Corporate Taxes and the Wage Distribution: Effects of the Domestic Production Activities Deduction

Christine Dobridge
Board of Governors,
Federal Reserve System

Paul Landefeld
Joint Committee on Taxation

Jacob A. Mortenson[†]
Joint Committee on Taxation

September 2019

Abstract

This paper investigates how corporate tax changes affect workers' wages. To identify the effect, we use a unique dataset of U.S. worker-level W-2 filings matched with corporate tax returns and study the implementation of the Domestic Production Activities Deduction (DPAD). We find a corporate tax rate reduction has a substantial effect on the distribution of within-firm wages. Wages of workers at the top of their firm's wage distribution rise relative to those at the bottom of the distribution. We estimate a semi-elasticity of average wages of 1.1 with respect to the DPAD marginal tax rate reduction, while the change in the median wage is small and statistically insignificant. Furthermore, we estimate a semi-elasticity of 1.0 at the 95th percentile of workers' wages and 2.5 at the 99th percentile. These results are especially pronounced for small firms. Looking at overall employment effects, we see no change overall, but the number of employees rises at small firms and declines at large firms. Our findings have implications for the progressivity of the U.S. tax code and for analyzing the effect of tax policy on the U.S. income distribution.

[†]Corresponding author: Jake.Mortenson@jct.gov

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1. Introduction

This paper studies how corporate income tax changes affect average wages paid within a firm, the wage distribution within a firm, and overall firm employment. The relative effect of corporate taxes on capital and labor incomes is a fundamental question in economics and remains an on-going subject of academic and public discussion. This question of the relationship between corporate taxes and wages was at the forefront of debate on the 2017 tax legislation—the law commonly referred to as the Tax Cuts and Jobs Act of 2017 (TCJA)—which reduced the highest marginal corporate tax rate from 35 percent to 21 percent.[1]

We contribute to the body of empirical work on the incidence of business taxation on workers' wages by studying implementation of the U.S. Domestic Production Activities Deduction (DPAD), in effect from 2005 to 2017. This policy is one of the few sources of variation in marginal tax rates faced by U.S. corporations prior to enactment of the TCJA; it provided taxpayers with up to a 9 percent deduction for net income from certain qualifying activities significantly related to domestic production.[2] To study the effect of this tax change on wages, we create a novel, matched employer-employee dataset, linking the universe of worker-level W-2s filings with corporate tax returns of public and private corporations. These data allow us to analyze the effects of the DPAD on aggregate measures of wages across firms as well as the distribution of wages within a firm. In particular, the granularity of this matched dataset allows us to estimate the semi-elasticity of worker wages for different points along the within-firm wage distribution, which has implications for the overall incidence of the deduction and the degree of progressivity embedded in the corporate income tax.

To quantify the effects of the DPAD policy, we use corporate tax filing data and calculate a firm's marginal corporate tax rate reduction resulting from the DPAD. We use an instrumental variables strategy that exploits natural variation in exposure to the DPAD by firm industry and size to address endogeneity of the DPAD rate reduction and employment decisions, building on work by Ohrn (2018a, 2018b). Our identification strategy also takes advantage of the staggered implementation of the deduction over time as well as the statutory income limitation of the deduction amount.

[1] Public Law 115-97 is officially titled "An Act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018."
[2] Lester and Rector (2016) provide a history of the deduction as well as detailed statistics on the type of firms that take advantage of this tax benefit.

We first study the effect of the DPAD marginal tax rate reduction on average firm wages and on wages at various points in the within-firm wage distribution. We find the DPAD tax reduction resulted in a substantial increase in average firm wages and that the wage gains were particularly concentrated at the top of the wage distribution. Our results suggest that a one percentage point reduction in marginal tax rates due to the DPAD led to a 1.0 percent increase in average wages at the firm level. We find a much smaller impact, however, on the median wage, with an estimated semi-elasticity that is small and statistically insignificant. Looking more broadly across the within-firm wage distribution, we find a semi-elasticity of wages at the 1st percentile of -0.2, indicating a reduction in the corporate tax rate leads to a decline in wages at very bottom of the firm wage distribution. However, at the 75th percentile we find a semi-elasticity of 0.4. Wages at the top of the distribution are even more responsive; we find a semi-elasticity at the 95th percentile of 1.0 and a semi-elasticity at the 99th percentile of 2.5—more than double that at the mean.

As a result of rising wages at the top of the distribution, we find the tax reduction leads to a widening of the within-firm wage distribution overall. A one percentage point tax rate reduction due to the DPAD leads to a 0.9 percent increase in the ratio of wages paid to the 95th percentile of workers compared to the 5th percentile. The change is even more pronounced at the higher end. A one percentage point rate reduction leads to a 2.7 percent increase in the 99th/1st percentile wage ratio.

While a wide range of theoretical models predict that workers will bear at least some portion of the corporate tax burden, our finding that the wage response is concentrated in top earners is particularly consistent with models of individual wage bargaining (Fuest, Peichl, and Siegloch, 2018; Rogerson, Shimer and Wright, 2005).[3] In these models, workers with more bargaining power over rents within a firm—in our case, expected to be the higher earning workers—bear more of the corporate tax incidence. While such models predict heterogeneity across workers in response to tax cuts, a number of models also suggest we should expect heterogeneity across firms as well. To further investigate the mechanisms behind our result, we study the heterogeneous effects of the tax change across different types of firms. Analyzing the effects by firm size, for example, we find that these distributional effects are concentrated among smaller firms in our

[3] Fuest, Peichl, and Siegloch (2018) show how different wage-setting assumptions affect the theoretical predictions of corporate tax changes on workers' wages. Rogerson, Shimer and Wright (2005) provide a survey of job search models with bargaining between individual employees and firms over firm rents.

sample; the wage response is the largest for firm in the bottom quintile of employment size (i.e., firms with fewer than 60 employees). Individuals may be expected to have more bargaining power in small firms compared to large firms. The evidence is also consistent with models of firm monopsony power in setting wages, which predict that wages will rise less at firm with more market power in wage setting: we find smaller effects on wages for public firms in our sample across most of the distribution. In public firms, we find a statistically significant effect of the corporate tax cuts on wages only at the 99th percentile of the distribution.

Finally, we examine the DPAD's effect on overall firm employment. The within-firm wage distribution can change by paying workers differently or by hiring or firing workers. We do not find evidence that hiring workers at the low end of the wage distribution drives our results on the overall widening of the wage distribution. We find that new workers are most likely to be hired into the middle of the wage distribution following the corporate tax cut. Studying employment effects more broadly, we find no effect of the DPAD tax reduction on average firm employment but find substantial heterogeneity across firms: the number of employees rises at small firms and declines at large firms. Commensurate with this effect on employment, we also find that total wages rise at small firms and decline at large firms. Looking directly at investment responses, we do see evidence of capital-labor substitution for large firms, with investment increasing substantially in the highest-quintile of firm size. But we find no investment effect of the tax cut for small firms.

This is the first empirical paper to study how corporate tax changes affect the full wage distribution within a firm. We contribute to the literature on business tax incidence as well as the literature on drivers of U.S. income inequality, particularly effects within a firm. Work dating to Harberger (1962) finds that theoretical estimates of corporate tax incidence on labor depend importantly on assumptions about the labor intensity of production, the substitutability between capital and labor, and the international mobility of capital (Kotlikoff and Summers (1987); Harberger (1995); Gravelle and Smetters (2006)). Empirical work has faced challenges identifying the effect of corporate tax changes on wages due to the scarcity of exogenous variation in corporate tax rates.

Several recent papers address this problem by studying business tax incidence on workers using geographic and temporal variation in local business tax rates. Suárez Serrato and Zidar (2016) investigate the incidence of state tax cuts broadly, finding that workers bear between 30 and 35 percent of the incidence. Fuest, Peichl, and Siegloch (2018) use a unique administrative dataset of linked worker-employer data for German firms to assess the impact of reductions in municipality level business tax rates on worker wages and find that employees bear about half of the burden of the corporate tax. They find evidence of significant worker and firm heterogeneity in incidence, particularly that low-skilled workers, female workers, and young workers are the most impacted by the corporate tax. Ohrn (2018a) analyzes the DPAD and accelerated, "bonus" depreciation to determine the impact of business taxes on the compensation of top executives at publicly traded companies. He finds that about a fifth of these tax benefits accrue to firms' executives but finds no evidence of similar changes in the average wages and earnings of workers.[4] In contrast to these studies, we evaluate the effect of corporate tax changes on wages across the distribution within a firm and show there is substantial heterogeneity across the distribution.

This paper also contributes to the literature studying drivers of U.S. income inequality, particularly to recent work studying the role of within-firm wage changes.[5] Recent work by Song, Price, Guvenen, Bloom, and von Wachter (2018) shows that the majority of the increase in U.S. earnings inequality over time can be explained by growing inequality across firms, not within firms, and that most of the within-firm changes occur in very large firms. A growing literature highlights the importance of firm level-factors in worker compensation and shows how firm-level shocks are incorporated into compensation (i.e., Kaplan and Rauh (2013); Picketty, Saez and Stantcheva (2014); Card, Cardoso and Kline (2016); Barth, Bryson, Davis and Freeman (2016); Mueller, Ouiment, and Simintzi (2016, 2017); Card, Cardoso, Heining, and Kline (2018); Kline, Petkova, Williams, Zidar (2019); Lamadon, Mogstag and Setzler (2019); and Smith, Yagan, Zidar, and Zwick (forthcoming)). We contribute to this literature by exploring how corporate tax changes affect the U.S. within-firm wage distribution, highlighting the importance of taxes as a factor widening the wage distribution of small firms specifically. Relatedly, Nallareddy, Rouen, and Suárez Serrato (2018) study the effect of state-level corporate tax changes on state income inequality, finding that tax cuts increase inequality substantially at the local geographic level.

[4] Other notable empirical papers on corporate tax incidence include Desai, Foley and Hines (2007); Felix and Hines (2009); Hasset and Mathur (2010); Arulampalam, Devereux and Maffini (2012); Clausing (2013); Liu and Altshuler (2013).

[5] The ongoing rise in U.S. income inequality has been documented, for example, by Piketty and Saez (2003), Acemoglu and Autor (2011), and Saez (2017). Auten and Splinter (2019) challenge the view that overall U.S. income inequality has risen on an after-tax basis.

Finally, this work relates to other papers that finding substantial effects of the DPAD on corporate behavior as well as papers studying effects of corporate tax changes on employment and investment more generally. Lester (2018) investigates the impact of the DPAD deduction on firm employment and investment. She finds that large, publicly traded firms decrease employment while increasing investment, consistent with a labor-capital substitution effect. We find similar effects for the largest firms in our sample. Ohrn (2018a) also finds substantial effects of the DPAD on investment, payout policy and corporate debt. Blouin, Krull, and Schwab (2014) finds substantial effects of the DPAD on firm payout and Blouin, Fich, Rice, and Tran (2018) study the impact of the DPAD on corporate merger activity. Several recent papers study employment responses to state-level corporate tax changes including Giroud and Rauh (forthcoming), who find that state tax changes have substantial effects on establishment-level employment within a state and on the reallocation of resources across state borders. Ljungqvist and Smolyansky (2016) find that employment falls following tax rate increases but find little effect of state-level corporate tax cuts on local employment and income. Our work also complements the large literature studying corporate taxation and capital investment decisions—dating to Hall and Jorgenson (1967)—as we find the DPAD had substantial investment effects for large firms but little effect for small firms.[6]

2. The Domestic Production Activities Deduction

The domestic production activities deduction was instituted in 2004 as part of the American Jobs Creation Act (AJCA) and provided a 9 percent deduction for income related to domestic production meeting certain criteria. The deduction was repealed in 2017 as part of public law 115-97, commonly referred to as the Tax Cuts and Jobs Act (TCJA). When in force, the deduction was intended as a replacement for a number of export subsidies that were repealed by the AJCA in response to international pressure. In order to take advantage of the deduction, firms determined their domestic production gross receipts, which were receipts derived from property that was "manufactured, produced, grown, or extracted by the taxpayer in whole or in significant part within the United States."[7] Upon determining their level of domestic production gross receipts (DPGR), firms would allocate cost of goods sold and other expenses to those receipts to arrive at the net

[6] Recent empirical work includes House and Shapiro (2008), Edgerton (2010), Yagan (2015), Zwick and Mahon (2017), Dobridge (2018) and Xu and Zwick (2018).

[7] Section 199(c)(4)(A)(i)(I)

income concept of qualified production activities income (QPAI). The deduction amount was then determined by multiplying a taxpayer's QPAI by the statutory deduction rate which phased in from 3 percent to 9 percent between 2005 and 2010. This pattern of the phase-in is shown in Figure 1A. Upon full implementation of the policy, the deduction essentially resulted in a reduction in marginal tax rates faced by taxpayers of up to 3.15 percentage points.

In addition to regulations governing what qualifies as domestic production gross receipts, there were two other important limitations on the deduction amount. First, firms were limited in the deduction amount to 50 percent of the W-2 wages paid in relation to domestic production gross receipts. Secondly, the deduction amount was limited to 9 percent of taxable income calculated without regard to the DPAD. This latter restriction was binding for a large number of firms, particularly those in loss positions or those using a net operating loss carryforward. Lester and Rector (2016) document that nearly 40 percent of taxpayers were subject to one of these limitations.

The DPAD was important not only to individual firms as a relatively large reduction in the marginal rate faced, but was also important in the aggregate. Figure 1B plots the total amount of QPAI and the total amount of the deduction for all subchapter C corporations. Qualifying income peaked in 2007 at over $600 billion and was more than $450 billion in 2015, the final year of our sample. This led to deductions of nearly $35 billion in 2015, representing a 3.3 percent decline in aggregate net income among taxpayers filing form 1120 in that year.[8]

3. Empirical Strategy

We use the domestic production activities deduction to identify the effect of a change in marginal business tax rates on a number of firm-level behaviors. Our identification relies on three features of the domestic production deduction. First, the deduction was implemented in 2005 and the deduction rate was phased in over the subsequent four years, introducing time series variation in the value of the deduction. Second, due to the requirements for qualifying activities, certain types of industries and firms were better able to make use of the deduction than others. Finally, the taxable income limitation of the deduction resulted in some firms receiving a larger benefit than others.

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[8] This implies an average deduction rate of around 7.5 percent, lower than the statutory 9 percent reflecting the limitations on W-2 wages and, particularly, the taxable income limitation discussed earlier.

The tax policy variable of interest in this setting is the firm's percentage point reduction in the marginal corporate tax rate due to the deduction:

$$DPAD\_CUT_{it} = \left(\frac{DPAD_{it}}{TXBL\_INC\_PRE\_DPAD_{it}}\right) * \tau_{it} \quad (1)$$

The reduction in the marginal rate owing to the domestic production deduction is simply the amount of the deduction as a share of taxable income before the deduction times the marginal rate faced by the firm. Our baseline specification is:

$$\ln(w_{it}) = \beta_0 + \beta_1 DPAD\_CUT_{it} + \gamma\chi_{it} + f_i + y_t + \epsilon_{it} \quad (2)$$

We begin by estimating versions of equation (2) via OLS where $\ln(w_{it})$ are either the total wage bill of the firm or the average wage paid by the firm. We also analyze the extensive margin by performing similar regressions on the log of firm employment, giving us a more complete picture of the impact of the deduction. Here χ_{kt} are time-varying firm level controls, and f_i and y_t are firm and year fixed effects. We also estimate similar equations of the form:

$$\ln\left(w_{it}^{p}\right) = \beta_0 + \beta_1 DPAD\_CUT + \gamma\chi_{it} + f_i + y_t + \epsilon_{it} \quad (3)$$

The outcome wage variables are log wages as measured at various points in the wage distribution within each firm. For example, $\ln(w_{it}^{p1})$ is the log wage at the 1st percentile at firm i in year t and $\ln(w_{it}^{p99})$ is the log wage at the 99th percentile of that same firm. We estimate this specification for the 1st, 5th, 10th, 25th, 50th, 75th, 90th, 95th, and 99th percentiles of the within-firm wage distribution. These equations are similar to the approach of Fuest, Peichl, and Siegloch (2018) who use an event study design in which the dependent variable is the log median wage within a firm. They also estimate separate regressions using the median wage of high, medium, and low-skilled workers.

One issue that arises when using firm level values of the deduction is the endogeneity of the rate reduction attained by a firm, $DPAD\_CUT_{it}$ from equation (1). In particular, wages paid are generally deducted by the corporation, lowering the marginal tax rate due to the statutory corporate rate schedule. In addition, because the deduction amount is based on a net income concept, paying additional wages directly reduces the amount of the deduction. This relationship will bias against finding a positive relationship between the DPAD benefit and wages.[9] A second source of endogeneity is that treatment is not randomly assigned, but a decision made by the firm. To the extent that firms who choose to use the DPAD more heavily are also more likely to increase wages, this would bias our estimates upwards.

To address these sources of endogeneity we rely on the fact that certain industries and types of firms are more likely to be able to benefit from the DPAD than others. We generate firm-specific measures of the share of gross receipts that are classified as domestic production gross receipts (DPGR) and aggregate these for a number of industry-firm size-year cells.[10] These aggregate measures of the share of qualifying gross income are firm-specific in that we leave out the contribution of a given firm when calculating industry measures. In addition to these aggregate instruments, we also use a discontinuity in the structure of the deduction which limits the deduction amount to 9 percent of taxable income without regard to the deduction.[11] We use this as an additional firm level instrument to aid in identification.

Our first stage equation is then:

$$DPAD\_CUT_{it} = \alpha_0 + \alpha_1 DPAD\_PCT_t * DPGR\_SHARE_{ict} + \alpha_2 D_{it} + \rho\chi_{kt} + f_i + y_t + \upsilon_{kt} \quad (4)$$

where $DPGR\_SHARE_{ict}$ is the measure of the share of gross receipts that qualifies for the deduction within an industry-firm size-year cell ct. This is calculated ignoring the contribution of firm i. $DPAD\_PCT_t$ is the statutory deduction rate in year t, beginning at 0.03 in 2005 and increasing to 0.09 by 2010. D_{it} is a dummy variable for whether or not a firm is limited by the taxable income limitation. $DPGR\_SHARE_{ict}$, $DPAD\_PCT_t$, and D_{it} thus provide us with the industry-year specific, year specific, and firm-year specific sources of variation that allow us to perform our IV estimation. More details on the calculation of variables discussed here are found in Appendix A, including references to tax forms and line numbers.

[9] Note that this endogeneity is analogous the endogeneity of debt/interest expense and tax rates which is well documented in the corporate finance literature. See Graham, Lemmon, Schallheim (1998).

[10] These measures are similar to the proxy variables constructed by Ohrn (2018a) and Ohrn (2018b). Those papers instead rely upon the share of net income that is qualifying income, as measured by the share of QPAI in taxable income.

[11] Lester (2018) uses this variation as well, accounting for the use of net operating loss carryforwards in constructing treatment and control groups.

4. Data

We use two sources of tax data to create the merged employee-employer dataset for our analysis: form 1120 corporate tax return filings and form W-2 individual wage income filings. The corporate filings selected for the analysis were sampled as part of IRS' annual corporate tax return samples. The Statistics of Income Division (SOI) of IRS creates a stratified random sample of corporate tax returns each year (Statistics of Income, 2013). In our analysis, we make use of data from the corporate tax return form 1120 and associated schedules. In particular we make use of data from Schedule L, which includes balance sheet information on a GAAP basis, and form 8903, which taxpayers use to claim the DPAD.

To generate our corporate sample, we combine SOI samples for tax years 1999-2015 to create an unbalanced panel of corporations. We include only "C" corporations, which excludes pass-through and other entities.[12] We also exclude payroll agencies and firms who identify as being in the financial, insurance, or utility industries.[13] This results in an unbalanced panel of over 875,000 firm-year observations. Further requiring that firms are in the sample for at least two consecutive years in order to create control variables further reduces the sample to around 600,000 firm-year observations.

Our wage data come from Form W-2. The W-2 is an annual report of wages and deductions at the individual-employer level, filed by the employer, and contains the individual's and employer's taxpayer identification numbers. We access the population of these filings for the purposes of generating our match to corporate returns and exclude W-2s without the wage-equivalent of one quarter of full-time employment at minimum wage — $3,770 in 2015 — following Song et al. (2018).

We aggregate W-2s to the parent company level by first merging employer identification numbers (EINs) against the population of EINs found on virtually all relevant entity-level tax filings in corresponding years. Next, we link EINs of subsidiaries to the parent corporation using information on parent-subsidiary relationships. W-2s deemed to belong to a consolidated firm group are pooled at the parent level. The central data-related innovation of this paper is taking into

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[12] In particular this excludes taxpayers filing return types 1120-S, 1120-F, 1120-REIT, 1120-RIC, 1120-PC, and 1120-L.

[13] We also exclude firms whose industry is "Management of Companies" because inspection reveals that they are largely holding companies in the financial sector.

account these parent-subsidiary linkages when merging W-2s with corporate tax returns.[14] While Song et al. aggregate W-2s by employer identification number (EIN) as the measure of a firm, linking to the ultimate parent companies gives a broader perspective of the firm wage distribution. Large firms often have multiple EINs, some thousands of EINs, causing an EIN to be a poor proxy for many large firms. In 2015, using an EIN to proxy for a firm understates the number of corporations (those EINs associated with an 1120 filing or deemed to belong to a C-Corp) with 10,000 or more employees by more than 10 percent. Further, the average median wage of EINs belonging to corporations with more than 10,000 employees is $39,507 in 2015, while the analogous figure after aggregating EINs to the parent level is $42,635, an 8 percent difference.[15] In addition, many W-2s are issued by lower-tier corporate and non-corporate entities who do not directly claim the DPAD; we would miss these affected workers if aggregating only by EIN.

To finalize our analysis sample, we collapse the W-2 dataset to the parent level and merge with the unbalanced panel of corporate tax returns, by year. We are able to match around 500,000 firm-years. We implement one final restriction that firms must have at least 20 workers (as counted by the number of W-2s) in order to be included.

Our measure of compensation is Medicare wages (Box 5 of Form W-2). Medicare wages are broader than taxable wages in that they incorporate retirement contributions and other deductible employer-provided forms of compensation. This has consequences for measures of compensation by firm-size, as larger firms may be more likely to offer taxable benefits that are not counted in taxable wages (Box 1 of Form W-2).

Summary statistics for this sample of around 350,000 firm-years are found in Table 1. Each line presents the mean, median, 25th, and 75th percentile of the firm level statistics indicated.[16] The overall average of the firm level mean wage is $49,600.[17] The average firm in our sample pays workers at the 75th percentile 2.9 times what they pay the worker at the 25th percentile. The same statistic measured from the 90th to the 10th percentile is 9.4. The statistics presented make it clear that the distribution of firm size as measured by number of workers, total wages, and revenue are

[14] See Appendix B for a detailed description of the construction of the W-2 data.
[15] This is calculated using the population of W-2s in 2015 that are associated with a form 1120, not the sample used in the regression analyses.
[16] To avoid disclosure of taxpayer information, all percentile values are cell averages of observations around the percentile in question.
[17] The overall average of the firm level median wage is $36,400

all highly skewed in the sample. This motivates our work investigating distributional effects, beyond mean effects.

Table 2 presents summary statistics on the tax policy variables we use in our analysis. Because the DPAD was phased in between 2005 and 2010 we present samples for the phase in period and the full-policy period separately. We also present results for the overall sample as well as for those firms who report positive QPAI and thus stand to benefit from the deduction. Overall utilization of the DPAD is fairly low in the sample, with 24 and 27 percent of firms claiming the deduction during the phase-in and full-policy periods respectively. This is actually higher than the usage reported by Lester and Rector (2016), primarily due to our sample restrictions. In particular, the exclusion of certain industries largely eliminates firms who would have little benefit from the DPAD. The mean rate reduction due to the DPAD is 1.14 percentage points during the phase-in and 2.39 percentage points during the full-policy period among firms with positive QPAI.[18] Note that sources of firm-level variation in the DPAD rate reduction presented here are due not only to differences in the QPAI share of taxable income for a given firm, but also the graduated structure of the corporate tax schedule and limitations related to taxable income and W-2 wages defined by section 199.

The remaining lines in Table 2 present summary statistics for the various instruments, hence DPGR share and QPAI share are at the industry-size level. For the average positive QPAI firm, 34 and 37 percent of gross receipts in their industry-size cell were DPGR during the phase-in and full policy periods respectively. The QPAI share of taxable income is actually larger than 1 on average for positive QPAI firms, with some very large outliers.[19] The difference in results between the share of receipts qualifying and the share of income qualifying suggests that there are significant differences in the allocation of expenses to DPGR that are correlated at the industry-size level. In the phase-in and full-policy period periods, 41 and 40 percent of firms, respectively, are limited in their DPAD usage due to their taxable income, nearly the same share as reported by Lester and Rector (2016).

5. Results

5a. Graphical Results

[18] This is calculated following equation (1).
[19] Because of this, in our robustness tests we winsorize this variable at the one percent level.

The identifying assumption for our difference-in-differences approach is that firms which used the DPAD more intensively had similar trends to the less intensive users (or non-users) in the period prior to policy implementation. In order to test this assumption, we estimate our first stage, equation (4) and calculate the predicted values of the DPAD rate reduction. We then average the predicted rate reduction for each firm over the policy window and interact that with year dummies to estimate the following equation:

$$\ln(y_{it}) = \beta_0 + \sum[\beta_{1,t}\widehat{DPAD\_CUT} \times y_t] + \gamma\chi_{it} + f_i + y_t + \epsilon_{it} \tag{5}$$

The point estimates $\beta_{1,t}$ thus give a sense of how the rate reduction engendered by the DPAD affected firms in each year of the sample. In addition allowing us to assess the validity of the parallel trends assumption, this exercise also allows us to see whether firms responded differently to the DPAD in the phase in period versus in the full policy period. We plot the coefficient estimates along with the 95 percent confidence intervals of this procedure in Figure 2 for the mean wage, the median wage, the 5st percentile and the 95th percentile. In general, the figure suggests that the parallel trends assumption is satisfied. To preview our main results, it appears that there was a positive and significant effect of the policy on average wages. It appears that the response of firm median wages was substantially smaller and took effect somewhat later. Similarly, wages for the 5th percentile workers in firms were flat while those of the 95th percentile increased. In addition, for the mean and 95th percentile wages it appears that the coefficient estimates in the full policy period (2010 and after), were qualitatively higher than in the early period. While these differences do not appear to be significant, they parallel results from Lester (2018) which suggest that firms did not respond fully to the policy until after the phase-in period was complete.

5b. Mean and Median Wage Level Estimates

We next present OLS and IV estimates of specifications following equation 3, where the dependent variable is a variety of measures of firm level log-wages. These results are presented in Panel B of Table 3, which also shows the first-stage estimate of the DPAD rate cut in Panel A. All specifications include firm and year fixed effects and control for quartics in firm age, revenue, revenue growth, and profit margin. We also include controls for the implementation of bonus depreciation and the repeal of the regime for extraterritorial income, two tax policies in effect during the period which could confound our results. In creating these controls we follow Zwick and Mahon (2016) and Ohrn (2018) respectively. Panel A confirms a strong first-stage estimate of the *DPAD Cut* variable. In the second stage, columns (1) and (2) on Panel B are the coefficients on the natural log of firm average wages. The OLS estimate is 0.0102, suggesting that a one percentage point reduction in the marginal tax rate owing to the DPAD results in a 1.09 percent increase in firm total wages. The IV estimate, is approximately the same, also implying a semi-elasticity of 1.0. Due to the nature of the endogeneity, we had no priors on whether the potential negative or positive bias in the OLS estimates would dominate. In columns (3) and (4) we see that the median wage exhibits a much weaker reaction than mean wages, with the coefficient estimate in the IV specification implying a statistically insignificant semi-elasticity of 0.3.

The distributional summary statistics presented in Table 1, coupled with the analyses here, suggest the distribution of wages and other firm-level variables are highly skewed. The same is true of within-firm wages. As a result, analyses of the mean and median may mask substantial heterogeneity, both between and within firms. In the next two sub-sections, we investigate heterogeneous responses along these lines.

5c. Within-Firm Wage Distribution Estimates

Table 4 contains IV estimates from a regression of equation 3, where the log ratios of various points of the within-firm wage distributions are regressed on the DPAD. In particular, we use the log ratio of the worker at the 75th percentile to the 25th percentile (firm inter-quartile range), the 90th percentile to the 10th percentile, and the 99th percentile to the 1st percentile as dependent variables. Across all specifications we estimate positive effects of the DPAD, though they are only stat-stically significant for the suggesting that benefits of the rate reduction accrue more frequently to workers at the higher end of a firm's wage distribution. A one percentage point tax rate reduction due to the DPAD leads to a 0.9 percent increase in the ratio of wages paid to the 95th percentile compared to the 5th percentile . At the far end of the distribution, a one percentage point rate reduction due to the DPAD leads to a 2.7 percent increase in the ratio of wages at the 99th percentile to the 1st percentile.[20]

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[20] We are unable to differentiate firm owners' W-2 wages from employee wages due to a lack of data availability in our sample. Our results reflect wage effects, therefore, for owners as well as employees.

We also estimate equation (3) via IV separately for various points in the within-firm wage distribution where the dependent variables are $\ln(w_i^p)$. This is similar in spirit to the approach of Fuest, et al. (2018) who perform separate regressions for different types of workers to tease out worker heterogeneity in the wage responsiveness to local business taxes. The coefficients of each regression are plotted in Figure 3. The point estimates at the 1st percentile estimate implies a semi-elasticity of -0.2 for the very bottom of the firm wage distribution which is statistically significant at the 10 percent level. Above this, the point estimates are generally increasing but are not statistically discernible from zero at the 10 percent level until the 50th percentile. We estimate a semi-elasticity of 0.6 for workers at the 90th percentile, of 1.0 for workers at the 95th percentile, and 2.5 for workers at the 99th percentile of the within-firm wage distribution.

This significant heterogeneity in wage effects across workers is consistent with models of individual wage bargaining whereby workers with higher bargaining power take home a larger share of the rents generated by corporate tax cuts. Our results are consistent with the highest-earning workers having more bargaining power within a firm. These results are in contrast to the wage effects by worker type found in Fuest, Peichl, and Siegloch (2018), who find that corporate tax increases have smaller effects on wages of high-skilled workers, white-collar workers, male workers, and older workers; these groups could also proxy for high-bargaining-power groups of workers. The difference between our results and their results could be due to differences in worker mobility in their setting—they study municipal-level corporate tax cuts. In our federal corporate tax cut setting, mobility is likely to be less important, especially within a given industry.[21]

To this point we have discussed wages when considering the impact of the DPAD on workers, but there are two ways firms can change their wage distribution: pay workers differently, or change the composition of the firm's work force. To illustrate the effect of the latter: if a firm adds low wage workers while holding all current worker wages constant, the wage recorded at the 99th percentile will decrease despite no change in wages paid to existing workers. Similarly, if firms decide to substitute capital for low-skilled labor in response to the deduction, the wage recorded at the 99th percentile will increase. Another margin along which firms might respond is in terms of capital investment. If this is the case, capital deepening could lead to wage increases for workers

[21] The Fuest, Peichl, and Siegloch data are also top-coded, which is a key reason that their analysis focuses on median wage effects.

at the firm, but capital-labor substitution could also lead to declines in employment. We investigate these intensive margin effects further in section 5e below.

5d. Heterogeneity Across Firms

In addition to documenting the within-firm heterogeneity in Figure 3, we investigate differential responses across firms as well to gain insight into potential mechanisms driving the wage effects. First, we perform separate regressions by quintiles of the employment-size distribution of the log inter-quartile range on the DPAD rate. Coefficient estimates associated with these regressions are presented in Table 5. Generally, these results suggest that the widening of the wage distribution is driven by firms in the bottom quintile by employment size (below about 60 employees). Estimates for the bottom quintile of the employment distribution are qualitatively larger than those for the largest firms (above about 400 employees in the sample).

Figure 4a reproduces the exercise resulting in Figure 3—displaying estimates for different points of the within-firm wage distribution—but estimates separate coefficients for firms in the bottom and top quintiles of the employment distribution. The results here are a blend of those in Figures 1 and 2. Small firms exhibit positive and significant semi-elasticity estimates, and the estimates are strongest at the upper end of the wage distribution. The semi-elasticities for small firms become significant at the 50th percentile while they are only marginally significant at the 75th percentile for the largest firms. The point estimate for the 95th percentile among the bottom quintile of firms by employment implies a semi-elasticity of 2.6, far larger than the 0.2 estimated for the largest firms.[22] Finding larger effects for small firms is consistent with employees having more bargaining power at small firms and with large firms having more monopsony power to set wages. In particular, if high wage earners at small firms are also owners of the firms, they may choose to shift compensation into W-2 wages if they find the W-2 wage limitation binding.

Next, we investigate the effects for publicly traded firms in our sample (Figure 4b) and find a statistically significant increase in firm wages only in the 99th percentile of the distribution. We find a semi-elasticity of about 2.1 for this group–much larger than for the firms in the top quintile

[22] Differential responses at the top of the within-firm wage distribution could also be the result of a detection effect: Ohrn (2018) investigates the impact of the DPAD on executive compensation of publicly traded companies and finds large responses among the 5 highest paid executives. If that response occurs in our sample (and that is the only effect) then the 99th percentile of the distribution of firms with at least 500 employees would remain unchanged. Conversely, if the executive of a small firm is paid more as a result of the DPAD the 99th percentile would exhibit a response.

of firm size in the whole sample. Our findings for the top of the distribution also aligns with Ohrn's (2018a) finding that top executives of publicly traded firms capture a substantial fraction of the DPAD and bonus depreciation tax reductions, but that there are few effects elsewhere in the wage distribution for public firms. Column 3 in Table 5 also shows that there is no statistically significant effect of the corporate rate cut on total wages or firm employment for these firms. Studying results for multinational firms as well (Column 4), we find similar effects as those of publicly traded firms. This result is consistent with open-economy models showing that greater international labor mobility leads to smaller wage effects. As most publicly traded firms in the sample have multinational operations, mobility of labor is also a mechanism that may be muting wage effects across most of the distribution for public firms.

Finally, we investigate the effects of the DPAD rate reduction on financially constrained and unconstrained firms in Columns 5 and 6 of Table 5, respectively. As our measure of financial constraints, we use whether a firm paid out dividends or repurchased stock (or not) as our measure of financially unconstrained and financially constrained firms respectively. We see similar results across these two types of firms, suggesting that financial constraints are not a key factor affecting these firms' wage decisions following the tax cut.

5e. Total Wage, Employment, and Investment Responses

Finally, we investigate responses in terms of firm level aggregates of wages, employment, and net investment in order to get a better sense of the aggregate response. Our baseline estimates are found in Table 6. Column (1) shows the results for total wages at the firm level and finds an estimated semi-elasticity of 1.7, which is quite high. Thinking about the "extensive margin" discussed earlier, column (2) of Table 6 presents results for the log number of workers and finds no significant response. Because calculation of net investment requires an extra year of data, columns (3) and (4) reproduce the estimates from columns (1) and (2) with the smaller, common sample and we can see that results are little changed. Column (5) presents the results for net investment as a share of installed capital and finds a point estimate of 0.006, implying that a one percentage point reduction in the tax rate leads to 0.6 percentage point increase in net investment as a share of installed capital.[23] It is difficult to use these point estimates to draw conclusions about

[23] We estimate this equation in terms of the ratio of net investment to installed capital, rather than our usual semi-log specification, because net investment is frequently negative, leading to dropping a number of observations.

the aggregate effects of the policy, however, because our prior analysis suggests that these point estimates likely mask substantial differences in responses across firms.

Indeed, we find that the total wage results as well as the extensive margin responses, employment and investment, differ substantially across quintiles of the employment distribution. To demonstrate this, we divide firms by size based on their quintile of the total employment distribution in a given year. We then run separate regressions for each quintile and plot the results in Figure 5. Figure 5a shows that the effects on total firm wages are primarily concentrated among firms in the smallest two quintiles. The heterogeneity in terms of overall employment is even more pronounced, with the smallest firms showing increases in employment and the largest firms showing large declines, which explains this leads to the inability to detect an effect in the overall sample. Figure 5c shows the response of net investment as a share of installed capital to the DPAD rate cut. We find that the investment response is generally concentrated among the largest firms.[24] The combination of results in figures 5b and 5c are consistent with evidence from Lester (2018) who uses a sample of large, publicly traded firms and finds that total employment declined among firms using the DPAD. She suggests that this is consistent with capital-labor substitution among these firms.

To directly study the intensive margin effects of hiring and separations, we investigate whether the widening of the within-firm wage distribution overall is due to firms hiring new employees at the low end of the distribution. We use the panel nature of the W-2 and 1120 data to isolate employees that joined the firm in year *t*. In practice, this means we first observe wages for them with the firm in year *t*. Similarly, we can observe the wages of employees who were already at the firm in year *t*. This allows us to calculate where a new employee in year *t* fits in the distribution of existing employees at a firm. We estimate a variant of equation 3 where the dependent variable is the share of new employees hired into various points of the within firm wage distribution.[25] Figure 6 shows results from this analysis looking at firms who are in are sample for three consecutive years. We find that new employees are least likely to be hired into the upper end of the prior-year wage distribution—above the 90th percentile, but otherwise there is no systematic pattern. Better

[24] One mechanism for increased wages to worker is through increased productivity due to capital deepening. Generally this is thought of as an effect present in the long-run equilibrium, we continue to work on separating the long-term and short-term effects of the DPAD.

[25] In order to ensure we observe a full year of wages, we are only able to perform this exercise for employees we observe in years *t*, *t+1*, and *t+2*. Similarly, existing employees at the firm must be observed in *t-1*, *t+1*, and *t+1*. We compare wages of new employees in *t+1* to the distribution of "stayers" in year *t*.

understanding the workers who join and leave firms as well as the wage response for the workers who remain at a firm is an area for further work.

6. Conclusion

We analyze the impact of the Domestic Production Activities Deduction on average firm-level wages, total employment, and the wage distribution within a firm; additionally, we investigate heterogeneity of this response both within and between firms. The deduction changes the marginal tax rate faced by firms, making it an attractive setting in which to study the incidence of business taxes on workers.

Leveraging a unique dataset matching W-2 filings to corporate tax returns, we estimate that there was a significant response among firms in our sample in terms of both average wages, but a relatively small effect on the median wage. Diverging results between the median and mean are expected given the high degree of skewness of the within-firm wage distributions. We investigate this further by estimating semi-elasticity for a variety of points along the distribution and find that the elasticities are highest at the upper ends of the wage distribution. These effects are concentrated among the smaller firms in our sample. We also examine the extensive margin—overall firm employment—and find evidence of a differential response between small and large firms. The largest firms in the sample exhibit a negative semi-elasticity of employment with respect to the DPAD, while the smallest firms exhibit a positive semi-elasticity.

Our work contributes to the literature on the incidence of business taxes on workers by estimating average responses to this marginal rate deduction, documenting extensive margin effects, and analyzing differential responses across the wage distribution. Further work remains to understand the mechanisms driving our results in greater detail, to understand the long-term and short-term effects of the policy, and to understand effects on the economy-wide income distribution.

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Figures and Tables:

Figure 1A: Domestic Production Activities Deduction Rate

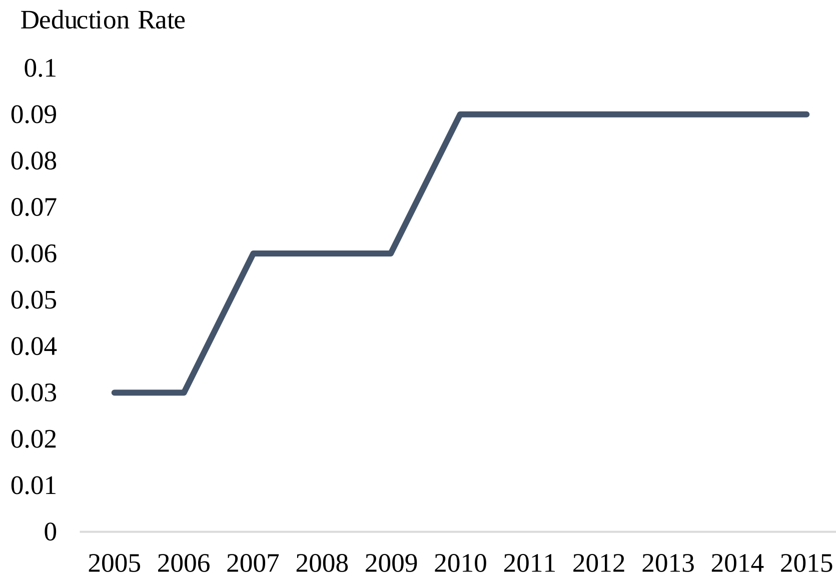


Figure 1B: Qualified Production Activities Income and DPAD

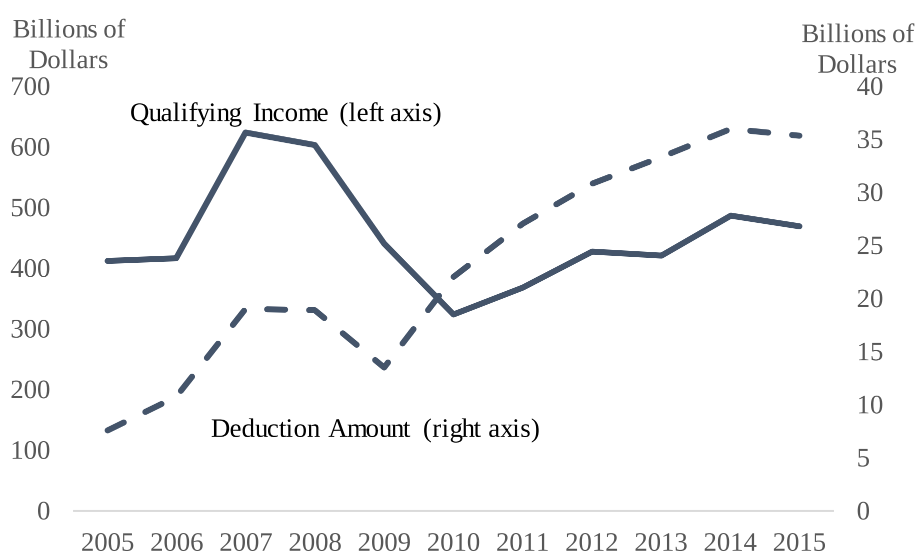


Figure 1A shows the phase-in of the DPAD deduction rate over the sample period. Figure 1B shows the value of C-Corp income that qualified for the DPAD deduction as well as the total deduction amount claimed. Source: Internal Revenue Service.

Figure 2: Analysis of Pre-trends

Fig 2A: Mean Wage

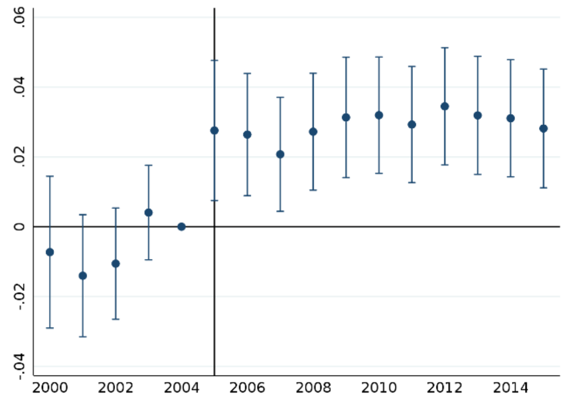


Fig 2B: Median Wage

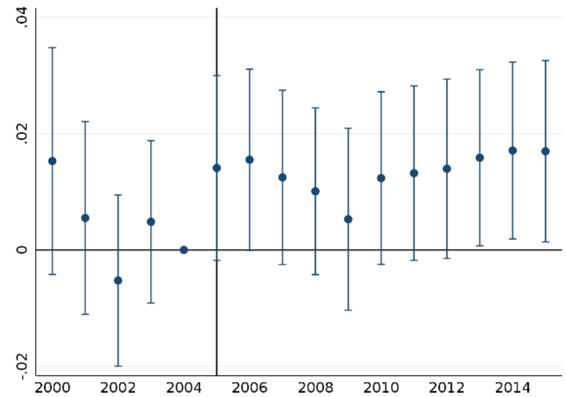


Fig 2C: Firm 5th Percentile Wage

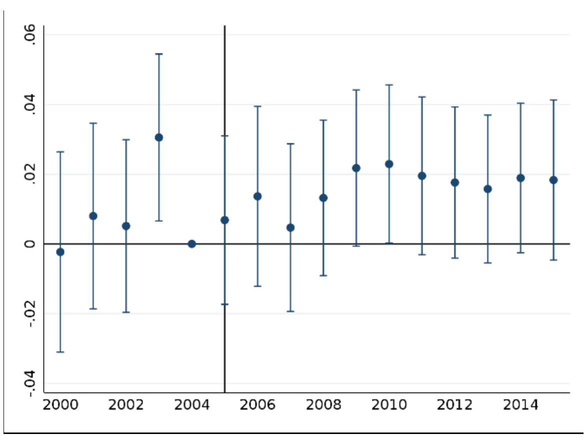
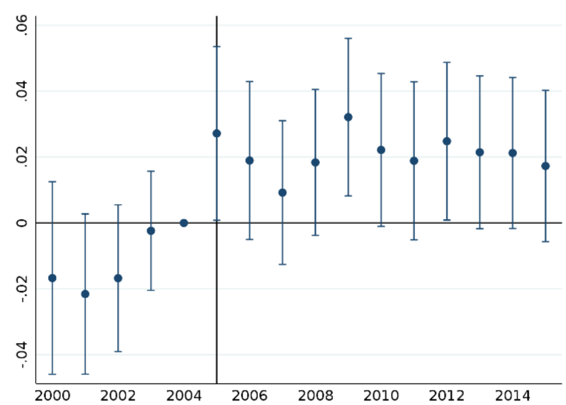
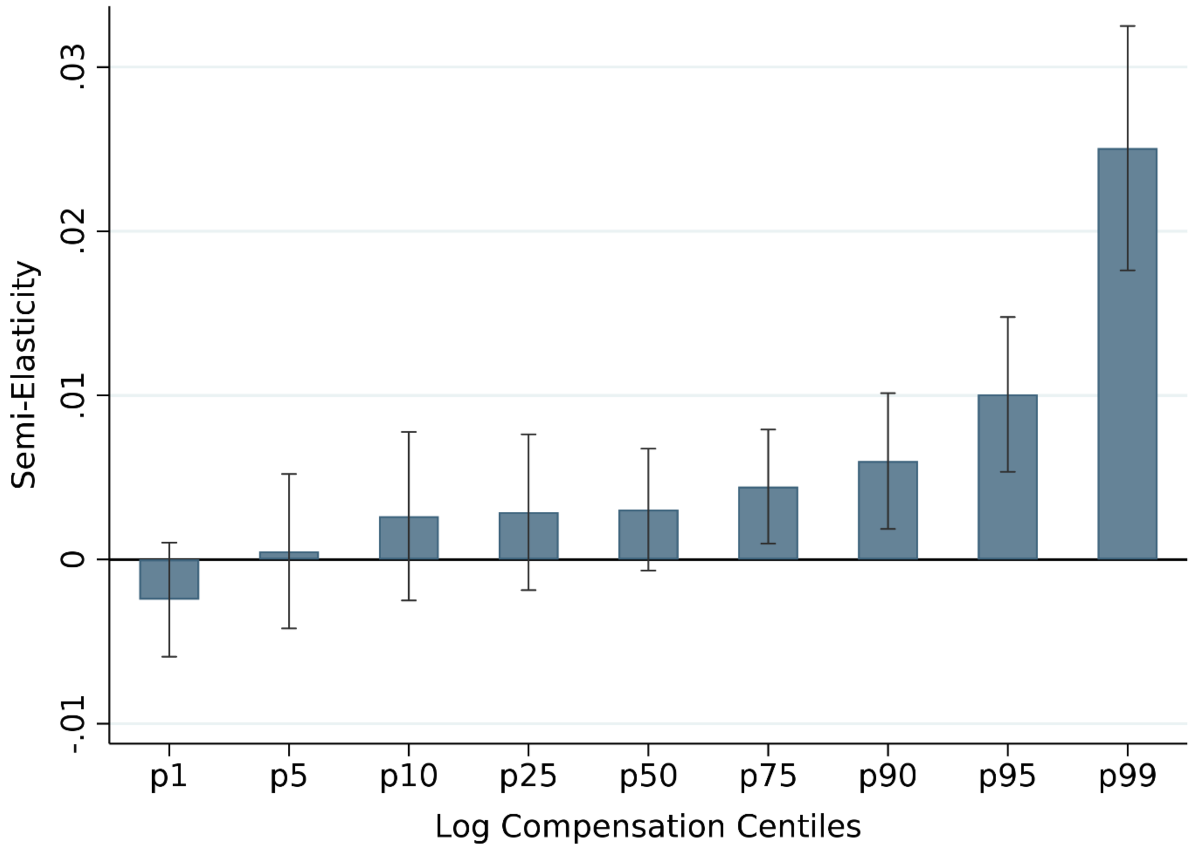


Fig 2D: Firm 95th Percentile Wage



This figure presents an analysis of the time trend in changes of firm wages resulting from the *DPAD Cut* at various points in the within-firm wage distribution. We estimate the following regression specification to study the time trend, as described in section 5a: $\ln(y_{it}) = \beta_0 + \sum[\beta_{1,t}\widehat{DPAD\_CUT} \times y_t] + \gamma\chi_{it} + f_i + y_t + \epsilon_{it}$. All regressions include firm and year fixed effects as well as fourth order polynomials of age, revenue, profit margin, and revenue growth. Standard errors are clustered at the industry-size level. Lines reflect a 95 percent confidence interval.

Figure 3: Semi-elasticity of wages across the within-firm wage distribution



This figure presents coefficient estimates from an IV regression of the level of wages at various points of the within-firm wage distribution on the *DPAD Cut* and a variety of control variables, detailed below and summarized in equation (3). The data include firms and employees observed from 2000 to 2015. The coefficient estimates (displayed as bars) are those associated with *DPAD Cut*. *DPAD Cut* is the percentage point reduction in the marginal tax rate due to the deduction - instruments are the cell average share of eligible income and a dummy variable for whether a firm is subject to the taxable income limitation. The lines indicate the 95 percent confidence interval. All regressions include firm and year fixed effects as well as fourth order polynomials of age, revenue, profit margin, and revenue growth. Standard errors are clustered at the industry-size level.

Figure 4: Heterogeneity of wage effects by firm size and public ownership

Figure 4A: Wage effects by employment size

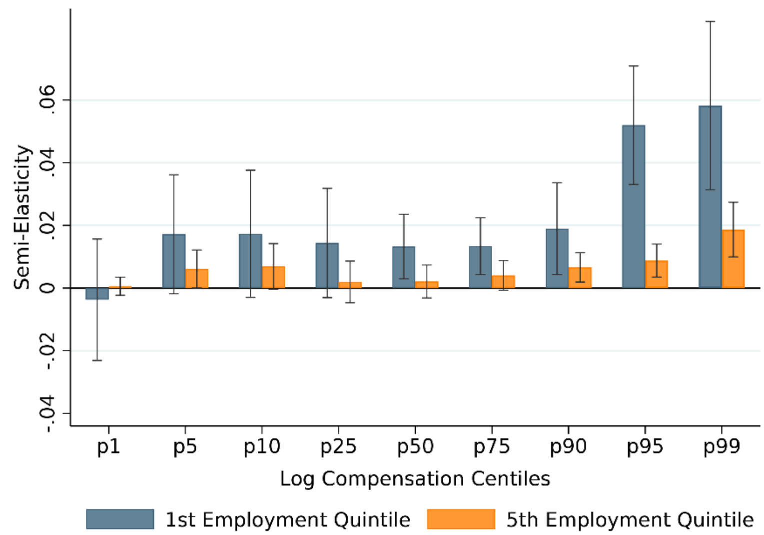
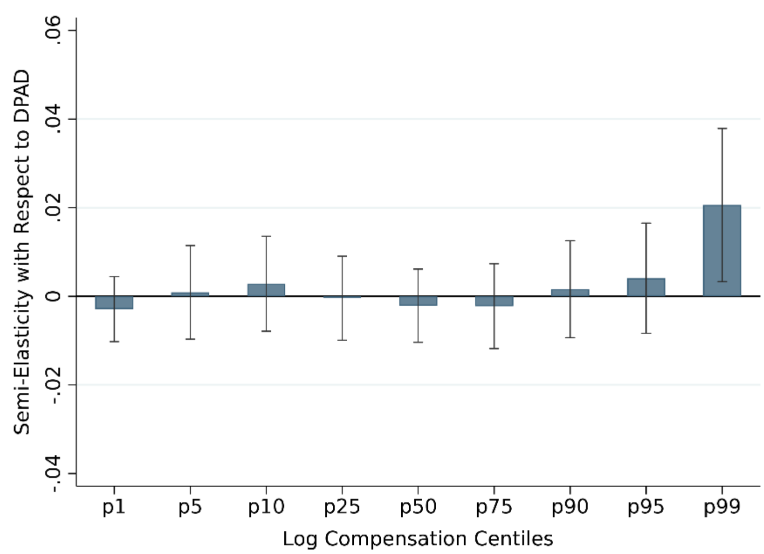


Figure 4B: Wage effects for publicly held firms



This figure presents coefficient estimates from an IV regression of the level of wages at various points of the within-firm wage distribution on the *DPAD Cut* and a variety of control variables. The top panel shows results for firms in the first quintile of employment size in the sample (below about 40 employees) and the fifth quintile of employment size (about 400 employees). The bottom panel shows results for publicly listed firms. The coefficient estimates (displayed as bars) are those associated with *DPAD Cut*, which is presented separately for firms in the bottom [left panel] and top quintile [right panel] of the firm-level employee count distribution. *DPAD Cut* is the percentage point reduction in the marginal tax rate due to the deduction - instruments are the cell average share of eligible income and a dummy variable for whether a firm is subject to the taxable income limitation. The lines indicate the 95 percent confidence interval. All regressions include firm and year fixed effects as well as fourth order polynomials of age, revenue, profit margin, and revenue growth. Standard errors are clustered at the industry-size level.

Figure 5: Firm level effects across employment-size distribution

Fig 5A: Effect on Firm Total Wages

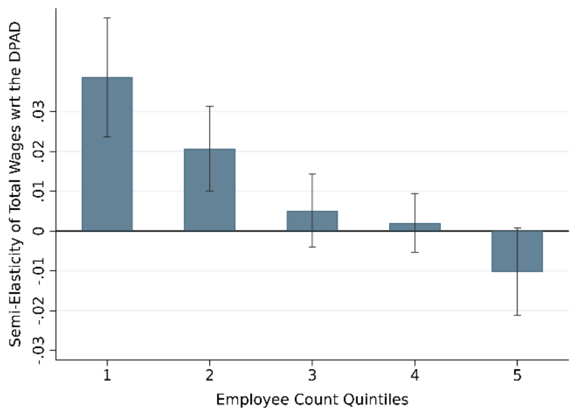


Fig 5B: Effect on Firm Total Employment

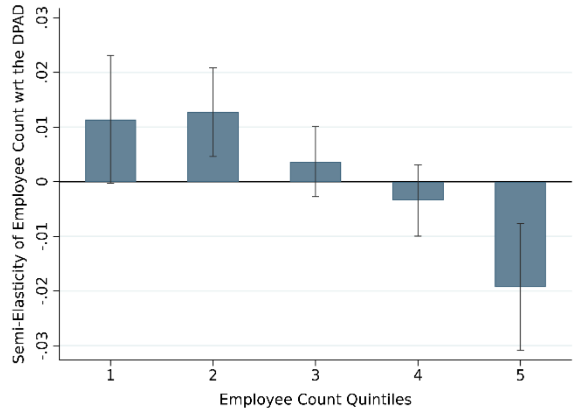
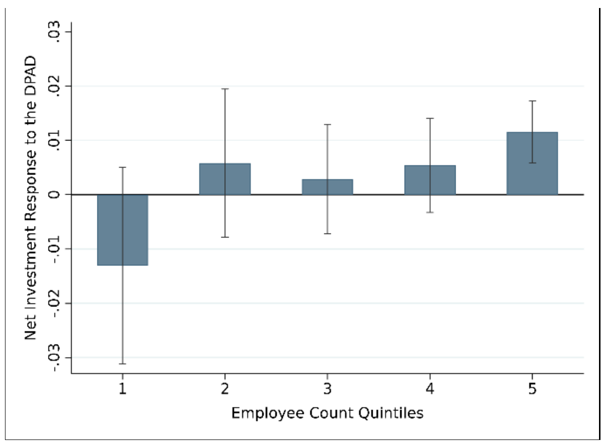
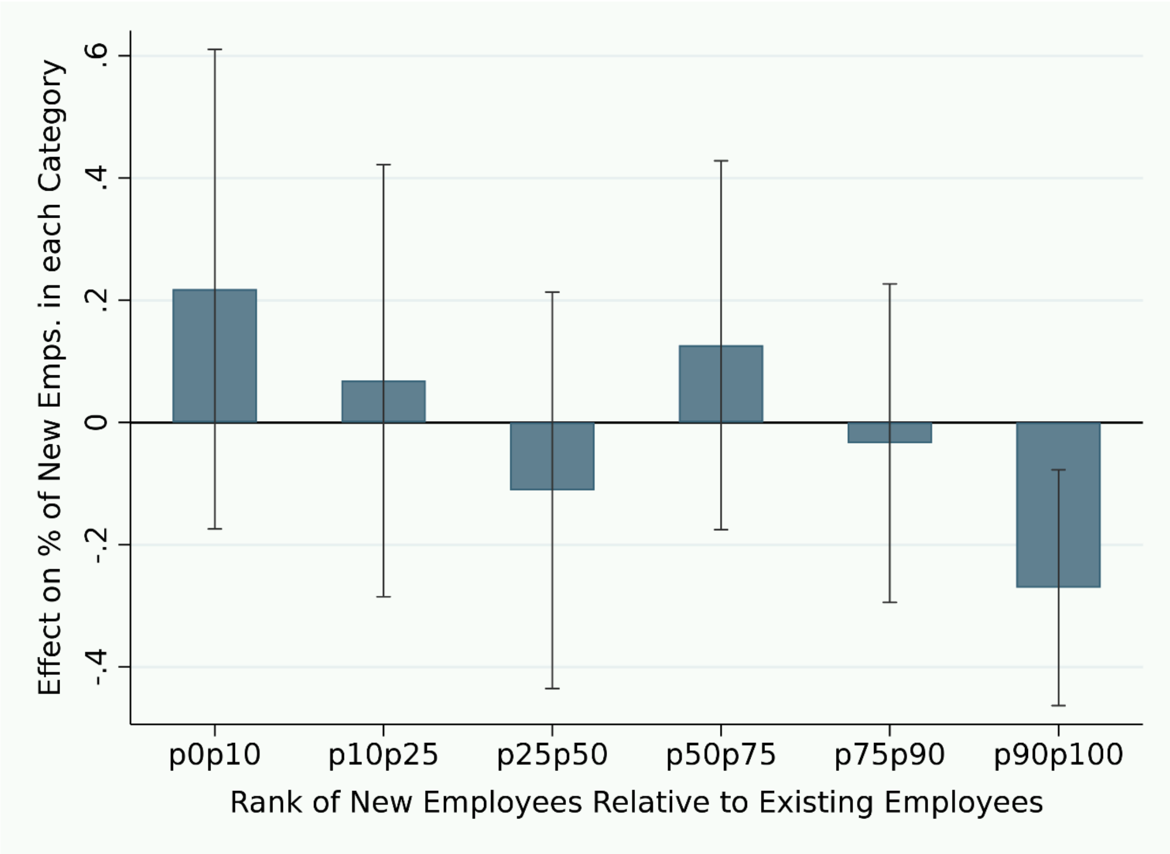


Fig 5C: Effect on Firm Net Investment



These figures presents coefficient estimates from an IV regression of the log number of firm-level employees on the *DPAD Cut* and a variety of control variables, detailed below and summarized by equation (3). Regressions were run separately for each quintile of the firm-size distribution, where firm-size is determined by the number of employees. The coefficient estimates (displayed as bars) are those associated with *DPAD Cut*. *DPAD Cut* is the percentage point reduction in the marginal tax rate due to the deduction - instruments are the cell average share of eligible income and a dummy variable for whether a firm is subject to the taxable income limitation. The lines indicate the 95 percent confidence interval. All regressions include firm and year fixed effects as well as fourth order polynomials of age, revenue, profit margin, and revenue growth. Standard errors are clustered at the industry-size level.

Figure 6: Where are new employees hired into the wage distribution?



This figure presents coefficient estimates of the share of new employees hired into various points of the existing firm wage distribution as a result of the DPAD. They are estimated from an IV regression of the percent of new employees hired on the *DPAD Cut*. The regression is run within various bins of the firm wage distribution in the year prior. The regression also includes a variety of control variables, detailed below and summarized by equation (3). Regressions were run separately for each quintile of the firm-size distribution, where firm-size is determined by the number of employees. The coefficient estimates (displayed as bars) are those associated with *DPAD Cut*. *DPAD Cut* is the percentage point reduction in the marginal tax rate due to the deduction - instruments are the cell average share of eligible income and a dummy variable for whether a firm is subject to the taxable income limitation. The lines indicate the 95 percent confidence interval. All regressions include firm and year fixed effects as well as fourth order polynomials of age, revenue, profit margin, and revenue growth. Standard errors are clustered at the industry-size level.

Table 1: Summary Statistics for Analysis Sample

	Mean	Median	p25	p75
	(1)	(2)	(3)	(4)
Firm Level Outcomes:				
Number of Workers	1,326	142	56	426
Total Wages ($ Millions)	61	6	2	19
Mean Wage	49,600	40,900	29,100	59,400
Median Wage	36,600	31,600	22,200	44,800
p75/p25	2.9	2.7	2.2	3.4
p90/p10	9.4	8.2	6.1	11.0
p99/p1	67.8	46.0	30.3	71.5
Firm Level Controls:				
Age (Years)	22	22	11	35
Revenue ($ Millions)	229	33	9	115
Profit Margin	-0.7	0.0	0.0	0.1
Revenue Growth	1.1	1.0	0.9	1.2
Observations (Firm-Years)		351,019		
Number of Firms		54,972		

Notes: Firm level outcomes derived from form W-2 and author's calculations. Firm level controls derived from SOI data and author's calculations. All variable definitions, including tax form line numbers, found in Appendix A.

Table 2: Summary of Tax Policy Variables for Analysis Sample

	All Firms		Positive QPAI Firms	
	Phase-in Period	Post-2009	Phase-in Period	Post-2009
	(1)	(2)	(3)	(4)
DPAD Cut				
Mean	0.23	0.52	1.14	2.39
Median	0.00	0.00	1.02	2.98
p25	0.00	0.00	0.75	1.79
p75	0.00	0.00	1.86	3.06
DPGR Share				
Mean	0.18	0.21	0.34	0.37
Median	0.09	0.11	0.36	0.41
p25	0.02	0.03	0.17	0.21
p75	0.32	0.44	0.49	0.51
QPAI Share				
Mean	0.65	0.71	1.35	1.38
Median	0.26	0.29	0.81	0.84
p25	0.05	0.06	0.39	0.44
p75	0.79	0.94	1.11	1.10
QPAI>Taxable income				
Mean	0.08	0.09	0.41	0.40
Median	0.00	0.00	0.00	0.00
p25	0.00	0.00	0.00	0.00
p75	0.00	0.00	1.00	1.00
Observations (Firm-Years)	99,309	123,660	19,257	26,223
Number of Firms	32,029	29,274	7,830	7,968

Notes: Statistics derived from SOI data and author's calculations. All variable definitions, including tax form line numbers, included in Appendix A.

Table 3: Firm Wages and the Domestic Production Activities Deduction

Panel A: First Stage

DPGR Share	**10.20*** **
	[2.406]
QPAI>Taxable Income	**1.334*** **
	[0.0216]
Observations	351,019
R-Squared	0.316

Panel B: Second Stage

	ln(Mean Wage)		ln(Median Wage)	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
DPAD Cut	**0.0102*** **	**0.00974*** **	**0.00351*** **	0.00304
	[0.00136]	[0.00201]	[0.00120]	[0.00189]
Observations	351,019	351,019	351,019	351,019
R-Squared	0.016	0.016	0.020	0.020

This table presents OLS and IV regression results from empirical specification (1). *DPAD Cut* is the percentage point reduction in the marginal tax rate due to the deduction - instruments are the cell average share of eligible income and a dummy variable for whether a firm is subject to the taxable income limitation. All regressions include firm and year fixed effects as well as fourth order polynomials of age, revenue, profit margin, and revenue growth. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level respectively.

Table 4: Within Firm Wage Distributions and the DPAD

ln of	p75/p25	p90/p10	p95/p05	p99/p01
	(1)	(2)	(3)	(4)
DPAD Cut	0.00156	0.00336	**0.00955*** **	**0.0275*** **
	[0.00191]	[0.00260]	[0.00298]	[0.00421]
Observations	351,019	351,019	351,019	351,019
R-Squared	0.006	0.006	0.006	0.012

This table presents IV regression results from empirical specification (1). Outcome variables are the log ratio of various points in the within firm wage distribution. DPAD Cutis the percentage point reduction in the marginal tax rate due to the deduction - instruments are the cell average share of eligible income and a dummy variable for whether a firm is subject to the taxable income limitation. All regressions include firm and year fixed effects as well as fourth order polynomials of age, revenue, profit margin, and revenue growth. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level respectively.

Table 5: Heterogenous DPAD Response of Within Firm Wage Distributions

	Employment Size				Financial Constraints	
	Bottom Quintile	Top Quintile	Publicly Traded	Multinationals	No Payout Firms	Payout Firms
	(1)	(2)	(3)	(4)	(5)	(6)
ln(Total Wages)	**0.0386*** **	**-0.0102***	-0.000636	0.0027	**0.0187*** **	**0.0138***
	[0.00762]	[0.00558]	[0.00977]	[0.00774]	[0.00492]	[0.00800]
ln(Mean Wage)	**0.0272*** **	**0.00905*** **	0.00821	0.00455	**0.00854*** **	**0.0137*** **
	[0.00595]	[0.00258]	[0.00545]	[0.00387]	[0.00223]	[0.00403]
ln(p50)	**0.0133** **	0.00211	-0.00214	-0.00305	**0.00386***	**0.00537***
	[0.00525]	[0.00268]	[0.00421]	[0.00300]	[0.00219]	[0.00314]
ln(p75)	**0.0134*** **	**0.00403***	-0.00223	-0.00254	**0.00351***	**0.00738** **
	[0.00463]	[0.00242]	[0.00487]	[0.00347]	[0.00195]	[0.00353]
ln(p95)	**0.0520*** **	**0.00878*** **	0.00407	0.00393	**0.00966*** **	**0.0118** **
	[0.00963]	[0.00268]	[0.00634]	[0.00464]	[0.00266]	[0.00502]
ln(Employment)	**0.0114***	**-0.0193*** **	-0.00885	-0.00186	**0.0102** **	0.000136
	[0.00595]	[0.00591]	[0.0124]	[0.00923]	[0.00506]	[0.00963]
Observations	68,000	68,718	47,165	76,716	271,074	70,543

This table presents IV regression results from empirical specification (1). Outcome variables are the log ratio of various points in the within firm wage distribution. *DPAD Cut* is the percentage point reduction in the marginal tax rate due to the deduction - instruments are the cell average share of eligible income and a dummy variable for whether a firm is subject to the taxable income limitation. All regressions include firm and year fixed effects as well as fourth order polynomials of age, revenue, profit margin, and revenue growth. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level respectively.

Table 6: Firm Investment and Employment and the DPAD

			Constant Sample		
	ln(Wages)	ln(Employment)	ln(Wages)	ln(Employment)	(Net Investment)/ (Installed
	(1)	(2)	(3)	(4)	(5)
DPAD Cut	**0.0167*** **	0.00692	**0.0171*****	**0.00904***	**0.00572*****
	[0.00478]	[0.00503]	[0.00447]	[0.00491]	[0.00195]
Observations	351,019	351,019	268,171	268,171	268,171
R-Squared	0.184	0.136	0.032	0.176	0.126

This table presents OLS and IV regression results from empirical specification (1). *DPAD Cut* is the percentage point reduction in the marginal tax rate due to the deduction - instruments are the cell average share of eligible income and a dummy variable for whether a firm is subject to the taxable income limitation. All regressions include firm and year fixed effects as well as fourth order polynomials of age, revenue, profit margin, and revenue growth. Standard errors are clustered at the industry-size level. *, **, and *** indicate significance at the 1 percent, 5 percent and 10 percent level respectively.

Appendix A: Variable Creation

Specifics of variable creation, including the relevant line items on tax forms 1120, 8903, and W-2, are detailed here.

Tax Policy Variables:

Calculation of all tax policy variables uses information from form 1120 and form 8903 contained in the SOI stratified random sample.

$DPGR\_share_{ict}$ is created at the industry-asset-year level and is intended to capture natural variation in the share of gross receipts qualifying for the DPAD. The variable is defined for firm i in industry c at year t as:

$$DPGR\_share_{ict} = \frac{\sum_{j \neq i, j \in c} DPGR_{jt}}{\sum_{j \neq i, j \in c}(GROSS\_RECEIPTS_{jt})}$$

$DPGR_{jt}$ is the amount of DPGR from line of form 8903. $GROSS\_RECEIPTS_{jt}$ is from line 1c of form 1120. The industry cells are three digit industries reported to SOI. The twelve asset-size cells are defined to line up with published SOI data and feature cut-points at 0.5, 1, 5, 10, 25, 50, 100, 250, 500, and 2,500 million dollars.

$QPAI\_share_{ict}$ is created analogously to $DPGR\_share_{ict}$. The variable is defined for firm i in industry c at year t as:

$$QPAI\_share_{ict} = \frac{\sum_{j \neq i, j \in c} QPAI_{jt}}{\sum_{j \neq i, j \in c}(TXBL\_INCM_{jt} + DPAD_{jt})}$$

$QPAI_{jt}$ is the pre-limitation amount of QPAI from line 10b of form 8903. $TXBL\_INCM_{jt}$ and $DPAD_{jt}$ are from lines 25 and 30 of form 1120..

D_{it} is a dummy variable equal to one if the firm faces the taxable income limitation, defined as $\mathbf{1}(TXBL\_INCM_{it} + DPAD_{it} \leq QPAI_{it})$.

$DPAD\_Rate_{it}$ is the deduction amount (line 25 of form 1120) divided by taxable income before the deduction (line 30 plus line 25 of form 1120) times the statutory marginal tax rate faced by the firm, times 100.

Outcome Variables:

Wage distribution measures are all based on box 5, Medicare Wages, from form W-2.

Net Investment is measured as the year-over-year percent change in tangible capital stock, line 10b column (d) from schedule L of form 1120.

Control Variables:

Calculation of control variables uses information from form 1120 and follows Yagan (2015).

Age is measured as the difference from the tax year and the date of incorporation of the taxpayer, reported in Box C of form 1120. This is right censored at 37 years.

Revenue is defined as gross receipts, line 1c of form 1120.

Profit Margin is operating profit divided by revenue. Operating profit is gross receipts less cost of goods and total deductions not accounting for officer compensation, interest, pension contributions, depreciation, and the DPAD. This is line 2 minus line 27 plus lines 12, 18, 19, 20, and 25 of form 1120.

Revenue growth is the year-over-year change in revenue.

Appendix B: Constructing Firm Level Wage Distributions using Tax Filings

We construct taxpayer-level wage distributions using the population of W-2 filings from 2000 to 2015.[26] We then merge these wage distributions with our panel of corporate tax returns. The primary contribution of our wage distribution construction process is to identify employer identification numbers (EINs) belonging to a given parent company, and pooling the W-2s associated with those EINs. Given the complexity of large, modern firms, using an EIN as a proxy for a firm may generate non-trivial measurement error. In particular, the size of the firm (as measured by number of employees) will be biased downward using this approach, and to the extent the distribution of wages varies across EINs for a given firm, the median wage may be biased as well.

B.1. Linking Parents with Subsidiaries, Determining Entity Type

Our process of constructing parent-level wage distributions is implemented on a year-by-year basis, and consists of three primary steps: building the parent-subsidiary bridge, merging the bridge with the universe of W-2s, and merging the product of the first two steps with our corporate panel.

To construct the parent-subsidiary bridge, we retrieve all employer identification numbers (EINs) from the universe of entity-level tax filings in the U.S. in a given year. These filings consist of the Form 1120 series (including 1120-F, 1120-S, etc.), Form 1065 series (partnerships), Form 1040 schedules C and F, and Form 990 series (non-profits). We also use the population of payroll filings (i.e. Form W-3, Form 941, Form 943, and Form 944), the EIN application filing (Form SS-4), and the attachment to Form 1120 listing subsidiaries and their EINs (Form 851).

We currently only use the Form 851 ("Affiliations Schedule" attachment to a Form 1120) to identify parent-subsidiary relationships.[27] On form 851, a taxpayer will list all of their subsidiary corporations as well as their parent corporation. An entity is identified as a parent on this filing if the corporation owns at least 80 percent of the subsidiary.[28] Parent-subsidiary relationships

[26] We appreciate the help of Ithai Lurie and James Pearce, who shared code that greatly improved the "identify subsidiaries and entity type" step of this process.

[27] In general, we will do a better job of identifying EINs belonging to younger companies. Older firms will have had more opportunities to accumulate EINs -- for example, through mergers and acquisitions -- and will be more likely to have EINs fail to appear on any recent (observed digitally) filings tying them back to a parent company.

identified in a given year are not transferred to future or prior years, as subsidiaries may be bought, sold, or spun-off. For the purposes of this paper, because we are interested in behavioral changes for the entity actually claiming the deduction, we treat each taxpayer as an independent firm, and thus do not use the information on common parents found on form 1120 and attached filings. In other settings it might be more sensible to aggregate all subsidiaries to a common parent regardless of tax filing status, or potentially to treat each subsidiary as truly independent.

Note that the parent-subsidiary information contained on Form 851 is not exhaustive. In some cases, subsidiary EINs are not reported on any annual filings connected to the parent company. One example of this, which we hope to address in future iterations of the data, is from Form 8832 where a taxpayer reports any disregarded entities. Because these corporations are not treated as separate entities for tax purposes, their EINs are not required to be reported on Form 851.

To reduce the computational resources required to merge the population of W-2 EINs for 2000 to 2015 with our corporate sample, we want to drop EINs belonging to non-profit organizations. The payroll filings and EIN application filing include information on "entity type," and we augment this information with internal IRS entity type classifications. Our entity type classification is equal to the form the entity files for entities that file tax returns. The IRS also deems certain EINs as being required to file a tax return, and EINs with such designations are classified by this designation. Other entity type classifications include categories as broad as "business" or as narrow as "Tribal Government." Subsidiary EINs are assigned the entity type of their parent.[29] Table A1 contains the number of employees and amount of compensation by entity type in 2015. We are able to match 82 percent of employees that are associated with for-profit entities to an entity level tax return, which includes around 83 percent of compensation.

B.2. Generating Firm-Level Wage Distributions

After we have generated a parent-subsidiary bridge for each EIN in a given year, and classified EINs by entity type, we merge entity EINs with the population of W-2s in that year. After merging our year-specific EIN list with the population of W-2s for a given year, we drop duplicate or amended W-2s (i.e. the data are unique in EIN, individual combinations for a given year). Next, we drop W-2s with Medicare wages (Box 5 of the W-2) less than the equivalent of one quarter of

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[29] We plan to revisit this particular approach. For example, a for-profit entity that is wholly-owned by a non-profit entity is probably best classified as "for-profit."

full time work at the minimum wage, following Song et al. (2018). In 2015, for example, this was \$3,770. We then pool W-2s belonging to the same Parent EIN, and calculate distributional statistics in Medicare wages for each parent. Finally, W-2s deemed to belong to non-profits or state, local, federal, or tribal governments are dropped. The end product of this process is a file that is unique by parent EIN and tax year, and contains information on the firm wage distribution, number of workers, and average wage.

B.3. Merging W-2s with the Panel of Corporate Tax Returns

The final step necessary to use the W-2 data as part of our analyses of the wage and employment effects of the DPAD is to merge the W-2 data with our panel of corporate tax returns. The construction of the panel is described in section III of the paper. In summary, the panel consists of only firms filing form 1120, large firms are overrepresented in the panel owing to SOI sampling methods, but the panel contains both large and small firms (as measured by assets).

Merging with the aggregated W-2 files with the panel is straight forward, and is accomplished using a combination of EINs and tax years. However, “tax year” in the W-2 data is equivalent to a calendar year, and many firms do not have December end-accounting-year months. As a proxy for calendar tax year, those firms with end account months in June or earlier are assigned to the prior tax year, and those with July or later are assigned the current tax year. This is a source of measurement error between the firm’s measures of compensation deduction and the W-2 measure.

B.4 Retrospectively Improving the Match

Despite our efforts described above, the match is not perfect. We can see this using name searches, or by examining unmatched corporate returns that nonetheless have substantial compensation deductions. To address such mismatches, we augment our mechanical parent-subsidiary matching effort using manual name-based matches. This sub-process is as follows: for a given year, we merge the W-2 data with our panel of corporate tax returns. We then sort the corporate panel on the magnitude of missing wages, which compares the sum of Medicare wages on Form W-2 associated with the company with the sum of the company’s reported wage and salary deduction, officer compensation deduction, and cost of labor deduction (included in the cost of goods sold). There are generally timing differences in the measurement of these two items. For example, wages embedded in the cost of goods sold are deducted only at the time of sale, whereas they are reported on a W-2 at the time they are paid. Another source of timing difference is when the firm does not have a December accounting year end, as discussed above. Despite these measurement issues, the difference between the two items should give us a rough idea of which taxpayers are particularly problematic for our matching procedure. Once we have identified the largest mismatches, we search the names on Form W-2s for the name of the parent company, and if we find apparent matches we change the W-2 EINs to match the parent company EINs, and reproduce the within-firm wage distribution statistics. A “match” in this instance is generally determined using a combination of internet searches related to the parent company’s structure, the closeness of the name match, and the magnitude of wages reported for a given EIN.

Once we have compiled a list of these “corrected” EIN pairs, we return to the beginning of step 2 (“Generating Firm-Level Wage Distributions”) and reassign the corrected parent EINs. Then we repeat steps 2 and 3. Note, however, that our approach (and the approach of using an EIN as a firm) is not robust to the increasing use of payroll agencies. These agencies file W-2s on behalf of firms, but list their EIN on the W-2, not the firm’s EIN. This is a persistent source of mismatch in our approach, and a source of measurement error in an approach of using an EIN as a proxy for a firm.

Table A1: Employees and Compensation by Entity Type, 2015

	Employees		Compensation	
Entity Type	Count (Thou.)	Percent	Sum (Millions)	Percent
Form 1120	49,808	29.7%	$ 2,707,195	36.8%
Form 1120s	35,834	21.3%	$ 1,240,276	16.9%
State or Local Gov't	15,850	9.4%	$ 696,658	9.5%
Form 1065	13,120	7.8%	$ 514,743	7.0%
Business	12,985	7.7%	$ 490,473	6.7%
Form 990t	8,068	4.8%	$ 422,109	5.7%
Non-Profit	8,053	4.8%	$ 289,008	3.9%
IRS: 1120 Sub.	5,097	3.0%	$ 227,377	3.1%
Federal Gov't	4,466	2.7%	$ 214,119	2.9%
Form 1040c	3,243	1.9%	$ 126,048	1.7%
Non-profit or Gov't	2,129	1.3%	$ 77,702	1.1%
IRS: 1065	1,891	1.1%	$ 74,291	1.0%
IRS: 1120	1,469	0.9%	$ 49,517	0.7%
IRS: 1120s	1,178	0.7%	$ 35,536	0.5%
Religious	1,156	0.7%	$ 31,635	0.4%
Other	3,639	2.2%	$ 162,651	2.2%
Total	167,987		$ 7,359,339	

Note: Categories beginning with "Form" indicate W-2s matched to entity level tax returns. Categories beginning with "IRS" indicate W-2s were matched to EINs deemed by the IRS to belong to a given type of entity. The remainder of the categories, some of which are vague, are either the result of internal IRS classifications or boxes checked on payroll forms associated with the EIN. The "other" category includes those EINs deemed to belong to tribal governments, undetermined government entities, other types of Form 1120, estates or trusts, and other types of non-profit returns.