follows directly from the acquiring firm's first-order condition with respect to acquisitions and the definition of the tax discount. In particular, a firm's return from acquisitions equals one minus the tax discount.

This appendix extends our model to allow for (1) a general bargaining model, (2) a general amount of trapped equity in a target, and (3) a choice of payout between dividends and share

²⁷Without sacrificing any substance, ψ can also be defined as the non-tax preference for dividends relative to share repurchases. In this case, firms may choose to pay dividends despite the extra tax cost (1) because shareholders believe they constrain managerial excess ([Easterbrook, 1984](#)), (2) because they cater to certain investor clienteles ([Miller and Modigliani, 1961](#)), or (3) because dividends were initiated in the past and investors punish firms that do not continue to deliver regular dividends. A large literature has discussed these reasons for dividend payouts, and other theories have been proposed to explain why dividend payments persist when share repurchases are tax advantaged (see [Allen et al. \(2000\)](#), [Allen and Michaely \(2003\)](#), [Brav et al. \(2005\)](#), [Denis and Osobov \(2008\)](#), and [Crane et al. \(2016\)](#)).

repurchases. As stated in the text, as long as (1) acquiring firms gain some of the surplus from the tax discount and (2) there is trapped equity within targets, then proposition 1 holds.

To show that proposition 1 holds in these cases, first note that the acquiring firm is better off not making any acquisitions for a sufficiently large premium given to the target. In this case, a firm's return on acquired assets does not depend on the tax discount because there are no acquired assets. This only occurs, however, if the acquiring firm does not gain any surplus from the tax discount. Therefore, for a sufficiently low ϕ the acquiring firm makes acquisitions. Specifically, $\phi < G'(0)(1 - \tau_c)(1 - \tau_d)/(\tilde{q}(1 + r)(1 - \tau_p))$, where \tilde{q} is the price of acquiring assets with $\phi = 1$.

To show that the acquisitions firms make are distorted by the tax discount, consider the derivative of $r_A \equiv G'(A)$ with respect to the tax discount,

$$\frac{\partial r_A}{\partial(1 - \frac{1-\tau_p}{1-\tau_{cg}})} = -\phi \left(1 - \frac{1+r}{1-\tau_c} \frac{\tau_{cg}}{1-\tau_d} \frac{\xi}{A} \right). \quad (18)$$

This derivative is negative as long as,

$$\begin{aligned} \xi &< \frac{(1-\tau_c)(1-\tau_d)}{\tau_{cg}(1+r)} A \\ &< qA \frac{1-\tau_{cg}}{\phi} + \tau_{cg}\xi \\ (1-\tau_{cg})\xi &< qA \frac{1-\tau_{cg}}{\phi} \\ \xi &< qA \frac{1}{\phi} \end{aligned} \quad (19)$$

which is the condition that there is trapped equity in targets.²⁸ In summary, the return on acquired assets is decreasing in the tax discount as long as (1) acquiring firms gain some of the surplus from the tax discount and (2) there is trapped equity within targets.

A.5 Predictions

If $\xi = 0$, the predictions are the same in differences ($r_A = \phi$ for share repurchase firms before and after the tax reform).

If $\xi > 0$, then share repurchase firms will face a difference. $G'(A)$ increases for share repurchase firms after the tax reform. This will make it harder for us to find an effect if there is less trapped equity in targets.

²⁸Note that, $\frac{\partial r_A}{\partial \tau_d} < 0$, $\frac{\partial r_A}{\partial \tau_{cg}} > 0$ and $\frac{\partial r_A}{\partial \tau_p} < 0$.

$$\begin{aligned}
r_A(\tau_p = \tau_{d,0}|t = 0) &= \frac{1 - \tau_{d,0}}{1 - \tau_{cg,0}} \phi \left(1 - \frac{1 + r}{1 - \tau_c} \frac{\tau_{cg,0}}{1 - \tau_{d,0}} \frac{\xi}{A} \right) \\
r_A(\tau_p = \tau_{d,1}|t = 1) &= \phi \left(1 - \frac{1 + r}{1 - \tau_c} \frac{\tau_{cg,1}}{1 - \tau_{d,1}} \frac{\xi}{A} \right) \\
r_A(\tau_p = \tau_{cg,0}|t = 0) &= \phi \left(1 - \frac{1 + r}{1 - \tau_c} \frac{\tau_{cg,0}}{1 - \tau_{d,0}} \frac{\xi}{A} \right) \\
r_A(\tau_p = \tau_{cg,1}|t = 1) &= \phi \left(1 - \frac{1 + r}{1 - \tau_c} \frac{\tau_{cg,1}}{1 - \tau_{d,1}} \frac{\xi}{A} \right)
\end{aligned}$$

After the tax reform, the return on acquired assets increases for dividend-payers,

$$\begin{aligned}
r_A(\tau_p = \tau_{d,1}|t = 1) - r_A(\tau_p = \tau_{d,0}|t = 0) &= \\
\frac{1 + r}{1 - \tau_c} \frac{\xi}{A} \left(\frac{\tau_{cg,0}}{1 - \tau_{cg,0}} - \frac{\tau_{cg,1}}{1 - \tau_{d,1}} \right) + \phi \left(1 - \frac{1 - \tau_{d,0}}{1 - \tau_{cg,0}} \right) &> 0
\end{aligned} \tag{20}$$

and for share repurchase firms,

$$\begin{aligned}
r_A(\tau_p = \tau_{cg,1}|t = 1) - r_A(\tau_p = \tau_{cg,0}|t = 0) &= \\
\frac{1 + r}{1 - \tau_c} \frac{\xi}{A} \left(\frac{\tau_{cg,0}}{1 - \tau_{d,0}} - \frac{\tau_{cg,1}}{1 - \tau_{d,1}} \right) &> 0.
\end{aligned} \tag{21}$$

The increase in return on acquired assets, however, is larger for dividend-payers,

$$\begin{aligned}
(r_A(\tau_p = \tau_{d,1}|t = 1) - r_A(\tau_p = \tau_{d,0}|t = 0)) - (r_A(\tau_p = \tau_{cg,1}|t = 1) - r_A(\tau_p = \tau_{cg,0}|t = 0)) &= \\
\phi \left(1 - \frac{1 - \tau_{d,0}}{1 - \tau_{cg,0}} \right) + \frac{1 + r}{1 - \tau_c} \frac{\tau_{cg,0}}{1 - \tau_{cg,0}} \frac{\xi}{A} &> 0.
\end{aligned} \tag{22}$$

Notice that, when $\phi = 1$ and $\xi = 0$, as we assume in the text, this difference reduces to the tax discount.

B Acquisition Sample Construction

Table A1 summarizes steps we take to construct the sample of acquisitions that we use in the majority of the empirical analyses. The first step is to download data on the 15,274 deals made by publicly listed firms on the NYSE or NASDAQ during the years 1998–2008 from Amadeus’ Zephyr database. Second, we restrict attention to deals in which the acquirer purchased 100% of the target. This decreases our sample by 5,302 acquisitions, leaving us with 9,972 deals. In step 3., we eliminate acquisitions made by acquiring firms that made more than twenty acquisitions in the sample period. This reduces our sample by 1,755 deals, leaving us with 8,217 deals. Next, we must eliminate 1,036 deals for which we cannot construct 24 month buy-and-hold abnormal returns. This leaves us with 7,181 deals. We lose another 393 deals because institutional shareholding data from Thomson Reuters 13f filings or control variable data from Compustat are not available. This cut leaves us with 6,788 deals. Finally, we limit the sample to the 1,998 acquisitions that were made by firms that only paid dividends or only repurchased shares in the two years before a given acquisition. This choice follows directly from our theoretical model.

Table A1: Acquisition Sample Construction

	Limiting Description	End Count
1.	Acquisition by Publicly Traded Companies 1998–2008	15,274
2.	100% Acquisitions	9,972
3.	Acquisitions by firms performing fewer than 20 acquisitions	8,217
4.	Data to construct 24 month BHARs	7,181
5.	Adequate payout, institutional holding, and control variable data	6,788
6.	Dividend only or share-repurchasing only acquisition	1,998

Notes: Table A1 summarizes the construction of our analysis sample.

C Randomization Inference

A concern is that our estimation strategies may over-reject the null hypothesis when error terms are serially correlated (Bertrand et al., 2004). To combat these concerns we perform a randomization inference test similar to those used in Chetty et al. (2009) and Zidar (2015).

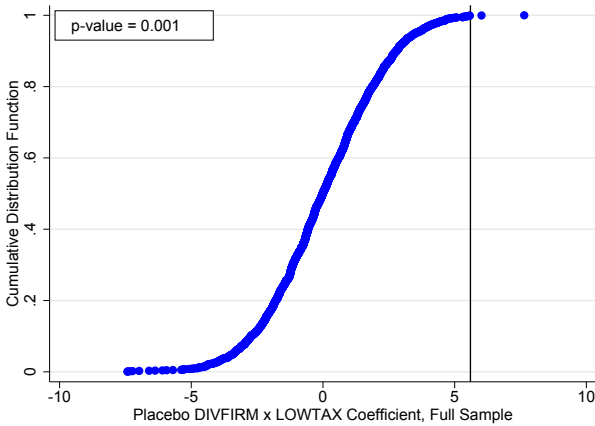
We begin by randomly assigning each acquisition another acquisition’s payout form and year of acquisition, without replacement. This effectively randomizes the payout type and whether the acquisition was performed in the pre- or post-period while maintaining the underlying structure of the data. We then replicate the difference-in-differences analysis from column (4) of Table 2 and the triple differences analysis from column (6) of the same table. We store the coefficients of interest from each regression then repeat the process another 1,999 times.

Panel (a) of Figure A1 displays an empirical CDF of the 2,000 placebo difference-in-differences coefficients. No parametric smoothing is applied; the CDF looks smooth because of the large number of points used to construct it. The vertical black line represents the real difference-in-differences effect size from column (4) of Table 2. Only 3 out of the 2,000 placebo coefficients are larger than the original difference-in-differences estimate of 9.100, implying a nonparametric p -value of 0.0015. As this estimate suggests statistical significance at the 1% level, it matches the statistical significance level of the difference-in-differences coefficient in column (4) of Table 2.

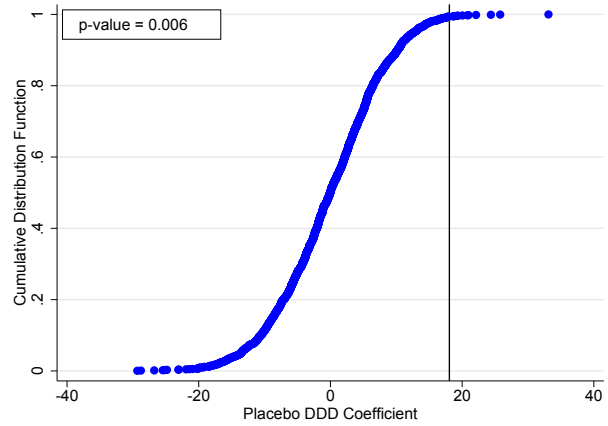
Panel (b) of Figure A1 presents the empirical CDF of the 2,000 triple differences coefficients. Here, 12 of the 2,000 placebo coefficients are larger than the column (6) Table 2 triple differences coefficient of 18.06, implying a nonparametric p -value of 0.012. As this estimate suggests statistical significance at the 1% level, it suggests the standard error on the triple differences coefficient in column (6) of Table 2 are conservative.

Figure A1: Randomization Inference CDFs and p -values

(a) difference-in-differences Coefficient, Most Taxable Sample



(b) triple differences Coefficient



Notes: Figure A1 presents empirical CDFs based on 2,000 difference-in-differences placebo regression coefficients (panel (a)) and 2,000 triple differences placebo regression coefficients. The coefficients are generated by randomly assigning each acquisition another acquisition's payout form (dividend or share-repurchase and year) of acquisition, without replacement. Then we estimate the difference-in-differences and triple differences models from the column (4) and column (6) models of Table 2. We then store the coefficients and repeat the procedure 1,999 times. 3 of the 2,000 placebo coefficients in panel (a) are larger than the original difference-in-differences estimate of 5.598, implying a nonparametric p -value of 0.0015. 12 of the 2,000 placebo coefficients in panel (b) are larger than the original triple differences estimate of 18.06, implying a nonparametric p -value of 0.006.

D Return on Assets

A2 repeats the analysis presented in Table 2 replacing the 24 month buy-and-hold abnormal return outcomes with acquiring firms' changes in ROA. The change is calculated as the difference between the ROA two years after the acquisitions relative to the average ROA in the two years prior to the acquisition.

Table A2: Effect of the Tax Discount on Changes in ROA

	(1)	(2)	(3)	(4)	(5)	(6)
	Δ ROA	Δ ROA	Δ ROA	Δ ROA	Δ ROA	Δ ROA
DIV	-1.097 (1.255)	-1.766 (1.186)	-2.409 (1.467)	-2.823* (1.513)	2.697 (2.417)	1.667 (2.209)
POST	-2.396*** (0.820)	-1.201 (0.806)	-3.914*** (1.450)	-3.300** (1.427)	-2.290* (1.246)	-0.952 (1.212)
DIV \times POST (DD)	1.178 (2.065)	1.032 (1.974)	6.396*** (2.331)	5.253** (2.234)	-6.706 (4.286)	-5.995 (4.130)
Taxable %					0.857 (2.516)	0.304 (2.448)
POST \times Taxable %					0.255 (3.241)	-0.882 (3.204)
DIV \times Taxable %					-10.17* (5.641)	-9.235* (5.578)
DD \times Taxable % (DDD)					19.95** (9.144)	18.50** (8.978)
Observations	1871	1871	847	847	1871	1871
Adjusted R ²	0.00255	0.0530	0.00691	0.0514	0.00439	0.0538
Most Taxable			✓	✓		
Controls		✓		✓		✓

Notes: Table A2 repeats the analysis presented in Table 2 replacing the abnormal return outcome variable with change in the acquiring firm's return on assets between the average in the two years prior to the acquisition and the return two years after the acquisition was announced (Δ ROA). DIV is an indicator equal to 1 if the acquisition is made by a firm that only pays dividends and 0 if the acquisition is made by a firm that only repurchases shares. POST is equal to 1 if the acquisition is made in 2004 or later and equal to 0 if the acquisition is made in 2002 or earlier. Taxable% is the percentage of shares owned by non-institutional investors. Specifications (3) and (4) are limited to the 50% of acquisitions in the top half of the Taxable% distribution. Specifications (2), (4), and (6) include controls for acquiring firm size, return on assets, debt ratio, cash flow, and financial distress. Standard errors are presented in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

E Acquisition Quantity Descriptive Statistics

Table A3: Descriptive Statistics, Acquisition Quantity Sample

(a) dividend-payers (DIV = 1)

(b) share-repurchasers (DIV = 0)

	mean	std dev	median	obs		mean	std dev	median	obs
<i>Outcome</i>					<i>Outcome</i>				
Acquisitions per Year	0.314	0.464	0.000	3,582	Acquisitions per Year	0.333	0.472	0.000	3,431
<i>Tax Status</i>					<i>Tax Status</i>				
Taxable %	0.642	0.277	0.699	3,582	Taxable %	0.512	0.305	0.488	3,431
I(Most Taxable)	0.591	0.492	1.000	3,582	I(Most Taxable)	0.409	0.492	0.000	3,431
<i>Controls</i>					<i>Controls</i>				
Ln(Assets)	6.280	2.156	6.444	3,582	Ln(Assets)	5.474	1.732	5.406	3,431
ROA	-0.188	0.859	0.010	2,847	ROA	-0.010	0.357	0.044	3,410
Debt Ratio	0.739	0.849	0.753	3,579	Debt Ratio	0.457	0.458	0.414	3,423
Cash Flow	-1.116	11.297	0.512	3,240	Cash Flow	0.416	7.128	0.462	3,055
Financial Distress	-4.953	1.600	-5.138	3,582	Financial Distress	-4.448	1.334	-4.360	3,431
<i>Sample Splits</i>					<i>Sample Splits</i>				
I(Most Acquisitions)	0.177	0.381	0.000	3,582	I(Most Acquisitions)	0.222	0.415	0.000	3,431
I(Payout Increase)	0.587	0.493	1.000	3,582	I(Payout Increase)	0.416	0.493	0.000	3,431

Notes: Table A3 presents descriptive statistics for all variables used in the acquisition quantity analysis (Table 5). The observational is a firm-year. Panel (a) presents summary statistics for acquisitions made by dividend-payers. Panel (b) presents summary statistics for acquisitions made by share-repurchasers. Acquisitions per year is the number of acquisitions a firm makes during a year. Taxable % is the percentage of the firm not held by institutional investors. I(Most Taxable) is an indicator equal to 1 for firms in the top half of the Taxable % distribution. Ln(Assets) is the log of the acquiring firm's total assets. ROA is the acquiring firm's return on assets. Cash Flow is an acquiring firm's income before extraordinary items plus depreciation and amortization divided by lagged property, plant, and equipment. Financial Distress is the Hadlock and Pierce (2010) measure of financial distress. I(Most Acquisition) is an indicator equal to 1 if a firm made more than three acquisitions in the pre-period. I(Payout Increase) is an indicator equal to 1 for firm's that increased their average payouts per year after the tax reform. Payouts is defined as the sum of cash dividends and share repurchases.