Corporate Tax Breaks and Executive Compensation

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Abstract

I analyze the effect of two corporate tax breaks, bonus depreciation and the Domestic Production Activities Deduction (DPAD), on executive compensation in publicly traded US firms. I find both tax breaks significantly increase executive compensation. For every dollar a firm benefits from the tax breaks, compensation of the firm's top five highest paid executives increases by 17 to 25 cents. The tax breaks increase compensation primarily in firms with weaker governance structures, suggesting the compensation response is driven by executive rent extraction.

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1 Introduction

Over the past 40 years, the value of compensation packages awarded to corporate executives in the US has risen dramatically; between 1980 and 2008, average CEO pay at S&P 500 firms more than quintupled (Frydman and Jenter, 2010). At the same time, a less well-known trend has shaped the US economy: in the presence of increased pretax corporate profits, effective corporate income tax rates have decreased significantly (Dyreng, Hanlon, Maydew and Thornock, 2017).

These trends motivate an obvious, but empirically unaddressed question: Do corporate tax breaks increase executive compensation? There is, of course, mechanical reason to believe this relationship exists. Corporate tax breaks increase after-tax income that can be used to increase executive compensation via either a competitive market for managerial talent or rent capture by the executives. Understanding whether and to what extent tax breaks are used to increase executive compensation is important as policymakers, ostensibly, design corporate tax breaks to incentivize desired behaviors such as job creation, capital investment, or the adoption of clean energy sources, rather than to pad the pockets of corporate executives. Answers to these questions are also timely as the Tax Cuts and Jobs Act (TCJA) has accelerated the decline in effective corporate tax rates in the US and placed additional downward pressure on corporate tax rates worldwide.

In this study, I address this question by measuring the effect of two recent US federal corporate tax expenditures (or "breaks") on the value of compensation awarded to executives at large publicly traded corporations. I find both corporate tax breaks significantly increase executive compensation. I estimate that for every dollar generated by the tax breaks, compensation of the top five highest paid executives at publicly traded US firms increased by 17 to 25 cents.

The first tax break I study, bonus depreciation, allows firms to deduct an additional percentage of the purchase price of new capital assets from their taxable income in the year they are purchased. This decreases the after-tax present value cost of new assets and dramatically decreases the current tax bill of firms that purchase large amounts of capital. I find that a one percentage point decrease in the cost of new investments due to bonus depreciation increases executive pay by 6.2%. Comparing the cash benefits of bonus depreciation to the compensation response at the average firm suggests that for every dollar generated by bonus depreciation, compensation of top executives increases by 25 cents.

The second policy I study, the Domestic Production Activities Deduction (hereafter DPAD), allows firms to deduct a percentage of the income derived from domestic manufacturing activities from their taxable income. The DPAD decreases taxes paid by up to 3.15 percentage points, increasing after-tax cash flows substantially for domestic manufacturing firms. My preferred estimates suggest a one percentage point reduction in effective corporate income tax rates generated by the DPAD increases executive compensation by 4.2% or by 17 cents for every dollar of tax break.

To estimate these effects, I rely on detailed compensation data from the Execucomp database, well-established quasi-experimental variation in each tax break, and a modified difference-in-differences empirical framework. To identify the effect of bonus depreciation, I follow Zwick and Mahon (2017) in comparing executives in industries that, on average, invest in long-lived assets to executives at firms in industries that invest in short-lived assets. As long-lived assets are typically deducted from taxable income more slowly, bonus depreciation decreases the after-tax present value cost of these assets more than short-lived assets that are deducted more quickly. To identify the effect of the DPAD, I follow Ohrn (2018) in comparing executives in industries where a large portion of income is derived from domestic manufacturing – and therefore eligible for the DPAD – to executives in industries where only a small amount is classified as such. Comparing executives and their compensation packages across these dimensions as the policies are implemented and scaled yields difference-in-differences estimates of the effect of each policy.

The primary threat to the empirical identification of the effect of the tax breaks on executive compensation is that other shocks affecting executive pay covary with the tax breaks. I address this threat in a number of ways. First, I implement dynamic difference-in-differences analyses, which show how the compensation of executives at treated firms evolve relative to the same outcomes at untreated firms over time. The dynamic analyses support the study's design, displaying both no differential pre-trends and large differences between treated and control units after the tax breaks are implemented. Second, I estimate the effect of two placebo policies, one for each tax break. The bonus depreciation placebo is based on firms that invest primarily in long-lived goods that do not qualify for bonus depreciation. The DPAD placebo is based on firms in industries that derive a large percentage of income from domestic production, but rarely find themselves in a taxable position so cannot take advantage of the policy. By showing these placebos do not increase executive compensation, I reinforce the conclusion that the estimated effects of the tax breaks are due to the tax breaks themselves rather than other shocks to long-lived asset- or domestic production intense-industries. In addition to these checks, I show that the tax break estimates are stable across a variety of empirical specifications designed to address a number of other empirical concerns. While the assumption underlying the estimation strategy is fundamentally untestable, these checks limit the possibility that it does not hold.

In addition to understanding whether and by how much the tax breaks affect executive compensation, I design a number of tests to explore the mechanisms at play. One possibility is that the effect is purely due to performance-linked pay in the sense that the tax breaks increase stock prices or measures of firm performance and that compensation contracts are based on these measures.[1] I find that directly controlling for the most common performance measures used in compensation contracts—earnings per share, total sales, total operating income, and sales growth relative to the industry average (Edmans, Gabaix and Jenter, 2017)— has little effect on either estimate,

[1]A well-developed literature in accounting asks a related but fundamentally different question: How do effective corporate income tax rates respond to the metrics upon which executive performance is based? Papers in this literature include Phillips (2003), Gaertner (2014), and Powers, Robinson and Stomberg (2016).

suggesting this performance-linked mechanism is not driving the estimated effects.

Next, I explore whether the increase in pay is due to a highly competitive market for scare managerial talent (Rosen, 1981; Kaplan and Rauh, 2009, 2013). A number of results suggest this is not the case. First, I show that the effects of the tax breaks are not concentrated among newly hired executives, where the effects of extra resources to bid for talent are most likely to be observed. Second, the effects are also not concentrated in industries with large firms where executive talent is most valuable (Gabaix and Landier, 2008). Finally, compensation effects are larger in industries that make more hires from inside the firm. These are exactly the type of industries where a highly competitive market is unlikely to develop because executive talent is firm-specific and executives cannot be hired from other firms (Parrino, 1997; Cremers and Grinstein, 2014).

The third possible mechanism I consider is rent extraction by high powered executives (Bertrand and Mullainathan, 2001; Bebchuk, Fried and Walker, 2002; Bebchuk and Fried, 2003). In support of this mechanism, I find the effects of the tax breaks are concentrated among firms with weaker governance structures. More precisely, I test whether the effects of the tax breaks are larger among firms (1) with charters and bylaws that better protect managers from shareholder discipline, (2) with a smaller percentage of shares held by the single largest institutional investor, and (3) with higher average executive tenure.[2] For firms with strong governance scores in at least two of these three metrics, I estimate a null effect of the tax breaks on executive pay, suggesting strong corporate governance can fully mitigate the compensation effects of the tax breaks.

Finally, I investigate whether the pay increases are designed to incentivize value-maximizing responses to the tax breaks on the part of the executives (Edmans, Gabaix and Jenter, 2017). While the tax breaks seem to result in some increased pay-performance sensitivity which may constitute evidence of this mechanism, I also find that increased firm performance in response to the tax breaks is not concentrated among firms that saw the largest pay increases. Overall, the results across all of these tests point toward rent extraction as the primary mechanism by which the tax breaks precipitate increases in executive pay.

The findings in this paper significantly enhance our understanding of the incidence of corporate income taxation on worker compensation, particularly on those at the very top of the income distribution. A number of influential papers have demonstrated that, from a theoretical perspective, the incidence of the corporate income tax depends on a number of factors, including the capital intensity of the corporate sector, the degree of capital mobility across borders, the substitutability of foreign and domestically produced goods, and the substitutability between both capital and labor and foreign and domestic inputs (Harberger, 1962; Kotlikoff and Summers, 1987; Harberger, 1995; Randolph, 2006; Gravelle and Smetters, 2006).[3]

[2] The use of these three particular measures of firm governance quality follow Bebchuk, Cohen and Ferrell (2009), Chetty and Saez (2005), and Bertrand and Mullainathan (2001), respectively.

[3] Clausing (2011) notes that the incidence of the corporate tax may depend on up to seven additional factors including whether the tax system includes preferential treatment of debt financing and whether corporate taxes

Given this theoretical ambiguity, more recent studies have attempted to empirically estimate the incidence of corporate taxes. Three well-identified examples are Suárez Serrato and Zidar (2016), Fuest, Peichl and Siegloch (2018), and Dobridge, Landefeld and Mortenson (2021).[4] Suárez Serrato and Zidar (2016) use variation in US state corporate tax rates and a structural modeling approach and find workers bear approximately one third of the corporate tax burden. Fuest, Peichl and Siegloch (2018) examine the effect of thousands of German municipal tax rate changes on wages and estimate workers bear 50% of the burden.[5] Dobridge, Landefeld and Mortenson (2021) rely on variation in the DPAD and linked employer-employee tax return data to estimate the effect of corporate taxation on the full earnings distribution of workers. They find the DPAD increased median earnings, but had much larger effects for workers at the 95th and 99th percentiles of firm-level earnings distributions, suggesting the DPAD increased income inequality among workers at the same firm.

This paper adds to these excellent studies and the corporate tax incidence literature more broadly in three distinct ways. First, by using Execucomp data, I am able to study the incidence of the corporate tax on workers at the very top of the earnings distribution. My baseline DPAD estimate suggests compensation increases by more than 4% for every percentage point decrease in the corporate tax rate. Dobridge, Landefeld and Mortenson (2021) estimate the same semi-elasticity among publicly traded firms and find no effect on median earnings, but a 2.2% increase for workers at the 99th percentile of the earnings distribution. The findings in this paper therefore suggest that corporate tax breaks may lead to even larger increases in within-firm earnings inequality at publicly-traded firms than Dobridge, Landefeld and Mortenson (2021) find after taking into account earners at the very top of the earnings distribution.

Second, by incorporating a number of additional data sources, I am able to test the mechanisms by which corporate tax breaks translate into compensation gains for top executives. That a large portion of the dollar value generated by the tax breaks flows directly to top executives and almost exclusively to those executives at less well governed firms suggests that a bargaining model in which executives have significant power is at play (i.e. rent extraction). Third, I estimate the effect of two distinct types of tax breaks, an effective corporate tax rate reduction (the DPAD) and an investment tax incentive (bonus depreciation). As these are the two most important determinants of effective corporate tax rates globally (Steinmüller, Thunecke and Wamser, 2019), knowing that both significantly increase executive compensation and may increase income inequality is important for policy makers considering either lever.

This study also contributes to our understanding of the determinants of the substantial growth

influence wage bargaining.

[4]Other highlights in the empirical corporate tax incidence literature include Felix (2007), Desai and Foley (2007), Felix (2009), Arulampalam, Devereux and Maffini (2012), Clausing (2013), and Liu and Altshuler (2013).

[5]The divergence in estimates between Suárez Serrato and Zidar (2016) and Fuest, Peichl and Siegloch (2018) may be due to asymmetries in the effect of corporate taxes on wages. Suárez Serrato and Zidar (2016) primarily analyze effects of tax cuts, while Fuest, Peichl and Siegloch (2018) focus on tax hikes.

in executive compensation over the past 40 years. Leading explanations include weak corporate governance (Bebchuk and Fried, 2004; Kuhnen and Zwiebel, 2007), technology-driven increases in executive marginal product (Garicano and Rossi-Hansberg, 2006; Frydman and Papanikolaou, 2018), increased competition for executives with widely applicable skillsets (Murphy and Zabojnik, 2004; Frydman, 2019), increases in firm size coupled with a multiplicative executive production functions (Gabaix and Landier, 2008; Tervio, 2008), and rigidity of executive contracts (Shue and Townsend, 2017).[6] All of these explanations are consistent with some of the trends in executive compensation documented by Frydman and Jenter (2010) and Edmans, Gabaix and Jenter (2017).

My contributions to this literature are twofold. First, I document a new source of exogenous variation in after-tax cash flows that can be used to better understand the determinants of executive compensation. To date, other well-identified sources of such variation include changes in industry-average growth rates (Bertrand and Mullainathan, 2001), exposure to gloablization (Keller and Olney, 2017), and changes in energy prices (Bertrand and Mullainathan, 2001; Davis and Hausman, 2018). Second, like Bertrand and Mullainathan (2001), I find the largest effects for firms with the weakest governance structures, suggesting that rent extraction on the part of high-powered executives plays an important role in the determination of executive compensation.

The remainder of the paper is organized as follows. Section 2 provides further details on the tax breaks I study. Section 3 presents data sources, variable definitions, and descriptive statistics. I outline the estimation strategy and present baseline results in Section 4. Section 5 presents a series of tests that scrutinize the study's identification strategy. In Section 6, I conduct a number of tests to identify the mechanism(s) at play. In Section 7, I discuss the generlizability of the study's findings, consider the implications of the study with regard to income inequality, and suggest areas for future research. Section 8 concludes.

2 The Tax Breaks

This section describes each tax break in detail. I choose to study these two tax breaks for three reasons. First, Steinmüller, Thunecke and Wamser (2019) note that the two main factors in determining effective corporate income tax rates are statutory tax rates and depreciation rules. By focusing on examples of these two most important factors, this study's findings apply to the majority of effective tax rate changes. I further discuss the generalizability of this study's findings in Section 7.2. Second, the two tax breaks operate on the same firms over the roughly the same time period. Therefore, examining one while ignoring the other could potentially lead to biased estimates. Finally, recent research has carefully documented that quasi-experimental variation in each tax break that is unrelated to other firm or industry-level shocks.

[6] A related literature explores the empirical determinants of executive compensation, itself. Some highlights include Kostiuk (1990), Sloan (1993), Mehran (1995), Hartzell and Starks (2003), Core, Guay and Larcker (2008), and Graham, Li and Qiu (2012).

2.1 Bonus Depreciation

Typically, businesses cannot deduct the full price of newly installed assets from their taxable income in the year the assets are purchased. Instead, businesses are allowed to deduct only a portion of the price in each year of the asset's life according to the Modified Accelerated Cost Recovery System (MACRS) (detailed in IRS Publication 946). MACRS specifies both the life and depreciation method for each type of potential investment (or asset class). For equipment, lives can be 5, 7, 10, 15, or 20 years and the method is called the "declining balance switching to straight line deduction method." Bonus depreciation allows for an additional "bonus" percentage of the total cost of new equipment purchases to be deducted from taxable income in the year the asset is purchased.[7] Because firms can deduct the new investments from their taxable income sooner, the present value of the deductions associated with an investment is larger and the after-tax present value cost of the investment is smaller.

Appendix A provides a numerical example of the effects of 50% bonus depreciation on both a 7-year and a 3-year asset. As I discuss in depth below, the effect of bonus depreciation is larger in the case of the longer-lived asset.

Panel (a) of Figure 1 displays bonus depreciation rates during the sample period. Bonus depreciation was first enacted as part of the Job Creation and Worker Assistance Act of 2002. Initially, bonus depreciation was offered at a rate of 30% and was applied to purchases made after September 11, 2001. In 2003, the additional first year deduction was increased to 50% through the end of 2004. Bonus depreciation was not available in 2005–2007, but was reinstated in 2008 at a 50% rate. The 50% rate was available through the end of the sample period, except in 2011 when bonus depreciation was offered at a rate of 100% (100% bonus depreciation is often called "expensing" or "immediate expensing").[8] The policy was implemented during the sample period in five separate bills. Several of these were signed at the 11$^{\text{th}}$ hour and two of these applied retroactively to investments made in the past.

[Figure 1 about here]

The identification strategy that I employ to analyze the effects of bonus depreciation follows Cummins, Hassett, Hubbard et al. (1994), Desai and Goolsbee (2004), House and Shapiro (2008), Edgerton (2010), and Zwick and Mahon (2017) in comparing firms in industries that invest, on average, in longer-lived assets to firms in industries that invest in shorter-lived assets where asset lives are defined by MACRS. Bonus depreciation decreases the present value of investment costs more for firms that invest in longer-lived assets because it accelerates deductions from further in

[7] During the sample period, bonus depreciation was not available for assets with tax lives longer than 20 years, mostly structures and intellectual property.

[8] 50% bonus depreciation was offered through the end of 2017 when TCJA replaced bonus depreciation with immediate expensing through 2022.

the future. Consistent with this intuition, the Appendix A example shows bonus depreciation has a larger effect on the present value cost of a 7-year asset than on a 3-year asset.

Panel (b) of Figure 1 illustrates the quasi-experimental variation that I rely on by showing how much the present value costs of new investments change for firms in the top quartile of average asset life to firms in the lowest quartile of average asset life during the sample period.[9] When bonus depreciation is offered, the present value cost of new investments decreases for both quartiles. However, the decrease is larger for firms that invest in longer-lived assets as they are allowed to accelerate deductions from further in the future.[10]

A potential concern in using this cross-industry variation is that firms may shift their investment to assets with longer MACRS lives in response to the policy. In Appendix B, I use IRS Statistics of Income data (Internal Revenue Service, 2000–2012) to show that this is not the case; firms do not shift to assets with longer lives in response to bonus depreciation. Even if they did, this behavior would introduce measurement error into my bonus depreciation treatment variable and downward bias my estimates.

2.2 The DPAD

The DPAD is a federal US tax provision designed to encourage domestic manufacturing. The DPAD allows firms to deduct a percentage of "Qualified Production Activities Income" (QPAI) from their taxable income. As a result, the DPAD results in lower effective tax rates for firms that report a higher percentage of QPAI. QPAI is calculated as revenues from the sales of domestically produced goods less the cost of goods sold attributable to domestic production and other expenses related to domestic production. A firm's deduction is capped by both (1) 50% of its W-2 wages and (2) the firm's gross taxable income. While the first of these caps is unlikely to bind for large, publicly traded firms, the second is important. The gross taxable income cap means that firms in a tax loss position cannot claim—and, therefore, do not benefit from—the DPAD.

The DPAD was enacted as part of the American Jobs Creation Act (AJCA) of 2004.[11] AJCA stipulated (and it came to pass) that the policy was phased in during the years 2005–2010. The deduction was implemented at a rate of 3% in 2005, was scaled to 6% in 2007, and increased to its

[9] I provide a more detailed description of the construction of both the bonus depreciation and DPAD variables in the following section.

[10] A number of papers have used this cross-sectional comparison to estimate the effects on bonus depreciation on the US economy. House and Shapiro (2008) and Zwick and Mahon (2017) show bonus depreciation increases business investment. Edgerton (2010) shows the effect of bonus depreciation is concentrated among firms that are cash constrained, but not among firms that are presently nontaxable. Garrett, Ohrn and Suárez Serrato (2020) show local exposure to bonus depreciation increases employment but depresses wages. Ohrn (2019) uses state bonus depreciation adoption to estimate investment effects. His findings are similar to others in the literature, reinforcing the validity of the industry cross-sectional research design.

[11] The DPAD was designed to replace a series of export incentives that were ruled illegal by the World Trade Organization. The final incentive in the series, the Extraterritorial Income Exclusion (ETI), allowed firms to deduct a percentage of exports from their taxable income. I control for the ETI throughout the analysis.

maximum rate of 9% in 2010.[12] Panel (c) of Figure 1 displays the DPAD rate (the percent of QPAI that can be deducted) in each year during the sample period. In contrast to bonus deprecation, the course of the DPAD was exactly prescribed in AJCA; increases in the generosity of the tax break were predictable and certain.

Assuming firms faced the maximum statutory corporate tax rate of 35%, once fully phased in, the DPAD decreased the effective tax rate on QPAI by 3.15 (=0.09 x 35) percentage points. How much the DPAD decreases the effective tax rate for a firm depends on the percentage of income defined as QPAI. In 2010, a firm that defined 75% of income as QPAI received a 2.3625 percentage point reduction in their effective tax rate via the DPAD whereas a firm that derives only 25% of their income from qualified production activities received a break of only 0.7875 percentage points.

I follow Ohrn (2018) in using IRS Statistics of Income data to calculate the percentage of income that qualifies for the deduction at the industry-by-firm-size level.[13] Scaling this quasi-experimental, cross-sectional variation by the DPAD rate in each year and the statutory tax rate then interacting the measure with an indicator for taxable status yields the effective tax rate reduction due to the DPAD received by a firm in a given year.

Panel (d) of Figure 1 shows how the DPAD effective tax rate reduction evolves during the sample period for firms in the top and bottom quartiles of average QPAI% in 2005. The graph clearly demonstrates that firms with a large percentage of income derived from domestic manufacturing activities receive an increasingly generous tax break as the DPAD rate is increased from 3 to 6 to 9%. Firms in the bottom quartile receive essentially no tax break during the sample period. That the tax break does not increase for firms in the bottom quartile suggests firms were not able to alter their production processes in any dramatic way to take advantage of the deduction. Thus, as was the case with bonus depreciation, the cross-sectional differences in the generosity of the tax break do not seem to be influenced by firm behaviors in this setting.

3 Data

To analyze the effect of the tax breaks on executive compensation, I build a dataset that combines executive-level compensation data from Execucomp (Standard & Poor, 1998–2012*b*) with quasi-experimental variation in each tax break, and firm-level financial statement data and governance variables from Compustat (Standard & Poor, 1998–2012*a*), Thomson Reuters (Thomson Reuters, (1998–2012), and Risk Metrics (ISS Governance Services, 1998–2012). The analysis dataset has 100,520 executive-by-year observations and covers 23,361 unique executives at 1,669 firms during

[12]For Oil related QPAI, the maximum rate is 6 percent.

[13]Several studies have used this variation to explore the effects of the policy on firm business activities. Ohrn (2018) shows that the DPAD caused firms to increase investment, payouts to shareholders, and equity financing (debt is less attractive at lower, DPAD-adjusted effective tax rates). Blouin, Fich, Rice and Tran (2021) uses this variation to show firms use cash flows generated by the DPAD to fund merger and acquisition activity. Lester (2019) compares firms the disclose DPAD benefit to a matched sample to estimate investment and other responses to the policy.

the years 1998–2012. In the remainder of this section, I describe the construction of the main variables used in the analysis. Table 1 presents descriptive statistics for these variables. Appendix C provides detailed definitions of each variable in tabular format and additional descriptive statistics.

[Table 1 about here]

3.1 Executive Compensation and Characteristics

Executive compensation data is taken from the Compustat Execucomp database. Execucomp reports compensation of executives at large, publicly traded US firms. The main executive compensation outcome variable used in the analysis is **Total Comp Awarded** (referred to as TDC1 in Execucomp and often abbreviated throughout the text as simply Total Comp or Ln(Comp) when logs are taken). Total Comp Awarded is the total amount of compensation awarded to (but not necessarily realized) by the executive in a given year. Total Comp Awarded, as well as all other variables based on dollar values, are measured in real 2010 dollars. Total Comp Awarded is the sum of salary, bonus, the value of restricted stock granted, the estimated value of stock options granted (using a Black-Scholes calculation), and the value of long-term incentive payouts.[14] The analysis sample is limited to the top five executives at each firm in each year in terms of Total Comp Awarded to avoid over-representation of any particular firm in the analysis.

Figure 2 describes the structure of Total Comp Awarded. Panel (a) shows how the average level of Total Comp Awarded and its different components evolved over the sample period. Panel (b) shows the share of Total Comp Awarded in each category over time. Average Total Comp Awarded is fairly stable during the sample period, except in 2000 due to a spike in the value of options awarded. Other forms of compensation are fairly stable in both levels and shares of total compensation during the period.

The average executive in the sample receives $2.92 million in compensation per year (see Table 1). For reference, households in the top 1% of the US income distribution reported just under $1.5 million in taxable income in 2010 (CBO, 2013). Therefore, the executives in this study represent earners at the very top of the US income distribution.

[Figure 2 about here]

In supporting analyses, I separate Total Comp Awarded into two components, **Total Current** and **Total NonCurrent**. Total Current is the sum of an executive's salary and bonus compensation; it is "current" in that it does not contain stock-based or incentive components whose value will

[14] De Simone, McClure and Stomberg (2021) discuss how compensation measures based on SEC filings such as Total Comp Awarded may differ from W-2 earnings. Differences arise due to the timing of tax liability associated with stock grants and stock options. The value of stock grants and stock options are including in the Total Comp Awarded measure when they are awarded. Stock grants are taxed and, therefore, included on W-2s when they vest. Stock options are taxed and included on W-2s when they are exercised.

be realized in the future. Total NonCurrent compensation is the value of restricted stock grants, stock options grants, and the value of long-term incentive payouts given to the executive during the year. All executive compensation variables as well as all firm level outcomes and controls are winsorized at the 1^{st} and 99^{th} percentiles to mitigate the effects of outliers on parameter estimates.

In addition to compensation data, Execucomp provides data on executive characteristics and positions. In most specifications, I include the log of **Experience** (measured as the number of years in the Execucomp database) and the executive's gender. On average, executives have five years of experience. Only 6.2% of the sample are women. Approximately 20% of the sample are **CEO**s and 14.5% of executives are new to a firm in a given year (**New Hire**).

3.2 Tax Policy Variables

3.2.1 BONUS

Recall that in the absence of bonus depreciation, firms deduct new equipment investments from their tax bill according to MACRS rules. Let z_0 represent the present value of the deduction created by $1 of new equipment investment under MACRS. It then follows that z_0 multiplied by τ, the corporate income tax rate, is equal to the present value of the tax shield created by $1 of new equipment investment.

Bonus depreciation allows firms to deduct an additional b percent of investment costs. The remaining $1 - b$ is deducted according to the normal MACRS schedule. After incorporating bonus, the present value of the tax shield created by $1 of investment can be written as

$$z\tau = [b + (1 - b)z_0]\tau.$$

The **BONUS** variable used in the analysis is the percentage point decrease in the present value cost of new equipment investments due to bonus depreciation. This is equivalent to the increase in the tax shield generated by $1 of new investment which can be written as written as

$$\textbf{BONUS} = (z - z_0)\tau.$$

I compute BONUS at the industry-by-year level using the statutory bonus depreciation rates and industry-level z_0 data from Zwick and Mahon (2017). Zwick and Mahon (2017) use corporate tax return data to construct industry-level z_0. Variation in z_0 is based on the average eligible investments made by firms in a given 4-digit NAICS industry. As described above, bonus depreciation is more valuable for firms in industries that invest in longer-lived assets.

On average, bonus depreciation decreases the present value of new equipment investments by 0.99 percentage points during the full sample period. When firms are able to immediately deduct 50% of new assets via bonus depreciation, the incentive lowers the present value of these investments by just over 2 percentage points. Appendix Figure A2, Panel (a) presents the cross-sectional variation in BONUS for years when the tax incentive was offered. Firms and executives in the utilites, agriculture, and real estate industries benefit the most from bonus depreciation, while firms in wholesale trade, construction and professional, science, and technical service industries benefit less. Cross-sectional identification of the effect of BONUS on compensation comes from comparing the compensation of executives in industries that benefit the most to the compensation of executives that benefit the least.

3.2.2 DPAD

As mentioned above, I follow Ohrn (2018) in using publicly available aggregate tax data from the IRS's SOI database to construct **DPAD**, the percentage point reduction in effective tax rates generated by the policy. To do so, I follow these steps:

1. Use industry-level data to calculate QPAI% at the industry level.

For each industry, SOI provides aggregate Income Subject to Tax and aggregate Domestic Production Activities Deduction. Dividing total Domestic Production Activities Deduction by the DPAD rate yields total Qualified Production Activities Income. Dividing this amount by total Income Subject to Tax plus total Domestic Production Activities Deduction generates an industry-level measure of QPAI% in each year 2005–2012.[15]

2. Use firm size-level data to calculate QPAI% for firms in different firm-size bins.

For 11 firm size bins, the SOI Corporate Source Book provides aggregate Income Subject to Tax and aggregate Domestic Production Activities Deduction. Use these variables to construct QPAI% for each bin in each year 2005–2012 in the same way as the industry-level data above. This generates 11 firm-size QPAI% observations in each year 2005–2012.

3. Create firm-size scaling factors and use them to scale industry-level QPAI%.

Divide each firm-size QPAI% by the average QPAI% across all asset-classes in each year to create firm-size bin scaling factors. Multiply industry-level QPAI% by the firm-size bin scaling factors.[16] This creates industry-by-firm-size QPAI% in years 2005–2012.

[15] A concern in relying on time-varying QPAI% is that firms may shift domestic manufacturing income into high DPAD years. Estimates are stable when I use average QPAI% over the full time period, alleviating this concern. Further, if firms were successful in shifting, DPAD would over estimate the generosity of the policy on treated firms and downward bias estimates of the effect of the DPAD on executive compensation.

[16] Ohrn (2018) show the main effect of this scaling is to decrease QPAI% by different rates for firms with fewer than $5 million in total assets and to increase QPAI% almost uniformly for firms with more than $5 million in total assets. As almost all executives in the Execucomp database work at firms with more than $5 million total assets, the firm-size scaling increases QPAI% for all firms, but does not introduce substantial cross-sectional variation.

4. Scale industry-by-firm-size QPAI% by the DPAD rate offered in each year and the 35% statutory corporate tax rate to find **DPAD**, the effective tax rate reduction due to the tax break.

This process results in a DPAD measure that varies across approximately 900 industry-by-firm-size bins and over the years 2005–2012. As a final adjustment, because the deduction is limited to firms with positive taxable income, I set DPAD equal to 0 for firms that report no taxable income in a given year.[17] Thus, the DPAD variable also varies at the firm-level over time due to a firm's taxable status.

Once the DPAD is fully phased in at the 9% rate, it decreases the average effective tax rate that firms in the sample face by 0.95 percentage points. During this time, firms in the top quartile of DPAD benefit receive a 1.9 percentage point reduction in their effective tax rates due to the policy. Panel (b) of Appendix Figure A2 shows the sector-level variation in DPAD in years after 2005. Firms in information, construction, and manufacturing industries benefit the most from the tax break, while firms in finance, healthcare, and transportation and warehousing industries benefit the least. Identification of the effect of the DPAD comes mostly from this cross-industry variation in the tax break's benefit. Additional within-industry identification comes from comparing executives at firms that are taxable or not and at firms of different sizes, but to a lesser degree.

3.2.3 Potential Measurement Error in the Tax Breaks

There are several sources of potential measurement error in the tax breaks that I have not yet discussed. First, because the tax breaks are constructed using aggregate, as opposed to firm-level, data, there may be classical measurement error in each. This measurement error would downward bias estimates of the tax breaks on executive compensation. Second, because large publicly traded firms operate in many different industries, the assignment of the tax breaks according only to each firm's primary industry may introduce measurement error. Finally, the DPAD scaling factors are based on each firm's worldwide total assets. Because the DPAD applies only to domestic production, using worldwide assets to create these scaling factors may introduce additional measurement error. In Appendix E, I use Compustat Segments data to address these second and third concerns. Specifically, I use business segments data to reassign the tax breaks proportionally according to all primary-industries and use geographic segments data to assign the DPAD based on domestic assets. Neither of these adjustments has a statistically significant or large impact on the tax break estimates, suggesting that these sources of potential measurement error are relatively minor.

[17] I follow Manzon Jr and Plesko (2001) and others in "grossing-up" US federal income taxes plus US deferred taxes by the US federal statutory tax rate of 35% during the period to construct a proxy for taxable income. In doing so, I acknowledge the concerns noted by Hanlon (2003) and others in estimating taxable income from financial statement data. These concerns are less severe in this context because I only use the taxable income to generate an indicator for taxable status. To the extent that I mismeasure taxable income, my estimates of the effects of the DPAD on executive compensation will be biased toward zero.

3.3 Control Variables

3.3.1 ETI

Because the DPAD replaced the ETI, I am careful to control for its effects. I construct the **ETI** variable in a manner similar to the DPAD variable. ETI varies at the industry-level based on export intensity (data from USA Trade Online (US Census Bureau, 1998–2005)) and over time due to the timing of the policy. ETI measures the percentage point reduction in effective corporate income tax rates due to the export incentive.[18]

3.3.2 Firm-Level Controls from Compustat

Execucomp data is linked to firm financial statement data from Compustat. In baseline specifications, I follow the intuition presented in Gabaix and Landier (2008) and control for **Firm Size** measured as the log of total assets. In other specifications, I control for the log of **R&D** expenditures as Garicano and Rossi-Hansberg (2006) showed that executive compensation is linked to technological change. In most specifications, I also control for return on assets or **ROA** to compare similarly productive firms. To avoid a "bad controls" problem (Angrist and Pischke, 2008), I operationalize each of these firm control variables as decile bins based on the pre-period interacted with year fixed effects.

3.4 Additional Control and Heterogeneity Variables

In Sections 5 and 6, I use a number of additional control and heterogeneity variables. I denote the introduction new variables in these sections using bold face type. Detailed definitions of each these variables are available in Appendix C and descriptive statistics are presented in Appendix Table A3.

4 Estimation Strategy & Baseline Results

4.1 Estimation Strategy

To measure the effect of the tax breaks on executive compensation, I implement a modified difference-in-differences empirical strategy. I estimate parameters from regressions of the form

$$\text{Ln(Comp)}_{i,t} = \beta_0 + \beta_1[\text{BONUS}_{j,t-1}] + \beta_2[\text{DPAD}_{i,j,a,t-1}] + \gamma \mathbf{X}_{i,f,t-1} + \nu_t + \mu_f + \varepsilon_{i,t}, \tag{1}$$

[18] Although the ETI is also a corporate tax break, I do not focus on estimating or interpreting its effects because (1) it was directed at a small subset of firms, (2) it was available for only a limited amount of time (2001–2004) and during this time was under constant litigation from the WTO, and (3) it is unlikely to generalize to contemporary policies as the ETI was ruled illegal under WTO standards.

where subscripts i, f, j, a, and t index executives, firms, industries, firm size bins, and time, respectively. In all specifications, I include year and firm fixed effects, $\nu_t + \mu_f$, to eliminate secular trends in executive compensation and level differences in pay across firms.[19] $\mathbf{X}_{i,f,t}$ represents an array of control variables that vary across specifications. Following the executive compensation literature, I lag right hand side variables one period, recognizing that contracts are written in advance and therefore pay may take some time to incorporate changes in factors such as firm performance or, here, tax policy.[20] Coefficient β_1 is an estimate of the percent increase in executive compensation generated by a one percentage point decrease in the present value of investment costs due to bonus depreciation. Coefficient β_2 is the percent increase in executive compensation due to a one percentage point decrease in effective corporate income tax rates due to the DPAD.

β_1 is identified by comparing executive compensation in industries that invest in assets that are deducted more slowly according to tax rules (and therefore benefit more from bonus depreciation) relative to the increase in compensation in industries that invest in assets that can be deducted more quickly when bonus is offered or the bonus rate is increased. β_2 is estimated by comparing the increase in executive compensation in industry-firm-size bins in which a large amount of income qualifies for the DPAD relative to compensation in industry-firm-size bins in which a small amount of income qualifies when the policy is implemented and scaled. Because most of the variation in the tax breaks is at the industry-level, I cluster standard errors at the 4-digit NAICS industry level (Bertrand, Duflo and Mullainathan, 2004; Cameron and Miller, 2015).[21]

The identifying assumption underlying this estimation strategy is that in the absence of the tax breaks, compensation of executives most exposed to the policies would move in parallel with compensation of executives who were less exposed. The primary threats to this assumption are that compensation growth trends or other industry-by-time or industry-firm-size-by-time shocks affecting executive compensation might covary with the policies. I address these threats in Section 5 by (1) performing dynamic difference-in-differences analysis to evaluate pretrends and the timing of the tax breaks impacts, (2) by performing placebo tests designed to show that effects are not driven by trends in high QPAI% firms or firms that tend to invest in long-lived assets, but rather by the tax breaks themselves, and (3) by showing that the estimates are stable across a variety of specifications formulated to address this primary threat and other threats.

[19] I use firm fixed effects following the executive compensation literature and because the average executive appears in the data for fewer than four years. In Appendix F, I show the that tax breaks estimates remain positive, large, and statistically significant with executive or executive-firm fixed effects.

[20] In Appendix F, I estimate the contemporaneous effect of the tax breaks on executive compensation and find magnitudes similar to the baseline results.

[21] In Section 5.2, I show that clustering at the industry-by-firm-size level yields tighter tax break estimates.

4.2 Baseline Results

Table 2 presents baseline estimates of the effects of the tax breaks on executive compensation. Specification (1) estimates the effect of the tax breaks in the presence of only firm and year fixed effects. Specifications (2)–(4) progressively add controls for executive experience and gender, the ETI, Firm Size Bins interacted with year fixed effects, and ROA and R&D Bins interacted with year fixed effects. Across all five baseline specifications, the effects of both tax breaks are large, positive, statistically significant at the 1% level.

[Table 2 about here]

Specification (4) is my preferred specification. I use this specification and its tax break estimates as my benchmarks moving forward. I prefer Specification (4) to the other specifications in Table 2 for two reasons. First, controlling for differential growth across firms of varying size is important as firm size is the most consistent predictor of executive compensation. Second, as I show in Appendix G, the tax breaks affect ROA and R&D, but not firm size.[22] Therefore, controlling for compensation growth across ROA or R&D Bins may soak up some of the effects of the tax breaks on executive compensation. The preferred estimates suggest a one percentage point decrease in the present value cost of new investments increases executive pay by 6.18% while a one percentage point reduction in effective corporate income tax rates due to the DPAD increases compensation by 4.23%.

4.3 Dollar-for-dollar Magnitudes

A more intuitive way to understand these estimates is to compare the dollar-value increase in executive compensation to the dollar-value increase in after-tax cash flows generated by each tax break. I begin with bonus depreciation. The average value of BONUS during the years 2001–2012 was 1.47. The 1.47 percentage point decrease in the PV of investment costs increased compensation of the five highest paid executives at a firm by 9.1% (=6.18% $\times$ 1.47) or by \$1.32 million.[23]

In thinking about the after-tax cash flows generated by the policy, recall that bonus depreciation accelerates tax deductions from the future to the present. As a result, there are two ways to think about the cash flows generated by a one unit increase in BONUS. The first is simply the cash generated in a given year, ignoring the resulting lower cash flows in the future. The second is the present value of cash flows, which takes into account the intertemporal displacement of the tax shield. While the first way is clearly incomplete, it may be the way that unsophisticated (or

[22] Appendix G shows how firm-level business activity responds to the tax breaks for the analysis sample. Consistent with Zwick and Mahon (2017), bonus depreciation increases investment. Consistent with Ohrn (2018), the DPAD increases investment, decreases debt usage, and increases payouts. The analysis also confirms the first-stage; the tax breaks decrease after-tax investment costs and effective tax rates.

[23] The base here is the average compensation awarded from Table 1, \$2.92 million $\times$ 5.

captured) compensation committees measure their available funds or justify their compensation decisions.

During the years 2001–2012, the average bonus depreciation rate was 43%. The average firm in the sample made \$362 million in investments per year. Firms were taxable during this period 75% of the time. As a result, bonus depreciation increased cash flows in any given year by about \$117 million per year per firm (=\$362 million × 43% × 75%) when future cash flows are ignored. Comparing the \$1.3 million to \$117 million suggests that just over 1.1% of immediate cash flows generated by bonus depreciation go towards executive pay.

When we instead correctly consider the intertemporal nature of the tax break, this statistic is more alarming. Bonus depreciation decreased the present value costs of investment by 1.47% for the average firm during the years 2001–2012. This decreased the present value costs of investment by only \$5.32 million per year for the average firm. Comparing the \$1.3 million increase in compensation to this \$5.32 million increase in *present value* cash flows suggests that for every present value dollar generated by the tax break, compensation of the top five highest paid executives at a firm increased by approximately 25 cents.

The DPAD calculation is more straightforward as there is no time value of money consideration. Here, a one percentage point decrease in effective tax rates due to the DPAD increases the compensation of the top five highest paid executives by \$611,000. The average firm that benefited from the DPAD reported \$361 million in taxable income per year so the one percentage point decrease in effective tax rate increased after-tax cash flows by \$3.61 million for the average firm. Comparing the \$611,000 to the \$3.61 million base suggests that for every dollar generated by the DPAD, compensation of the five highest paid executives at a firm increased by just under 17 cents.

In sum, across the two tax breaks, I find that for every dollar a firm benefits from the tax breaks, compensation of the firm's top five highest paid executives increased by 17 to 25 cents.

5 Identification Strategy Scrutiny

5.1 Dynamic Difference-in-Differences Analysis

The estimated effects of the tax breaks on executive compensation may be an artifact of differential trends between treated and control groups rather than direct results of the tax policies. To address this concern, I estimate differences in compensation between the most and least treated executives in each year for each policy. To do this, I replace each tax break in Equation (1) with its identifying cross-sectional variation interacted with year fixed effects. For bonus depreciation, I run the regression,

$$\text{Ln(Comp)}_{i,t} = \beta_0 + \sum_{k=1996}^{2012} (\beta_k[(1-z_0)\tau\mathbb{1}(k)]) + \beta_1[\text{DPAD}_{j,a,t}] + \gamma \mathbf{X}_{i,f,t} + \nu_t + \mu_f + \varepsilon_{i,t}, \qquad (2)$$

where $(1-z_0)\tau$ is the bonus depreciation cross-sectional variation, which is equal to the percentage point reduction in bonus depreciation that a firm would receive if bonus depreciation were set to 100%. $\mathbb{1}(k)$ is an indicator equal to 1 in year k. Other specification choices mimic Specification (4) of Table 2. The coefficients β_{1996}–β_{2012} describe differences in executive compensation between firms with high and low benefit from bonus depreciation relative to the differences in 2001.[24] If bonus depreciation has a causal effect on executive compensation, we would expect to see no difference in compensation in years 1996–2001 and positive differences when bonus depreciation is offered in years 2002–2004 and 2008–2012. If the values of executive compensation packages exhibit downward rigidity, then we may expect the positive differences to remain in tact during the years 2005–2007 as well.

Panel (a) of Figure 3 presents the $\beta_{1996} - \beta_{2012}$ coefficients with corresponding 95% confidence intervals. For scale, Panel (b) adds these coefficients to trends in the average of Ln(Comp) during the period. Four takeaways are readily apparent. First, the estimates exhibit no differential trends in the 1996–2001 period. Second, upon bonus depreciation implementation in 2002, executive compensation at firms that benefit most from bonus depreciation increases sharply relative to compensation in shorter-lived industries, suggesting a causal effect of the tax break on executive compensation. Third, there is no obvious reversal of this effect when bonus depreciation is not offered in years 2005–2007, suggesting downward wage rigidity among executives (or perhaps asymmetric effects of the tax break as in Benzarti, Carloni, Harju and Kosonen (2020)). Fourth, differences in compensation remain large and elevated when bonus depreciation is reintroduced in 2008 suggesting the average effects of the tax break are not short-lived or corrected via firm-level governance mechanisms.

[Figure 3 about here]

I analyze the dynamic effects of the DPAD on executive compensation in a similar manner by estimating coefficients from a regression of the form

$$\begin{aligned}\text{Ln(Comp)}_{i,t} = \beta_0 + \sum_{k=1998}^{2012} (\beta_k[\text{QPAI\%}_{j,a} \times \mathbb{1}[\text{Non-Taxable}_f] \times \mathbb{1}(k)]) + \beta_1[\text{BONUS}_{j,t}] + \gamma \mathbf{X}_{i,f,t} \\ + \nu_t + \mu_f + \varepsilon_{i,t} \qquad (3)\end{aligned}$$

where QPAI% is the industry-firm-size average percent of income eligible for the DPAD deduction, and $\mathbb{1}[\text{Non-Taxable}_f]$ is an indicator equal to zero for firms that are not taxable in the majority of years in which the DPAD is offered. Mechanically, including the time-invariant Non-Taxable interaction yields β_k estimates that are based on comparisons between more and less profitable and

[24] I extend the sample back to 1996 for the dynamic bonus depreciation analysis to better rule out differential trends in the pre-period.

firms. To focus the comparison on the DPAD variation and not profitability, I include decile bins based on the percent of years non-taxable during the sample interacted with year fixed effects when I estimate the dynamic DPAD effects.[25]

Figure 4 presents coefficients $\beta_{1998} - \beta_{2012}$ in Panel (a) and the coefficients added to average compensation trends in Panel (b). As was the case with bonus depreciation, firms that benefit most and least from the DPAD do not seem to be trending differently in the pre-period. Interestingly, there does not seems to be any effect of the DPAD on compensation just after the tax break was implemented in years 2005–2006. Differences in compensation start to increase in 2007 and become large and statistically significant in years 2008–2012. The delayed compensation response to the DPAD is likely due to the uncertainty surrounding the policy in its early years. Lester and Rector (2016) document DPAD takeup among corporate taxfilers and find very few firms claimed the deduction in 2005. Takeup doubled between 2005 and 2007. Overall, the estimates presented in Figure 4 suggest a causal effect of the tax break on executive compensation as differences in compensation between executives in DPAD-eligible firms and non-eligible firms are relatively small and stable prior to policy implementation and increase in magnitude after 2007.

[Figure 4 about here]

Across both tax breaks, the dynamic analyses suggest (1) that executive pay did not differ in ways that would invalidate the empirical analysis in the pre-period for either policy and (2) that the two tax breaks had a substantial effect on executive compensation.

5.2 Robustness to Alternative Specifications

Table 3 presents a host of alternative specifications that are designed to demonstrate the robustness of the baseline results or rule out alternative explanations for the estimated responsiveness of executive compensation to the tax breaks. In Specifications (1) and (2) I estimate the effect of each of the tax breaks separately. The magnitude of each tax break estimate is large relative to the baseline. This is unsurprising given BONUS and DPAD are positively correlated ($\rho = 0.3417$) and reinforces the decision to jointly estimate the effect of the policies as omitting one policy will upward bias estimates of the other.

[Table 3 about here]

In Specification (3), standard errors are clustered at the industry-firm-size level as DPAD varies across industries and firm-size bins. Standard errors are tighter than in the baseline specification.

[25] In Appendix H, I present Dynamic DD estimates for the DPAD where taxable status is allowed to vary over time. Estimated effects are similar in scale and time pattern.

Specifications (4) and (5) address the concern that industry-specific trends or shocks unrelated to the tax policies are driving the results. To combat this concern, Specification (4) includes NAICS 2-digit sector-by-year fixed effects. The effects of the DPAD on executive compensation remains large and statistically significant, but the BONUS estimate is smaller and no longer statistically different from zero. This null BONUS effects does not, in and of itself, invalidate the research design, it simply suggests that the identification of BONUS comes mostly from cross-sector variation in policy generosity. As another test to rule out industry-specific concerns, in Specification (5), I replace the sector-level fixed effects with decile bins of **Ind Comp Growth**, the industry-level average compensation growth rates from 1998–2001, interacted with year fixed effects. By including these fixed effects, I force the tax break coefficients to be identified based on variation among executives in industries whose compensation grew at very similar rates in the pre-period. The Specification (5) estimates are very close to the baseline effects. This result (in tandem with the absence of differential pretrends in Figures 3 and 4) suggests industry-specific concerns relating to executive compensation do not violate the study's identifying assumption.

Other policies that affect executive compensation and that are implemented at the same time as bonus depreciation or the DPAD may also lead to violations of the parallel trends assumption. One such policy is the accounting rule FAS 123 that required firms to expense the value of stock options starting in 2005. Carter, Lynch and Tuna (2007) show this rule led to a decrease in the use of options compensation and an increase in stock grants. To mitigate this concern, I separate firms into deciles according to, **Options Usage**, the percent of compensation that consisted of stock options in 2004. I then include fixed effects for these bins interacted with year fixed effects in Specification (6). This forces identification to come from tax policy variations within sets of firms using similar ratios of options to total compensation prior to FAS 123. Specification (6) results are similar to the baseline suggesting FAS 123 is not driving the results.

The dynamic DPAD analysis presented in Section 5.1 shows statistically significant effects of the DPAD on compensation only in years after 2008. As these positive effects are coincident with the 2008 recession, a concern is that the recession is leading to this time-pattern in estimates. I address this in Specification (7) by including deciles bins based on **Recession**, the industry-level growth in total sales from 2006–2009, interacted with year fixed effects. Coefficient estimates are stable when this recession control is included suggesting that positive DPAD effects after 2008 are not due to differential responses to the 2008 recession.

The dynamic analysis is also robust to alternative specifications. Figure 5 presents dynamic specifications that start with no firm level controls as in Specification (1) of Table 2 then adds Industry Comp Growth Bins and Firm Size Bins interacted with year fixed effects as in Specification (4) of Table 3 and finally adds ROA, and R&D bins interacted with year fixed effects as in Specification (5) of Table 2. For bonus depreciation, there seems to be a slight pretrend when no firm-level controls are included and slightly more muted effects in the specification that includes

ROA and R&D controls. On the DPAD side, the pre-period estimates are slightly more stable in the specifications with additional controls.

[Figure 5 about here]

In Appendix J, I explore whether a select number of tax break outliers are driving the estimated effects. As a first step in this check, I create binned scatterplots that compare residualized values of executive compensation to residualized values of the tax breaks where the residuals are derived from the baseline model (Specification (4) of Table 2). For both tax breaks, the bulk of the binned data suggest a strong positive relationship. However, values at the extreme right side of the distribution for each tax break suggest that outliers may be resulting in lower tax break estimates (which correspond to the line in each figure). To address this concern, in Appendix Table A7, I progressively winsorize the tax break variables at 1, 3, 5, and 10% levels. Consistent with the binned-scatterplot visual evidence, winsorizing the tax break variables at progressively more aggressive levels increases the magnitude of the tax break coefficients. This confirms that outliers push estimates down rather than up.

5.3 Placebo Tests

I now implement two placebo tests, one for each tax break, designed to show that the tax breaks themselves, rather than other shocks to executive compensation in long-lived asset or domestic manufacturing-intense industries, are responsible for the the baseline policy estimates.

The bonus depreciation placebo relies on the fact that only equipment investments qualified for bonus depreciation during the sample period. This limitation results in a set of industries that invested heavily, on average, in long-lived assets classified as structures and intellectual property that did not qualify for bonus depreciation. Industries that invested in five times more structures and intellectual property than equipment are identified as placebo industries.[26] To implement the placebo analysis, I generate **BONUS Placebo** $= b\times$ an indicator for placebo industries where b is the bonus depreciation rate. BONUS Placebo is scaled such that coefficient estimates are interpreted as the percent increase in compensation of executives in placebo industries due to a one percent decrease in the after-tax present value cost of investments they would receive if all their investments qualified. The BONUS Placebo analysis will be concerning if it returns estimates that are large and positive as it would indicate shocks in long-lived asset industries unrelated to the tax break are driving the policy estimates.

For the DPAD Placebo, I test whether the tax break affects compensation among firms with persistent losses, those that are not taxable in the majority of years after the DPAD is implemented.

[26] Garrett, Ohrn and Suárez Serrato (2020) first proposed this placebo. Industries represented by NAICS codes 2111, 4821, 5311, 7111, 7112, 7211, 7212, and all of sector 81 invested in five times more ineligible than eligible capital during the sample period.

The DPAD should have no effect for these firms because, as mentioned above, the DPAD is capped by a firm's taxable income. To implement this test, I code **DPAD Placebo** as the industry-firm-size DPAD effective tax cut only for firms with persistent losses. Firms with persistent positive income are left out of the analysis. Here, the placebo estimate will be concerning if it is large and positive because it would indicate shocks to domestic manufacturing-intense firms, but not the policy are driving the results.

Table 4 presents results from the placebo tests. Specification (1), shows the effect of the BONUS placebo is small and statistically insignificant. Specification (2), shows the DPAD has no effect on executive compensation for firms in persistent loss positions.[27] Specification (3) performs both tests together, estimating the effect of the bonus placebo and the DPAD among firms with persistent losses. Again, neither placebo has a statistically significant effect on executive compensation.

[**Table 4 about here**]

I provide dynamic estimates for each placebo tax break in Figure 6. BONUS placebo results are presented in Panel (a), which shows relative increases in executive salaries exactly when bonus depreciation is not offered in years 2005–2007.[28] These differences dissipate when the policy is again offered in 2008–2012. The direct mismatch between positive coefficients and bonus depreciation availability leads to the statistically insignificant estimate in Specification (1) of Table 4. Panel (b) presents dynamic estimates of the DPAD among firms with persistent losses. In all years, coefficient estimates are statistically insignificant. The economic magnitudes are somewhat variable, but relatively small in years after DPAD implementation. Based on the placebo estimates in Table 4 and these dynamic estimates, it seems shocks to compensation in long-lived asset industries or domestic manufacturing-intense industries that are unrelated to the tax breaks, themselves, are not responsible for the baseline policy estimates.

To summarize, the tests presented in this section support the internal validity of the study's design. The dynamic difference-in-differences estimates, placebo tests, and alternative specifications all suggest both tax breaks led to large increases in executive compensation.

6 Mechanisms

I now move on to identify the mechanism or mechanisms by which the tax breaks increased executive compensation. I explore four potential pathways.[29] The first is performance-linked incentives;

[27] Among the sample of firms with persistent losses, the effect of the BONUS is large and statistically significant, which accords with the logic that bonus depreciation is particularly valuable for financially constrained firms.

[28] It is possible that these positive 2005–2007 coefficients represent a lagged response to bonus due to sticky contracts. However, as the Figure 3 coefficients shows a more immediate response to bonus depreciation itself, in order for this to be the case, contracts would have to be stickier for executives at placebo firms. There is no reasons to believe this is the case.

[29] Fuest, Peichl and Siegloch (2018) catalog the most common mechanisms by which corporate taxes may influence wages. These include competitive labor markets, wage bargaining, fair wage models, wages that affect productivity,

the tax breaks may lead to increases in the performance metrics upon which compensation is contractually based. The second pathway is a highly competitive market for managerial talent. That is, the tax breaks increase after-tax cash flows which can be used to attract scarce, high value managers. Third, it could be that executives with strong bargaining power benefit via rent extraction. Finally, firm owners may alter the level or composition of pay in order to incentivize managers to respond to the tax breaks in profitable ways. I explore each of these possibilities in turn below.

6.1 Performance-Linked Compensation Mechanism

In their handbook chapter on executive compensation, Edmans, Gabaix and Jenter (2017) explain the bonus portion of executive compensation is usually based on one or more measures of accounting performance (earnings per share, operating income, or sales) and that many plans also rely on sales growth relative to a peer group or other relative performance measures. If the tax breaks increase these metrics, then the tax breaks may increase executive compensation via this performance-linked mechanism. If so, the estimated impact of the tax breaks on executive compensation could be due purely to a mechanical and non-discretionary process. Another similar concern is that the tax breaks may increase the value of compensation awarded because executives are given a fixed number of restricted stock grants or options grants and the tax breaks increase the value of the stock and stock options (Shue and Townsend, 2017).

I test whether this performance-linked mechanism is driving the compensation response to the tax breaks in Table 5. To do so, I include time-varying firm-level controls for **Earnings per Share (EPS)**, **Operating Income**, **Sales**, **Relative Sales Growth**, and **Stock Return**. For each of these controls, I include both the current and lagged values as the calculated metrics may be based on multiple years of performance (Edmans, Gabaix and Jenter, 2017). By including these controls, I effectively shut down the performance-linked mechanism by which the tax breaks may increase executive compensation.

[Table 5 about here]

Specifications (1)–(5) of Table 5 introduce each control separately. Specification (6) includes all the controls simultaneously. Across all six specifications, the effects of both tax breaks remain large, positive, and statistically significant. When all the controls are included, the estimated effect of bonus deprecation on executive compensation is larger than in the baseline specification, while the effect of the DPAD is somewhat smaller.These results show that the estimated tax break effects

and monopsonistic labor markets. There are also a number of ways in which cash windfalls can affect wages (e.g. Blanchard, Lopez-de Silanes and Shleifer, 1994; Howell and Brown, 2020). Here, I focus on the mechanisms by which the tax breaks are most likely to lead to compensation increases for high powered executives whose pay is composed of salary, performance-based bonuses, options, and stock grants.

are not due purely to mechanical and non-discretionary increases driven by performance-linked compensation.

6.2 Competitive Market for Scarce Talent Mechanism

The tax breaks may increase executive pay due to a highly competitive market for scarce executive talent. Here, the tax breaks increase after-tax cash flows, allowing firms to pay more. I investigate whether this mechanism is responsible for the tax break effects in Table 6 via a series of heterogeneity tests. I attempt to order these tests from weakest to strongest in terms of their ability to confirm or reject the competitive market mechanism.

[Table 6 about here]

First, I test whether the tax break responses differ by executive gender by including interactions between each tax break and a female indicator. The idea behind this test is that conditional on experience working as a top five executive at a large public traded firm and position (CEO or not), female executives are equally qualified with men.[30] Under this assumption, if the effect of the tax breaks differed by gender, it would suggest discrimination in the market for executive talent and would speak against the competitive market mechanism. The results presented in Specification (1) show there is no statistically significant difference in the effect of the tax breaks on compensation by gender. This first test, therefore, does not reject the competitive market mechanism.

Next, I test whether the effect of the tax breaks are concentrated among CEOs. Under the assumption that CEOs matter relatively more for firm value than other executives, the effect of the tax breaks on compensation should be concentrated among CEOs. The Specification (2) results show marginal support for this test.[31] A 1% increase in BONUS has a 1% larger effect for CEOs than other executives. A 1% increase in the DPAD results in a 3% larger effect than for other executives. Both coefficients are statistically significant at the 10% level. While these results may support the competitive market mechanism, they are also consistent with a rent-extraction mechanism if CEOs have more bargaining power than the average executive.

In Specification (3), I interact the tax breaks with the New Hire indicator, which is equal to one for executives in their first year with a firm. If the effect of the tax breaks operates mainly through the competitive market mechanism and there is some internal cost to executives to moving firms, then we would expect the tax break effects to be concentrated among newly hired executives. This is not the case. Neither tax break has larger effects for new hires. That the tax breaks lead to similar increases in pay for new hires and veteran executives speaks against the competitive market mechanism.

[30] I also control for CEO during this test.

[31] The Specification (2) results also show that effects for non-CEOs are close to—and statistically indistinguishable from—baseline effects. This suggests the tax breaks effects on compensation are not skewed toward CEOs, who are paid approximately twice as much as non-CEO executives.

The fourth test explores whether the tax break effects are concentrated among executives in industries that are composed of firms that, on average, have larger market capitalization (**Ind. Avg. Market Cap**). Gabaix and Landier (2008) show that when production functions are multiplicative in CEO talent, the largest firms will compete harder for CEO talent. To the extent that there is some industry-specific skill component of executive talent, the Gabaix and Landier (2008) result implies that firms in industries with larger firms will compete harder for executive talent. In this context, the tax breaks would have larger effects in industries with larger firms and a more competitive market. The results of this test, presented in Specification (4), reject this hypothesis and, therefore, do not support the competitive market mechanism.

Finally, I test whether the tax break effects vary according to the percentage of executives that are insider (within-firm) hires. Parrino (1997) and Cremers and Grinstein (2014) argue that industries with a high percentage of insider hires rely on specific as opposed to general skills. In contrast, firms in industries with a low percentage of insider hires, do not rely on specific skills and must bid for executive talent against a large number of competing firms. Based on this logic, if the tax break effects are due to a competitive market, the effects should be concentrated in industries with a low percentage of insider hires and a more competitive environment for scarce executive talent. Again, the data do not bare this prediction out. In Specification (5), I interact the tax breaks with an indicator equal to one for firms in industries with a high percentage of CEO hires made from within the firm (**Insider Hires %**)). The results suggest the effects of the tax breaks are concentrated in industries with a high percentage of insider hires where executives have fewer outside options. That the effects are concentrated in the industries operating in the least competitive markets rejects the competitive market mechanism and points towards a rent-extraction mechanism.

In sum, while the tax breaks effects do not differ by gender and are concentrated among CEOs, the bulk of the evidence presented in this subsection rejects the competitive market mechanism. In particular, the tax break effects are not concentrated among new hires, and are not concentrated among firms in industries with larger firms and fewer insider hires—those firms more likely to participate in highly competitive markets for executive talent.

6.3 Rent Extraction Mechanism

Several of the tests in Subsection 6.2 reject the competitive market explanation and suggest the tax breaks lead to compensation increases via a rent-extraction mechanism. If rent extraction is responsible for the larger benefits of the tax breaks that accrue to executives in positions of power then strong corporate governance structures may mitigate their effects. I test this hypothesis in Table 7. In Specification (1), I include interactions between the tax breaks and $\mathbb{1}$(**Bebchuk Gov**), an indicator denoting whether firms are in the top/bottom tercile of firms with best governance structures according to the Bebchuk, Cohen and Ferrell (2009) Entrenchment Index. In Specification (2), I follow Chetty and Saez (2005) in testing whether the effect of the tax break is mitigated in firms with the largest single institutional shareholders.[32] To do so, I interact the tax breaks with an indicator denoting whether the firm is in the top/bottom tercile of the **Large Holder** distribution. In Specification (3), I follow Bertrand and Mullainathan (2001) in considering management relatively more immune from shareholder governance at firms with executives with longer tenure. Here, I interact the tax breaks with an indicator, $\mathbb{1}$(**Exec Tenure**) that is equal to 1/0 for firms in the bottom/top tercile in terms of the average tenure of the top five highest paid executives at the firm.[33] Specification (4) includes all three interactions. In Specification (5), I interact the tax break with $\mathbb{1}$(**Combined Gov**), an indicator equal to one for firms that are in the top tercile in any two of the three governance indicators that I use in Specifications (1)–(3). If the tax breaks are mitigated in firms with better shareholder governance and less entrenched managers then the interactions terms should all be negative.

[**Table 7 about here**]

The interaction terms in Specification (1) are both negative in sign and the DPAD interaction is economically large and statistically significant. The Specification (2) and (3) results suggest that both tax breaks have less effect on compensation in firms with the largest institutional shareholders and shorter executive tenures. In Specification (4), the signs of all the interactions are negative and the magnitudes are fairly large and four of the six coefficient are statistically significant at the 10% level. I take this as strong, but suggestive, evidence that all of the governance measures may mitigate the effects. I use the term "suggestive" in interpreting the results as only 21,688 observations occur in the top or bottom terciles of all three governance measures. In Specification (5), the interaction terms on the Combined Governance indicators are negative and statistically significant. Importantly, we see the coefficient sizes on the interactions are roughly the same size – but in the opposite direction – as the tax break effects, themselves. Non-linear combinations of these estimates suggests the tax breaks have small and statistically insignificant effects for firms in the top tercile of at least two governance measures. Put differently, strong governance structures have the power to fully mitigate the effects of the tax breaks on executive compensation. Overall, Table 7 provides strong evidence that the tax breaks have smaller effects in better governed firms and, therefore, supports the rent extraction mechanism.

[32] Recent research has shown that large *passive* institutional investors are not necessarily strong principals (Schmidt and Fahlenbrach, 2017). However, passive ownership was less than 10% of total equity ownership during the sample period as opposed to 40% today (Anadu, Kruttli, McCabe and Osambela, 2020).

[33] I construct all three indicators based on firm-level averages during the entire sample period. In Appendix L, I test whether the tax breaks affect the governance measures upon which the indicators are based. The tax breaks do not have statistically significant effects on any of the measures. The effect sizes also suggest the tax breaks do not affect the firm-level indicators as they are not large enough to move firms from one tercile of any distribution to the other.

6.4 Inducing Value-Maximizing Effort Mechanism

Responding to the tax breaks in value-maximizing ways is likely to require additional executive effort. If boards of directors want to induce such efforts, they may have to increase the level of pay or the pay-performance sensitivity of compensation packages (Edmans, Gabaix and Jenter, 2017). There is reason to believe this may be case as firms seem to become more productive in response to the tax breaks. Lester (2019) documents firms increase ROA and return on sales in response to the DPAD. Blouin, Fich, Rice and Tran (2021) find the DPAD leads to improvement in merger and acquisition quality. The Appendix G results suggest that for the sample of firms analyzed herein, the DPAD increased ROA and stock return. Given that firms seem to respond to the tax breaks in value-optimizing ways (at least for the DPAD), it may be that the pay increases were made to induce value-maximizing efforts that resulted in these gains.

As a first test of this mechanism, I consider how the tax breaks changed the composition of pay. Table 8 shows how the tax breaks affect current compensation (salary and bonus) and non-current compensation (all non-salary and bonus compensation which includes options and restricted stock grants) as well as the ratio of current to total compensation. If boards wanted to induce value-maximizing efforts in responding to the tax breaks, they may have to increase the pay-performance sensitivity of executive compensation (Edmans, Gabaix and Jenter, 2017). Evidence of this would show up as larger increases in non-current compensation and decreases in the ratio of current to total compensation. Focusing on columns (1)–(3), we see that BONUS increases both current and non-current compensation and leaves the current/total ratio unchanged. In contrast, the DPAD has a larger effect on non-current compensation and induces a decrease in the current/total ratio. These results are not due to performance-linked incentives as the results are similar in Columns (4)–(6), which control for the most common metrics upon which performance-linked pay is based (see Subsection 6.1). I take this as suggestive evidence that contracts may have been rewritten to induce value-maximizing efforts in response to the DPAD.

[Table 8 about here]

In a second, more direct test, I explore whether increased compensation actually induced value-maximizing responses to the tax breaks. Here, I rely on the heterogeneity in compensation responses by firm governance documented in Section 6.3. We see larger compensation increases in poorly governed firms. If these compensation increases induced successful value-maximizing efforts in response to the tax policies, then firms with weaker governance structures that increased pay more should also see larger increases in firm performance measures such as ROA and stock returns. I test exactly this in Tables A9 and A10 of Appendix M, which regress firm level ROA and stock returns on the tax breaks and interactions between the tax breaks and governance measures exactly as in Table 7. Overall, these results show the firms that increased pay more did not see larger increases in ROA or stock return. This result does not support the hypothesis that the pay increases were made to induce (successful) value-maximizing efforts.

To summarize, the tests presented in Section 6 show (1) the tax breaks still affect compensation after controlling for the most common metrics upon which performance-linked pay is based, (2) the effects of the tax breaks are not concentrated among new hires, in industries with large firms where executives are likely to have the most value, or in industries that rely on general skills, (3) that the effects of the tax breaks are largest in firms with the weakest governance structures, (4) that performance-pay sensitivity increases in response to the DPAD, and (5) that larger compensation responses in more weakly governed firms do not induce larger increases in firm performance. Taken together, I conclude from this evidence that the most likely mechanism by which the tax breaks increased compensation is rent extraction on the part of high-powered executives. I also find the evidence that boards attempted to rewrite contracts to induce value-optimizing responses to the DPAD compelling.

7 Discussion and Directions for Future Research

In this section, I discuss implications of the study's findings and highlight areas for future research.

7.1 Corporate Tax Breaks and Income Inequality

The findings presented herein have two important implications for the effect of corporate taxation on income inequality. First, examining earnings responses at the very top of the income distribution suggests corporate tax breaks lead to even larger increases in within-firm income inequality previously documented. Second, tax breaks in the form of investment incentives likely have similar effects on inequality as decreased effective income tax rates. I expand on each of these points below.

Dobridge, Landefeld and Mortenson (2021) estimate the effect of the DPAD on the full earnings distribution using W-2 earnings data. They find the DPAD increases income inequality. For the average firm in the economy, they estimate a one percentage point decrease in effective tax rates due to the DPAD increases median earnings by 0.5%. For workers at the 95th and 99th percentile of the earnings distribution, earnings increase by 1.3% and 2.7% in response to the same one percentage point effective tax rate shock. Among publicly traded firms, they find similar results; median earnings do not respond to the DPAD, but for 99th percentile workers, earnings increase by 2.2% in response to a one percentage point decrease in the DPAD.

For executives at the very top of the income distribution, I find even larger responses; a one percentage point increase in the DPAD increases awarded compensation by 4.2%. This larger response suggests that the DPAD leads to even more severe increases in within-firm income inequality at large publicly traded companies than Dobridge, Landefeld and Mortenson (2021) find after taking into account workers at the very top of the firms' income distributions.[34]

There is also reason to believe that bonus depreciation increases income inequality. Multiple studies show US federal bonus depreciation does not affect average earnings per worker. Garrett, Ohrn and Suárez Serrato (2020) use a local labor markets approach to show average earnings per worker do not increase in response to local exposure to bonus depreciation. Curtis, Garrett, Ohrn, Roberts and Suárez Serrato (2021) show that earnings per worker at manufacturing plants that benefit most from bonus depreciation do not increase relative to earnings at plants that benefit less. Contrasting the null effect on average earnings with the large responses I document among top executives suggests bonus depreciation, like the DPAD, increases income inequality. I note this conclusion is more tenuous than in the case of the DPAD because no studies estimate the effect of bonus depreciation on average earnings for large, publicly traded firms. Despite this caveat, the weight of the evidence suggests that both tax breaks significantly increase income inequality.

Other research also indicates a connection between corporate taxation and inequality. In particular, Nallareddy, Rouen and Suárez Serrato (2018) show that state corporate tax cuts also increase income inequality. Future research should explore the effects of corporate taxation on the long-run trends in income inequality documented by Piketty, Saez and Zucman (2017) and Smith, Zidar and Zwick (2020).

7.2 Generalizability of Findings

An important question is the degree to which the tax break effects I document are generalizable to other policy instruments that decrease effective tax rates, such as statutory corporate rate cuts or more generous tax credits for R&D. There are three reasons to believe that the results are generalizable to these settings. First, the dollar-for-dollar effects of the tax breaks are very similar, approximately 17 cents per dollar for the DPAD and 25 cents per dollar for bonus depreciation. The similar dollar-for-dollar effect sizes suggest a common mechanism that relates the dollar increase in after-tax cash flows to the dollar increase in executive compensation. The analysis presented in Section 6.3 also supports a common mechanism. Second, the two tax breaks I study differ along several dimensions. Bonus depreciation is an investment incentive that affects the present value purchase price of capital, while the DPAD is a directed corporate rate reduction. Bonus depreciation was implemented as a number of short-term incentives, while the DPAD scaled slowly over time according to a pre-announced schedule. Bonus depreciation has big benefits to constrained firms, while the DPAD only benefits firms that produce positive taxable income. That two very

[34] Song, Price, Guvenen, Bloom and Von Wachter (2019) show that most increases in US income inequality since the late 1970s come from between- rather than within-firm differences in income inequality. Given this context, the results here and in Dobridge, Landefeld and Mortenson (2021) suggest a nonneglible portion of the increases in within-firm income inequality may be due to decreases in effective corporate income tax rates. Piketty, Saez and Stantcheva (2014), Kline, Petkova, Williams and Zidar (2019), and Andersen and López (2019) explore alternative sources of increases in within-firm inequality.

different tax breaks lead to similar responses suggests other tax breaks with an alternative set of characteristics will also lead to similar compensation increases. Finally, even if the results I find only generalize to very similar tax breaks, they still have significant predictive power. Steinmüller, Thunecke and Wamser (2019) note accelerated depreciation and statutory corporate rate reductions are the main determinants of effective corporate rates worldwide. Bonus depreciation is a generic accelerated depreciation policy. The DPAD is akin to a corporate statutory rate reduction if firms cannot shift their business activities to manipulate the fraction of their income that qualifies for the deduction. Analysis in Ohrn (2018) and Panel (d) of Figure 1 show this to be the case. Thus, the results of this study are very likely to at least generalize to the two classes of tax breaks that are the primary determinants of effective corporate income tax rates worldwide.

I am less confident that the results of this study are generalizable to policy changes that increase—as opposed to decrease—effective tax rates. Focusing on tax cuts, Suárez Serrato and Zidar (2016) find workers bear 30-35% of the corporate tax burden. In the context of tax hikes, Fuest, Peichl and Siegloch (2018) find about 50% of the corporate tax burden is born by workers. This asymmetry of magnitudes in response to changes in corporate taxes suggests we should exercise caution in extrapolating the results of this study to increases in effective tax rates. Future research exploring the effect of corporate tax hikes on executive compensation would be a valuable contribution to our understanding of the incidence of the corporate tax on workers across the income distribution.

8 Conclusion

This is the first study to measure the effect of corporate tax breaks – in the form of accelerated depreciation or directed rate reductions – on executive compensation. The results suggest that a large portion of the benefits generated by the tax breaks go directly to executives in the form of higher compensation. For every dollar the tax breaks generate for a firm, compensation awarded to the highest paid executives at the firm increases by between 17 and 25 cents. Comparing these results to estimates from other studies that estimate the effect of the same tax breaks on average earnings suggests both tax breaks increase income inequality. The estimated effects are concentrated primarily in firms with the weakest corporate governance, suggesting high powered executives are able to capture a large portion of the rents generated by tax breaks.

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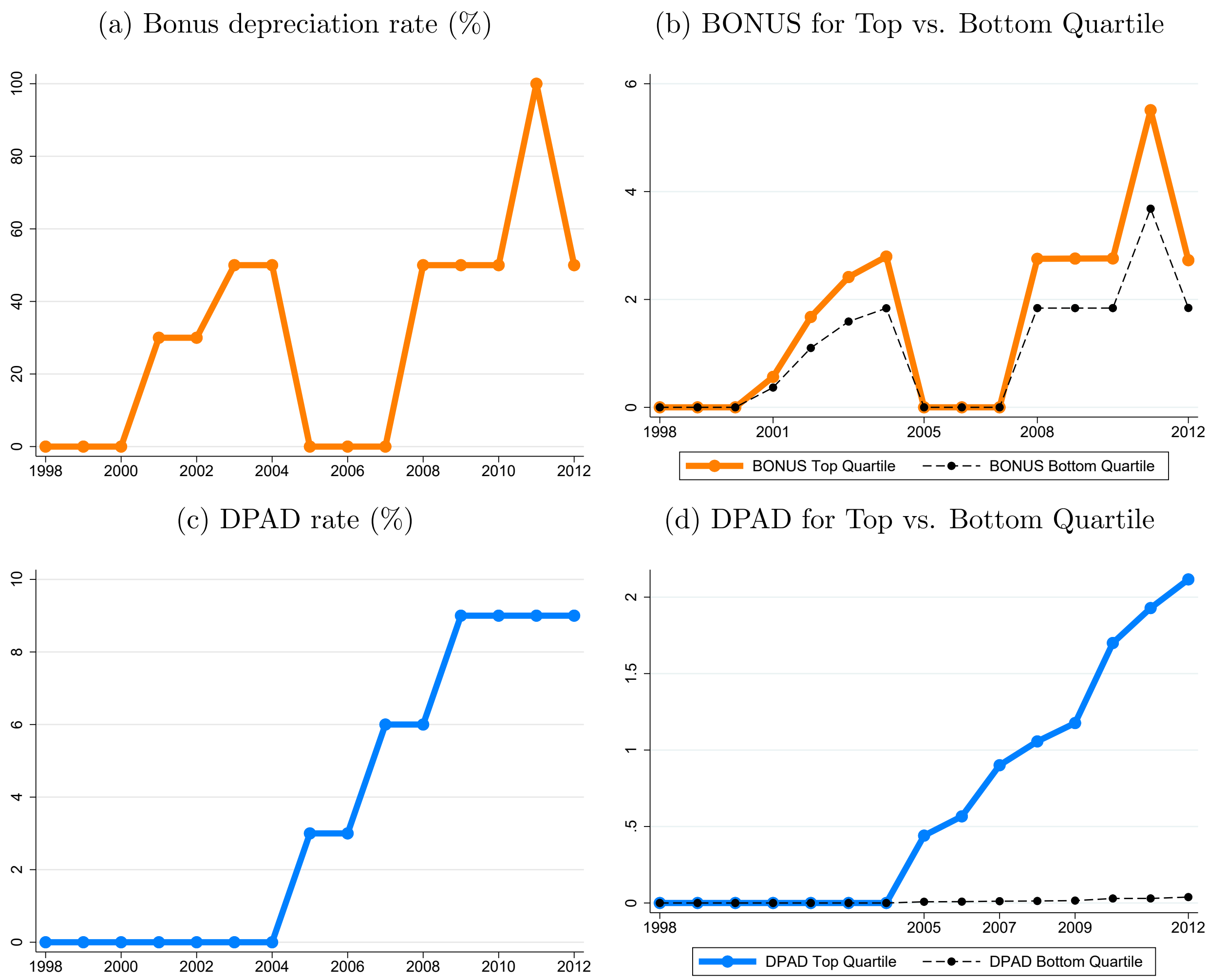
Figures

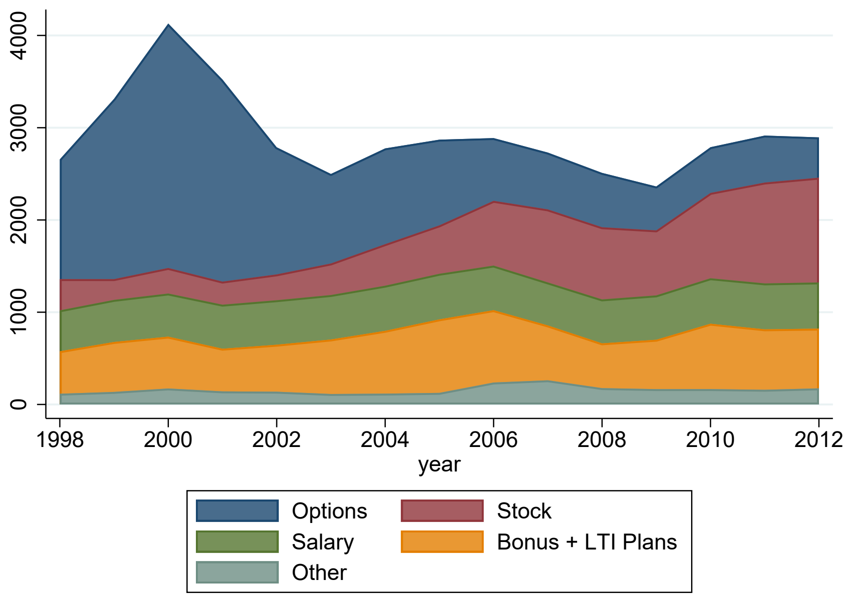
Figure 1: Bonus Depreciation and DPAD Rates and Empirical Variation over time



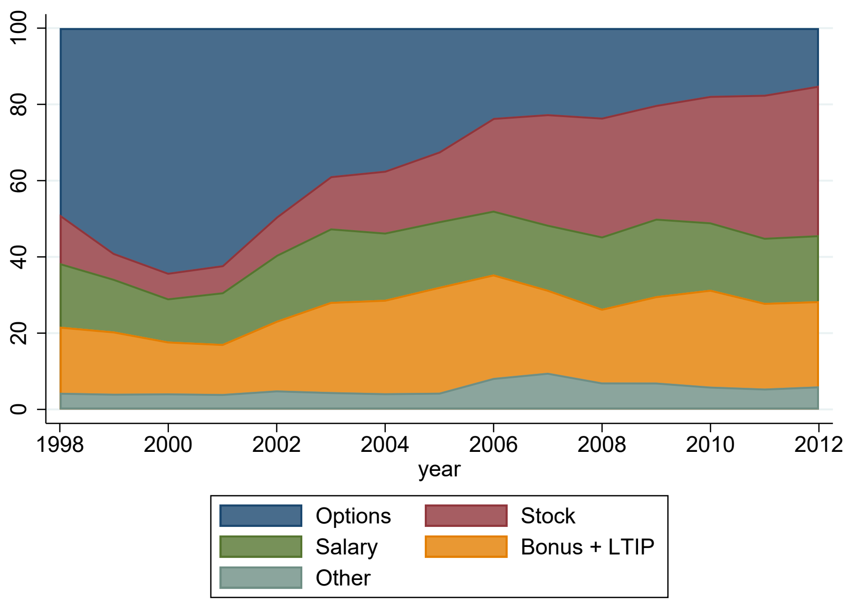
Notes: Figure 1 shows how statutory and empirical bonus depreciation and DPAD rates vary during the sample period, 1998–2012. Panel (a) displays the bonus depreciation rate offered in each year. Panel (b) shows the percentage point reduction in the present value of new investments due to bonus depreciation for firms in the top and bottom quartile of bonus depreciation benefit in each year. Panel (c) displays the DPAD rate in each year. Panel (d) displays the percentage point reduction in effective corporate income tax rates for firms in the top and bottom quartile of DPAD benefit in each year. *Source*: IRS publications and author's calculations based on IRS Statistics of Income, Zwick and Mahon (2017), and Compustat data.

Figure 2: Structure of Executive Compensation for Analysis Sample

(a) Compensation Levels by Category ($1,000s)



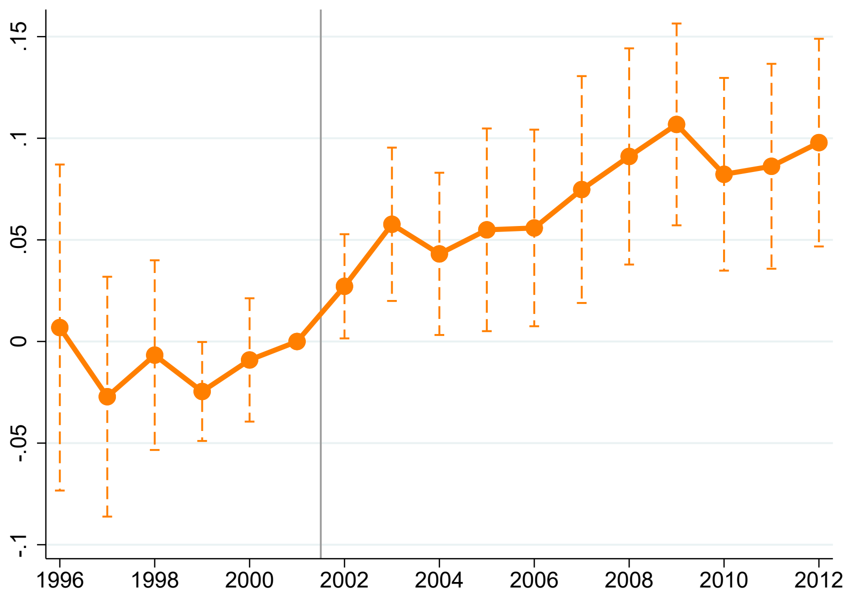
(b) Percent of Total Compensation by Category



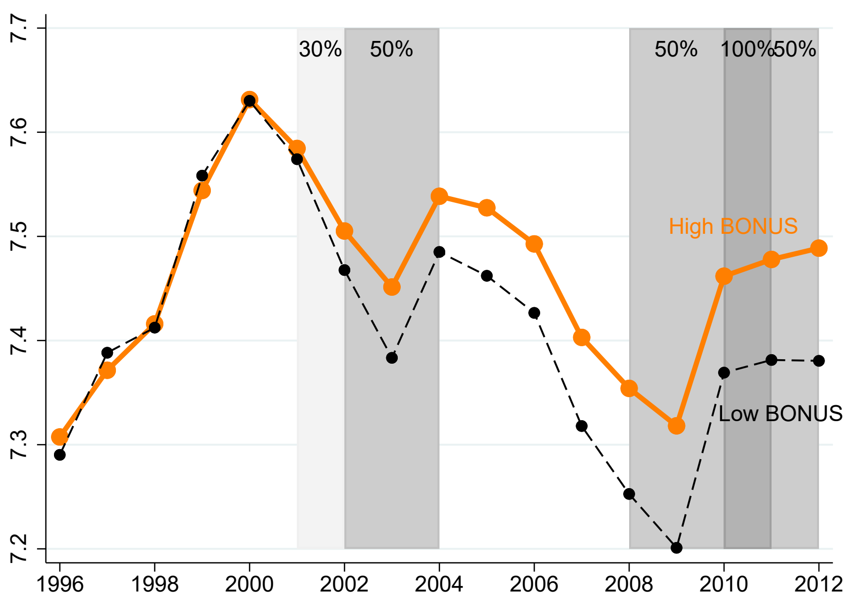
Notes: Figure 2 describes the level and composition of Total Compensation Awarded during the sample period, 1998–2012, across five different compensation categories: Options, Stock, Salary, Bonus and Long-term Incentive Plans, and All Other Compensation. Panel (a) displays the levels of each compensation category in thousands of 2010 dollars. Panel (b) describes the percentage of Total Compensation Awarded in each category in each year. The value of Options is measured using the Black-Scholes model. *Source:* Execucomp database.

Figure 3: Bonus Depreciation Dynamic Difference-in-Differences Estimates

(a) BONUS Coefficients



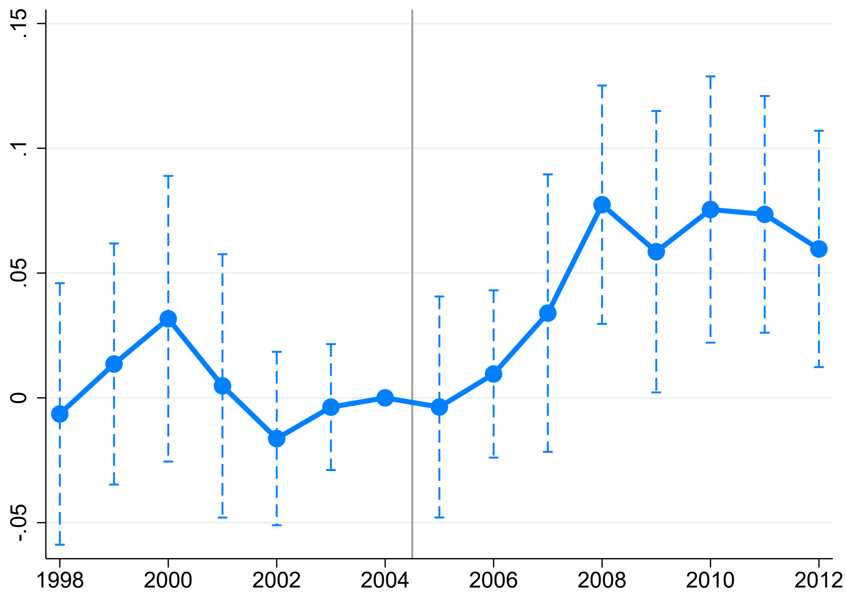
(b) Compensation Trend + Bonus Coefficients



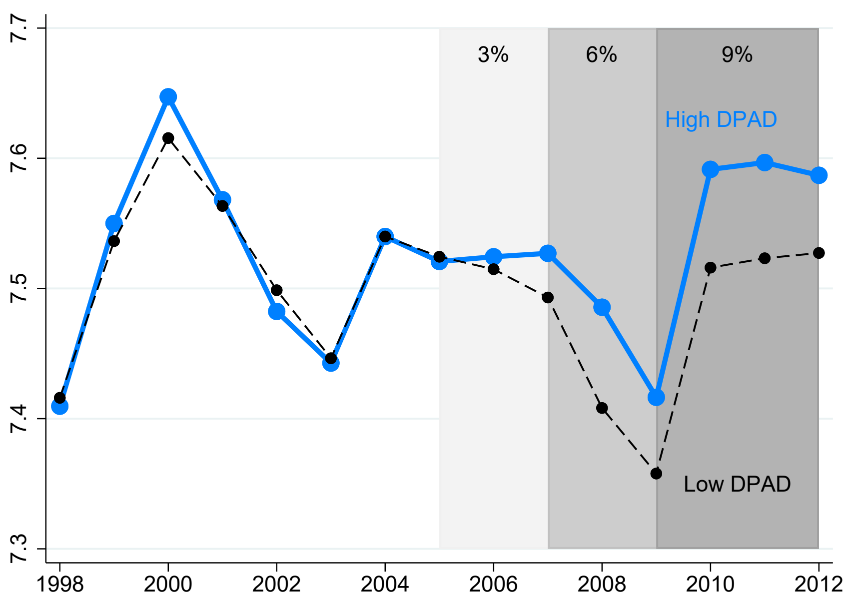
Notes: Figure 3 presents Dynamic Difference-in-Differences estimates as described in Section 5.1. Panel (a) displays $\beta_{1996} - \beta_{2012}$ corresponding to estimating equation (2) where the 2001 coefficient has been normalized to 0. Estimates have been scaled to represent the effect of a 1 percentage point decrease in present value investment costs. Vertical bands represent 95% confidence intervals. In Panel (b), the Panel (a) estimates are added to the trend in average Ln(Comp). Background shading is darker when bonus depreciation is more generous. *Sources*: Authors calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Figure 4: DPAD Dynamic Difference-in-Differences Estimates

(a) DPAD Coefficients



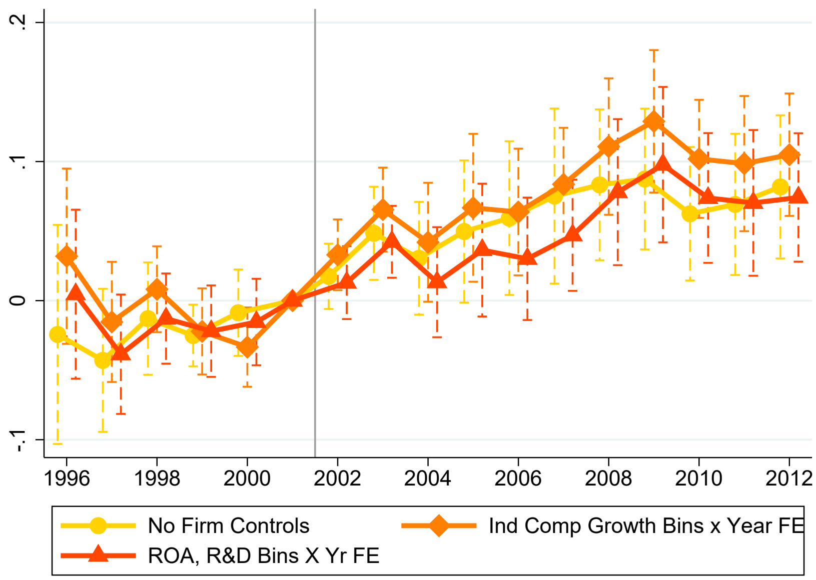
(b) Compensation Trend + DPAD Coefficients



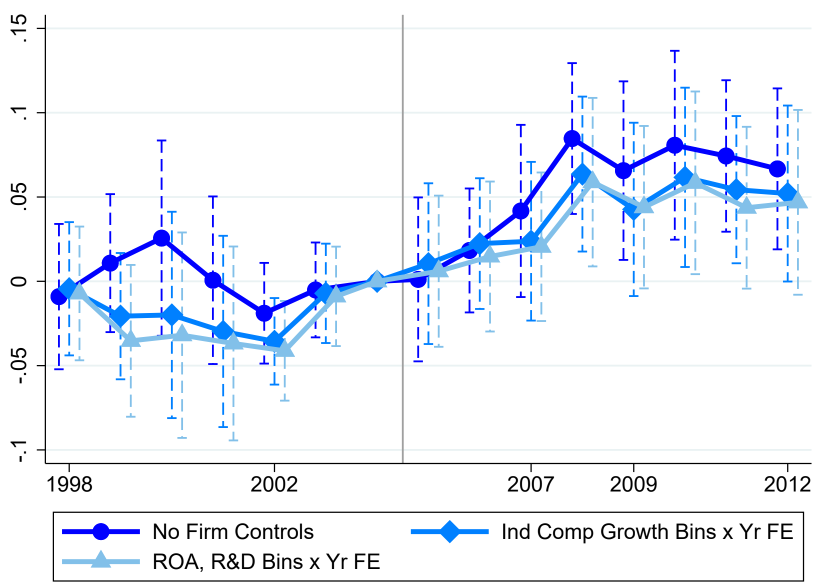
Notes: Figure 4 presents Dynamic Difference-in-Differences estimates as described in Section 5.1. Panel (a) displays $\beta_{1998} - \beta_{2012}$ corresponding to estimating equation (3) where the 2004 coefficient has been normalized to 0. Coefficients represent the difference between executives at 100% and 0% domestic manufacturing firms. Vertical bands represent 95% confidence intervals. In Panel (b), the Panel (a) estimates are added to the trend in average Ln(Comp). Background shading is darker when the DPAD is offered at higher rates. *Sources*: Authors calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Figure 5: Robustness of Dynamic Difference-in-Differences Estimates

(a) BONUS Robustness



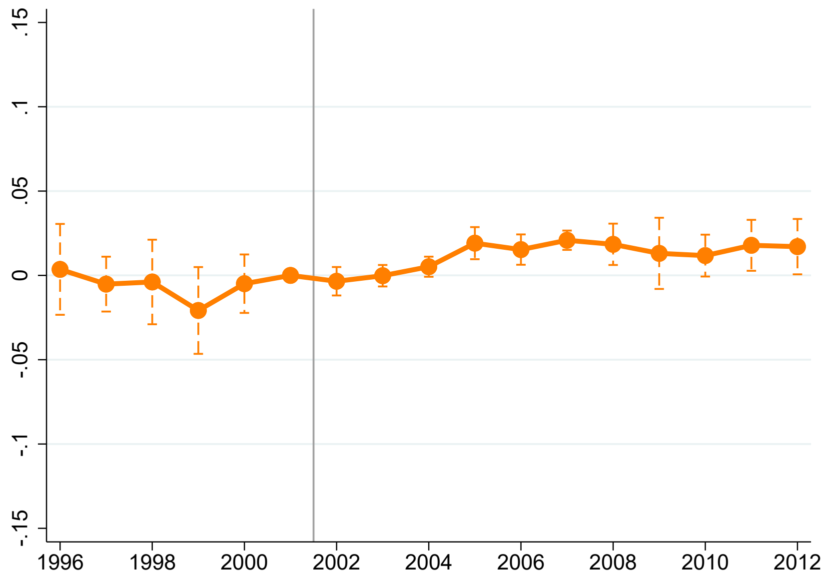
(b) DPAD Robustness



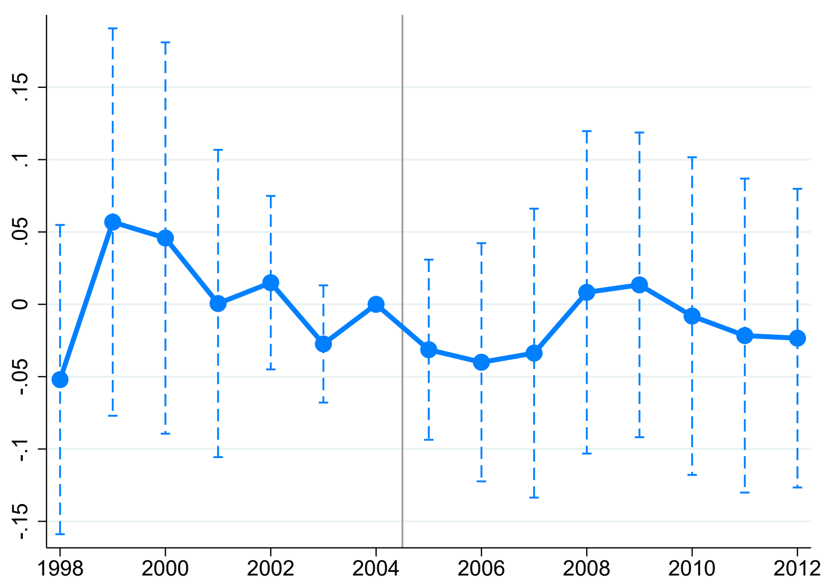
Notes: Figure 5 shows how the coefficient estimates presented in Figure 3 Panel (a) and Figure 4 Panel (a) vary when alternative control variables are included in the model. The first alternative model includes no firm controls. The second alternative model includes decile bins of industry average total compensation growth in the pre-period interacted with year indicators. The third alternative model includes pre-period decile bins of firm size, ROA, and R&D expenditure interacted with year indicators. All models include year and firm fixed effects as well as controls for executive experience and gender. Figure A4 presents each of these overlaid plots separately. *Sources*: Authors calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Figure 6: Dynamic Differences-in-Differences Placebo Tests

(a) BONUS Placebo



(b) DPAD Placebo



Notes: Figure 6 presents Dynamic Difference-in-Differences estimates corresponding to estimating equations (2) and (3) when the time-invariant BONUS and DPAD component have been replaced with the time-invariant components of BONUS Placebo and DPAD Placebo. Panel (a) estimates have been scaled to represent the effect of a 1 percentage point reduction in present value investment costs assuming all investments qualify for bonus. The estimates in panel (b) are scaled such that the coefficients represent the difference between loss-making firms that derive 100% of their income from domestic manufacturing activities and loss-making firms that derive no income from domestic manufacturing activities. Vertical bands represent 95% confidence intervals. *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Tables

Table 1: Descriptive Statistics

	Mean	Std. Dev.	25th Percentile	75th Percentile	Obs.
Policy Variables					
BONUS	0.988	1.250	0.000	1.870	100,520
BONUS (50% rate)	2.096	0.600	1.830	2.137	37,343
DPAD	0.221	0.529	0.000	0.010	100,520
DPAD (9% rate)	0.946	1.070	0.000	1.910	15,884
Executive Compensation					
Total Comp Awarded	2.918	4.183	0.776	3.181	100,520
Total Current	0.816	0.839	0.365	0.930	100,520
Total NonCurrent	2.102	3.714	0.277	2.213	100,520
Executive Characteristics					
Experience	5.424	3.981	2.000	8.000	100,520
Female	0.061	0.239	0.000	0.000	100,520
New Hire	0.146	0.353	0.000	0.000	100,520
CEO	0.197	0.397	0.000	0.000	100,520
Firm Controls					
ETI	0.169	0.416	0.000	0.000	100,520
Ln Firm Size	7.729	1.771	6.491	8.877	100,455
ROA	0.022	0.192	0.009	0.072	100,418
Ln R&D Exp	1.902	2.182	0.127	3.762	100,520

Notes: Table 1 presents descriptive statistics for the analysis sample. The unit of observation is an executive in a given year, 1998–2012. DPAD is the percentage point reduction in effective tax rates generated by the DPAD. BONUS is the percentage point reduction in the present value of investment prices due to bonus depreciation. Total Comp Awarded is the total compensation awarded to an executive. Total Current is the sum of salary and bonus paid to an executive. Total Non Current is the sum of all non salary and non bonus compensation paid to an executive. All compensation measures are presented in millions of dollars. Experience is the number of years an executive is in the sample prior to the current year. Female is an indicator equal to 1 if the executive is a woman. New Hire is an indicator equal to 1 in the first year an executive is paired with a given firm in the database. CEO is an indicator equal to 1 if the executive is listed as a firm's CEO. ETI is the percentage point reduction in a firm's effective tax rate due to the ETI. Firm Size is the log of a firm's total assets. ROA is a firm's ratio of earnings to total assets. Ln R&D Exp is the log a firm's total R&D expenditure. The analysis sample are the executives at firms with non-missing data for BONUS, DPAD, Total Comp Awarded, Total Current, Total NonCurrent, Experience, Female, ETI, Ln Firm Size, ROA, Ln R&D Exp. The analysis sample is composed of 100,520 executive-year observations. These observations represent 23,361 unique executives working at 1,669 unique firms. *Sources*: Execucomp, Compustat, Thomson Reuters, Risk Metrics, IRS Statistics of Income, and Zwick and Mahon (2017).

Table 2: Effect of Tax Breaks on Executive Compensation

	(1) Ln(Comp)	(2) Ln(Comp)	(3) Ln(Comp)	(4) Ln(Comp)	(5) Ln(Comp)
Lagged BONUS	0.0418***	0.0489***	0.0489***	0.0618***	0.0443***
	(0.0131)	(0.0123)	(0.0125)	(0.0110)	(0.00984)
Lagged DPAD	0.0450***	0.0443***	0.0445***	0.0423***	0.0426***
	(0.0156)	(0.0152)	(0.0143)	(0.0135)	(0.0130)
Ln(Experience)		0.322***	0.322***	0.322***	0.322***
		(0.00765)	(0.00766)	(0.00769)	(0.00760)
Female		-0.167***	-0.167***	-0.166***	-0.166***
		(0.0160)	(0.0160)	(0.0162)	(0.0167)
Lagged ETI			0.00229	0.000908	0.00586
			(0.0237)	(0.0240)	(0.0243)
Year FE	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓		
Exec Controls		✓	✓	✓	✓
Tax Controls			✓	✓	✓
Firm Size Bins x Year FE				✓	✓
ROA Bins x Year FE					✓
R&D Bins x Year FE					✓
Observations	100,520	100,520	100,520	100,520	100,520

Notes: Table 2 presents coefficient estimates of the effect of Lagged BONUS and Lagged DPAD on the log of total compensation awarded from a regression in the form of (1). The outcome variable in all specifications is the Ln(Comp). Specification (2)–(5) progressively add executive characteristic controls for Log Experience and Female, the Lagged ETI control, Firm Size Bins interacted with year fixed effects, and, finally, ROA Bins and R&D Bins interacted with year fixed effects. All specifications include firm and year fixed effects. Standard errors are presented in parentheses and are clustered at the four-digit NAICS industry level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Table 3: Effect of Tax Breaks on Executive Compensation; Alternative Specifications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Ln(Comp)	Ln(Comp)	Ln(Comp)	Ln(Comp)	Ln(Comp)	Ln(Comp)	Ln(Comp)
Lagged BONUS	0.0630***		0.0621***	0.0165	0.0598***	0.0577***	0.0631***
	(0.0110)		(0.00956)	(0.0201)	(0.0118)	(0.0103)	(0.0129)
Lagged DPAD		0.0437***	0.0424***	0.0626***	0.0384***	0.0416***	0.0498***
		(0.0142)	(0.0112)	(0.0144)	(0.0138)	(0.0128)	(0.0126)
Year FE	✓	✓	✓	✓	✓	✓	✓
Firm Size Bins x Year FE	✓	✓	✓	✓	✓	✓	✓
Industry-Size Clustered SE			✓				
Sector x Year FE				✓			
Ind Comp Growth Bin x Year FE					✓		
Options Usage Bins x Year FE						✓	
Recession Bins x Year FE							✓
Observations	100,520	100,520	100,490	100,520	100,520	96,620	100,323

Notes: Table 2 presents coefficient estimates of the effect of Lagged BONUS and Lagged DPAD on the log of total compensation awarded from a regression in the form of (1). All specifications include firm fixed effects and firm size bins interacted with year fixed effects as well as controls for executive experience, gender, and Lagged ETI. Unless otherwise noted, standard errors (presented in parentheses) are clustered at the four-digit NAICS industry level. Specifications (1) and (2) estimate the effect of each tax break separately. Specification (3) presents standard errors clustered at the industry-by-firm-size level. Specification (4) includes sector-by-year fixed effects. Specification (5) includes decile bins of 4-digit NAICS industry average growth in executive compensation in the pre-period interacted with year fixed effects. Specification (6) includes Options Usage Bins interacted with year fixed effects. Specification (7) includes Recession Bins interacted with year fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Table 4: Effect of Placebo Tax Breaks on Executive Compensation

	(1) Ln(Comp)	(2) Ln(Comp)	(3) Ln(Comp)
Lagged BONUS		0.0814***	
		(0.0246)	
Lagged DPAD	0.0468***		
	(0.0139)		
Lagged DPAD Placebo		-0.0545	-0.0566
		(0.0365)	(0.0386)
Lagged BONUS Placebo	0.00607		0.00147
	(0.00516)		(0.00297)
Year FE	✓	✓	✓
Firm FE	✓	✓	✓
Controls	✓	✓	✓
Observations	100,520	35,461	35,461

Notes: Table 4 shows the effect of the BONUS and DPAD placebos on total compensation awarded. Specification (1) presents estimates of Lagged BONUS and the Lagged DPAD Placebo on the Ln(Comp). Specification (2) presents estimates of Lagged DPAD and the Lagged BONUS Placebo on Ln(Comp). Specification (3) presents estimates of the Lagged BONUS Placebo and the Lagged DPAD Placebo on Ln(Comp). All specifications include firm fixed effects and firm size bins interacted with year fixed effects as well as controls for executive experience, gender, and Lagged ETI. Standard errors are presented in parentheses and are clustered at the four-digit NAICS level; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Table 5: Testing Performance-Linked Compensation Mechanism

	(1) Ln(Comp)	(2) Ln(Comp)	(3) Ln(Comp)	(4) Ln(Comp)	(5) Ln(Comp)	(6) Ln(Comp)
Lagged BONUS	0.0643***	0.0686***	0.0649***	0.0628***	0.0644***	0.0725***
	(0.0102)	(0.0108)	(0.0109)	(0.0108)	(0.0102)	(0.0100)
Lagged DPAD	0.0366***	0.0387***	0.0368***	0.0378***	0.0369***	0.0288**
	(0.0135)	(0.0137)	(0.0140)	(0.0135)	(0.0132)	(0.0133)
Year FE	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓
Baseline Controls	✓	✓	✓	✓	✓	✓
EPS Controls	✓					✓
Sales Controls		✓				✓
Operating Income Controls			✓			✓
Relative Sales Growth Controls				✓		✓
Stock Return Controls					✓	✓
Observations	96,083	96,583	94,979	95,380	98,364	92,200

Notes: Table 5 presents coefficient estimates of the effect of Lagged BONUS and Lagged DPAD controlling for various measures upon which performance-based compensation is commonly based. The outcome variable in all specifications is Ln(Comp). Specifications (1)–(4) progressively add time-varying firm level controls for EPS and lagged EPS, for Sales and Lagged Sales, for Operating Income and Lagged Operating Income, and for Relative Sales Growth and Lagged Relative Sales Growth. Specification (5) includes all four sets of performance-linked control variables. All specifications include firm fixed effects and firm size bins interacted with year fixed effects as well as controls for executive experience and gender and Lagged ETI. Standard errors are presented in parentheses and are clustered at the four-digit NAICS level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Table 6: Testing Competition for Scarce Talent Mechanism

	(1) Ln(Comp)	(2) Ln(Comp)	(3) Ln(Comp)	(4) Ln(Comp)	(5) Ln(Comp)
Lagged BONUS	0.0622***	0.0597***	0.0624***	0.000624	0.000128
	(0.0110)	(0.0106)	(0.0109)	(0.0527)	(0.0147)
Lagged DPAD	0.0460***	0.0376***	0.0406***	0.112	0.0243
	(0.0138)	(0.0130)	(0.0145)	(0.0965)	(0.0176)
L.BONUS × Female	-0.00381				
	(0.00758)				
L.DPAD × Female	-0.0274				
	(0.0183)				
L.BONUS × CEO		0.0100*			
		(0.00543)			
L.DPAD × CEO		0.0318*			
		(0.0189)			
L.BONUS × New Hire			-0.00186		
			(0.00707)		
L.DPAD × New Hire			0.0199		
			(0.0148)		
L.BONUS × Ind. Avg. Market Cap				0.00675	
				(0.00557)	
L.DPAD × Ind. Avg. Market Cap				-0.00906	
				(0.0122)	
L.BONUS × 𝟙(Insider Hires %)					0.0433***
					(0.0103)
L.PAD × 𝟙(Insider Hires %)					0.0623**
					(0.0271)
Year FE	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓
Observations	100,520	100,520	100,520	100,515	99,613

Notes: Table 6 presents several heterogeneity tests designed to confirm or reject whether competition for scarce talent is driving the effect of the tax breaks on executive compensation. Each test is based on Specification (4) from Table 2, but interacts the two tax break variables with a mediating variable that varies at the firm, industry, or executive level. Moving from Specification (1) to (5), the interacting variables are Female, CEO, New Hire, Industry Avg Market Cap, and 𝟙(Insider Hires %). All specifications include firm fixed effects and firm size bins interacted with year fixed effects as well as controls executive experience, gender, and lagged ETI. Standard errors are presented in parentheses and are clustered at the four-digit NAICS industry level; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Table 7: Testing Rent Extraction Mechanism

	(1) Ln(Comp)	(2) Ln(Comp)	(3) Ln(Comp)	(4) Ln(Comp)	(5) Ln(Comp)
Lagged BONUS	0.0593***	0.0485***	0.0592***	0.0341**	0.0442***
	(0.0120)	(0.0122)	(0.00958)	(0.0131)	(0.0112)
Lagged DPAD	0.0617***	0.0578***	0.0632***	0.106***	0.0777***
	(0.0164)	(0.0203)	(0.0154)	(0.0356)	(0.0182)
L.BONUS × 𝟙(Bebchuk Gov)	-0.00634			-0.0242*	
	(0.00691)			(0.0137)	
L.DPAD × 𝟙(Bebchuk Gov)	-0.0388**			-0.0696**	
	(0.0181)			(0.0291)	
L.BONUS × 𝟙(Large Holder)		-0.0230***		-0.0301**	
		(0.00761)		(0.0125)	
L.DPAD × 𝟙(Large Holder)		-0.0470*		-0.0304	
		(0.0243)		(0.0361)	
L.BONUS × 𝟙(Exec Tenure)			-0.0732***	-0.0814***	
			(0.0117)	(0.0168)	
L.DPAD × 𝟙(Exec Tenure)			-0.0421*	-0.0130	
			(0.0226)	(0.0324)	
L.BONUS × 𝟙(Combined Gov)					-0.0412***
					(0.00922)
L.DPAD × 𝟙(Combined Gov)					-0.0771***
					(0.0287)
Year FE	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓
Observations	56,263	54,544	63,240	21,688	40,406

Notes: Table 7 explores heterogeneity in the effect of the tax breaks on compensation by measures of corporate governance. All specifications are based on Specification (4) from Table (2) but now add interactions between the tax breaks and indicators for corporate governance measures. Specifications (1) and (4) include interactions between the tax breaks with 𝟙(Bebchuk Gov), an indicator equal to 1/0 for firms in the top/bottom tercile of the Bebchuk Governance distribution. Specifications (2) and (4) include interactions between the tax breaks with 𝟙(Large Holder), an indicator equal to 1/0 for firms in the top/bottom tercile of the distribution on percentage of shares held by the largest institutional investor. Specifications (3) and (4) include interactions between the tax breaks 𝟙Exec Tenure), an indicator equal to 1/0 for firms in the top/bottom tercile of the Executive Tenure distribution. Specification (5) includes interactions between the tax breaks with 𝟙(Combined Gov), an indicator equal to 1 for firms defined as 1 for at least two of the three other interaction terms. All specifications include firm fixed effects and firm size bins interacted with year fixed effects a well as controls executive experience, gender, and lagged ETI. Standard errors are presented in parentheses and are clustered at the four-digit NAICS industry level; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *Sources*: Author's calculations based on Execucomp, Compustat, Riskmetrics, Thomson Reuters, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Table 8: Effect of Tax Breaks on Compensation Components and Composition

	(1) Ln(Current)	(2) Ln(NonCurr)	(3) Current/Total	(4) Ln(Current)	(5) Ln(NonCurr)	(6) Current/Total
Lagged BONUS	0.0412***	0.0630**	-0.00548	0.0480***	0.0750***	-0.00618
	(0.0120)	(0.0264)	(0.00620)	(0.0116)	(0.0254)	(0.00592)
Lagged DPAD	-0.00265	0.0720***	-0.0168***	-0.00421	0.0477**	-0.0125***
	(0.0131)	(0.0248)	(0.00461)	(0.0109)	(0.0241)	(0.00400)
Firm FE	✓	✓	✓	✓	✓	✓
Firm Size x Year FE	✓	✓	✓	✓	✓	✓
Performance-Linked Controls				✓	✓	✓
Observations	100,520	99,212	100,520	92,200	91,061	92,200

Notes: Table 8 presents coefficient estimates of the effect of BONUS and DPAD on various measures of compensation. All specifications are in the form of (1) and include controls firm fixed effects and firm size bins interacted with year fixed effects as well as controls for executive experience and gender and Lagged ETI. The outcome variable in Specifications (1) and (4) is the log of total current compensation (the sum of salary and bonus). The outcome variable in Specifications (2) and (5) is the log of total non current compensation (total compensation minus salary and bonus). The outcome variable in Specifications (3) and (6) is the ratio of Total Current compensation to Total Compensation. Standard errors are presented in parentheses and are clustered at the four-digit NAICS level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Online Appendices

This appendix includes several sections of supplemental information.

Appendix A presents an example showing how bonus depreciation affects the after-tax present value cost of investments with varying MACRS tax lives.

Appendix B shows that bonus depreciation does not affect investment type.

Appendix C contains definitions for all the variables used in the paper and additional descriptive statistics.

Appendix D shows how the generosity of the tax breaks vary across NAICS major sectors.

Appendix E presents estimates after Compustat Segments data was used to refine definitions of BONUS and DPAD to account for multinational and multi-industry business activity.

Appendix F shows the effect of the tax breaks on executive compensation using alternative fixed effects and identification strategies.

Appendix G shows how the tax breaks affect firm-level business activities.

Appendix H presents dynamic DPAD estimates where tax loss status is allowed to vary annually.

Appendix I presents separate plots for each of the overlaid series in Figure 5.

Appendix J shows that the tax break estimates are stable when the tax break variables are winsorized at increasingly aggressive levels.

Appendix K describes how the Bebchuk Governance variable is constructed.

Appendix L shows the tax breaks do not affect measures of corporate governance.

Appendix M shows that the tax breaks do not lead to better ROA or stock return gains at better governed firms that increased pay more in response to the tax breaks.

Appendix A Effect of Bonus on PV Cost of Investment

Table A1 provides examples of the effect of 50% bonus depreciation on the present value after-tax cost of two assets, one with a 7-year MACRS life, the other with a 3-year MACRS life. In both examples we assume a firm makes a $100,000 investment and that the firm faces a statutory effective income tax rate of 35% (as was the case in the US during the sample period).

Panel (a) illustrates the 7-year asset example. In the absence of bonus depreciation, MACRS specifies that $25,000 of the total investment may be deducted in the first year, then $21,430 in the second, etc. With a federal tax rate of 35%, this leads to tax savings of $8,750 in the first year, then $7,500 in the second. Over the course of the 7 year life, all $100,000 of the investment cost are deducted from taxable income, generating $35,000 in total *nominal* tax shields. However, because the entire cost is not deducted from taxable income in the first year, the present value of tax savings associated with the investment are only worth $28,790.[35] The present value cost of the investment is the initial $100,000 minus the present value of the tax shield, $28,790, which is equal to $71,210.

Bonus depreciation allows for an additional percentage of the total cost to be deducted in the first year. In the example, 50% percent bonus depreciation allows $50,000 more to be deducted in the first year the investment is made. The remaining $50,000 of the cost is then deducted according to the original 7 year MACRS schedule. With 50% bonus there are now tax savings associated with the investment of $21,880 in the first year, $3,750 in the second year, etc. Thus, bonus depreciation accelerates the deduction of the investment and its associated tax savings. Because firms benefit from the tax savings earlier, the present value of the investment's tax shield increases to $31,890 and the present value cost of the investment decreases by 3.1 percentage points, from $71,210 to $68,110.

Panel (b) displays an identical exercise, but assumes the asset is deducted according to the 3-year MACRS schedule. The after-tax present value cost of the $100,000 investment is now $66,790 in the absence of bonus depreciation. The present value cost of the 3-year asset is lower than the present value cost of the 7-year asset because all $100,000 of the purchase price are deducted more quickly resulting in a larger present value tax shield and a lower present value cost of investment.

50% bonus depreciation decreases the present value cost of the 3-year asset from $66,790 to $65,900, or by 0.89 percentage points. Bonus depreciation has a smaller percentage point (and percent) impact on the after-tax present value cost of the 3-year asset than on the after-tax present value cost of the 7-year asset. This is because in the case of the 7-year assets, bonus depreciation accelerated deductions from further in the future, thereby increasing the present value of the deductions by more.

The comparison between the effects of bonus depreciation on the 7-year asset versus the 3-year asset perfectly illustrates the identification strategy used in this paper; bonus depreciation has a larger effect on the present value cost of investments for firms that invest in longer-lived assets, on average.

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[35] The $28,790 is a function of the assumed discount rate of 10%. At higher discount rates, the present value of the tax shield will be lower.

Table A1: Example of Effect of Bonus Depreciation on Present Value Cost of Investment

(a) Effect of 50% Bonus Depreciation on 7-year Asset Class Investment

Year	1	2	3	4	5	6	7	8	Total
MACRS Deduction	25	21.43	15.31	10.93	8.75	8.74	8.75	1.09	100
τ_f x Deduction	8.75	7.50	5.36	3.83	3.06	3.06	3.06	0.38	35
Present Value (τ_f x Deduction)									28.79
Present Value Cost of Investment									71.21
50% Bonus Ded.	62.5	10.72	7.65	5.47	4.37	4.37	4.37	0.545	100
τ_f x Deduction	21.88	3.75	2.68	1.91	1.53	1.53	1.53	0.19	35
Present Value (τ_f x Deduction)									31.89
Present Value Cost of Investment									68.11

(b) Effect of 50% Bonus Depreciation on 3-year Asset Class Investment

Year	1	2	3	4	5	6	7	8	Total
MACRS Deduction	58.33	27.78	12.35	1.54	0	0	0	0	100
τ_f x Deduction	20.42	9.72	4.32	0.51	0	0	0	0	35
Present Value (τ_f x Deduction)									33.21
Present Value Cost of Investment									66.79
50% Bonus Ded.	79.165	13.89	6.175	0.725	0	0	0	0	100
τ_f x Deduction	27.71	4.86	2.68	2.16	0.25	0	0	0	35
Present Value (τ_f x Deduction)									34.10
Present Value Cost of Investment									65.90

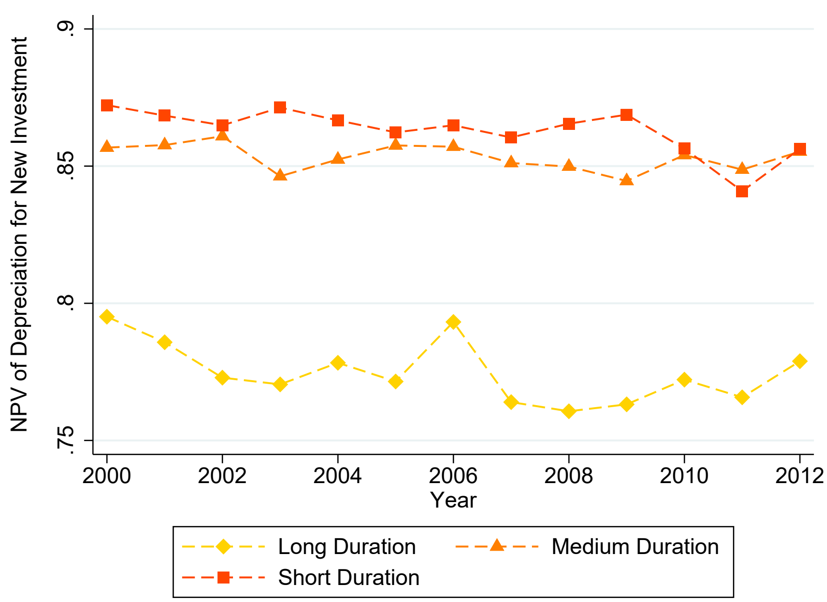
Notes: Table A1 shows the effects of 50% bonus depreciation on the present value of tax deductions associated with two $100,000 investments. In Panel (a), the investment is made is an asset with a 7-year MACRS life. In Panel (b), the investment is made in an asset with a 3-year MACRS life. The federal corporate tax rate in both panels is assumed to be 35%. The discount rate in both panels is assumed to be 10%. All numbers are in thousands of dollars. *Source*: Authors calculations.

Appendix B Stability of Sector-Level Investment Types Over Time

In this appendix, I show the stability of sector-level z_0 measures during the period 2000–2012. To do so, I start with sector-level Form 4562 data from the IRS's Statistics of Income division. The aggregated, sector-level data details investment levels for each possible MACRS asset-life (3-year, 5-year etc.). Using the percentages of investment in each category and MACRS depreciation schedules and assuming a 10% discount rate, I calculate sector-level measures of z_0, the present value of tax depreciation on a dollar of investments. I then sort sectors into terciles according to their 2000 z_0 values. Figure A1 plots z_0 during the years 2000–2012 for each tercile. Overall, Figure A1 shows z_0 is fairly stable across sectors. The implication is that firms are not significantly altering their mix of investments across MACRS asset classes in response to the policy.

The stability of investment patterns across MACRS categories is likely due to the fact that most MACRS categories are defined by asset "use" rather than asset "type." For example, assets used for wholesale trade are depreciated over a five year period while assets used for textile manufacturing are depreciated over a seven year period. As a result, the same asset used in different industries is depreciated over different horizons. This means firms are less able to re-optimize the types of investments they make to take advantage of bonus depreciation.

Figure A1: Stability of Sector-Level z_0 Measure Over Time



Notes: Figure A1 presents average z_0 measures across sectors for three groups of sectors sorted according to their 2000 z_0. Sector-level z_0 measures are constructed from IRS Statistics of Income sector-level aggregate Form 4562 data which details the percent of investment in each MACRS asset-life category. *Source*: IRS Statistics of Income.

Appendix C Variable Definitions and Additional Descriptive Stats

Table A2: Variable Definitions and Sources

Variable Name	Description
BONUS	Percentage point reduction in the present value of investment prices due to bonus depreciation. *Source:* Author's calculations based on Zwick and Mahon (2017) data and bonus depreciation rates defined in IRS Publication 946.
DPAD	Percentage point reduction in effective corporate income tax rates generated by the DPAD. *Source:* Author's calculations based on IRS Statistics of Income and Compustat data.
Ln(Comp)	Log of the total compensation awarded to an executive in a year. *Source:* Execucomp.
Ln(Experience)	Log of the number of years an executive is present in the Execucomp data prior to the current year.
Female	An indicator equal to one if the executive identifies as female. *Source:* Execucomp.
ETI	Percentage point reduction in effective corporate income tax rates due to the Extraterritorial Income Exclusion. *Source:* Author's calculations based on USA Trade Online data.
Firm Size Bins	Decile bins based on the log of total assets in 2001. *Source:* Author's calculations based on Compustat data.
ROA Bins	Decile bins based on average net income divided by total assets during the years 1997–2001. *Source:* Author's calculations based on Compustat data.
R&D Bins	Decile bins based on the log of R&D expenses during the years 1997–2001. *Source:* Author's calculations based on Compustat data.
Ind Comp Growth Bins	Decile bins based on the percentage change in average total compensation awarded at the NAICS 3-digit level from 1998–2001. *Source:* Author's calculations based on Execucomp and Compustat data.
Option Usage Bins	Decile bins based on the firm-level ratio of the value of options awarded to total compensation awarded in 2004. *Source:* Author's calculations based on Execucomp and Compustat data.
Recession Bins	Decile bins based on industry-level percent increase in sales from 2006–2009. *Source:* Author's calculations based on Execucomp and Compustat data.
Domestic Firms	An indicator equal to one for firms that report no pretax foreign income in years 1998–2012. *Source:* Author's calculations based on Compustat data.

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Table A2 – *Continued from previous page*

Variable	**Description**
BONUS Placebo	The percentage point reduction in present value investment prices in a year due to bonus depreciation multiplied by an indicator equal to one for NAICS codes 2111, 4821, 5311, 7111, 7112, 7211, 7212, and 8100–8199. *Source:* Author's calculations based *Source:* Author's calculations based on Zwick and Mahon (2017) and IRS Publication 946.
DPAD Placebo	Percentage point reduction in effective corporate income tax rates due to the DPAD. Coded as nonmissing only for firms in non taxable status in the majority of years after the DPAD was implemented. *Source:* Author's calculations based on IRS Statistics of Income and Compustat data.
Return on Assets (ROA)	Income before extraordinary items divided by total assets. *Source:* Author's calculations based on Compustat data.
Earnings per Share (EPS)	Net income divided by common shares outstanding. *Source:* Author's calculations based on Compustat data.
Sales	A firm's total revenue. *Source:* Author's calculations based on Compustat data.
Operating Income (OI)	A firm's operating income. *Source:* Author's calculations based on Compustat data.
Relative Sales Growth	The different between a firm's annual growth in sales and their NAICS 4-digit industry's annual growth in sales. This variable is normalized to standard deviation units. *Source:* Author's calculations based on Compustat data.
New Hire	An indicator equal to one in the first year an executive is paired with a given firm in the Execucomp database. *Source:* Author's calculation based on Execucomp data.
$\mathbb{1}$(Insider Hires %)	An indicator equal to one/zero for firms in the top/bottom half of the distribution of industry-level percentage of new CEO hires made from within the firm during the period 1993–2005. *Source:* Calculations by Cremers and Grinstein (2014) using Execucomp data.
CEO	An indicator equal to one if the executive is designated as a firm's CEO. *Source:* Execucomp.
Industry Average Market Cap	Log of NAICS 4-digit industry-level market cap in a year. *Source:* Author's calculations based on Compustat data.
$\mathbb{1}$(Bebchuk Governance)	An indicator equal to one/zero when a firm is in the top/bottom tercile of Bebchuk Governance following Bebchuk, Cohen and Ferrell (2009). Appendix K describes how the Bebchuk Governance variable is constructed. *Source:* Author's calculations based on Riskmetrics data.
$\mathbb{1}$(Large Holder)	An indicator equal to one/zero when a firm is in the top/bottom tercile of the distribution of the percentage of shares held by the single largest institutional investor in a year. *Source:* Author's calculations based on Thomson Reuters 13f data.

Continued on next page

Table A2 – *Continued from previous page*

Variable	**Description**
𝟙(Executive Tenure)	An indicator equal to one/zero when a firm is in the top/bottom tercile of average years executives have been working at their current firm. *Source:* Author's calculation based on Riskmetrics, Thomson Reuters 13f, and Execucomp data.
𝟙(Combined Governance)	An indicator equal to one when any two or more of 𝟙(Bebchuk Governance), 𝟙(Large Holder), or 𝟙(Executive Tenure) are equal to one and zero otherwise. Author's calculations based on Riskmetrics data
Ln(Current)	Log of the sum of salary and bonus paid to an executive in a year. Author's calculation based on Execucomp data.
Ln(NonCurr)	Log of the sum of all non salary and non bonus compensation paid to an executive in a year. Author's calculation based on Execucomp data.
Current/Total	The sum of salary and bonus paid to an executive in a year divided by total compensation awarded to an executive in a year. Author's calculation based on Execucomp data.
Ln(CX)	Log of capital expenditures in a year. *Source:* Author's calculations based on Compustat data.
Debt Ratio	Total liabilities divided by total assets in a year. *Source:* Author's calculations based on Compustat data.
Payouts / l.SL	Dividends plus share repurchases divided by lagged sales in a year. Share repurchases are defined as non-negative increases in treasury stock. *Source:* Author's calculations based on Compustat data.
Ln(Assets)	Log of total assets in a year. *Source:* Author's calculations based on Compustat data.
Stock Return	Dividends paid plus stock price growth divided by last year's year end stock price. *Source:* Author's calculations based on Compustat data.
Ln R&D	Log of R&D expenses in a year. *Source:* Author's calculations based on Compustat data.
US Fed Tax	US Federal taxes paid divided by total assets in a year. *Source:* Author's calculations based on Compustat data.
CX	Capital expenditure divided by total assets in a year. *Source:* Author's calculations based on Compustat data.
PI	Pretax income divided by total assets in a year. *Source:* Author's calculations based on Compustat data.

Table A3: Additional Descriptive Statistics

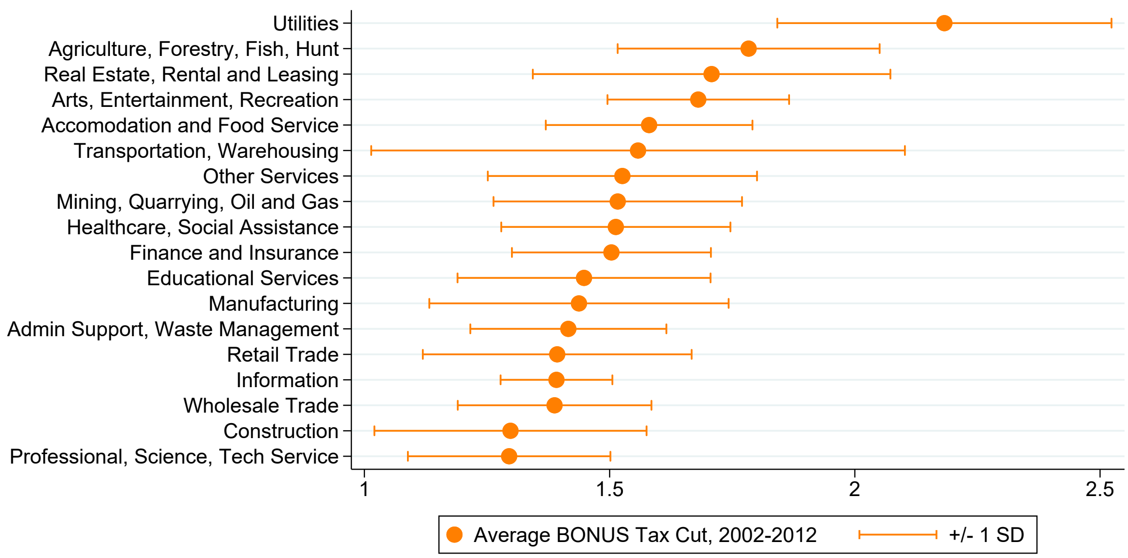
	Mean	Std. Dev.	25th Percentile	75th Percentile	Obs.
More Controls					
Ind Comp Growth	0.405	0.450	0.120	0.714	100,520
Options Usage	0.307	0.242	0.104	0.482	96,620
Recession	0.100	0.265	-0.034	0.267	100,323
Placebos					
BONUS Placebo	0.389	2.778	0.000	0.000	100,520
DPAD Placebo	0.323	0.632	0.000	0.360	35,461
Governance Variables					
Bebchuk Governance	3.586	1.434	3.000	5.000	74,961
Largest Instit. Holder %	0.094	0.182	0.064	0.114	81,819
Executive Tenure	8.761	4.993	5.000	12.000	100,520
Performance Metrics					
Earnings per Share (EPS)	1.367	8.076	0.285	2.267	97,950
Sales	6628.898	19818.032	608.875	4991.989	98,236
Operating Income	774.347	3284.365	33.581	466.176	96,414
Relative Sales Growth	-0.008	0.028	-0.009	-0.006	96,489
Stock Return	0.242	1.391	-0.142	0.231	99,244
Market Measures					
Insider Hires %	0.693	0.113	0.610	0.770	99,613
Ind. Avg. Market Cap	2871.799	3450.877	982.562	3434.480	100,515
Other Variables					
Current/Total	0.456	0.265	0.241	0.635	100,520

Notes: Table A3 presents additional descriptive statistics for the analysis sample. Ind Comp Growth is the percentage change in average total compensation awarded at the NAICS 4-digit level from 1998–2001. Option Usage is the firm-level ratio of the value of options awarded to total compensation awarded in 2004. Recession Bins is the industry-level percent increase in sales from 2006–2009. BONUS Placebo is the percentage point reduction in present value investment prices in a year due to bonus depreciation multiplied by an indicator equal to one for NAICS codes 2111, 4821, 5311, 7111, 7112, 7211, 7212, and 8100–8199. DPAD Placebo is the percentage point reduction in effective corporate income tax rates due to the DPAD for firms with persistent losses. Bebhuk Governance is a governance measure ranging from 0 to 6 based on the Bebchuk, Cohen and Ferrell (2009) Entrenchment Index. Largest Instit. Holder % is the percentage of outstanding shares held by the largest single institutional shareholder. Executive Tenure is the total number of years each executive works at given firm. Earning per share is net income divided by common shares outstanding. Sales is a firm's total revenue. Operating Income is a firm's operating income. Stock Return is the change in stock price plus dividends as a percentage of last year's ending stock price. Insider Hires % is the percentage of executive new hires made from within the firm, measured at the 4-digit NAICS level. Ind. Avg. Market Cap is the 4-digit NAICS industry average market cap. Current/Total is the percentage of awarded compensation composed of salary and bonus. *Sources*: Execucomp, Compustat, Thomson Reuters, Risk Metrics, IRS Statistics of Income, and Zwick and Mahon (2017).

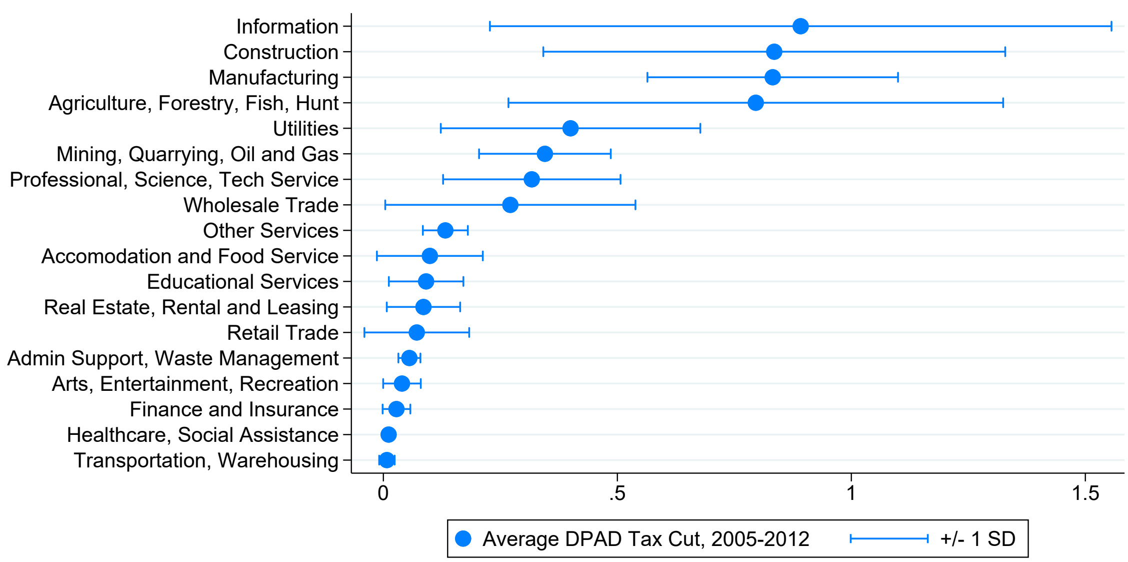
Appendix D Sector-Level Cross-sectional Variation in the Tax Breaks

Figure A2: Tax Break Variation Across Major Sector

(a) BONUS by NAICS Sectors



(b) DPAD by NAICS Sectors



Notes: Figure displays the average effective tax break and $+/-$ 1 standard deviation unit for firms across NAICS sectors. Panel (a) focuses of BONUS. Panel (b) focuses on DPAD. *Source*: Authors calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Appendix E Using Segments Data to Refine BONUS, DPAD

E.1 Assigning BONUS and DPAD by Industry Segments

Both the tax break variables are assigned to an executive based on their firm's primary industry. Large publicly traded firms may operate in many different industries. Therefore, assigning the tax breaks based only on primary industry codes may create some mismeasurement in the tax break variables. To address this concern, I use Compustat business segments data to calculate the percentage of a firm's total assets in each of its business segments for those firms reporting business segments data. I then aggregate according to each business segment's primary industry to find the percentage of assets in each NAICS industry. Then, I reassign each of the the tax breaks according to the distribution of assets across industries. I present results using these modified tax break variables in Specification (2) of Table A4. The effect of each tax break on executive compensation remains large, positive, and statistically significant. While both estimates are slightly smaller than the baseline effects (reproduced in Specification (1) of the same table), the differences are statistically insignificant at conventional levels. In sum, adjusting the tax breaks variables using the business segments data and assigning the tax break measures based on the percentage of assets in each segment's primary industry does not suggest there is significant measurement error in tax break variables due to the multiplicity of business activity across industries of large publicly traded firms.

E.2 Assigning DPAD by US Asset Class

The DPAD tax break variable is assigned to an executive based on their firm's primary industry and asset class where asset class is assigned by total worldwide assets. Large publicly traded firms may operate in many different countries and hold only a fraction of their total worldwide assets in the US. Therefore, assigning the DPAD tax break based on total worldwide assets may create some mismeasurement of the DPAD variable. To address this concern, I use Compustat geographic segments data to calculate the percentage of total assets held abroad for those firms reporting foreign segments data. I multiply this percentage by total worldwide assets to find each firm's total US assets and reassign the DPAD variable based on firm size bins based on this measure. I present results using this modified DPAD variable in Specification (3) of Table A4. The effect of the adjusted variable on executive compensation remains large, positive, and statistically significant. While the estimate is slightly smaller than the baseline DPAD estimate (reproduced in Specification (1) of the same table), the difference between the two effects is statistically insignificant at conventional levels. Adjusting the DPAD variable using the geographic segments data does not suggest there is significant measurement error in the DPAD variable due to the multinational nature of large publicly traded US firms.

As an additional check, Specification (4) presents baseline model results estimated using only domestic firms (those reporting no pretax foreign income when the DPAD was available). For this much smaller subsample of executives, the tax breaks continue to have large and statistically significant effects on executive compensation, suggesting that measurement error due to the international activities of many of the large publicly traded firms in the sample does not lead to the large positive effects. These results also suggest that tax break effects are not due to industry-level export intensity, which Keller and Olney (2017) show is strongly correlated with executive compensation.

Table A4: Effect of Segments-Adjusted Tax Breaks on Executive Compensation

	(1) Ln(Comp)	(2) Ln(Comp)	(3) Ln(Comp)	(4) Ln(Comp)
Lagged BONUS	0.0618***		0.0621***	0.0590***
	(0.0110)		(0.0110)	(0.0146)
Lagged DPAD	0.0423***			0.0710**
	(0.0135)			(0.0293)
Lagged BONUS, Industry Segments		0.0593***		
		(0.0108)		
Lagged DPAD, Industry Segments		0.0363***		
		(0.0102)		
Lagged DPAD, Geographic Segments			0.0362***	
			(0.0102)	
Firm FE	✓	✓	✓	✓
Firm Size Bins x Year FE	✓	✓	✓	✓
Baseline Controls	✓	✓	✓	✓
Domestic Firms Only				✓
Observations	100,520	100,410	100,410	31,701

Notes: Table A4 shows how estimates of the effect of BONUS and DPAD differ from baseline estimates when Compustat geography and industry segments data are used to refine the tax break variables. All Specifications are based on Specification (4) from Table (2). Specification (1) reproduces the estimates from Specification (4) from Table (2). Specification (2) replaces both tax break variables with refined measures where the tax breaks are assigned to industries based on the percentage of total assets reported in each industry segment. Specification (3) replaces Lagged DPAD with a refined measure firm size bins are assigned according to total US assets. Specification (4) re-estimates the baseline model using only data for domestic firms (those reporting no pretax foreign income when the DPAD is available). Standard errors are presented in parentheses and are clustered at the four-digit NAICS industry level; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Appendix F Alternative Identification Strategies

Table A5: Effect of Tax Breaks on Executive Compensation; Alternative ID Strategies

	(1) Ln(Comp)	(2) Ln(Comp)	(3) Ln(Comp)	(4) Ln(Comp)
Lagged BONUS	0.0618***	0.0466***	0.0473***	
	(0.0110)	(0.0100)	(0.00904)	
Lagged DPAD	0.0423***	0.0311**	0.0303**	
	(0.0135)	(0.0156)	(0.0142)	
BONUS				0.0603***
				(0.0109)
DPAD				0.0526***
				(0.0126)
Firm FE	✓	✓		✓
Firm Size Bins x Year FE	✓	✓	✓	✓
Exec FE		✓		
Exec x Firm FE			✓	
Observations				
N	100,520	95,627	95,047	100,371

Notes: Table A5 explores how coefficient estimates of the effect of BONUS and DPAD differ when alternative identification strategies are used. All Specifications are based on Specification (4) from Table (2) and include controls for executive gender and experience as well as firm size bins interacted with year fixed effects. Specification (1) reproduces the estimates from Specification (4) from Table (2). Specification (2) includes executive fixed effects. Specification (3) includes executive-by-firm fixed effects instead of executive and firm fixed effects. Specification (4) replicates the Specification (1) strategy, but employs contemporaneous measures of BONUS and DPAD rather than lagged values. Standard errors are presented in parentheses and are clustered at the four-digit NAICS industry level; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Appendix G Effect of Tax Breaks on Firm Business Activities

In this appendix, I estimate the effect of the tax breaks on business activities for the sample of firms in the analysis dataset. I implement a firm level regression of business outcomes on the two tax breaks. Results are presented in Table A6. In Column (8), I implement a regression in the style of Dyreng and Lindsey (2009) to estimate the effect of bonus depreciation on after-tax present value investment costs per dollar of investment and the effect of the DPAD on effective tax rates. To do so, I regress taxes paid scaled by assets on taxable income scaled by assets and capital expenditure scaled by assets as well as BONUS interacted with capital expenditure scaled by assets and DPAD interacted with taxable income scaled by assets. The coefficient on the BONUS interaction is the percentage point reduction in after-tax investment costs due to bonus depreciation. The coefficient on the DPAD interaction is the percentage point reduction in effective tax rates due to the DPAD. These coefficients should be close to 0.01 if the treatment variables are correctly specified.

Consistent with Zwick and Mahon (2017), I find bonus depreciation increases capital investment, but has no effect on payouts. Interestingly, among the analysis sample, bonus depreciation decreases debt usage. This finding is not consistent with Zwick and Mahon (2017), but likely due to the very different samples. Consistent with Ohrn (2018), the DPAD increases capital expenditure, lowers debt usage, and increases payouts. Neither policy affects assets. The DPAD has a weak effect on stock return. The DPAD increases R&D while bonus depreciation decreases R&D. This finding is consistent with the investment incentive inducing a substitution toward investment and away from R&D. The DPAD increases ROA while bonus depreciation does not. This is consistent with the logic presented in Edgerton (2012) which shows bonus depreciation does not affect accounting earnings.

The BONUS $\times$ CX coefficient in Specification (8) suggests a one percentage point increase on BONUS decreases the after-tax cost of investment by 0.935 percentage points. The DPAD $\times$ PI coefficient in the same regression means a one percentage point decrease in DPAD decreases effective tax rates by 1.91 percent. Both of these coefficients are statistically different from zero at the 99% level. They are also statistically indistinguishable from 0.01 at standard levels of statistical significance. In sum, the findings in Specification (8) show that there is a strong first stage effect of both tax breaks and that the tax breaks are correctly specified.

Table A6: Effect of Tax Breaks on Firm Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Ln(CX)	Debt Ratio	Payouts / L.SL	Ln(Assets)	Stock Return	Ln(R&D)	ROA	US Fed Tax
BONUS	0.117***	-0.0184*	-0.00211**	0.00671	-0.00946	-0.0586***	0.00850	
	(0.0192)	(0.00987)	(0.000812)	(0.0140)	(0.0154)	(0.0154)	(0.00593)	
DPAD	0.0593***	-0.0232***	0.00436***	0.00914	0.0350*	0.112***	0.0128***	
	(0.0210)	(0.00713)	(0.00144)	(0.0200)	(0.0190)	(0.0276)	(0.00417)	
PI								0.0290***
								(0.00290)
CapX								0.0339***
								(0.00604)
BONUS × CX								-0.00762***
								(0.00211)
DPAD × PI								-0.0191***
								(0.00473)
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	
Observations	19,285	20,554	20,107	20,606	20,313	20,606	20,597	17,491

Notes: Table A6 presents coefficient estimates of the effect of BONUS and DPAD on firm outcomes. The observational unit in each specification is a firm in a given year. The outcome variable in Specification (1) is the log of capital expenditure. The outcome variable in Specification (2) is the debt ratio. The outcome variable in Specification (3) is total payouts scaled by lagged sales. The outcome variable in specification (4) is firm size. The outcome variable in specification (5) is the stock return. The outcome in Specification (6) is Log R&D. The outcome in Specification (7) is ROA. The outcome in specification (8) is taxes paid scaled by total assets. All dependent variables in Specification (8) are scaled by assets. All specifications include firm and year fixed effects and the ETI control. All specifications other than (4) and (8) include firm size as a control. Standard errors are presented in parentheses and are clustered at the four-digit NAICS industry-level; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

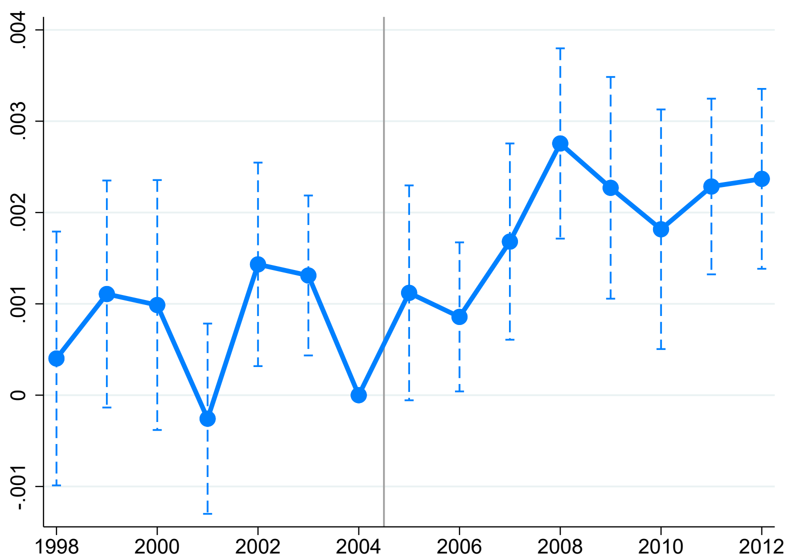
Appendix H Dynamic DPAD DD; Changing Taxable Status

This appendix presents an alternative dynamic DPAD estimates. The estimates are based on the following specification

$$\text{Ln(Comp)}_{i,t} = \beta_0 + \sum_{k=1998}^{2012} (\beta_k[\text{QPAI\%}_{j,a} \times \mathbb{1}[\text{Non-Taxable}_f, t] \times \mathbb{1}(k)]) + \beta_1[\text{BONUS}_{j,t}] + \gamma \mathbf{X}_{i,f,t} + \nu_t + \mu_f + \varepsilon_{i,t},$$

which is the same as estimating Equation (3), but allows the non-taxable indicator, $\mathbb{1}[\text{Non-Taxable}_f, t]$ to vary from year to year. $\beta_{1998} - \beta_{2012}$ estimates are presented in Figure A3. Consistent with the evidence presented in Figure A3 and Panel (a) of Figure 5, executive compensation is elevated in years 2007 and beyond.

Figure A3: DPAD Dynamic Difference-in-Differences Estimates

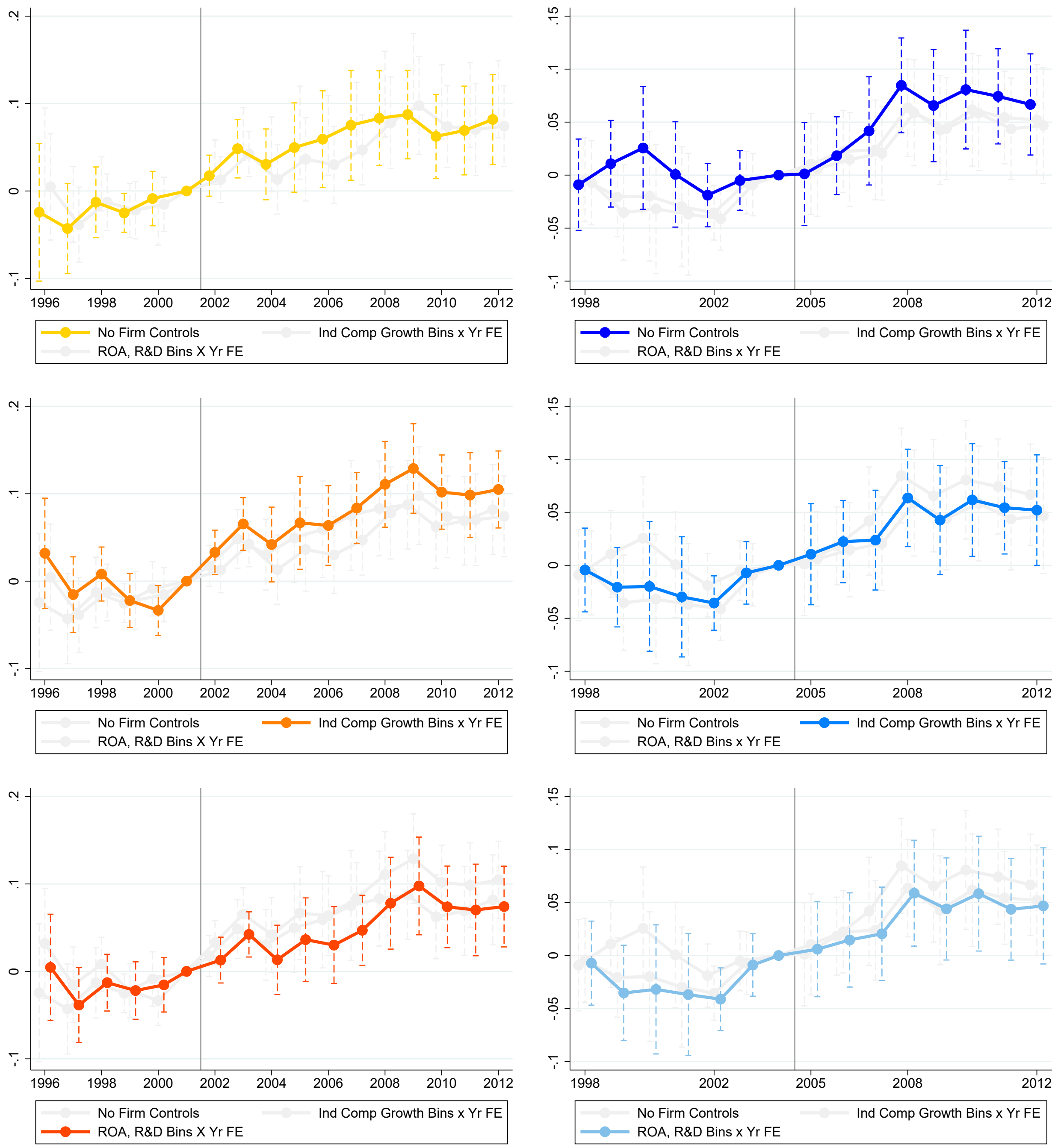


Notes: Figure A3 presents Dynamic Difference-in-Differences estimates as described in Section 5.1 and this appendix. The figure displays $\beta_{1998} - \beta_{2012}$ corresponding to estimating equation (3), but where the taxable status indicator is allowed to vary annually as firms enter and exit tax loss positions. The 2004 coefficient has been normalized to 0. DPAD is scaled such that the coefficients represent the difference between firms that derive 100% of their income from domestic manufacturing activities and firms that no income from domestic manufacturing activities. Vertical bands represent 95% confidence intervals. *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Appendix I   Separated Figure 5 Plots

Figure A4: Robustness of Dynamic Difference-in-Differences Estimates

(a) BONUS   (b) DPAD



Notes: Figure A4 presents each of the overlaid plots presented Figure 5 separately.

Appendix J Tax Break Outlier and Winsorization

Appendix J explores whether a select number of tax break outliers are driving the estimated effects. As a first step in this check, I create binned scatterplots that compare residualized values of executive compensation to residualized values of the tax breaks where the residuals are derived from the baseline model (Specification (4) of Table 2). These are presented Appendix Figure A5. For both tax breaks, the bulk of the binned data suggest a strong positive relationship. However, average values of residualized compensation at the extreme right of the distribution of each tax break are quite far from the regression line, suggesting that outliers may affect estimates. In Table A7, I present tax breaks estimates where I progressively winsorize both tax breaks at the 1%, 3%, 5%, and 10% level. Winsorizing the tax breaks increases the policy estimates suggesting tax break outliers lead to lower estimates. I rely on baseline estimates rather than those based on winsorized tax break variables as they are more conservative.

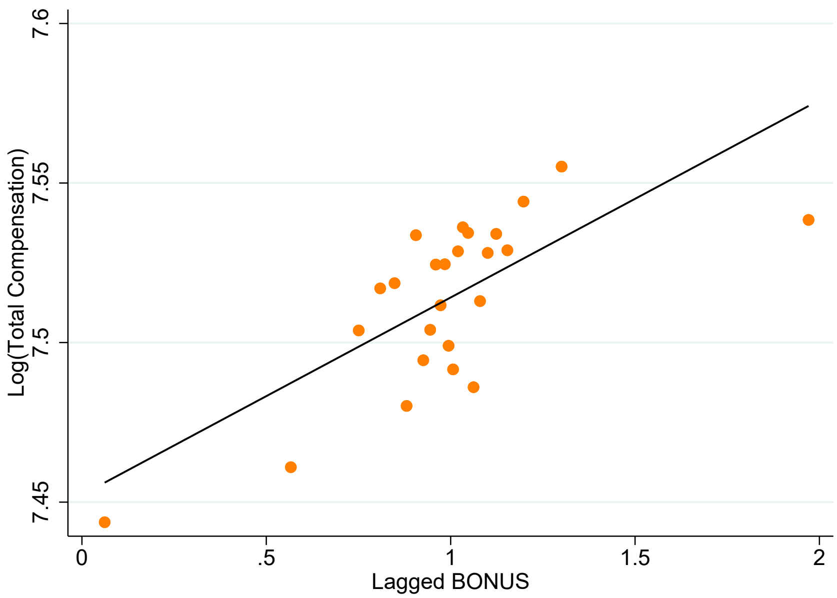
Table A7: Effect of Tax Breaks, Robustness to Winsorizing Tax Breaks

	(1) Ln(Comp)	(2) Ln(Comp)	(3) Ln(Comp)	(4) Ln(Comp)	(5) Ln(Comp)
Lagged BONUS	0.0618***	0.0622***	0.0629***	0.0661***	0.137***
	(0.0110)	(0.0109)	(0.0110)	(0.0112)	(0.0359)
Lagged DPAD	0.0423***	0.0426***	0.0431***	0.0446***	0.0510***
	(0.0135)	(0.0135)	(0.0136)	(0.0138)	(0.0146)
Year FE	✓	✓	✓	✓	✓
Firm Size Bins x Year FE	✓	✓	✓	✓	✓
Tax Breaks Winsorized at the 1% Lvl.		✓			
Tax Breaks Winsorized at the 3% Lvl.			✓		
Tax Breaks Winsorized at the 5% Lvl.				✓	
Tax Breaks Winsorized at the 10% Lvl.					✓
Observations	100,520	100,520	100,520	100,520	100,520

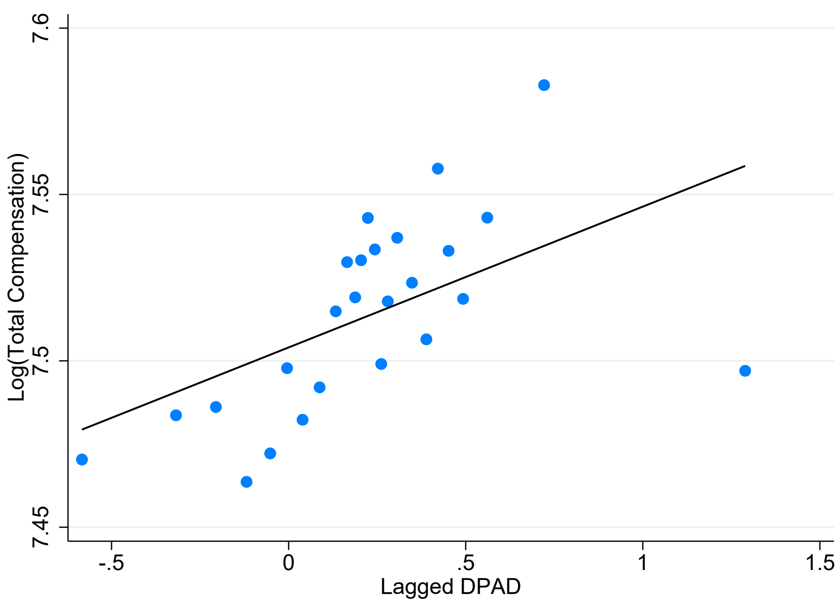
Notes: Table A7 shows how winsorizing the tax break variables at progressively more severe levels affects coefficient estimates. All specifications are based on Specification (4) from Table (2) and include firm fixed effects and firm size bins interacted with year fixed effects as well as controls for controls executive experience, gender, and lagged ETI. Specification (1) replicates baseline effects. Specifications (2)–(5) progressively winsorize the tax break variables at the 1%, 3%, 5%, and 10% levels. Standard errors are presented in parentheses and are clustered at the four-digit NAICS industry level; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Figure A5: Effect of Tax Breaks on Executive Compensation; Binscatter Graphs

(a) BONUS



(b) DPAD



Notes: Figure A5 presents binscatter plots showing the effect of each tax break on Ln(Comp). Black lines are linear projections based on the underlying data. Binscatter plots are conditional means of the outcome on 30 equal sized bins of the tax breaks. In creating each plot, the outcome variable has been residualized to exclude the effects of all firm, executive, and tax policy control variables as well as year and firm fixed effects. The resulting relationships and linear predictions (based on un-binned data) correspond to the Lagged BONUS and Lagged DPAD estimates from Specification (4) of Table 2. *Sources*: Author's calculations based on Compustat, Execucomp, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Appendix K Bebchuk Governance Variable Construction

I use the Risk Metrics Governance and Governance Legacy datasets to construct the Bebchuk Governance measure used in the Table 7 analysis. The Governance Legacy dataset documents governance metrics for publicly traded firms in even years 1998–2006. The Governance dataset does the same in all years 2007–2011. I follow Bebchuk, Cohen and Ferrell (2009) in constructing an Entrenchment Index that can range from 0 to 6. The index is one point higher (1) if a super majority of shareholders must approve a merger or takeover, (2) if executives have a golden parachute (a large guaranteed payment if they are dismissed after a merger or takeover), (3) if management can enact poison-pill defenses to make a takeover less attractive, (4) if shareholders have limited abilities to amend the company's charter, (5) if shareholders have limited abilities to amend the company's bylaws, and (6) if the company elects board members using staggered elections. For years with no governance data, I use the measure from the previous year.

Appendix L Effect of Tax Breaks on Firm Governance Measures

Table A8: Effect of Tax Breaks on Firm Governance Measures

	(1) Large Holder	(2) Bebchuk Gov	(3) Executive Tenure
Lagged BONUS	0.00421*	0.0344	0.0380
	(0.00245)	(0.0299)	(0.0934)
Lagged DPAD	-0.00386*	0.0324	0.123
	(0.00213)	(0.0326)	(0.113)
Year FE	✓	✓	✓
Firm FE	✓	✓	✓
Controls	✓	✓	✓
Observations	16,743	15,192	20,627

Notes: Table A8 shows how the tax breaks affect firm-level governance measures. The observational unit in each specification is a firm in a given year. All specifications include firm fixed effects and firm size bins interacted with year fixed effects as well as controls for controls for lagged ETI. The outcome variable in Specification (1) is Large Instit. Holder %. The outcome variable in Specification (2) is Bebchuk Governance. The outcome variable in Specification (3) is Executive Tenure. Standard errors are presented in parentheses and are clustered at the four-digit NAICS industry level; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *Sources*: Author's calculations based on Execucomp, Compustat, Riskmetrics, Thomson Reuters, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Appendix M Governance Interactions and Performance Outcomes

Table A9: Heterogeneous Effects of Tax Breaks by Governance Measures on ROA

	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA
Lagged BONUS	-0.00435	-0.000204	0.000781	-0.00761**	-0.000414
	(0.00265)	(0.00797)	(0.00687)	(0.00377)	(0.00808)
Lagged DPAD	0.00982***	0.0225***	0.0134**	0.00616	0.0121*
	(0.00376)	(0.00565)	(0.00669)	(0.00642)	(0.00620)
L.BONUS × $\mathbb{1}$(Bebchuk Gov)	0.00109			0.00206	
	(0.00211)			(0.00346)	
L.DPAD × $\mathbb{1}$(Bebchuk Gov)	-0.00215			-0.000623	
	(0.00400)			(0.00760)	
L.BONUS × $\mathbb{1}$(Large Holder)		0.000632		0.0000934	
		(0.00415)		(0.00208)	
L.DPAD × $\mathbb{1}$(Large Holder)		-0.0146*		-0.00448	
		(0.00768)		(0.00912)	
L.BONUS × $\mathbb{1}$(Exec Tenure)			0.00376	0.00116	
			(0.00458)	(0.00744)	
L.DPAD × $\mathbb{1}$(Exec Tenure)			-0.0109	-0.000266	
			(0.0106)	(0.0211)	
L.BONUS × $\mathbb{1}$(Combined Gov)					-0.00188
					(0.00309)
L.DPAD × $\mathbb{1}$(Combined Gov)					0.0103
					(0.0118)
Year FE	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓
Observations	11,366	11,122	13,027	4,325	8,140

Notes: Table A10 repeats the Table 7 analysis, but at the firm level and replacing the outcome variable with ROA in order to test whether stronger governance measures induce executives to respond to the tax breaks in ways that increase ROA. All specifications include firm fixed effects and firm size bins interacted with year fixed effects a well as controls executive experience, gender, and lagged ETI. Standard errors are presented in parentheses and are clustered at the four-digit NAICS industry level; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *Sources*: Author's calculations based on Execucomp, Compustat, Riskmetrics, Thomson Reuters, IRS Statistics of Income, and Zwick and Mahon (2017) data.

Table A10: Heterogeneous Effects of Tax Breaks by Governance Measures on Stock Return

	(1) Stk Return	(2) Stk Return	(3) Stk Return	(4) Stk Return	(5) Stk Return
Lagged BONUS	-0.0102	-0.0256	-0.0269	-0.0278*	-0.0470**
	(0.0224)	(0.0183)	(0.0296)	(0.0149)	(0.0198)
Lagged DPAD	-0.0207	-0.0404	-0.000833	0.0214	-0.0215
	(0.0275)	(0.0255)	(0.0280)	(0.0334)	(0.0299)
L.BONUS × $\mathbb{1}$(Bebchuk Gov)	0.00379			0.00407	
	(0.0126)			(0.0143)	
L.DPAD × $\mathbb{1}$(Bebchuk Gov)	0.000321			0.0254	
	(0.0287)			(0.0364)	
L.BONUS × $\mathbb{1}$(Large Holder)		-0.00191		0.0107	
		(0.0171)		(0.0168)	
L.DPAD × $\mathbb{1}$(Large Holder)		-0.00929		-0.0489	
		(0.0314)		(0.0324)	
L.BONUS × $\mathbb{1}$(Exec Tenure)			0.0157	0.0318	
			(0.0278)	(0.0213)	
L.DPAD × $\mathbb{1}$(Exec Tenure)			-0.0434	-0.155**	
			(0.101)	(0.0634)	
L.BONUS × $\mathbb{1}$(Combined Gov)					0.000995
					(0.0220)
L.DPAD × $\mathbb{1}$(Combined Gov)					-0.0288
					(0.0423)
Year FE	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓
Observations	11,369	11,053	12,877	4,326	8,121

Notes: Table A10 repeats the Table 7 analysis at the firm level, but at the firm level and replacing the outcome variable with Stock Return in order to test whether stronger governance measures induce executives to respond to the tax breaks in ways that increase Stock Return. All specifications include firm fixed effects and firm size bins interacted with year fixed effects a well as controls executive experience, gender, and lagged ETI. Standard errors are presented in parentheses and are clustered at the four-digit NAICS industry level; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ *Sources*: Author's calculations based on Execucomp, Compustat, Riskmetrics, Thomson Reuters, IRS Statistics of Income, and Zwick and Mahon (2017) data.