

Capital Tax Reform and the Real Economy: The Effects of the 2003 Dividend Tax Cut[†]

By DANNY YAGAN*

This paper tests whether the 2003 dividend tax cut—one of the largest reforms ever to a US capital tax rate—stimulated corporate investment and increased labor earnings, using a quasi-experimental design and US corporate tax returns from years 1996–2008. I estimate that the tax cut caused zero change in corporate investment and employee compensation. Economically, the statistical precision challenges leading estimates of the cost-of-capital elasticity of investment, or undermines models in which dividend tax reforms affect the cost of capital. Either way, it may be difficult to implement an alternative dividend tax cut that has substantially larger near-term effects. (JEL C72, C78, C91)

The Jobs and Growth Tax Relief Reconciliation Act of 2003 reduced the top federal tax rate on individual dividend income in the United States from 38.6 percent to 15 percent. The president projected that the tax cut would provide “near-term support to investment” and “capital to build factories, to buy equipment, hire more people.”¹ The underlying rationale finds support in economics: traditional models imply that dividend tax cuts substantially reduce firms’ cost of capital (Harberger 1962, 1966; Feldstein 1970; Poterba and Summers 1985), and investment appears highly responsive to the cost of capital (Hall and Jorgenson 1967; Cummins, Hassett, and Hubbard 1994; Caballero, Engel, and Haltiwanger 1995). Similar arguments motivate ongoing proposals to use capital tax reforms to increase near-term output (Ryan 2011, 2012; Hubbard et al. 2012).²

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¹The first quote is from the February 2003 *Economic Report of the President* (Bush 2003, p. 55); the second quote is from President Bush’s speech on January 7, 2003, introducing the tax cut (<http://cnsnews.com/news/article/president-bushs-speech-unveiling-his-economic-stimulus-plan> (accessed March 22, 2012)). Both refer specifically to the dividend tax cut.

²The influential “Ryan Plans” of the US House Committee on the Budget proposed to keep capital income tax rates low or to lower them further in order to “provide an immediate boost to a lagging economy by increasing

However, there is no direct evidence on the real effects of the 2003 dividend tax cut, for the simple reason that real corporate outcomes are too cyclical to distinguish tax effects from business cycle effects. Aggregate investment rose 31 percent in the five years after the tax cut, but that increase could have been driven by secular emergence from the early 2000s recession. Indeed, aggregate investment rose by 34 percent in the five years following the early 1990s recession despite no dividend tax cut. As a result, existing work on the real effects of dividend taxes has relied on indirect evidence such as the goodness-of-fit of alternative structural investment equations (Poterba and Summers 1983).

This paper tests for real effects of the 2003 dividend tax cut by using a set of unaffected corporations to control for the business cycle. Upon incorporating at the state level, US corporations adopt either “C” or “S” status for federal tax purposes. C-corporations and S-corporations face similar tax rates except that C-corporations are subject to dividend taxation while S-corporations are not. S-status typically confers tax advantages, but restrictions on the number and type of shareholders prevent corporations with publicly traded stock, with any institutional equity financing, or with any divisions between ownership and control from enjoying S-status. This paper uses S-corporations (not directly affected by the dividend tax cut) as a control group for C-corporations (directly affected) over time.³

The identifying assumption underlying this research design is *not* random assignment of C- versus S-status; it is that C- and S-corporation outcomes would have trended similarly in the absence of the tax cut. Three facts support this “common trends” assumption. First, C- and S-corporations of the same ages operate in the same narrow industries and at the same scale throughout the United States and are thus subject to similar cyclical shocks. Second, contemporaneous stimulative tax provisions like accelerated depreciation applied almost identically. Third and perhaps most important, key outcomes empirically trended similarly for C- and S-corporations in the several years before 2003.

This paper uses rich data from US corporate income tax returns from years 1996 to 2008. All publicly traded corporations, and thus the absolute largest corporations, are C-corporations; I therefore focus on a stratified random sample of private C- and S-corporations with assets between one million and one billion dollars (the ninetyth and 99.9th percentiles of the US firm size distribution) and revenue between 0.5 million and 1.5 billion dollars. Based on Census Bureau data, firms in this size range employ over half of all US private sector workers. In the tax data, C- and S-corporations in this range are densely populated within fine industry-firm-size bins, and all results flexibly control for time-varying industry-firm-size shocks. This paper’s main sample is an unbalanced panel comprising 333,029 annual observations from 73,188 corporations, 58 percent of which are C-corporations; I obtain

wages, lowering costs, and providing greater returns on investment” (Ryan 2011) and to prevent “raising taxes on investing at a time when new business investment is critical for sustaining the weak economic recovery” (Ryan 2012). Hubbard et al. (2012, p. 5) predicted that Governor Mitt Romney’s proposed capital and labor income tax reforms “will increase GDP growth by between 0.5 percent and 1 percent per year over the next decade.”

³To the extent that an increase in C-corporation investment displaced S-corporation investment, this empirical design *overstates* the magnitude of the aggregate effect. The design tests for the canonical price effect of dividend taxation; indirect effects such as wealth effects among savers that could have increased or decreased worldwide corporate investment are outside the scope of this paper. Switching between corporate types is rare.

qualitatively similar results in balanced panel regressions in which the only firm-level variable changing over time is the outcome of interest.

I find that annual C-corporation investment trended similarly to annual S-corporation investment before 2003 and continued to do so after 2003. The difference-in-differences point estimate implies an elasticity of investment with respect to one minus the top statutory dividend tax rate of 0.00 with a 95 percent confidence interval of -0.08 to 0.08 , equivalent to -0.03 to 0.03 standard deviations of firm-level investment.

The finding of no significant increase in investment is robust across alternative specifications (with and without controls), sample frames (unbalanced and balanced panels), investment measures (gross investment and net investment), outlier top-coding (at the ninety-fifth and ninety-ninth percentiles), and subsamples (defined by size, age, growth, profitability, cash, and debt). I further find a negative point estimate and a 95 percent confidence upper bound elasticity of 0.04 (0.02 standard deviations) for the related and independently relevant outcome of total employee compensation. Results remain unchanged when including the 76 percent of publicly traded corporations that fall in this paper's size range and become negative when including all publicly traded corporations.

To confirm the tax cut's salience and relevance in spite of the lack of detectable real effects, I test for an effect on total payouts to shareholders (dividends plus share buybacks)—the focus of the existing academic debate over the effects of this tax reform (Chetty and Saez 2005; Brown, Liang, and Weisbenner 2007; Blouin, Raedy, and Shackelford 2011; Edgerton 2013). I find that C-corporation payouts spiked immediately in 2003 by 21 percent relative to S-corporation payouts, with a t -statistic over 5. The payouts effect was large and persistent in percentage terms but small in dollar terms and is consistent with a small dollar-for-dollar displacement of C-corporation investment, or alternatively with a mere reshuffling of financial claims that had no real effects.

These core results do not necessarily apply to corporations that were smaller or larger than the firm size range analyzed here, so I test for real effects of the tax cut within each firm size decile and ask whether the results suggest that out-of-sample effects were likely different. For each real outcome, I find a zero effect within every firm size decile and no upward or downward trend across deciles. Hence, I do not find evidence suggestive of different out-of-sample results.

Finally, a recent model notes that a dividend tax cut can increase the productivity of investment even if it does not increase its level, by causing poorly-managed C-corporations to reduce wasteful investment and to increase payouts while causing other C-corporations to increase productive investment via increased equity issuance (Chetty and Saez 2010). When dividing the sample by each of six firm characteristics (size, age, growth, profitability, cash, and debt), I find no relationship between the subgroups that increased payouts the most and those that increased equity issuance the least. Thus I do not find evidence in favor of this efficiency-enhancing channel.

This paper complements a large empirical literature that has found substantial real effects of other fiscal policies. Temporary countercyclical policies such as accelerated investment depreciation (House and Shapiro 2008; Zwick and Mahon 2014), individual income tax rebates (Johnson, Parker, and Souleles 2006), and temporary durable goods subsidies (Mian and Sufi 2012) have increased at least some

component of aggregate spending. Many studies have shown that labor income taxes reduce labor supply (see Chetty 2012 for a recent review); q -theory-based regressions suggest that corporate income taxes reduce investment (Cummins, Hassett, and Hubbard 1994); and the pooled effect on near-term output of labor income, capital income, and other tax reforms since World War II was substantial (Romer and Romer 2010). This paper contributes to this literature by documenting that in contrast to numerous other fiscal policies, the 2003 dividend tax cut—one of the largest changes ever to a US capital income tax rate—had no detectable near-term impact on the real outcomes it was projected to improve.

The null result relates to theory and to alternative dividend tax reforms. Economically, the null result rejects the joint hypothesis that the tax cut substantially reduced firms' cost of capital as in traditional models and that investment responded to the cost of capital as much as leading estimates predict. In particular, combining the leading "traditional-view" model of dividend taxation (Poterba and Summers 1985) with consensus estimates of the cost-of-capital elasticity of investment (Hassett and Hubbard 2002) would predict a dividend tax elasticity of investment range of 0.21 to 0.41—at least 2.5 times the 95 percent confidence upper bound of this paper's empirical estimate.

The null result accords instead with the leading class of alternative models (the "new view" or "trapped equity view" of dividend taxation) in which marginal investments are funded out of retained earnings and riskless debt rather than out of newly issued equity or risky debt (King 1977; Auerbach 1979; Bradford 1981). The key mechanism is that earnings from preexisting operations will inevitably be subject to dividend taxes (whether paid out immediately or paid out in the future after being retained for investment), so a dividend tax cut increases the post-tax return on investment by the same magnitude that it increases the opportunity cost of investment, inducing no investment change.⁴

Traditional models of dividend taxation can nevertheless explain the null result as due to particular features of this dividend tax cut and other tax rates, as detailed in Section V. The bottom line from that discussion is that even in that case, it may be difficult for policymakers to implement an alternative dividend tax cut that substantially increases near-term investment. For example, the 2003 dividend tax cut carried a default expiration date, and it is possible that a permanent dividend tax cut would have substantially increased investment. However, the United States has never committed to a near-term or long-term path for tax policy so the required longevity may be infeasible to guarantee: the 2003 dividend tax cut has outlasted many tax reforms that had no expiration date, and a majority of G7 countries have revised their dividend tax rates up or down substantially since 2003.

The corporate finance literature on the 2003 dividend tax cut has focused on whether the post-2003 increase in dividend payouts from publicly traded corporations (Chetty and Saez 2005) represented an increase in total corporate payouts or was offset by an equal reduction in share buybacks (Brown, Liang, and Weisbenner 2007; Blouin, Raedy, and Shackelford 2011; Edgerton 2013). This paper shows that the tax cut indeed increased total corporate payouts—a finding again made possible

⁴In terms of Tobin's q , q is less than 1 in the new view by an amount that varies proportionally with 1 minus the dividend tax rate.

by the S-corporation control group because, like investment, share buybacks are very procyclical.

The remainder of this paper is organized as follows. Section I describes the 2003 dividend tax cut and the distinction between C- and S-corporations. Section II introduces the tax data. Section III estimates real effects of the 2003 dividend tax cut. Section IV confirms salience and relevance by analyzing payouts. Section V details economic and policy implications. Section VI concludes.

I. C- versus S-Corporations and the 2003 Tax Reform

A. C- versus S-Status

After filing incorporation documents at the state level, US corporations elect either “C” or “S” status for federal tax purposes. C-corporations pay the corporate income tax on annual taxable income, and US shareholders pay dividend taxes on dividends and pay capital gains taxes on qualified share buybacks. S-corporations—named after their subchapter of the Internal Revenue Code—have the same legal structure as C-corporations but for tax purposes are flow-through entities that do not pay an entity-level income tax. Instead, taxable business income flows through pro rata to individual shareholders’ tax returns and is taxed as ordinary income in the year it is earned, regardless of whether the income is actually distributed to shareholders that year.⁵ When distributed, S-corporation dividends are untaxed.⁶

S-status typically confers tax advantages (detailed in the next subsection), but not all corporations qualify for S-status. The most important restrictions are that the corporation must have no more than 100 shareholders, all shareholders must be US citizens or residents and not business entities, and the corporation must have only one class of stock. Thus all publicly traded corporations, corporations financed with venture capital, corporations partially or wholly owned by private equity or other firms, corporations that widely use stock-based compensation, and corporations that use stock classes to divide ownership from control cannot be S-corporations. Despite these restrictions some very large corporations are publicly-known S-corporations such as Fidelity Investments.⁷ Corporations can switch status and I account for this in the analysis below, though consecutively switching back and forth is restricted by law and switching is rare empirically because most factors that bar S-status (e.g., institutional shareholders) are persistent.

Except for the very largest corporations which are all publicly traded and are thus C-corporations, C- and S-corporations of the same ages operate in the same narrow industries and at the same scales across the United States. For example, online Appendix Figure 1A uses data from the full population of US corporate tax returns

⁵Taxable dividend income or capital gains earned by S-corporations (e.g., on passively held securities) retain their character and are taxed as dividend income or capital gains at the shareholder level.

⁶The tax treatment of C- and S-corporations differ in other, smaller ways. For example, C-corporations can deduct charitable deductions up to only 10 percent of taxable income whereas S-corporations face limits at the individual shareholder level. S-corporations are taxed similarly to partnerships; relative to partnerships which were not analyzed for this paper, S-corporations may be a more appropriate control group for C-corporations because, aside from taxes, C- and S-corporations have identical legal rights and responsibilities.

⁷This information was obtained from a recent press report (http://www.boston.com/business/globe/articles/2007/11/03/fidelity_changes_its_corporate_structure/ (accessed March 22, 2012)) and not from tax data.

to plot the distribution of C- and S-corporations by 1-digit NAICS classification for all 397,008 corporations in 2002 that satisfy the size and industry restrictions in this paper, detailed in Section IIB.⁸ The figure shows that C- and S-corporations are relatively evenly distributed across major industries. Zeroing in on the 23,892 corporations in the most-common 3-digit NAICS classification (wholesale durable goods trade), online Appendix Figure 1B shows the even distribution of C- and S-corporations across narrow 4-digit industries. Online Appendix Figure 1C similarly shows even distributions of firm size. Online Appendix Figure 1D uses public data on two large corporations (Home Depot and Menard Inc., respectively, the country's largest and third-largest home improvement retailers) to illustrate a specific example of publicly known C- and S-corporations operating in the same narrow industry and in the same locale (the Chicago metropolitan area).

C- and S-corporations differ along some notable dimensions. For example, C-corporations tend to be more asset-intensive and less-profitable than S-corporations after controlling for revenue and industry. Nevertheless, the substantial overlap demonstrated in online Appendix Figure 1—and below in Figure 1 and Table 1 for the main analysis sample—by industry and size suggests that even if the corporation types differ in the *level* of outcomes, they may share *common trends* because they share any time-varying industry and firm-size shocks. Common trends is the condition required for identification below. Later, I demonstrate empirically that C- and S-corporation outcomes indeed trended similarly before 2003.

B. The 2003 Tax Reform

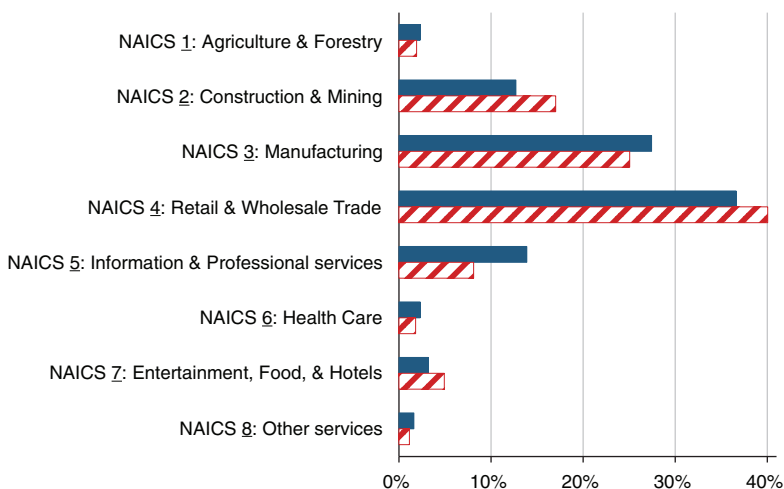
On May 28, 2003, President George W. Bush signed into law the Jobs and Growth Tax Relief Reconciliation Act of 2003. This tax reform reduced the marginal federal dividend income tax rate from 38.6 percent to 15 percent for the recipients of most taxable dividends.⁹ President Bush proposed the reform on January 7, 2003; it applied retroactively to January 1, 2003; and the dividend tax proposal appears to have been largely unanticipated (Auerbach and Hassett 2007). As the name of the law (“Jobs and Growth”) and the paper’s introductory quotes from President Bush indicate, the tax cut’s supporters argued that it would affect real economic outcomes beginning in the near-term.

The tax reform changed three other relevant provisions. It reduced the top capital gains tax rate (the rate assessed on income earned from qualified share buybacks) from 20 percent to 15 percent. It expanded temporary accelerated depreciation for equipment and light structures investment through 2004, which applied nearly

⁸These unedited population data lack investment and other key variables and so are used only for online Appendix Figures 1A–1C.

⁹The tax reform reduced the marginal tax rate on qualified (i.e., from US or tax-treaty-qualifying foreign corporation stock held for at least 60 days) and taxable (i.e., not from S-corporations or accrued to tax-preferred accounts) dividends for individual taxpayers in the top 4 ordinary income tax brackets from 27 percent, 30 percent, 35 percent, and 38.6 percent to 15 percent, and for taxpayers in the bottom 2 ordinary income tax brackets from 10 percent or 15 percent to 5 percent. Most taxable dividends accrue to taxpayers in the top ordinary income tax bracket and approximately 90 percent accrue to taxpayers in the top 4. The tax reform did not change the tax treatment of dividends received by individuals in tax-favored savings accounts or by nonprofit, corporate, or government entities.

Panel A. Industry



Panel B. Size (lagged revenue)

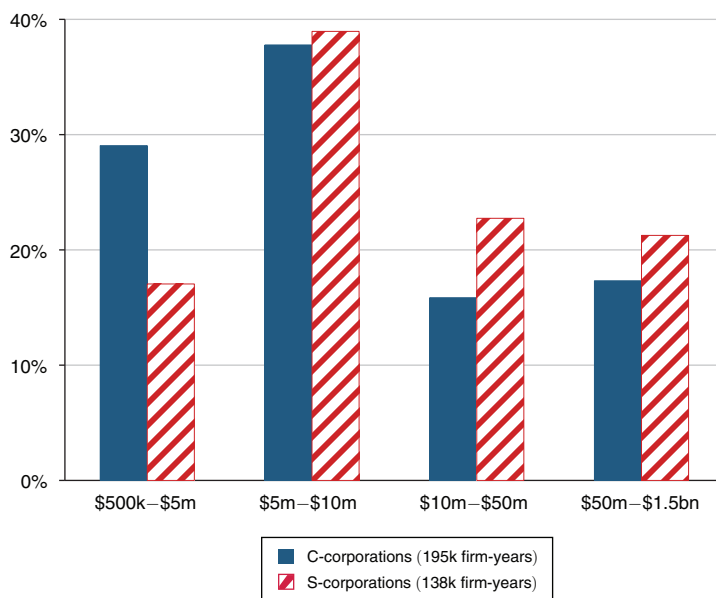


FIGURE 1. INDUSTRY AND SIZE DISTRIBUTION OF THE MAIN ANALYSIS SAMPLE

Notes: This figure plots the industry and size mix of the C-corporations (whose dividends are taxable) and S-corporations (whose dividends are not taxable) in this paper’s main analysis sample. Each graph’s bars sum to 100 percent within corporation type. Lagged revenue denotes operating revenue averaged over the preceding two lags. This sample is an unbalanced panel of annual corporate income tax returns, comprising all observations from the IRS Statistics of Income stratified random sample in years 1998–2008 in which the filing corporation had between \$1 million and \$1 billion in lagged assets and \$500,000 and \$1.5 billion in lagged revenue, was private through the previous year, and is not in the finance or utilities industries. All analyses flexibly control for any time-varying industry or firm-size shocks by non-parametrically reweighting the S-corporation sample within every year to match the distribution of C-corporations across 190 industry-firm-size bins as detailed in Section IIE. C-versus S-status is defined as of the second lag; corporations can switch status if they meet the legal requirements but fewer than 4 percent ever switched in this sample. See Table 1 for summary statistics.

TABLE 1—UNWEIGHTED SUMMARY STATISTICS FOR THE MAIN ANALYSIS SAMPLE

	C-corporations				S-corporations			
	Mean (1)	Median (2)	10th percentile (3)	90th percentile (4)	Mean (5)	Median (6)	10th percentile (7)	90th percentile (8)
<i>Characteristics</i>								
Lagged revenue	69,214,032	26,410,150	3,310,941	164,050,464	76,377,272	42,265,004	5,385,821	169,980,800
Lagged assets	45,330,360	16,945,392	1,878,245	105,045,088	35,529,524	19,258,636	3,002,156	74,923,672
Lagged tangible capital assets	10,803,074	2,041,562	118,378	25,007,676	7,826,240	2,281,994	173,325	17,449,492
Lagged profit margin	-0.03	0.04	-0.09	0.17	0.08	0.06	-0.01	0.25
Lagged revenue growth	0.15	0.03	-0.21	0.45	0.10	0.03	-0.18	0.34
Lagged cash/lagged assets	0.18	0.10	0.01	0.47	0.17	0.10	0.01	0.46
Lagged leverage	0.68	0.66	0.21	1.00	0.63	0.66	0.16	0.97
Age	26	22	6	52	27	23	7	51
<i>Outcomes</i>								
Investment	2,245,204	249,801	1,185	4,599,334	1,909,465	308,066	4,502	3,803,072
Investment/lagged tangible capital assets	1.608	0.153	0.001	0.767	1.112	0.166	0.005	0.791
Net investment	440,842	-19,591	-1,280,729	1,756,233	349,969	-21,495	-988,169	1,572,145
Net investment/ lagged tangible capital assets	0.870	-0.034	-0.286	0.459	1.715	-0.030	-0.254	0.454
Employee compensation	12,410,943	3,843,863	324,038	28,162,686	11,265,016	5,013,783	452,621	24,175,638
Employee compensation/ lagged revenue	0.291	0.160	0.028	0.492	0.188	0.131	0.027	0.376
Payouts	659,858	0	0	443,330	3,486,271	684,450	0	7,762,084
Payouts/lagged revenue	0.015	0.000	0.000	0.011	0.093	0.016	0.000	0.169
Dividends	531,236	0	0	250,080	3,410,537	658,080	0	7,599,040
Dividends/lagged revenue	0.012	0.000	0.000	0.006	0.092	0.016	0.000	0.166
Equity issued	2,754,047	0	0	572,898	276,790	0	0	389
Equity issued/lagged revenue	0.239	0.000	0.000	0.013	0.023	0.000	0.000	0.000
Number of firm-year observations			195,033				137,996	
Number of firms			43,988				32,113	

Notes: This table lists unweighted summary statistics for C-corporations (whose dividends are taxable) and S-corporations (whose dividends are not taxable) in this paper's main analysis sample: an unbalanced panel of annual corporate income tax returns, comprising all observations from the IRS Statistics of Income stratified random sample in years 1998–2008 in which the filing corporation had between \$1 million and \$1 billion in lagged assets and \$500,000 and \$1.5 billion in lagged revenue, was private through the previous year, and is not in the finance or utilities industries. Lagged denotes averaged over the two preceding lags. Revenue equals operating revenue. Assets equals the book value of assets. Tangible capital assets, also called capital, equals the book value of tangible capital assets (e.g., excluding cash and patents). Profit margin equals one minus the ratio of operating costs to revenue. Cash equals liquid current assets. Leverage equals the book value of non-equity liabilities divided by assets (this is greater than one when accumulated losses exceed paid-in equity). Age equals the year of the return minus the year of incorporation. Investment equals the cost of all newly purchased tangible capital assets. Net investment equals the annual dollar change in tangible capital assets. Employee compensation equals the sum of all non-officer wages, salaries, benefits, and pension contributions. Dividends equals cash plus property distributions to shareholders. Payouts, also called total payouts to shareholders, equals dividends plus share buybacks (non-negative annual changes in treasury stock). Equity issued equals non-negative annual changes in paid-in capital. C- versus S-status is defined as of the second lag; corporations can switch status if they meet the legal requirements but fewer than 4 percent ever switched in this sample. All monetary figures are in 2010 dollars.

identically to C- and S-corporations.¹⁰ And it accelerated the already-legislated phase-in of reductions in individual ordinary income tax rates, such as immediately reducing the top rate from 38.6 percent to 35 percent rather than waiting for it to fall to 37.6 percent in 2004 and 35 percent in 2006. S-corporation income (as well as dividend income until 2003) is taxed as ordinary income, but because the small reduction in ordinary income tax rates was merely an acceleration and based on evidence presented in Section III E, I make the simplification of considering S-corporation income tax rates to have been unaffected. The tax reform did not change the corporate income tax schedule.

The 2003 dividend tax cut was originally legislated to expire in 2009 but was extended to 2013 and has now been made “permanent” (i.e., with no default expiration date) in nearly its original form. In late 2005 Congress proposed to extend the tax cut until 2011, and President Bush signed it into law in May 2006.¹¹ In 2010, Congress and President Barack Obama extended it again until 2013. In the first days of 2013, President Obama signed into law a permanent extension of the tax cut for all individuals with taxable income below \$400,000 and married couples with taxable income below \$450,000, as well as a permanent marginal dividend tax rate of 20 percent for taxpayers with taxable income above these thresholds. In Section V B, I discuss the possible implications of the original default expiration dates.

The OECD reports that when considering federal and average state tax rates, the 2003 tax reform reduced the top statutory dividend tax rate from 44.7 percent to 20.8 percent. In the empirical analysis below, I report elasticities with respect to one minus this top statutory rate.¹² One minus the dividend tax rate is the relevant entity for parameterizing traditional models as I illustrate in Section V. The vast majority of taxable dividend income accrues to households in the top tax bracket. Shares of private corporations (the focus of this paper) are unlikely to be held by dividend-tax-exempt investors like pension funds or by taxpayers in the lowest dividend tax brackets. And unlike public company share buybacks, private corporation share buybacks are typically taxed as dividends rather than capital gains (and indeed share buybacks are relatively uncommon in my sample).¹³ Readers can apply their own assumed tax change to the raw estimates as they see fit; for example, one could assume that private C-corporation dividends faced the average taxable dividend tax rates for the total US economy, which Poterba (2004) reports fell from 32.1 percent to 18.5 percent.

¹⁰The exception is that owners of S-corporations with current losses could deduct the depreciation allowances from any current wage or other ordinary income on their 1040s, while C-corporations must carry forward the tax benefit to future years' profit. Thus the 2003 tax reform could, in principle, have benefited low-profit S-corporations relative to low-profit C-corporations. However, the negative point estimate in Table 3, column 1, row 4 (introduced in Section III C) suggests that this was not a relevant confound.

¹¹This law also lowered the bottom dividend tax rate from 5 percent to 0 percent beginning in 2008 and was set to expire in 2011 but never did before being made permanent in 2013.

¹²See OECD Tax Database Table II4 (<http://www.oecd.org/tax/tax-policy/tax-database.htm>). Elasticities with respect to the tax rate are 19 percent smaller in absolute value; one minus the tax rate is the element relevant for theory.

¹³IRS rules require a share buyback to materially change ownership in order to qualify as a capital gain. This may be easier to do with dispersed shareholders who trade their stock in public markets than it is for concentrated shareholders who do not.

II. Data

A. SOI Sample of US Corporate Income Tax Returns

This paper uses a large stratified random sample of US corporate income tax returns from years 1996–2008. Each year the Internal Revenue Service (IRS) Statistics of Income (SOI) division randomly samples corporate income tax returns, edits many variables for accuracy and consistency, and uses them to publish aggregate statistics. The sampling percentages are a function of assets and a measure of net income; corporations with at least \$50 million in assets are sampled with probability one and progressively smaller corporations are sampled at progressively smaller rates. Corporations sampled in one year are typically though not always sampled in subsequent years, so the SOI sample constitutes an unbalanced panel.¹⁴ The fine reweighting I detail in Section IIE accounts for any differential changes over time in the sampling percentages.

The SOI sample has three key advantages relative to the commonly used Compustat database on corporations: it contains data on both C-corporations and S-corporations, it contains data on many young corporations, and it has a much larger sample size even of relatively large corporations. As detailed below, this paper focuses on corporations with between \$1 million and \$1 billion in assets. Most Compustat corporations fall in this asset range but the SOI sample contains observations on many more such firms, including in the range \$500 million to \$1 billion.

B. Analysis Sample

This paper focuses on corporations in the SOI sample with between \$1 million and \$1 billion in assets (the 89.7th and 99.9th percentiles of the 2002 US pooled C- and S-corporation size distribution) and with revenue between \$0.5 million and \$1.5 billion (i.e., within 50 percent of either asset threshold) in 2010 dollars, for three reasons. The \$1 million lower bound restricts attention to corporations operating at substantial scale and lies comfortably above a reporting threshold that restricts the balance sheet information available on corporations with less than \$250,000 in assets. Almost all of the very largest corporations are publicly traded and are therefore C-corporations, so the \$1 billion upper bound ensures substantial overlap between C- and S-corporations across size bins. And corporations in this size range are quantitatively important: firms in this size range employ over half of all US private sector workers.¹⁵

The main analysis sample is an unbalanced panel of corporations constructed from the SOI samples. The unbalanced panel includes a corporation's year t tax return if the corporation: (i) had assets in the range \$1 million to \$1 billion and

¹⁴The sampling is done using a deterministic function of the last four digits of the corporation's employer identification number, so corporations sampled in one year are usually sampled the next as well.

¹⁵Corporate income tax returns do not include employment. In the most recent Census Bureau release with employment statistics by firm revenue, 45.2 percent of private sector employees were employed by firms with between \$500,000 and \$100 million in revenue (<http://www.census.gov/econ/susb/data/susb2007.html>). Employment at firms with revenue between \$100 million and \$1.5 billion is not reported separately; I estimate that an additional 5.3 percent to 18.5 percent of private sector employees are employed at firms with between \$100 million and \$1.5 billion in revenue.

revenue in the range \$0.5 million to \$1.5 billion on average between years $t-2$ and $t-1$ (so that lagged values can be used for scaling); (ii) was private at least until year $t-2$ (since all S-corporations are private); and (iii)—as restricted in earlier work on the 2003 dividend tax cut (Chetty and Saez 2005)—is not a financial company (whose main productive assets are typically not tangible capital) or a utility company (to which unique regulations apply). I further discard any tax returns that contain missing variable values or in which the filing months of consecutive tax years indicate that the tax return did not cover a full 12 month period.

I use the unbalanced panel for all main results due to its simplicity and inclusiveness. However, it has the potential disadvantage of a changing composition over time. I therefore repeat all analyses using a balanced panel constructed similarly to the unbalanced panel except that it includes the same corporations in every year. The balanced panel comprises annual observations on corporations that: (i) filed tax returns in all years 1996–2008; (ii) had assets in the range of \$1 million to \$1 billion and revenue in the range of \$0.5 million to \$1.5 billion average over years 1996–1997; (iii) were private through 1997; and (iv) are outside the financial and utilities industries. As I describe in Section IIIB, the balanced panel allows me to conduct the regression analysis such that the outcome of interest is the only firm-level variable changing from year to year. However, the balanced panel carries the obvious drawbacks of omitting corporations that are young in the post-2003 era and of requiring survival through 2008.

C. Variable Definitions

The SOI data contain the variables necessary for this paper's analysis: assets, revenue, investment, tangible capital assets, net investment, employee compensation, dividends, total payouts to shareholders, equity issued, profit margin, cash, debt, NAICS industry classification, and age. All variables are constructed from annual corporate income tax returns filed by the corporation. This section defines variables in economic terms; online Appendix A defines them in terms of line items on tax forms.

C-corporations file the corporate income tax Form 1120 and S-corporations file the similar Form 1120S. Year t refers to the corporation's tax filing that covered July of calendar year t . Each observation's C- versus S-status is defined as of its filing in year $t-2$; this means, for example, that a spike in C-corporation payouts in 2003 refers to corporations that filed a Form 1120 in 2001. Results are insensitive to this choice.

Investment equals the purchase price of all newly installed capital assets logged on Form 4562, filed alongside the corporate income tax return in order to claim depreciation deductions.¹⁶ The US tax code permits a corporation to deduct the purchase price of newly acquired capital assets (i.e., both new and used capital assets as long as they are new to the corporation) from its taxable income. The corporation typically cannot deduct the entire amount immediately and instead must make a

¹⁶Throughout this paper, "capital assets" refers to property depreciable under the US tax code (equipment and structures used in the trade or business). Thus "capital assets" is used here in its traditional economic sense rather than in the tax accounting sense of securities that generate passive income or similar assets.

sequence of depreciation deductions over several years, computed each year using Form 4562. To a close approximation, investment eligible for depreciation comprises the same capital goods included in NIPA private fixed non-residential investment statistics; see House and Shapiro (2008); Kitchen and Knittel (2011); and IRS Publication 946 for more details.¹⁷

Tangible capital assets (shortened to “capital” in table headings) equals the book value of all tangible (e.g., excluding goodwill) capital assets owned by corporation at the end of the tax year, net of accumulated book depreciation. I compute net investment as the annual dollar change in tangible capital assets, which equals new tangible investment less tangible capital asset retirements and accumulated book depreciation. Employee compensation equals the sum of wages and salaries paid to non-officer employees, payments for employee benefit programs (e.g., health insurance), and contributions to pension or employee-profit-sharing plan contributions.

Dividends equals the sum of cash and property distributions to shareholders. Total payouts to shareholders (sometimes shortened to “payouts”) equals dividends plus share buybacks—where share buybacks are defined as non-negative annual dollar changes in treasury stock, the primary method used in Blouin, Raedy, and Shackelford (2011); Skinner (2008); and Edgerton (2013). Equity issued equals non-negative annual changes in total paid-in capital.

Assets equals total book assets. Revenue equals operating revenue. I use tax fields to define operating profit margin (sometimes shortened to “profit margin”) homogeneously for C-corporations and S-corporations. Operating profit margin equals operating revenue less cost of goods sold and all components of total deductions except interest, depreciation, domestic production activities, and officer compensation deductions.¹⁸ Cash equals the sum of all liquid current assets. Debt equals the sum of all non-equity liabilities. For each corporation, 2-digit NAICS classification equals the first two digits of the 6-digit NAICS classification code reported on the corporate income tax return observed for each corporation that was filed nearest to 2003. There are 19 valid 2-digit NAICS classifications. Age is defined similarly, using the date incorporation field reported on the return filed nearest to 2003.

D. Summary Statistics

Table 1 displays unweighted summary statistics for the main analysis sample (the unbalanced panel) by C- and S-status. All values are annual and all monetary amounts are in 2010 dollars. The sample comprises 195,033 annual observations on 43,988 C-corporations and 137,996 annual observations on 32,113 S-corporations. The average C-corporation observation has lagged revenue of \$69 million, investment of \$2.2 million, and employee compensation of \$12 million; S-corporation averages

¹⁷ Kitchen and Knittel (2011) demonstrate that SOI Form 4562 aggregates approximate NIPA investment statistics. Software, equipment, and structures are included; land and depletable assets (e.g., oil deposits) are not. New purchases of patents and certain other intangible assets can be logged as new investment. If the investment purchase is only partially used by the firm, only a portion is logged as new investment. US-based corporations with foreign operations typically establish wholly-owned foreign entities that are regarded as separate entities; property placed into service in separate entities do not appear on Form 4562.

¹⁸ I exclude interest, depreciation, and domestic production activities deductions because they are not operating costs. I exclude officer compensation because private corporations may have leeway in the timing and form of compensating owner-managers.

are similar. When weighted by lagged revenue as is done for all subsequent analyses (see next subsection), the average lagged revenue in the sample is \$281 million, so the average firm in this paper's analysis operates at considerable scale. Figure 1 shows that there is substantial overlap across C- and S-corporations by industry and size; in the next subsection, I explain how I flexibly account for any differences along these dimensions. The size distribution of corporations is right-skewed, reflecting the right-skewness of the population firm size distribution. Fewer than 4 percent of firms ever switched between C and S status.¹⁹

E. Weighting and Winsorizing

I specify the final weight used for each observation in online Appendix B; the formula can be understood as the result of two steps. I initially weight each observation according to its revenue, averaged over the previous two lags. Thus each observation contributes to all graphs and regression estimates according to its economic scale, making the parameter estimates "dollar-weighted" in this sense. I then reweight the S-corporation sample to match the C-corporation sample along 190 size-industry bins in order to flexibly control for time-varying size- or industry-based shocks using the reweighting method of DiNardo, Fortin, and Lemieux (1996) that is commonly used in labor economics when datasets are large enough to support it. Specifically, after initially weighting observations by their lagged revenue, I bin each corporation into one of 190 (= 19 two-digit industries \times 10 within-industry size deciles) bins according to the within-industry size-decile distribution of C-corporations in 2002. Then within each corporation type and year, I inflate or deflate each bin's weight so that each bin carries the same relative weight as the 2002 distribution of C-corporations. This ensures, for example, that time-varying shocks to large construction firms will not influence the results because large construction firms will contribute to the results equally for each corporation type and in every year. Empirically, this reweighting turns out to be a careful precaution that makes almost no quantitative difference (compare estimates reported in Table 2 column 2 and online Appendix Table 4 column 10, introduced below) because C- and S-corporation industry distributions are very similar (Figure 1, panel A) and effect sizes are constant across firm sizes (Figure 3, introduced below).

Finally and unless otherwise specified, I winsorize (top-code) scaled outcomes (e.g., investment divided by lagged tangible capital assets) at the ninety-fifth percentile.²⁰ I intentionally winsorize observations differently for the time series panels of Figure 2 than I do for the regressions. The figures are intended to illustrate how investment and other outcomes change year-by-year and especially around the passage of the 2003 dividend tax cut. Thus for the figures, I hold the winsorization

¹⁹The total number of corporations reported in the introduction is slightly smaller than the sum of the total number of C-corporations and the total number of S-corporations reported in Table 1 because of this small number of switching corporations.

²⁰By "winsorize," I mean that any observations with values above the ninety-fifth percentile are assigned the ninety-fifth percentile value. Winsorizing removes the influence of data coding errors, which are occasionally present even in the edited SOI samples. Even without data errors, winsorizing can be optimal when estimating means in finite samples from skewed distributions as one trades off bias with minimizing mean squared error (Rivest 1994). I winsorize controls at the ninety-ninth percentile since they're used as quartics; winsorizing at the ninety-fifth percentile yields nearly identical results.

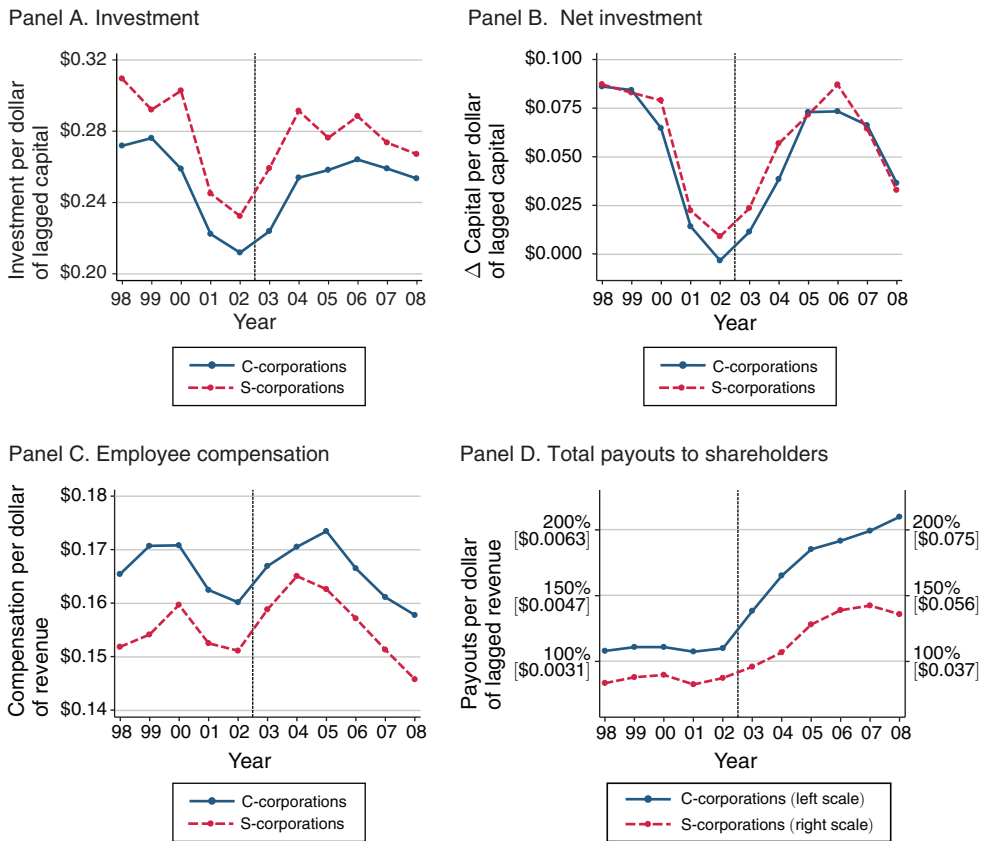


FIGURE 2. EFFECTS OF THE 2003 DIVIDEND TAX CUT

Notes: These figures plot the time series of annual mean outcomes for C-corporations and S-corporations in the main analysis sample net of a rich set of controls. Investment equals the cost of all newly purchased tangible capital assets. Net investment equals the annual dollar change in tangible capital assets. Employee compensation equals the sum of all non-officer wages, salaries, benefits, and pension contributions. Total payouts to shareholders equals dividends plus share buybacks (non-negative annual changes in treasury stock). Each panel is constructed by scaling each observation by either the firm's tangible capital assets or revenue averaged over the two preceding lags; winsorizing (top-coding) observations at the ninety-fifth percentile; regressing this scaled outcome variable within every year on a C-corporation indicator, two-digit NAICS industry fixed effects, and quartics in age, lagged revenue, lagged profit margin, and revenue growth; and requiring that the vertical distance between the two lines equals the regression coefficient on the C-corporation indicator and that the weighted average of the lines equals the sample average in that year. The regressions are dollar-weighted (each observation is weighted by its lagged revenue) and flexibly control for any time-varying industry or firm-size shocks by non-parametrically reweighting the S-corporation sample within every year to match the distribution of C-corporations across 190 industry-firm-size bins as detailed in Section IIE. Panel D is included as a test for an immediate behavioral response in financial outcomes and differs from the other graphs in two ways that account for income-tax-induced differences in baseline payout levels and for slightly differential pre-trends as detailed in Section IVA.

percentiles fixed across years and, in particular, use the pre-2003 distribution of the outcome to compute winsorization levels in all years. However, as will be relevant for the payouts outcome only, the tax cut can shift the outcome distribution (e.g., increasing the ninety-fifth percentile), and estimates of the impact of tax cut would ideally censor an equal share of observations over time. Thus for the regressions, I winsorize pre-2003 observations using the pre-2003 distribution of the outcome and

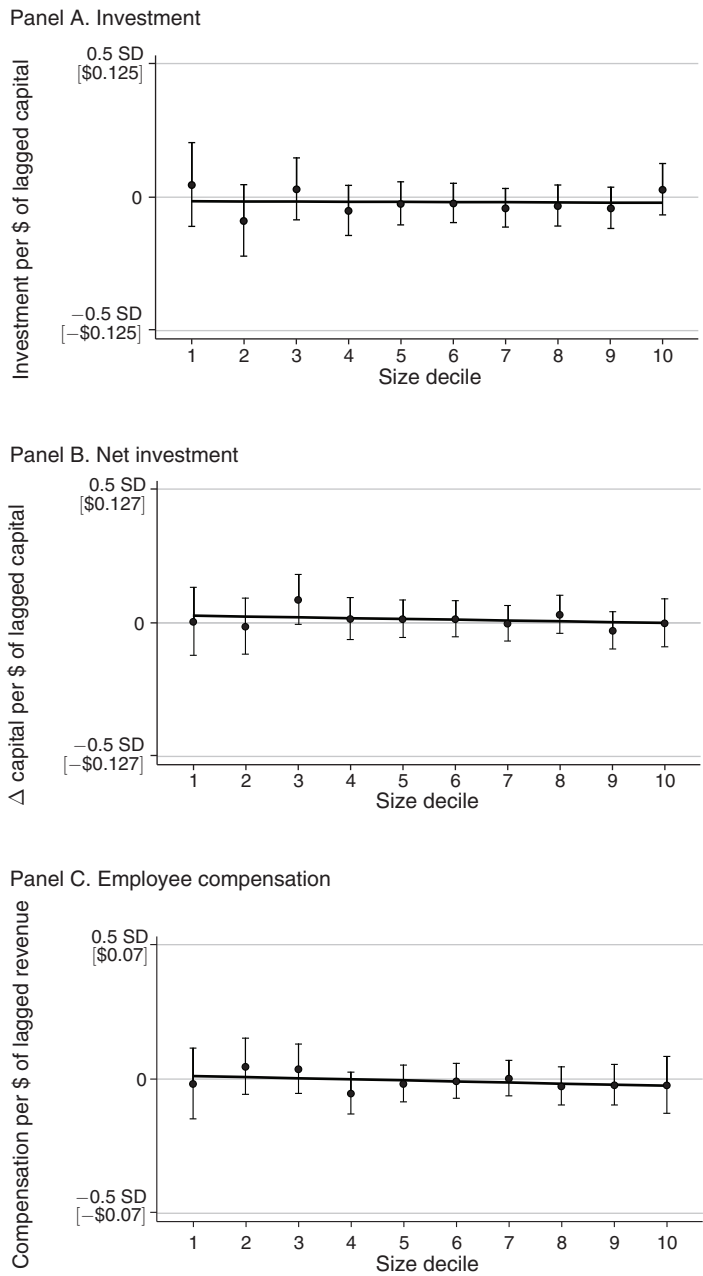


FIGURE 3. EFFECTS BY SIZE DECILE

Notes: This figure plots estimated within-size-decile effects of the 2003 dividend tax cut in the main analysis sample. Variables are defined, scaled, and winsorized as detailed in Figure 2. Each y-axis height equals one standard deviation of the outcome. Each panel is computed by binning corporations into deciles according to the unweighted deciles of the pooled C-corporation lagged revenue distribution, and then within each decile estimating a regression of the outcome on a C-corporation indicator, the interaction of a C-corporation indicator and post-2003 indicator, year fixed effects, two-digit NAICS industry fixed effects, and quartics in age, lagged revenue, lagged profit margin, and revenue growth. Each panel plots the coefficients on the interaction term with Bonferroni-corrected 95 percent confidence intervals to adjust for multiple (ten) hypothesis testing; uncorrected confidence intervals are one-third tighter. Standard errors are clustered by firm. The solid line is the best unweighted linear fit through the coefficients. Observations are weighted analogously to Figure 2.

I winsorize 2003-and-beyond observations using the 2003-and-beyond distribution of the outcome.²¹

III. Effect on Investment and Employee Compensation

I first test whether the 2003 dividend tax cut caused C-corporations to increase investment: a key real behavioral response suggested by policymakers and by economic theory. I begin by presenting visual evidence and regression estimates of the effect of the tax cut on investment. I then present extensive robustness checks, tests for effects on employee compensation, heterogeneity analyses, tests for internal and external validity, and a test for an efficiency-enhancing reallocation of investment.

A. Investment

Figure 2, panel A plots the time series of mean investment for C-corporations and S-corporations in the unbalanced panel, net of a rich set of controls as done in Chetty et al. (2011). As is standard in corporate finance, I first scale each corporation's annual investment by its lagged tangible capital assets and top-code observations at the ninety-fifth percentile as described in Section IIE. Then within each year, I regress scaled investment on a C-corporation indicator and this paper's standard set of controls: indicators for two-digit NAICS industry classification and quartiles in age, lagged revenue, lagged profit margin, and revenue growth from the second to the first lag.²² I then construct the two series shown in the figure by setting each year's difference between the two lines equal to that year's regression coefficient on the C-corporation indicator and setting the weighted average of that year's data points equal to the year's sample average. To be concrete, the 2002 C-corporation data point indicates that the average C-corporation in 2002 invested \$0.21 per dollar of its lagged capital assets, net of controls.

The figure shows that the time series of C-corporation investment tracked the time series of S-corporation investment closely in the several years before 2003, suggesting that the two time series would have continued to track each other in the absence of the 2003 dividend tax cut. The two series in fact continued to track each other after 2003, suggesting that the tax cut had little or no effect on C-corporation investment.

Table 2 formalizes this visual evidence by reporting estimates of the following difference-in-differences (DD) regression that uses the same definitions, scaling, and controls underlying the figure:

$$(1) \quad INVESTMENT_{it} = \alpha_1 CCORP_{i,t-2} + \alpha_2 CCORP_{i,t-2} \times POST_t \\ + \mathbf{X}_{i,t-2}\beta + \mathbf{YEAR}_t\gamma,$$

²¹ In each case, I compute percentiles separately for C-corporations and S-corporations to account for level differences in the outcome. When I use only the pre-2003 distribution to winsorize, main regression results remain nearly unchanged but the payouts effect size is approximately two-thirds as large and still very statistically significant.

²² "Lagged" denotes "averaged over the previous two lags."

TABLE 2—EFFECT OF THE 2003 DIVIDEND TAX CUT ON INVESTMENT, NET INVESTMENT, AND EMPLOYEE COMPENSATION

Dependent variable:	Investment					
	95th percentile			99th percentile		
Dep. var. winsorized at:	Unbalanced		Balanced	Unbalanced		Balanced
Panel:	(\$ per lagged capital)		(\$ per 96–97 cap.)	(\$ per lagged capital)		(\$ per 96–97 cap.)
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A. Investment</i>						
C-Corp × Post-2003	0.0008 (0.0044)	−0.0002 (0.0042)	−0.0063 (0.0226)	−0.0104 (0.0068)	−0.0118 (0.0066)	−0.1884 (0.1483)
Lagged controls	X			X		
Firm FE's			X			X
Observations (firm-years)	333,029	333,029	85,624	333,029	333,029	85,624
Clusters (firms)	73,188	73,188	7,784	73,188	73,188	7,784
R ²	0.01	0.07	0.53	0.01	0.05	0.55
Pre-2003 C-corp mean	0.2428	0.2428	0.2939	0.2828	0.2828	0.3682
Pre-2003 C-corp SD	0.2514	0.2514	0.3070	0.4181	0.4181	0.6478
Implied ε wrt $(1 - \tau_{div})$	0.01 [−0.08, 0.09]	0.00 [−0.08, 0.08]	−0.05 [−0.4, 0.3]	−0.09 [−0.19, 0.02]	−0.10 [−0.2, 0.01]	−1.18 [−3.01, 0.64]
Dependent variable:	Net investment			Employee compensation		
Dep. var. winsorized at:	95th percentile					
Panel:	Unbalanced		Balanced	Unbalanced		Balanced
	(\$ per lagged capital)		(\$ per 96–97 cap.)	(\$ per lagged revenue)		(\$ per 96–97 rev.)
	(7)	(8)	(9)	(10)	(11)	(12)
<i>B. Net investment and employee compensation</i>						
C-Corp × Post-2003	0.0048 (0.0041)	0.0042 (0.0039)	−0.0110 (0.0116)	−0.0013 (0.0025)	−0.0013 (0.0020)	0.0083 (0.0062)
Lagged controls	X			X		
Firm FE's			X			X
Observations (firm-years)	333,029	333,029	85,624	333,029	333,029	85,624
Clusters (firms)	73,188	73,188	7,784	73,188	73,188	7,784
R ²	0.01	0.04	0.20	0.00	0.37	0.87
Pre-2003 C-corp mean	0.0421	0.0421	0.0885	0.1647	0.1647	0.1727
Pre-2003 C-corp SD	0.2541	0.2541	0.2732	0.1415	0.1415	0.1450
Implied ε wrt $(1 - \tau_{div})$	0.26 [−0.18, 0.71]	0.23 [−0.19, 0.66]	−0.29 [−0.88, 0.3]	−0.02 [−0.09, 0.05]	−0.02 [−0.07, 0.04]	0.11 [−0.05, 0.27]

Notes: This table reports difference-in-differences estimates of the effect of the 2003 dividend tax cut on real outcomes. All columns display the coefficient on the interaction between a C-corporation indicator and an indicator for the year being 2003 or later, from a regression of the outcome on this interaction, a C-corporation indicator, year fixed effects and possibly additional controls. Lagged controls indicates that the regression includes two-digit NAICS industry fixed effects and quartics in age, lagged revenue, lagged profit margin, and revenue growth. Firm FE's indicates that the regression includes firm fixed effects. The unbalanced panel is this paper's main sample; see Table 1 for details. The balanced panel is constructed similarly, except the sample restrictions apply only to years 1996–1997 and observations are required in all years 1998–2008. Before the regression, each observation's outcome value is scaled by either the firm's tangible capital assets or its revenue (see online Appendix Table 2 for alternative scalings) averaged over the two preceding lags in the unbalanced panel and over 1996–1997 in the balanced panel, and then winsorized (top-coded) at the level indicated. The regressions are dollar-weighted (each observation is weighted by its lagged or 1996–1997 revenue) and they flexibly control for any time-varying industry or firm-size shocks by non-parametrically reweighting the S-corporation sample within every year to match the distribution of C-corporations across 190 industry-firm-size bins as detailed in Section III. Elasticity equals the reported coefficient divided by the pre-2003 C-corporation outcome mean, divided by the percent change in one-minus-the-top-statutory-dividend-tax-rate (the top rate fell from 44.7 percent to 20.8 percent). Standard errors are clustered by firm. See online Appendix Tables 1–7 for robustness checks.

where $INVESTMENT_{it}$ denotes scaled investment for firm i in a year t between 1998 and 2008 and $CCORP_{i,t-2}$ denotes an indicator for whether firm i was a C-corporation in $t-2$, $POST_t$ denotes an indicator for year t being 2003 or later, $\mathbf{X}_{i,t-2}$ denotes a possibly empty vector of lagged firm controls, and \mathbf{YEAR}_t denotes a vector of year fixed effects.²³ The coefficient α_2 represents the mean effect of the tax cut on annual C-corporation investment and is my statistic of interest. Standard errors clustered by firm are reported below each estimate.

Column 2 of Table 2 reports that when controlling for the full set of controls used in the graph, the 2003 dividend tax cut is estimated to have had an insignificantly negative effect on C-corporation investment: a change of $-\$0.0002$ per dollar of lagged tangible capital assets with a standard error of $\$0.0042$, relative to a pre-2003 mean of $\$0.2428$ and standard deviation of $\$0.2514$. The 2003 dividend tax cut reduced the top statutory dividend tax rate from 44.7 percent to 20.8 percent (see Section IB), so these estimates imply an elasticity of investment with respect to one minus the top statutory dividend tax rate of 0.00 with a 95 percent confidence interval of -0.08 to 0.08 .²⁴ The confidence interval in terms of standard deviations of firm-level investment is -0.03 to 0.03 . Column 1 reports similar estimates when omitting the firm-level controls.

B. Robustness

I conduct several robustness checks. First, columns 4–5 of Table 2 replicate columns 1–2 when top-coding at the ninety-ninth percentile. Second, online Appendix Table 1 replicates Table 2 while allowing for differential pre-2003 trends.²⁵ Third, online Appendix Table 2 replicates Table 2 when scaling investment by lagged revenue. Online Appendix Table 3 replicates Table 2, restricted to years 1998–2004 in order to omit years in which the controls, scaling variable, and C-corporation indicator use potentially endogenous post-2003 values. All report more negative point estimates than Table 2 with similar or smaller 95 percent confidence upper bounds. Online Appendix Tables 4 and 5 report results under 14 additional variations to the sample frame, variable definition, or reweighting with continued null or marginally significantly negative results; see online Appendix C for details.

Additionally, I replicate the analysis in the balanced panel of corporations; this sample comes at the obvious cost of omitting corporations that are young in the post-2003 era and requiring survival through 2008, but it permits regressions in which the only firm-level characteristic changing from year to year is investment. Column 3 of Table 2 reports results from estimating equation (1) in the balanced panel, with three changes relative to column 2: each corporation's C- versus S-status

²³ See online Appendix CII and online Appendix Table 5 for similar results when scaling investment by (time-invariant) pre-2003 tangible capital rather than (time-varying) lagged tangible capital.

²⁴ The elasticity is computed as the percent change in C-corporation investment divided by the percent change in one-minus-the-tax-rate: $(\hat{\alpha}_2 / \overline{investment}) / (0.239 / 0.553)$, where $\overline{investment}$ equals mean pre-2003 C-corporation investment and is reported in Table 2. The elasticity bounds are computed similarly, replacing $\hat{\alpha}_2$ in the above formula with $\hat{\alpha}_2$ plus or minus 1.96 times the standard error.

²⁵ For this table, I estimate: $INVESTMENT_{it} = \alpha_1 CCORP_{i,t-2} + \alpha_2 CCORP_{i,t-2} \times POST_t + \alpha_3 CCORP_{i,t-2} \times t + \alpha_4 CCORP_{i,t} \times POST_t \times t + \mathbf{X}_{i,t-2} \beta + \mathbf{YEAR}_t \gamma$. I report the effect of the tax cut on investment averaged across the post-period, equal in this regression to $\alpha_2 + 2005.5\alpha_4$ since 2005.5 is the midpoint of the post-period.

is defined as of 1996, each corporation's annual investment value is scaled by its mean tangible capital assets over years 1996–1997, and I replace the lagged firm-level controls with firm fixed effects. The resulting estimate has a wider confidence interval but is also essentially zero.

Finally, Figure 2, panel B replicates Figure 2, panel A for the related outcome of net investment, equal to the real annual dollar change in the corporation's stock of tangible capital assets as reported on the balance sheet. Arithmetically, net investment equals investment less tangible capital asset retirements and book depreciation. The figure shows no relative change in C-corporation net investment after the 2003 tax cut. Columns 7–9 of Table 2 repeat the specifications underlying columns 1–3 for the net investment outcome. The unbalanced panel point estimates are positive while the balanced panel point estimate is negative, and none is statistically significantly different from zero.²⁶ Online Appendix Tables 1–3 repeat these analyses using the same alternative specifications described above for investment, with similar results.

C. Employee Compensation

Figure 2, panel C replicates Figure 2, panel A for the outcome of employee compensation. Each firm's level of employee compensation is scaled by lagged revenue. The figure shows no relative change in C-corporation employee compensation after 2003.²⁷ Columns 10–12 of Table 2 repeat the specifications underlying columns 1–3 for the employee compensation outcome. Column 11 lists the results from equation (1) using the set of lagged controls. The point estimate is a change of $-\$0.0014$ per dollar of lagged revenue with a standard error of $\$0.0020$, relative to a pre-2003 mean of $\$0.1647$ and standard deviation of $\$0.1415$. This corresponds to an elasticity of -0.02 with 95 percent confidence interval of -0.07 to 0.04 . The confidence interval in terms of firm-level standard deviations is -0.04 to 0.02 . The balanced panel point estimate is positive but is similarly not statistically significantly different from zero. Online Appendix Tables 1–3 repeat these analyses using the same alternative specifications described above for investment and with similar results.

D. Heterogeneity Analysis

Although the above results indicate no statistically significant impact of the divided tax cut on C-corporation investment, it is possible that this overall result obscures a particular spike in investment at, for example, large C-corporations relative to small C-corporations. To investigate this in a compact way, I estimate six triple-difference regressions, one for each of six prominent firm-level traits: firm size (lagged revenue), age, lagged revenue growth, lagged profitability, lagged cash (liquid assets as a fraction of total assets), and lagged leverage (debt as a fraction of total assets).

²⁶Elasticity confidence intervals for net investment are larger than those for investment because the base level of net investment is close to zero, but standard-deviation confidence intervals are similar.

²⁷Note that the downward trend in scaled employee compensation after 2005 is due in part to rising lagged revenue (the scaling variable). Trends are less stable when scaling by tangible capital assets; online Appendix Table 2 shows that the results are robust to the choice of scaling variable.

In order to avoid strong parametric assumptions such as whether these traits should enter the regressions linearly or in logs, I divide corporations along these traits by their ranks. To explain the general procedure, consider the example of firm size. I compute the twentieth and eightieth percentiles of firm size in the pooled C-corporation distribution, drop all corporations in the middle quintiles (between the twentieth and eightieth percentiles), and define an indicator for each observation equal to one if and only if the corporation's size lies in the top quintile (above the eightieth percentile). I then estimate the triple-difference analogue of equation (1):

$$\begin{aligned}
 (2) \quad INVESTMENT_{it} = & \alpha_1 CCORP_{i,t-2} + \alpha_2 CCORP_{i,t-2} \times POST_t + \alpha_3 TRAIT_{i,t-2} \\
 & + \alpha_4 CCORP_{i,t-2} \times TRAIT_{i,t-2} + \alpha_5 TRAIT_{i,t-2} \times POST_t \\
 & + \alpha_6 CCORP_{i,t-2} \times TRAIT_{i,t-2} \times POST_t \\
 & + \mathbf{X}_{i,t-2} \boldsymbol{\beta} + \mathbf{YEAR}_t \boldsymbol{\gamma},
 \end{aligned}$$

where $TRAIT_{i,t-2}$ is the top-quintile indicator defined above, $\mathbf{X}_{i,t-2}$ denotes the vector of lagged firm characteristics used in column 2 of Table 2, and all other variables retain the definitions used above. The triple-difference coefficient α_6 represents the quantity of interest: the effect of the 2003 dividend tax cut on large C-corporations relative to small C-corporations and relative to S-corporations.

Columns 1–3 of Table 3 report the results for investment, net investment, and employee compensation. Each cell reports the point estimate of the triple-difference coefficient and its standard error from a separate regression in which the trait indicator is defined using the trait listed in the row heading. For example, the upper left cell indicates that large C-corporations increased investment by a statistically insignificant \$0.0105 per dollar of lagged tangible capital assets more than small C-corporations. All coefficients are small relative to the standard deviation of the outcome (displayed in Table 2 columns 2, 8, and 11, respectively) and are statistically insignificant even when not accounting for the large number of hypotheses being tested simultaneously, though with wider standard errors than in the main analysis.

E. Internal Validity

As mentioned in Section IB, a threat to the internal validity of the empirical design is that temporary or small contemporaneous changes to other tax policies could in principle have increased S-corporation investment relative to C-corporation investment after 2003, masking positive effects of the dividend tax cut on C-corporation investment. Specifically, the 2003 tax reform accelerated the already-legislated reduction in the individual ordinary income tax rates from 38.6 percent to 35 percent (which benefited S-corporations relative to C-corporations) and it expanded temporary accelerated depreciation of investment expenditures (which would have

TABLE 3—EFFECT HETEROGENEITY

	Investment (\$ per lagged capital)	Net investment (\$ per lagged capital)	Employee comp. (\$ per lagged revenue)	Payouts (Percent)	Equity issued (\$ per lagged revenue)
	(1)	(2)	(3)	(4)	(5)
C-Corp × Post-2003					
× High lagged revenue	0.0103 (0.0127)	-0.0017 (0.0102)	-0.0042 (0.0054)	-3.6 (8.9)	-0.0009 (0.0004)
× High age	0.0104 (0.0168)	0.0003 (0.0144)	-0.0055 (0.0060)	40.0 (10.4)	0.0003 (0.0006)
× High lagged rev. growth	-0.0069 (0.0160)	-0.0164 (0.0165)	-0.0006 (0.0082)	-8.5 (11.0)	-0.0005 (0.0008)
× High profit margin	-0.0265 (0.0167)	0.0103 (0.0140)	-0.0106 (0.0109)	97.9 (16.0)	0.0020 (0.0012)
× High cash/assets	-0.0212 (0.0155)	-0.0217 (0.0148)	-0.0120 (0.0115)	34.7 (12.2)	-0.0006 (0.0011)
× High leverage	-0.0030 (0.0199)	0.0144 (0.0190)	-0.0120 (0.0101)	-59.6 (17.8)	-0.0002 (0.0012)

Notes: This table reports triple-difference estimates of the effect of the 2003 dividend tax cut. Each cell represents a separate regression and reports the coefficient on the triple interaction of a C-corporation indicator, an indicator for the year being 2003 or later, and an indicator for the firm being in the top quintile rather than the bottom quintile (the middle three quintiles are omitted) of the trait specified in the row heading (see Table 1 for definitions). The specifications underlying each cell of columns 1–3 are identical to the difference-in-differences specifications underlying Table 2 columns 2, 8, and 11, respectively, except that each regression fully interacts the top-quintile indicator with the C-corporation and post-2003 indicators. Similar to Table 2, regressions are dollar-weighted (each observation is weighted by its lagged revenue) and flexibly control for any time-varying industry and firm-size shocks by non-parametrically reweighting the S-corporation sample within every year and quintile to match the distribution of C-corporations across 190 industry-firm-size bins; the exception is regressions by the lagged-revenue trait which can be reweighted only across 19 industry bins since the top and bottom quintiles do not overlap in size. Column 4 makes the same modifications to the difference-in-difference regression underlying Table 4 column 2. Column 5 replicates this table's column 3 for the outcome of equity issued. Standard errors are clustered by firm.

benefited S-corporations relative to C-corporations if S-corporations used capital with moderately longer asset lives).²⁸

I conduct three tests for quantitatively important bias; see online Appendix D for full detail. First and most simply, I conduct placebo tests for an increase in S-corporation investment in 2001 and 2002, taking advantage of the fact that the reduction in individual ordinary income tax rates began in 2001 and accelerated depreciation began in 2002.²⁹ Online Appendix Table 6 columns 2–3 in fact show statistically insignificant reductions in S-corporation investment in those years, providing the simplest evidence suggesting little or no bias.³⁰ Second, column 4 shows that controlling flexibly for asset life differences across firms has almost no effect on the estimated effect of the dividend tax cut on C-corporation investment, explained by C- and S-corporations having nearly identical asset life mixes in this sample. Third and most completely, I follow Auerbach and Hassett (1992) and Cohen, Hansen, and Hassett (2002) in computing a structural firm-year-specific measure of the cost of capital that encompasses the effects of these contemporaneous non-dividend-tax

²⁸ It also reduced the top capital gains tax rate from 20 percent to 15 percent. The Auerbach-Hassett parameterization below addresses this minor potential confound.

²⁹ In standard models, both the 2001 reduction in individual income tax rates and the 2001-legislated future reductions lowered S-corporations' cost of capital immediately in 2001 (Auerbach 1989).

³⁰ This null result can also be seen visually in Figure 2, panel A.

changes. Columns 5–10 show that controlling for this all-in cost-of-capital measure again has almost no effect on the results, explained by S-corporations' cost of capital falling by similarly modest amounts both before and after 2003. Thus none of these varied tests suggests a violation of internal validity.

F. External Validity

The above results are local to the sample and do not necessarily apply to publicly traded corporations and to corporations that were smaller or larger than the size range analyzed here. I therefore conduct two additional analyses to test for suggestive evidence of different out-of-sample results. First, recall that publicly traded corporations were excluded from the main sample because all publicly traded corporations are C-corporations and thus may have no reasonable S-corporation counterparts. I nevertheless repeat the regressions of Table 2 on a broadened sample that includes the 76 percent of publicly traded corporation observations matched to tax data that also satisfy this paper's firm size restrictions. Publicly traded corporations are large, so these additional observations loom large in these size-weighted regressions. Online Appendix Table 7 shows that this inclusion leaves the results of Table 2 nearly unchanged.³¹

In a second test, Figure 3, panels A–C display heterogeneity in the main overall difference-in-differences effects on investment, net investment, and employee compensation, respectively, by firm size decile. The graph is constructed by computing the deciles of the pooled C-corporation distribution of lagged revenue, using them to divide all corporations into size deciles, estimating equation (1) within each decile using the full set of lagged controls, and plotting the resulting regression coefficients, 95 percent confidence intervals, and the best unweighted linear fit through the coefficients.³² The figures reveal three facts: no within-decile estimate is statistically significantly different from zero, each graph's cross-decile variance in point estimates is small relative to the standard deviation, and there is no upward or downward trend in any graph's point estimates. Hence if one were to extrapolate from these results, one would predict that the 2003 dividend tax cut had no real effects on C-corporations outside of this paper's size range. However, further research is necessary to support out-of-sample conclusions.

G. Potential Reallocation of Investment

The central question of this paper is whether the 2003 dividend tax cut increased the level of corporate investment and employee compensation. This section has found no detectable increase in these levels. I now briefly investigate the separate question of whether there is evidence to suggest that the dividend tax cut improved the allocative efficiency of investment, even if it did not increase its overall level. This

³¹ Online Appendix Table 4, column 5 shows a more negative result when including all public corporations regardless of size.

³² Each graph's y-axis is centered at zero and has total height equal to one standard deviation of the outcome used in the regression (reported in columns 2, 8, and 11 of Table 2). Each confidence interval is Bonferroni-adjusted for the fact that each graph tests multiple (ten) hypotheses; each interval would be 30 percent tighter if unadjusted (i.e., the *t*-statistic threshold for statistical significance at the 5 percent level is 2.81 rather than 1.96).

possibility is motivated by a recent theoretical contribution (Chetty and Saez 2010, building on Shleifer and Vishny 1986) that argues that a dividend tax cut can reduce wasteful investment at some C-corporations (as shareholders improve monitoring and force managers to reduce wasteful investment spending) while increasing productive investment at other C-corporations (via the traditional cost-of-capital channel described below in Section VA), consistent with Swedish evidence (Alstadsæter, Jacob, and Michaely 2014). Among other predictions, this agency theory predicts that the subgroups of C-corporations that increased total payouts to shareholders the least are also the ones that most increased equity issuance.³³ Columns 4–5 of Table 3 repeat the heterogeneity analysis of Section IIID for the outcomes of payouts and equity issuance. The results are noisy but no negative relationship is apparent between equity issuance and payouts when comparing coefficients across the columns. Hence, I do not find evidence in support of investment rebalancing across C-corporation subgroups.³⁴

IV. Confirmation of Salience and Relevance

The previous section documented robust zero effects of the 2003 dividend tax cut on C-corporation investment and employee compensation. Whenever an intervention is found to have had no significant impact, an important concern for interpretation is that perhaps the intervention was simply not salient or relevant. A lack of salience is perhaps unlikely given the prominence and size of the 2003 dividend tax cut; more plausible is that unknown tax provisions neutralized the actual applicability of the tax cut. The dividend tax is assessed on dividend income, so I now test for an immediate impact of the dividend tax cut on dividends and on total payouts to shareholders (dividends plus share buybacks).

I focus on total payouts in the text and report the very similar dividend results in the online Appendix in order to allow the main results to speak to the unresolved academic debate on the effects of the 2003 dividend tax cut on total payouts. Chetty and Saez (2005) showed that the tax cut increased the dividends of publicly traded corporations. However, subsequent papers have questioned the relevance of this behavior by arguing that planned buybacks may have simply been relabeled as dividends, leaving total payouts unchanged (Blouin, Raedy, and Shackelford 2011; Brown, Liang, and Weisbenner 2007; Edgerton 2013).

A. Effect on Payouts

Figure 2, panel D plots the time series of mean payouts to shareholders from C-corporations and S-corporations in the unbalanced panel. Each corporation's payouts value is scaled by its lagged revenue in the spirit of Lintner (1956), though results are robust to this choice. The figure is then constructed exactly as in Figure 3, panels A–C except for two differences. Because C-corporations pay taxes on annual

³³Reduced wasteful investment results in increased payouts; increased productive investment is funded by increased equity issuance.

³⁴Public corporations have much more dispersed ownership and thus may be more prone to agency problems than this paper's private corporations.

corporate income at the entity level while S-corporation shareholders are liable for them at the shareholder level, S-corporations often pay higher levels of dividends (approximately ten times larger on average than C-corporations) to help shareholders cover these tax liabilities. Thus I account for level differences in pre-2003 scaled payouts by dividing firm i 's scaled payouts in year t by the mean level of payouts for i 's corporate type (C or S) in the pre-2003 period, essentially transforming the comparison into percentage terms.³⁵ Second, I account for slightly differential pre-trends by de-trending each series; I show below that the main qualitative result does not depend on de-trending.³⁶ To be concrete, the 2002 C-corporation data point means that the average C-corporation in 2002 paid out 0.34 cents per dollar of its lagged revenue, net of controls.

The figure shows that C-corporation and S-corporation payouts tracked each other in the five years before 2003, suggesting that in the absence of a tax change the two series would have continued to track each other after 2003. Then immediately after the dividend tax cut, C-corporation payouts spiked by 20 percent relative to S-corporation payouts and relative to the 2002 difference, and remained elevated above S-corporation payouts through the end of the sample.

The first row of Table 4 columns 1–3 formalizes this visual evidence by replicating columns 1–3 of Table 2 for the scaled payouts outcome; Table 4 columns 4–6 report estimates for analogous regressions that allow for differential pre-2003 trends (see footnote 25). To test for a statistically significant increase immediately in 2003, each column also reports coefficients from a separate regression that is analogous to the main specification (1) except that it replaces the post-period indicators with indicators for each post-period year. That is, I estimate

$$(3) \quad \text{PAYOUTS}_{it} = \alpha_1 \text{CCORP}_{i,t-2} + \mathbf{X}_{i,t-2} \boldsymbol{\beta} + \text{YEAR}_t \boldsymbol{\gamma} \\ + \text{CCORP}_{i,t-2} \times \text{YEAR}_t \boldsymbol{\delta},$$

where $\text{CCORP}_{i,t-2} \times \text{YEAR}_t$ is a vector of six indicators for each year $T \in \{2003, 2004, 2005, 2006, 2007, 2008\}$, each equal to one if and only if $t = T$ and corporation i was a C-corporation in year $t-2$.³⁷ The coefficient vector $\boldsymbol{\delta}$ contains the coefficients of interest: the effect of the tax cut on C-corporation payouts from the pre-period to each post-period year, net of the change in S-corporation payouts. For brevity, Table 4 reports only the estimates I refer to in the main text; see online Appendix Tables 8 and 9 for full results for the payouts outcome and the dividends-only outcome, respectively.

³⁵C and S-corporation payouts may be expected a priori to track each other in percentage terms because S-corporation income tax liabilities are approximately a flat percentage of income, and a corporate finance tradition conceives of firms paying out a set fraction of after-tax earnings (Lintner).

³⁶The C-corporation series has a slightly steeper downward trend, consistent with the well-documented twenty-year decline in dividend payments (Chetty and Saez 2005), combined with the fact that S-corporation dividends include payouts intended to cover tax payments that need not have been in secular decline.

³⁷Columns 4–6 of Table 4 report estimates when an additional term— $\text{CCORP}_{i,t-2} \times t$ —is included in the regression in order to allow for differential pre-trends.

TABLE 4—EFFECT OF THE 2003 DIVIDEND TAX CUT ON TOTAL PAYOUTS TO SHAREHOLDERS (Percent)

Panel:	Unbalanced		Balanced	Unbalanced		Balanced
	(1)	(2)	(3)	(4)	(5)	(6)
C-Corp × Post-2003	23.4 (3.6)	27.6 (3.3)	78.1 (8.0)	39.4 (7.3)	45.5 (6.5)	53.6 (15.1)
C-Corp × Year-2003	18.1 (4.3)	21.4 (4.1)	58.5 (8.8)	26.2 (4.8)	30.5 (4.6)	45.1 (11.3)
C-Corp × Year-2004	32.1 (5.2)	35.6 (5.0)	66.6 (11.4)	43.3 (6.5)	48.3 (6.2)	48.8 (10.4)
C-Corp × Year-2005	26.8 (5.8)	29.8 (5.5)	81.4 (12.4)	41.2 (8.2)	46.0 (7.5)	59.1 (16.6)
Lagged controls		X			X	
Firm FE's			X			X
Pre-trend controls				X	X	X
Observations (firm-years)	333,029	333,029	85,624	333,029	333,029	85,624
Clusters (firms)	73,188	73,188	7,784	73,188	73,188	7,784
Pre-2003 C-corp mean (\$ per lagged revenue)	0.0031	0.0031	0.0061	0.0031	0.0031	0.0061

Notes: This table reports difference-in-differences estimates of the effect of the 2003 dividend tax cut on total payouts to shareholders (dividends plus buybacks). The first row of columns 1–3 use the same specifications, controls, scaling, weights underlying Table 2 columns 10–12 except that before the winsorizing and in order to account for large level differences in pre-2003 payouts (see Table 1 and the y-axis of Figure 2, panel D), each firm i 's payouts in year t is divided by the mean level of payouts for i 's corporate type (C or S) in the pre-2003 period, essentially transforming the comparison into percentage terms. The second through fourth rows of each column report results from a separate regression in which the C-corp × post-2003 interaction term is replaced with a vector of interactions between the C-corporation indicator and post-2003 year indicators; see online Appendix Table 8 for additional reported coefficients. Columns 4–6 modify the specifications of columns 1–3 in order to allow for differential pre-2003 trends; see Section IVA for the specification and online Appendix Table 1 for analogous specifications for real outcomes. Standard errors are clustered by firm. See online Appendix 9 for results on the outcome of dividends only.

Across all specifications and samples, I find a large and statistically significant effect on C-corporation payouts. Column 2 reports that in the unbalanced panel with the full set of controls, I estimate that the dividend tax cut caused an immediate 21.5 percent increase in C-corporation payouts in 2003, with a t -statistic over 5, implying an elasticity of payouts with respect to one minus the top statutory dividend tax rate of 0.50 (reported in online Appendix Table 8). The remaining columns report similar or larger estimates when considering all years, when de-trending, and in the balanced panel. Online Appendix Table 9 reports similar estimates for the outcome of dividends only. I conclude that the 2003 dividend tax cut was immediately salient and relevant to C-corporations.

B. Compatibility of the Payouts and Investment Results

Standard models of dividend taxation abstract from cash and debt and assume that every dollar of increased payouts substitutes for a dollar of investment; the significant payouts effect may therefore appear at first glance incompatible with the null investment result. However, the payouts effect was large in percentage terms but small in dollar terms relative to all other balance sheet flows and the investment effect's standard error, so the results are consistent with a small dollar-for-dollar reduction in investment, or with a mere reshuffling of corporate financial claims

(e.g., a little less cash or a little more debt) and no reduction in investment.³⁸ The main relevance of the payouts result for this paper is that it validates the empirical design and salience.

V. Economic Interpretation and Policy Implications

The previous sections documented that the 2003 dividend tax cut was immediately salient and relevant but had no detectable impact on investment or employee compensation. This section considers reasons for the null investment result and asks under what circumstances would future dividend tax cuts be expected to have large and positive real effects. I begin by noting that a near-zero dividend tax elasticity of investment implies either a small dividend tax elasticity of firms' cost of capital, or a small cost-of-capital elasticity of investment, or both. I then detail whether and why either elasticity would likely have been small and the implications for the real effects of future alternative dividend tax reforms. The section ends with a discussion of the payouts response.

A. Economic Interpretation

The prediction that a dividend tax cut can substantially increase investment derives from models that are referred to as representing the "traditional view" (Harberger 1962, 1966; Feldstein 1970; Poterba and Summers 1985). Traditional-view models feature permanent dividend tax cuts and firms that finance marginal investments with newly issued equity.³⁹ A dividend tax cut reduces firms' cost of capital—the pretax rate of return required on marginal investments—because it reduces the taxes that must be paid when profits are distributed to shareholders; this induces firms to raise new investment funds and increase investment.⁴⁰

I now derive a quantitative traditional-view prediction for the elasticity of investment with respect to one minus the dividend tax rate ("the dividend tax elasticity of investment"). I do so by multiplying a traditional-view parameterization of the elasticity of the cost of capital with respect to one minus the dividend tax rate ("the dividend tax elasticity of the cost of capital") by empirical estimates of the elasticity of investment with respect to the cost of capital ("the cost-of-capital elasticity of investment").

Desai and Goolsbee (2004) parameterize the workhorse traditional model (Poterba and Summers 1985) as follows. A C-corporation faces a cost of capital equal to

$$\frac{r}{(1 - \tau_{inc})[(1 - \tau_{div})p + (1 - \tau_{acg})(1 - p)]},$$

³⁸The standard error on the investment effect (Table 2, column 2) implies a 95 percent upper bound reduction in investment of \$87,557 per C-corporation, while the payouts response (Table 4, column 2) implies a payouts increase of \$59,922 per C-corporation.

³⁹Similar qualitative predictions obtain when firms finance investment with risky debt, since debt holders often become equity holders after bankruptcy reorganization. Dai et al. (2013) formulate a related argument based on financing constraints with similar predictions.

⁴⁰In terms of Tobin's q , q always equals 1 under the traditional view: the marginal dollar invested within the firm generates the same after-tax return as outside options, and investment must rise after a dividend tax cut in order to maintain $q = 1$.

where r is the economy's rate of time preference, τ_{inc} is the corporate income tax rate, τ_{div} is the tax rate applied to dividends and other payouts,⁴¹ p is the share of earnings paid out rather than retained, and τ_{acg} is the effective tax rate on accrued capital gains.⁴² The effective tax rate on accrued capital gains represents a combination of future payouts (taxed at τ_{div}), future realized capital gains (taxed at the statutory capital gains tax rate), and bequests (taxed at the estate tax rate). Based on their reading of the literature, Desai and Goolsbee assume a payouts share of earnings equal to 0.5 and an effective tax rate on accrued capital gains equal to one-quarter of the top statutory rate.⁴³ Combining these parameters with the decrease in the top statutory dividend tax rate from 44.7 percent to 20.8 percent yields an elasticity of the cost of capital with respect to one minus the payout tax rate of -0.411 . Hassett and Hubbard (2002) summarize the recent empirical literature as reaching a consensus range for the cost-of-capital elasticity of investment of -0.5 to -1.0 .⁴⁴

Multiplying these elasticities together, one obtains a predicted range of the dividend tax elasticity of investment of 0.21 to 0.41. These predicted elasticities are 2.5 to 5 times as large as this paper's estimated 95 percent confidence upper bound (0.08). Hence, either the consensus range for the cost-of-capital elasticity of investment or the parameterized tax elasticity of the cost of capital, or both, failed to materialize.

There is no obvious reason to believe that corporations would have been unusually unresponsive to cost-of-capital changes in the 2003–2008 time period. Fixed costs to capital stock adjustment can temporarily mute investment responses to cost-of-capital changes (Caballero, Engel, and Haltiwanger 1995), but the 2003 dividend tax cut was passed at the end of a cyclical downturn in investment, so corporations are unlikely to have been particularly far from any positive investment thresholds. The short-run supply of capital assets may be inelastic (Goolsbee 1998), but this cannot explain the lack of a relative change (between C- and S-corporations) in investment expenditures (price times quantity, not just quantity).

There are at least three reasons that the true cost-of-capital elasticity of investment may be smaller than the Hassett-Hubbard consensus range. First, a large time series literature dating back to Eisner's (1969, 1970) responses to Hall and Jorgenson (1967) finds small cost-of-capital elasticities of investment, and the newer estimates that underlie the modern consensus range employ reasonable but difficult-to-verify structural assumptions (e.g., Caballero, Engel, and Haltiwanger 1995). Second, these newer estimates may reflect intertemporal substitution over short horizons (c.f. Caballero 1994 and Cummins, Hassett, and Hubbard 1994) or relaxation of financing constraints (e.g., Zwick and Mahon 2014) that would apply, for example,

⁴¹ Most private C-corporation payouts are taxed at the dividend tax rate; see footnote 13.

⁴² Poterba and Summers allow r to depend negatively on p so that the required rate of return is lower for corporations that pay dividends, e.g., because regular dividends may have signaling value. Dividend-paying private corporations tend to pay dividends frequently but in irregular amounts so I ignore this dependency here.

⁴³ The top statutory capital gains rate equals approximately the top dividend tax rate of 20.8 percent; it is quantitatively irrelevant whether one uses this value or a five-percentage-points-higher pre-2003 rate.

⁴⁴ The investment time horizon that these estimates are based on varies but a two-year-or-shorter horizon is common (e.g., Cummins, Hassett, and Hubbard 1994 and Caballero, Engel, and Haltiwanger 1995). Note that in the very long run after adjustment to a new steady-state capital stock, measured elasticities of investment scaled by lagged tangible capital will be zero, but recall that this paper's results hold even when scaling investment by pre-2003 tangible capital (see online Appendix CII and online Appendix Table 5).

to temporary accelerated depreciation but likely not to a dividend tax cut.⁴⁵ Third, there may be publication bias toward statistically significant empirical results (Card and Krueger 1995) and such bias could have led to the publication of erroneously large estimates.

Because this paper is fundamentally concerned with the effects of the dividend tax cut, I proceed by taking as given the Hassett-Hubbard consensus range for the cost-of-capital elasticity of investment and turning to why the dividend tax elasticity of the cost of capital could have been small and the implications for the real effects of future alternative dividend tax cuts.

B. Policy Implications of a Small Cost-of-Capital Change

Explanations for why the large 2003 dividend tax cut could have caused a small reduction in the cost of capital fall into either of two lines of reasoning: *traditional-view models are the wrong models*, or *traditional-view models are correct but the above parameterization is wrong*. Each line of reasoning clarifies the circumstances under which future dividend tax cuts would be expected to substantially increase investment

Wrong Model.—The leading alternative to the traditional view—called the “new view” (also called the “trapped equity view”; King 1977; Auerbach 1979; Bradford 1981)—can explain the null result on investment. New-view models feature firms with profits from preexisting operations that are abundant enough to fund all profitable investment.⁴⁶ Because those preexisting profits will inevitably be subject to dividend taxes (whether paid out immediately, or retained for investment and paid out in the future), a permanent dividend tax cut increases the post-tax return on investment by the same factor that it increases the opportunity cost of investment.⁴⁷ Thus the new view predicts that a permanent dividend tax cut affects firm value but does not affect the cost of capital and does not affect corporate investment.⁴⁸

The policy implication of the new view is that dividend tax cuts typically do not reduce firms’ cost of capital and thus are typically not useful tools for increasing investment. The exception would be if a dividend tax cut today signaled that dividend tax rates would fall even further in the future. This is possible, though the

⁴⁵ In other words, cost-of-capital formulas could be misspecified in the sense that a unit reduction in the cost of capital due to temporary accelerated depreciation affects investment more than a unit reduction due to other tax changes.

⁴⁶ Access to riskless debt generates similar results because interest payments are not subject to dividend taxes.

⁴⁷ To see this in a simple riskless two-period setup in which all profits in the second period are paid out as dividends, consider a new-view firm in a small-open economy that begins the first period with abundant past profits. It chooses how much to retain for investment (equal to past profits minus dividend payouts) by equating the return on marginal investment to the opportunity cost of that investment: $(1 - \tau_{DIV})(1 - \tau_{INC})f'(PASTPROFITS - PAYOUTS) = (1 - \tau_{DIV})r$, where τ_{DIV} is the dividend tax rate, τ_{INC} is the business income tax rate, $f'(\cdot)$ is a concave gross profit function, and r is the fixed return available on outside investments. A reduction in the dividend tax rate increases both sides of the equation by the same factor, inducing no change in optimal investment. In terms of Tobin’s q , q is less than 1 in the new view by an amount that varies proportionally with one minus the dividend tax rate.

⁴⁸ An anticipated dividend tax cut would induce an increase in investment before the tax cut, which Figure 2, panel A suggests did not happen. See Poterba and Summers (1985); Ayers, Cloyd, and Robinson (2002); and Auerbach and Hassett (2007) for evidence of effects on firm value.

policy debate since 2003 has centered on keeping top dividend tax rates constant or increasing them.⁴⁹

Of course, even if the new view characterizes most firms, the traditional view may characterize other firms (Auerbach and Hassett 2003; Dhaliwal et al. 2005), especially start-ups that may be particularly reliant on external equity financing. This paper's main analysis sample contains many start-ups, but most firms are not young: the median firm age studied here is 22 years, and only 1 of the 100 most valuable publicly traded companies in the United States was founded since 2003.⁵⁰ The implication would be that the effect of dividend tax cuts on the US capital stock may grow large as start-ups (traditional-view firms) gradually replace mature (new-view) firms over the very long run, but the near-term effect may be small because mature firms dominate US production.

Wrong Parameterization.—An alternative explanation of the null investment result is that the traditional view correctly models firms' investment decisions and that alternative dividend tax cuts can substantially reduce firms' cost of capital and thereby increase investment, even if the 2003 dividend tax cut in this sample did not. There are at least three distinct versions of this explanation. Considered together, the implication is that it may be difficult for policymakers to implement an alternative dividend tax cut that has substantially larger near-term effects.

First, the returns to new investment can take years to accrue in the form of higher profits that can be paid out to shareholders, and a dividend tax cut reduces the cost of capital for new investment only insofar as those payouts will be taxed at the new low rate. The 2003 dividend tax cut originally carried an expiration date of 2009 before being extended to 2013 and then being made permanent at nearly the full rate reduction (see Section IB). It is therefore possible that a dividend tax cut with no initial default expiration date would have substantially reduced the cost of capital, even if the 2003 dividend tax cut did not.⁵¹ In this case, modern democracies may be unable to guarantee the permanence necessary for a dividend tax cut to substantially reduce firms' cost of capital and thus increase investment. For example, the Tax Reform Act of 1986 reduced the top personal income tax rate to 28 percent in 1988 with no default expiration date, but the rate was subsequently raised to 39.6 percent in 1993. Looking globally, a majority of the G7 economies (Japan, Italy, the United States, and the United Kingdom) have substantially raised or lowered their top dividend tax rates since 2003.⁵²

Second and despite stock price evidence that the tax cut was unanticipated (Auerbach and Hassett 2007), perhaps C-corporations had been expecting to enjoy low dividend taxes at some point in the future and thus had been investing at a

⁴⁹ In fact, the new view implies that reducing the dividend tax rate to a minimum conceivable rate could actually reduce investment because dividend tax rates could then only rise (Korinek and Stiglitz 2009).

⁵⁰ Inference on start-ups is also challenging because the counterfactual (e.g., perhaps not founding the company in the first place) may be difficult to discern.

⁵¹ That is, with respect to the traditional-view parameterization, perhaps the assumed change in the dividend tax rate was too large.

⁵² Japan lowered its top rate from 43.6 percent to 10 percent; Italy raised its top rate from 12.5 percent to 20 percent; and the UK raised its top rate from 25 percent to 36 percent (OECD 2012). These figures include average subnational top rates.

permanently higher rate even before the tax cut.⁵³ Under this candidate explanation, a future dividend tax cut would increase investment only if its magnitude exceeded expectations or if it increased expectations of future cuts.

Third and although substantial corporate profits are subject to dividend taxation—about \$300 billion in 2008 and similar in magnitude to total taxable capital gains—it is possible that most profits from private C-corporations escape dividend taxation and are instead taxed as capital gains in corporate acquisitions, as bequests subject to the estate tax, or not at all through various capital income exclusions.⁵⁴ This would imply that a future dividend tax cut could substantially increase near-term investment if the dividend tax base were substantially broadened, such as by lowering the dividend tax rate relative to the capital gains tax rate. However, there may be political impediments to doing so: US policymakers have historically kept tax rates on taxable dividend income weakly greater than those on taxable capital gains, perhaps because most Americans hold small portions of their assets in stocks relative to housing (Campbell 2006) and may be more receptive to low tax rates on capital gains.⁵⁵

C. The Payouts Response

This paper shows that the 2003 dividend tax cut increased total corporate payouts. This increase was small in dollar terms and may have been irrelevant for real outcomes (see Section IVB), but the effect is relevant for the study of corporate finance and I now discuss its potential drivers and outline directions for future research.

Traditional-view models do not explain the payouts response.⁵⁶ A new-view explanation of the payouts response is that firms viewed the tax cut as temporary and thus engaged in intertemporal tax arbitrage by distributing payouts before tax rates rise (Korinek and Stiglitz 2009). The time series of payouts provide one reason to doubt this mechanism: Figure 2, panel D and Table 4 suggest that payouts did not decline substantially after 2004 when President Bush won reelection and his party won control of both houses of Congress, which likely reduced expectations of a near-term rise in dividend taxes and hence incentives for immediate tax arbitrage (Korinek and Stiglitz 2009).⁵⁷ However, this is not conclusive because expectations are not observable, because various concerns may govern the timing of tax-arbitraging payouts, and because of sampling and specification uncertainty.

⁵³That is, with respect to the parameterization, perhaps the assumed tax change was again too large.

⁵⁴That is, with respect to the parameterization, perhaps the assumed value of p was too large. Payouts can escape taxes if they are distributed in the form of bequested corporate equity below the estate tax threshold, if the corporate stock is held in tax-favored investment accounts or by untaxed entities like pension funds (though this is unlikely for most private corporations), or if private C-corporations preparing to distribute earnings manage to meet S-status requirements and switch tax status (though switching is relatively rare).

⁵⁵All forms of capital income accrue very disproportionately to high-income Americans, but Republican lawmakers in 2003 explained that in contrast to cutting dividend taxes, “millions of Americans understand the power of cutting the tax on capital gains” making low capital gains tax rates “easier to sell” (David Firestone, “As Bush Tax Plan Falts, Conservatives Find a Silver Lining,” *New York Times*, May 8, 2003, <http://www.nytimes.com/2003/05/08/us/as-bush-tax-plan-falts-conservatives-find-a-silver-lining.html>).

⁵⁶The exception is the traditional-view model of Poterba and Summers (1985) which allows for a dividend tax cut to immediately increase payouts (and investment) when payouts such as regular dividends carry signaling value. This is unlikely to be relevant for the private corporations studied here.

⁵⁷The 2004 Democratic presidential challenger, John Kerry, pledged to repeal the tax cut for high-income Americans and at one point was the front runner according to betting markets (Auerbach and Hassett 2007).

Chetty and Saez (2010) show that the new view can explain the payouts increase as a permanent dividend tax cut causing dispersed shareholders to incur the monitoring costs necessary to prevent wasteful investment by managers. This too is possible, though such agency problems would be expected to be least severe among private corporations, whose shareholders are typically concentrated.

Three under-emphasized mechanisms may instead explain the payouts response. First, the dividend tax cut raised the value of C-corporation equity (Auerbach and Hassett 2007), so owners of illiquid private C-corporation stock may have increased payouts in order to rebalance their portfolios or to reoptimize consumption among themselves and their heirs. Second, the dividend tax cut could have induced controlling owners to use payouts for their own liquidity, against the interests of minority shareholders and similar to tunneling (Johnson et al. 2000). Third, high dividend tax rates incent owner-managers to avoid or evade taxes by paying out earnings as officer compensation or purchasing consumption goods through the corporation (Gordon and Slemrod 2000); the tax cut reduced the benefits of such behavior and may have caused C-corporations to increase formally-labeled payouts. These effects are observationally equivalent in the data available to me, but testing among these various mechanisms is an interesting area for future research.

VI. Conclusion

The 2003 dividend tax cut was one of the largest changes ever to a US capital income tax rate and was intended to increase corporate investment and labor utilization, beginning in the near term. This paper used a large sample of tax returns from large private corporations—some subject to dividend taxation (C-corporations) and others not (S-corporations)—to test whether these real goals were achieved in a firm size range that employs most US private sector workers. I estimate that the tax cut caused no change in C-corporation investment or employee compensation relative to S-corporations. Evidence of an immediate increase in payouts confirms salience and relevance. External validity remains an open question, but neither broadening the sample to include publicly traded corporations nor heterogeneity by firm size suggests different out-of-sample results.

The findings contrast with evidence of large real effects of numerous other fiscal policies. Economically, the null result implies either that the dividend tax cut had little effect on firms' cost of capital, or that investment responded to cost-of-capital changes substantially less than recent evidence would have predicted, or both. The tax cut could have failed to reduce the cost of capital either because marginal investments are funded out of retained earnings and riskless debt as in "new-view" models of dividend taxation (King 1977; Auerbach 1979; Bradford 1981) or because of particular features of the tax regime. Each potential mechanism suggests that it may be difficult for policymakers to implement an alternative dividend tax cut that has substantially larger near-term effects.

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