Corporate Tax Breaks and Executive Compensation

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PRELIMINARY AND INCOMPLETE DRAFT. DO NOT CITE.

Abstract

I analyze the effect of two corporate tax breaks, the Domestic Production Activities Deduction (DPAD) and bonus depreciation, on executive salaries using a modified difference-in-differences empirical strategy, plausibly exogenous variation in each of the tax breaks, and data on executive salaries from the *Execucomp* database. I find a one percentage point decrease in the present value cost of new investments due to bonus depreciation increases executive compensation by 4.3%. A one percentage point reduction in effective corporate income tax rates generated by the DPAD increases executive compensation by 3.8%. These results are concentrated in firms that experience the largest cash inflows from the tax breaks and among executives sitting on the board of directors. The estimates suggest that approximatley 19% of every dollar generated the tax breaks goes to the five highest paid executives at a firm. Subsidiary analyses using CPS data do not show an equivalent response for the earnings and wages of average U.S. workers.

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1 Introduction

I study the effect of two U.S. federal corporate tax policies, bonus depreciation and the Domestic Production Activities Deduction (the DPAD), on the compensation packages of executives at large, publicly trade corporations. The first policy, bonus depreciation, is an investment incentive that allows firms to deduct an additional percentage of price of new capital assets in the year they are purchased. This decreases the present value purchase price of new assets and dramatically decreases the current tax bill of firms that purchase large amounts of capital assets. The second policy, the DPAD, allows firms to deduct a percentage of their income derived from domestic manufacturing activities from their taxable income. The DPAD decreases taxes paid by up to 3.15%, increasing after-tax cash flows substantially for profitable domestic manufacturing firms.

I find that a one percentage point decrease in the present value cost of new investments due to bonus depreciation increases executive compensation by 4.3%. A one percentage point reduction in effective corporate income tax rates generated by the DPAD increases executive compensation by 3.8%. Accounting for the amount of investments and taxable income reported by the average firm in the sample, these estimates suggest that approximately 19 cents of every dollar generated by either of the two tax breaks goes into the pockets of a publicly traded corporation's firm's five highest paid executives.

To establish these results, I rely on detailed executive compensation data from the *Execucomp* database, well-established quasi-experimental variation in each tax break, and a modified difference-in-differences empirical framework. 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 to identify the effect of bonus depreciation. As long-lived assets are deducted from taxable income more slowly, bonus depreciation decreases the present value purchase price 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 via OLS regression yields difference-in-differences estimates of the effect of each policy.

The primary threat to the empirical identification of the effect of either tax break on executive compensation is that other industry-by-time shocks affecting executive pay might covary with the policies. I address this threat by (1) showing that prior to policy enactment, executive compensation in treated vs. non-treated industries exhibits statistically indistinguishable trends, (2) examining and finding evidence that the effect of both policies are larger in the firms that experience the largest after-tax cash inflows from by the policies, and (3) by demonstrating that the policy effects are concentrated among executives that sit on the board of directors and have the most ability to

bargain for increases in compensation.

The results of this study are important for three reasons. First, they contribute to our understanding of the determinants of executive compensation. Second, they foreshadow the effects of the recent Tax Cuts and Jobs Act of 2017 on executive pay. Finally, they represent a new mechanism by which corporate tax cuts may increase income inequality.

Determinants of Executive Compensation The level and rate of increase in executive compensation in the U.S. over the last 40 years is staggering. In 2014, the median S&P 500 CEO earned $10.1 million per year in total compensation. This sum represents a sixfold increase in pay since 1980 and is 335 times higher than the annual income of the average U.S. worker (Edmans et al. (2017)). These impressive numbers have led to a healthy debate regarding the determinants of executive pay. While some have argued that executive pay is simply the efficient outcome of a labor market in which firms optimally compete for managerial talent (Rosen (1981), Kaplan and Rauh (2009), Kaplan and Rauh (2013)), others contend that executive pay represents a form of rent extraction and that the level and structure of pay are decided by the executives themselves (Bertrand and Mullainathan (2001), Bebchuk et al. (2002), Bebchuk and Fried (2003)). On the one hand, the results presented herein may support the shareholder value view. Lower effective corporate tax rates increase the after-tax returns to the firms and therefore the potential value that executives can create. Additionally, increased after-tax cash flows may increase the demand and price of executive talent. On the other hand, the fact that compensations increases when executives did nothing to increase firm performance and that the effect of the policies is concentrated among directors and at firms with weaker governance structures supports the rent extraction view.

Effects of the Tax Cuts and Jobs Act of 2017 The two hallmark corporate tax provisions of the Tax Cuts and Jobs Act of 2017 – at least on the domestic side – are a lower statutory corporate income tax rate and immediate expensing through 2022. As the DPAD constitutes an effect corporate tax rate cut, and immediate expensing is equivalent to 100% bonus depreciation, studying the effects of bonus depreciation and the DPAD in the recent past can help in predicting the effect of the TCJA on executive compensation. Extrapolating the results from this study, the TCJA will increase executive compensation substantially, likely without an accompanied wage or earnings response for the average U.S worker.

Corporate Income Taxation and Income Inequality Recent empirical work based on U.S. and German data has shown that workers bear a significant burden of corporate income taxation (Suárez Serrato and Zidar (2016) and Fuest et al. (2018)). An implication of these papers is that decreasing the effective corporate income tax will lift wages for corporate employees, including for executives. Even more directly related, Nallareddy et al. (2018) shows that cuts in state corporate income tax rates increase incomes at the top but not the bottom of the income distribution, leading to increased income inequality.

The results of this study show that while average wages may increase, total compensation rises disproportionately for high income executives. As a result, corporate tax break constitute a newly discovered mechanism to by which within firm income inequality may increase. Kline et al. (2017) and Piketty et al. (2014) present evidence of alternative mechanisms. Kline et al. (2017) shows that within firm returns to innovation are dispropotitonately concentrated among high income earnings. Piketty et al. (2014) shows that when personal income tax rates are lowered, executives may bargain harder for rents, increasing inequality.

The remainder of the paper is organized as follows. Section 2 provides further details on bonus depreciation and the DPAD. Sections 3 and 4 present data sources, data definitions, and descriptive statistics. I outline the estimation strategy in Section 5. Baseline estimates are presented in Section 6. Section 7 presents a dynamic estimation of each policy on executive compensation. Tests for heterogeneity in the effect of each policy according to their firm-level cash flow effects are presented in Section 8. Section 9 breaks down the effect of each policy by the type of compensation, salary and bonus or stock and incentives. In Section 10, I show that the effect of each tax break is concentrated among executives with more scope for rent capture. I discuss the magnitude of the estimated effects, relate the findings to the effect of the policies on average U.S. wages and earnings, and consider how the results relate to our understanding of the determinants of executive compensation in Section 11. Section12 concludes.

2 Two Corporate Tax Breaks

2.1 Bonus Depreciation

Typically, businesses cannot deduct the full purchase price of newly installed assets from their taxable income in the year the assets are purchased and placed into service. Instead, businesses may deduct the value of the assets over time according to the Modified Accelerated Cost Recovery System (MACRS) (detailed in IRS Publication 946). MACRS specifies the life and depreciation method for each type of potential investment (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 in the first year. Because firms benefit from the tax savings earlier, the present value of a given investment's tax shield increases, and the after-tax present value of the investment decreases. Bonus depreciation decreases the after-tax present value of new investments more when firms invest in assets with longer lives, when firms face higher tax rates, and when firms more heavily discount future profits.

Bonus depreciation was first enacted in 2001 at a rate of 30%. It was originally intended to be a temporary and counter-cyclical policy. In 2003, the additional first year deduction was increased

to 50%. The bonus was eliminated during years 2005, 2006, and 2007, but was reinstated in 2008 at the 50% rate. After 3 years at 50%, the bonus rate was increased to 100% in 2011 (100% is often called expensing or immediate expensing). Bonus held steady at a rate of 50% since 2011 but was replace was an immediate expensing provision – akin to 100% bonus depreciation – by the Tax Cuts and Jobs Act of 2017. Panel (a) of Figure 1 displays the evolution of the applicable bonus depreciation percentage over the sample period.

Table 1 illustrates the impact of 50% bonus depreciation on the cost of a $100 investment that has a 7-year life. MACRS specifies that $25 of the total investment may be deducted in the first year, then $21.43 in the second, etc. With a federal tax rate of 35%, this leads to tax savings of $8.75 in the first year, then $7.50 in the second. Over the course of the 7 year life, all $100 of the investment cost are deducted from taxable income, generating $35 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 $28.79.[1]

Table 1: Example of Federal Tax Impact of 50% Bonus

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
PV(τ_f x Deduction)									28.79
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
PV(τ_f x Deduction)									31.89

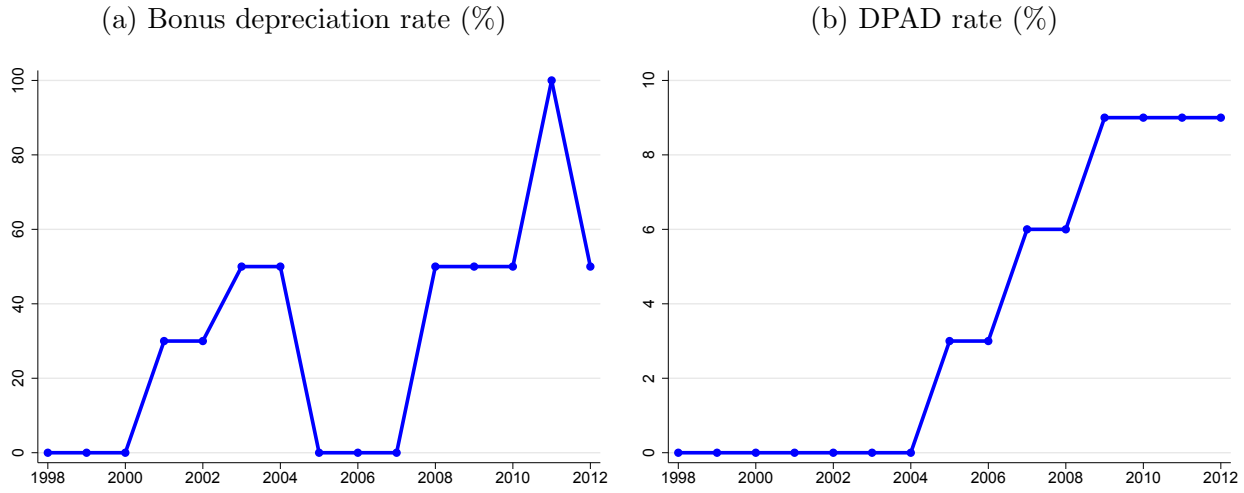
Notes: Table 1 calculates the present value of federal tax deductions for a $100 investment under both a traditional 7-year accelerated depreciation regime and under a 50% bonus regime. The federal corporate tax rate is assumed to be 35%. The discount rate is assumed to be 10%.

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 additional dollars to be deducted in the first year the investment is made. The remaining $50 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 $21.88 in the first year, $3.75 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 $31.89 and the present value cost of the investment decreases by 3.1% (=31.89-29.79). While this is only

[1]The $28.79 is a function of the assumed discount rate of 10%. At higher discount rates, the present value of the tax shield will be lower. 10% is used in the example because it is often the rate used in corporate net present value calculations.

an illustrative example, the benefits of bonus are not far off. Zwick and Mahon (2017) estimates that 50% federal bonus depreciation decreases the purchase price of new investments by 2.73%.

Figure 1: Bonus Depreciation and DPAD Rates over time



Notes: Figure 1 shows statutory bonus depreciation rates during the years 1998–2012. Sample years include 1996 and 1997 but neither policy had been implemented this early in the sample.

2.2 The DPAD

The DPAD is a federal U.S. tax provision that allows firms to deduct a percentage of "Qualified Production Activities Income" (QPAI) from their taxable income. 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 DPAD may not exceed 50 percent of its W-2 wages and may not exceed the firm's gross taxable income. Section 199 of the U.S. Tax Code details the specifics of the deduction. Taxpayers claim the deduction using IRS Form 8903.

The DPAD was phased in during the years 2005–2010. The deduction was implemented at a rate of 3 percent in 2005, was scaled to 6 percent in 2007, and increased to its maximum rate of 9 percent in 2010.[2] Panel (b) of Figure 1 displays the DPAD deduction rate over the sample period.

Assuming firms faced the maximum statutory corporate tax rate of 35 percent, 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 percent 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 percent of their income from qualified production activities received a break of only 0.7875

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

percentage points.

Ohrn (2018) shows that the DPAD caused firms to increase investment, payouts to shareholders, and equity finance (debt is less attractive at lower, DPAD-adjusted effective tax rates), but did not have any effect on reported corporate taxable income. Fich et al. (2017) shows firms benefiting most from the DPAD use some of the funds to increase their merger and acquisition activity.

3 Data

This study's empirical analysis relies on tax policy data capturing the effects of the DPAD and bonus depreciation, as well as executive compensation data and firm-level financial statement data. This section describes sources and variable definitions.

3.1 Executive Compensation and Characteristics

Executive compensation data is taken from the Compustat Execucomp database. 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). 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. 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.

In supporting analyses, three alternative executive compensation measures are used. The first is **Total Comp Realized**, which is equal to the total compensation realized by the executive in a given year. Total Comp Realized differs from Total Comp Awarded in that the estimated value of stock options granted is replaced with the net value of stock options exercised. Because executives typically exercise options that were granted from previous years, Total Comp Realized may represent compensation for more than one year.

The second measure is **Total Current** which is equal to an executive's total current compensation; the sum of an executive's salary and bonus in a given year. Finally, Total Non Current is the difference between Total Comp Awarded and Total Current. **Total Non Current** captures 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 four executive compensation variables are winsorized at the 1st and 99th percentiles to eliminate outlier concerns and are logged for use in the empirical analysis.

In addition to compensation data, Execucomp includes some addition information on the characteristics of executives that I include as controls in most regressions. These include the log of **Experience**, measured as the number of years in a top 5 compensation job and the executive's gender, which I code as the **Female** indicator variable.

3.2 Tax Policy Variables

3.2.1 BONUS

I follow Cummins et al. (1994), Desai and Goolsbee (2004), House and Shapiro (2008), Edgerton (2010), and Zwick and Mahon (2017) in constructing an industry-by-time measure to capture the effects of bonus depreciation.

Under a tax regime without bonus depreciation, firms deduct a portion of the purchase price of new assets from their tax bill each year according to the Modified Accelerated Cost Recovery System (MACRS). MACRS determines the life of the investment and annual allowable deductions based on the type of investment. Investments such as computers are depreciated faster for tax purposes than mining and oilfield machinery.

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 percent of investment costs, b, in the first year then depreciate the remaining $1 - b$ 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 increase in the tax shield generated by \$1 of new investment (equivalently the percentage point decrease in the present value price of new investment. BONUS can by written as

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

and computed at the industry-by-time level using the bonus depreciation levels described in Section 2 and industry-level z_0 data from Zwick and Mahon (2017) based on corporate tax return data.

3.2.2 DPAD

I follow Ohrn (2018) in constructing **DPAD** at the industry-firm size-by-year level to capture the percentage point reduction in effective tax rates generated by the DPAD. Once the policy has been fully phased in at a 9% deduction rate, if a firms classifies 100% of its income as Qualified

Production Activities Income (QPAI %), then the firm deducts 9%. At a statutory rate of 35%, this generates a 3.15 percentage point reduction in the firms effective tax rate. More generally, **DPAD** = QPAI % $\times$ 35 $\times$ d where d is the deduction rate which varies from 0% before 2005 to 3% in 2005 and 2006 to 6% in 2007 and 2008 and finally to 9% in 2009 and beyond. 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.

The key to constructing DPAD is the accurate measurment of QPAI %. Ohrn (2018) uses IRS Statistics of Income division data to calculate QPAI % at the industry level. For each of approximately 75 IRS industries, SOI provides total Income Subject to Tax and total 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 a industry-level measure of QPAI % in each year 2005–2012. The industry-level QPAI % is then rescaled to account for differences in DPAD usage across firms of different sizes using data from the SOI Corporate Source Book. The resulting QPAI % measure varies across approximately 900 (= 75$\times$12) industry-size bins and over the years 2005–2012.

DPAD is matched to firms in the Execucomp and COMPUSTAT databases using 4-digit NAICS codes, which closely correspond to IRS industry definitions, and balance sheet measures of total assets which place firms in one of the 12 firm size bins used in the Corporate Source Book.

3.2.3 ETI

Although the Extraterritorial Income Exclusion is not a focus of this study as the policy (1) was directed at a small subset of firms, (2) was available for only a limited amount of time, and (3) was under constant threat from the World Trade Organization leading to significant policy uncertainty, I include a measure of the policy to allay concerns that the ETI biases the estimated effects of BONUS and DPAD. I construct **ETI** is constructed in a manner similar to the DPAD variable. ETI varies at the industry-level based on export intensity (data from USA Trade Online) and over time due to the timing of the policy. ETI measures the percentage point reduction in corporate income tax rates due to the export incentive.

3.3 Firm Control Variables

Execucomp data is linked to firm financial statement data from COMPUSTAT in order to control for firm-level determinants of executive pay. Following the intuition presented in Gabaix and Landier (2008), I include the log of **Firm Size**, measured as total assets. Following Garicano and Rossi-Hansberg (2006), which shows that increases in incomes are often linked to technological change, I control for the log of **R&D Expenditures**. Finally, to control for changes in executive

income linked to firm performance – perhaps through incentive contracts – I control for firm Return on Assets (**ROA**), calculated as accounting earnings divided by total assets. Like the executive compensation data, firm financial data is winsorized at the 1st and 99th percentiles.

3.4 Sample Splitting and Heterogeneity Variables

In Section 8, I interact BONUS and DPAD with variables designed to measure the cash flow effects of the policies. In particular, I test whether the effects of BONUS on executive compensation are larger when firms do more capital investment. I classify firms as **High CAPX** if they are in the top third of the capital expenditure distribution in a given year and 0 if a firm is in the bottom third. I also test whether the effects of DPAD on executive compensation are larger when firms have higher taxable incomes. I calculate Taxable Income as a firm's federal taxes paid plus its deferred tax expense grossed up by the statutory tax rate, 35%, following Manzon Jr and Plesko (2001). I interact DPAD with **High Taxable Income**, an indicator equal to 1 if a firm is in the top third of the taxable income distribution among firms with positive taxable income and 0 for firms in the bottom third.

In Section 10, I explore whether tax breaks have larger effects for executives that sit on the board or among executives at better governed firms. **Director** an indicator equal to 1 if an executive sits on the firm's board of directors. **Large Holder** is an indicator of governance quality based on the percentage of outstanding stock held by the largest single institutional shareholder based on 13f filing from Thomson Reuters. Large Holder is equal to 1 if a firm is in the top third of this distribution and 0 if in the bottom third. Strong Gov is an indicator equal to 1 if a firm scores a 0, 1, or 2 on the Bebchuk et al. (2009) Entrechment Index and a 0 if the firm scores a 3, 4, or 5.

4 Descriptive Statistics

Table 2 presents descriptive statistics for the main analysis sample. After limiting the sample to top 5 executives in firms with non-missing financial and tax data, the sample includes 117,372 executive-year observations and covers 29,682 executives at 2,582 firms during the years 1996–2012.

Bonus depreciation decreases the purchase price of new capital assets by 1.175 percentage points during the full sample period. When the bonus rate is set at 50%, this decrease is 2.01 percentage points. When bonus was set to 100% in 2011, the policy decreased the purchase price of new capital assets by 4.00%. The DPAD decreased effective corporate income tax rates by only 0.359 percentage points during the full sample, but after the DPAD was fully phased in – after 2009 – the policy decreased effective tax rates by 1.13 percent points on average and by 1.6 percentage points for firms with positive taxable income.

The average executive was awarded $ 2.7 in total compensation during the sample period. Of this compensation, approximately 0.77% or 28% came from Total Current / salary and bonus

income. The remaining 72% was awarded in the form of stock grants, options, and long-term incentive plans. The average executive has 5 years of top 5 executive experience. The large majority of executives are men. Approximately 32% of executive sit on the board of directors. Only 1% of executives sit on their own compensation committees.

The average firm in the sample has $14.7 billion in total assets, reports $180 million in taxable income per year, purchases $314 of new capital per year, and does $115 million of R&D annually.

Table 2: Descriptive Statistics

	mean	std dev	25th Percentile	75th Percentile	obs
DPAD	0.359	0.691	0.000	0.443	117,372
BONUS	1.175	1.286	0.000	1.931	117,372
Total Comp Awarded	2.697	3.685	0.730	2.958	117,372
Total Comp Realized	2.679	4.230	0.593	2.710	117,372
Total Current	0.766	0.760	0.345	0.872	117,372
Total Non Current	1.932	3.248	0.260	2.054	117,372
Experience	5.079	3.832	2.000	7.000	117,372
Female	0.061	0.240	0.000	0.000	117,372
Director	0.327	0.469	0.000	1.000	117,372
Firm Size	14694.894	96789.253	575.683	6073.771	117,350
ROA	0.066	0.173	0.039	0.127	117,080
R&D Expenditure	115.398	569.295	0.000	36.000	117,372
ETI	0.152	0.395	0.000	0.000	117,372
Capital Expenditure	314.092	1210.867	11.623	187.538	117,372
Taxable Income	180.512	384.930	0.000	180.627	117,342
High CAPX	0.500	0.500	0.000	1.000	73,200
High Taxable Income	0.500	0.500	0.000	1.000	54,436
Strong Gov	0.520	0.500	0.000	1.000	65,971
Large Holder	0.500	0.500	0.000	1.000	64,127

Notes: Table 2 presents descriptive statistics for the analysis sample. The unit of observation is an executive in a given year, 1996–2012. 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 Comp Realized is the total compensation realized by 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. Firm Size is a firm's total assets. ROA is a firm's ratio of earnings to assets. R&D Expenditure is a firm's total R&D expenditure. 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. ETI is the percentage point reduction in a firm's effective tax rate due to the ETI. High CAPX is an indicator equal to 1 if a firm is in the top third of the capital expenditure distribution and equal to 0 if a firm is in the bottom third. High Taxable Income is an indicator equal to 1 if a firm is in the top third of the positive taxable income distribution and equal to 0 if a firm is in the bottom third. Director an indicator equal to 1 if an executive sits on the firm's board of directors. Interlock is an indicator equal to 1 if an executive sits on the compensation committee of the board.

5 Estimation Strategy

To estimate the effect of corporate tax breaks on executive compensation, I regress the log of compensation on the tax policy variables as well as the controls described above and year and firm fixed effects.[3] The regression can be written as

$$\text{Log(Compensation)}_{i,t} = \beta_0 + \beta_1[BONUS_{j,t-1}] + \beta_2[DPAD_{j,a,t-1}] + \gamma \mathbf{X}_{i,f,t-1} + \nu_t + \mu_f + \varepsilon_{i,t}, \tag{1}$$

where subscripts i, f, j, a, and t index executives, firms, industries, asset classes, and time, respectively. $\mathbf{X}_{i,f,t}$ is an array of control variables. Following the executive compensation literature, right hand side variables are lagged to allow executive contracts time to incorporate changes in firm performance and tax policy. Coefficient β_1 as an estimate of the percent increase in executive compensation generated by a 1 percentage point decrease in the present value of investment costs due to bonus depreciation. Coefficient β_2 captures the effects of a one percentage point decrease in effective corporate income tax rates due to the DPAD.

Both β_1 and β_2 are can be roughly interpreted as difference-in-differences estimates. β_1 represents the increase in executive compensation in industries that invest in longer-lived assets (and therefore benefit more from bonus depreciation) relative to the increase in compensation in industries that invest in shorter-lived assets when bonus is turned on or increased. β_2 is estimated by comparing the increase in executive compensation in industry-size cells in which a large amount of income qualifies for the DPAD relative to compensation in industry-size cells in which a small amount of income qualifies when the policy in implemented and scaled.

The primary threat to the identification of either parameter of interest is that other industry-by-time or industry-size-by-time shocks affecting executive compensation might covary with the policies. I address this threat in Sections 7, 8, and 10 by (1) showing that prior to policy enactment, executive compensation in treated vs. non-treated groups exhibits statistically indistinguishable trends, (2) examining and finding evidence of increasing effects of bonus depreciation by capital expenditure level and increasing effects of the DPAD by taxable income level, and (3) by demonstrating that policy effects are concentrated among executives that sit on boards or compensation committees, those with the most ability to bargain for increases in compensation.

6 Baseline Analysis

Table 3 presents baseline estimates of the effects of tax breaks on executive compensation. All specifications include year and firm fixed effects. When no additional controls are added to the

[3] I use firm fixed effects following the executive compensation literature. Specification (2) of Table 8 presents baseline results using executive fixed effects. The effects of both policies remain large and statistically significant at the 5% level.

regression – in Specification (1), both tax policies have large and statistically significant effects on executive compensation. The BONUS coefficient is equal to 0.0285 meaning a one percentage point decrease in the present value purchase price of new capital generated by bonus depreciation increases total executive compensation by 2.85%. The DPAD coefficient is equal to 0.0521 meaning a a one percentage point decrease in effective corporate income tax rates via the DPAD increases executive compensation by 5.21%.

Table 3: Effect of Tax Policy on Executive Compensation; Baseline Analysis

	(1)	(2)	(3)	(4)
	Lg(Total Comp)	Lg(Total Comp)	Lg(Total Comp)	Lg(Total Comp)
Lagged BONUS	0.0285***	0.0354***	0.0440***	0.0437***
	(0.00985)	(0.00868)	(0.0108)	(0.0111)
Lagged DPAD	0.0521***	0.0422***	0.0391**	0.0380**
	(0.0115)	(0.0136)	(0.0158)	(0.0147)
Lagged Firm Size		0.211***	0.167***	0.168***
		(0.0238)	(0.0248)	(0.0245)
Lagged ROA		0.187***	0.149***	0.148***
		(0.0391)	(0.0363)	(0.0360)
Lagged R&D		-0.00677	-0.00697	-0.00748
		(0.0148)	(0.0159)	(0.0154)
Log(Experience)			0.307***	0.307***
			(0.0104)	(0.0104)
Female			-0.169***	-0.169***
			(0.0150)	(0.0150)
Lagged ETI				-0.0152
				(0.0306)
Year FE	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Observations	117371	117371	117371	117371
Adj. R2	0.00109	0.0195	0.118	0.118

Notes: Table 3 presents coefficient estimates of the effect of BONUS and DPAD on executive compensation from a regression in the form of (1). The outcome variable in all specifications is the log of Total Comp Awarded. Specification (2) includes firm-level controls. Specification (3) includes firm-level and executive-level controls. Specification (4) includes firm-level and executive-level controls as well as ETI. All specifications include firm and year fixed effects. Standard errors are presented in parentheses and are clustered at the IRS industry-level * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Specifications (2), (3), and (4) progressively add firm controls, executive characteristic controls,

and ETI to the regression. In Specification (4), when all controls are included, a one percentage point increase in BONUS increases executive compensation by 4.37% and a one percentage point increase in DPAD increases compensation by 3.8%. Both tax break coefficients are statistically different from zero at the 5% level. The sign of most other coefficients load as expected. Firm Size and ROA are both correlated with higher executive compensation. Male executives with and executive with more experience are paid more. Firm R&D expenditures have no effect, suggesting that among S&P firms, salaries do not increase with technological innovation. ETI also, as expected, has no effect on executive compensation, likely due to the short duration of the policy and the uncertainty that surrounded it.

In the remainder of the analysis, Specification (4) of Table 3 is referred to as the baseline specification and the Specification (4) estimates of BONUS and DPAD are referred to as the baseline estimates. Figure 2 provides a bin-scatterplot visual presentation of baseline effects of BONUS and DPAD on executive compensation. In Panel (a), residualized values of the log of Total Comp Awarded are averaged then plotted across 30 equal sized BONUS bins. The outcome variable has been residualized to exclude the effects of all firm and executive controls, DPAD and ETI, as well as year and firm fixed effects. Given this residualization, the slope of the line corresponds to the Table 3, Specification (4) BONUS coefficient and is based on the underlying (un-binned) data. Panel (b) presents the equivalent bin-scatterplot for DPAD. Both panels show a strong positive correlation between the tax policy variables and executive compensation. As is clear from the bin-scatterplots, there exist outliers in terms of the tax policies that may be driving the estimated coefficients. Specification (2) of Appendix Table 8 presents estimates after eliminating executives in the top and bottom bins in terms of BONUS and DPAD. The policy effects remain large and statistically significant.

7 Dynamic Analysis

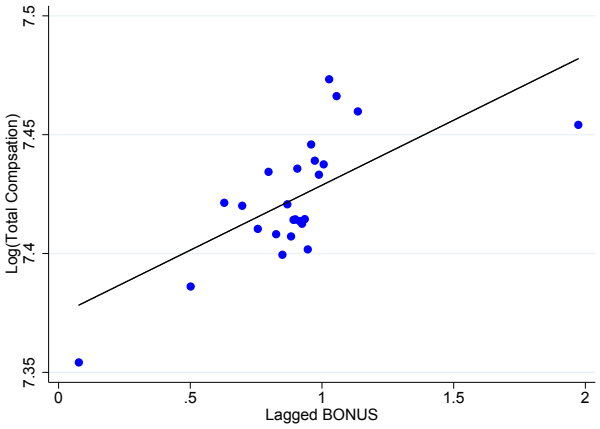
A key concern is that the estimated effects of the tax breaks on executive compensation may be an artifact of trends between treated and control groups rather than direct results of the tax policies. To address this concern, I present a graphical dynamic analysis of the effect of each policy on executive compensation. To begin, I estimate how executive compensation differs across industries that invest in long versus short-lived assets in each year, 1998 to 2012 via the estimation equation

$$\text{Log(Compensation)}_{i,t} = \beta_0 + \sum_{k=1998}^{2012} (\beta_k[(1-z_0)\tau I(k)]) + \beta_1[DPAD_{j,a,t}] + \gamma \mathbf{X}_{i,f,t} + \nu_t + \mu_f + \varepsilon_{i,t} \tag{2}$$

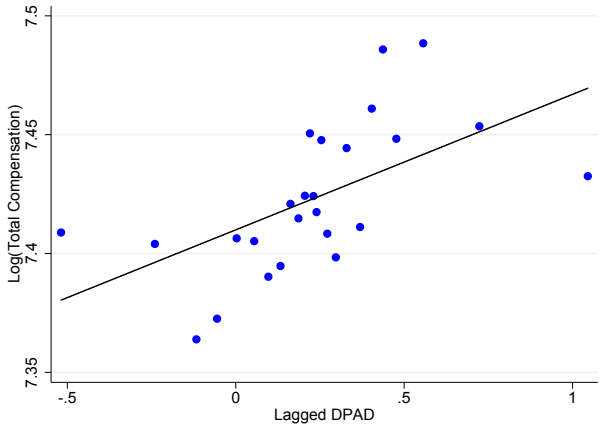
where $(1-z_0)\tau$ measures the extent to which a firm may benefit from bonus depreciation (it is larger for executives in industries that investment in longer-lived assets) and $I(k)$ is an indicator

Figure 2: Effect of Tax Policy on Executive Compensation; Binscatter Graphs

(a) BONUS



(b) DPAD



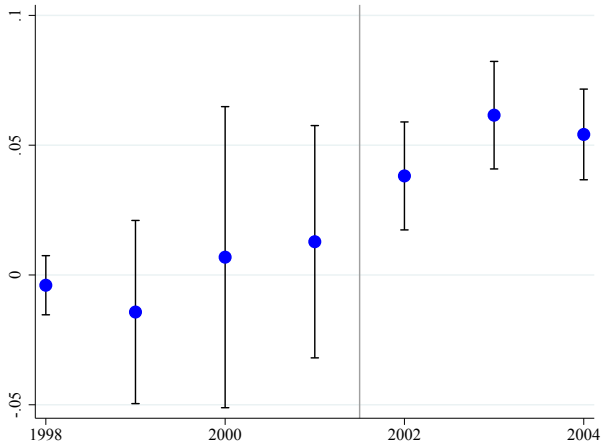
Notes: The bin-scatterplots in Figure 2 show average residualized log of Total Comp Awarded for 30 equal sized executive of BONUS (in Panel (a)) and DPAD (in Panel (b). The outcome variable has been residualized to exclude the effects of all firm, executive, and tax policy control variables as well as year and firm fixed effects. The resulting relationships and linear predictions (based on un-binned data) correspond to the BONUS and DPAD estimates from Specification (4) of Table 3.

equal to 1 in year k. The coefficients β_{1998} – β_{2012} describe the relationship between executive compensation and long-lived investment in each year. If, in fact, bonus depreciation affects executive compensation, then the differences in executive compensation, as measured by β_{1998} – β_{2012}, should be larger in years when bonus depreciation in turned on relative to when it is turned off as these are the years when firms that invest in long-lived assets benefit relative to firms that invest in short-lived assets due to the policy.

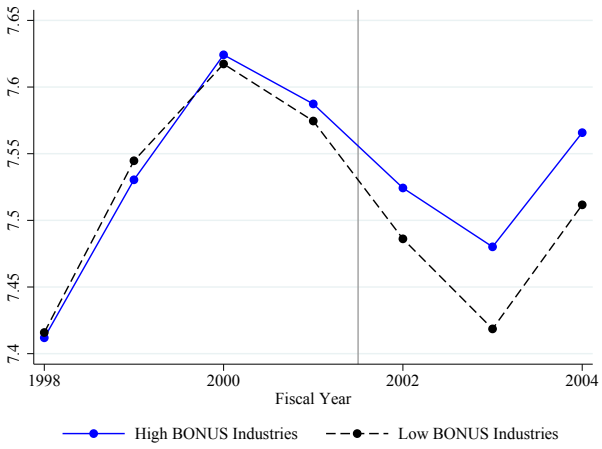
I begin by analyzing the first episode of bonus depreciation (2002 to 2004) in Panel (a) of Figure 3. I plot the β_{1998} – β_{2004} coefficients after setting the average coefficient from years 1998–2001 to zero to eliminate the effect of level differences across firms according to z_0 in non-bonus years. The vertical bands represent 90% confidence intervals. Panel (a) shows that in years prior to 2002, the effect of BONUS on executive compensation is zero (or stable), meaning that there are no pretrends that might drive the baseline estimates. However, in years 2002 – 2004, as bonus is turned on and increased from 30 to 50%, the coefficients increase. That the coefficients jump upon policy impacts suggests a causal relationship between bonus depreciation and executive compensation. For scale, Panel (b) presents a trends in the Log of Total Comp Awarded and then the trend plus the coefficients. The two lines show how executive compensation in High BONUS Industries evolves relative to Low BONUS Industries and differences in the trends pre- and post-2002 represent a graphical equivalent of the difference-in-differences estimation strategy. The graphical difference-in-difference shows a clear effect of bonus depreciation on executive compensation.

Figure 3: Effect of Bonus Depreciation on Executive Compensation

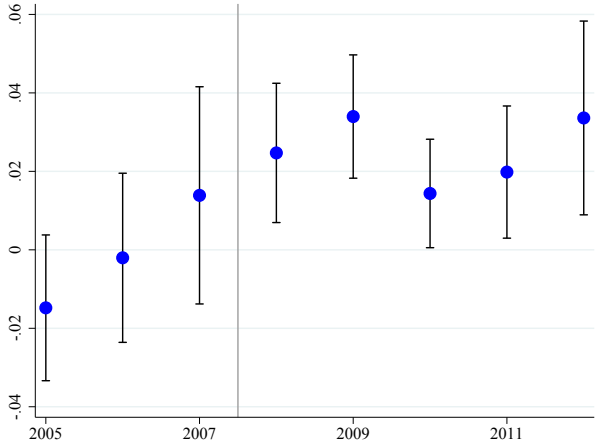
(a) BONUS Coefficient, First Episode



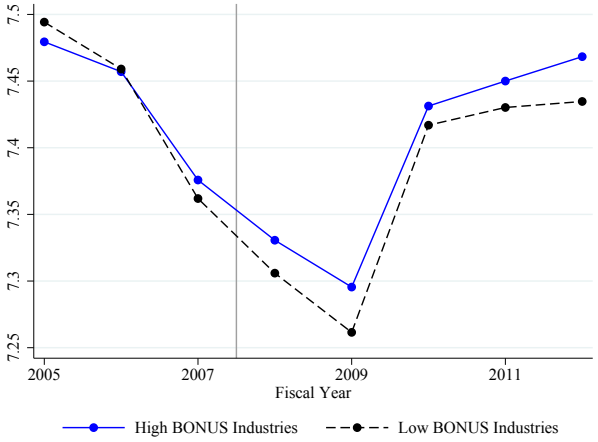
(b) Comp Trend + Coefficients, First Episode



(c) BONUS Coefficients, Second Episode



(d) Comp Trend + Coefficients, Second Episode



Notes: Figure 3 presents a graphical dynamic analysis of the effect of bonus depreciation on executive compensation. To begin, estimates of $\beta_{1998} - \beta_{2012}$ from a regression in the form of (2). Panel (a) plots coefficients $\beta_{1998} - \beta_{2004}$ after the average coefficient from years 1998–2001 has been normalized to zero. Vertical bands represent 90% confidence intervals. Panel (b) presents the trend in the Log of Total Comp Awarded and the trend plus the coefficients. These lines represent trends in average executive compensation for Low BONUS (the trend) and High BONUS (the trend plus coefficients) industries. Comparing the trends before and after bonus depreciation implementation in 2002 represented a graphical equivalent of the difference-in-differences estimation strategy. Panels (c) and (d) repeat the Panel (a) and (b) procedure for years 2005–2012 after coefficients in years prior to 2008 are normalized to zero.

Panels (c) and (d) repeat the procedure using the $\beta_{2005} - \beta_{2012}$ coefficients and normalizing coefficients in years 2005–2007 to zero. Here, again, we see that adjusted 2005–2007 coefficients (those years with no bonus depreciation) are equal to zero and coefficients in years 2008 to 2012 are positive. Again, the increase in coefficient upon policy impact suggests bonus depreciation has

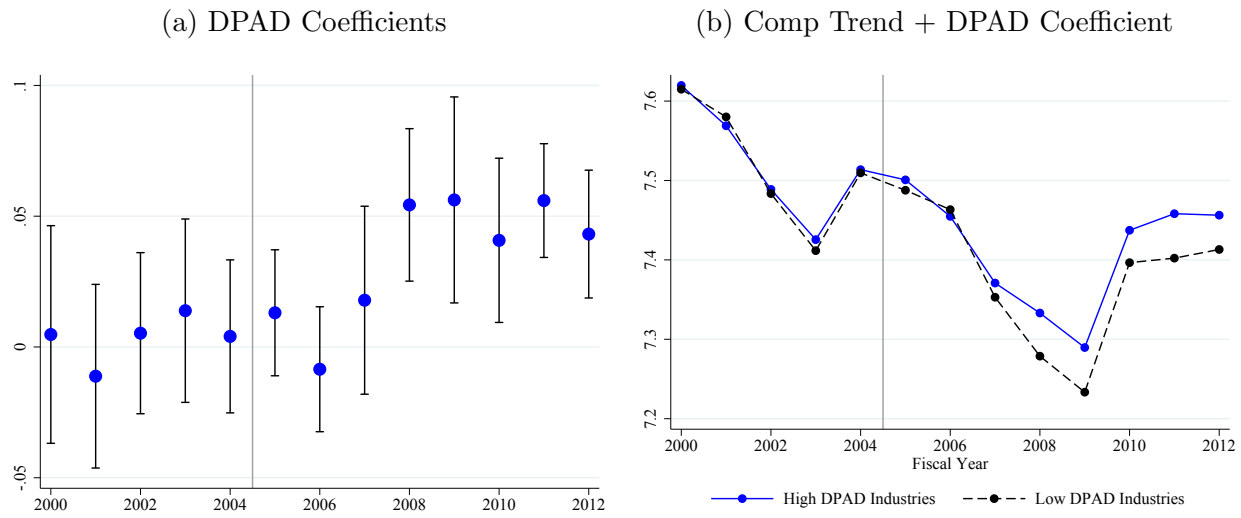
a large and positive effect of executive compensation. Unlike in Panel (a) there is visual evidence of a slight pretrend during the years 2005–2007. Although all three coefficient are not statistically different from one another, they are increasing. This, however, is likely due to momentum effects created by the increases in compensation driven by the first episode of bonus.

I analyze the dynamic effects of the DPAD on executive compensation in a similar manner. First, I estimate how executive compensation differs across QPAI% in each year 1998–2012 by estimating coefficients from a regression of the form

$$\text{Log(Compensation)}_{i,t} = \beta_0 + \sum_{k=1998}^{2012} (\beta_k [] \text{QPAI\%}_{j,a} I(k)]) + \beta_1 [BONUS_{j,t}] + \gamma \mathbf{X}_{i,f,t} + \nu_t + \mu_f + \varepsilon_{i,t} \tag{3}$$

where QPAI% is the industry-size cell average percent of income receives the DPAD deduction. If the DPAD affects executive compensation, then the β_k coefficients should be larger after DPAD has been implemented and scaled.

Figure 4: Effect of the DPAD on Executive Compensation



Notes: Figure 4 presents a graphical dynamic analysis of the effect of the DPAD on executive compensation. To begin, estimates of $\beta_{1998} - \beta_{2012}$ from a regression in the form of (3). Panel (a) plots coefficients $\beta_{1998} - \beta_{2012}$ after the average coefficient from years 1998–2004 has been normalized to zero. Vertical bands represent 90% confidence intervals. Panel (b) presents the trend in the Log of Total Comp Awarded and the trend plus the coefficients. These lines represent trends in average executive compensation for Low DPAD (the trend) and High DPAD (the trend plus coefficients) industries. Comparing the trends before and after bonus depreciation implementation in 2005 represented a graphical equivalent of the difference-in-differences estimation strategy.

Panel (a) of Figure 4 presents coefficients $\beta_{1998} - \beta_{2012}$ after the coefficients have been normalized such that the average coefficient in years prior to 2005 is equal to zero. The coefficients are not statistically different from zero in years 1998–2004 suggesting differences in pretrends across

executive according to QPAI% are not present. In years 2005 –2007, coefficients continue to be statistically insignificant. However, in years 2008–2012, once the DPAD has been in place for several years and has been scaled to 6% and then 9%, the coefficients are statistically different from zero. The lag between policy implementation and differentials in executive compensation is likely due to three factors. First, the deduction rate was small is years 2005 and 2006. Second, due to uncertainty and complexity of the policy, very few firms claimed the deduction in early years (Lester and Rector (2016) shows the percent of corporate tax filers claiming the deduction doubled between 2005 and 2007.). Finally, bargaining for higher compensation may take time.

Despite the delayed response of executive wages to the DPAD, the estimates presented in Panel (b) demonstrate a significant increase in the compensation of executives in High DPAD Industries relative to Low DPAD Industries once the policy was in place and scaled. In sum, the dynamic analysis suggests (1) that executive salaries did not cleave in ways that would invalidate the empirical analysis in the pre-period of either policy and (2) that the two tax breaks had a substantial effect on executive compensation.

8 Heterogeneity in Cash Flow Effects

To further validate the empirical results presented thus far and to begin to understand the mechanisms behind the executive compensation response to the tax breaks, I now explore heterogeneity in the effects of the two policies according to the cash flows they generate. To do this I add two interaction terms to the baseline model. The first term is an interaction between the lagged value of BONUS and the indicator High CAPX. I add this interaction term because the magnitude of the cash flows generated by bonus depreciation depend not only on the type of asset a firm invests in (long or short-lived) but also the amount of investment the does; the policy generates more near term cash flows for firms that invest more. Specification (1) of Table 4 include this interaction. The coefficient on the interaction term is large and positive indicating that the effect of bonus on executive compensation is concentrated among executives in firms that do lots of capital investment and receive larger cash flows as a result of the policy. The BONUS coefficient is no longer positive or statistically significant meaning there is not effect for execs at firms that do not receive large inflows of cash. The magnitude and precision of the DPAD coefficient in Specification (1) decreases but this may be due to the smaller sample size resulting from one third of firms with medium levels of capital expenditures.

Specification (2) replaces the BONUS, High CAPX interaction term with an interaction between DPAD and High Taxable Income. Now the DPAD interaction term is large and positive while the point estimate on the original DPAD coefficient is negative not statistically different from zero. This result again indicates that the effects of the DPAD on executive compensation are the result of the cash flows generated by the policy.

Table 4: Heterogenous Effects of Tax Policy by CAPX, Taxable Income

	(1) Ln(Total Comp)	(2) Ln(Total Comp)	(3) Ln(Total Comp)
Lagged BONUS	-0.00690	0.0458***	-0.00745
	(0.0153)	(0.00791)	(0.0159)
Lagged DPAD	0.0446**	-0.00569	-0.0123
	(0.0196)	(0.0169)	(0.0192)
BONUS × High CAPX	0.0403***		0.0441***
	(0.00821)		(0.0104)
High CAPX	0.0272		0.0717
	(0.0462)		(0.0872)
DPAD × High Taxable Income		0.0548**	0.0799***
		(0.0222)	(0.0299)
High Taxable Income		0.0449*	0.0290
		(0.0254)	(0.0321)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Observations	73199	54435	39666
Adj. R2	0.118	0.126	0.131

Notes: Table 4 presents coefficient estimates from regressions in the form Specification (4) from Table (3) but now add interactions between BONUS and High CAPX in Specifications (1) and (3) and DPAD and High Taxable Income in Specifications (2) and (3). The outcome variable in all specifications is the log of Total Comp Awarded. All specifications include controls and firm and year fixed effects. Standard errors are presented in parentheses and are clustered at the IRS industry-level. Standard errors are presented in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Specification (3) adds both the BONUS and DPAD interaction terms to the baseline model. The estimates echo those presented in Specifications (1) and (2) and suggest that the effect of the policy is due to the cash flows generated by the tax policies. In addition to suggesting that the mechanism by which executive compensation increases hinges on the cash effects of these policies, these heterogeneous results are hard to reconcile with alternative industry-by-time shocks to compensation and further validate the study's design.

9 Alternative Compensation Measures

An additional way to explore the mechanisms by which tax breaks increase executive compensation is to estimate the effects of the policies on alternative measures of compensation. Table 5

re-estimates baseline coefficients for three different compensation measures. The outcome in Specification (1) is the log of Total Current (the sum of salary and bonus). The outcome variable in Specification (2) is the log of Total Non Current (total compensation minus salary and bonus). The outcome variable in Specification (3) is the log of Total Comp Realized. Interestingly, the Specification (1) and (2) results suggest BONUS affects current compensation (salary and bonus) while the DPAD increases compensation only through non-current means (stock grants, options, incentive plans). A possible explanation for these alternative channels is the differing nature of the two policies. Bonus depreciation generates cash in the near term by allowing firms to write off investment costs now instead of in the future. While this creates more cash now, it also creates higher taxes and less cash later. The DPAD, on the other hand, generates cash flows that are not reclaimed later. Therefore, executives bargaining over cash flows created by bonus may want to take the money and run while executives bargaining over proceeds from the DPAD may happily accept compensation contingent on future cash flows.

Table 5: Effect of Tax Policy on Alternative Compensation Measures

	(1)	(2)	(3)
	Ln(Current)	Ln(Non Current)	Ln(Total Comp 2)
Lagged BONUS	0.0332***	0.0310	0.0491***
	(0.00717)	(0.0216)	(0.00970)
Lagged DPAD	-0.00270	0.100***	0.0599**
	(0.0141)	(0.0326)	(0.0233)
Year FE	✓	✓	✓
Firm FE	✓	✓	✓
Controls	✓	✓	✓
Observations	117371	115808	117371
Adj. R2	0.144	0.0403	0.151

Notes: Table 5 presents coefficient estimates of the effect of BONUS and DPAD on executive compensation from a regression in the form of (1). The outcome variable in Specification (1) is the log of Total Current (the sum of salary and bonus). The outcome variable in Specification (2) is the log of Total Non Current (total compensation minus salary and bonus). The outcome variable in Specification (3) is the log of Total Comp Realized. All specifications include controls and firm and year fixed effects. Standard errors are presented in parentheses and are clustered at the IRS industry-level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The Specification (3) results suggest both policies have large effects on Total Comp Realized in addition to Total Comp Awarded. The results suggests that while the DPAD effects executive compensation exclusively through non-current compensation methods, the DPAD continues to affect realized, not just awarded income.

10 Heterogeneity by Executive Position / Firm Governance

As a final exercise in exploring the mechanisms by which the tax breaks increase executive compensation and validating the identification strategies employed in this study, this section tests whether the effects of the tax breaks are concentrated among executives that may have mor bargaining power or among firms that are more poorly governed. To do this, I interaction the tax policies variables with the Director indicator in Specification (1), with the Large Holder indicator in Specification (2), and with the Strong Gov Indicator in Specificaiton (3). Table 6 presents the results.

Specification (1) shows some evidence that compensation responses to the DPAD are concentrated among exectutives that sit on the board of directors and and therefore arguably have more ability to capture rents from the firm.

Specifications (2) and (3) show the effects of the DPAD on total compensation is limited when firms have a large institutional shareholder or a strong goverance score. Effects of bonus depreciation on compensation do not seem to be mitigated among these groups of firms.

Table 6: Heterogeneity in the Effect of Tax Break by Executive Position

	(1) Ln(Total Comp)	(2) Ln(Total Comp)	(3) Ln(Total Comp)
Lagged BONUS	0.0202**	0.0387***	0.0315***
	(0.00920)	(0.0117)	(0.0102)
Lagged DPAD	0.0245**	0.0653**	0.0566***
	(0.0119)	(0.0257)	(0.0181)
BONUS × Director	0.0154***		
	(0.00341)		
DPAD × Director	0.0150*		
	(0.00857)		
BONUS × Large Holder		-0.00292	
		(0.00791)	
DPAD × Large Holder		-0.0608***	
		(0.0214)	
BONUS × Strong Gov			-0.00637
			(0.00728)
DPAD × Strong Gov			-0.0301**
			(0.0148)
Controls	✓	✓	✓
Exec FE	✓		
Firm FE		✓	✓
Year FE	✓	✓	✓
Observations	109857	64124	65970
Adj. R2	0.0255	0.127	0.138

Notes: Table 6 presents coefficient estimates from regressions in the form Specification (4) from Table (3). Specifications (1) includes interactions between BONUS and DPAD with the Director indicator. Specification (2) includes interactions between BONUS and DPAD with the Large Holder. Specification (3) includes interactions between BONUS and DPAD with the Strong Gov. All specifications include controls and firm and year fixed effects. Standard errors are presented in parentheses and are clustered at the IRS industry-level. Director, Large Holder, and Strong Governance Coefficients have been suppresses for brevity. Standard errors are presented in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

11 Discussion

I now discuss the results from this study in three ways. First, I use the estimated elasticities to compare the dollar magnitude of the tax breaks to the resulting dollar magnitude in the increase in executive compensation. Second, I compare the percentage increase in top 5 executive compensation created by the tax breaks to the percentage increase in average compensation they create. To do this, I rely on a subsidiary analysis in which I apply essentially the same estimation strategy to Current Population Surveys' Annual Earnings File (often referred to as the Merged Outgoing Rotation Groups or MORG) data on earnings, hours, wages, and employment representing all workers in the U.S. Third, I discuss how the results presented herein (1) relate to theories explaining the meteoric rise in executive compensation in the U.S. over the last 35 years, (2) predict the response of executive compensation to the Tax Cuts and Jobs Act of 2017, and (3) constitute a new channel by which decreases in corporate income taxes may exacerbate income inequality.

11.1 Results Magnitude

To better understand the magnitude of the estimates elasticities (focusing on those from Specification (4), Table 3), I now relate the dollar value of cash flows created by each of the tax breaks to the dollar value increase in top 5 executive compensation for the average firm in the sample. I begin with bonus depreciation.

The average firm in the sample does \$314 million dollars of investment per year. Therefore, a one percentage point decrease in the (present value) price of capital expenditure due to bonus depreciation increases the (present value) of firm cash flows by \$3.14 million. This same one percentage point decrease in investment costs via bonus increases each top 5 compensation package at the firm by 4.37%. The average top 5 compensation package is \$2.7 million dollars per year so the one percentage point decrease in investment costs increases the average executive compensation package by \$0.118 million or \$118,000 ($= 0.0437 \times \$2.7$ million). Total top 5 compensation in the average firm increases by \$0.59 million or \$590,000 or simply by five times as much as for the average executive. So, \$0.59 of each \$3.14 million or 18.8% of the (present value) of all cash flows generated by bonus deprecation goes to top 5 executives in large, publicly traded corporations.[4]

The symetric calculation for the DPAD returns a surprisingly similar result. The average firm reports taxable income of \$180 million per year (for those reporting positive taxable income). Therefore, a one percentage point decrease in a firm's effective tax rate via the DPAD increases after-tax cash flows by \$1.8 million dollars per firm. This one percentage point decrease in effective tax rates increases the value of the average top 5 compensation package by 3.8%. On a base value of \$2.7 million, that increase equates to \$0.1026 million or \$102,600 per top 5 executive and \$0.513

[4]Notice, due to nature of bonus depreciation, the benefits of the policy can only be measured in present value terms. The reason is that bonus depreciation simply moves tax shields – and therefore after-tax income – forward in time; the policy does not increase nominal cash flows.

million or $513,000 for all 5 top executives. So, $0.513 million of each $1.8 million or 28.8% of all cash flows generated by the DPAD goes to top 5 executives at large, publicly traded corporations.

That approximately of every dollar created by the tax breaks goes directly into the pockets of top 5 executives would suggest that (1) top executives have substantial bargaining or wage-setting power and (2) that the tax breaks may increase income inequality among workers within a firm. This second result may not be the case if non top 5 executives at firms benefiting from bonus depreciation and the DPAD also experience substantially increases in pay. In the next subsection, I explore whether and to what extent the average worker in the U.S. benefits from the these tax breaks.

11.2 Effects of Tax Breaks for the Average U.S. Worker

To investigate the effects of bonus depreciation and the DPAD on the average U.S. worker, I rely on data from the CPS MORG data which provides earnings, hours, wage, and employment data for approximately 25,000 adults each month.[5] I link BONUS and DPAD to MORG data at the industry and time level.[6]

I examine four outcomes: the log of weekly earnings, the log of weekly hours, the log of wages where the wage is either the stated hourly wage or weekly earnings divided by weekly hours for salaried employees, and an indicator for whether the individual is employed.[7] I limit the sample to men and, in examining the earnings, hours, and wage data, I limit the men working at least 29 hours per week. Controls for education, marital status, race, age, and age-squared as well as industry and year fixed effects as added to each regression. Table 7 presents the results of the exercise.

The CPS MORG results show BONUS has a positive effects of weekly earnings; a one percentage point increase in BONUS increases weekly earnings by just under 1% (0.97% to be precise). However, this result seems to be coming most via hours worked – which increase by 0.597% in response to the policy – instead of through increases in wages which are unaffected. A one percentage point increase in BONUS also seems to increase employment by approximately 1%. While bonus depreciation affects earnings for the average U.S. worker, the effect for the average worker are significantly smaller in magnitude than the effect of the tax break on executive compensation.

Estimates of the effect of the DPAD suggest a marginally significant and small response on the

[5] From the National Bureau of Economic Research: "Every household that enters the CPS is interviewed each month for 4 months, then ignored for 8 months, then interviewed again for 4 more months. Usual weekly hours/earning questions are asked only at households in their 4th and 8th interview. These outgoing interviews are the only ones included in the extracts. New households enter each month, so one fourth the households are in an outgoing rotation each month."

[6] Because the size of the firm at which respondent work is not listed, I cannot use firm-size variation in the construction of the DPAD variable used in this analysis.

[7] A caveat in estimating the effect on employment using industry-level policy variation is that it the industry categorization for unemployed respondents is imperfect because, of course, they do not have an industry.

Table 7: Effect of Tax Breaks on Average U.S. Wages, Hours, Employment

	(1) Log(Earnings)	(2) Log(Hours)	(3) Log(Wage)	(4) Employed %
BONUS	0.00970**	0.00597***	0.00396	0.00937**
	(0.00486)	(0.00227)	(0.00580)	(0.00471)
DPAD	-0.0000904	0.00320*	-0.00339	0.000916
	(0.00625)	(0.00175)	(0.00569)	(0.00151)
Observations	1283212	1249822	1248136	1772209
Adj. R2	0.322	0.0247	0.258	0.0316
Controls	✓	✓	✓	✓
Hours/Week	≥ 29	≥ 29	≥ 29	
Year FE	✓	✓	✓	✓
Industy FE	✓	✓	✓	✓

Notes: Table 7 presents estimates of the effect of BONUS and DPAD on the log of weekly earnings, log of weekly hours, log of hourly wage, and an employment indicator from CPS MORG data. Specifications include controls for education, marital status, race, age, and age-squared as well as industry and year fixed effects. All specifications limit the analysis to men. Specifications (1)–(3) limit the analysis to workers working at least 29 hours per week. Standard errors are presented in parentheses and clustered at the IRS industry level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

margin of hours worked but no response in terms of earnings, wages, or employment. Given no earnings or wage response to the DPAD, the estimated effect of the policy on the compensation seems to be concentrated among top executives.

Of course, the average worker in the CPS data does not work for a large, publicly traded corporation so comparing these results to those presented in Table 3 should be made with some caution. In making the comparison two points are important. First, prior research has shown use of the DPAD is concentrated among large publicly traded firms (Lester and Rector (2016)), as a result, the estimates here may underestimate the response of earnings by the average worker to the policy. The responsiveness of firms to bonus depreciation, on the other hand, has been shown to be concentrated among smaller firms (Zwick and Mahon (2017)) so the estimate here may be larger than in publicly traded firms. Second, because these results represent the effect of the policies on the average worker and because executives are, in principle, included in the survey, these estimates are inflated relative to elasticities that represent the effect of the policies on non-executive workers. Based on these caveats, it seems comparing the effect of BONUS on executive vs. average compensation will not overstate the magnitude of the executive to average response rate.

The baseline estimate of BONUS on executive compensation is 0.0437 while the estimate on average earnings is 0.0097 meaning the percentage effect of the tax break on executive compensation is 4.5 times larger than the percentage effect on the average worker. Therefore, while some of the

cash flows generated by tax breaks go straight to employees, the benefits are disproportionately showered on those at the extreme top end of the income distribution.

11.3 Implications

Determinants of Executive Compensation The level and rate of increase in executive compensation in the U.S. over the last 40 years is staggering. In 2014, the median S&P 500 CEO earned $10.1 million per year in total compensation. This sum represents a sixfold increase in pay since 1980 and is 335 times higher than the annual income of the average U.S. worker (Edmans et al. (2017)). These impressive numbers have led to a healthy debate regarding the determinants of executive pay. While some have argued that executive pay is simply the efficient outcome of a labor market in which firms optimally compete for managerial talent (Rosen (1981), Kaplan and Rauh (2009), Kaplan and Rauh (2013)), others contend that executive pay represents a form of rent extraction and that the level and structure of pay are decided by the executives themselves (Bertrand and Mullainathan (2001), Bebchuk et al. (2002), Bebchuk and Fried (2003)). On the one hand, the results presented herein may support the shareholder value view. Lower effective corporate tax rates increase the after-tax returns to the firms and therefore the potential value that executives can create. Additionally, increased after-tax cash flows may increase the demand and price of executive talent. On the other hand, the fact that compensations increases when executives did nothing to increase firm performance and that the effect of the policies is concentrated among directors and at firms with weaker governance structures supports the rent extraction view.

Effects of the Tax Cuts and Jobs Act of 2017 The two hallmark corporate tax provisions of the Tax Cuts and Jobs Act of 2017 – at least on the domestic side – are a lower statutory corporate income tax rate and immediate expensing through 2022. As the DPAD constitutes an effect corporate tax rate cut, and immediate expensing is equivalent to 100% bonus depreciation, studying the effects of bonus depreciation and the DPAD in the recent past can help in predicting the effect of the TCJA on executive compensation. Extrapolating the results from this study, the TCJA will increase executive compensation substantially, likely without an accompanied wage or earnings response for the average U.S worker.

Corporate Income Taxation and Income Inequality Recent empirical work based on U.S. and German data has shown that workers bear a significant burden of corporate income taxation (Suárez Serrato and Zidar (2016) and Fuest et al. (2018)). An implication of these papers is that decreasing the effective corporate income tax will lift wages for corporate employees, including for executives. Even more directly related, Nallareddy et al. (2018) shows that cuts in state corporate income tax rates increase incomes at the top but not the bottom of the income distribution, leading to increased income inequality.

The results of this study show that while average wages may increase, total compensation rises disproportionately for high income executives. As a result, corporate tax break constitute a newly discovered mechanism to by which within firm income inequality may increase. Kline et al. (2017) and Piketty et al. (2014) present evidence of alternative mechanisms. Kline et al. (2017) shows that within firm returns to innovation are dispropotitonately concentrated among high income earnings. Piketty et al. (2014) shows that when personal income tax rates are lowered, executives may bargain harder for rents, increasing inequality.

The remainder of the paper is organized as follows. Section 2 provides further details on bonus depreciation and the DPAD. Sections 3 and 4 present data sources, data definitions, and descriptive statistics. I outline the estimation strategy in Section 5. Baseline estimates are presented in Section 6. Section 7 presents a dynamic estimation of each policy on executive compensation. Tests for heterogeneity in the effect of each policy according to their firm-level cash flow effects are presented in Section 8. Section 9 breaks down the effect of each policy by the type of compensation, salary and bonus or stock and incentives. In Section 10, I show that the effect of each tax break is concentrated among executives with more scope for rent capture. I discuss the magnitude of the estimated effects, relate the findings to the effect of the policies on average U.S. wages and earnings, and consider how the results relate to our understanding of the determinants of executive compensation in Section 11. Section12 concludes.

12 Conclusion

This is the first study to measure the effect of corporate tax breaks – in the form of accelerated depreciation or reductions in effective income tax rates – 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; 13.5 cents of every present value dollar generated by accelerated depreciation and 19.5 cents of every dollar generated by a cut in the effective income tax rates goes directly into the pocket of C-suite executives. These benefits are concentrated among executives that are likely to have more bargaining power: those sitting on the board of directors or those sitting on the firm's compensation committee. Additional analysis suggests similar increases in earnings do not accrue to the average U.S. employee and as a result, that corporate tax breaks increase inequality, even among the income of employees at the same firms.

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Appendix A Alternative Specifications

Table 8: Effect of Tax Policy on Executive Compensation; Alternative Specifications

	(1) Ln(Total Comp)	(2) Ln(Total Comp)
Lagged BONUS	0.0273***	0.0284**
	(0.0100)	(0.0130)
Lagged DPAD	0.0315**	0.0887***
	(0.0138)	(0.0286)
Year FE	✓	✓
Exec FE	✓	
Firm FE		✓
Trimmed		✓
Observations	109857	105162
Adj. R2	0.0109	0.113

Notes: Table 8 presents coefficient estimates of the effect of BONUS and DPAD on executive compensation from a regression in the form of (1). The outcome variable in all specifications is the log of Total Comp Awarded. Specification (2) includes firm-level controls. Specification (3) includes firm-level and executive-level controls. Specification (4) includes firm-level and executive-level controls as well as ETI. All specifications include firm and year fixed effects. Standard errors are presented in parentheses and are clustered at the IRS industry-level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$